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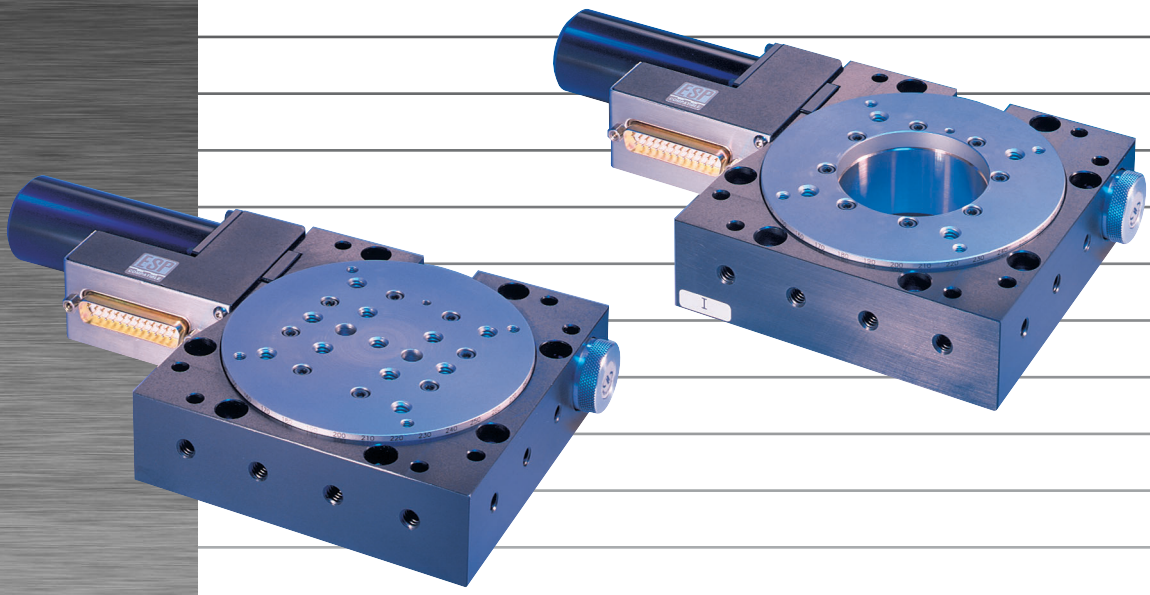
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Find the *Newport 495CC* at our website: *Click HERE*

(M-)495CC
(M-)495ACC

Rotation Stages



USER'S MANUAL

Newport®

www.newport.com

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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 rotation stage greater than maximum specified load.**
  - **Carriage speed higher than specified speed.**
  - **Improper grounding.**
    - ¬ **Connectors must be properly secured.**
    - ¬ **When the load on the rotation stage represents an electrical risk, it must be connected to ground.**
  - **Excessive or improper cantilever loads.**
- **Modification of the rotation stage or any part.**

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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We declare that the accompanying product, identified with the "CE" mark, meets all relevant requirements of Directives:

- 73/23/EEC, for Low Voltage Compatibility.
- 89/336/EEC for Electromagnetic Compatibility.

Generic standard:

Emission: NF EN61326-1, for measurement, lab and control equipment.

Immunity: NF EN61326-1, for measurement, lab and control equipment.

Safety: EIC 1010-1, safety standards for measurement, lab and control equipment.

Newport Corporation shall not be liable for damages when using the product:

- Modification of the product.
- Using modified connector, or modified or not supplied cables.
- Connecting this product to non-CE equipment.

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Warnings

WARNING

The rotation 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.

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Cautions

CAUTION

Do not place this stage in a hostile environment such as X-Rays, hard UV,... or in a vacuum environment less than 10^{-2} Torr.

CAUTION

Do not place this stage in a location affected by dust, oil fumes or steam. 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 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.

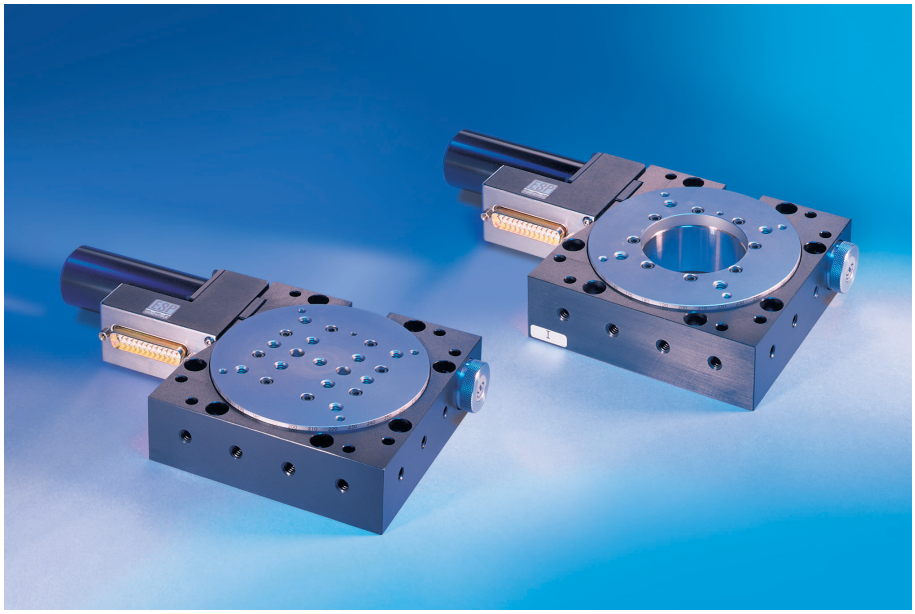
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Rotation Stages (M-)495CC/ACC

