BG Series

Goniometric Cradles

GUARANTEED SPECIFICATIONS

ESP COMPATIBLE

RoHS Compliant

Newport®
Experience | Solutions

USER'S MANUAL

For Motion, Think Newport

Warranty

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

To exercise this warranty, write or call your local Newport representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the instrument, transportation prepaid, to the indicated service facility. Repairs will be made and the instrument returned, transportation prepaid. Repaired products are warranted for the balance of the original warranty period, or at least 90 days.

Limitation of Warranty

This warranty does not apply to defects resulting from modification or misuse of any product or part.

CAUTION

Warranty does not apply to damages resulting from:

- **Incorrect usage:**
  - **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.**

CAUTION

Please return equipment in the original (or equivalent) packing.

You will be responsible for damage incurred from inadequate packaging if the original packaging is not used.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. Newport Corporation shall not be liable for any indirect, special, or consequential damages.

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

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EC Declaration of Conformity

BG Series

EC Declaration of Conformity

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

Newport
Experience | Solutions

The manufacturer:

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

Hereby declares that the machinery:

Description: " BG"
Function: High Precision Goniometers
Models: BGS50/80/-CC/-PP ; M-/BGM120/160/200/-CC/-PP/-PE/-PEV6

– the technical file of which was compiled by:

Mr Dominique DEVIDAL, Quality Director,
MICRO-CONTROLE Spectra-Physics, Zone Industrielle - B.P.29
F-45340 Beaune La Rolande France

– complies with all the relevant provisions of the Directive 2006/42/EC on machinery.
– complies with all the relevant provisions of the Directive 2004/108/EC relating to electro-magnetic compatibility.

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

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

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

NF EN 61000-4-2
NF EN 61000-4-3
NF EN 61000-4-4
NF EN 61000-4-5
NF EN 61000-4-6

ORIGINAL DECLARATION

Done in Beaune La Rolande on 07 June 2011
Dominique DEVIDAL
Quality Director

DC1-EN rev:A

Definitions and Symbols

The following terms and symbols are used in this documentation and also appear on the product where safety-related issues occur.

General Warning or Caution

The exclamation symbol may appear in warning and caution tables in this document. This symbol designates an area where personal injury or damage to the equipment is possible.

European Union CE Mark

CE

The presence of the CE Mark on Newport Corporation equipment means that it has been designed, tested and certified as complying with all applicable European Union (CE) regulations and recommendations.

ATTENTION

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

Warnings and Cautions

The following are definitions of the Warnings, Cautions and Notes that may be used in this manual to call attention to important information regarding personal safety, safety and preservation of the equipment, or important tips.

WARNING

Situation has the potential to cause bodily harm or death.

CAUTION

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

NOTE

Additional information the user or operator should consider.

Warnings

WARNING

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

WARNING

Do not use this 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.

Cautions

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 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.

Goniometric Cradles
BG Series

1.0 Introduction

This manual provides operating instructions for the BG series goniometric cradles:

- M-BGMPP
- M-BGMCC
- BGSPP
- BGSCC
- M-BGMPE
- M-BGMPEV6 (1)

1) REMARK

Vacuum compatible goniometric cradles to 10^{-6} hPa. In this case, max. speed and load capacity have to be divided by two.

BGS50CC, BGS80PP and (M-)BGM120PP goniometric cradles.

RECOMMENDATION

We recommend you read carefully the chapter "Connection to electronics" before using the BG series goniometric cradle.

Adjacent sizes of BG cradles can easily be stacked to provide orthogonal 2 axis rotation around a fixed point.

2.0 Description

BG Series goniometric cradles rotate on a transverse axis above the platform. Compared to full 360° rotation stages, they offer maximum access to the rotating part and allow construction of very compact multi-axis rotation assemblies. BG cradles are designed so that orthogonal mounting of two adjacent-sized cradles (e.g., BGS50 and BGS80) provides two perpendicular axes of rotation at about the same point in space. Mounting a rotation stage under the assembly adds a third orthogonal rotation axis through the same point.

Precise rotation is ensured by a precision ground, hardened worm gear drive. Single-row ball bearings and precision-ground tool-steel races ensure smooth rotation with minimal wobble and eccentricity. A home switch, conveniently located at center of travel, facilitates the return of the platform to a level position.

BG Series goniometric cradles are available in 5 sizes and may be configured with DC motors or stepper motors. The selection of the motorization is dependent on the application.

2.1 Design Details

Base Material	Stainless steel with Aluminum body
Bearings	Ball bearings
Drive Mechanism	Ground worm gear
Worm Gear Ratio	BGS50 to BGM120: 1:180 BGM160 and BGM200: 1:60
Reduction Gear	BGS50CC: 14:1; BGS50PP: 43:1 BGS80CC: 44:20 BGS80PP and BGM120*: None BGM160* and BGM200*: 3:1
Feedback	BGS50CC: Motor mounted rotary encoder; 2,048 cts/rev. BGS50PP and BGS80PP: None BGS80CC: Worm mounted rotary encoder with index pulse; 4,000 cts/rev. BGM120 to BGM200: Rotary encoder with index pulse; 2,000 cts/rev.
Limit Switches	At ±45° (at ±30° for BGS50)
Origin	At center of travel
Cable	3 m with Sub-D25 male output connector
MTBF	20,000 h

* Additional motor mounted 10:1 reduction gear with PE versions.

3.0 Characteristics

3.1 Definitions

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

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

(Absolute) Accuracy

Difference between ideal position and real position.

On-Axis Accuracy

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

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

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

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

Repeatability

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

Reversal Value (Hysteresis)

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

Minimum Incremental Motion (Sensitivity)

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

Resolution

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

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.

