

# Miniature Monocarrier<sup>®</sup> MCM02, MCM03

Supports small conveyors and test equipment in a wide range of applications.  
Compact, lightweight design saves space and delivers high performance.



Patent Pending





# Lightweight, space-saving structure made possible through compact design. These all-in-one Monocarriers are easy to use and provide high accuracy and rigidity.

Monocarriers are used in a variety of applications, including production, inspection, packaging and conveyance systems. Already recognized in the industry for improving efficiency and reducing labor, Monocarriers have been increasingly in demand to meet a growing range of needs. NSK has been developing a wide range of Monocarriers, making full use of its world-class technologies in ball screws and linear guides. To meet demand for smaller, lighter Monocarriers, NSK developed the MCM02 and MCM03, a series of compact Monocarriers that realizes unprecedented lightweight and space-saving features. In addition, these Monocarriers feature NSK's state-of-the-art technologies, such as a long life, maintenance-free NSK K1™ lubrication unit, an all-in-one structure for easy use, and high accuracy and rigidity, earning the product line a reputation for outstanding reliability. These small and lightweight Monocarriers are consequently well equipped to meet specific needs.

## Monocarrier® MCM02, MCM03

Stroke and lead of products with standard specification  
 (● mark: standard inventory, ● mark: made to order) Unit: mm

Reference number	MCM02				MCM03					
	1		2		1	2	10		12	
	High grade	Precision grade	High grade	Precision grade	Precision grade	High grade	Precision grade	High grade	Precision grade	
50	●	●	●	●	●	●	—	—	—	—
100	●	●	●	●	●	●	●	●	●	●
150	●	●	●	●	●	●	●	●	●	●
200	—	—	—	—	—	—	●	●	●	●
250	—	—	—	—	—	—	●	●	●	●

### Features

#### 1. Lightweight, compact design

Integration of components minimizes cross-sectional dimensions, while reducing weight by one-half compared to existing combination units (single-axis tables). This compact design meets the demand for lighter weight and saving more space.

#### 2. All-in-one structure

The all-in-one structure, integrating ball screw and linear guide into a single unit, significantly reduces workload for design and installation.

#### 3. Long-term, maintenance-free operation

The NSK K1™ lubrication unit is incorporated into the guide and ball screw parts for the Monocarrier MCM02 and MCM03. The use of the NSK K1™ lubrication unit maintains smooth lubrication performance for long periods in mechanical environments where lubrication is difficult to apply, such as machinery and equipment for food processing and medical applications requiring a highly clean environment, thus enabling maintenance-free operation over an extended period of time.

#### 4. Available in small and large ball screw leads

A range of standard sizes is available between 1 millimeter small lead to 12 millimeter large lead.

#### 5. Anticorrosion feature

Special surface treatment is provided as a standard feature to prevent corrosion under various operating conditions.

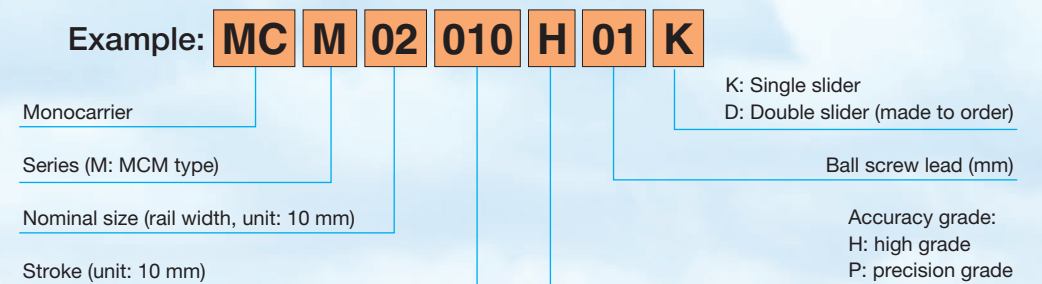
#### 6. High accuracy and rigidity

The concave main base, although lightweight, resists bending and can be used as cantilever beams. The structure, composed of several rolling elements, reduces friction and provides higher positioning accuracy.



