

# Mirror Holders Application Note

Mirror holders are divided into six categories by function.

## Classification of Mirror Holder Functions

Part Number	Mounting Center	Rotational Mechanism	Fine Adjustment Center	Optics Fixation	Control Direction	Control
<b>MHG</b>	Offset	None	Offset	Lateral side set screw	Back	Screw
<b>MMHN</b>	Offset	None	Offset	Mirror case	Back	Screw
<b>MHAN/MHA</b>	Mirror center	Mirror center	Mirror center	Retaining ring	Front/Back	Screw/Micro
<b>BHAN</b>	Mirror center	Mirror center	Mirror center	Retaining ring	Front/Back	Screw/Micro
<b>BSHL</b>	Offset	None	Mirror center	Retaining ring	Vertical	Screw

### (1) Center of Mounting

Mirror holders fitted with a post (such as MHAN) are designed so that the reflective surface of the mirror is along the center of the post.

MMHN-25RO and MMH-50M6 are excluded. By having the reflective optical axis and center post coaxial, the position of the laser beam irradiated on mirrors will not change even when the mounting direction of the holder is changed. In such cases where the center of mounting has offset, attention is required to the positional relationship between the laser beam and the mirror holder. Mirror holders that do not come standard with posts must be aligned when mounted to a post. The holder will come with an offset to position the mirror and laser beam correctly. (The following figure on the right shows this.)

To install a mirror holder that has an offset at the center of mounting, roughly position the angle of the mirror before fixing the holder.

Find the position of the mirror where the laser beam irradiates at the center of the mirror at the specified incidence angle, and fix the mirror holder at that position. The mounting screws for the baseplate may not match the hole position of the breadboard. If such a case arises, use a magnetic baseplate or a different baseplate designed for offset positions.

Special plates for mounting posts (MHG-BPRO) are available for the MHG holders to match the center of the post to the center of the reflective surface of the mirror.

Image of MHAN Holder Installation

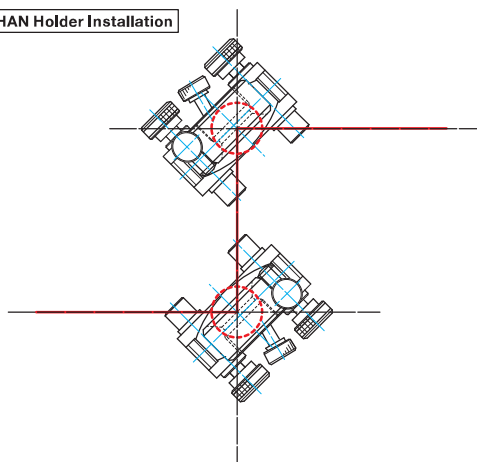
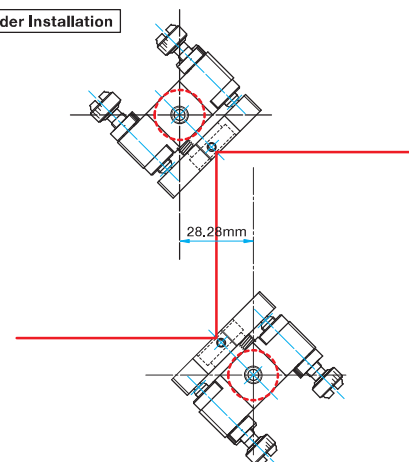


Image of MHG Holder Installation



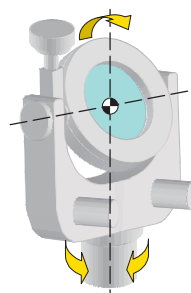
### (2) Rotational Mechanism

With their two-axis gimbal structure, the MHAN and BHAN holders can be positioned to face any laser beam source in any direction.

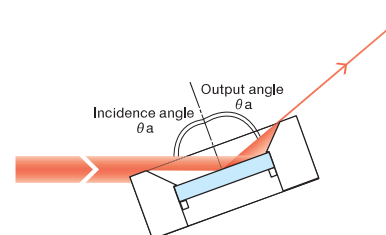
The rotational center of the gimbal mechanism is at the center of the reflective surface; therefore, a laser beam irradiated at the center of the mirror will stay at the center of the mirror regardless of mirror rotation. There are no constraints on mirror rotation, thus the reflected beam can be directed at angles vertically, diagonally, or horizontally.

The reflected beam may become partially blocked by the mirror holder frame depending on the beam diameter or angle of incidence.

Image of Gimbal Type Mirror Holder



Schematic of Beam Loss due to Mirror Frame



### (3) Fine Adjustment Center

Mirror holders are capable of fine angle adjustments using one of two mechanisms.

The first type of fine adjustment mechanism is the gimbal type which allows for rotation of the reflective surface of the mirror. The second type, kinematic type, allows for rotating around the outside of reflective surface.

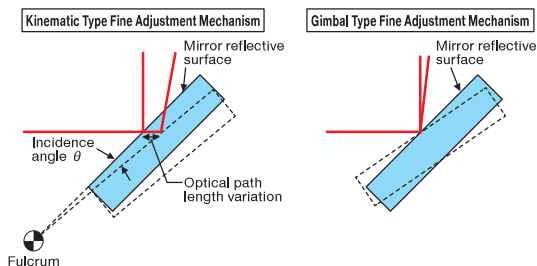
The only differences in stability between the two adjustment mechanisms arise when dealing with interferometers and laser resonators.

Optical path length variations caused by angle adjustment are shown in the table to the right for kinematic mirror holders. Using the gimbal fine adjustment is advantageous for small optical path length variations.

Conversely, the kinematic adjustment has issues with small optical path variations. The physical and temperature stability of the kinematic adjustment make them excellent for laser resonators applications.

Variation in optical path length by angle adjustment of kinematic mirror holder

Part Number	Adjustment Range [°]	Max Optical Path Length Deviation (Incidence angle 0 degree) [mm]	Optical Path Length Variation when Turned by 0.5° (mm)	
			Incidence Angle 0°	Incidence Angle 45°
MHG-12.7	±3	0.5	0.17	0.12
MHG-30	±3	1.0	0.33	0.24
MHG-50	±2	1.0	0.51	0.36
MHG-80	±2	1.5	0.77	0.55
MHG-100	±2	2.1	1.03	0.73



### (4) Mounting Method of Optics

Mirrors with high surface accuracy are used in optical experiments with interferometers or laser concentration. Beam deviation may not be seen due to the thickness or hardness of the material, but a slight bump to the holder can cause deviations in the shape of the beam. The deviation can be observed in the more precise optical experiments. It is imperative to choose the correct mounting method for mirrors, and to mount the mirrors securely.

#### ●Retaining Ring Mount

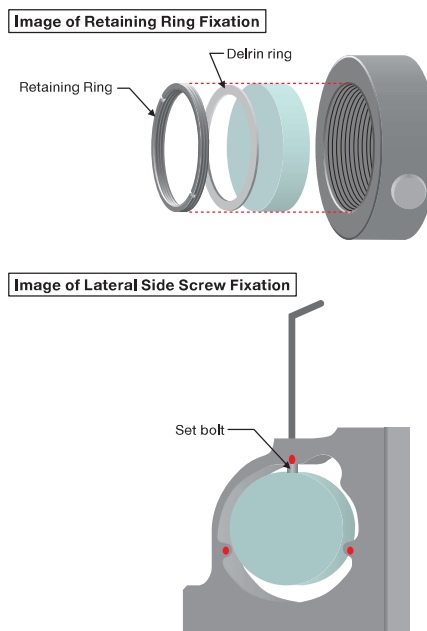
With retaining rings, the mirror is pressed against a resin ring secured by an aluminum threaded ring.

The position of the reflective surface of the mirror does not change because it is pressed against the face of the mirror frame. Optics will rarely fall out of their holders due to vibration or impact with these mounting method. The retaining rings must not be over tightened or the mirrors will be in stress.

#### ●Lateral Side Screw Mount

The mirror is held on its edge with two points and one resin set screw as shown in the figure to the right. Changes in thickness of the mirrors shifts the position of the reflective surface because the mirror is mounted by its edges and not by its face. The mirror can be tilted relative to the frame with this mounting method.

Stressed is induced with the torque of the set screw, and can be changed after lens installation. The mirror can fall out of the holder in situations with high vibrations or potential impact.



### (5) Control Directions

When holders are used in complex crowded optical systems or narrow spaces, operating the mechanisms becomes difficult. Mirror holders with vertical or horizontal adjustment control directions can be used to make adjustments easier.

### (6) Types of Adjustment Mechanisms

There are two types of adjustment mechanisms for holders. The graduated micrometer has a long knurled rotating knob that allows for frequent and easy manipulations. The other type of adjustment is a 0.25 mm pitched screw. These screws are shorter than micrometers allow for fine adjustments in confined spaces.

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# Mirror Holders Selection Guide

## Emphasis on workability

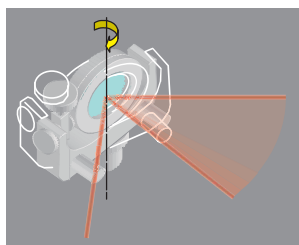
### MHAN series BHAN series



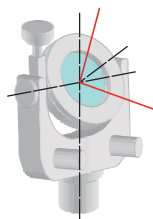
These holders are easily manipulated and have simple alignment

#### Advantages:

- The mirror can be mounted 45 degrees
- Easily mounted to an optical bench
- Can change the reflected beam path easily



- Holders have enough adjustments to be in 3-D optical systems



## Emphasis on stability

### MHG series



The MHG series holders have high stability due to less moving parts.

#### Advantages:

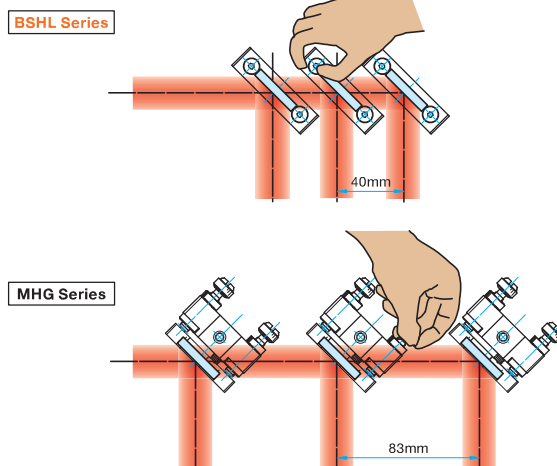
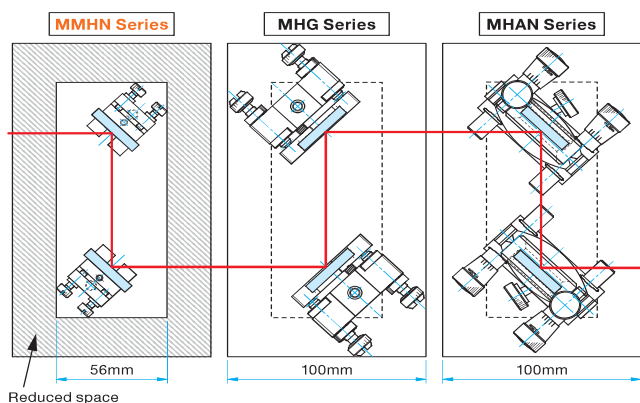
- Holders work well in optical systems with low optical height axis.
- Holders provide stability in environments with vibration, or temperature fluctuations.

Interferometer configured with MHG mirror holder



## Downsizing

MHG and MHAN mirror holders require working areas of about two diameter sizes of the mirrors. MMHN and BSHL mirror holders are good for applications that do not require high operability or resolution. The BSHL series adjustment is vertical allowing for the holders to be arranged close to each other.





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## Beamsplitter compatible mirror holders

Some mirror holders can be used only for mirrors, while other mirror holders can hold a beamsplitter and handle transmitted light.

Furthermore, among the holders which can handle transmitted light, some holders like the BHAN series can handle beams from both left and right directions, while other holders like the MHG and MHI series can handle transmitted beam from only one side.

When using a holder with transmitted light, please check the transmitted beam diameter at 45 degrees incidence listed in the specification table of each product.

Not Suitable for Use with Transmitted Beam	Used for Transmitted Beam from Only One Direction	Used for Transmitted Beam from Two Directions
<b>LMHB, LMMH, MMHN, MHD, MHL</b>	<b>MHG-NL, MHI, MHGT</b>	<b>BSHL, MHAN, BHAN</b>
<p>Transmitted Beam borderline</p> <p>Center Line of Reflective surface</p> <p>Transmitted Beam borderline</p>	<p>Transmitted Beam borderline</p> <p>Transmitted Beam</p> <p>Center Line of Transmitted Beam</p> <p>Transmitted Beam borderline</p>	<p>Transmitted Beam borderline</p> <p>Center Line of Transmitted Beam</p> <p>Transmitted Beam</p> <p>Transmitted Beam borderline</p>
These models cannot be used with transmitted beams at 45 degrees incidence even with a center aperture. However, some can be used for transmitted beams at 0 degrees incidence.	These models are used in observation systems containing coaxial illumination or a Mach-Zehnder interferometer. The direction of transmitted light can be changed by rotating the holder.	These models can be used in a Michelson interferometer. The transmitted beam diameter varies depending on the specific model holder.

