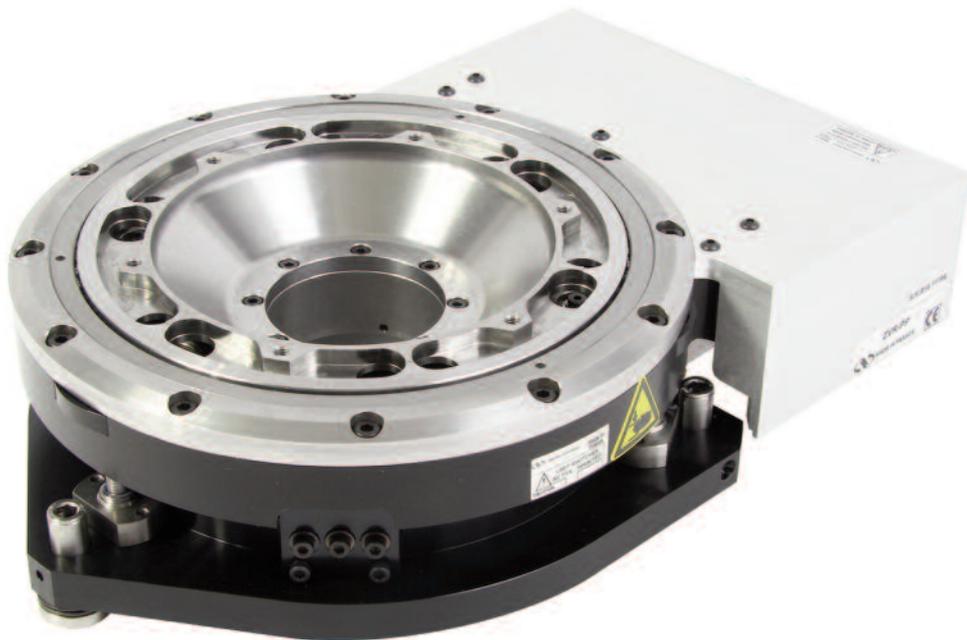




# ZVR Series

## Integrated Vertical and Rotation Stages for Wafer Positioning



 **Newport**<sup>®</sup>

**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.**

---

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.

No part of this document may be reproduced or copied without the prior written approval of Newport Corporation. This document is provided for information only, and product specifications are subject to change without notice. Any change will be reflected in future publications.



#### 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.

# Table of Contents

Warranty .....	ii
EC Declaration of Conformity.....	v
Definitions and Symbols.....	vii
Warnings .....	viii
Caution .....	ix
<hr/>	
<b>1.0 — Introduction.....</b>	<b>1</b>
<hr/>	
<b>2.0 — Description .....</b>	<b>2</b>
2.1 Design Details .....	2
<hr/>	
<b>3.0 — Characteristics.....</b>	<b>3</b>
3.1 Definitions .....	3
3.2 Mechanical Specifications .....	4
3.3 Load Specification Definitions.....	4
3.4 Load Characteristics and Stiffness .....	5
3.5 Stage Weights .....	5
<hr/>	
<b>4.0 — Drives and Motors .....</b>	<b>5</b>
4.1 Stepper Drive Axes .....	5
4.2 DC-Servo Drive Axis .....	6
4.3 Sensor Position.....	6
4.4 Feedback Signal Position .....	7
4.5 Pinouts.....	7
4.6 MSCABLE-3 Cable .....	8
<hr/>	
<b>5.0 — Connection to Newport Controllers.....</b>	<b>9</b>
5.1 Warnings on Controllers .....	9
5.2 Connection.....	10
5.3 Cables .....	10
5.4 MSCABLE-3 Cable.....	10
<hr/>	
<b>6.0 — Connection to Non-Newport Electronics .....</b>	<b>11</b>
6.1 Connections .....	11
<hr/>	
<b>7.0 — Disabling Limit Switches of the Rotation Axis.....</b>	<b>12</b>
<hr/>	

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<b>8.0</b>	<b>— Dimensions</b>	13
8.1	ZVR-PP Stage	13
8.2	ZVR-PC Stage	14

---

<b>9.0</b>	<b>— Maintenance</b>	15
9.1	Maintenance	15
9.2	Repair	15
9.3	Calibration	15

---

	Service Form	17
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# EC Declaration of Conformity



2 Tech Drive  
Andover, MA 01810  
[www.mksinst.com](http://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 (RoHS3) – (EU) 2015/863<sup>(7)</sup>
- 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:

- EN 55011: 2016 +A1:2017<sup>(4)</sup> 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
- EN 61000-4-6:2014 EMC/Conducted Disturbances induced by Radio Frequency Fields Immunity Test