#### Reference number coding

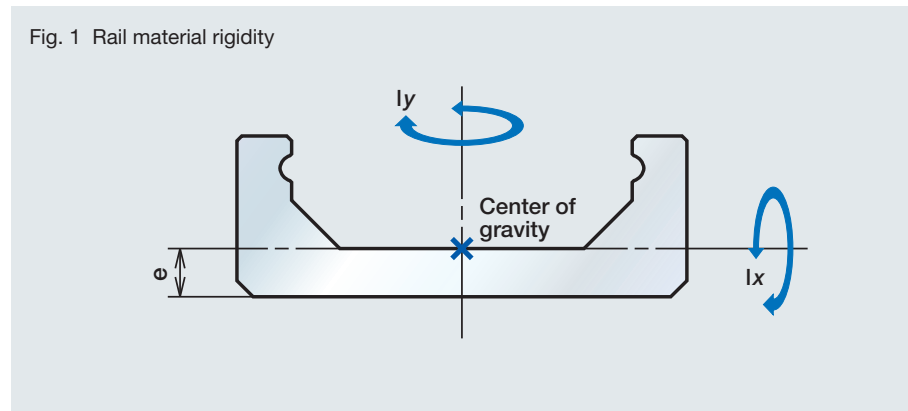
The Monocarrier reference number is composed of the main basic specifications.



## Monocarrier rigidity

### Rail material rigidity

The Monocarrier MCM02 and MCM03 rail features a special concave shape with a small space to maintain high resistance to deflection and distortion. The geometrical moment of inertia of rail area in each direction is shown in Fig. 1.

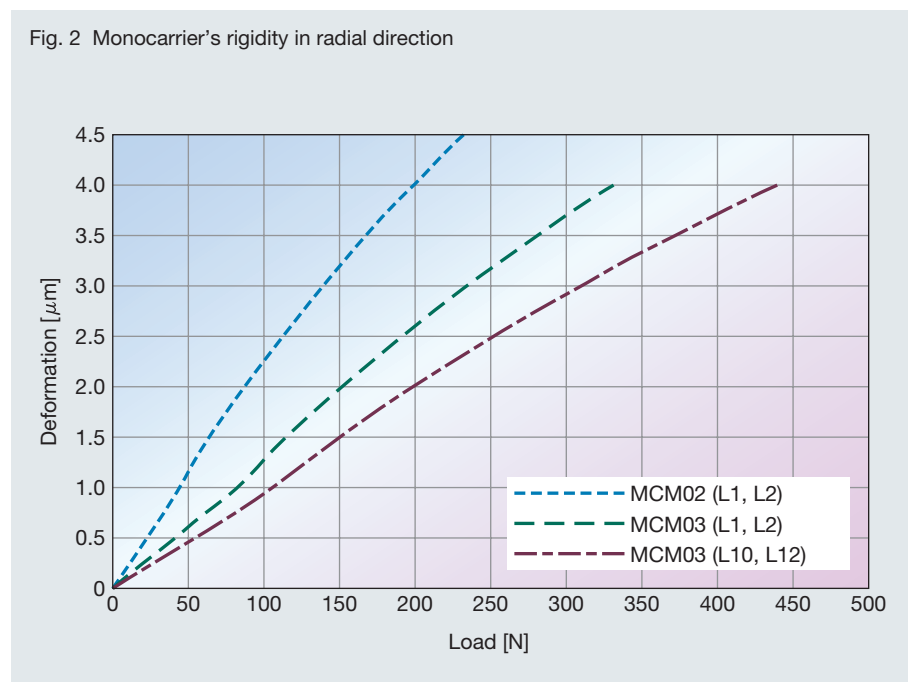


### ●Rail material rigidity

	Geometrical moment of inertia [mm <sup>4</sup> ]		Center of gravity [mm]
	$l_x$	$l_y$	$e$
MCM02	$9.71 \times 10^2$	$1.32 \times 10^4$	3.3
MCM03	$0.30 \times 10^4$	$3.30 \times 10^4$	4.5

