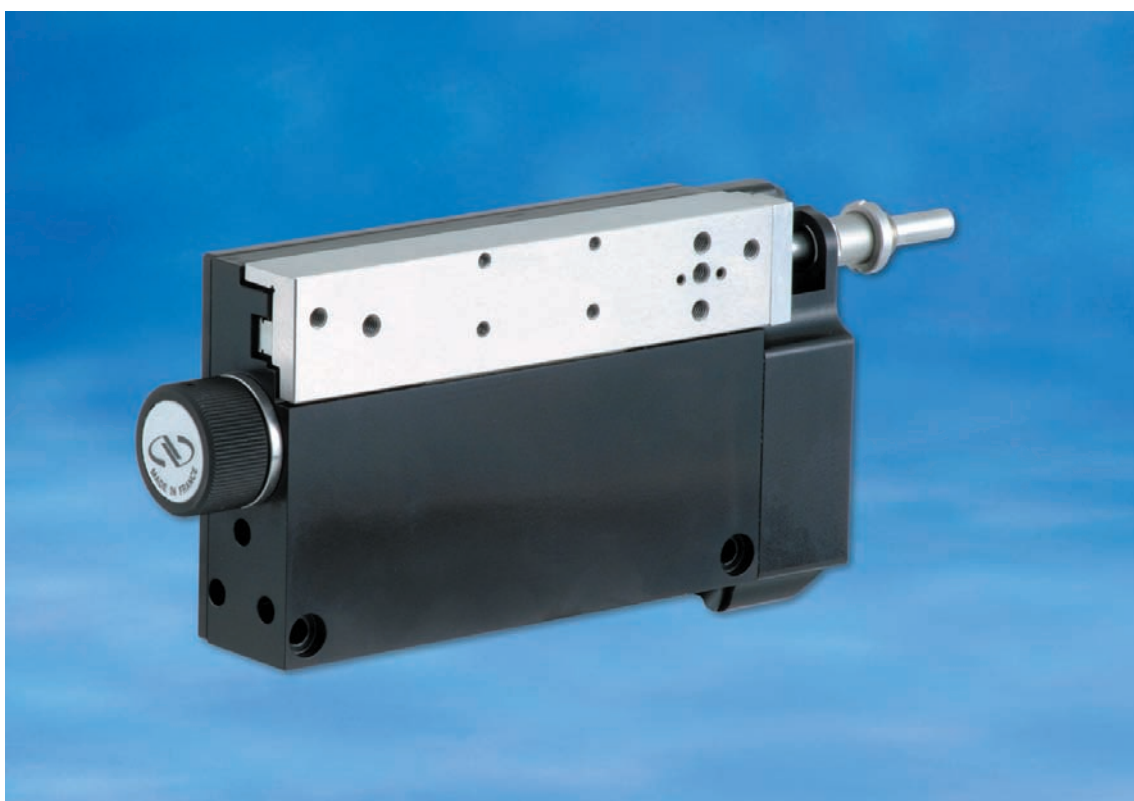


VP-25AA

High-Performance Precision Motorized Actuator



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.

No part of this manual may be reproduced or copied without the prior written approval of Newport Corporation.

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.

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EC Declaration of Conformity

VP-25AA

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'Épine - BP189
F-91006 Evry FRANCE

Hereby declares that the machinery:

Description: "VP-25AA"
Function: High-Performance Precision Motorized Actuator
Models: (M-)VP-25AA

- the technical file of which was compiled by:
Mr Dominique DEVIDAL, Quality Director,
MICRO-CONTROLE Spectra-Physics, Zone Industrielle - B.P.29
F-45340 Beaugency 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 61000-4-5
NF EN 61000-4-6

ORIGINAL DECLARATION

Done in Beaugency La Rolande on 09 June 2011
Dominique DEVIDAL
Quality Director

A handwritten signature in black ink, appearing to read 'D. Devidal', is written over a horizontal line.

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.

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.



ATTENTION

This stage is a Class A device. In a residential environment, this device can cause radioelectric interferences. In this case, suitable measurements must be taken by the user of this device.

Warnings and Cautions

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

Situation has the potential to cause bodily harm or death.



