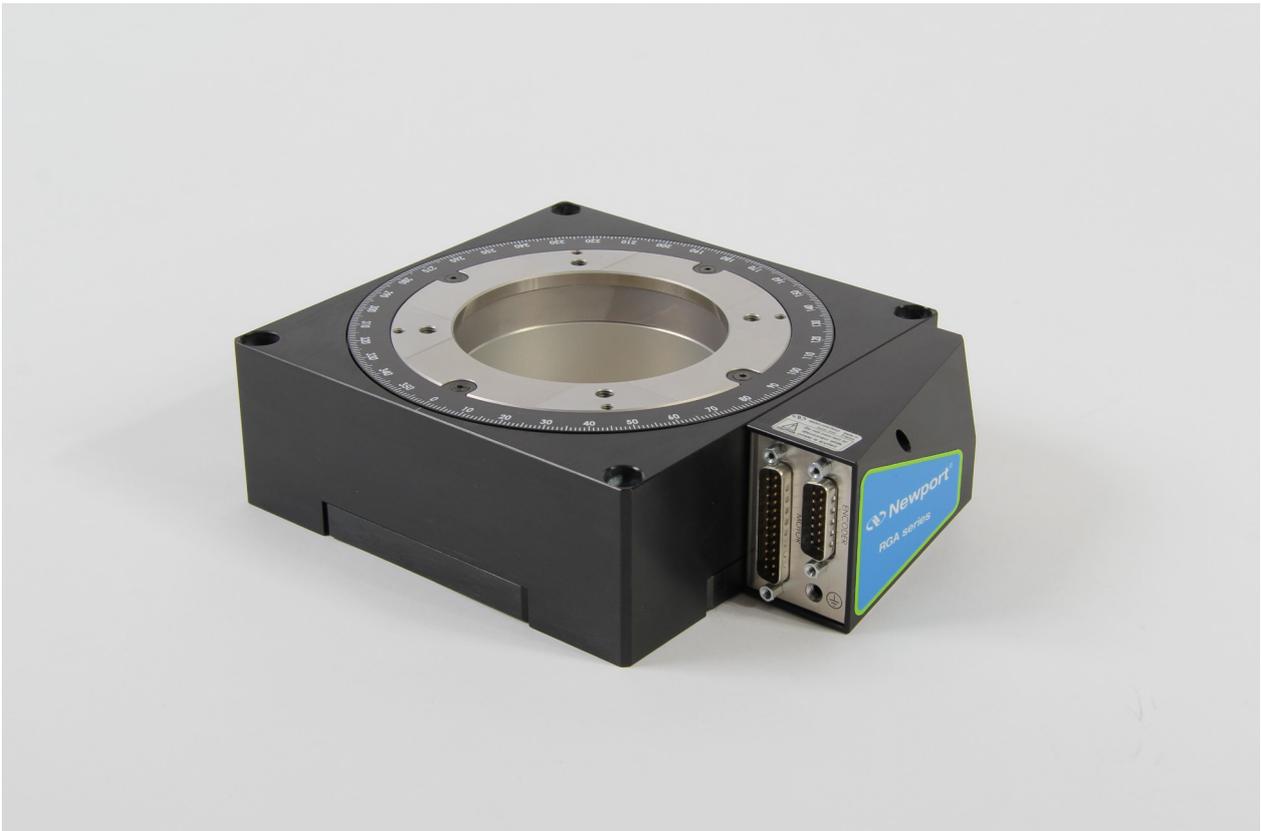


RGA Series

Low profile fast rotation stage



 **Newport®**

USER'S MANUAL

Warranty

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

To exercise this warranty, write or call your local Newport representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the 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



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.

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.

©2020 by Newport Corporation, Irvine, CA. All rights reserved.

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 publishings.

Table of Contents

	Waranty	ii
	EU Declaration of Conformity	v
	UK Declaration of Conformity.....	vi
	Definitions and Symbols	vii
	Warnings	viii
	Cautions.....	x
1.0	Introduction	1
2.0	Description	2
2.1	Design Details	3
3.0	Characteristics	4
3.1	Definitions	4
3.2	Mechanical specifications	6
3.3	Load Characteristics and Stiffness	6
3.4	Weights.....	7
4.0	Drives and Motors	7
4.1	Motor Characteristics	7
4.2	Sensors.....	7
4.3	Position Feedback Signals.....	8
4.4	Pinouts.....	8
4.4.1	Motor Connector.....	8
4.4.2	Encoder Connector	8
5.0	Installation	9
5.1	Unpacking	9
5.2	Setting up.....	9
5.3	Mounting conditions.....	10
5.4	Grounding.....	10
6.0	Connection to Newport Controllers.....	11
6.1	Warnings on Controllers.....	11
6.2	Cables	12
6.2.1	Motor cable (MCAB-5-B)	12
6.2.2	Encoder cable (E5775A).....	13
6.2.3	Longer cables.....	13
6.3	Connection.....	13
6.4	Configuration.....	14