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

Authorized Representatives Name & Location: \_\_\_\_\_

Equipment Type/Description: **Integrated Vertical and Rotation Stage for Wafer Positioning**

Model Number(s)<sup>(6)</sup>: **ZVR-PC-PP**

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: 11/29/2022

**Le Cointe Hervé – Quality Director**

4) Class A, Group 2

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](http://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 (RoHS3) – (EU) 2015/863<sup>(7)</sup>
- Waste Electrical and Electronic Equipment – Directive 2012/19/EU



### Standard(s) to which conformity is declared:

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

### Emissions:

- EN 55011: 2016 +A1:2017 <sup>(4)</sup> Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement

### Immunity:

- BS EN 61000-4-2:2009 EMC/Electrostatic Discharge Immunity Test
- BS EN 61000-4-3:2006+A2:2010 EMC/Radiated Radio Frequency Electromagnetic Field Immunity Test
- BS EN 61000-4-4:2012 EMC/Electrical Fast Transient/Burst Immunity Test
- BS EN 61000-4-5:2014+A1:2017 EMC/Surge Immunity Test
- BS EN 61000-4-6:2014 EMC/Conducted Disturbances induced by Radio Frequency Fields Immunity Test

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

Authorized Representatives Name & Location: \_\_\_\_\_ / \_\_\_\_\_

Equipment Type/Description: **Integrated Vertical and Rotation Stage for Wafer Positioning**

Model Number(s) <sup>(6)</sup>: **ZVR-PC/-PP**

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: 11/29/2022

**Le Cointe Hervé – Quality Director**

4) Class A, Group 2

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.

# 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 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.

# 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 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 control every year.

---



# Integrated Vertical and Rotation Stages for Wafer Positioning

## ZVR Series

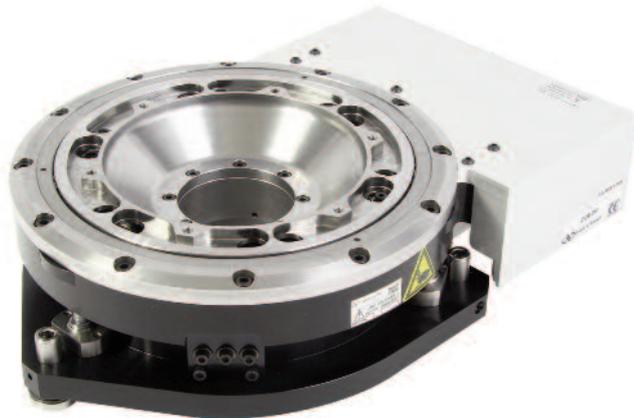
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### 1.0 Introduction

---

This manual provides operating instructions for the ZVR series stages:

- ZVR-PC (Stepper motor vertical, DC rotation)
- ZVR-PP (Stepper motor vertical and rotation)



*ZVR stage.*

---

#### RECOMMENDATION

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

---

## 2.0 Description

Newport's new ZVR stages are integrated vertical and rotation positioning stages designed primarily to precisely elevate and rotate wafer chucks, and other samples or objects that would require adjustments to align the object's orientation or to focus. These applications are not limited to inspection or laser machining.

The ZVR's design takes the unconventional approach of most vertical (elevation) stage designs on the market today. The payload is supported and driven at three points (separated by 120 degrees) along the outer circumference of the stage. Ordinary designs use a single cam, wedge, or screw located at the centre of the stage. Newport's three point design benefits applications that have slight to extreme unbalanced loading such as wafer probing which can impart vertical forces at locations along the outer edges of the chuck. Angular deflections due to these off-centre loads are minimized and binding during vertical motion is eliminated. The ZVR's unique design also permits convenient height and tip/tilt adjustment, and allows the centre of the stage to remain open through the bottom plate, important for routing utilities to the wafer chuck. The clear aperture with the integrated rotary stage is 50 mm in diameter.

Guiding the stage through its vertical trajectory are three miniature, ultra-quiet, recirculating bearing guides. Like the drive screws that actuate vertically, these three guides are located 120 degrees apart and are in-line with the drive screws. The upper limit switch has a 4 mm adjustment range enabling the user to set the upper limit of travel. The ZVR stages are equipped with a hardware origin that serves as an absolute reference (home) position.

For optimum performance and compatibility, use the Newport family of controllers for these devices. The ZVR stages are ESP compatible allowing the user to take advantage of Newport's smart-stage features when used with Newport controllers. Each stage axis is supplied with a 3-meter, shielded cable with 25-pin sub-D connector for direct connection to a Newport motion controller (XPS, ESP301, SMC100) or other OEM motion controller and driver.