CAUTION

Situation has the potential to cause damage to property or equipment.

NOTE

Additional information the user or operator should consider.

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

When the rod of a VP-25AA is moving, there exists a risk of squeezing fingers in some areas of the actuators. Each dangerous area is indicated by a sticker.

CAUTION

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

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.

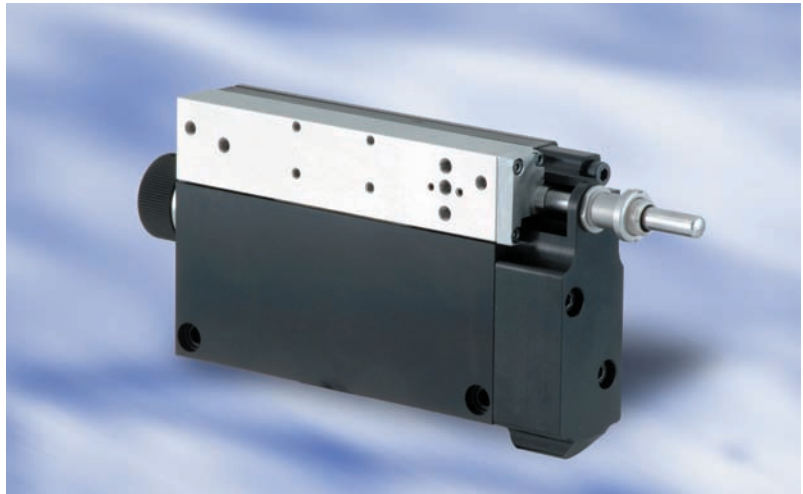
CAUTION

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

High-Performance Precision Motorized Actuator VP-25AA

1.0 Introduction

This manual provides operating instructions for the (M-)VP-25AA high-performance precision motorized actuator.



VP-25AA motorized actuator.

RECOMMENDATION

We recommend you read carefully the chapter “Connection to electronics” before using the VP-25AA motorized actuator.



2.0 Description

The VP-25AA actuator features an all aluminum body and recirculating pre-loaded ball bearing slides as guide ways to ensure accurate linear travel. The actuator rod doesn't rotate during its displacement.

A preloaded, backlash-free ballscrew with a 1 mm pitch provides smooth motion. The screw is accurately ground to reduce the heating factor to a minimum and extend the lifetime of the stage.

The position is read on a metal optical scale with pitch of 20 µm and a 200x interpolation of signals to obtain a 0.1 µm resolution.

The VP-25AA actuator features end-of-run limit switches at both ends to prevent bearing damage from over-travel. The origin (Mechanical Zero) is at the center of travel, with a reference on the optical scale.

For optimal performance, we recommend the use of our ESP or MM series motion controllers.

The VP-25AA actuator is equipped with a cable of 1.5 m length and a 25-pin sub-D connector for connection to our motion controllers.

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 effect. All Newport motion electronics can compensate for linear accuracy errors by step encoder correction.

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

$$\text{Absolute Accuracy} = \text{On-Axis Accuracy} + \text{Slope} \times \text{Travel}$$

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 (Sensitivity)

Minimum motion that a stage can achieve. Our stages and our kinematic chain are conceived in such a way that sensitivity is better than the resolution of the encoder.

Resolution

The smallest motion an encoder fixed to the stage can measure.

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 stage is tested with a laser interferometer.

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

3.2 Mechanical Specifications

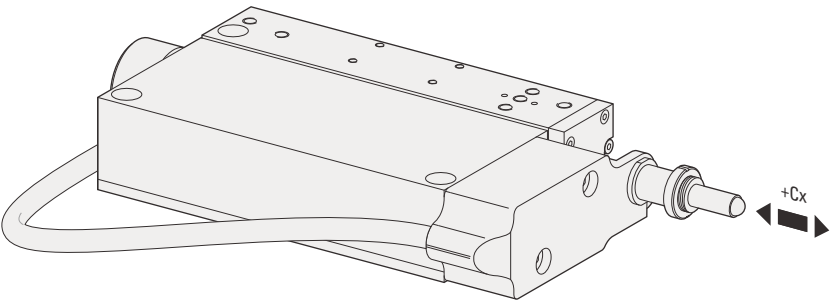
Resolution	(µm)	0.1
On-Axis Accuracy	(µm)	2
Uni-directional Repeatability	(µm)	0.1
Reversal Value (Hysteresis)	(µm)	0.5
MTBF ⁽¹⁾	(h)	20,000

¹⁾ See chapter: “Maintenance”.