## Post type and Mounting type

The two types of mirror holders are the post type that come with a post, and the mounting type that can be mounted onto a base plate or adapter plate. The post type of mirror holders is useful when adjusting optical axis height frequently.

The mounting type is useful when space is limited in the optical system, or used in an OEM device application. The optical axis height must be set in the design because the mounting type has a fixed height.

Some of the mounting type holders can be mounted onto a post directly, or converted to fit a post using an adapter plate.



## Kinematic Center Mirror Mount | MHI

RoHS

Catalog  
Code

W4102

The Kinematic Center Mount is designed to allow the mirror to be loaded from the rear, keeping the reflective front surface centered above the mounting hole.

- When this mount is rotated 45 degrees on an optical bench, the center of mirror will stay at the optical axis.
- Cutouts and bevels allow these to be used as beamsplitter holders and not interfere with the transmitted beam.
- Building the mirror frame into the support of the holder keeps the mount thin with a small footprint.
- The small footprint allows more room to access the adjusters compared to regular kinematic mirror holders.
- Includes alignment pin holes to accurately place mount in OEM instruments ( $\phi 3H7$  except MHI-12.7, which is  $\phi 2H7$ ).



## Guide

- ▶ Vertical control gimbal mirror and beamsplitter holders (BSHL) where the rotation of the fine adjustment matches the mirror center are also available. [Reference](#) C022
- ▶ Can be mounted using an M4 low head screw to secure them from the top or an M6 threaded post from the bottom. (MHI-12.7 can be mounted with an M3 low head screw from the top and M4 threaded post from the bottom.)

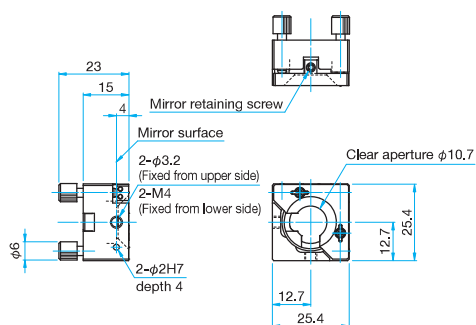
## Attention

- ▶ MHI-12.7 limits the tilt and rotation to be  $\pm 1^\circ$  and  $\pm 2^\circ$  respectively, even when a low and small head hexagon socket head cap screw is used.
- ▶ When securing a mirror with a low head hexagon socket head cap screw, a hex wrench may interfere with the mirror. Please retract the mirror by turning the rotation and tilt adjustment screws before tightening the low head hexagon socket head cap screw.
- ▶ When securing a mirror on a baseplate with a M4 low head hexagon socket head cap screw, there will be  $\pm 1\text{mm}$  clearance.

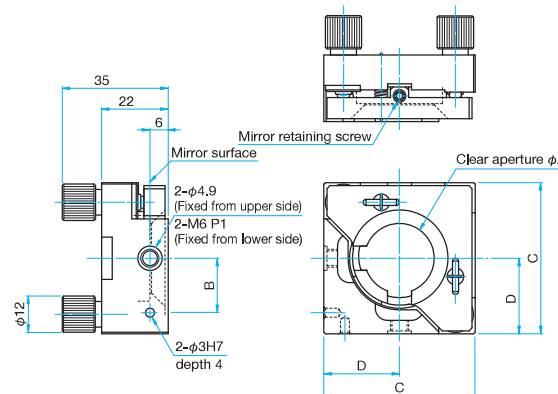


## Outline Drawing

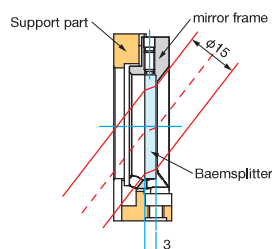
**MHI-12.7** Low head hexagon socket head cap screw M3x6...1 screw



**MHI-25.4/30** Low head hexagon socket head cap screw M4x8...1 screw



## Cross-section view of MHI-30



Part Number	B (mm)	C (mm)	D (mm)
MHI-25.4	18	50	25
MHI-30	20	55	27.5

## Specifications

Part Number	Options specified*1	Compatible Optics Diameter [mm]	Compatible Optics Thickness [mm]	Clear aperture φA [mm]	Reflected Beam Clear Aperture (45° incidence) [mm]	Transmitted Beam Clear Aperture (45° incidence)*2 [mm]	Adjustment Range		Resolution		Weight [kg]
							Tilt [°]	Rotation [°]	Tilt [°/rotation]	Rotation [°/rotation]	
MHI-12.7	—	φ12.7	2 – 9	φ10.7	φ6.8	φ5	±3	±3	about 0.74	about 0.74	0.05
MHI-25.4	UU	φ25, φ25.4	3 – 10	φ23	φ15.5	φ13	±1.5	±1.5	about 0.4	about 0.4	0.12
MHI-30	UU	φ30	3 – 10	φ27	φ18.3	φ15	±1.5	±1.5	about 0.35	about 0.35	0.13

\*1 For specifying options, please refer to "Conversion of Posts, Post Holders and Pedestal Bases of Holders". [Reference](#) C007

\*2 When light is transmitted through a BK7 plane parallel substrate of 3mm thickness.

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A new design based on the Kinematic mirror holders (MHG) resulting in reduced prices. These holders are best for experiments using many simple mirror holders or for use in production devices.

- a small footprint offers more adjustment space compared to the MHG series.
- Mirrors are held at three points along the side to distribute the stress on the mirror evenly.
- The thin frame and setscrew mounting method insure that large clear apertures can be obtained with reflected or transmitted light.



#### Guide

- ▶ Threaded and counterbored mounting holes allow MHGT to be mounted on female threaded M4 posts or on male threaded M6 posts.
- ▶ If lockable adjusters are required, see MHG-NL mirror holders. [Reference](#) C014

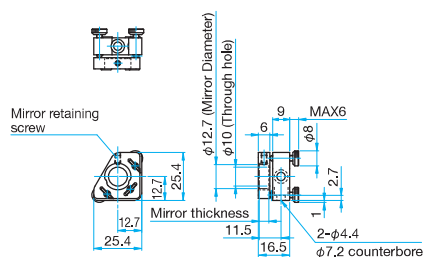
#### Attention

- ▶ The installation center of the post is offset from the mirror reflective surface. These holders cannot be used for installation on an optical bench at 45 degrees incidence. Please use the mirror holders without offset (MHI). [Reference](#) C012
- ▶ The rotation center of fine adjustment does not match the mirror reflective surface. For fine measurement, Please use gimbal mirror holders (MHAN) of which rotation center of fine adjustment matches the mirror reflective surface. [Reference](#) C024

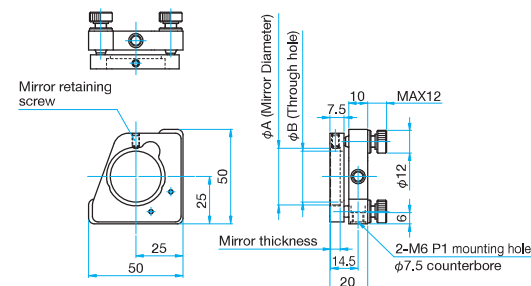


#### Outline Drawing

**MHGT-12.7** Hexagon socket head cap screw M4x6...1 screw

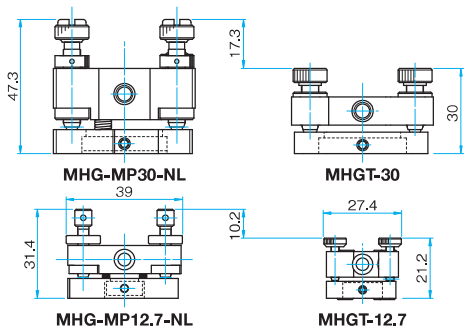


**MHGT-25.4/30** Hexagon socket head cap screw M4x10...1 screw

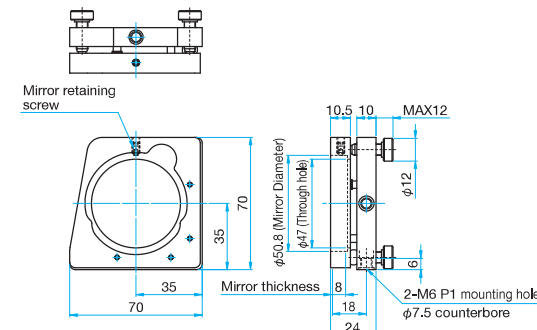


Part Number	φA (mm)	φB (mm)
MHGT-25.4	φ25, φ25.4	φ22
MHGT-30	φ30	φ27

#### Compare the size of the MHG-NL and MHGT



**MHGT-50.8** Hexagon socket head cap screw M4x10...1 screw



#### Specifications

Part Number	Options specified*	Compatible Optics Diameter φA [mm]	Compatible Optics Thickness [mm]	Through hole φB [mm]	Number of Adjustment Axes	Adjustment Range		Resolution		Weight [kg]
						Tilt [°]	Rotation [°]	Tilt [°/rotation]	Rotation [°/rotation]	
MHGT-12.7	—	φ12.7	3 – 5	φ10	2	±3	±3	0.74	0.74	0.013
MHGT-25.4	UU	φ25, φ25.4	3 – 5	φ22	2	±3	±3	0.39	0.39	0.067
MHGT-30	UU	φ30	3 – 5	φ27	2	±3	±3	0.39	0.39	0.067
MHGT-50.8	UU	φ50.8	5 – 9	φ47	2	±3	±3	0.25	0.25	0.12

\* For specifying options, please refer to "Conversion of Posts, Post Holders and Pedestal Bases of Holders". [Reference](#) C007

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NOMI LOCK™ is the new locking mechanism from OptoSigma. It can adjust the torque of the adjustment screws and lock down the screws with negligible shift. It is best suited for use in interferometers or laser processing devices where beam displacement can cause issues.

NOMI LOCK™ is a registered trademark of SIGMA KOKI CO., Ltd.

- Kinematic mirror holders have excellent rigidity and stability. These qualities make them perfect for use in interferometers and laser resonators.
- There are two types of mirror holders, a high stability model (MHG-HS) and a production model (MHG-MP).
- The MHG-HS high stability model is fitted with large adjustment knobs. These knobs allow for movement in the vertical direction as well making it a 3 axis mount.
- NOMI LOCK™ will have a single fringe displaced in the optical axis when used in interferometers. (There are individual differences in the operation of the lock.)
- Three point fixation of the mirrors reduce the stress caused by mounting greatly.
- These holders have a large aperture for reflective or transmitted light. The retaining rings to not reduce the clear aperture.



#### Guide

- ▶ This product can be mounted on pedestal stands (PST: optional) or posts with an M6 external thread (RO: optional).
- ▶ Production model (MHG-MP) can be fixed directly on plates or stages with M4 screws.
- ▶ Production model (MHG-MP) comes with a special wrench for NOMI LOCK™.

#### Attention

- ▶ The rotation center of the production model (MHG-MP) is outside the mirror (fulcrum of holder).
- ▶ To mount the high stability model (MHG-HS) on a flat surface, use the plates for mounting posts (MHG-\*\*BPRO). [Reference](#) C016
- ▶ When the plates for mounting posts (MHG-\*\*BPRO) are used, the optical axis will move 10mm upward.
- ▶ The back surface of the mirror is the reference surface when the mirror is mounted in the holder. Due to this condition, the location of the front surface will vary with the thickness of the mirror.

#### NOMI LOCK™ Adjustment Method

	Control Method Lock knob      Adjustment screw	Interference Fringe Image (Image)	
(1) Free			Loosening the knob allows for easy movement of the adjustment screw.
(2) Half lock			Tightening the locking knob about 30 degrees to make fine adjustments where this is just a little resistance in the adjustment screw. (When changing from free to half-lock, the interference fringe changes greatly.)
(3) Lock			Tightening the locking knob all the way so that it will not move. When changing from half-lock to lock, the interference fringe only changes by about 1 fringe.