1.0 Introduction

This manual provides operating instructions for the rotation stage that you have purchased in the (M-)495CC/ACC Series:

- (M-)495CC
- (M-)495ACC



(M-)495CC and (M-)495ACC rotation stages.

RECOMMENDATION

We recommend you read carefully the chapter “Connection to electronics” before using the (M-)495CC/ACC rotation stage.

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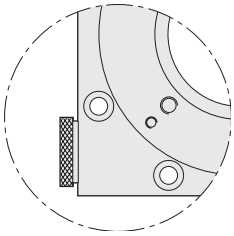
2.0 Description

The (M-)495CC rotation stages are a cost-effective performance alternative to the precision (M-)URM100 rotation stages. They employ a lowprofile design with highly flexible mounting grid for horizontal or vertical mounting.

(M-)495CC stages incorporate a hardened and ground worm compliantly loaded against a precision cut self-lubricating worm wheel for continuous smooth travel. Compliant loading minimizes inherent drivetrain backlash, limiting it to 0.015°. The worm wheel is held in a large diameter crossed-roller bearing to minimize wobble and play.

A precision optical encoder is hard mounted to the worm and reads position to 0.001° resolution. Coarse angular readout is provided by a stage mounted scale graduated in degrees. The (M-)495CC includes limit switches and a home switch. If desired, the limit switches can be disabled to provide continuos 360° rotation.

All (M-)495CC/ACC Series stages are equipped with a knurled knob for a manual control when motor power is off.



The (M-)495ACC version is available with an aperture allowing a light beam to pass over the stage.

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

The (M-)495CC/ACC Series rotation stages are supplied with a 3-meter cable for connection to our motion controllers.

2.1 Design Details

Base Material	Stainless steel with aluminum body
Bearings	Crossed-roller bearings
Drive Mechanism	Ground worm gear with self compliant preload
Worm Gear Ratio	1:180
Feedback	Worm mounted rotary encoder, 2000 pts/rev., index pulse
Limit Switches	Optical, at ±170°, can be disabled for continuous 360° rotation (1)
Origin	Optical
Motor	DC-servo motor UE31CC

1) See section: "Disabling of Limit Switches".

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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:

Absolute Accuracy = On-Axis Accuracy + Slope x 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 rotation stage can achieve. Our rotation 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 rotation stage can measure.

Concentricity

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.

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 rotation stage is tested with a precision optical encoder.

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

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3.2 Mechanical Specifications

Travel Range	(°)	360 continuous [1]
Resolution	(°)	0.001
Minimum Incremental Motion	(°)	0.003
Uni-directional Repeatability	(°)	0.006
Reversal Value (Hysteresis)	(°)	0.015
Origin Repeatability	(°)	0.002
Absolute Accuracy	(°)	0.05
Maximum Speed	(°/sec)	2.5
Normal Load Capacity	(N)	250
Wobble	(µrad)	150

1) With disabled limit switches, see section: "Disabling of Limit Switches".

3.3 Load Specification Definitions

Normal Load Capacity (Cz)

Maximum load a rotation stage can move while maintaining specifications.

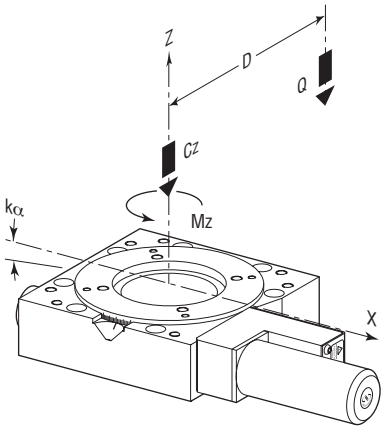
This value is given with speed and acceleration specified for each rotation stage, and with a load perpendicular to bearings.

Off-Centered Load (Q)

Maximum cantilever-load a rotation stage can move: $Q \leq Cz / (1 + D/44)$

D: Cantilever distance.

