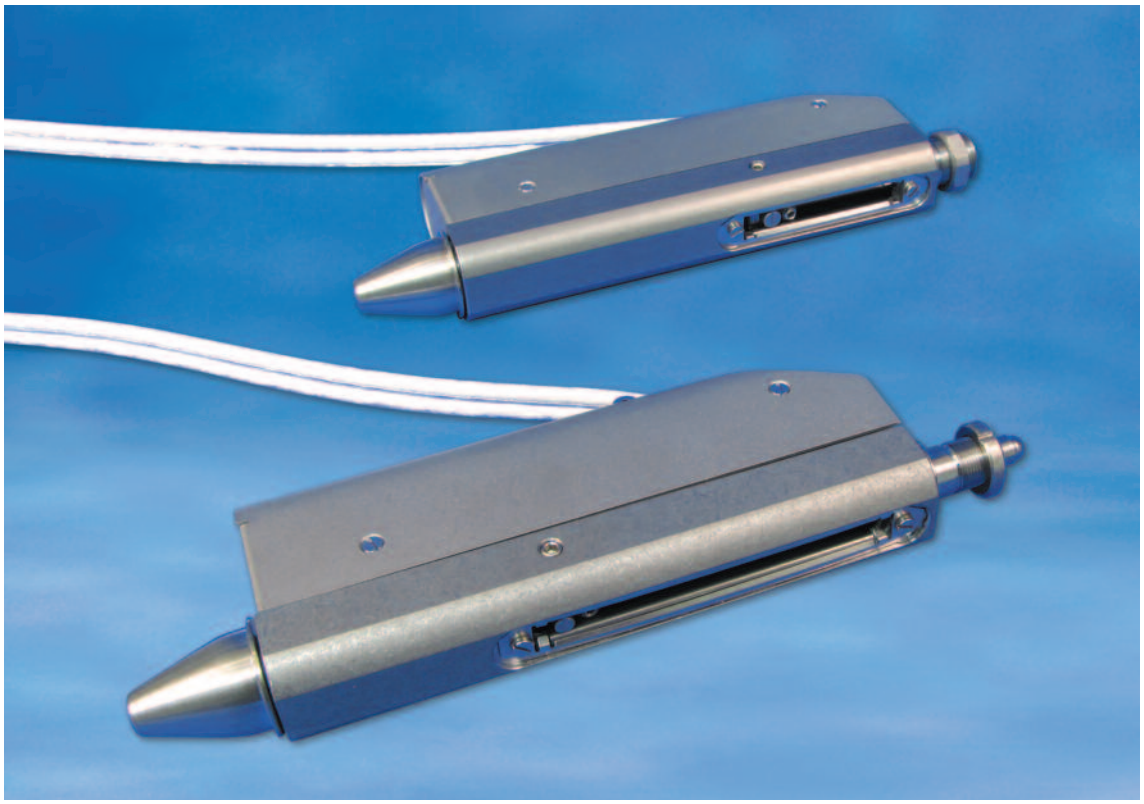
LTAHxPPV6

Vacuum Compatible Stepper Motorized Actuators



Newport®
Experience | Solutions

USER'S MANUAL

For Motion, Think Newport™

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 of the actuator:**
  - **Driven load greater than maximum specified load.**
  - **Actuator speed higher than specified speed.**
  - **Improper grounding.**
    - ¬ **Connectors must be properly secured.**
    - ¬ **When the driven load represents an electrical risk, it must be connected to ground.**
  - **Excessive or improper driven 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.

This manual has been provided for information only and product specifications are subject to change without notice. Any changes will be reflected in future printings.

Table of Contents

Warranty ii
EC Declaration of Conformity v
Definitions and Symbols vi
Warnings vii
Cautions viii

1.0 — Introduction 1

2.0 — Description 2
2.1 Design Details 2

3.0 — Characteristics 3
3.1 Definitions 3
3.2 Mechanical Specifications 4
3.3 Axial Load Capacity 4
3.4 Minimal Axial Load 4
3.5 Actuator Weights 4

4.0 — Drive 5
4.1 Stepper Motor Drive 5

5.0 — Motor 5
5.1 Stepper Motor Characteristics 5
5.2 Command Signals for the Motor 5
5.3 Sensor Position 5
5.4 Pinouts 6