Specifications					Primary material: Aluminum (Brass only for MHG-MP12.7-NL) Finish: Black Anodized (Super Black Chrome only for MHG-MP12.7-NL)				
Part Number	Options specified*	Compatible Optics Diameter [mm]	Compatible Optics Thickness [mm]	Number of Adjustment Axes [mm]	Adjustment Range		Resolution Rotation [°/rotation]	Resolution Tilt [°/rotation]	Weight [kg]
MHG-MP12.7-NL	—	φ12.7	3 – 5	3	±3	±3	about 0.74	about 0.74	0.04
MHG-MP20-NL	UU	φ20	3 – 5	2	±3	±3	about 0.39	about 0.39	0.12
MHG-HS20-NL	UU	φ20	3 – 5	3	±3	±3	about 0.39	about 0.39	0.12
MHG-MP25-NL	UU	φ25, φ25.4	3 – 5	2	±3	±3	about 0.39	about 0.39	0.12
MHG-HS25-NL	UU	φ25, φ25.4	3 – 5	3	±3	±3	about 0.39	about 0.39	0.12
MHG-MP30-NL	UU	φ30	3 – 5	2	±3	±3	about 0.39	about 0.39	0.12
MHG-HS30-NL	UU	φ30	3 – 5	3	±3	±3	about 0.39	about 0.39	0.12
MHG-MP50-NL	UU	φ50	5 – 8	2	±2	±2	about 0.26	about 0.26	0.24
MHG-MP50.8-NL	UU	φ50.8	5 – 8	2	±2	±2	about 0.26	about 0.26	0.24
MHG-MP80-NL	UU	φ80	7 – 12	2	±2	±2	about 0.18	about 0.18	0.38
MHG-MP100-NL	UU	φ100, φ101.6	10 – 15	2	±2	±2	about 0.13	about 0.13	0.56

\* For specifying options, please refer to "Conversion of Posts, Post Holders and Pedestal Bases of Holders". [Reference](#) C007

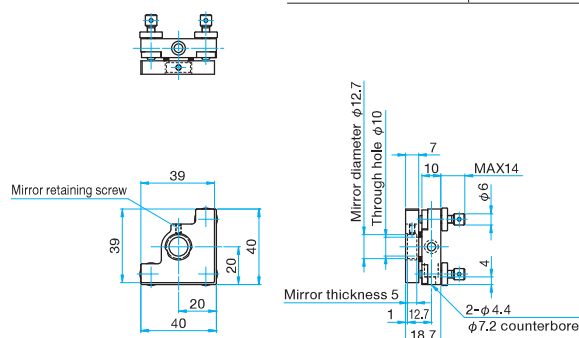


## Outline Drawing

### MHG-MP12.7-NL

Hexagonal socket head cap screw M4x8...1 screw  
Spanner for lock knob...1 screw

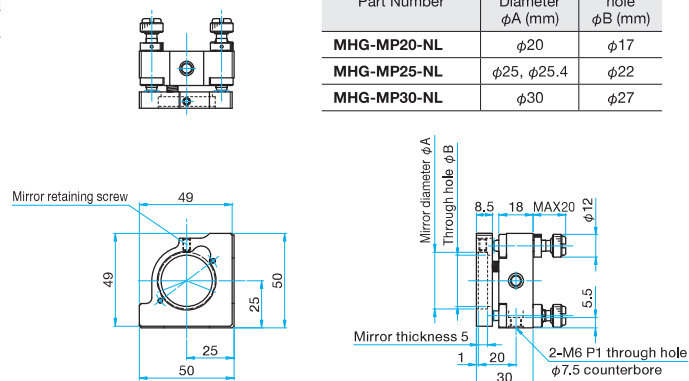
Part Number	Mirror Diameter (mm)
MHG-MP12.7-NL	φ12.7



### MHG-MP20-NL/25-NL/30-NL

Hexagonal socket head cap screw M4x10...1 screw  
Spanner for lock knob...1 screw

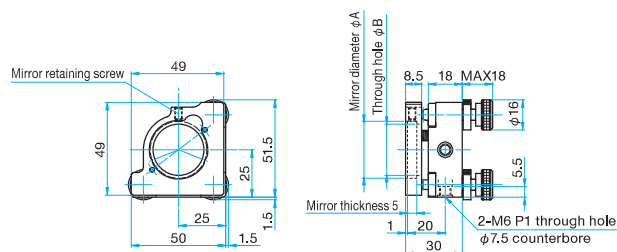
Part Number	Mirror Diameter φA (mm)	Through hole φB (mm)
MHG-MP20-NL	φ20	φ17
MHG-MP25-NL	φ25, φ25.4	φ22
MHG-MP30-NL	φ30	φ27



### MHG-HS20-NL/25-NL/30-NL

Hexagonal socket head cap screw M4x10...1 screw  
Spanner for lock knob...1 screw

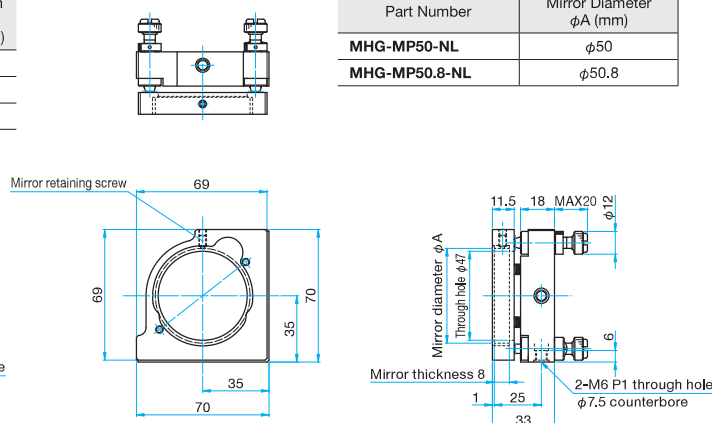
Part Number	Mirror Diameter φA (mm)	Through hole φB (mm)
MHG-HS20-NL	φ20	φ17
MHG-HS25-NL	φ25, φ25.4	φ22
MHG-HS30-NL	φ30	φ27



### MHG-MP50-NL/50.8-NL

Hexagonal socket head cap screw M4x10...1 screw  
Spanner for lock knob...1 screw

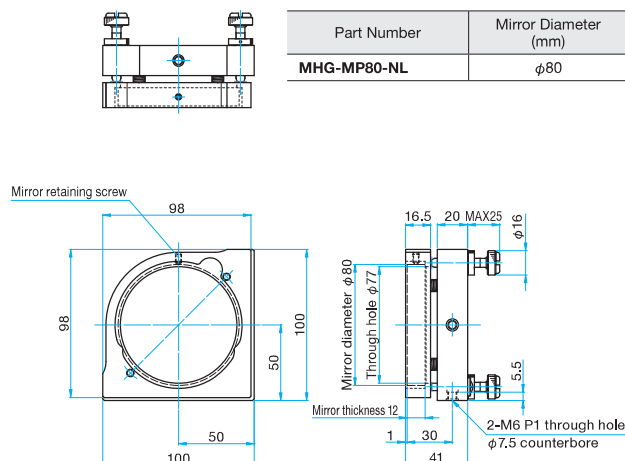
Part Number	Mirror Diameter φA (mm)
MHG-MP50-NL	φ50
MHG-MP50.8-NL	φ50.8



### MHG-MP80-NL

Hexagonal socket head cap screw M4x10...1 screw  
Spanner for lock knob...1 screw

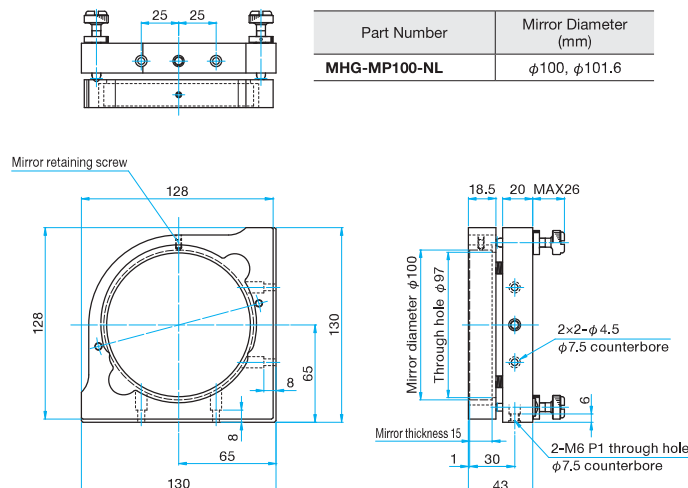
Part Number	Mirror Diameter (mm)
MHG-MP80-NL	φ80



### MHG-MP100-NL

Hexagonal socket head cap screw M4x12...3 screws  
Spanner for lock knob...1 screw

Part Number	Mirror Diameter (mm)
MHG-MP100-NL	φ100, φ101.6





## Mirror Mount Adapters | MHG-MAD

RoHS

Catalog  
Code

W4004

Adapters for mounting smaller diameter mirrors.



- Adapters are designed so that the end faces of mirror frames are aligned with the end faces of adapters when adapters are attached to kinematic mirror holders (MHG). However, the reflective surface of a mirror is positioned 1mm inside the end face of adapter.
- Mirrors are fixed at three points on the lateral side.
- Before mounting adapters to mirror holders, fix mirrors to the adapters. Mirrors cannot be mounted once the adapter is mounted in a mirror holder.
- The reflective surface position is dependant on the mirror thickness.

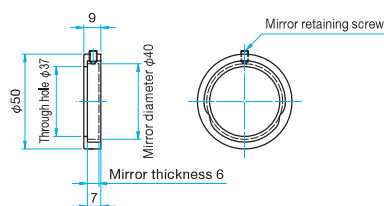
## Example of Use



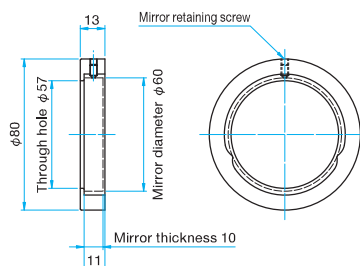
Specifications				Primary material: Aluminum Finish: Black Anodized
Part Number	Compatible Holders	Compatible Optics Diameter [mm]	Compatible Optics Thickness [mm]	Weight [kg]
<b>MHG-40MAD</b>	MHG-MP50	φ40	4 – 6	0.015
<b>MHG-60MAD</b>	MHG-80	φ60	6 – 10	0.06
<b>MHG-25.4SMAD</b>	MHG-MP25/-HS25	□25, □25.4	3 – 5	0.018

## Outline Drawing

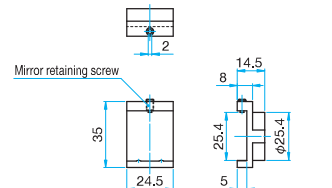
## MHG-40MAD



## MHG-60MAD



## MHG-25.4SMAD



## Prism Adapters | MHG-PAD

RoHS

Catalog  
Code

W4007

Adapters for holding cube optics such as beamsplitters or prisms. Provide extended stability with NOMI LOCK™.

- Rotation ( $\theta$  or yaw) and tilt ( $\alpha$  or pitch) of prisms and cube optics can be fine adjusted with this adapter.
- To adjust yaw tilt ( $\beta$ ), fit the prism adapters in kinematic mirror holders after adjusting the orientation.
- There is a through hole on the moun so that prisms can be used on all four faces.
- There is an offset of 40mm from the baseplate mounting hole of the kinematic mirror holder to the center of cube.
- The clamp allows for different sized cubes to be mounted.



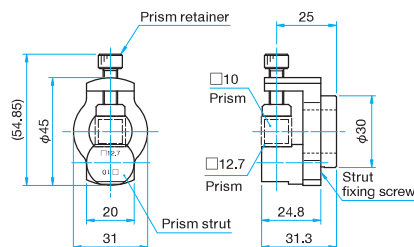
## Example of Use



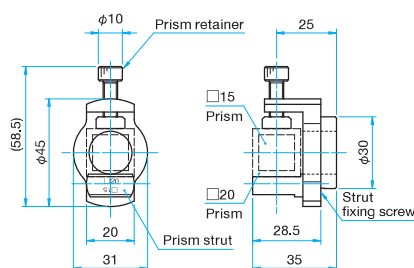
Specifications				Primary material: Aluminum Finish: Black Anodized
Part Number	Compatible Holders	Compatible Optics Diameter [mm]	Weight [kg]	
<b>MHG-12.7PAD</b>	MHG-MP30/-HS30	□10-□12.7	0.06	
<b>MHG-20PAD</b>	MHG-MP30/-HS30	□15-□20	0.055	

## Outline Drawing

## MHG-12.7PAD



## MHG-20PAD





Top adjust mirror holders can be used in small areas reducing the footprint of systems.

- Mirrors are held on their edge with a resin screw.
- These holders can be positioned and operated close to each other.



#### Guide

- Vertical control gimbal mirror and beamsplitter holders (BSHL) where the adjustment is along the reflective surface of the mirror are available too. [Reference](#) C022

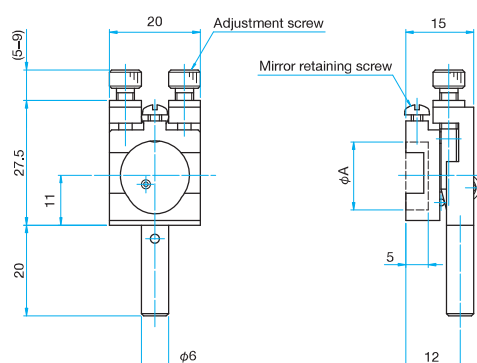
#### Attention

- Mirror thickness will change the position of the reflective surface of the mirror.  
 ► The front surface of the mount is 12 mm from the center axis of the post/mounting hole.