3.4 Load Characteristics and Stiffness



Cz	(N)	250
kαx	(µrad/N.m)	20
Mz	(N.m)	1.8

Q: Off-center load, $Q \leq Cz / (1 + D/44)$

Cz: Normal center load capacity on bearings

D: Cantilever distance in mm

kα: Transversal stiffness

Mz: Nominal Torque

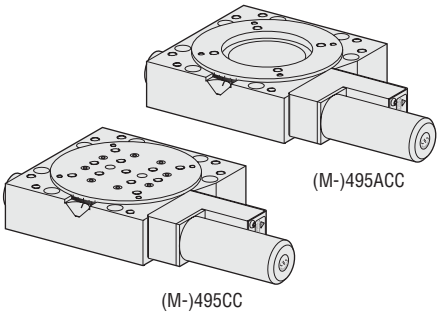
3.5 Rotation Stage Weights

The weights indicated into the below table is an average value for rotation stages with a typical drive unit installed.

(M-)495CC/ACC	[lb (kg)]	4.4 (2)

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4.0 Drive



4.1 DC-Servo Drive Version

(M-)495CC/ACC rotation stages are driven with a DC-motor enabling an angular speed to 2.5 °/sec. These stages offer a cost effective performance alternative to those who have precision positioning needs with budget limitations.

Performance Specifications

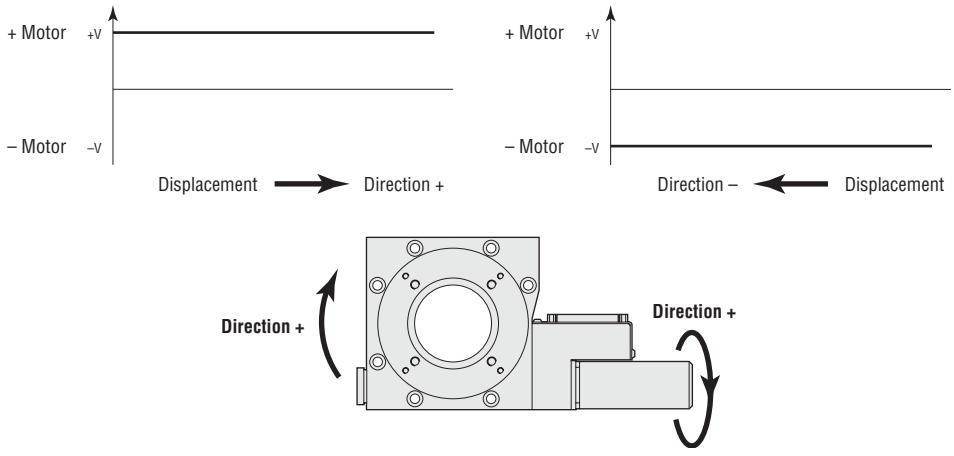
	Resolution (°)	Speed (°/sec)	Motor
(M-)495CC/ACC	0.001	2.5	UE31CC

5.0 Motor

5.1 UE31CC DC-Motor Characteristics

Motor	Mechanical Power (W)	Nominal Voltage (V)	Armature Resistance (Ω)	Inductance (mH)
UE31CC	2.53	24	57	1.6

5.2 Command Signals for the DC-Motor



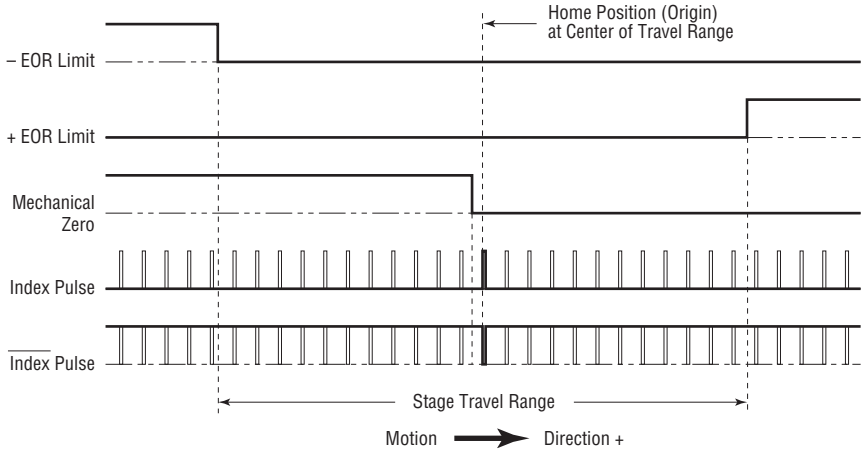
In the above drawings, + Motor signal is referred to – Motor signal.

❶ When the stage moves in + Direction, the + Motor voltage is higher than – Motor voltage.

❷ When the stage moves in – Direction, the + Motor voltage is lower than – Motor voltage.