### 2.1 Design Details

Base Material	Aluminum and Stainless Steel
Bearings	Stainless steel ball bearing
Drive Mechanism	Vertical: 3 ballscrews with 1 mm pitch. Rotation: Self-compensating, preloaded, precision worm gear with 1:90 ratio
Reduction Gear	ZVR-PC: Belt reduction 16:44
Feedback	ZVR-PC: 8,000 cts/rev. rotary encoder
Feedback (Vertical)	ZVR-PP, ZVR-PC: Optional linear encoder 0.1 $\mu$ m
Limit Switches	Optical $\pm 165^\circ$ (Limit switches can be disabled)
Origin	Centered on both rotation and vertical movements
Cable	3-meter, shielded cable
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.

#### **Eccentricity**

Displacement of the geometric center of a rotation stage from the rotation axis in the plane defined by bearings.

#### **Wobble**

Tilt of rotation axis during rotation of a stage, measured on a reference surface.

The testing of accuracy, repeatability, and reversal error are made systematically with test equipment in controlled environment (20<sup>±1</sup> °C).

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

## 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](http://www.newport.com)

### 3.2 Mechanical Specifications

Theta Rotation Stage Specifications	ZVR-PP	ZVR-PC
Travel Range (°)	±165 or continuous 360	
Minimum Incremental Motion <sup>(1)</sup> (°)	0.0002	0.002
Accuracy <sup>(3)</sup> , Typical (Guaranteed) (°)	±10 (±17)	±10 (±15)
Unidirectional Repeatability <sup>(3)</sup> , Typical (Guaranteed) (°)	±0.001 (±0.0015)	±0.0005 (±0.0015)
Bidirectional Repeatability <sup>(3)</sup> , Typical (Guaranteed) (°)	±0.003 (±0.006)	±0.0013 (±0.003)
Max. Speed (°/s)	40	80
Wobble <sup>(3)</sup> , Typical (Guaranteed) (μrad)	±22 (±40)	
Eccentricity <sup>(3)</sup> , Typical (Guaranteed) (μm)	±2.2 (±4)	
Z Vertical Stage Specifications		
Travel (mm)	10	
Minimum Incremental Motion <sup>(1)</sup> (μm)	0.5	
Accuracy <sup>(3)</sup> , Open Loop, Typical (Guaranteed) (μm)	±0.5 (±2)	
Unidirectional Repeatability <sup>(3)</sup> , Open Loop, Typical (Guaranteed) (μm)	±0.4 (±2)	
Bidirectional Repeatability <sup>(3)</sup> , Open Loop, Typical (Guaranteed) (μm)	±1.2 (±2)	
XY Cross Talk <sup>(2)</sup> , Typical (μm)	±0.1	
Max. Speed (mm/s)	10	
Pitch, Yaw <sup>(3)(4)</sup> , Typical (Guaranteed) (μrad)	±17 (±35)	



<sup>1)</sup> Depends on controller, see [www.newport.com](http://www.newport.com) for more information.

<sup>2)</sup> XY deviation when Z direction of motion is reversed.

<sup>3)</sup> For the definition of Typical and Guaranteed specifications see "Motion Basics Terminology & Standards" Tutorial at [www.newport.com](http://www.newport.com)

<sup>4)</sup> To obtain arcsec units, divide μrad value by 4.8.



#### CAUTION

To reach specifications stated, stages must be fixed on a plane surface with a flatness of 50 μm.

### 3.3 Load Specification Definitions

#### Normal Load Capacity (Cz)

Maximum load a rotation stage can move while maintaining specifications.

This value is given with speed and acceleration specified for each rotation stage, and with a load perpendicular to the bearings.

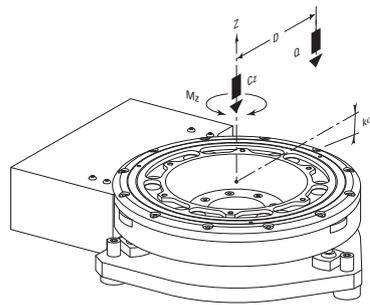
#### Off-Centered Load (Q)

Maximum cantilever-load a rotation stage can move:  $Q \leq Cz \div (1 + D/a)$

D: Cantilever distance.

a: Construction parameter.

**3.4 Load Characteristics and Stiffness**



Cz, Normal center load capacity on bearings	100 N
Mz, Nominal torque	1 Nm
Jz, Max. load inertia	0.050 kg.m <sup>2</sup>
Q, Off-center load (N)	$Q \leq Cz \div (1 + D/40)$

Where D = Cantilever distance (mm)

**3.5 Stage Weights**

The stage weight below does not include the cables.