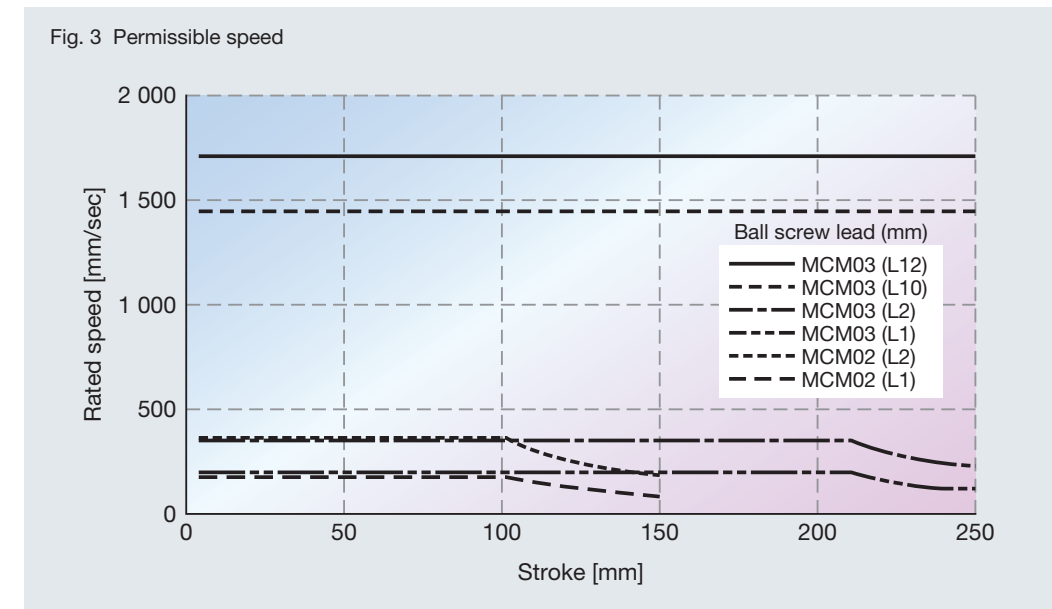
### Rigidity in radial direction

NSK has succeeded in fully eliminating clearance of the Monocarrier's linear guide at micron-meter processing accuracy through its own high-precision processing technique. The linear guide has virtually no clearance and exhibits the load/deformation characteristics shown in Fig. 2.



## Permissible speed

The relationship in permissible speed between rated speed and stroke is shown as follows:



## Accuracy standard

### MCM02

unit:  $\mu\text{m}$

Stroke [mm]	High grade [H]			Precision grade [P]			
	Repeatability positioning accuracy	Running parallelism (vertical)	Backlash	Repeatability positioning accuracy	Running parallelism (vertical)	Backlash	Positioning accuracy
50	$\pm 10$	14	20 or less	$\pm 3$	8	3 or less	20
100							
150							

### MCM03

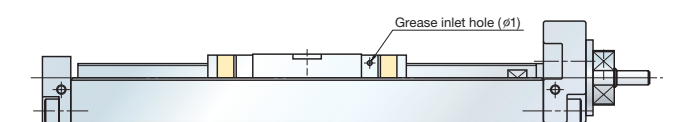
unit:  $\mu\text{m}$

Stroke [mm]	High grade [H]			Precision grade [P]			
	Repeatability positioning accuracy	Running parallelism (vertical)	Backlash	Repeatability positioning accuracy	Running parallelism (vertical)	Backlash	Positioning accuracy
50	$\pm 10$	14	20 or less	$\pm 3$	8	3 or less	20
100							
150							
200							
250							

## Load factor

Model numbers	MCM02		MCM03			
	1	2	1	2	10	20
$\epsilon_R$	95.2		79.4		79.4	
$\epsilon_P$	174		113.9		84.2	
$\epsilon_Y$	174		113.9		84.2	