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5.3 Sensor Position



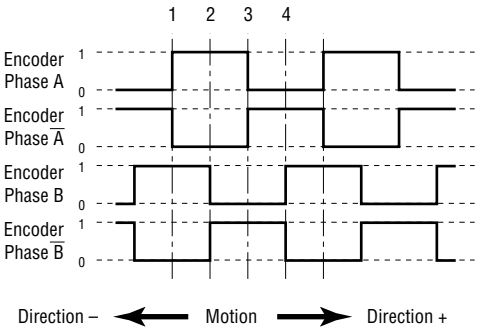
End-of-Run and Mechanical Zero are TTL type: 5 V ±5%, 2 mA max.

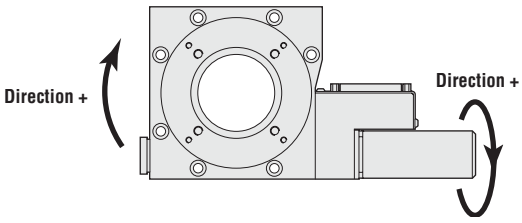
Use of the Index Pulse provides a repeatable Home Position at ±1 step.

CAUTION

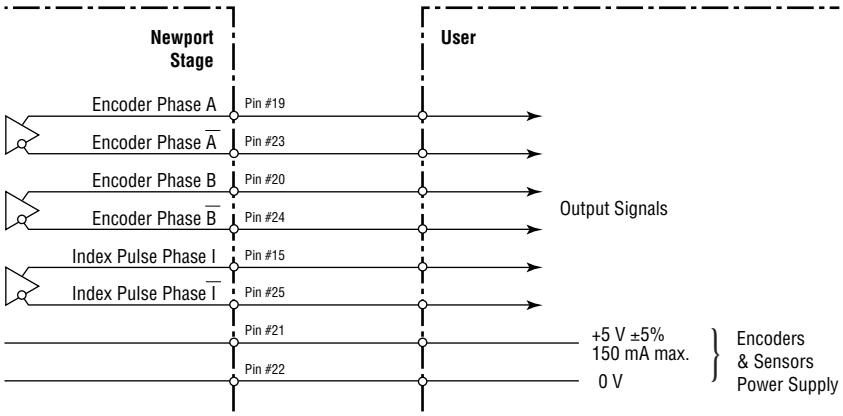
"End-of-Run" and "Mechanical Zero" are active signals and should not be connected to any other source. Use appropriate TTL type receivers.

5.4 Feedback Signal Position





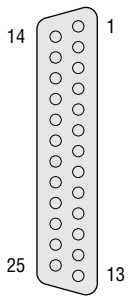
The incremental sensor operates following the photoelectric measurement principle, with a disk including slides. When the sensor shaft turns, the sensor generates square signals in quadrature, sent to pins #19, #20, #23 and #24 of the 25-pin Sub-D connector.



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5.5 Pinouts

The 25-pin Sub-D connection for the (M-)495CC/ACC rotation stages is given in the following table:



	UE31CC: (M-)495CC/ACC		
1	N.C.	**14**	Shield Ground
2	N.C.	**15**	Index Pulse I
3	N.C.	**16**	0 V logic
4	N.C.	**17**	+ End-of-Run
5	+ Motor	**18**	– End-of-Run
6	+ Motor	**19**	Encoder Phase A
7	– Motor	**20**	Encoder Phase B
8	– Motor	**21**	Encoder Power: +5 V
9	N.C.	**22**	0 V Encoder
10	N.C.	**23**	Encoder Phase /A
11	N.C.	**24**	Encoder Phase /B
12	N.C.	**25**	Index Pulse /I
13	Mechanical Zero		

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6.0 Connection to Newport Controllers

6.1 Warnings on controllers

Controllers are intended for use by qualified personnel who recognize shock hazards and are familiar with safety precautions required to avoid possible injury. Read the controller user's manual carefully before operating the instrument and pay attention to all written warnings and cautions.

WARNING

Disconnect the power plug under the following circumstances:

- **If the power cord or any attached cables are frayed or damaged in any way.**
- **If the power plug is damaged in any way.**
- **If the unit is exposed to rain, excessive moisture, or liquids are spilled on the unit.**
- **If the unit has been dropped or the case is damaged.**
- **If you suspect service or repair is required.**
- **Whenever you clean the electronics unit.**

CAUTION

To protect the unit from damage, be sure to:

- **Keep all air vents free of dirt and dust.**
- **Keep all liquids away from the unit.**
- **Do not expose the unit to excessive moisture (>85% humidity).**
- **Read this manual before using the unit for the first time.**

WARNING

All attachment plug receptacles in the vicinity of this unit are to be of the grounding type and properly polarized.

Contact your electrician to check your receptacles.

WARNING

This product is equipped with a 3-wire grounding type plug.

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

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

WARNING

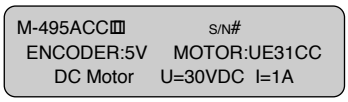
This product operates with voltages that can be lethal.