6.5	Mapping.....	14
7.0	Connection to Non-Newport Electronics.....	15
8.0	Dimensions	16
9.0	Accessories	17
9.1	URSBK: 90° Mounting Bracket for RGA150.....	17
9.2	(M-)URS150TP: Solid Top Mounting Plate for RGA150	18
10.0	Maintenance.....	19
10.1	Maintenance	19
10.2	Lubrication	19
10.3	Repair	20
10.4	Performance verification	20
	Service Form	21

EU Declaration of Conformity



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

EU27 Declaration of Conformity

Application of Council Directive(s):

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



Standard(s) to which conformity is declared:

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

Emissions:

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

Immunity:

- EN 61000-4-2:2009 EMC/Electrostatic Discharge Immunity Test 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 61000-4-6:2014 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: Low Profile Fast Rotation Stage

Model Number(s) ⁽⁶⁾: RGA150

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: 2/25/2021

Le Cointe Hervé – Quality Director

⁴Class A, Group 2

⁶Compliance 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.

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

UK Declaration of Conformity



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

UK Declaration of Conformity

Application of Council Directive(s):

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



Standard(s) to which conformity is declared:

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

Emissions:

- CISPR 11:2015 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 61000-4-6:2014 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: Low Profile Fast Rotation Stage

Model Number(s) ⁽⁶⁾: RGA150

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: 2/25/2021

Le Cointe Hervé – Quality Director

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.

United Kingdom Conformity Assessed Mark



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

Warnings



WARNING

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

WARNING

Strongly secure this stage on its support and the payload on its carriage. The high rotation speed capacity of this product, especially with off-centered load, may brake light fastening and cause injury.

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 or particles 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 an electrical issue.

WARNING

Do not exceed the specified speed and load limitations.

Cautions

CAUTION

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



CAUTION

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

CAUTION

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

CAUTION

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

- Operating temperature: +10 to +40 °C, 45% RH max. (non-condensing)
- Storage temperature: -10 to +40 °C, 45% RH max. (non-condensing, in its original packaging)

CAUTION

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

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

CAUTION

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

CAUTION

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

CAUTION

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

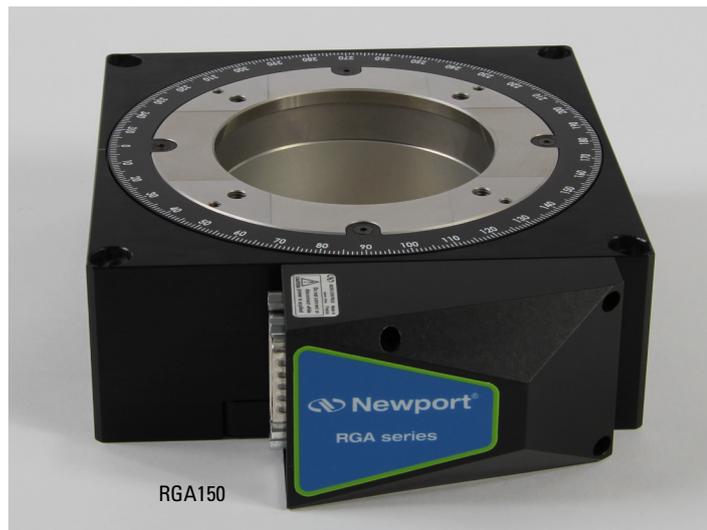


Low profile fast rotation stage

1.0 Introduction

This manual provides operating instructions for the rotation stage that you have purchased in the RGA Series:

- RGA150
- RGA150MAP (RGA150 + mapping file)
This mapping file can be introduced in the controller to improve accuracy (see §3.2 and §6.5)



Rotation stage of the RGA Series.

RECOMMENDATION

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

2.0 Description

The RGA is the latest world class rotation stage from MKS that adds to the breadth of readily-available, standard, precision stages. The RGA was designed to move fast, with a low-profile and a large aperture. It addresses the need for quick angle adjustments of wafers and vacuum chucks. Although specifically tailored to semiconductor applications, the RGA can also be utilized in other industrial applications, such as through hole imaging/inspection or laser processing, automation or any general positioning application that requires fast positioning response.

With a sub-mdeg MIM, the RGA is at the same level of positioning precision as the industry-proven RGV stages. Compared to the RGV, the lower profile RGA is able to handle faster speeds, similar MIM and loads up to the typical weight of the chuck and wafer in semiconductor wafer applications.