6.0 — Connection to Newport Controllers 7
6.1 Warnings on Controllers 7
6.2 Connection 8
6.3 Cables 8

7.0 — Connection to Non-Newport Electronics 9

8.0 — Dimensions 10
8.1 LTAHSPPV6 Actuator 10
8.2 ADAPT-BM17-375V6 Adapter for LTAHSPPV6 10
8.3 LTAHLPPV6 Actuator 10

9.0 — Setting of the Travel Range 11

10.0 — Adapter Mounting 12

11.0 — Dismantling of the Ball Tip 13

12.0 — Maintenance 14
12.1 Maintenance 14
12.2 Repairing 14
12.3 Calibration 14

Service Form 15

EC Declaration of Conformity

LTAPPV6 Series

Newport
Experience | Solutions

EC Declaration of Conformity

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

The manufacturer:

MICRO-CONTROLE Spectra-Physics,
1 rue Jules Guesde ZI. Bois de l'Epine - BP189
F-91006 Evry FRANCE

Hereby declares that the machinery:

Description: " LTAPPV6 "
Function: Precision long-Travel & High Speed Motorized Actuators
Models: LTAHSPPV6, LTAHLPPV6.

– the technical file of which was compiled by:

Mr Dominique DEVIDAL, Quality Director,
MICRO-CONTROLE Spectra-Physics, Zone Industrielle - B.P.29
F-45340 Beaune 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 2004/108/EC relating to electro-magnetic compatibility.

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

NF EN 61326-1:2006 « Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements »
NF EN 55011:2007 Class A

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

NF EN 61000-4-2
NF EN 61000-4-3
NF EN 61000-4-4
NF EN 61000-4-6

ORIGINAL DECLARATION

Done in Beaune La Rolande on 17 June 2011
Dominique DEVIDAL
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

Do not use this actuator when it 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 actuator immediately, switch off its 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 actuator yourself as this can be dangerous.

WARNING

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

Nevertheless, if any fluid has entered the actuator, switch off its 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 actuator, this may cause an electric shock, or lock the drive.

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

Contact your Newport service facility for repairs.

WARNING

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

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

Contact your Newport service facility and request repairs.

WARNING

Do not attempt to modify this actuator; 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.

Cautions

CAUTION

Do not place this actuator in a hostile environment such as X-Rays, hard UV,… or in any vacuum environment less than 10^{-6} hPa.

CAUTION

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

CAUTION

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

- **Operating temperature: +10 to +35 °C.**
- **Storage temperature: -10 to +40 °C (in its original packaging).**

CAUTION

Do not move this actuator if its power is on.

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

CAUTION

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

CAUTION

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

CAUTION

When the rod is in end-of-run position, it is strongly recommended not to go beyond this point by using the manual knob as this may damage the stage mechanism.

CAUTION

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

Vacuum Compatible Stepper Motorized Actuators LTAHxPPV6

1.0 Introduction

This manual provides operating instructions for the LTAHxPPV6 actuator that you have purchased.

LTAHxPPV6 into its sachet packaging.

RECOMMENDATION

We recommend you to read attentively the chapter “Connection to electronics” before LTAHxPPV6 actuator using.

LTAHxPPV6 vacuum compatible actuators.

2.0 Description

LTA actuators are designed to fit into existing manual stages and other opto-mechanical components directly replacing manual micrometers. The LTA series features a space-saving design that reduces the actuator length by 50% and minimizes the unwanted effects of cantilever loads on micro-positioning equipment. The non-rotating tip prevents wear and avoids periodic motion variations which can be caused by variable contact between a rotating tip and its mating surface.

Precision motion is accomplished through a miniature stepper motor with optimized output torque. This allows faster motion or high load capacity. The LTAHLPPV6 is recommended for heavy load applications. It features a robust, 8 mm diameter rod and a M12-0.5 mounting bezel that is compatible with the (M-)UMR8 and (M-)MVN80 linear stages. The LTAHSPPV6 is optimized for high-speed applications and provides a longer travel range. The mounting interface of the LTAHxPPV6 is compatible with a large number of both Newport and non-Newport manual components.

The LTAHSPPV6 and the LTAHLPPV6 were designed specifically for vacuum applications up to 10^{-6} hPa. These are comparable to the LTAHS, and the LTAHL respectively, but feature a miniature stepper motor with an encoder for reliable positioning.