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

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6.2 Connection

On each rotation stage is represented a label which indicates its name, its serial number and the motor it is equipped with (ex.: UE31PP).



WARNING

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

Rotation stages may be connected to the rear panel motor connectors labeled “Motor…” any time prior to power-up with the supplied cable assemblies.

WARNING

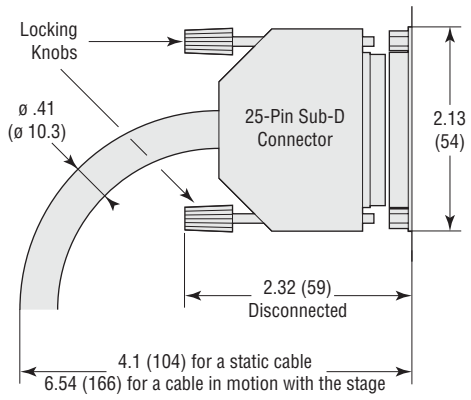
With MM series controllers, damage to rotation stage may occur if the rotation stage is not the same type as shown on driver label located near the rotation stage interface connector.

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

6.3 Cables

Our (M-)495CC/ACC rotation stages are delivered equipped with a 3-meter cable with 25-pin Sub-D connectors so they can be directly connected to our controllers/drivers of MM or ESP series.

Dimensions in inches (millimeters)



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 (**MMCABLE-3**) included with your rotation stage is not adequate, Newport offers longer length cables designed to ensure the integrity of your positioning application.

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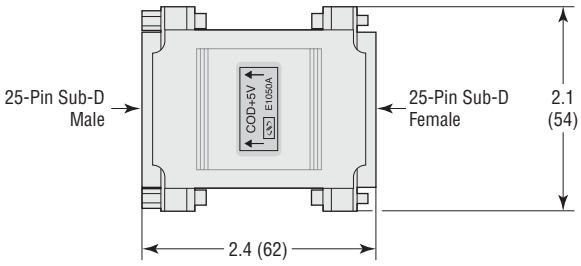
These cables are specially shielded and terminated with Newport's standard 25-pin sub-D connectors. They are available in 5-m (**MMCABLE-5**), 7-m (**MMCABLE-7**) or 10-m (**MMCABLE-10**) lengths.

WARNING

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

For cable lengths in excess of 3 meters, we recommend the **MMCABLE-REG** to ensure a high quality, regulated 5 V supply to the rotation stages.

Dimensions in inches (millimeters)



This regulator is available as an option. Please note that for best efficiency, this regulator should be attached to the stage to re-adjust the 5 volts coming from the controller through the long cable.

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7.0 Connection to Non-Newport Controllers

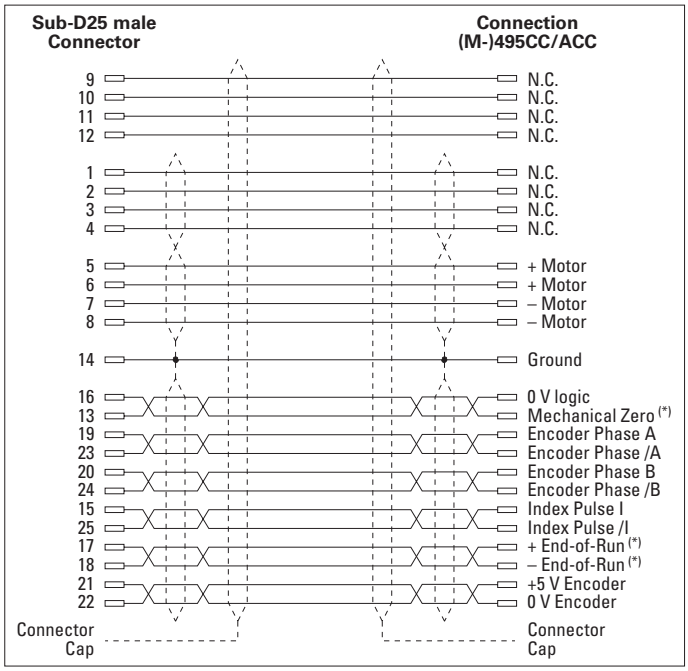
WARNING

Newport takes no responsibility for improper functioning or damage of a rotation stage when it is used with any non- Newport controllers.

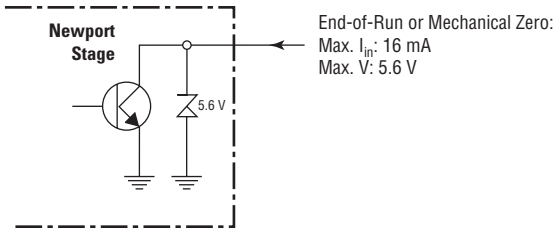
WARNING

Newport guarantees the "CE" compliance of the (M-)495CC/ACC rotation stages only if they are used with Newport cables and controllers.