The excellent repeatability and mapped sub-mdeg accuracy of the RGA are a result of MKS' experience in design and precision manufacturing. Tolerances down to micron level, enable almost perfect fits on the various machined or ground components of the bearings and mounting surfaces of the motor and encoder.

Design:

With a high peak torque output direct drive motor, the RGA can achieve high accelerations needed to minimize move times. The single row bearing design is manufactured to exacting tolerances, ensuring low wobble and eccentricity, resulting lower, geometry-induced errors. This single row bearing design is an improved version of those found in other MKS rotation stages. The high resolution, non-contact encoder, enables the precise MIM and repeatability needed for semiconductor wafer applications, coupled with the high reliability required in industrial settings.

Mounting pads are included in the RGA in case the mounting surfaces are not as flat as required. These pads distribute the weight and overcome the flatness found in most commercially available isolation tables, leading to a performance close to what is achieved under ideal conditions.

Unique features:

A number of features sets the RGA apart from other direct drive rotation stages, including other MKS products. (low profile, fast rotation, large aperture for chuck utilities, less Abbe error, wider bearing, less geometric errors, so better wobble and eccentricity).

The RGA's large aperture allows more utilities through the stage and connected to the wafer chuck. More vacuum zones can be designed, ensuring a flatter wafer. With more room the strain or drag from hoses and/or cables are minimized, which increases reliability and reduces the torque/power required to accelerate. For through hole applications, this simply means larger samples can be inspected or processed.

The RGA's low profile enables the lowest possible position of the wafer relative to the XY which reduces the effect of geometrical errors from the XY and also from the RGA. This eventually improves accuracy and repeatability at the wafer level, providing better confidence in the measurements or the process. With more accurate placement of the wafer, this reduces the need to correct for these geometric errors, implying a reduction in process times.

The high torque, direct drive motor enables high accelerations for fast positioning or alignment of the wafer. High torque can overcome the friction introduced by the hoses and cable. A non-contact motor means no wear of the motor components, ensuring reliable operations for years. Fine

magnet pitch enables higher MIM capability for those precise positioning application needs.

Fast rotation and high acceleration enables faster completion of the process, whether this is patterning, testing, inspection or repair of the wafer. The response and settling times are also optimized with the structural design of the RGA. All these enable faster throughputs.

The RGA uses non-contact motor and encoders, which not only provides the speed, MIM and repeatability, but also improves reliability, since there is no wear in these components. This minimizes the long term operating costs.

ESP technology, plug and play for quick and safety setups contributes to the lower Cost of Ownership. Since stage parameters are already configured in the XPS controller, there is very little amount or need to adjust the operating parameters to begin using the stage quickly and more importantly, safely.

Like all MKS motorized products, each RGA is shipped with a free test report that documents the positioning performance of each individual unit meeting the published specifications. For higher accuracy, a mapped version RGA150MAP is available.

Value:

In summary, the design, features and resulting performance of the RGA ensures fast and reproducible processes. Reliability also increases due to the non-contact components. All these reduces risk in a production setting and also overall operating cost.

2.1 Design Details

Base Material	Aluminum body
Bearings	Large diameter steel ball bearings
Drive mechanism	High torque & speed brushless DC motor with rare earth magnet
Feedback	On-axis encoder
Limit switches	None: continuous movement
Origin	Optical index pulse, fixed at position 0°

3.0 Characteristics

3.1 Definitions

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

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

Accuracy

- **Absolute Accuracy**

Difference between ideal position and real position.

- **On-axis accuracy**

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

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

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

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

Repeatability

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

Reversal Error (Hysteresis)

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

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

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

The other following parameters can also be evaluated:

Minimum Incremental Motion (MIM or Sensitivity)

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

Resolution

The smallest increment that a motion device can theoretically move and/or detect. Resolution is not 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.

Guaranteed and Typical Specifications

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

3.2 Mechanical specifications



	RGA150
Travel range (deg)	360 continuous
Minimum Incremental Motion, typical ⁽¹⁾⁽³⁾ (mdeg)	0.01
Uni-directional repeatability, typical ⁽¹⁾⁽³⁾ (mdeg)	±0.035
Bi-directional repeatability, typical ⁽¹⁾⁽³⁾ (mdeg)	±0.0975
Accuracy, typical (guaranteed) ⁽¹⁾⁽³⁾ (mdeg)	±4 (±8)
Mapped accuracy, guaranteed ⁽¹⁾⁽³⁾⁽⁴⁾ (mdeg)	±1
Maximum speed ⁽³⁾ (deg/s - rpm)	1800 - 300
Maximum acceleration	See curves below
Inertia (no load) (kg.m ²)	0.0062
Static Bearing Drag Torque ⁽⁵⁾ (N.m)	0.4
Dynamic Bearing Drag Torque ⁽⁵⁾ (N.m/deg/s)	.001
Wobble, typical (guaranteed) ⁽¹⁾⁽²⁾ (μrad)	±12 (±26)
Eccentricity, typical (guaranteed) ⁽¹⁾ (μm)	±0.5 (±1)
MTBF (1800 deg/s, 25% load capacity, 30% duty cycle) (h)	20,000