Common to all models is a movable limit switch that prevents over-travel. The switch positions can be changed in minutes to adjust the maximum travel position. A manual adjustment knob permits quick positioning of the actuator when the motor is off.

For compatibility with other Newport manual stages or opto-mechanical products, refer to the motorized actuator section of www.newport.com.

2.1 Design Details

Base Material	Stainless steel body
Drive Mechanism	Non-rotating lead screw
Feedback	Motor mounted rotary encoder, 48 cts/rev.
Limit Switches	Optical switches, both ends, adjustable
Origin	Uses minimum travel limit for homing, typically <4 µm repeatability
Motor	Stepper Motor
Cable Length	1.5 m, Sub-D25 connector not vacuum compatible.
Vacuum Compatibility	10^{-6} hPa ($0.7\ 10^{-7}$ Torr)
MTBF	10,000 h at half load and with a 10% duty cycle

RoHS Compliant

NOTE

This product complies with the RoHS directive (Restriction of Hazardous Substances).

3.0 Characteristics

3.1 Definitions

Specifications of our products are established in reference to ISO 230 standard part II “Determination of the position, precision and repeatability of the machine tools with CNC”.

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

(Absolute) Accuracy

Difference between ideal position and real position.

On-Axis Accuracy

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

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 follow:

Absolute Accuracy = On-Axis Accuracy + Correction Factor x Travel

Repeatability

Ability of a system to achieve a commanded position over many attempts. Can be specified as uni-directional or bi-directional.

Reversal Value (Hysteresis)

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

Minimum Incremental Motion (Sensitivity)

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

Resolution

The smallest increment that a motion device can be commanded to move and/or detect.

The testing of on-axis accuracy, repeatability, and reversal error are made systematically with our test equipment in an air-conditioned room (20 °C ±1 °C).

Each actuator is tested with a laser interferometer.

A linear cycle with 21 measures on the travel and 4 cycles in each direction gives a total of 164 points.

Guaranteed Specifications

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

3.2 Mechanical Specifications

	LTAHSPPV6	LTAHLPPV6
Travel (mm)	50	25
Minimum Incremental Motion [5] (µm)	0.08	0.08
Uni-directional Repeatability, Guaranteed [1] (µm)	0.5	0.6
Bi-directional Repeatability, Guaranteed [1, 2] (µm)	2 or ± 1	2 or ± 1
On-Axis Accuracy, Guaranteed [1] (µm)	10 mm or ± 5	5 or ± 2.5
Maximum Speed (mm/s)	0.5 [4]	0.25 [4]
Axial Load Capacity (+Cx) (N)	40	100
Side Load Capacity [3] (N)	5	10

[1] Shown are peak to peak, guaranteed specifications or ± half the value as sometimes shown. For the definition of typical specifications which are about 2X better than the guaranteed values, see the Newport Resource catalog.

[2] After backlash compensation.

[2] Avoid side loads during motion.

[4] With SMC100PP: 0.1 mm/s for LTAHLPPV6 and 0.2 mm/s for LTAHSPPV6.

[5] MIM in closed loop: 0.15 µm for LTAHLPPV6 and 0.3 µm for LTAHSPPV6.

CAUTION

Values in the table above are indicated for actuators operating with the rod in –Cx direction.

3.3 Axial Load Capacity

Maximum load an actuator can move while maintaining specifications. This value is given with speed and acceleration specified for the actuator.

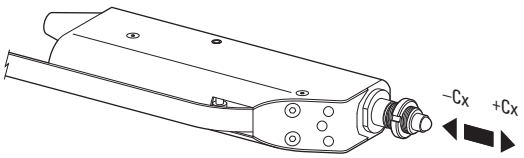
	LTAHSPPV6	LTAHLPPV6
Specified Speed (mm/s)	0.5	0.25
Specified Acceleration (mm/s²)	2	1

This value is given for load along the direction of the motion.

	LTAHSPPV6	LTAHLPPV6
–Cx (N)	40	100
+Cx (N)	40	100

CAUTION

Do not apply alternatively +Cx and –Cx loads during an operating cycle.



3.4 Minimal Axial Load

CAUTION

To reach the specifications stated for the LTAHxPPV6 actuator, a minimum axial load must be applied at the end of the rod.