Typical Specifications

For more information, please consult the metrology tutorial section in the Newport catalog or on the Newport website at **www.newport.com**

3.2 Mechanical Specifications

	BGS50CC	BGS50PP	BGS80CC	BGS80PP	BGM120, BGM160, BGM200
Travel Range (°)	±30	±30	±45	±45	±45
Resolution (°)	0.0000698	0.0000969 [1]	0.0005	0.0001 [2]	0.001
Minimum Incremental Motion (°)	0.0005	0.0002	0.0005	0.0002	0.002
Uni-directional repeatability, typical [3] (°)	0.001	0.001	0.001	0.001	0.004
Reversal value (Hysteresis), typical [3] (°)	0.012	0.015	0.002	0.004	0.02
On-axis accuracy, typical [3] (°)	0.06	0.07	0.05	0.06	0.05
Maximum speed (°/s)	10	4	20	20	CC and PP: 20 PE: 2
Wobble, typical [3] (µrad)	200	200	200	200	200

[1] Equals 1/20 of a full step.
[2] Equals 1/100 of a full step.
[3] Because of the complexity of the measurement, the actual performances of the BGM stages are not verified on 100% of the produced stage. Hence, only typical specifications are provided. For more information about typical and guaranteed specifications, see the metrology tutorial section on the Newport Resource catalog, or on our website at www.newport.com

3.3 Load Specification Definitions

Normal Load Capacity (Cz)

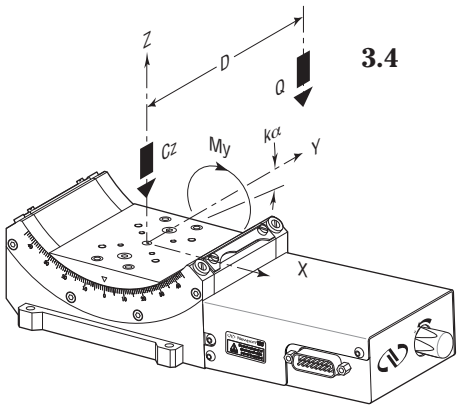
Maximum load a rotation stage can move while maintaining specifications.

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: $Q \leq Cz / (1 + D/a)$

D: Cantilever distance.



3.4 Load Characteristics and Stiffness

		BGS50	BGS80	BGM120	BGM160	BGM200
Cz, normal centered load capacity	(N)	20	60	200	300	500
a, construction parameter	(mm)	30	40	70	90	120
kα, radial compliance	(µrad/Nm)	100	20	10	5	2
Mz, Maximum torque	(Nm)	0.5	1	PE: 10 PP: 6 CC: 9	PE: 20 PP: 16 CC: 10	PE: 29 PP: 17 CC: 10
Q, Off-center load: Q ≤ Cz / (1+D/a), where D = Cantilever distance in mm						

3.5 Goniometric Cradle Weights

Weights indicated into the below table are average values for goniometric cradles with a typical drive unit installed, without any cable.

	Weight [lb (kg)]
BGS50	1.76 (0.8)
BGS80	4.63 (2.1)
3-meter Cable for BGS models (MSCABLE-3)	0.66 (0.3)
(M-)BGM120	18.7 (8.5)
(M-)BGM160	39.7 (18.0)
(M-)BGM200	83.8 (38.0)
3-meter Cable for (M-)BGM models (MMCABLE-3)	1.50 (0.7)

The weight variation between drive units is not very significant.

4.0 Drive

4.1 Stepper Drive Versions

Stepper motor-driven stages are available in 2 versions:

- The mini-step drive version (PP) enables high angular speed up to 20 °/s. The larger models, BGM120PP to BGM200PP, feature a worm mounted rotary encoder for improved accuracy and repeatability. The encoder also provides a method for detecting motor stalling, an important feature for applications with loads or high torques.

  The BGS50PP and BGS80PP are not equipped with an encoder. Instead, position is attained by the number of commanded steps and micro-steps. The high output torque of the stepper motor, combined with extensive performance tests, ensures position accuracy as long as the recommended load and torque are not exceeded. The BGS50PP and BGS80PP provide very high motion sensitivity with good linearity between commanded micro-steps and the actual motion of the stage at a very reasonable price.
- The full-step version (PE) is equipped with a reduction gear providing higher torque. This version is only available on the models BGM120 to BGM200 and is recommended for high inertia payloads and vacuum applications.

Mini-Step Drive

Is used for stepper motors, when 1 pulse emitted by electronic corresponds to theoretical physical motion of a fraction of a full step of the motor.

For these goniometric cradles a mini-step equals 1/10 of a full step.

Full-Step Drive

Is used for stepper motors, when 1 pulse emitted by electronic corresponds to theoretical physical motion of 1 full step of the motor.

Stepper Motor Performance Specifications

	Resolution (°)	Speed (°/s)	Motor
BGS50PP	0.0000969	4	UE16PP
BGS80PP	0.001	20	UE34PP
M-BGM120PP	0.001	20	UE62PP
M-BGM160PP and M-BGM200PP	0.001	20	UE63PP
M-BGM120PE to M-BGM200PE	0.001	2	UE41PP

4.2 DC-Servo Drive Versions

DC motor-driven stages use 3 different motors and encoders depending on the size of the cradle:

- The BGS50CC uses a miniature DC servo motor with a motor mounted rotary encoder, a reduction gear and a belt drive in order to fold the motor. The result is a very small and lightweight package providing very high resolution output and great minimum incremental motion capability. However, reversibility is compromised due to some backlash and hysteresis in the reduction gear and belt drive system.
- The BGS80CC features a high resolution 4,000 cts/rev rotary encoder with index pulse for precision homing and is the recommended choice for applications requiring accurate bi-directional positioning. For tight-

est position control, the rotary encoder is directly mounted on the worm screw. This avoids the majority of drive train error sources that affect other stages with indirect position read-out.

- The BGM120CC to BGM200CC use higher-torque DC servo motors. The motor also features a built-in tachometer to provide superior speed stability.

DC-Motor Performance Specifications

	Resolution (°/s)	Speed (°/s)	Motor
BGS50CC	0.0000698	10	UE1724SR
BGS80CC	0.001	20	UE34CC
(M-)BGM120CC to (M-)BGM200CC	0.001	20	UE511CC