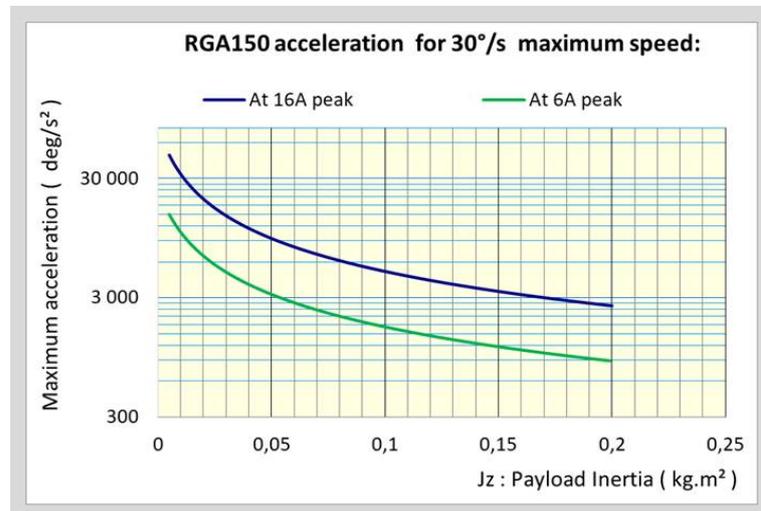
¹⁾ For the definition of Typical and Guaranteed specifications see "Motion Basics Terminology & Standards" Tutorial at www.newport.com

²⁾ To obtain arcsec units, divide μrad value by 4.8.

³⁾ With XPS-DRV11 Drive, maximum value is driver dependent. Contact Newport for additional information.

⁴⁾ Require ordering RGA150MAP

⁵⁾ Total Drag Torque = 0.4 + Speed/1000



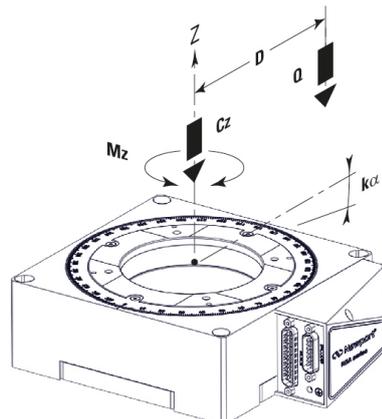
At 6A peak (XPS-DRV11) – At 16A peak (external driver)



CAUTION

To reach specifications stated, stages must be fixed on a surface compliant with section 5.3 "Mounting conditions".

3.3 Load Characteristics and Stiffness



	RGA150
Cz, Normal centered load capacity (N)	50
Kα, Transversal compliance (μrad/Nm)	5
Max. transverse dynamic moment (Nm)	11
Mz, Maximum torque @ 0 deg/s (Nm)	2.25
Q, Off-center load	$Q \leq Cz \div (1 + D/55)$
Where	
D = Cantilever distance in mm	

**CAUTION**

When a RGA150 rotation stage is integrated in an assembly or in a system, vibrating events due to the rotation of an off-center load at a high speed must be taken into account.

These event amplitudes may damage RGA150 rotation stage specifications, or even damage assembly or system specifications.

3.4 Weights

The stage weights indicated below do not include the cables.

	Mass [lb (kg)]
RGA150	9.9 (4.5)

4.0 Drives and Motors

4.1 Motor Characteristics

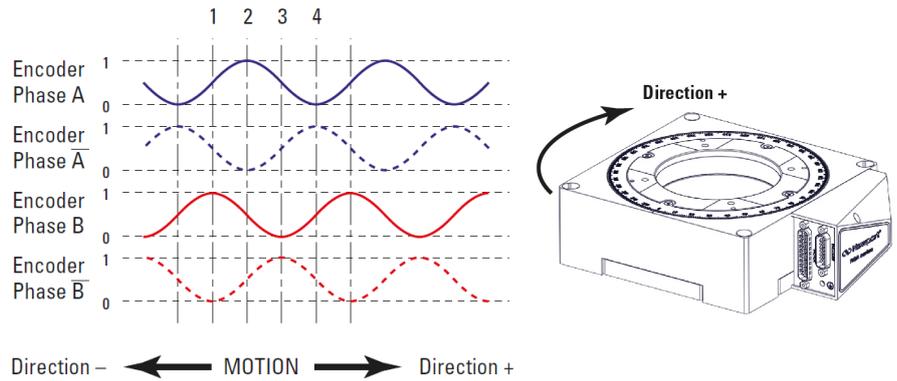
RGA stages are equipped with a brushless DC-motor (Torque motor) and a high-resolution scale encoder.