#### Outline Drawing

LMMH-R M4 P0.7



#### Specifications

Part Number	Options specified*	Compatible Optics Diameter $\phi A$ [mm]	Compatible Optics Thickness [mm]	Adjustment Range		Resolution		Weight [kg]
				Tilt [°]	Rotation [°]	Tilt [°/rotation]	Rotation [°/rotation]	
LMMH-10R	N	$\phi 10$	5	$\pm 2.5$	$\pm 2.5$	about 0.28	about 0.3	0.03
LMMH-12.7R	N	$\phi 12.7$	5	$\pm 2.5$	$\pm 2.5$	about 0.28	about 0.3	0.03
LMMH-15R	N	$\phi 15$	5	$\pm 2.5$	$\pm 2.5$	about 0.28	about 0.3	0.03

\* For specifying options, please refer to "Conversion of Posts, Post Holders and Pedestal Bases of Holders". [Reference](#) C007

Rectangular mirrors can be bonded to the front plate and circular mirrors can be bonded or held with the mirror adapters (MKAD).

- MKAD adapters allow for easy removal and mounting of circular mirrors.
- Two baseplate versions are available. MMHN-25L type has the mounting holes on the mirror side, and MMHN-25R type has mounting on the adjustment screw side.
- To align the reflective surface of the mirror to the mounting post axis use MMHN-25LRO mirror holders.



## Guide

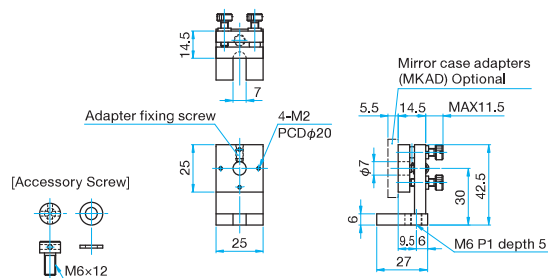
- ▶ 25mm square aluminum flat mirrors (TFA-25S05-10) are available.  
[WEB Reference](#) [Catalog Code](#) W3403

## Attention

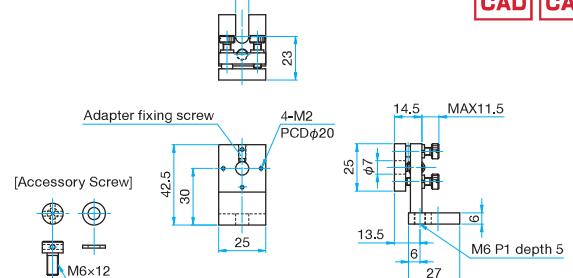
- ▶ The adjustment is not along the reflective surface of the mirror. Gimbal mirror holders (MHAN) have the adjustment along the reflective surface the mirrors. [Reference](#) C024

## Outline Drawing

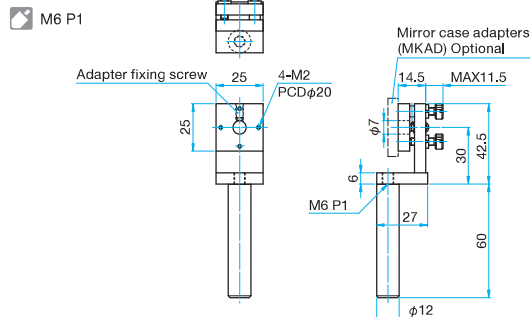
### MMHN-25L



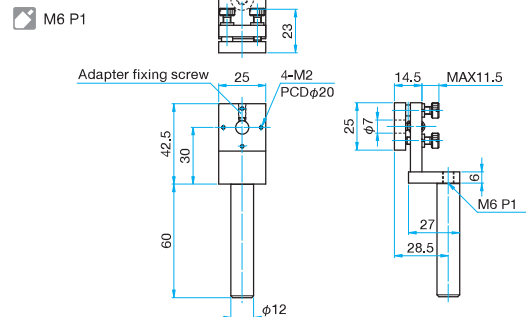
### MMHN-25R



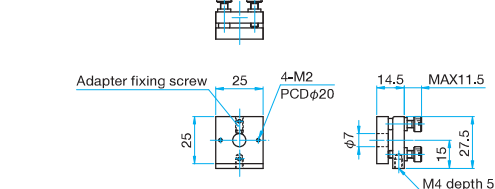
### MMHN-25LRO



### MMHN-25RRO



### MMHN-25BN



Specifications							Primary material: Aluminum Finish: Black Anodized
Part Number	Options specified*	Compatible Optics Diameter [mm]	Adjustment Range		Resolution		Weight [kg]
			Tilt [°]	Rotation [°]	Tilt [°/rotation]	Rotation [°/rotation]	
MMHN-25L	EE/UU	□25 or less φ25 or less	±5	±5	about 0.9	about 0.9	0.04
MMHN-25R	EE/UU		±5	±5	about 0.9	about 0.9	0.04
MMHN-25LRO	—		±5	±5	about 0.9	about 0.9	0.09
MMHN-25RRO	—		±5	±5	about 0.9	about 0.9	0.09
MMHN-25BN	—		±5	±5	about 0.9	about 0.9	0.03

\* For specifying options, please refer to "Conversion of Posts, Post Holders and Pedestal Bases of Holders". [Reference](#) C007

## Option Mirror Adapters | MMHN-MAD

RoHS Catalog Code W4133



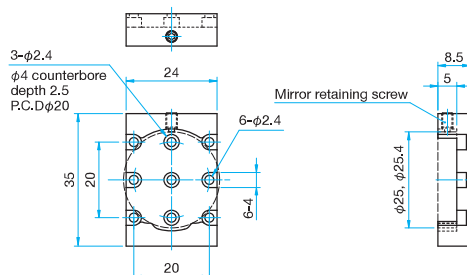
Can be used to change the mounting position of mirrors relative to the mirror holder.

- Round and rectangular reflective optics can be fixed.
- With nine fixed screw holes with 10mm interval, can easily achieve 10mm offset adjustment.
- The optics can be held at three points on the side.

### Outline Drawing

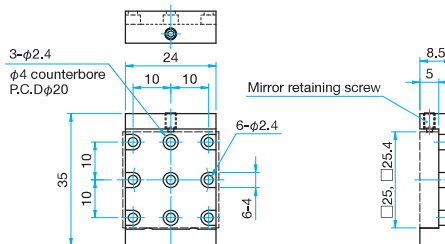
#### MMHN-25CMAD

Hexagonal socket head cap screw M2×3...3 screw



#### MMHN-25SMAD

Hexagonal socket head cap screw M2×3...3 screw



Specifications			Primary material: Aluminum Finish: Black Anodized
Part Number	Compatible Optics Dimensions [mm]	Weight [kg]	
MMHN-25CMAD	φ25, φ25.4	0.01	
MMHN-25SMAD	□25, □25.4	0.01	

## Option Mirror Cells | MKAD

RoHS Catalog Code W4122

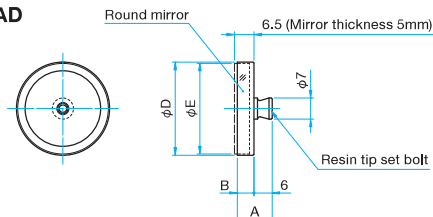
Mirror cells provide a method of mounting mirrors in compact mirror holders (MMHN-25) without adhesive.

- A split from provides a spring force to maintain a secure grip on mirrors inserted into these cells.
- To remove the mirror, push the mirror out by turning the M4 resin tipped setscrew clockwise.



### Outline Drawing

#### MKAD



Specifications							Primary material: Aluminum Finish: Black Anodized
Part Number	Compatible Optics Diameter [mm]	A [mm]	B [mm]	Min Mirror Thickness [mm]	φD [mm]	φE [mm]	Weight [kg]
MKAD-12.7	φ12.7	10.5	4.5	3	φ13.4	φ12.7 <sup>+0.15</sup> <sub>-0.1</sub>	0.002
MKAD-19.05	φ19.1	12	6	4.5	φ19.9	φ19.1 <sup>+0.15</sup> <sub>-0.1</sub>	0.003
MKAD-25.4	φ25.4	11.5	5.5	4	φ26.1	φ25.4 <sup>+0.15</sup> <sub>-0.1</sub>	0.005
MKAD-30	φ30	11.5	5.5	4	φ30.8	φ30 <sup>+0.15</sup> <sub>-0.1</sub>	0.006

Application Systems

Optics &amp; Optical Coatings

Opto-Mechanics

Bases

Manual Stages

Actuators &amp; Adjusters

Motorized Stages

Light Sources &amp; Laser Safety

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Prisms

Polarizers

Lasers

Beam Shaping Diffusers

Filters

Shutter

Others

Fiber

## Vertical Control Gimbal Beamsplitter Holders

BSHL-2/BSHL-TF

RoHS

These vertical holders are ideal for small spacers due to their thin design and vertical adjustment. Holders can be positioned close to each other reducing optical system size.



- There are two types, one is fitted with knobs on top (BSHL-2), and the other is without knobs and adjusted by hex wrench (BSHL-TF).
- This product provides large clear aperture of transmitted beam even if beamsplitter is placed at 45 degrees.
- The gimbal design maintains the center position of mirror even when fine adjusted.
- Adjustment screws can be fixed with the clamp screws on the back of the mounts.
- Two M4 mounting holes are also provided on both sides to mount the holder horizontally.

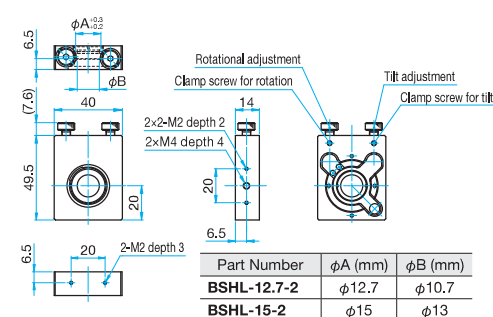
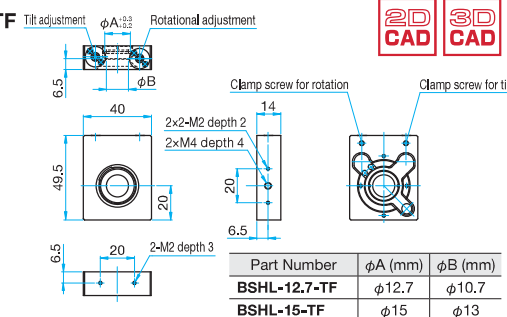
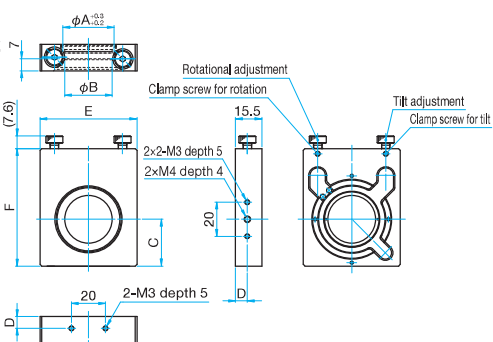
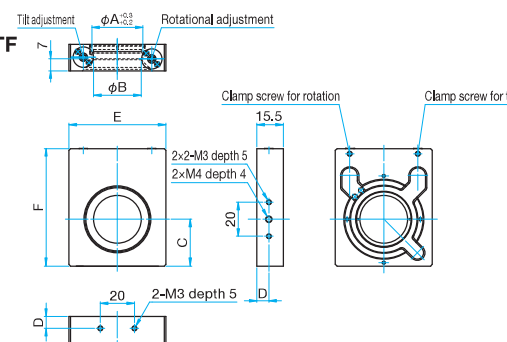
## Guide

- ▶ M6 mounting plates are available for purchase. [Reference](#) C023
- ▶ Can be mounted on post stands (PST-\*\*) using the M4 tapped holes of holders. [WEB Reference](#) [Catalog Code](#) W6039
- ▶ Custom baseplates can be made to order.