## Guide for grease replenishment (for MCM02)

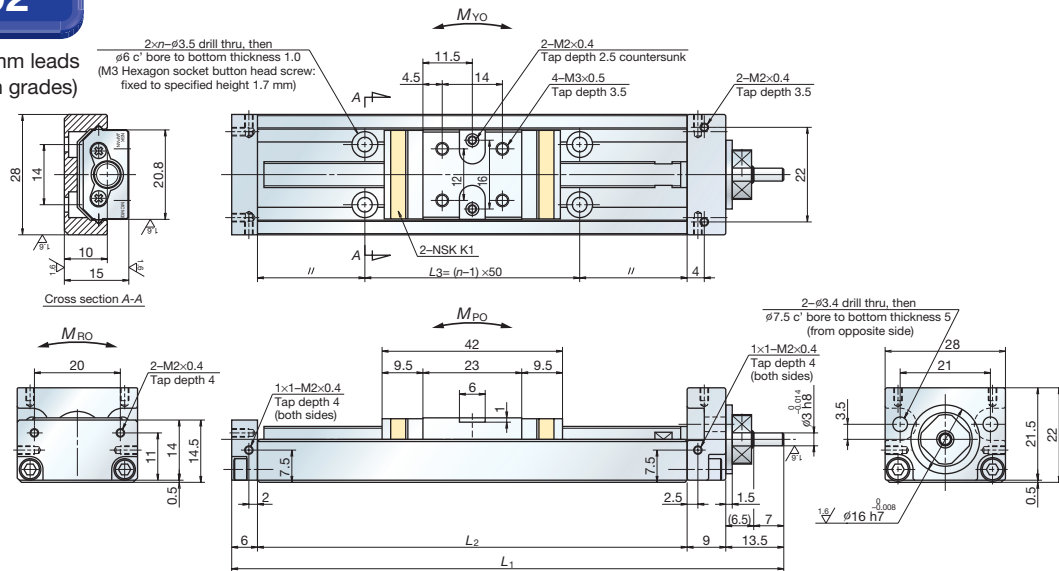


When packing grease into the unit, apply it directly to the rail groove or ball screw groove or use a grease gun or similar tool to pack it into the grease inlet hole located on the side of end cap (as shown above). Generally, the applied area must be filled with grease to the point where a small amount of supplied grease is discharged around the area surrounding the ball slide.



## MCM02

For 1-mm and 2-mm leads  
(high and precision grades)



Reference number (model number)	Nominal stroke [mm]	Stroke limit [mm]	Ball screw lead [mm]	Body length [mm]			No. of mounting holes <i>n</i>	Inertia $\times 10^{-7}$ [kg·m <sup>2</sup> ]	Mass [kg]
				<i>L</i> <sub>1</sub>	<i>L</i> <sub>2</sub>	<i>L</i> <sub>3</sub>			
MCM02005H01K	50	58	1	128.5	100	50	2	0.93	0.26
MCM02005P01K									
MCM02005H02K			2						
MCM02005P02K									
MCM02010H01K	100	108	1	178.5	150	100	3	1.36	0.32
MCM02010P01K									
MCM02010H02K			2						
MCM02010P02K									
MCM02015H01K	150	158	1	228.5	200	150	4	1.81	0.39
MCM02015P01K									
MCM02015H02K			2						
MCM02015P02K									

### Ball screw specification

	MCM02				MCM03			
	High grade		Precision grade		High grade		Precision grade	
Lead [mm]	1	2	1	2	10	12	10	12
Shaft diameter [mm]	6				8			
Effective turns of balls	1×2				1.5×1			
Basic load rating [N]	Dynamic <i>C</i> <sub>a</sub>	340	405		1 160	735	1 160	
	Static <i>C</i> <sub>0a</sub>	555	615		1 160	1 230	1 160	

### Linear guide specification

	MCM02				MCM03			
	High grade		Precision grade		High grade		Precision grade	
Lead [mm]	1	2	10	12	10	12	10	12
Basic load rating [N]	Dynamic <i>C</i> <sub>a</sub>	4 910	3 900	10 900	8 650	6 250	5 880	
	Static <i>C</i> <sub>0a</sub>	2 120	2 120	4 900	6 620			
Preload [N]	30				34			
Static moment [N·m]	<i>M</i> <sub>RO</sub>	24		61		82		
	<i>M</i> <sub>PO</sub>	8		25		45		
	<i>M</i> <sub>YO</sub>	8		25		45		