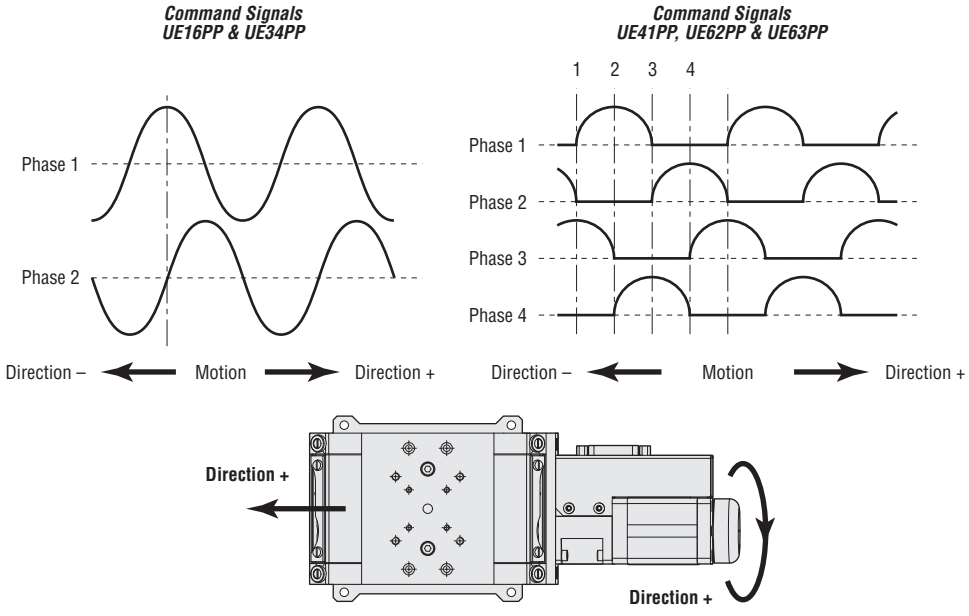
5.0 Motor

5.1 Stepper Motor Characteristics

Motor	Angle by Step (°)	Current (A)	Resistance (Ω)	Inductance (mH)	Newport Utilization
UE16PP	0.23 (1)	0.25	12.5	5.5	Micro-Step
UE34PP	1.8 (1)	1.0	1.7	2.8	Micro-Step
UE41PP	1.8	1.2	3	4.3	Full-Step or Mini-Step
UE62PP	1.8	1.8	2.6	4.9	Mini-Step
UE63PP	1.8	2.9	1.16	2.0	Mini-Step

1) Angle by micro-step.

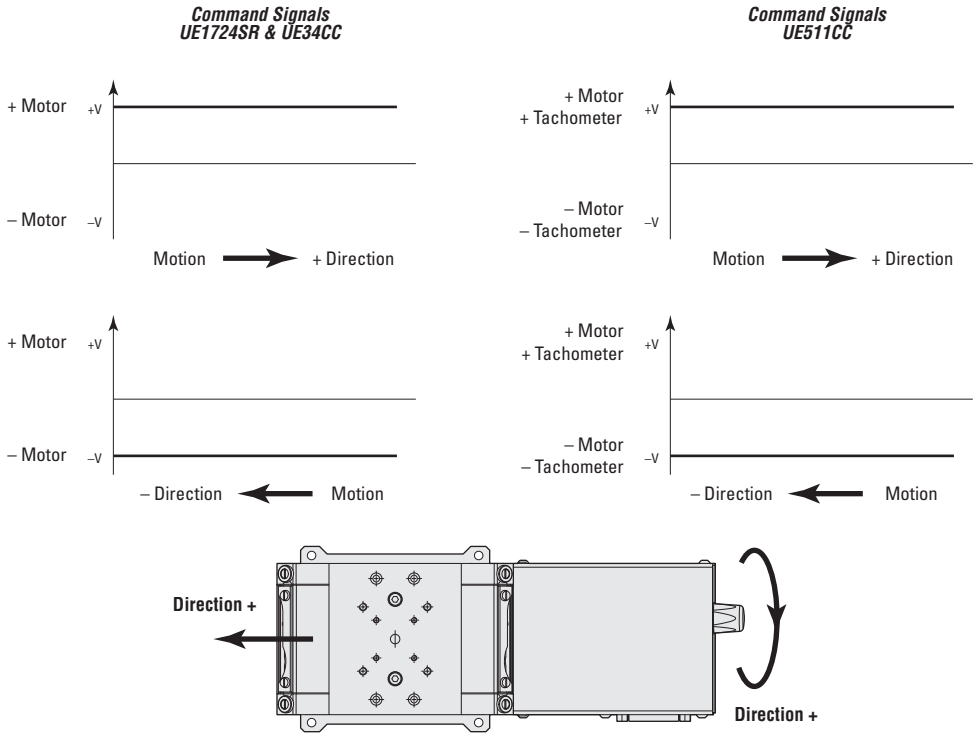
5.2 Command Signals for Stepper Motors



5.3 DC-Motor Characteristics

Motor	Mechanical Power (W)	Nominal Voltage (V)	Nominal Current (A)	Resistance (Ω)	Inductance (mH)	Tachometer (V/Krpm)
UE1724SR	3.5	24	0,2	54,6	1,19	–
UE34CC	12.5	48	1.5	2.58	0.52	–
UE511CC	110	75	2	5.1	3.2	7 (±10%)

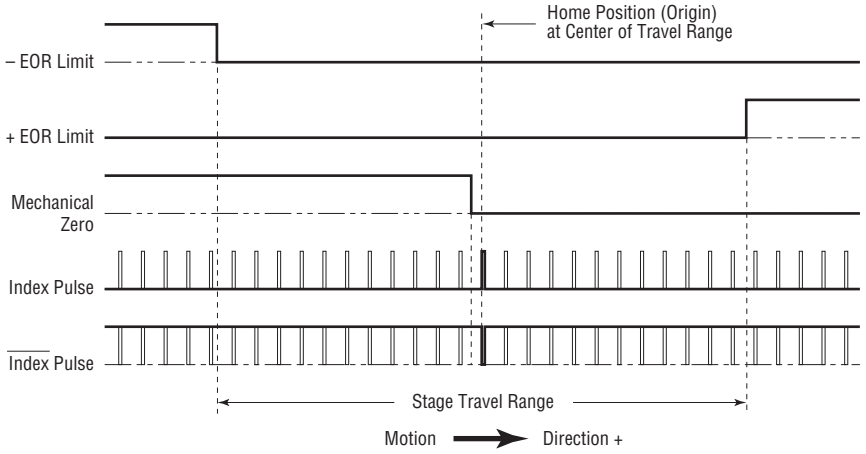
5.4 Command Signals for DC-Motors



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

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

5.5 Sensor Position

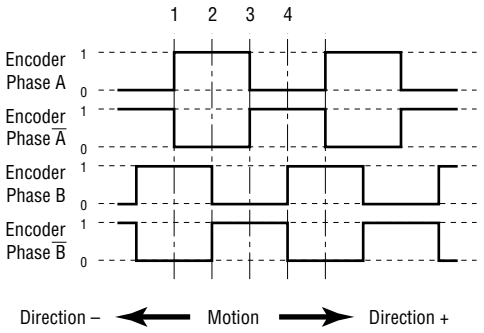


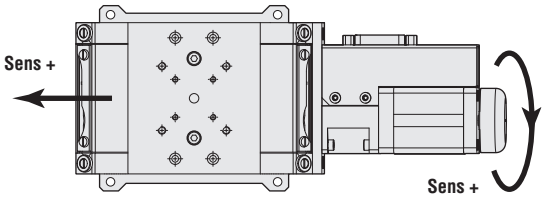
End-of-Run and Mechanical Zero are TTL type. Use of the Index Pulse provides a repeatable Home Position at ±1 step.