The MTBF value indicated above is given to use the actuator with the following parameters:

Axial load	(N)	20
Displacements	(mm)	2
Speed	(mm/s)	10
Operating rate on the cycle		20%
Cycle	21 hours/day 330 days/year	

3.3 Axial Load Capacity (±Cx)



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

Specified Speed	(mm/s)	25
Specified Acceleration	(mm/s²)	100

This value is given for load along the direction of the drive train.

– Cx; + Cx	(N)	40
------------	-----	----

3.4 Actuator Weight

Weight indicated is the value for the actuator with the cable.

(M-)VP-25AA	(kg)	1
-------------	------	---

4.0

Drive

The VP-25AA actuator is equipped with DC-motor and a metal optical scale.

Specifications

	Resolution (μm)	Maximum Speed (mm/s)	Motor
VP-25AA	0.1	25	UE25CC

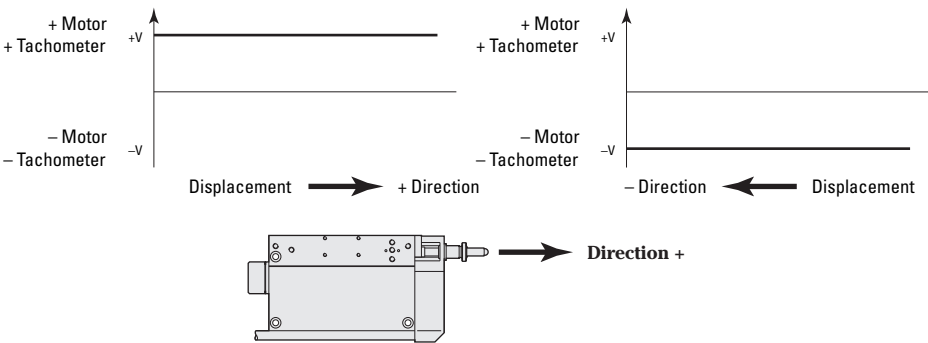
5.0

Motor

5.1 DC Motor Characteristics

Motor	Nominal Voltage (V)	Max. Current (A)	Resistance (Ω)	Inductance (mH)
UE25CC	48	0.9	8	0.83

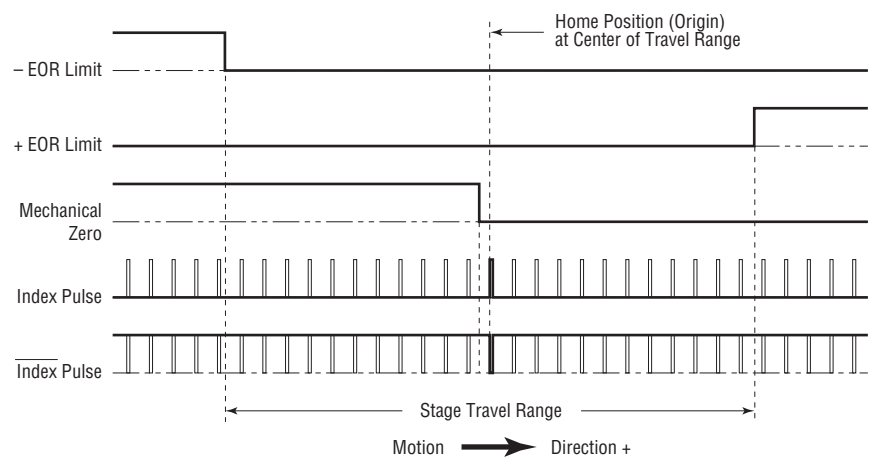
5.2 Command Signals for UE25CC DC Motor



In the above drawings, + Motor signal is referred to – Motor signal, + Tacho Generator signal is referred to – Tacho Generator signal.