	RGA150
Design voltage V_p (V)	48
Magnet pitch (Commutation period) (deg)	10
Motor constant S ($N^2 \cdot m^2 / W$)	0.38
Motor torque constant K_t (N.m/A)	1.07
Back-emf constant (V/rpm)	0.092
Motor resistance per phase (Ω)	1.03
Motor inductance per phase (mH)	2.45
Thermal resistance R_{th} ($^{\circ}C/W$)	0.23
Motor thermal time constant τ_{th} (s)	22
Max. speed @ V_p (rpm)	300
Peak current [with XPS-DRV11] (A)	16 [6]
Peak torque [with XPS-DRV11] (N.m)	11 [4.1]
Max. rms current [with XPS-DRV11] (A)	7.3 [3]
Max. rms torque [with XPS-DRV11] (N.m)	5.5 [2.25]

4.2 Sensors

The RGA stages include neither Mechanical Zero sensor nor End-of-Run sensor.

4.3 Position Feedback Signals

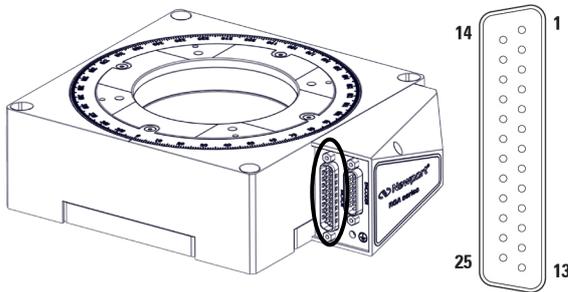


The incremental sensor consists of an optical scale and an encoder head. When the carriage moves, the encoder head generates signals in quadrature and sends them to the pins of the encoder connector.

4.4 Pinouts

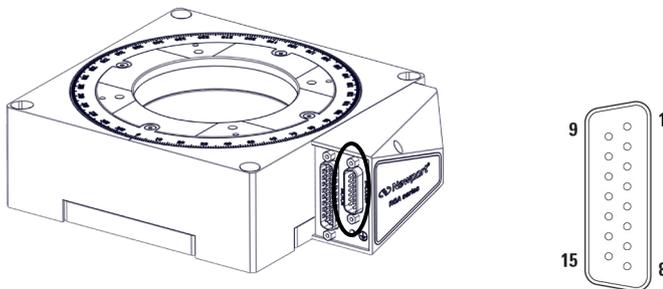
The pinout diagrams for RGA stage connectors are shown below.

4.4.1 Motor Connector



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

4.4.2 Encoder Connector



SUB-D15M	
1	Encoder Phase A
2	GND
3	Encoder Phase B
4	+5V
5	N.C.
6	N.C.
7	Index Pulse /I
8	N.C.
9	Encoder Phase /A
10	N.C.
11	Encoder Phase /B
12	N.C.
13	Do not connect
14	Index Pulse I
15	Do not connect

5.0 Installation

5.1 Unpacking

The RGA stages are delivered in packaging designed for safe transport. To remove the stage from packaging, carefully lift the handle installed in the middle.



NOTE

A 2.5mm Allen key is supplied for CHC M3 and BHC M4 screws.

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

5.2 Setting up

Once the product is in place, remove the handle (2 BHC M4x10) and store for future handling.



CAUTION

Remove the handle before using an RGA stage.



5.3 Mounting conditions

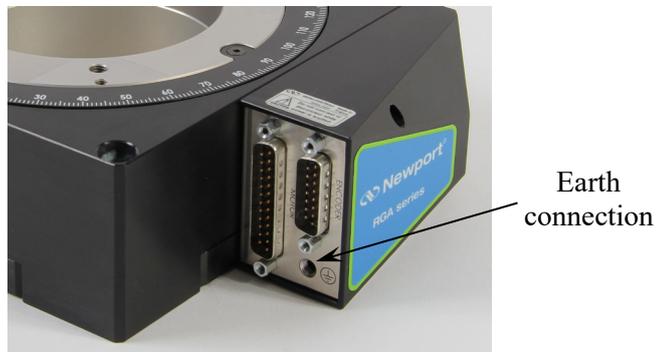
The RGA stage features special four-point mounting surfaces. While the compactness of its body provides good stiffness, it is recommended that the mounting conditions below are followed for best performance.