CAUTION

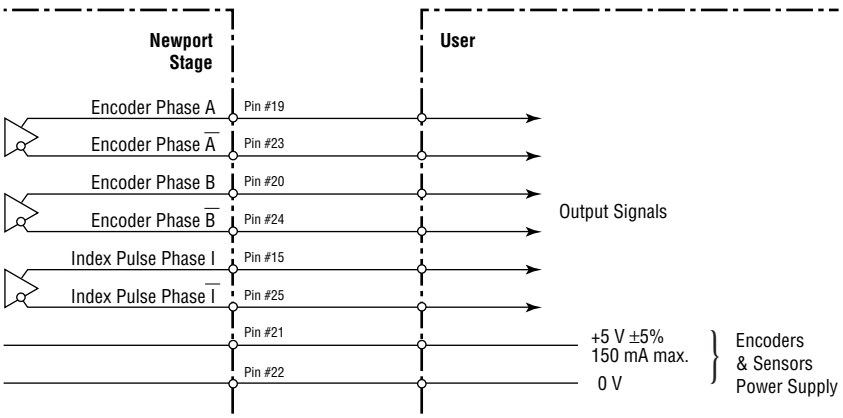
"End-of-Run" and "Mechanical Zero" are active signals and should not be connected to any other source. Use appropriate TTL type receivers.

5.6 Feedback Signal Position



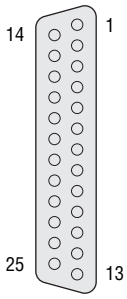


The incremental sensor operates following the photoelectric measurement principle, with a disk including slides. When the sensor shaft turns, the sensor generates square signals in quadrature, sent to pins #19, #20, #23 and #24 of the 25-pin Sub-D connector.



5.7 Pinouts

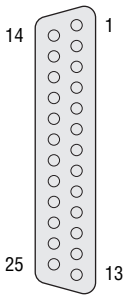
The 25-pin Sub-D male connection at the end of the cable for the BG series goniometric cradles, is given in the following table:



BGS Models

	BGS50PP UE16PP		**BGS80PP** UE34PP		**BGS50CC** UE1724SR		**BGS80CC** UE34CC
1	Phase 1a	**1**	+ Phase 1	**1**	N.C.	**1**	N.C.
2	N.C.	**2**	+ Phase 1	**2**	N.C.	**2**	N.C.
3	Phase 1b	**3**	– Phase 1	**3**	N.C.	**3**	N.C.
4	N.C.	**4**	– Phase 1	**4**	N.C.	**4**	N.C.
5	Phase 2a	**5**	– Phase 2	**5**	+ Motor	**5**	+ Motor
6	N.C.	**6**	– Phase 2	**6**	+ Motor	**6**	+ Motor
7	Phase 2b	**7**	+ Phase 2	**7**	– Motor	**7**	– Motor
8	N.C.	**8**	+ Phase 2	**8**	– Motor	**8**	– Motor
9	N.C.	**9**	N.C.	**9**	N.C.	**9**	N.C.
10	N.C.	**10**	N.C.	**10**	N.C.	**10**	N.C.
11	N.C.	**11**	N.C.	**11**	N.C.	**11**	N.C.
12	N.C.	**12**	N.C.	**12**	N.C.	**12**	N.C.
13	Mechanical Zero	**13**	Mechanical Zero	**13**	N.C.	**13**	Mechanical Zero
14	Shield Ground	**14**	Shield Ground	**14**	Shield Ground	**14**	Shield Ground
15	N.C.	**15**	N.C.	**15**	N.C.	**15**	Index Pulse
16	0 V logic	**16**	0 V logic	**16**	0 V logic	**16**	0 V logic
17	+ End-of-Run	**17**	+ End-of-Run	**17**	+ End-of-Run	**17**	+ End-of-Run
18	– End-of-Run	**18**	– End-of-Run	**18**	– End-of-Run	**18**	– End-of-Run
19	N.C.	**19**	N.C.	**19**	Encoder Phase A	**19**	Encoder Phase A
20	N.C.	**20**	N.C.	**20**	Encoder Phase B	**20**	Encoder Phase B
21	+5 V (Mech. Zero & E-o-R)	**21**	+5 V (Mech. Zero & E-o-R)	**21**	Encoder Power: +5 V	**21**	+5 V (Mech. Zero, E-o-R & Encoder)
22	0 V	**22**	0 V	**22**	0 V Encoder	**22**	0 V Encoder
23	N.C.	**23**	N.C.	**23**	Encoder Phase /A	**23**	Encoder Phase /A
24	N.C.	**24**	N.C.	**24**	Encoder Phase /B	**24**	Encoder Phase /B
25	N.C.	**25**	N.C.	**25**	N.C.	**25**	/Index Pulse