- 1 When the actuator moves in + Direction, the + Motor voltage is higher than – Motor voltage, and + Tacho Generator voltage is higher than – Tacho Generator voltage.
- 2 When the actuator moves in – Direction, the + Motor voltage is lower than – Motor voltage, and + Tacho Generator voltage is lower than – Tacho Generator voltage.

5.3 Sensor Position



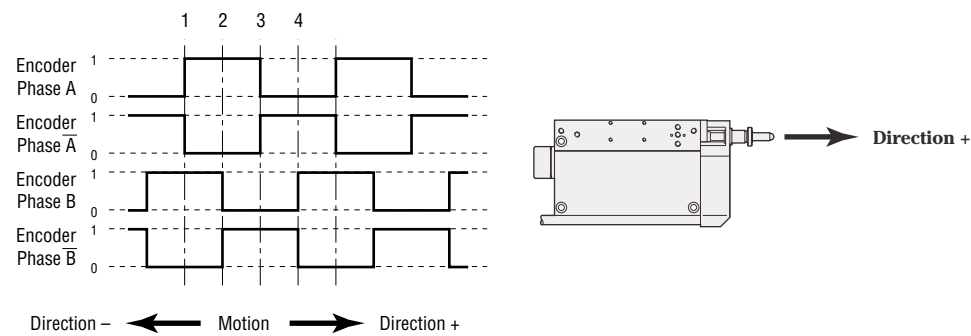
End-of-Run and Mechanical Zero are TTL type: 5 V $\pm$ 5%, 2 mA max.
Use of the Index Pulse provides a repeatable Home Position at $\pm$ 1 step.

CAUTION

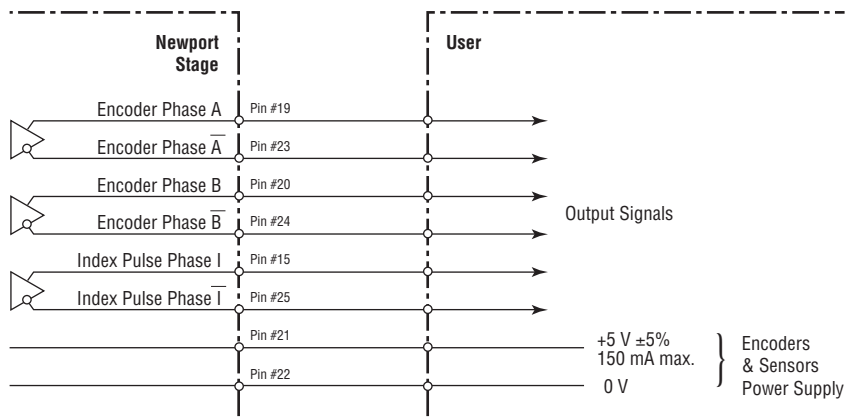
“End-of-Run” and “Mechanical Zero” are active signals and should not be connected to any other source. Use appropriate TTL type receivers.

Index Pulse 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.

5.4 Feedback Signal Position



The incremental sensor consists of an optical scale and an encoder head. When the carriages of the stage move, the encoder head generates square signals in quadrature, sent to pins #19, #20, #23 and #24 of the 25-pin Sub-D connector.



Encoders are “differential pair” (type RS422) 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 respectively.

5.5 Pinouts

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

UE25CC: (M-)VP-25AA	
1	+ Tachometer
2	N.C.
3	– Tachometer
4	N.C.
5	+ Motor
6	+ Motor
7	– Motor
8	– Motor
9	N.C.
10	N.C.
11	N.C.
12	N.C.
13	Mechanical Zero
14	Shield Ground
15	Index Pulse I
16	0 V logic
17	+ End-of-Run
18	– End-of-Run
19	Encoder Phase A
20	Encoder Phase B
21	Encoder Power: +5 V
22	0 V Encoder
23	Encoder Phase /A
24	Encoder Phase /B
25	Index Pulse /I

6.0 Connection to Newport Electronics

6.1 Warnings on Electronic Units

Electronic units are intended for use by qualified personnel who recognize shock hazards and are familiar with safety precautions required to avoid possible injury. Read the electronics 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 the actuator is a label which indicates its name, its serial number and the motor it is equipped with (eg.: UE25CC).