## Attention

- ▶ The locking clamps prevent the adjustment screws from rotating.
- ▶ To adjust the BSHL-TF mounts, a hex wrench is required. A ball end wrench set (SKB-JBX6) is available. [WEB Reference](#) [Catalog Code](#) W6077

## Outline Drawing

BSHL-12.7-2  
BSHL-15-2BSHL-12.7-TF  
BSHL-15-TFBSHL-20-2  
BSHL-25.4-2  
BSHL-30-2BSHL-20-TF  
BSHL-25.4-TF  
BSHL-30-TF

With Knobs Part Number	Without Knobs Part Number	φA (mm)	φB (mm)	C (mm)	D (mm)	E (mm)	F (mm)
BSHL-20-2	BSHL-20-TF	φ20	φ18	25.2	7	50.4	64
BSHL-25.4-2	BSHL-25.4-TF	φ25.4	φ23.4	25.2	7	50.4	64
BSHL-30-2	BSHL-30-TF	φ30	φ28	27.5	7	57	69

## Specifications

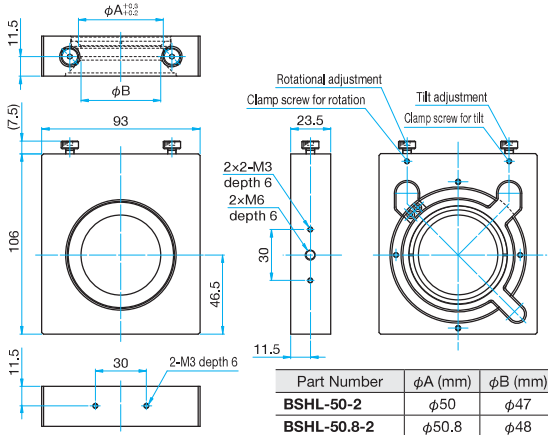
Primary material: Aluminum  
Finish: Black Anodized

With Knobs Part Number	Without Knobs Part Number	Compatible Optics		45° Incidence Reflected Beam Diameter [mm]	45° Incidence Central Transmission Beam Diameter [mm]	Fine Adjustment Range		Fine Adjustment Resolution		Weight [kg]
		Diameter [mm]	Thickness [mm]			Tilt [°]	Rotation [°]	Tilt [°/rotation]	Rotation [°/rotation]	
BSHL-12.7-2	BSHL-12.7-TF	φ12.7	1 – 3	φ6.8	φ2.51	±1.5	±1.2	0.6	0.6	0.06
BSHL-15-2	BSHL-15-TF	φ15	1 – 3	φ8.4	φ4.13	±1.5	±1.2	0.6	0.6	0.06
BSHL-20-2	BSHL-20-TF	φ20	3 – 5	φ12	φ7.67	±1.2	±1.2	0.35	0.45	0.11
BSHL-25.4-2	BSHL-25.4-TF	φ25, φ25.4	3 – 5	φ15.8	φ11.49	±1.2	±1.2	0.35	0.45	0.11
BSHL-30-2	BSHL-30-TF	φ30	3 – 5	φ19	φ14.74	±1.2	±1.2	0.34	0.4	0.13
BSHL-50-2	BSHL-50-TF	φ50	5 – 8	φ31	φ27.39	±1.5	±1.5	0.23	0.27	0.48
BSHL-50.8-2	BSHL-50.8-TF	φ50.8	5 – 8	φ31	φ28.10	±1.5	±1.5	0.23	0.27	0.48

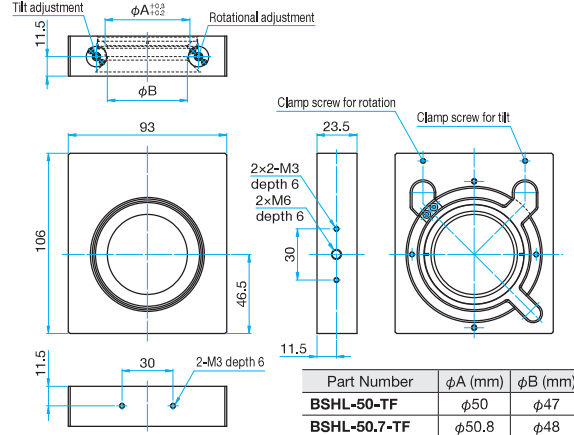


## Outline Drawing

## BSHL-50-2/BSHL-50.8-2



## BSHL-50-TF/BSHL-50.8-TF



## Option Options for Vertical Control Gimbal Beamsplitter Holders | BSHL-BP

RoHS Catalog Code W4510

Base plates for mounting BSHL mirror holders on optical breadboards or optical baseplates. Base plates are available to mount the BSHL at 0 degrees and 45 degrees incidence positions.

- BSHL-BPRO adapter plates for mounting posts (RO-12/20) on the bottom of the BSHL.
- BSHL-12.7BP mounts BSHL-12.7/15 holders on base plates with M2 threads on 10mm spacing at 0 degrees and 45 degrees incidence positions.
- When securing with an M4 thread, use the M6-M4 conversion adapter (AD-M6-M4).

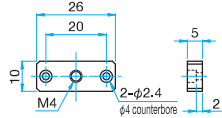
WEB Reference Catalog Code W6030



## Outline Drawing

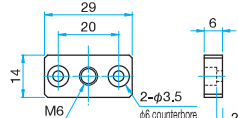
## BSHL-12.7BPRO

- hexagon socket head cap screw M2x4...2 screws



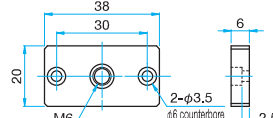
## BSHL-20BPRO

- hexagon socket head cap screw M3x6...2 screws



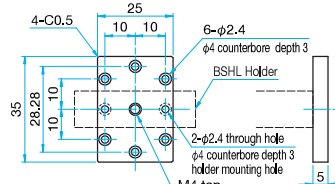
## BSHL-50BPRO

- hexagon socket head cap screw M3x8...2 screws



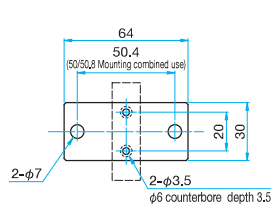
## BSHL-12.7BP

- hexagon socket head cap screw M2x5...6 screws



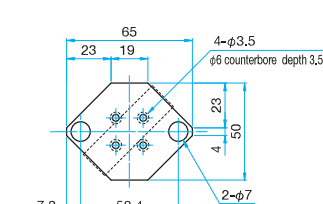
## BSHL-25.4BP-0/-0UU

- hexagon socket head cap screw M3x6...2 screws, M6x10...2 screws (0)  
hexagon socket head cap screw M3x6...2 screws, 1/4-20UNCx3/8...2 screws (0UU)



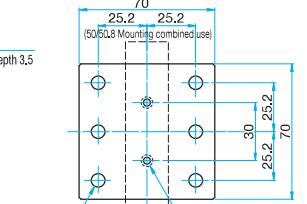
## BSHL-25.4BP-45/-45UU

- hexagon socket head cap screw M3x6...2 screws, M6x10...2 screws (45)  
hexagon socket head cap screw M3x6...2 screws, 1/4-20UNCx3/8...2 screws (45UU)



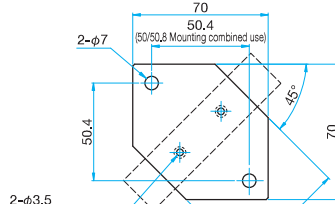
## BSHL-50.8BP-0/-0UU

- hexagon socket head cap screw M3x6...2 screws, M6x10...6 screws (0)  
hexagon socket head cap screw M3x6...2 screws, 1/4-20UNCx3/8...6 screws (0UU)



## BSHL-50.8BP-45/-45UU

- hexagon socket head cap screw M3x6...2 screws, M6x10...2 screws (45)  
hexagon socket head cap screw M3x6...2 screws, 1/4-20UNCx3/8...2 screws (45UU)



## Specifications

Primary material: Aluminum  
Finish: Black Anodized

Part Number		Type	Compatible Holders	Weight [kg]
METRIC	INCH			
BSHL-12.7BPRO	—	M4-Rod	BSHL-12.7, BSHL-15	0.01
BSHL-20BPRO	—	M6-Rod	BSHL-20, BSHL-25.4, BSHL-30	0.01
BSHL-50BPRO	—	M6-Rod	BSHL-50, BSHL-50.8	0.02
BSHL-12.7BP	—	Combined use 0° and 45° Incidence	BSHL-12.7, BSHL-15	0.01
BSHL-25.4BP-0	BSHL-25.4BP-0UU	0° Incidence	BSHL-20, BSHL-25.4, BSHL-30	0.03
BSHL-25.4BP-45	BSHL-25.4BP-45UU	45° Incidence	BSHL-20, BSHL-25.4, BSHL-30	0.03
BSHL-50.8BP-0	BSHL-50.8BP-0UU	0° Incidence	BSHL-50, BSHL-50.8	0.08
BSHL-50.8BP-45	BSHL-50.8BP-45UU	45° Incidence	BSHL-50, BSHL-50.8	0.06

Mirrors can rotate 360 degrees in the pitch direction.

Ideal for applications where the incident light has multiple angles of incidence.

- The angle of the mirror can be fine tuned with the coarse/fine switching clamp.
- The mount is designed to have the reflective surface at the center of rotation of the mount. Mirror thickness does not affect this.
- 0.25 mm fine pitch screw adjusters or differential micrometers can be used to save space and provide finer adjustment for MHAN mounts  $\phi 50.8$  mm and under



## Guide

- ▶ The RO-20-60 post (diameter  $\phi 20$ mm, length 60mm) is included but it can be replaced with other sizes. Special tools are required to remove the post. Different sized post can be specified at the time of purchase.
- ▶ Kinematic mirror holders, MHG-NL, should be used for low optical axes applications. [Reference](#) C014

## Attention

- ▶ Beam splitters mounted at 45 degrees will have the beam blocked by the aluminum frame. The BHAN gimbal beamsplitter holders are recommended and have a larger transmitted clear aperture. [Reference](#) C026
- ▶ Use the coarse/fine switching clamp to lock down the mount after the desired adjustment.
- ▶ The post should be well secured before adjusting the mount.

## Mirror Mounting Methods

When mounting a mirror in a mirror holder, use gloves or finger cots so that finger prints do not get on the mirror.

When securing a mirror to the gimbal mirror holder, place the reflective surface downward so that the mirror will be tight against the bottom (face side) of the mirror frame. Place a Delrin ring on the mirror from the top, so that it does not scratch the mirror. Secure the retaining ring into the mirror frame using a spanner wrench or similar tool.

Guide:

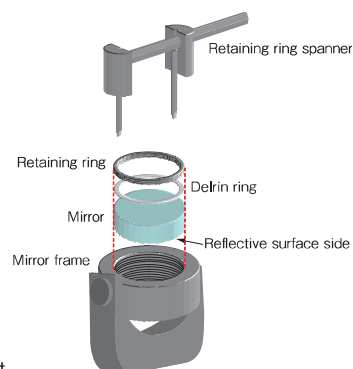
First, tighten the retaining ring until it just contacts the mirror.

Second, firmly tighten the retaining ring once, until mirror frame and mirror, Delrin ring, and retaining ring are all in tight contact.

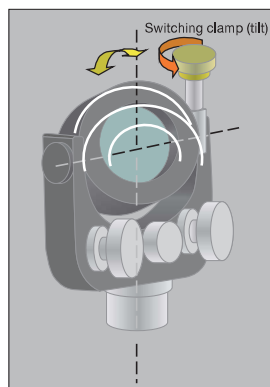
Third, loosen the retaining ring until the mirror can move.

Finally, slowly tighten the retaining ring, stopping at the position where the retaining ring is held lightly. So as not to put stress on the mirror.

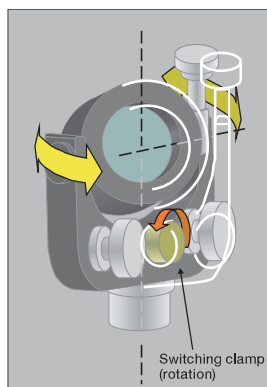
When shipping or when used in locations with a lot of vibration, it is possible that the retaining ring will come loose, and the mirror will fall off. In this case, either firmly tighten the retaining ring so that it does not come loose, or secure the retaining ring with thread locking adhesive.



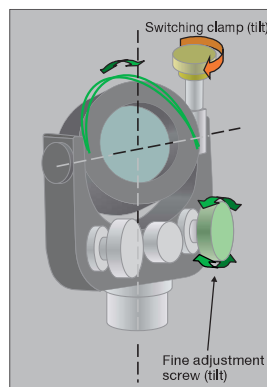
## How to Use the Coarse / Fine Switching Clamp and Fine Adjustment Screws



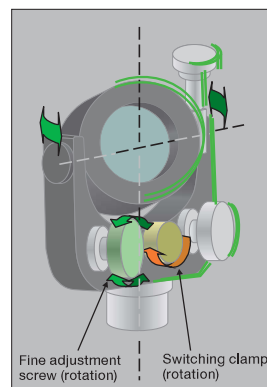
Tilt (pitch) coarse movement control



Rotation (Yaw) coarse movement control



Tilt fine movement control



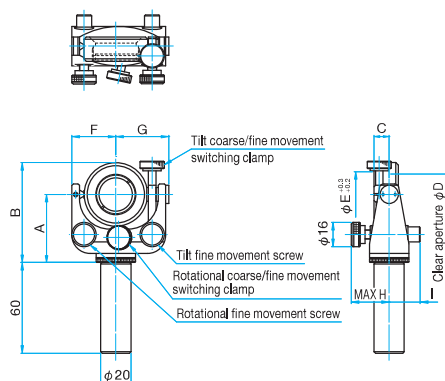
Rotational fine movement control



## Outline Drawing

**MHAN-S**

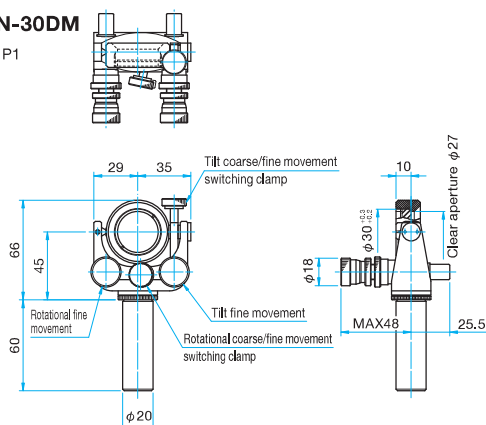
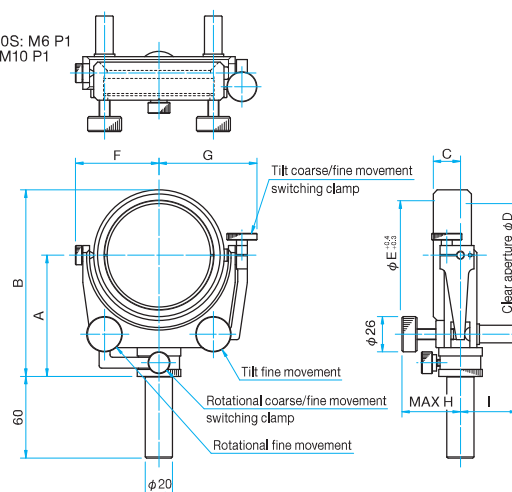
M6 P1