(M-)BGM Models



	(M-)BGMPP & PE UE41PP; UE62PP; UE63PP		(M-)BGMCC UE511CC
1	Phase 1	**1**	+ Tachometer
2	Phase 1	**2**	+ Tachometer
3	Phase 2	**3**	– Tachometer
4	Phase 2	**4**	– Tachometer
5	Phase 3	**5**	+ Motor
6	Phase 3	**6**	+ Motor
7	Phase 4	**7**	– Motor
8	Phase 4	**8**	– Motor
9	Common Phase 3-4	**9**	N.C.
10	N.C.	**10**	N.C.
11	Common Phase 1-2	**11**	N.C.
12	N.C.	**12**	N.C.
13	Mechanical Zero	**13**	Mechanical Zero
14	Shield Ground	**14**	Shield Ground
15	Index Pulse I	**15**	Index Pulse I
16	0 V logic	**16**	0 V logic
17	+ End-of-Run	**17**	+ End-of-Run
18	– End-of-Run	**18**	– End-of-Run
19	Encoder Phase A	**19**	Encoder Phase A
20	Encoder Phase B	**20**	Encoder Phase B
21	Encoder Power: +5 V	**21**	Encoder Power: +5 V
22	0 V Encoder	**22**	0 V Encoder
23	Encoder Phase /A	**23**	Encoder Phase /A
24	Encoder Phase /B	**24**	Encoder Phase /B
25	Index Pulse /I	**25**	Index Pulse /I

6.0 Connection to Newport Controllers

6.1 Warnings on Controllers

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

WARNING

Disconnect the power plug under the following circumstances:

- **If the power cord or any attached cables are frayed or damaged in any way.**
- **If the power plug is damaged in any way.**
- **If the unit is exposed to rain, excessive moisture, or liquids are spilled on the unit.**

- **If the unit has been dropped or the case is damaged.**
- **If you suspect service or repair is required.**
- **Whenever you clean the electronics unit.**

CAUTION

To protect the unit from damage, be sure to:

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

WARNING

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

Contact your electrician to check your receptacles.

WARNING

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

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

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

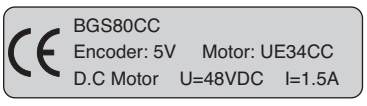
WARNING

This product operates with voltages that can be lethal.

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

6.2 Connection

On each goniometric cradle is represented a label which indicates its name and the motor it is equipped with (eg.: UE34CC).



WARNING

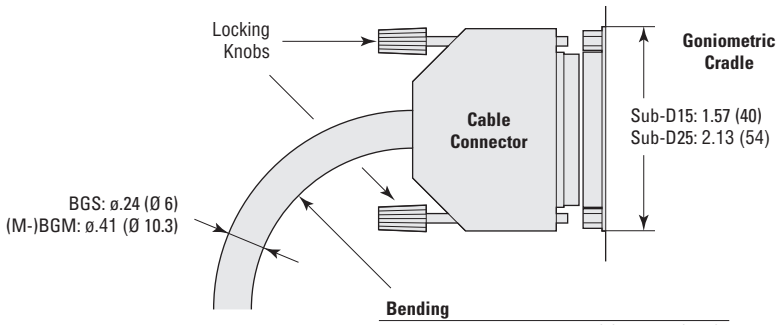
Always turn the controller's power OFF before connecting to a stage.

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

6.3 Cables

All our BG series goniometric cradles are delivered with a 3-meter cable equipped with a Sub-D25 male output connector: **MSCABLE-3** for BGS80, **MMCABLE-3** for (M-)BGM. They can be directly connected to our controllers/drivers.

Dimensions in inches (millimeters)



Bending		
Cable Diameter	.24 (6)	.41 (10.3)
For a static cable	.94 (24)	1.57 (40)
For a cable in motion	2.76 (70)	3.94 (100)

WARNING

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

WARNING

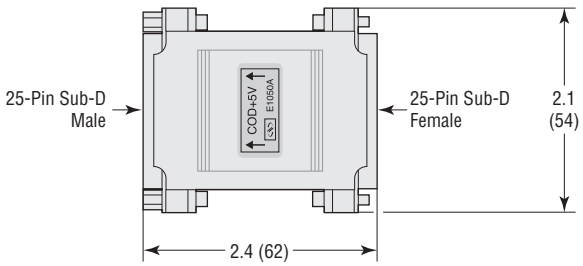
Keep the motor cables at a safe distance from other electrical cables in your environment to avoid potential cross talk.

For applications where the 3-meter cable included with your goniometric cradle is not long enough (except BGS50), Newport offers the possibility to order a 10-meter cable for the BGS80 and a 5-meter, 7-meter or 10-meter cable for (M-)BGM, designed to ensure the integrity of your positioning application.

This cable is specially shielded and terminated with a Newport's standard 25-pin sub-D connector used with our controllers. It must be ordered separately with the reference:

MSCABLE-10 10-meter cable for BGS80
MMCABLE-5 5-meter cable for (M-)BGM
MMCABLE-7 7-meter cable for (M-)BGM
MMCABLE-10 10-meter cable for (M-)BGM

For MMCABLE-7 and MMCABLE-10 cables, we recommend the **MMCABLE-REG** to ensure a high quality, regulated 5 V supply to the (M-)BGM goniometric cradles.



This regulator is available as an option. Please note that for best efficiency, this regulator should be attached to the Sub-D25 connector of the stage to re-adjust the 5 volts coming from the controller through the long cable.

7.0 Connection to Non-Newport Electronics

WARNING

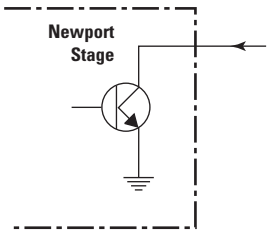
Newport takes no responsibility for improper functioning or damage of a goniometric cradle when it is used with any non- Newport controllers.

WARNING

Newport guarantees the "CE" compliance of the BG series goniometric cradles only if they are used with Newport cables and controllers.

Nevertheless, the figure below indicates the recommended wiring when a goniometric cradle of the BG series is used with non-Newport controllers.