Installation considerations

Mounting surface flatness (top or bottom mounting)	10 μm
Payload surface flatness (top or bottom mounting)	5 μm
Mounting screw torque	M6: 7 N.m M4: 2 N.m

5.4 Grounding

It is recommended to connect RGA stages to earth to drain potential electromagnetic disturbances. See connection point (threaded hole for M5 screw) for this purpose.



6.0 Connection to Newport Controllers

NOTE

RGA Series stages are intended to be used with Newport XPS-D controller and XPS-DRV11 driver card.

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 operates with voltages that can be lethal.

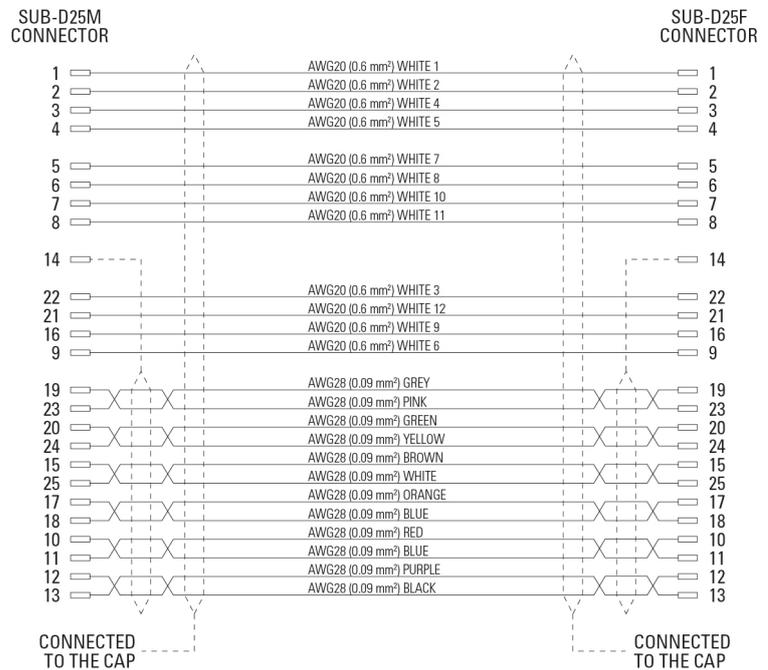
Pushing objects of any kind into cabinet slots or holes, or spilling any liquid on the product, may touch hazardous voltage points or short out parts.

6.2 Cables

All RGA stages are delivered with two cables for direct connection to XPS-D controller and XPS-DRV11 driver card. The wiring diagrams and connectors for these cables are provided below.

6.2.1 Motor cable (MCAB-5-B)

- Length: 16.4 ft (5 m)
- Connectors:
 - Stage side: SUB-D25F
 - Controller side: SUB-D25M
- Outer diameter: .39 in (10 mm)
- Min. static bending radius: 1.50 in (38 mm)
- Min. dynamic bending radius: 3.78 in (96 mm)



6.2.2 Encoder cable (E5775A)

- Length: 16.4 ft (5 m)
- Connectors:
 - Stage side: SUB-D15F
 - Controller side: SUB-D26HDM
- Outer diameter: .24 in (6 mm)
- Min. static bending radius: .79 in (20 mm)
- Min. dynamic bending radius: 2.95 in (75 mm)



6.2.3 Longer cables

For applications where the standard 5-meter cables included with your rotation stage are not adequate, Newport offers longer length cables designed to ensure the integrity of your positioning application.

These cables are especially shielded and terminated with Newport's standard SUB-D connectors. They are available in 10-meter length (**MCAB-10-B** for motor and **E5772A** for encoder)



WARNING

The RGA Series stages operate only with 10-meter max. cables.

6.3 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.

Plug both cables on the stage sockets.

At the other ends, plug motor connector on driver card, and encoder connector on the corresponding controller encoder socket.



WARNING

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

WARNING

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

NOTE



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

6.4 Configuration

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

$$ScalingAcceleration \left(\frac{deg}{s^2} \right) = \frac{277.441}{(0.00622 + L)}$$

$$AccelerationLimit \left(\frac{deg}{s^2} \right) = 0.8906 \cdot ScalingAcceleration$$

Where L = Inertia of the payload (kg/m²)

More details on these parameters can be found in XPS-D Configuration manual. See also "Methods for determining an optimized scaling acceleration value" Technical Application Note posted on the RGA product page at www.newport.com.

IMPORTANT

For optimum performance, it is important to configure the XPS controller with the weight/inertia on the RGA rotation stage.