Part Number	A (mm)	B (mm)	C (mm)	φD (mm)	φE (mm)	G (mm)	F+G (mm)	MAX H (mm)	I (mm)
MHAN-20S	40	56	10	φ17	φ20	30	54	26.5	20.5
MHAN-25.4S	45	66	10	φ22	φ25.4	35	64	27	20.5
MHAN-30S	45	66	10	φ27	φ30	35	64	27	20.5
MHAN-40S	52.5	79.5	12	φ37	φ40	41	76	27.5	20.5
MHAN-50S	60	92	15	φ46	φ50	46	86	29	20.5
MHAN-50.8S	60	92	15	φ47	φ50.8	46	86	29	20.5
MHAN-60S	65	102	15	φ56	φ60	51	96	28.5	20.5

**MHAN-30DM**

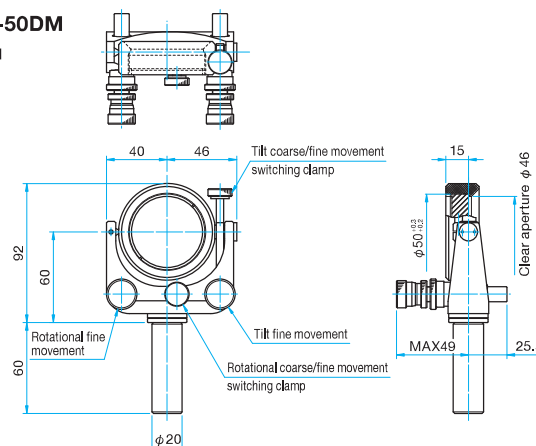
M6 P1

**MHA**MHA-80S: M6 P1  
Other: M10 P1

Part Number	A (mm)	B (mm)	C (mm)	φD (mm)	φE (mm)	G (mm)	F+G (mm)	MAX H (mm)	I (mm)
MHA-80S	89	137	20	φ75	φ80	72	133	48	42.5
MHA-100SA	115	177	21	φ95	φ100	101	184	48	45
MHA-130SA	128	205	24	φ124	φ130	116	214	48	45
MHA-150S	140	227	26	φ144	φ150	126	234	48	45

**MHAN-50DM**

M6 P1



## Screw Type

Primary material: Aluminum  
Finish: Black Anodized

Part Number	Options specified*	Compatible Optics Diameter [mm]	Compatible Optics Thickness [mm]	Reflected Beam Clear Aperture (45° incidence) [mm]	Fine Adjustment Range Tilt [°]	Fine Adjustment Range Rotation [°]	Fine Adjustment Resolution Tilt [°/rotation]	Fine Adjustment Resolution Rotation [°/rotation]	Weight [kg]
MHAN-20S	N/UU	φ20	2 - 6	φ9.2	±4	±4	about 0.54	about 0.68	0.3
MHAN-25.4S	N/UU	φ25, φ25.4	2 - 6	φ12.7	±4	±4	about 0.54	about 0.68	0.4
MHAN-30S	N/UU	φ30	2 - 6	φ16.3	±4	±4	about 0.54	about 0.68	0.4
MHAN-40S	N/UU	φ40	2 - 8	φ23.3	±4	±4	about 0.45	about 0.55	0.6
MHAN-50S	N/UU	φ50	3 - 11	φ30.4	±4	±4	about 0.35	about 0.48	0.7
MHAN-50.8S	N/UU	φ50.8	3 - 11	φ30.4	±4	±4	about 0.35	about 0.48	0.7
MHAN-60S	N/UU	φ60	3 - 11	φ37.5	±3	±4	about 0.31	about 0.41	0.9
MHA-80S	—	φ80	4 - 15	φ50.9	±3.5	±5	about 0.49	about 0.72	1.6
MHA-100SA	—	φ100	4 - 15	φ65.1	±3.4	±5	about 0.35	about 0.52	1.9
MHA-130SA	—	φ130	7 - 18	φ86.3	±2.9	±4	about 0.30	about 0.42	2.3
MHA-150S	—	φ150	4 - 20	φ100.4	±2.5	±4	about 0.26	about 0.38	2.5

\* For specifying options, please refer to "Conversion of Posts, Post Holders and Pedestal Bases of Holders". [Reference](#) C007

## Precision Type

Primary material: Aluminum  
Finish: Black Anodized

Part Number	Options specified*	Compatible Optics Diameter [mm]	Compatible Optics Thickness [mm]	Fine Adjustment Range Tilt [°]	Fine Adjustment Range Rotation [°]	Fine Adjustment Resolution Tilt [°/rotation]	Fine Adjustment Resolution Rotation [°/rotation]	Ultra Fine Adjustment Resolution Tilt [°/rotation]	Ultra Fine Adjustment Resolution Rotation [°/rotation]	Ultra Fine Adjustment Indicator Conversion Tilt [°/DIV]	Ultra Fine Adjustment Indicator Conversion Rotation [°/DIV]	Weight [kg]
MHAN-30DM	N/UU	φ30	2 - 6	±4	±4	about 1.08	about 1.35	about 0.11	about 0.14	about 0.002	about 0.002	0.47
MHAN-50DM	N/UU	φ50	3 - 11	±3	±4	about 0.71	about 0.95	about 0.07	about 0.10	about 0.001	about 0.002	0.58

\* For specifying options, please refer to "Conversion of Posts, Post Holders and Pedestal Bases of Holders". [Reference](#) C007Application  
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## Gimbal Beamsplitter Holders

BHAN-S/BHAN-DM

RoHS

Catalog  
Code

W4011

The frame of these mounts are narrow to accommodate a greater clear aperture at 45 degrees incident. The transmitted beam diameter is just about the same as the reflected beam diameter. Appropriate for beam branching optical systems or Michelson interferometers.

- BHAN-S functions the same as MHAN.



## Guide

- ▶ The RO-20-60 post (diameter  $\phi 20\text{mm}$ , length 60mm) is included but it can be replaced with other sizes. Special tools are required to remove the post. Different sized post can be specified at the time of purchase.

## Attention

- ▶ Resin rings are sold separately and are recommended.
- ▶ BHAN uses retaining rings unique to this mount. Contact the Sales Division for replacements..
- ▶ The mount will have some backlash if a large wedged beamsplitter is used. Wedges work better when they are secured on their edges. Kinematic mirror holders (MHG-NL) are recommended for circular wedges. [Reference](#) C014

## Screw Type

								Primary material: Aluminum Finish: Black Anodized
Part Number	Options specified*	Compatible Optics Diameter [mm]	Compatible Optics Thickness [mm]	Fine Adjustment Range Tilt [°]	Fine Adjustment Range Rotation [°]	Fine Adjustment Resolution Tilt [°/rotation]	Fine Adjustment Resolution Rotation [°/rotation]	Weight [kg]
BHAN-30S	UU	$\phi 30$	3 – 5	$\pm 4$	$\pm 4$	about 0.54	about 0.68	0.4
BHAN-50S	UU	$\phi 50, \phi 50.8$	5 – 8	$\pm 4$	$\pm 4$	about 0.31	about 0.48	0.5

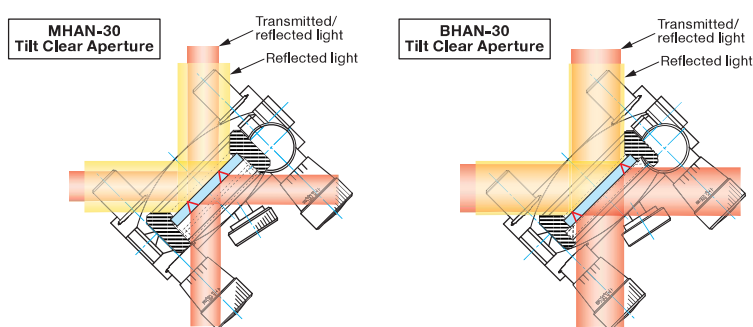
\* For specifying options, please refer to "Conversion of Posts, Post Holders and Pedestal Bases of Holders". [Reference](#) C007

## Precision Type

												Primary material: Aluminum Finish: Black Anodized
Part Number	Options specified*	Compatible Optics Diameter [mm]	Compatible Optics Thickness [mm]	Fine Adjustment Range Tilt [°]	Fine Adjustment Range Rotation [°]	Fine Adjustment Resolution Tilt [°/rotation]	Fine Adjustment Resolution Rotation [°/rotation]	Ultra Fine Adjustment Resolution Tilt [°/rotation]	Ultra Fine Adjustment Resolution Rotation [°/rotation]	Ultra Fine Adjustment Indicator Conversion Tilt [°/DIV]	Ultra Fine Adjustment Indicator Conversion Rotation [°/DIV]	Weight [kg]
BHAN-30DM	UU	$\phi 30$	3 – 5	$\pm 4$	$\pm 4$	about 1.08	about 1.35	about 0.11	about 0.14	about 0.002	about 0.002	0.45
BHAN-50DM	UU	$\phi 50, \phi 50.8$	5 – 8	$\pm 3$	$\pm 4$	about 0.71	about 0.95	about 0.07	about 0.10	about 0.001	about 0.002	0.55

\* For specifying options, please refer to "Conversion of Posts, Post Holders and Pedestal Bases of Holders". [Reference](#) C007

## Reflection and Transmission Clear Aperture at 45° Incidence

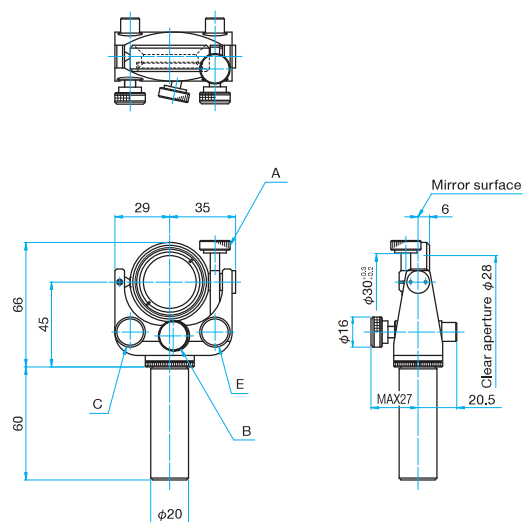


## Clear Aperture of Beamsplitter Holder

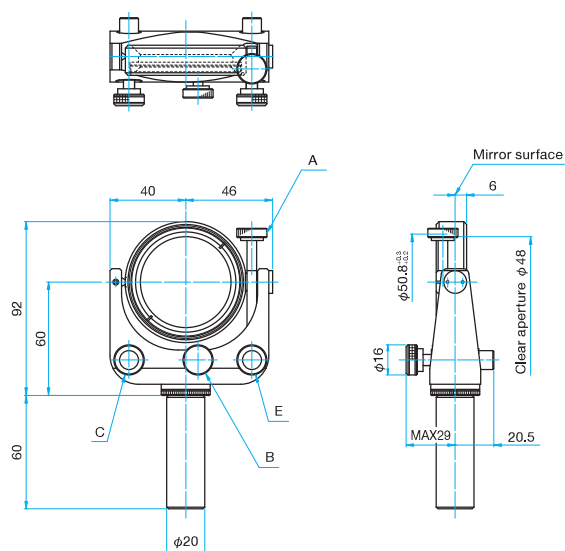
Part Number	Beamsplitter Thickness [mm]	Transmitted/Reflected Beam Clear Aperture	
		45° incidence [mm]	0° incidence [mm]
BHAN-30S	3	15.4	28
MHAN-30S	3	9.9	27
BHAN-50S	5	31.1	48
MHAN-50S	5	18.3	47
MHAN-20S	2	2.2	17
MHAN-25.4S	3	6.7	22
MHAN-40S	4	14.7	37
MHAN-60S	6	26.1	57
MHA-80S	8	34.5	76
MHA-100S	10	50.0	96
MHA-130S	13	69.3	126
MHA-150S	15	80.2	146