	Weight [lb (kg)]
ZVR	9.3 (4.2)
3-meter MSCABLE-3 Cable	0.66 (0.3)

The weight difference between drive units is not significant.

**4.0 Drives and Motors**

**4.1 Stepper Drive Axes**

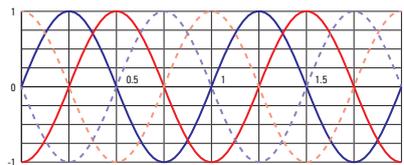
The ZVR-PP rotation axis and both ZVR-PP and ZVR-PC vertical axes are equipped with a stepper motor.

**Stepper Motor Performance Specifications and Characteristics**

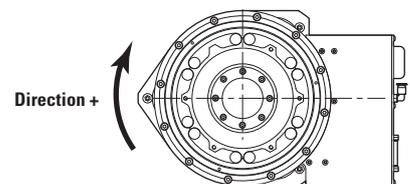
	Resolution	Speed	Angle by Step (°)	RMS Current per Phase (A)	Resistance (Ω)	Inductance (mH)
<b>ZVR-PP Rotation Axis</b>	0.0002° <sup>(1)</sup>	40 °/s	1.8	0.71	1.7	2.8
<b>ZVR-PP &amp; PC Vertical Axis</b>	50 nm <sup>(1)</sup>	10 mm/s	1.8	0.5	4.8	4.6

<sup>1)</sup> When used with an XPS motion controller.

**Command Signals for the Stepper Motor**



Step	1	2	3	4	5	8	7	8
+ Phase 1	+	+	-	-	+	+	-	-
- Phase 1	-	-	+	+	-	-	+	+
+ Phase 2	-	+	+	-	-	+	+	-
- Phase 2	+	-	-	+	+	-	-	+
Direction	-	←	MOTION	→	+			



4.2 DC-Servo Drive Axis

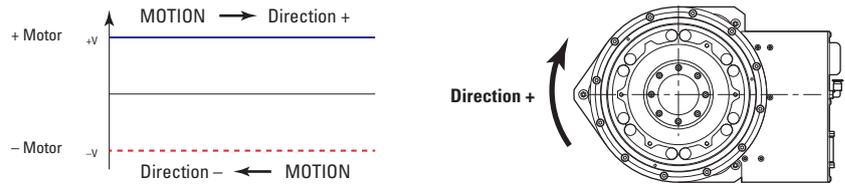
The ZVR-PC rotation axis is equipped with a DC-motor.

DC-Motor Performance Specifications and Characteristics

	Resolution (°)	Speed (°/s)	Nominal Voltage (V)	Max RMS Current (A)	Max. Peak Current (A)	Resistance (Ω)	Inductance (mH)	Tachometer Const. (V/krpm)
ZVR-PC Rotation Axis	0.002 <sup>(1)</sup>	80	48	0.9	1.8	2.58	0.52	–

<sup>1)</sup> When used with an XPS motion controller.

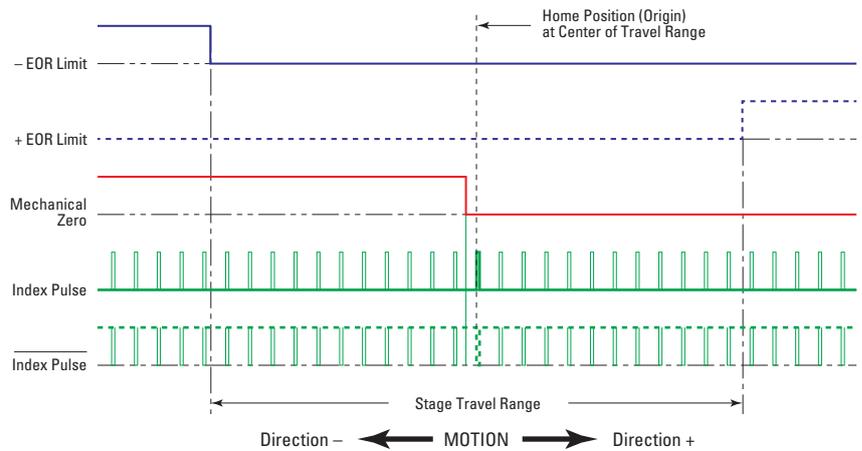
Command Signals for the DC-Motors



In the above drawings, + Motor signal is referenced to – Motor signal.

- ① When the stage moves in + Direction, the + Motor voltage is higher than – Motor voltage.
- ② When the stage moves in – Direction, the + Motor voltage is lower than – Motor voltage.