Min. ±Cx	(N)	2.5

3.5 Actuator Weights

Weights indicated are values for the weight actuator and the one of its cable.

LTAHxPPV6	[lb (kg)]	0.77 (0.35)

4.0 Drive

4.1 Stepper Motor Drive

	Resolution (µm)	Speed (mm/s)	Motor
LTAHSPPV6	0.08 (2)	0.5 (1)	UE16PPHSV6
LTAHLPPV6	0.08 (2)	0.25 (1)	UE16PPHLV6

1) With SMC100PP: 0.1 mm/s for LTAHLPPV6 and 0.2 mm/s for LTAHSPPV6.

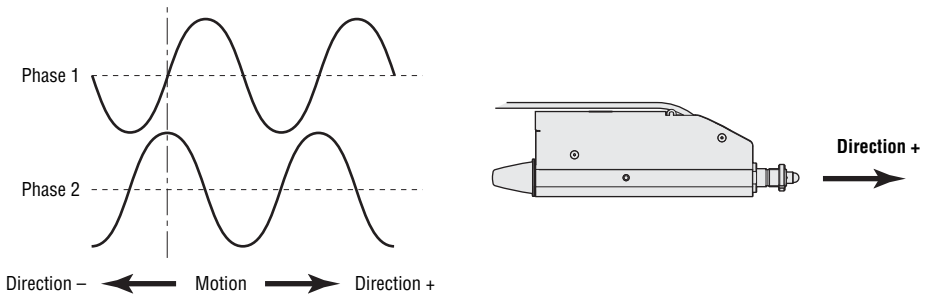
2) MIM in closed loop: 0.15 µm for LTAHLPPV6 and 0.3 µm for LTAHSPPV6.

5.0 Motor

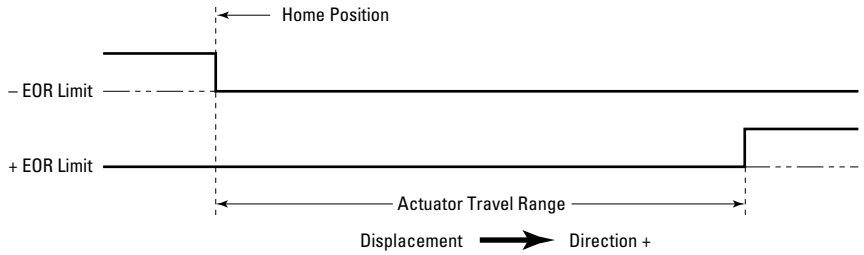
5.1 Stepper Motor Characteristics

Motor	Angle by Step (°)	RMS Current (A)	Resistance (Ω)	Inductance (mH)	Newport Utilization
UE16PPHSV6 UE16PPHLV6	15	0.18	12.5	5.5	Mini-Step

5.2 Command Signals for the Motor



5.3 Sensor Position



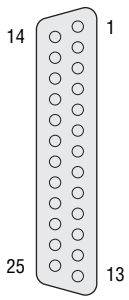
End-of-Run are 5 V open collector type.

WARNING

“End-of-Run” are active signals and should not be connected to any other source.

5.4 Pinouts

The 25-pin Sub-D connection for the LTAHxPPV6 actuator is given in the following table:



	UE16PP **LTAHxPPV6**		
1	+ Phase 1	**14**	0 V
2	+ Phase 1	**15**	N.C.
3	– Phase 1	**16**	0 V
4	– Phase 1	**17**	+ End-of-Run
5	+ Phase 2	**18**	– End-of-Run
6	+ Phase 2	**19**	Encoder Phase A
7	– Phase 2	**20**	Encoder Phase B
8	– Phase 2	**21**	+5 V (Mech. Zero & E-o-R)
9	N.C.	**22**	0 V
10	N.C.	**23**	Encoder Phase /A
11	N.C.	**24**	Encoder Phase /B
12	N.C.	**25**	N.C.
13	Mechanical Zero		*N.C.: Not connected*

6.0 Connection to Newport Controllers

6.1 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.

6.2 Connection

On each actuator sachet is represented a label which indicates its name and its serial number.

WARNING

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

Actuators may be connected to the rear panel motor connectors any time prior to power-up with the supplied cable assemblies.

NOTE

LTAHxPPV6 are ESP compatible actuators. 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.