# Outline Drawing

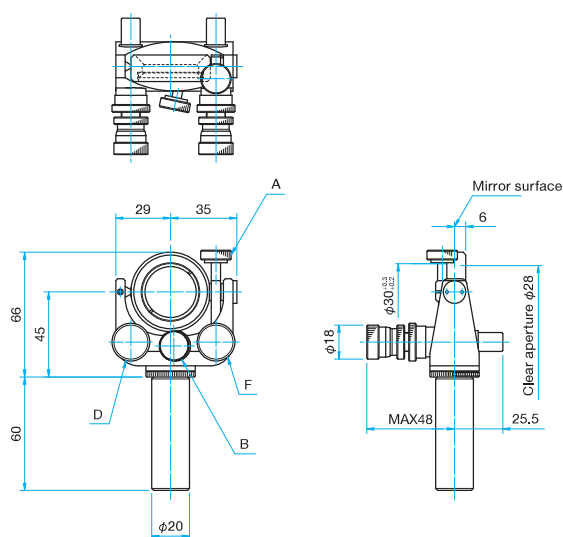
**BHAN-30S** M6 P1



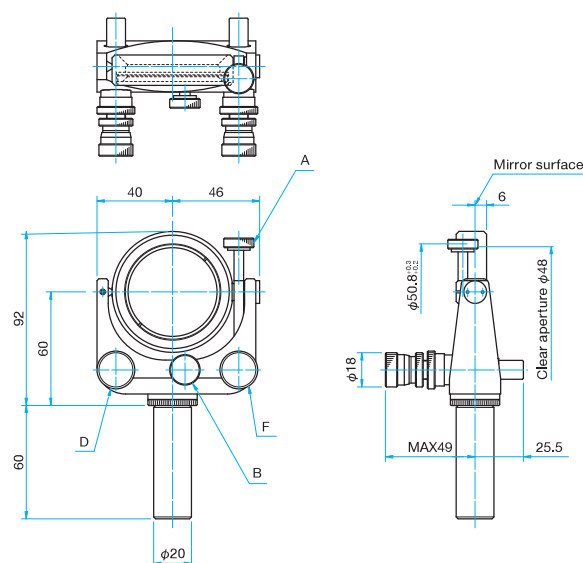
**BHAN-50S** M6 P1



**BHAN-30DM** M6 P1



**BHAN-50DM** M6 P1



A: Tilt coarse/fine movement switching clamp  
B: Rotational coarse/fine movement switching clamp  
C: Rotational fine movement screw

D: Rotational fine movement Differential micrometer head  
E: Tilt fine movement screw  
F: Tilt fine movement Differential micrometer head

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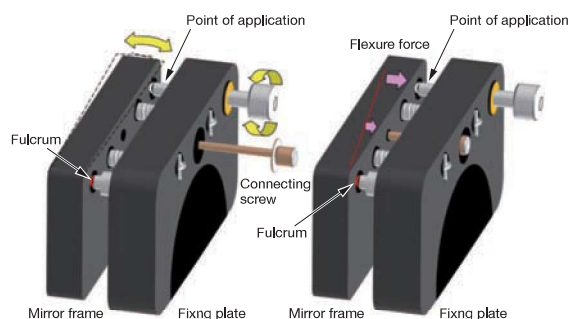
The MHL kinematic mirror holder incorporates a steel flexure spring for high rigidity and suppression of positional shifts due to shocks or vibrations.

- Includes provisions for post mounting (M6 tapped hole with counterbore for M4 or 8-32 thread inserts).
- Baseplates (MHL-BP) available for mounting directly to breadboards.
- Mirror holder cell is removable and can be replaced by custom cells or adapters.
- Setscrew locking mechanism for preventing accidental changes after adjusting mirror angle.



Mirror frame with locking mechanism

- ① By loosening the connecting screw, angle can be adjusted.
- ② By tightening the connecting screw, flexure force will act on point of application. Then mirror frame and fixing plate can be fixed. \*Lock will be released when adjusting screw is moved.



#### Guide

- ▶ Manual adjustment screws can be replaced by motorized actuators. Please contact Sales Division for more information.
- ▶ Remove mirror cell using four Philips head screws on front of mount.
  - Unscrew retaining ring and remove Resin washer.
  - Insert mirror with reflective surface facing the flange.
  - Tight against Resin washer.
  - Insert mirror cell into body and reattach using four Philips head screws.

#### Attention

- ▶ MHL has different design from MHB. Please confirm the dimension by CAD drawings.
- ▶ Posts and base plates are not included. Please purchase separately.
- ▶ Depending on the angle of incidence, the beam will be shaded by the frame of mirror mount. For the usage of 45 degrees transmittance, Kinematic Mirror Holder (MHG) or Gimbal Beamsplitter Holders (BHAN) is available. [Reference](#) C014, [Reference](#) C026
- ▶ Rotation center of MHL doesn't match the center of mirror surface. If the rotation center is needed to match the center of mirror surface, Vertical Control Gimbal Beamsplitter Holders (BSHL-2) or Gimballed Mirror Mounts (MHAN) are available. [Reference](#) C022, [Reference](#) C024

#### Specifications

Primary material: Aluminum  
Finish: Black Anodized

Part Number	Compatible Optics		Number of Adjustment Axis	Adjustment Range		Resolution		Weight [kg]
	Diameter [mm]	Thickness [mm]		Tilt [°]	Rotation [°]	Tilt [°/Rotation]	Rotation [°/Rotation]	
MHL-25.4S	φ25, φ25.4	3 – 9	2	±2	±2	±0.3	±0.3	0.28
MHL-30S	φ30	3 – 9	2	±2	±2	±0.3	±0.3	0.29
MHL-50S	φ50	4 – 16	2	±3	±3	±0.2	±0.2	0.56
MHL-50.8S	φ50.8	4 – 16	2	±3	±3	±0.2	±0.2	0.56



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Top adjustment of these mirror mounts allow for devices to be placed in close proximity with each other.

The mount can be mounted so that the micrometers are facing upwards or horizontally with the correct baseplate.

- The optical axis of the mount does not change with vertical or horizontal mounting.
- Each baseplate will work with the mount vertically or horizontally.



#### Guide

- Vertical control gimbal mirror and beamsplitter holders (BSHL) of which rotation center of fine adjustment matches the center of the mirror reflective surface are also available. [Reference](#) ► C022

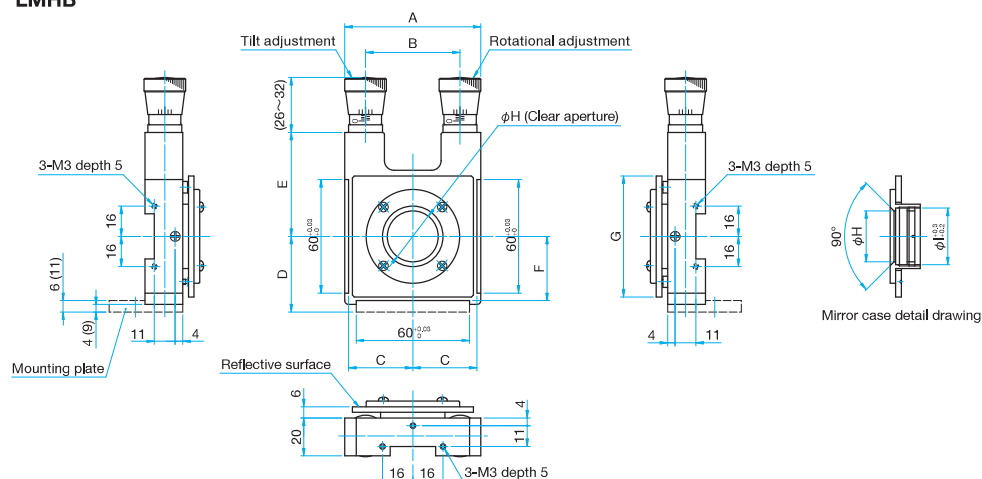
#### Attention

- LMHBP plates are required to install the mount onto an optical table.
- Beamsplitters will have the transmitted beam partially blocked at 45 degrees incident. MHG or MHAN mounts are commended for beamsplitters. [Reference](#) ► C014, C024



### Outline Drawing

#### LMHB



Part Number	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	φH (mm)	φI (mm)
LMHB-25.4M	72	50	34	40	55	34	64	φ22	φ25.4
LMHB-30M	72	50	24	40	55	34	64	φ27	φ30
LMHB-50M	102	80	49	55	69	49	94	φ47	φ50
LMHB-50.8M	102	80	49	55	69	49	94	φ47	φ50.8
LMHB-60M	102	80	49	55	69	49	94	φ57	φ60

### Specifications

Primary material: Aluminum  
Finish: Black Anodized

Part Number	Compatible Optics		Adjustment Range		Resolution		Weight [kg]
	Diameter [mm]	Thickness [mm]	Tilt [°]	Rotation [°]	Tilt [°/rotation]	Rotation [°/rotation]	
LMHB-25.4M	φ25.4	3 – 9	±2.8	±2.8	about 0.006	about 0.006	0.44
LMHB-30M	φ30	3 – 9	±2.8	±2.8	about 0.006	about 0.006	0.44
LMHB-50M	φ50	2 – 16	±1.8	±1.8	about 0.004	about 0.004	0.75
LMHB-50.8M	φ50.8	2 – 16	±1.8	±1.8	about 0.004	about 0.004	0.75
LMHB-60M	φ60	4 – 17	±1.8	±1.8	about 0.004	about 0.004	0.75

# Option Plates for Topmike Vertical Control Mirror Holders | LMHBP

RoHS

Catalog Code W4503

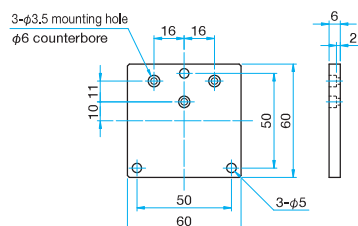
These plates are for mounting vertical control mirror holders (LMHB) on an optical breadboard, optical baseplates, or post.



## Outline Drawing

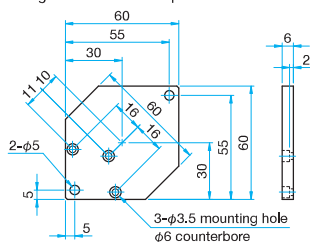
### LMHBP-0

1 Pan head screw M3x6...3screws,  
Hexagon socket head cap screw M4x10...3 screws



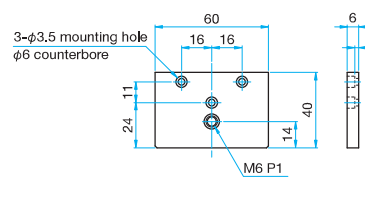
### LMHBP-45

1 Pan head screw M3x6...3screws,  
Hexagon socket head cap screw M4x10...2 screws



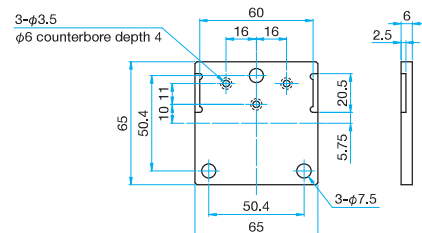
### LMHBP-M6

1 Pan head screw M3x6...3 screws



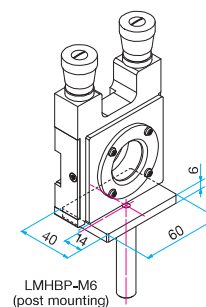
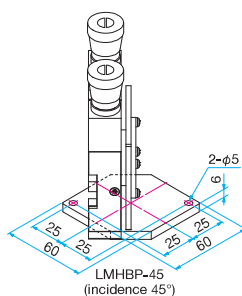
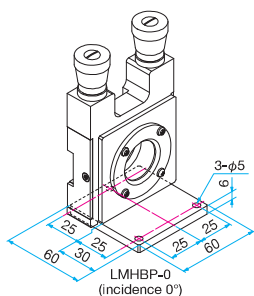
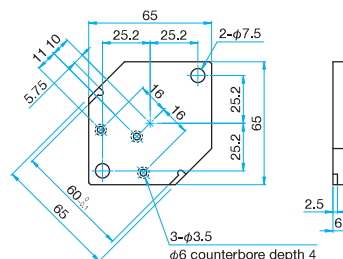
### LMHBP-0EE/0UU

1 Pan head screw M3x6...3 screws, Hexagon socket head cap screw M6x12...3 screws (EE)  
1 Pan head screw M3x6...3 screws, Hexagon socket head cap screw 1/4-20UNCx1/2...3 screws (UU)



### LMHBP-45EE/45UU

1 Pan head screw M3x6...3 screws, Hexagon socket head cap screw M6x12...2 screws (EE)  
1 Pan head screw M3x6...3 screws, Hexagon socket head cap screw 1/4-20UNCx1/2...2 screws (UU)



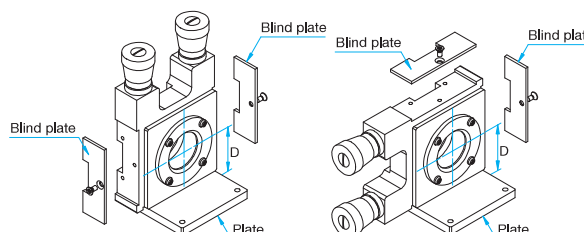
## Specifications

Primary material: Aluminum  
Finish: Black Anodized

Part Number		Type	Weight [kg]
METRIC	INCH		
LMHBP-0	—	0°Incidence, M4 Screw	0.06
LMHBP-0EE	LMHBP-0UU	0°Incidence, M6 or Inch Screw	0.06
LMHBP-45	—	45°Incidence, M4 Screw	0.05
LMHBP-45EE	LMHBP-45UU	45°Incidence, M6 or Inch Screw	0.05
LMHBP-M6	—	Post of M6 threaded	0.04

## Method to Change the Control Direction

To change the control direction for adjusting a mirror to left or right, please change the direction of the LMHB and mount it on a plate. Change in the control direction does not change the optical axis height (D). Please remove the blindfold boards attached on the sides of the holder, and mount the plate on one side of the holder.