Sub-D25 male Connector	Connection BGS50PP	Connection BGS80PP	Connection (M-)BGMPP & PE	Connection BGS50CC	Connection BGS80CC	Connection (M-)BGMCC
9	N.C.	N.C.	Common Phase 3-4	N.C.	N.C.	N.C.
10	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.
11	N.C.	N.C.	Common Phase 1-2	N.C.	N.C.	N.C.
12	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.
1	Phase 1a	+ Phase 1	Phase 1	N.C.	N.C.	+ Tachometer
2	N.C.	+ Phase 1	Phase 1	N.C.	N.C.	+ Tachometer
3	Phase 1	– Phase 1	Phase 2	N.C.	N.C.	– Tachometer
4	N.C.	– Phase 1	Phase 2	N.C.	N.C.	– Tachometer
5	Phase 2a	– Phase 2	Phase 3	+ Motor	+ Motor	+ Motor
6	N.C.	– Phase 2	Phase 3	+ Motor	+ Motor	+ Motor
7	Phase 2b	+ Phase 2	Phase 4	– Motor	– Motor	– Motor
8	N.C.	+ Phase 2	Phase 4	– Motor	– Motor	– Motor
14	Ground	Ground	Ground	Ground	Ground	Ground
16	0 V logic	0 V logic	0 V logic	0 V logic	0 V logic	0 V logic
13	Mechanical Zero (*)	Mechanical Zero (*)	Mechanical Zero (*)	N.C.	Mechanical Zero (*)	Mechanical Zero (*)
19	N.C.	N.C.	Encoder Phase A	Encoder Phase A	Encoder Phase A	Encoder Phase A
23	N.C.	N.C.	Encoder Phase /A	Encoder Phase /A	Encoder Phase /A	Encoder Phase /A
20	N.C.	N.C.	Encoder Phase B	Encoder Phase B	Encoder Phase B	Encoder Phase B
24	N.C.	N.C.	Encoder Phase /B	Encoder Phase /B	Encoder Phase /B	Encoder Phase /B
15	N.C.	N.C.	Index Pulse I	N.C.	Index Pulse I	Index Pulse I
25	N.C.	N.C.	Index Pulse /I	N.C.	Index Pulse /I	Index Pulse /I
17	+ End-of-Run (*)	+ End-of-Run (*)	+ End-of-Run (*)	+ End-of-Run (*)	+ End-of-Run (*)	+ End-of-Run (*)
18	– End-of-Run (*)	– End-of-Run (*)	– End-of-Run (*)	– End-of-Run (*)	– End-of-Run (*)	– End-of-Run (*)
21	+5 V	+5 V	+5 V Encoder	+5 V Encoder	+5 V Encoder	+5 V Encoder
22	0 V	0 V	0 V Encoder	0 V Encoder	0 V Encoder	0 V Encoder
Connector Cap	Connector Cap	Connector Cap	Connector Cap	Connector Cap	Connector Cap	Connector Cap



*** End-of-Run and Mechanical Zero logic signals are open collector type. They support until 30 V and 10 mA.**

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

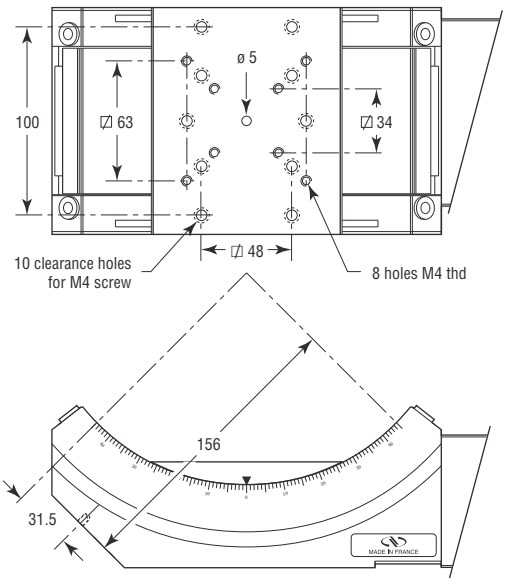
"Encoder" and "Index Pulse" are "differential pair" type output signals. Using these signals permits a high immunity to noise. Emission circuits generally used by Newport are 26LS31 or MC3487. Reception circuits to use are 26LS32 or MC3486.

8.0 (M-)BGM Goniometric Cradles Assembly Pattern

Stacking (M-)BGM goniometric cradles either together or with other Newport stage is easily accomplished. Below are example schematics of the assembly patterns used. These interfaces are accessed by unscrewing and removing the upper and/or lower plates of the stages (see dimension drawing).