4.3 Sensor Position



End-of-Run and Mechanical Zero are 5 V open collector type.

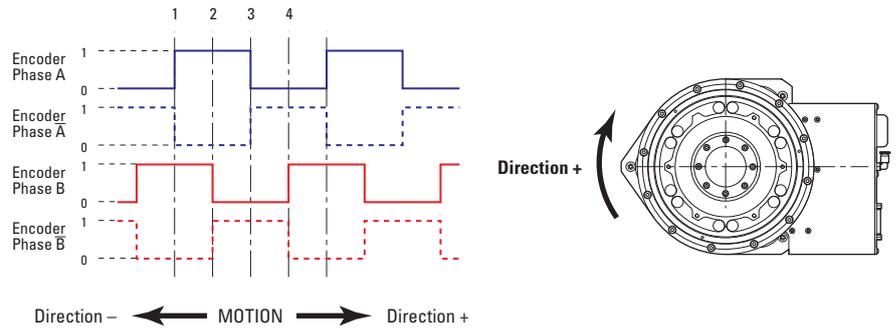
The Index Pulse provides a repeatable Home Position at ±1 step.



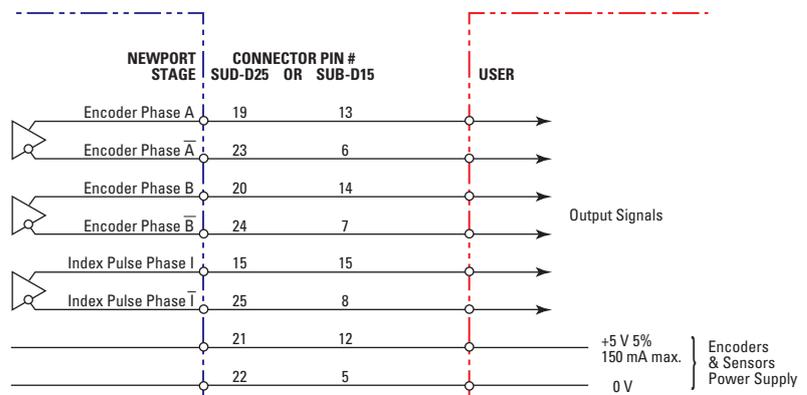
CAUTION

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

### 4.4 Feedback Signal Position



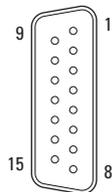
The incremental sensor consists of an optical scale and an encoder head. When the carriage moves, the encoder head generates square signals in quadrature and sends to pins #19, #20, #23 and #24 of the SUB-D25 connector.



“Encoder” and “Index Pulse” are “differential pair” (type RS-422) 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.

### 4.5 Pinouts

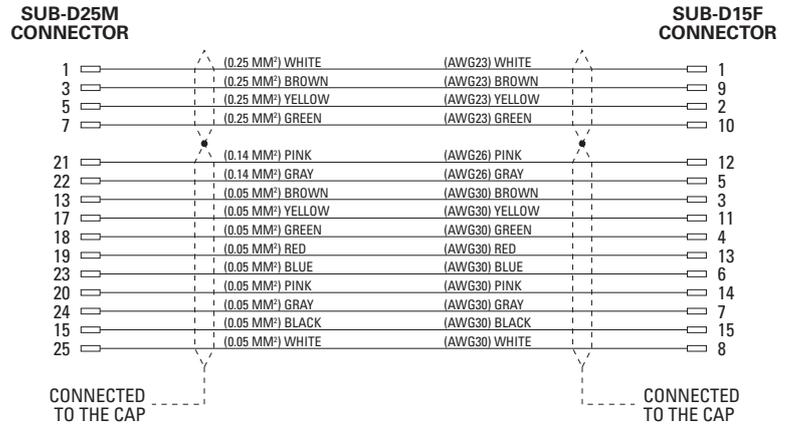
The pinout diagrams for the ZVR stages SUB-D15M connectors are shown below.



ZVR-PP (Rotation Axis)		ZVR-PP & ZVR-PC (Vertical Axis)		ZVR-PC (Rotation Axis)	
1	+ Phase 1	1	+ Phase 1	1	N.C.
2	+ Phase 2	2	+ Phase 2	2	+ Motor
3	Mechanical Zero	3	Mechanical Zero	3	Mechanical Zero
4	- End-of-Run	4	- End-of-Run	4	- End-of-Run
5	0 V	5	0 V	5	0 V
6	N.C.	6	N.C.	6	Encoder Phase /A
7	N.C.	7	N.C.	7	Encoder Phase /B
8	N.C.	8	N.C.	8	Index Pulse /I
9	- Phase 1	9	- Phase 1	9	N.C.
10	- Phase 2	10	- Phase 2	10	- Motor
11	+ End-of-Run	11	+ End-of-Run	11	+ End-of-Run
12	+5 V	12	+5 V	12	+5 V
13	N.C.	13	N.C.	13	Encoder Phase A
14	N.C.	14	N.C.	14	Encoder Phase B
15	N.C.	15	N.C.	15	Index Pulse I

4.6 MSCABLE-3 Cable

Two 3-meter MSCABLE-3 cables are supplied with each ZVR stage (see section 5.3: "Cables").