VP-25AA	S/N #
Encoder:5V	Motor:UE25CC
D.C Motor	U=48VDC I=1A

WARNING

Always turn power OFF on electronics units before connecting them to stage.

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

WARNING

With MM series controllers, damage to actuator may occur if the actuator is not the same type as shown on driver label located near the actuator interface connector (see drawing below).

Check that the option number specified on this label correspond to the number indicated in the driver module options for your actuator.

6.3 Cables

Our VP-25AA actuator is delivered equipped with a 1.5-meter cable with 25-pin Sub-D connector. It can be directly connected to our controllers/drivers of MM or ESP series.

WARNING

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

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

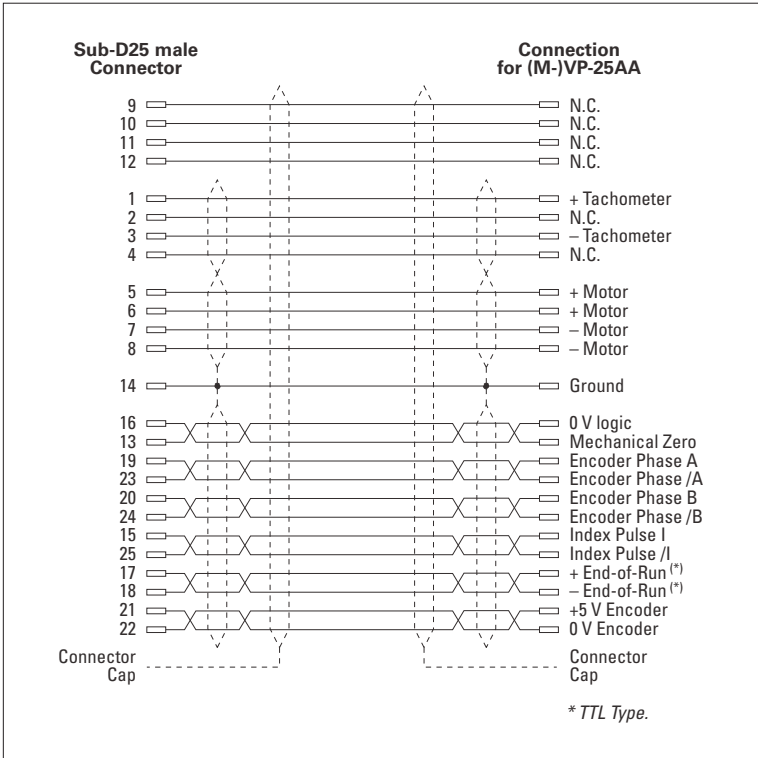
WARNING

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

WARNING

Newport guarantees the "EC" compliance of the VP-25AA actuators only if they are used with Newport cables and electronics.

Nevertheless, the figure below indicates the recommended wiring when a VP-25AA actuator is used with non-Newport electronics.