6.5 Mapping

For RGA150MAP, a CD Rom including the error compensation mapping file is provided.

Refer to XPS-D Features Manual to introduce this file and activate this function in the controller.

7.0 Connection to Non-Newport Electronics

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

WARNING

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

WARNING

Newport guarantees “CE” compliance of RGA stages only if used with the Newport cable and an XPS-D controller.



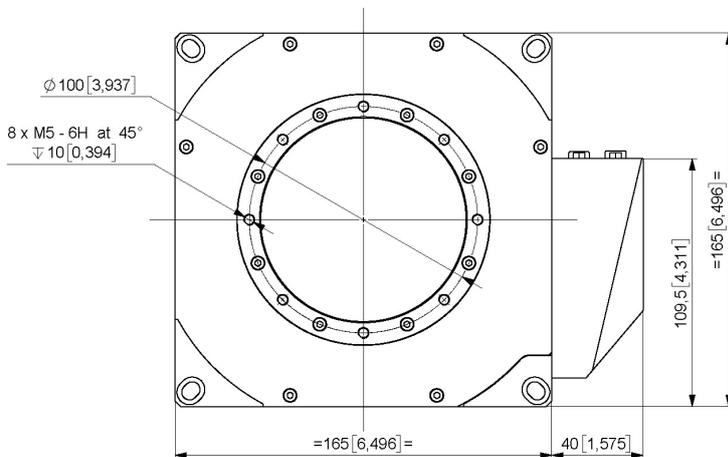
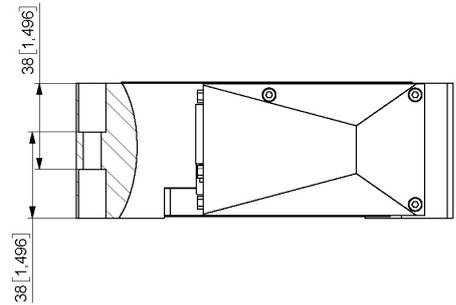
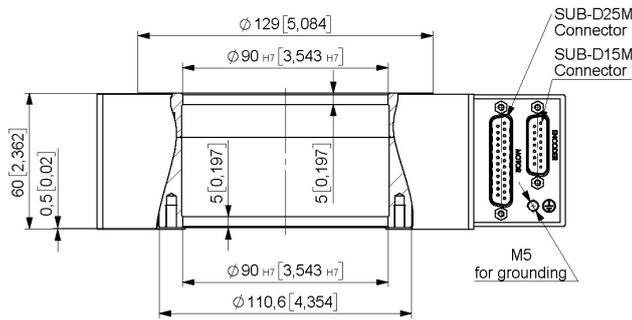
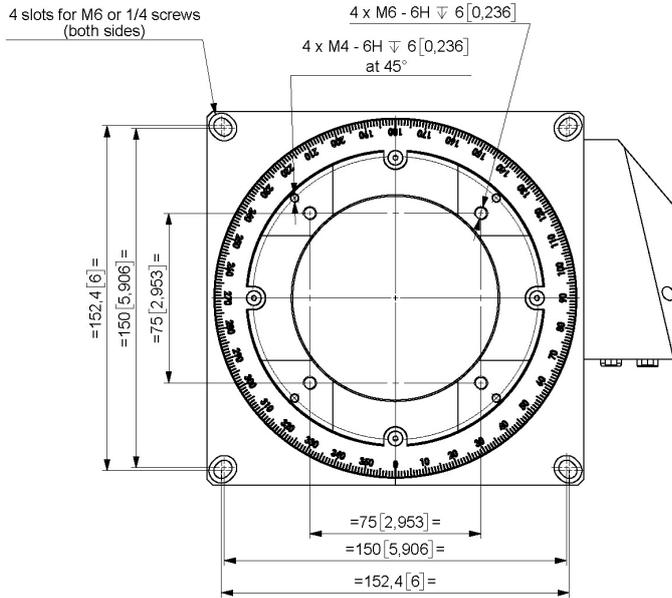
It is the customer's responsibility to modify the cables and take care of signal connections, when using the stage with non-Newport controllers.