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Gimbal mirror holders designed for mirrors  $\phi 100\text{mm}$  to  $\phi 300\text{mm}$ .

These mirror holders can minimize optical path length difference, a problem in large mirrors, caused by mirror tilt adjustment.

- It is structured to fix the mirror with the three resin tip screws from the back, and it is designed to fix the mirror of various thickness.
- Differential micrometer heads with large knobs are used for fine angular adjustment.



### Guide

- Custom style MHD mounts can be made to order. Contact our Sales Division for more information.

### Attention

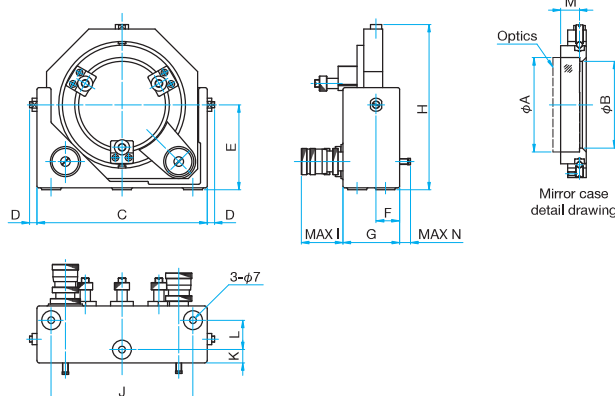
- Remove the retaining screw brackets to insert a mirror. Then screw the brackets back on.
- Pressing an optics hard with the resin tip screw of the mirror retainer may distort the mirror and worsen the surface accuracy.



## Outline Drawing

### MHD

- MHD-100: Hexagon socket head cap screw M6x10...3 screws
- MHD-150/200: Hexagon socket head cap screw M6x12...3 screws
- MHD-254: Hexagon socket head cap screw M6x14...3 screws
- MHD-300: Hexagon socket head cap screw M6x18...3 screws
- MHD-101.6/152.4/203.2: Hexagon socket head cap screw 1/4-20UNCx1/2...3 screws
- MHD-254-UU: Hexagon socket head cap screw 1/4-20UNCx1/2...3 screws
- Common Accessories
- Washer for M6...3 Pieces
- Special tool, long hexagon wrench...1 Piece



Part Number	$\phi A$ (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)	K (mm)	L (mm)	M (mm)	N (mm)
<b>MHD-100</b>	$\phi 100_{+0.015}^{-0.021}$	92	180	8	90	25	60	175	65	150	14	31	20	30
<b>MHD-101.6</b>	$\phi 101.6_{+0.015}^{-0.021}$	92	180	8	90	25	60	175	65	150	14	31	20	30
<b>MHD-150</b>	$\phi 150_{+0.015}^{-0.021}$	138	240	8	120	25	65	234	70	190	15	34	30	30
<b>MHD-152.4</b>	$\phi 152.4_{+0.015}^{-0.021}$	138	240	8	120	25	65	234	70	190	15	34	30	30
<b>MHD-200</b>	$\phi 200_{+0.015}^{-0.021}$	188	295	10	150	30	84	293	70	250	17	50	35	25
<b>MHD-203.2</b>	$\phi 203.2_{+0.015}^{-0.021}$	188	295	10	150	30	84	293	70	250	17	50	35	25
<b>MHD-254</b>	$\phi 254_{+0.015}^{-0.021}$	242	347	10	180	33	90	350	70	300	18	50	45	25
<b>MHD-300</b>	$\phi 300_{+0.015}^{-0.021}$	288	405	10	211	33	90	407	70	350	18	50	45	25

## Specifications

Primary material: Aluminum  
Finish: Black (main unit) Black Anodized (Holder)

Part Number	Options specified*	Compatible Optics		Adjustment Range		Coarse Adjustment Resolution		Fine Adjustment Indicator Conversion		Weight [kg]
		Diameter [mm]	Thickness [mm]	Tilt [°]	Rotation [°]	Tilt [°/rotation]	Rotation [°/rotation]	Tilt [°/DIV]	Rotation [°/DIV]	
<b>MHD-100</b>	—	$\phi 100$	5 – 28	$\pm 5.7$	$\pm 5.7$	about 0.57	about 0.57	about 0.0008	about 0.0008	2.1
<b>MHD-101.6</b>	—	$\phi 101.6$	5 – 28	$\pm 5.7$	$\pm 5.7$	about 0.57	about 0.57	about 0.0008	about 0.0008	2.1
<b>MHD-150</b>	—	$\phi 150$	5 – 38	$\pm 4.3$	$\pm 4.3$	about 0.43	about 0.43	about 0.0006	about 0.0006	3.3
<b>MHD-152.4</b>	—	$\phi 152.4$	5 – 38	$\pm 4.3$	$\pm 4.3$	about 0.43	about 0.43	about 0.0006	about 0.0006	3.3
<b>MHD-200</b>	—	$\phi 200$	20 – 44	$\pm 3.4$	$\pm 3.4$	about 0.34	about 0.34	about 0.0005	about 0.0005	4.9
<b>MHD-203.2</b>	—	$\phi 203.2$	20 – 44	$\pm 3.4$	$\pm 3.4$	about 0.34	about 0.34	about 0.0005	about 0.0005	4.9
<b>MHD-254</b>	UU	$\phi 254$	40 – 54	$\pm 2.8$	$\pm 2.8$	about 0.28	about 0.28	about 0.0004	about 0.0004	6.2
<b>MHD-300</b>	—	$\phi 300$	40 – 54	$\pm 2.3$	$\pm 2.3$	about 0.23	about 0.23	about 0.0003	about 0.0003	11.0

\* For specifying options, please refer to "Conversion of Posts, Post Holders and Pedestal Bases of Holders". [Reference](#) C007

## Option Plates for MHD Large Precision Gimbal Mirror Holders | MHD-P

RoHS

Catalog Code

W4507

Base plates for mounting large precision gimbal mirror holders (MHD) on optical breadboards or optical baseplates.

- Available in both inch and metric hole patterns.

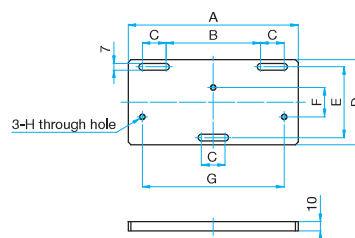


Specifications		Primary material: Aluminum Finish: Black Anodized
Part Number		Compatible Holders
METRIC	INCH	
MHD-100PEE	MHD-100PUU	MHD-100, MHD-101.6
MHD-150PEE	MHD-150PUU	MHD-150, MHD-152.4
MHD-200PEE	MHD-200PUU	MHD-200, MHD-203.2
MHD-254PEE	MHD-254PUU	MHD-254

### Outline Drawing

#### MHD-100P/150P/200P/254P

- Hexagon socket head cap screw M6x18...3 screws (EE)
- Hexagon socket head cap screw 1/4-20UNCx3/4...3 screws (UU)



Part Number	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H
MHD-100PEE	180	100	25	90	75	31	150	M6 P1
MHD-150PEE	240	150	25	120	100	34	190	M6 P1
MHD-200PEE	295	200	25	120	100	50	250	M6 P1
MHD-254PEE	348	250	25	140	125	50	300	M6 P1
MHD-100PUU	180	101.6	25.4	90	76.2	31	150	1/4-20UNC
MHD-150PUU	240	152.4	25.4	90	76.2	34	190	1/4-20UNC
MHD-200PUU	295	203.2	25.4	120	101.6	50	250	1/4-20UNC
MHD-254PUU	348	254	25.4	140	127	50	300	1/4-20UNC

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# Beam Steering Holders Precision Beam Steering Assembly

BSR  
BSRU

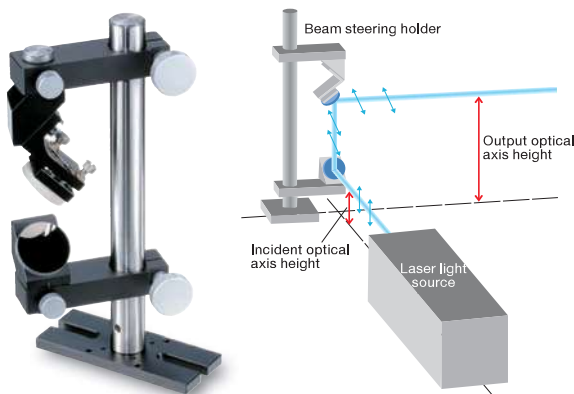
BSR

RoHS

Catalog Code W4013

Beam steering mounts are designed to easily change the height and direction of laser beams.

- Length of the optional post (PO-20-\*\*\*\*) can be specified at the time of purchase. [WEB Reference](#) [Catalog Code](#) W6053
- Mirrors  $\phi 25\text{mm}$  or less with a thickness of 5mm can be bonded to the holder.
- The clamps can be coarsely adjusted when rotated 50 mm about the center post.
- Adjustment screws are provided on the output side of the mirror to fine tune the direction of the output beam.



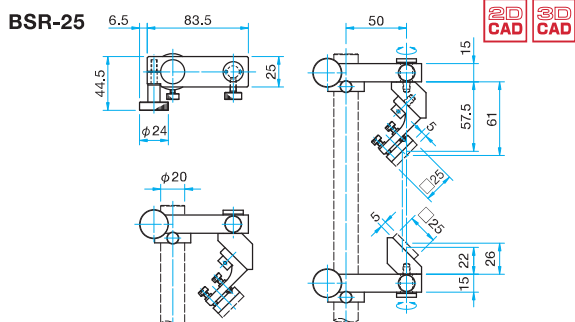
## Guide

- ▶ The photograph shows a typical configuration combining baseplate (BSP-40100), post (PO-20-200) and two mirrors (TFA-30C05-10).
- ▶ Adjustable mirror mounts in both locations are also available.

## Attention

- ▶ Depending on the direction reflected with the two mirrors, the polarization direction of the laser may change 90°. (See the illustration)
- ▶ RTV silicone adhesives are recommended to bond the optics.
- ▶ When you select this item, please note below points;  
Incident optical axis height : higher than 58mm  
Output optical axis height : higher than 20mm from the incident optical axis height  
Length of posts : higher than 70mm from the output optical axis height

## Outline Drawing



## Specifications

Primary material: Aluminum Finish: Black Anodized			
Part Number	Compatible Optics Diameter [mm]	Compatible Optics Thickness [mm]	Weight* [kg]
BSR-25	$\square 25$ or less $\phi 25$ or less	3 – 5	0.4

\* Weight does not include the weight of posts and baseplates.

BSRU

RoHS

Catalog Code W4014

Beam steering mounts are designed to easily and precisely change the height and direction of laser beams.

- The  $\phi 38.1\text{mm}$  dampened pole, and two holders are sold as a set.
- High stability is obtained from the damping properties of the poles and the rigidity of the holders.
- Use the optional mirror ( $\phi 30\text{mm}$ , thickness 5mm) by bonding it to the holder.
- The mirror holders can be coarsely adjusted 75 mm about the pole.
- Adjustment screws are provided on the output side of the holders to tilt the mirror, and angle adjustment of the output beam can be performed.



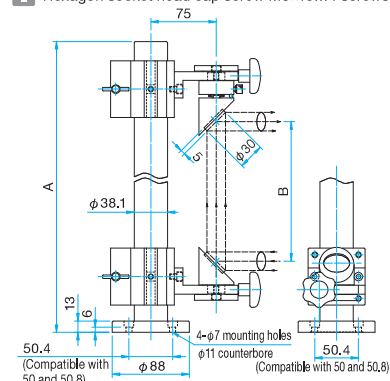
## Attention

- ▶ For best results, use on a laboratory or vibration isolating table.

## Outline Drawing

BSRU-177/355

Hexagon socket head cap screw M6x15...4 screws



## Specifications

Strut material: Stainless steel, Finish: None Control part primary material: Aluminum, Finish: Black Anodized					
Part Number	Compatible Optics Diameter [mm]	Compatible Optics Thickness [mm]	A [mm]	B [mm]	Weight [kg]
BSRU-177	$\phi 30$	5	177.8	33 – 40	3
BSRU-355	$\phi 30$	5	355.6	33 – 220	4.6

# Introducing Other Mirror Holders |

You will find more detail in the WEB Related Products and mirror holder that was not available in the catalog.

## Horizontal Prism Adapter | MHG-HPA

Catalog Code W4008



## Base Plates for Kinematic Mirror Holders | MHG-BP

Catalog Code W4123



## Adaptor Mounts | MAD-30/MAD-50

Catalog Code W4109



## One-touch Kinematic Mirror Holder | MHF

Catalog Code W4502



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