### Load rating of support unit

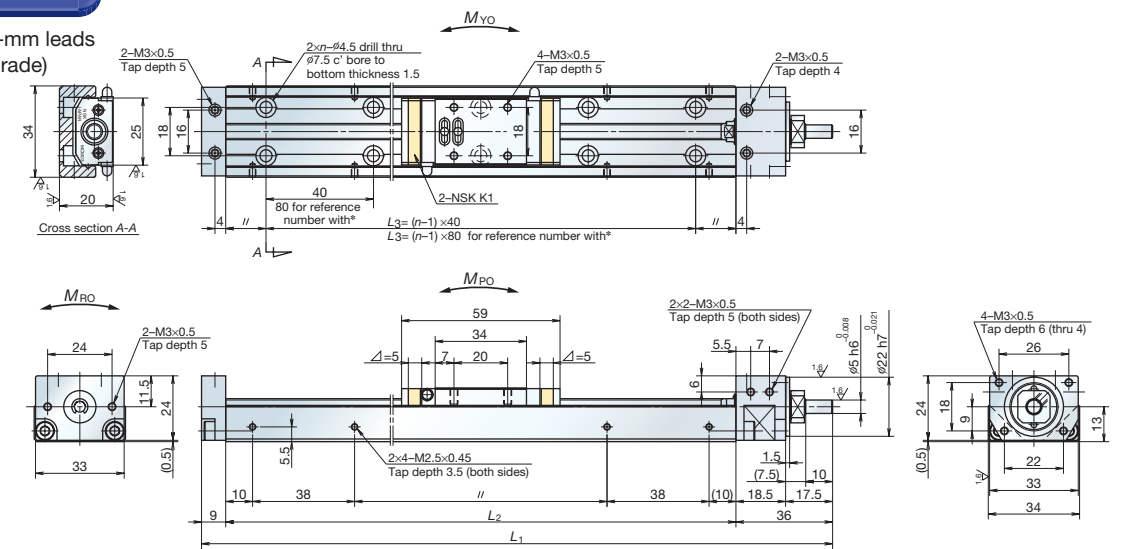
	MCM02	MCM03
Basic dynamic load rating [N]	615	2 670
Basic static load rating [N]	490	1 640

### Monocarrier dynamic torque specification

Ball screw lead (mm)	MCM02				MCM03			
	High grade		Precision		High grade		Precision	
	1	2	1	2	10	12	1	2
	0.1–1.3	0.2–1.6	0.3–3.0	0.2–1.7	0.7–5.0			

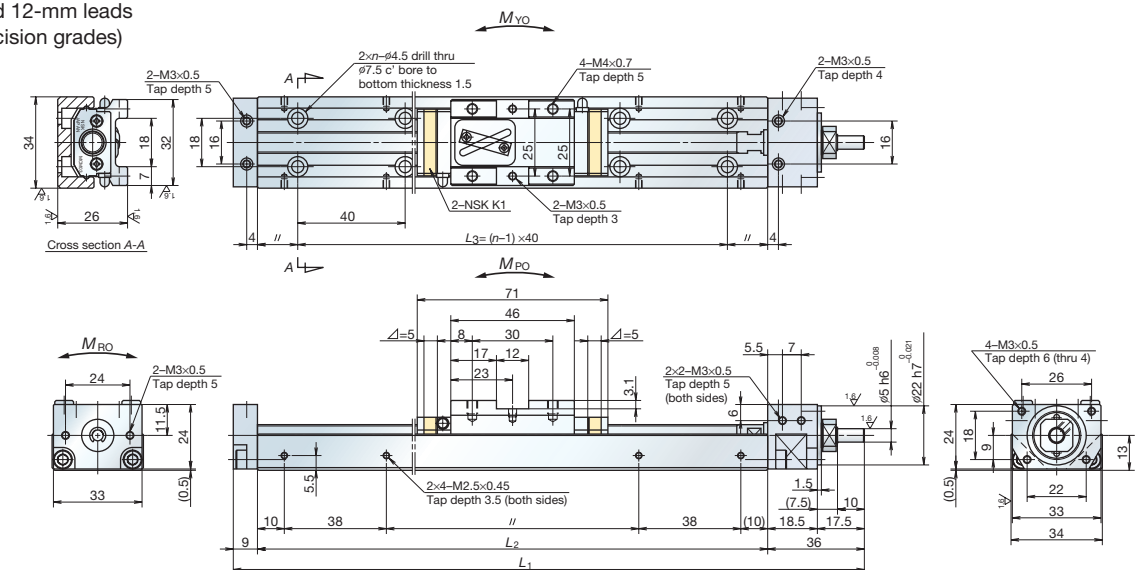
## MCM03

For 1-mm and 2-mm leads  
(precision grade)



Reference number [model number]	Nominal stroke [mm]	Stroke limit [mm]	Ball screw lead [mm]	Body length [mm]			No. of mounting holes <i>n</i>	Inertia $\times 10^{-5}$ [kg·m <sup>2</sup> ]	Mass [kg]
				<i>L</i> <sub>1</sub>	<i>L</i> <sub>2</sub>	<i>L</i> <sub>3</sub>			
*MCM03005P01K	50	56	1	160	115	80	2	0.015	0.6
*MCM03005P02K			2						
MCM03010P01K	100	131	1	235	190	160	5	0.021	0.7
MCM03010P02K			2						
MCM03015P01K	150	181	1	285	240	200	6	0.025	0.8
MCM03015P02K			2						