6.3 Cables

Our LTAHxPPV6 actuator is delivered equipped with a cable with 25-pin Sub-D connector. It can be directly connected to our controllers/drivers.

WARNING

This cable is shielded correctly. For a correct operation, make sure to lock connectors (ground continuity provided by the cable).

WARNING

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

7.0 Connection to Non-Newport Electronics

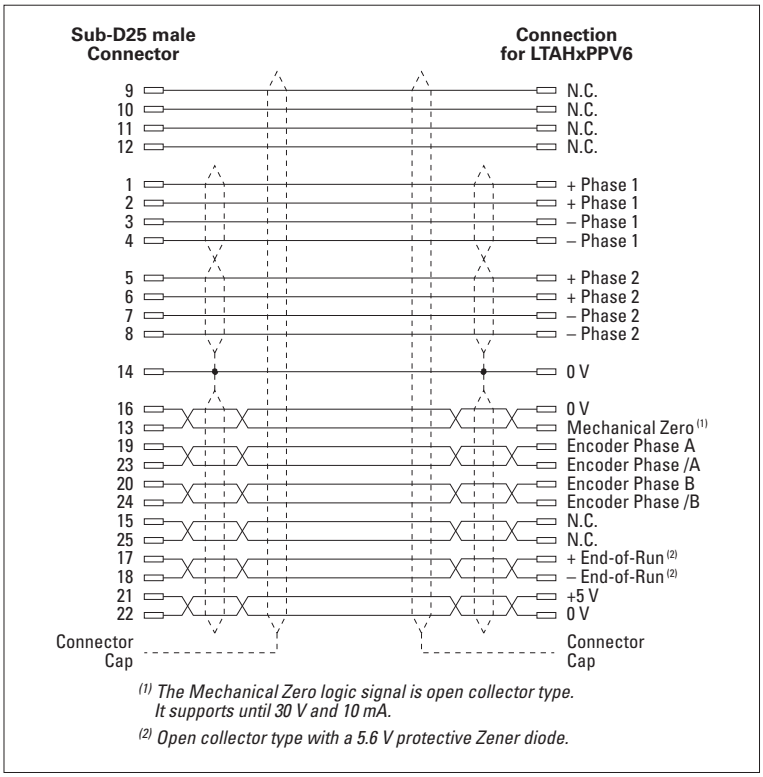
WARNING

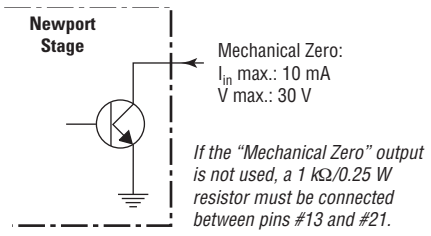
Newport takes no responsibility for improper functioning or damage of a LTAHxPPV6 actuator when it is used with any non- Newport electronics.

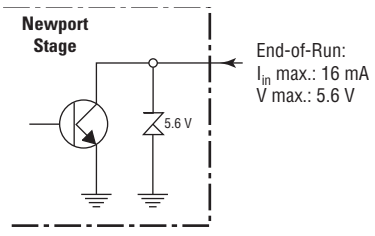
WARNING

Newport guarantees the "EC" compliance of the LTAHxPPV6 actuator only if it is used with Newport cables and electronics.

Nevertheless, the figure below indicates the recommended wiring when a LTAHxPPV6 actuator is used with non-Newport electronics.