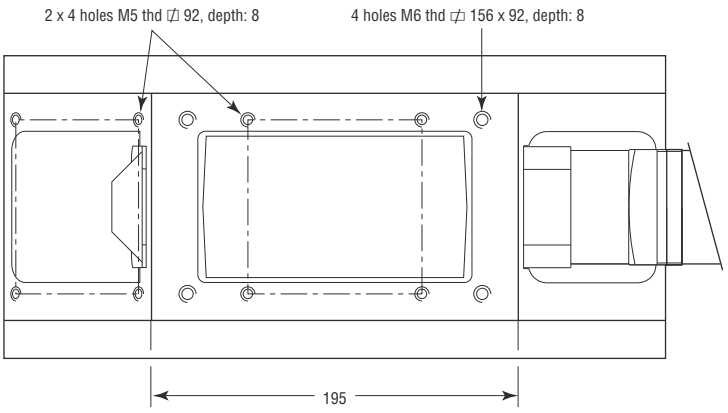
8.1 (M-)BGM120 Interfaces

(M-)BGM120 Carriage Interface

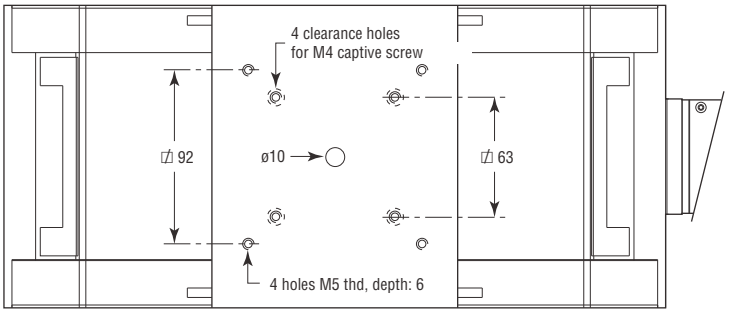


8.2 (M-)BGM160 Interfaces

(M-)BGM160 Body Interface

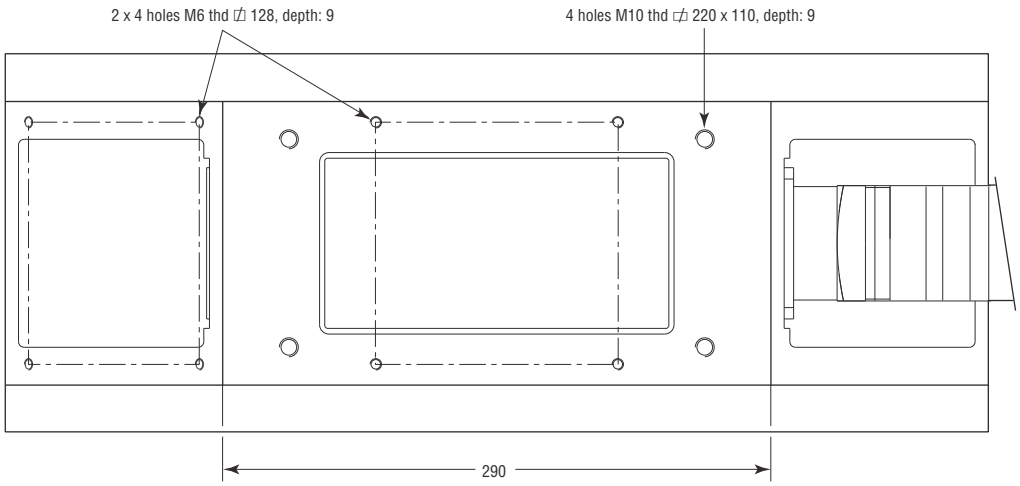


(M-)BGM160 Carriage Interface

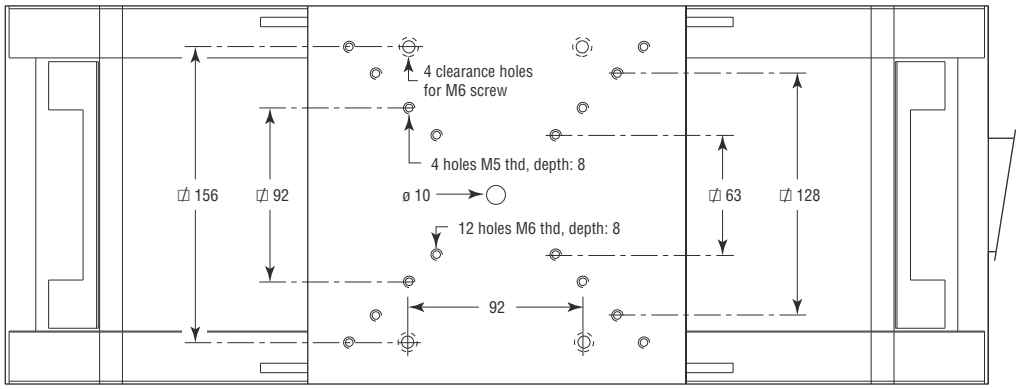


8.3 (M-)BGM200 Interfaces

(M-)BGM200 Body Interface

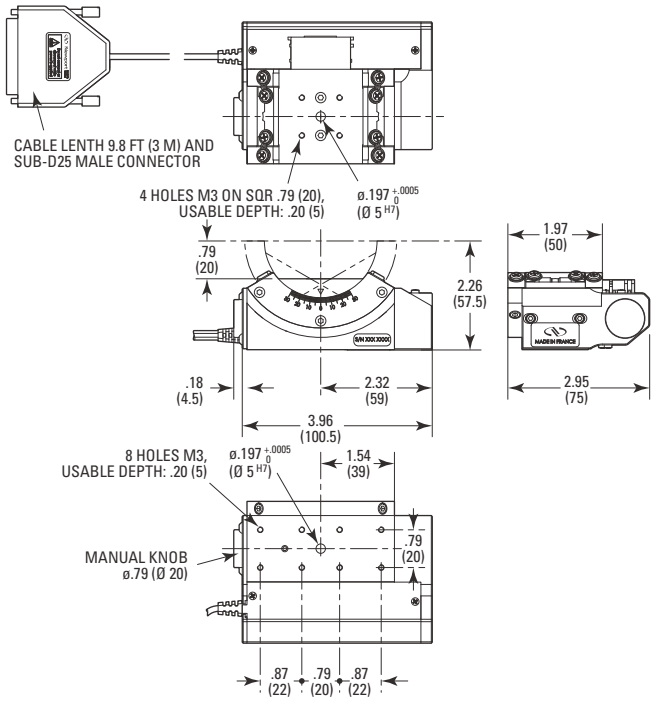


(M-)BGM200 Carriage Interface



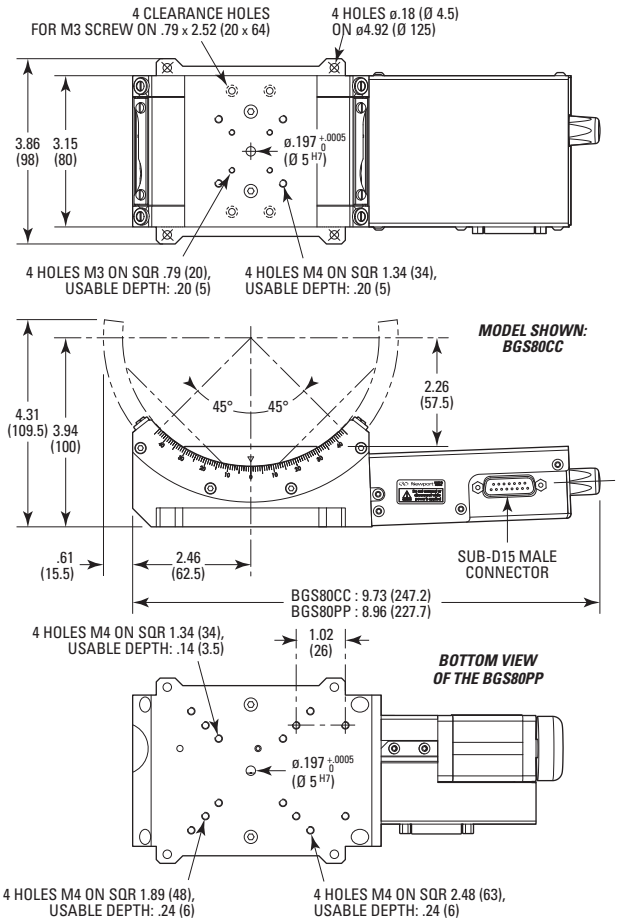
9.0 Dimensions

9.1 BGS50 Models

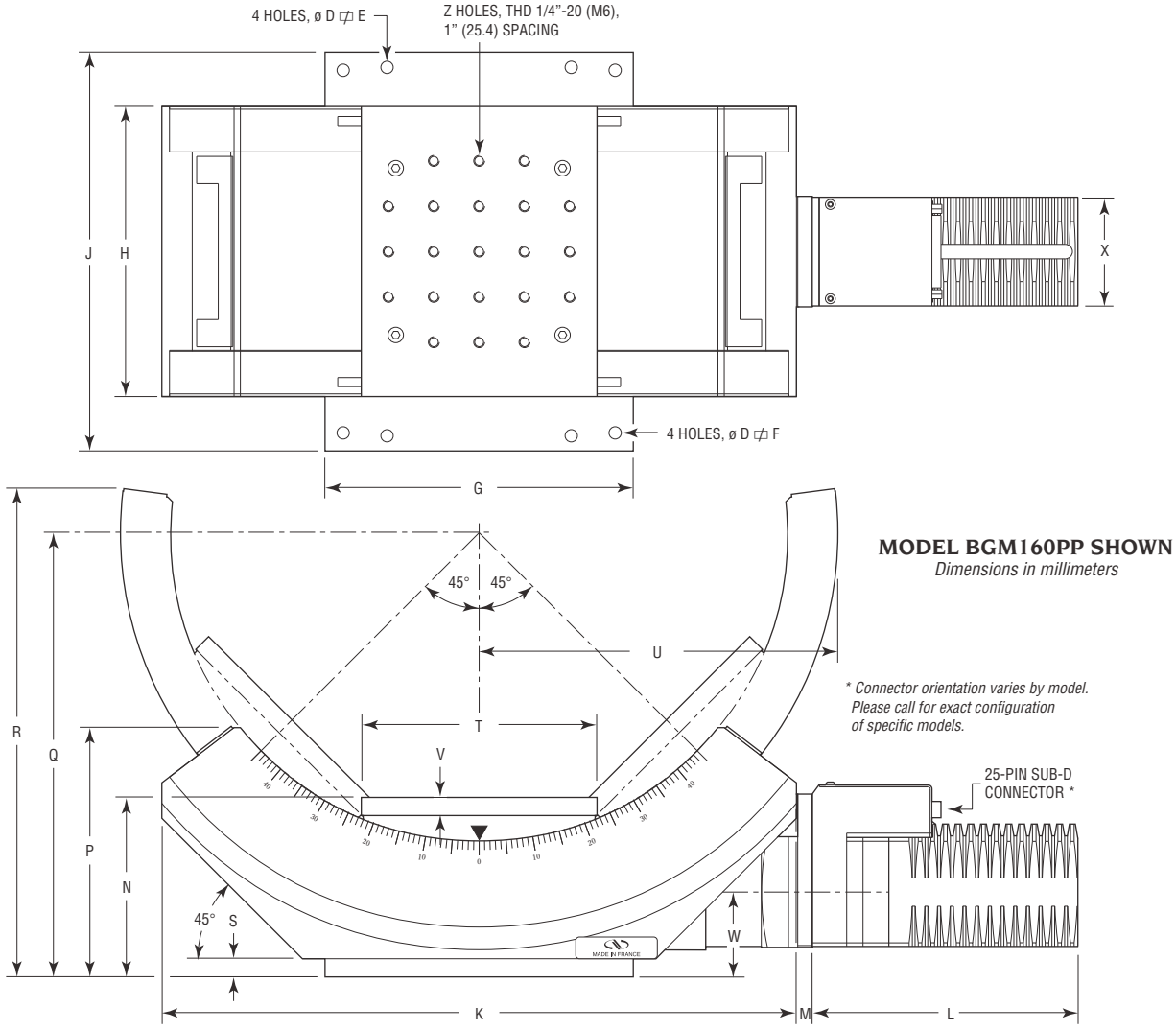


9.2 BGS80 Models

Note: *BGS80 goniometric cradles are supplied with a 3-m cable equipped with Sub-D15 female/Sub-D25 male connectors*



9.3 (M-)BGM Models



MODEL BGM160PP SHOWN
Dimensions in millimeters

** Connector orientation varies by model. Please call for exact configuration of specific models.*

	Dimension (mm)			
Model (Metric)	PP	PE	CC	MS
(M-)BGM120				
L	121	129.5	192	143.4
X	60	60	60	60
(M-)BGM160 & (M-)BGM200				
L	146.5	129.5	192	143.4
X	60	60	60	60

	Diameter	Dimension (mm)																
Model (Metric)	D	E	F	G	H	J	K	M	N	P	Q	R	S	T	U	V	W	Z
(M-)BGM120	6.8	152.4 x 50.8	150 x 100	120	120	170	206	31	70	94	164	180	8	99	128	6	43.2	15
(M-)BGM160	6.8	203.2 x 101.6	200 x 150	170	160	220	350	8.7	99	138.2	245	270	10	130	197.5	10	46.8	21
(M-)BGM200	6.8	254 x 203.2	250 x 250	270	200	270	520		135	196	360	398	10	200	300	10	62.5	49