## 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.

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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**

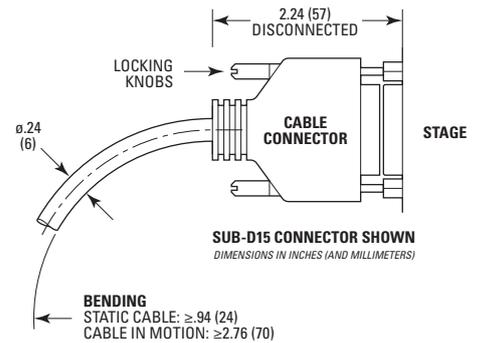


These stages are ESP compatible. Enhanced System Performance is Newport's exclusive technology that enables Newport ESP motion controllers to recognize the connected Newport ESP stage and upload the stage parameters. This ensures that the user can operate the motion system quickly and safely.

5.3 Cables

All ZVR stages are delivered with two **MSCABLE-3** 3-meter cables with a SUB-D25M connector for direct connection to Newport Controllers.

5.4 MSCABLE-3 Cable



**WARNING**

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

For applications where the standard 3-meter cable (**MSCABLE-3**) included with your stage is not adequate, Newport offers a 10-m longer length cable (**MSCAB-10**) designed to ensure the integrity of your positioning application.

**REMARK**

The cross section of the **MSCAB-10** cable is different from the one of the **MSCABLE-3** cable to allow a longer length. The **MSCAB-10** cable has the same mechanical properties as the **MCAB-10** cable.

These cables are specially shielded and terminated with Newport's standard SUB-D15 and SUB-D25 connectors.



**WARNING**

Keep the motor 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 ZVR stages when used with non-Newport controllers.

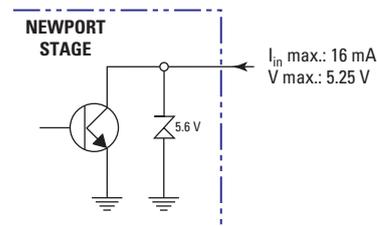
#### WARNING

Newport guarantees “CE” compliance of ZVR 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.

End-of-Runs and Mechanical Zero are open collector type with a 5.6 V protective Zener diode.



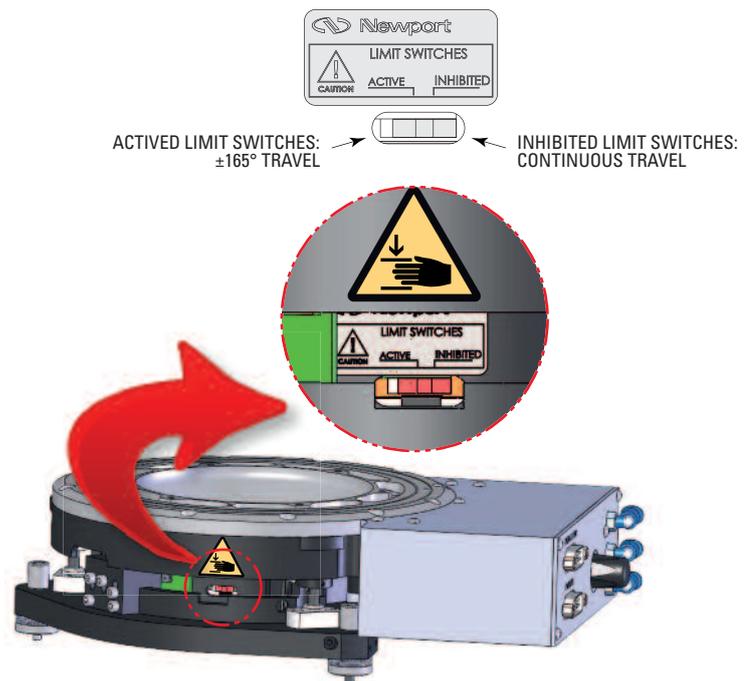
## 7.0 Disabling Limit Switches of the Rotation Axis

The rotation stage of the ZVR is equipped with optical limit switches set to  $\pm 165^\circ$ . These limit switches can be disabled for continuous 360° rotation.