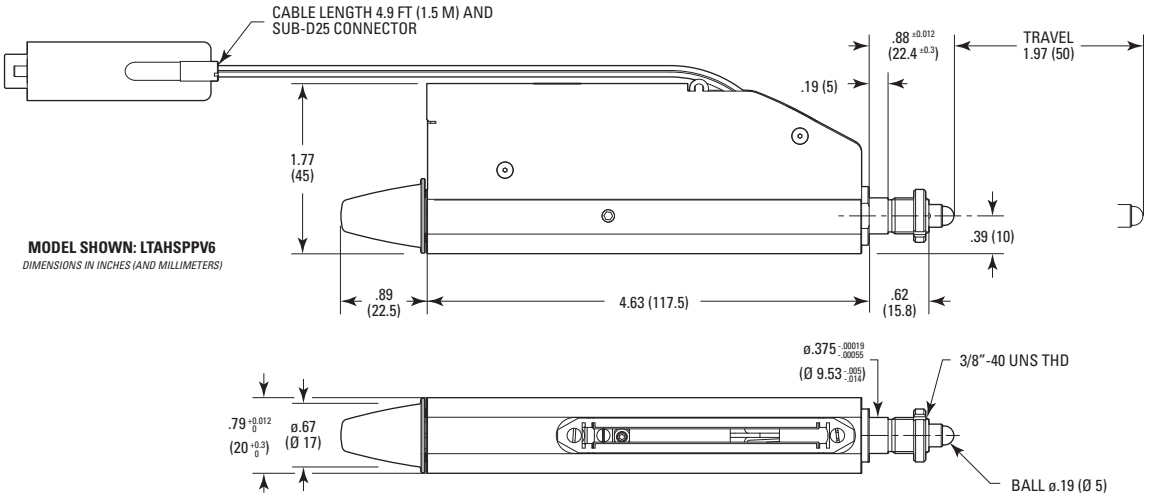




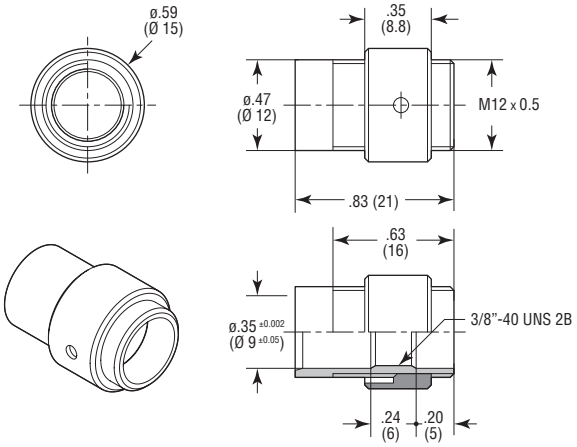
"Encoder" and "Index Pulse" are "differential pair" type output signals. Using these signals permits a high immunity to noise. Emission circuits generally used by Newport are 26LS31 or MC3487. Reception circuits to use are 26LS32 or MC3486.