Nevertheless, the figure below indicates the recommended wiring when a (M-)495CC/ACC rotation stage is used with non-Newport controllers.



*** Open collector type with a 5.6 V protective Zener diode.**



If the "Mechanical Zero" output is not used, a 1 kΩ/0.25 W resistor must be connected between pins #13 and #21.

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

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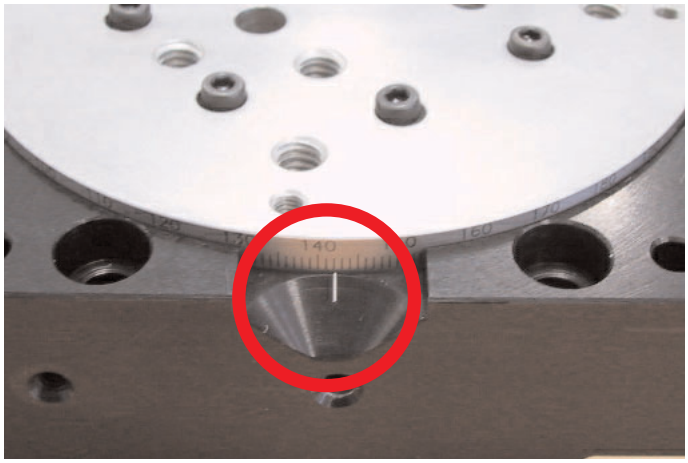
8.0 Disabling of Limit Switches

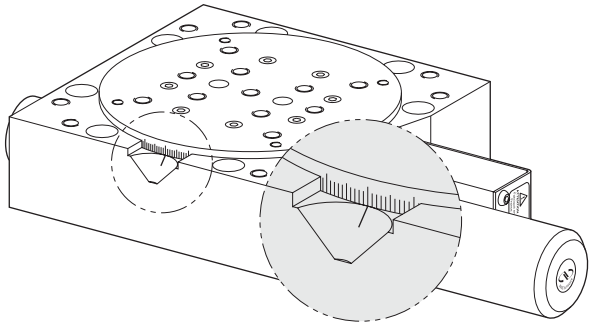
All (M-)495CC/ACC stages are equipped with ±170° optical limit switches. These limit switches can be disabled for continuous 360° rotation.

REMARK

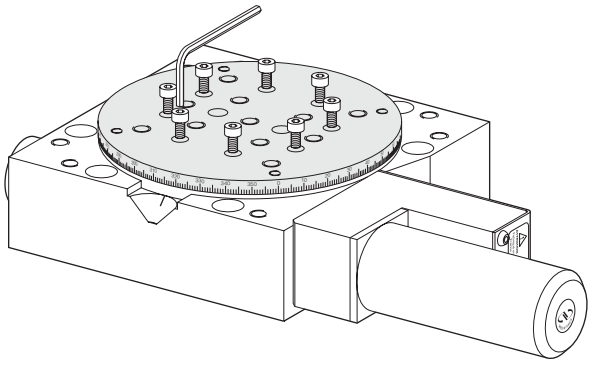
To inhibit limit switches, you have to add a jumper on an electrical component. Contact your Newport service facility and order this jumper with the reference AM1D-200-40-3.7-G.

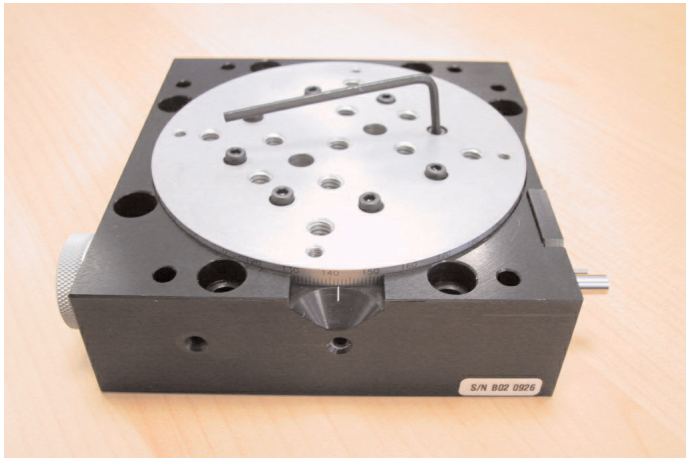
❶ Note the graduated limb position towards the index located on the body of the rotation stage.