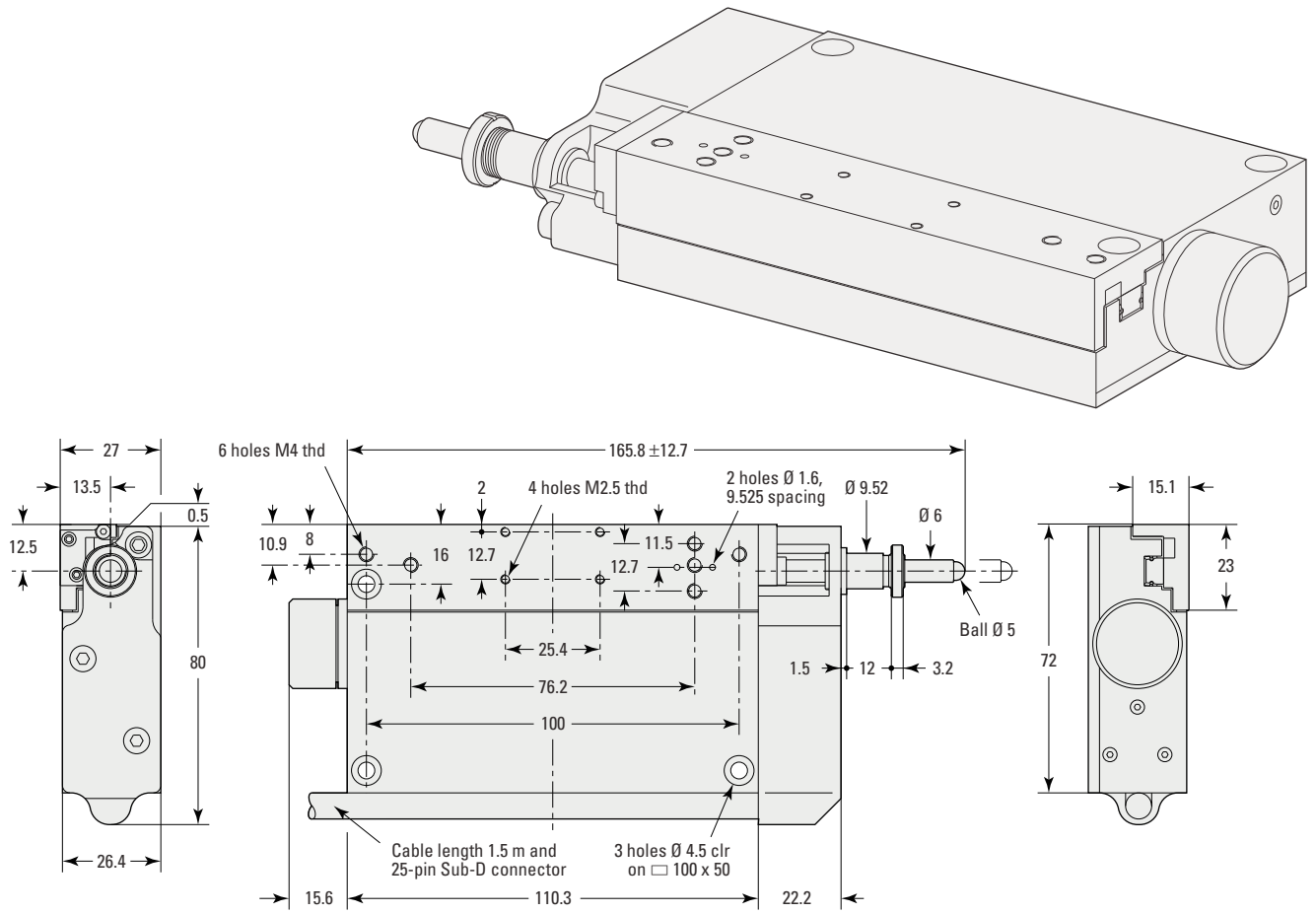


WARNING

Maximum characteristics used for CE compliance:

- UE25CC DC-motor: 48 V / 0.9 A peak-to-peak

8.0



9.0 Maintenance

RECOMMENDATION

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

9.1 Maintenance

The VP-25AA actuator requires no particular maintenance. Nevertheless, this is a precision mechanical device that must be kept and manipulated with precaution.

PRECAUTIONS

The VP-25AA 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 VP-25AA actuator is mounted on a workstation and cannot be easily dismantled, please contact our After Sales Service for further instructions.

9.2 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.

9.3 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:

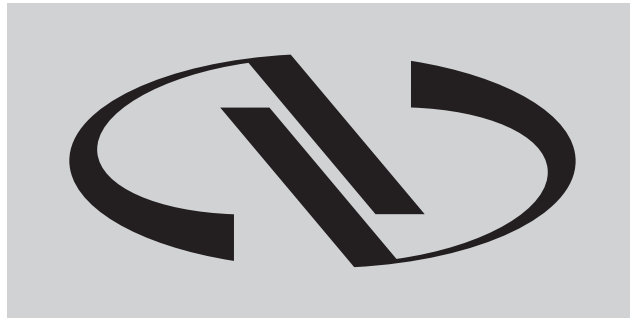
Item(s) Being Returned:

Model #: _____

Serial #: _____

Description: _____

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



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