### WARNING

The movement 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.



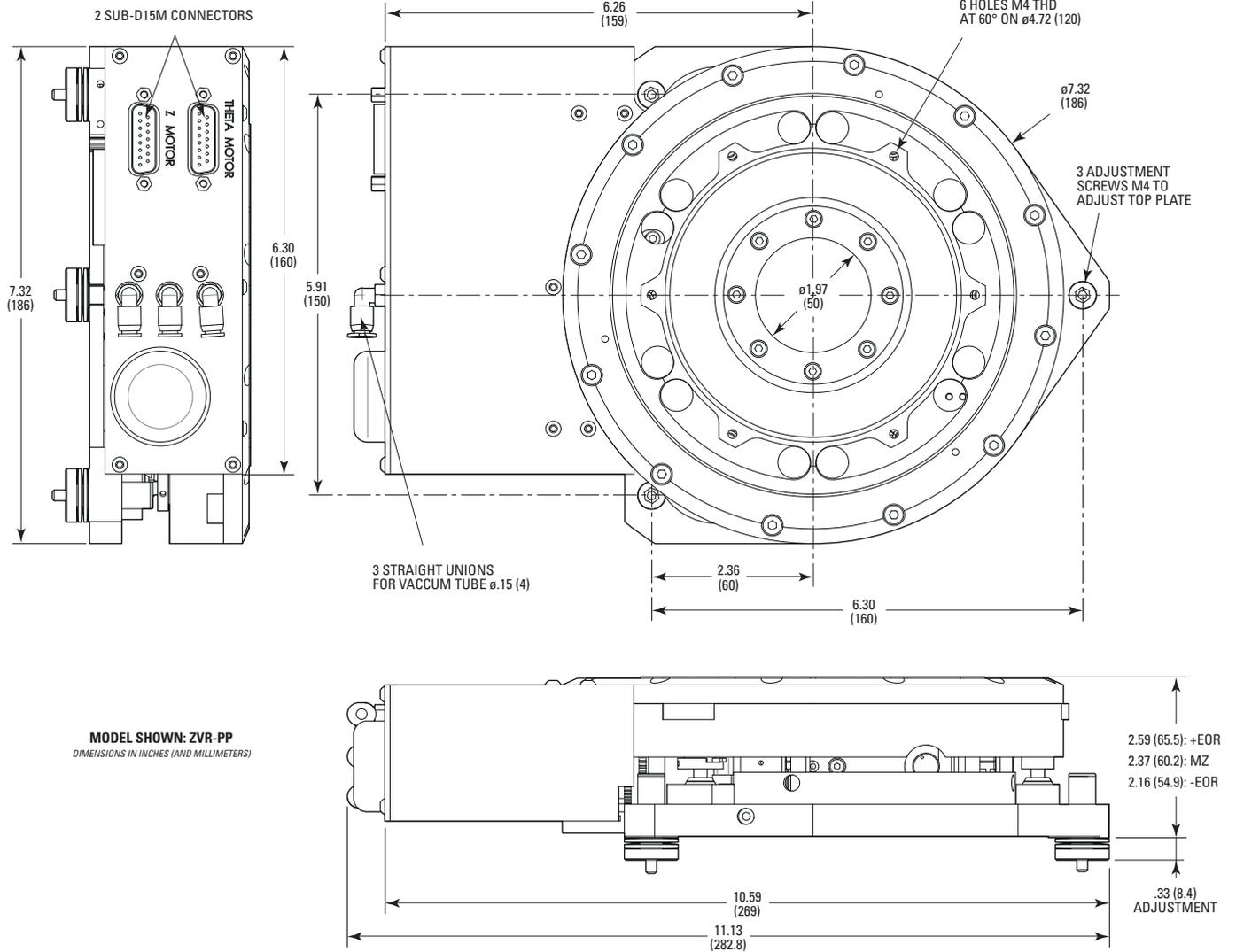
### NOTE

To access and activate or inhibit the limit switches, the Z-stage of the ZVR must be in its highest position.