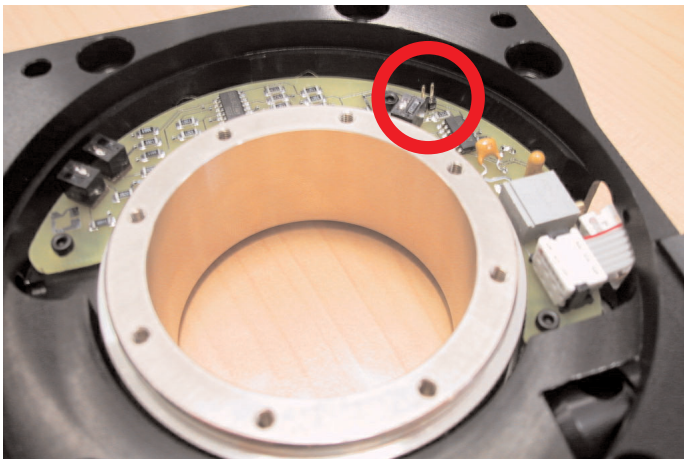
❷ Unscrew 8 CHc M3 screws fixing the graduated limb, and remove it.

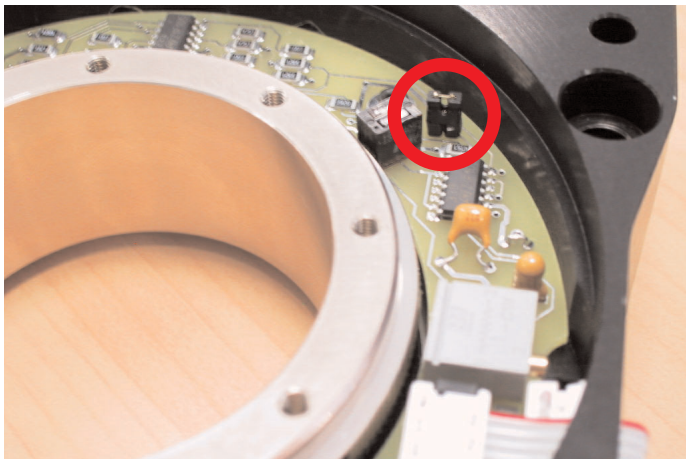




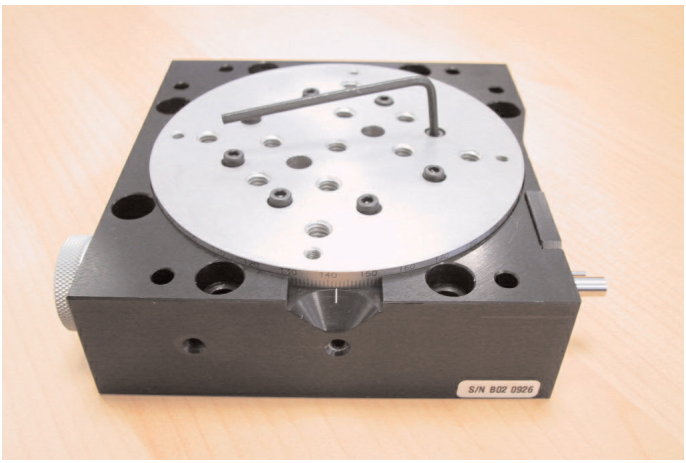
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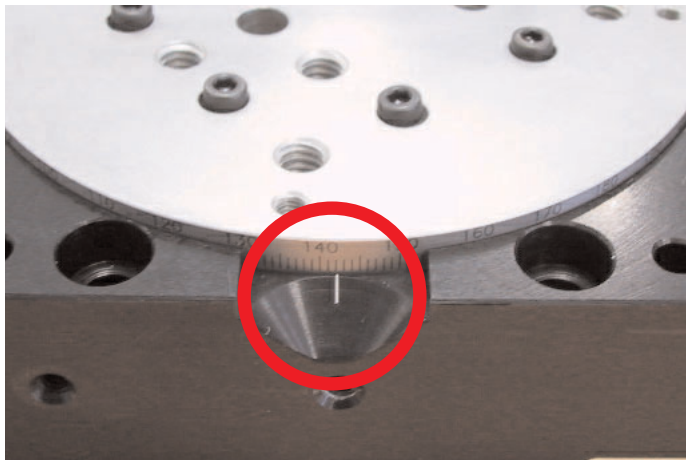
❸ On the 2-pin component, add the jumper you ordered with the reference **AM1D-200-40-3.7-G**.





❹ Reassemble with 8 CHc M3 screws the graduated limb at ±0.2° of its previous position.