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 BG Series goniometric cradle requires no particular maintenance. Nevertheless, this is a precision mechanical device that must be kept and manipulated with precaution.

PRECAUTIONS

The BG Series goniometric cradle must operate, and be stocked in a clean environment, without dust, humidity, solvents or other substances.

RECOMMENDATION

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

If your goniometric cradle 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 goniometric cradle that has not been specified in this manual.

Disassembling a non specified element can cause a malfunction of the goniometric cradle.

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

CAUTION

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

10.3 Calibration

CAUTION

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

Service Form

Your Local Representative
Tel.: _____
Fax: _____

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

Company: _____

Address: _____ Date: _____

Country: _____ Phone Number: _____

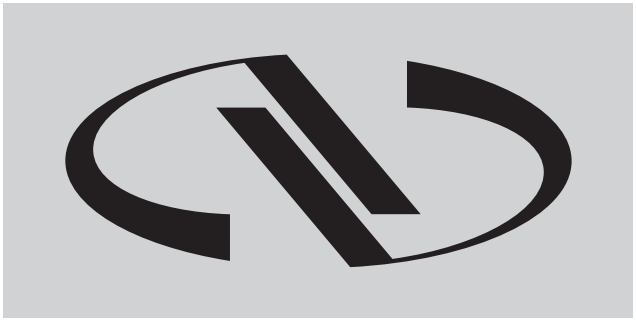
P.O. Number: _____ Fax Number: _____

Item(s) Being Returned:

Model #: _____ Serial #: _____

Description: _____

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



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