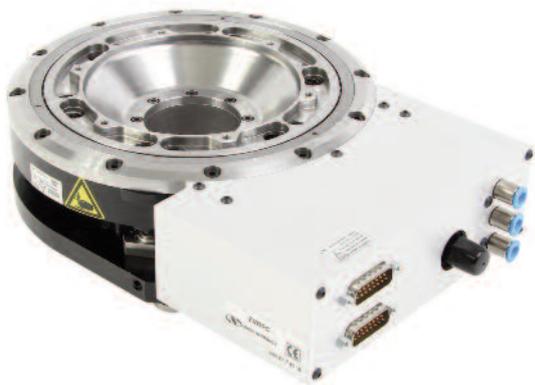
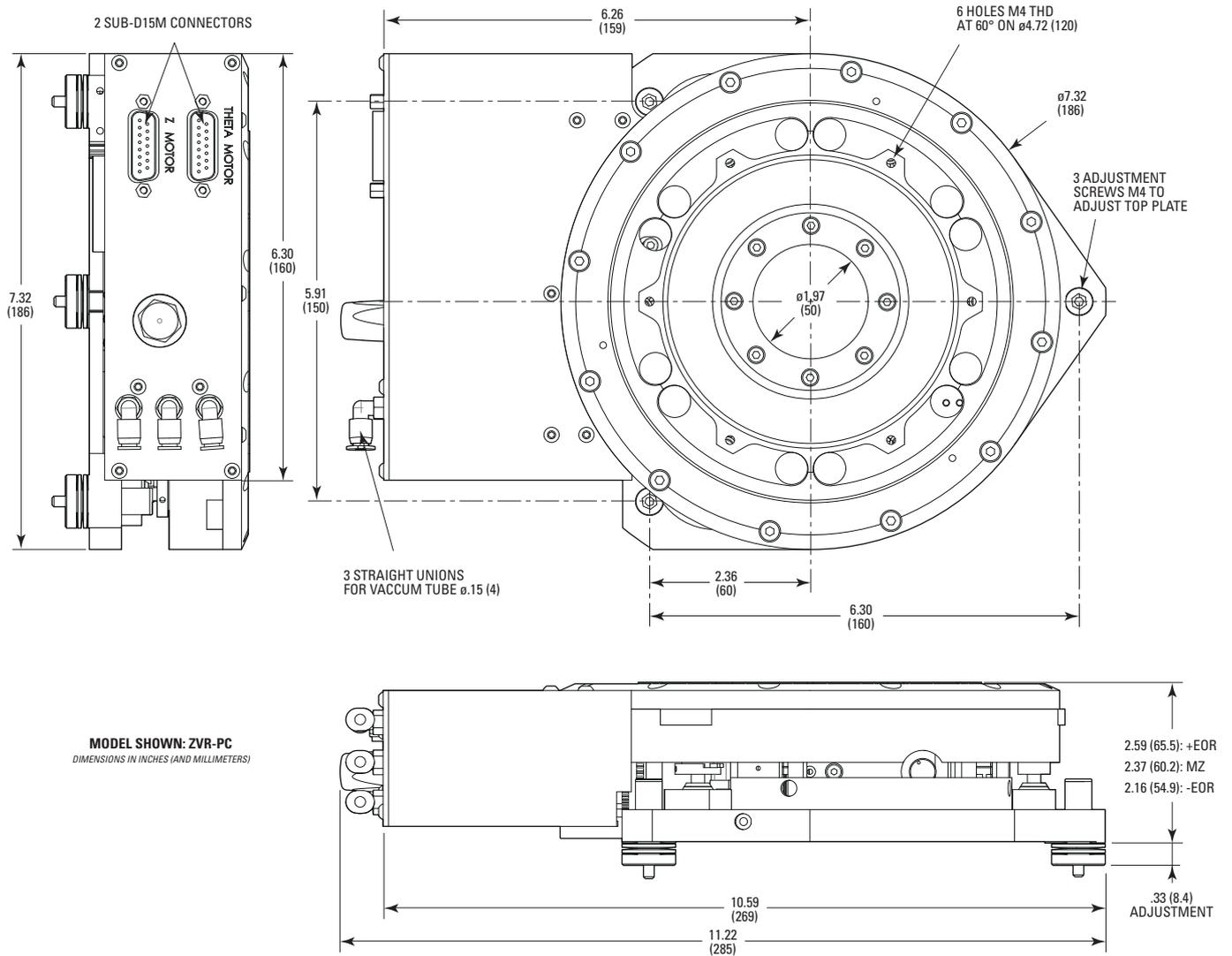
Disconnect the ZVR, then set the limit switch as required.

8.0 Dimensions

8.1 ZVR-PP Stage



8.2 ZVR-PC Stage



## 9.0 Maintenance

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### RECOMMENDATION

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

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#### 9.1 Maintenance

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

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### PRECAUTIONS

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

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### RECOMMENDATION

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

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

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#### 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.**

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

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### CAUTION

**Any attempt to disassemble or repair a stage without prior authorization will void your warranty.**

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#### 9.3 Calibration



### CAUTION

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

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