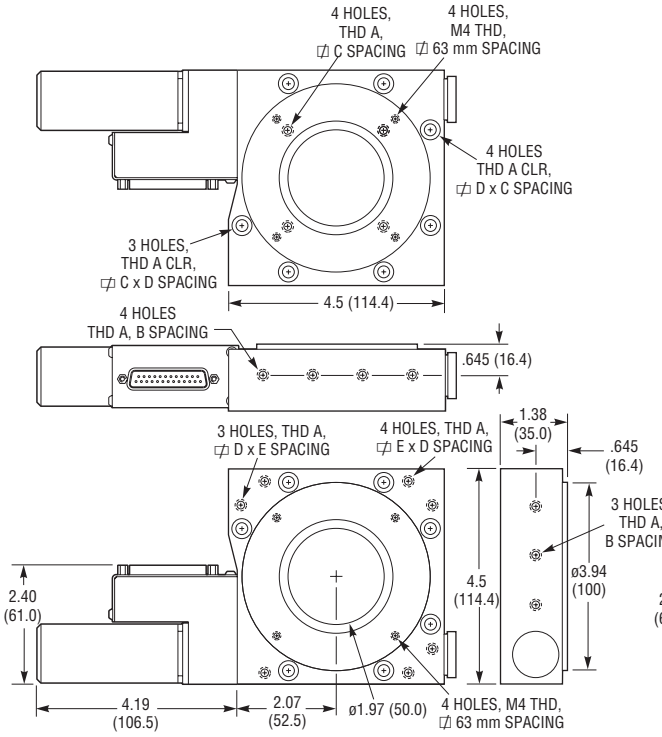
CAUTION

While you reassemble the graduated limb, make sure it is in the same position as it was before disassembling. It is very important to find again the zero position on the index and to reach the Index Pulse home position.

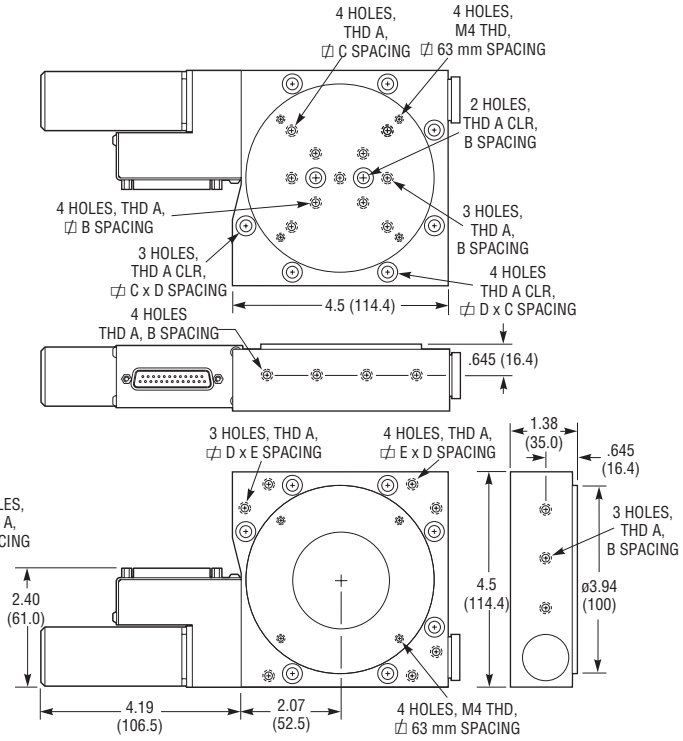
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9.0 Dimensions

(M-)495CC



(M-)495ACC



	Thread		Dimension [in. (mm)]		
Model (Metric)	A	B	C	D	E
495CC (M-495CC)	1/4-20 (M6)	1.000 (25.0)	2.000 (50.0)	4.000 (100.0)	3.000 (75.0)
495ACC (M-495ACC)	1/4-20 (M6)	1.000 (25.0)	2.000 (50.0)	4.000 (100.0)	3.000 (75.0)

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10.0 Maintenance

RECOMMENDATION

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

10.1 Maintenance

The (M-)495CC/ACC rotation stage requires no particular maintenance. Nevertheless, this is a precision mechanical device that must be kept and manipulated with precaution.

PRECAUTIONS

The (M-)495CC/ACC rotation stage must operate, and be stocked in a clean environment, without dust, humidity, solvents or other substances.

RECOMMENDATION

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

If your (M-)495CC/ACC rotation stage is mounted on a workstation and cannot be easily dismantled, please contact our After Sales Service for further instructions.

10.2 Repairing

CAUTION

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

Disassembling a non specified element can cause a malfunction of the rotation stage.

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

CAUTION

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

10.3 Calibration

CAUTION

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

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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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(M-)495CC
(M-)495ACC

Newport

Rotation Stages

CE Declaration of Conformity

We declare that the accompanying product, identified with the "CE" mark, meets all relevant requirements of Directive:

- 73/23/CEE, for Low Voltage Compatibility.
- 89/336/EEC for Electromagnetic Compatibility.

Compliance was demonstrated to the following specifications:

EMISSION:

Radiated and Conducted Emission in accordance with relative prescription to the EMC, NF EN61326-1: Standards for measurement, lab and control equipment.

IMMUNITY:

Radiated and Conducted Immunity in accordance with relative prescription to the EMC, NF EN61326-1: Standards for measurement, lab and control equipment.

SAFETY:

CEI 1010-1, safety standards for measurement, lab and control equipment.



Jean-Marc DELAHAYE
Quality Director
Zone Industrielle
45340 Beaune-la-Rolande, France

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