8.0 Dimensions

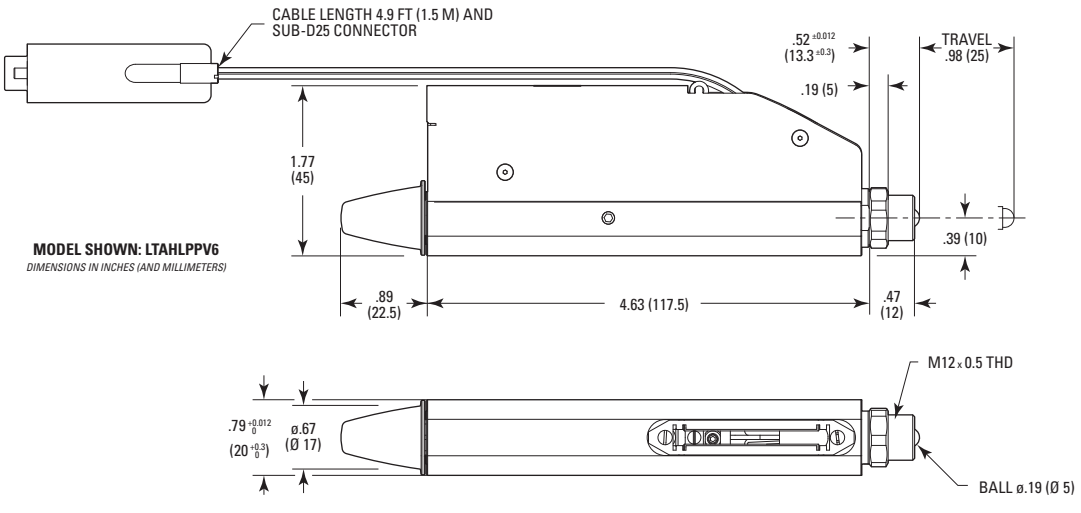
8.1 LTAHSPPV6 Actuator



8.2 ADAPT-BM17-375V6 Adapter for LTAHSPPV6



8.3 LTAHLPPV6 Actuator

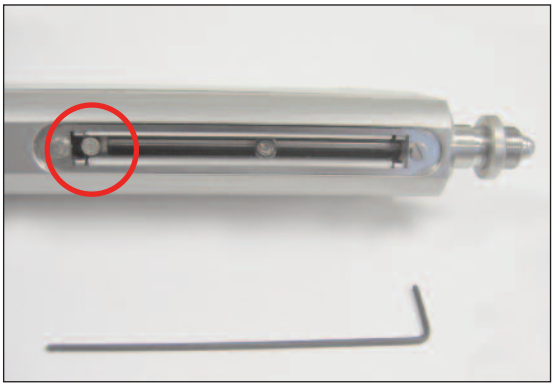


9.0 Setting of the Travel Range

WARNING

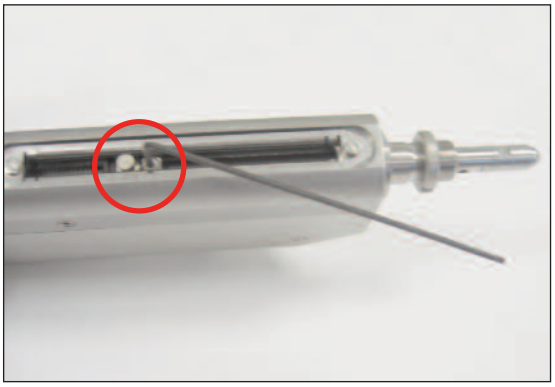
The actuator must be connected to a controller before setting the + limit switch.

1. Position the actuator at the mechanical zero position.



2. Operate a displacement at the needed travel, then move of +2 mm.

3. Disconnect the actuator from the controller.
4. With the Allen key, unscrew the lock screw and move it on the rod until the mechanical end-of-run position. Lock it without operating any lateral stress.



5. Move back the rod with the manual knob.
6. Now, you can connect your LTAHxPPV6 actuator to the controller and use it with the new travel range.

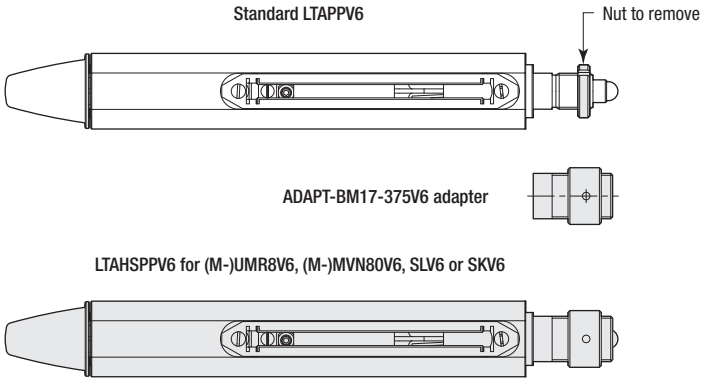
10.0 Adapter Mounting

NOTE

The ADAPT-BM17-375V6 adapter can only be used with the LTAHSPPV6 actuator.

When you have to fix a LTAHSPPV6 actuator on a (M-)UMR8V6 or (M-)MVN80V6 stage or on a SKV6 or SLV6 optical mount, you must use the ADAPT-BM17-375V6 adapter.

To do that, you have to remove the nut delivered with the LTAHSPPV6 and place the adapter instead.



11.0 Dismantling of the Ball Tip

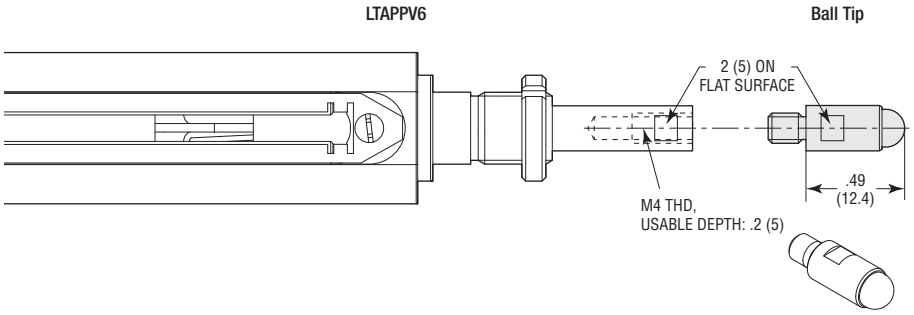
NOTE

The dismantling of the ball tip can only be operated on the LTAHSPPV6 actuator.