WARNING

Maximum motor peak voltage per phase: 48V

Maximum motor rms current per phase: 7.3A

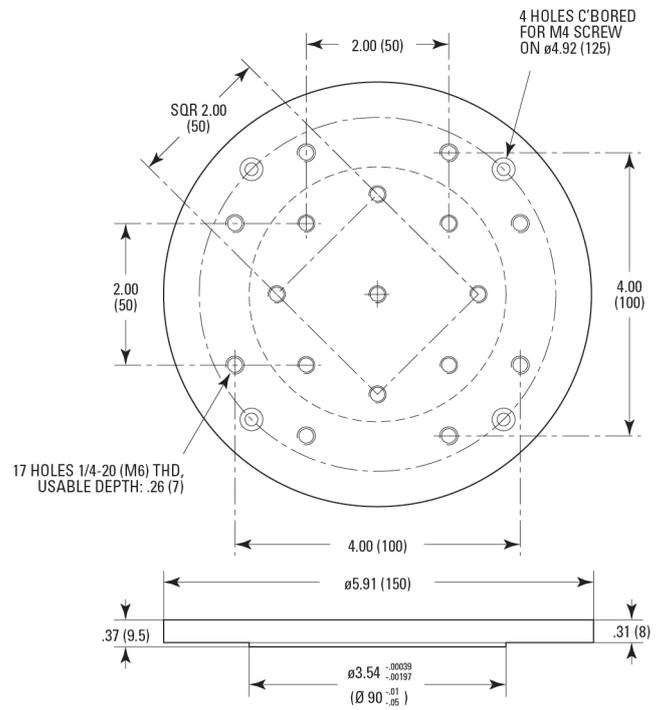
8.0 Dimensions



9.2 (M-)URS150TP: Solid Top Mounting Plate for RGA150

Material: stainless steel

Treatment: none



10.0 Maintenance

RECOMMENDATION

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

10.1 Maintenance

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

PRECAUTIONS

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

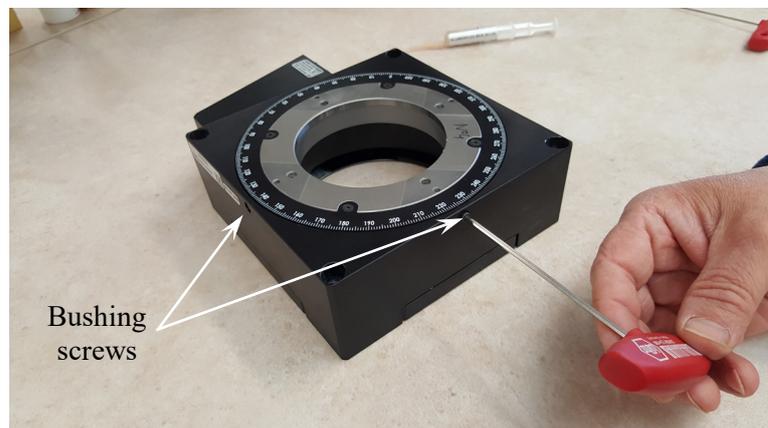
10.2 Lubrication

CAUTION

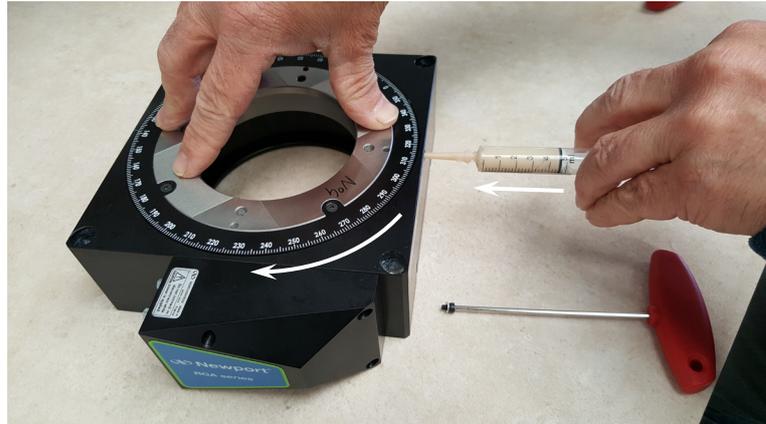
It is recommended to re-lubricate your RGA stage every 2000 hours (@ 30% Duty Cycle) or every year, whichever occurs first.

A syringe containing 2.5ml of KLUBERPLEX BEM 34-132 grease is provided with each stage.

- Depending on your system configuration, remove the more accessible of both CHC bushing screws



- Insert the syringe needle as deep as possible into the greasing hole and keep pressed against the stage



- Manually or using the motor, rotate the carriage while slowly injecting 0.5ml of grease (perform at least 4 complete rotations during grease injection)
- Remove the syringe and reinstall the CHC M3x3 screw

CAUTION

After 5 lubrication sequences, it will be necessary to return your RGA stage to Newport to perform a complete cleaning and grease replacement.

10.3 Repair

CAUTION



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

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

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



CAUTION

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

10.4 Performance verification



CAUTION

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



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

Tel.: +33 (0)1.60.91.68.68
e-mail: france@newport.com

Technical Support

e-mail: tech_europe@newport.com

Service & Returns

Tel.: +33 (0)2.38.40.51.55