WARNING

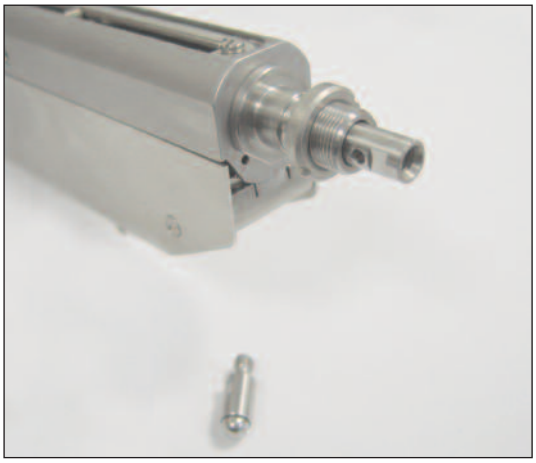
The actuator must be disconnected from any controller before dismantling of the ball tip.

If you dismantle the ball tip at the end of the actuator rod, you will get a M4 threaded interface instead.



To do that, two flat surfaces are available on both actuator rod and ball tip to remove.

Lock the rod actuator with a wrench and unscrew the ball tip with an other one.



Ball tip of the LTAHSPPV6 actuator.

12.0 Maintenance

RECOMMENDATION

It is recommended to contact our After Sales Service which will know to define the appropriate maintenance for your application.

12.1 Maintenance

The LTAHxPPV6 actuator requires no particular maintenance. Nevertheless, this is a precision mechanical device that must be kept and manipulated with precaution.

PRECAUTIONS

The LTAHxPPV6 actuator must operate, and be stocked in a clean environment, without dust, humidity, solvents or other substances.

RECOMMENDATION

It is recommended to return your actuator to our After Sales Service after every 2000 hours of use for lubrication.

If your LTAHxPPV6 actuator is mounted on a workstation and cannot be easily dismantled, please contact our After Sales Service for further instructions.

12.2 Repairing

CAUTION

Never attempt to disassemble an element of the actuator that has not been specified in this manual.

To disassemble a non specified element can cause a malfunction of the actuator.

If you observe a malfunction in your actuator, please immediately contact us to make arrangements for a repair.

CAUTION

All disassembly attempts or repair of actuator without authorization will void your warranty.

12.3 Calibration

CAUTION

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

Service Form

Your Local Representative
Tel.: _____
Fax: _____

Name: _____ Return authorization #: _____
(Please obtain prior to return of item)

Company: _____

Address: _____ Date: _____

Country: _____ Phone Number: _____

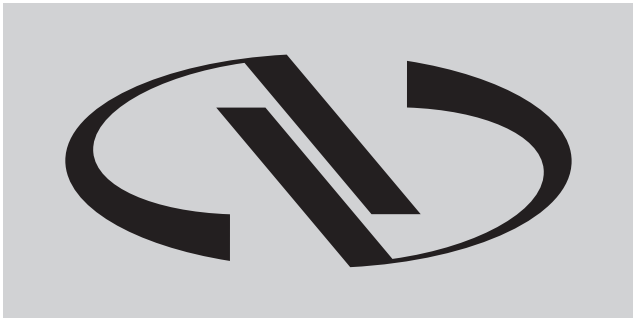
P.O. Number: _____ Fax Number: _____

Item(s) Being Returned:

Model #: _____ Serial #: _____

Description: _____

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



Newport®

Experience | Solutions

Visit Newport Online at:
www.newport.com

North America & Asia

Newport Corporation

1791 Deere Ave.
Irvine, CA 92606, USA

Sales

Tel.: (800) 222-6440

e-mail: sales@newport.com

Technical Support

Tel.: (800) 222-6440

e-mail: tech@newport.com

Service, RMAs & Returns

Tel.: (800) 222-6440

e-mail: service@newport.com

Europe

MICRO-CONTROLE Spectra-Physics S.A.S

9, rue du Bois Sauvage
91055 Évry CEDEX
France

Sales & Technical Support

Tel.: +33 (0)1.60.91.68.68

e-mail: france@newport.com

Service & Returns

Tel.: +33 (0)2.38.40.51.55