For 10-mm and 12-mm leads  
(high and precision grades)



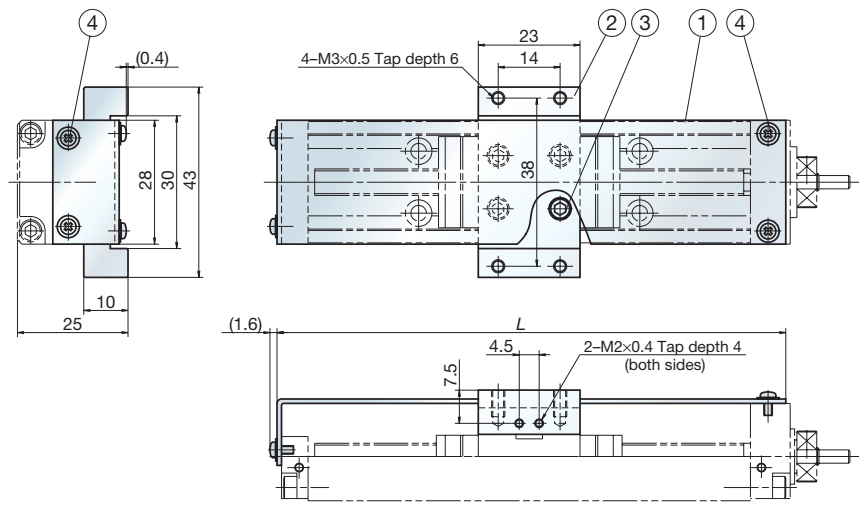
Reference number [model number]	Nominal stroke [mm]	Stroke limit [mm]	Ball screw lead [mm]	Body length [mm]			No. of mounting holes <i>n</i>	Inertia $\times 10^{-5}$ [kg·m <sup>2</sup> ]	Mass [kg]
				<i>L</i> <sub>1</sub>	<i>L</i> <sub>2</sub>	<i>L</i> <sub>3</sub>			
MCM03010H10K	100	119	10	235	190	160	5	0.092	0.7
MCM03010P10K									
MCM03010H12K			12						
MCM03010P12K									
MCM03015H10K	150	169	10	285	240	200	6	0.105	0.8
MCM03015P10K									
MCM03015H12K			12						
MCM03015P12K									
MCM03020H10K	200	219	10	335	290	240	7	0.118	0.9
MCM03020P10K									
MCM03020H12K			12						
MCM03020P12K									
MCM03025H10K	250	269	10	385	340	280	8	0.131	1.0
MCM03025P10K									
MCM03025H12K			12						
MCM03025P12K									

# Optional Components for MCM02

Monocarrier MCM02 offers optional parts as standard inventory to quickly meet any requirements.

## Cover unit

MC-CV020xx-00



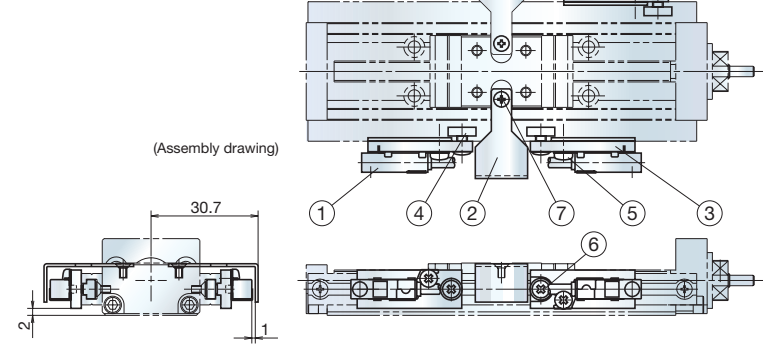
No.	Part name	Quantity	Remarks
①	Top cover	1	
②	Spacer	1	
③	Hexagon socket head cap bolt	4	M3×6
④	Cross-recessed pan-head machine screw with flat washer	4	M2×4

Unit: mm

Stroke	Reference number	L
50	MC-CV02005-00	115
100	MC-CV02010-00	165
150	MC-CV02015-00	215

## Sensor unit

MC-SR02-xx



Components of sensor unit

No.	Part name	Quantity			Remarks
		MC-SR02-00	MC-SR02-01	MC-SR02-02	
①	Small proximity sensor (a-contact point)		3	1	E2S-W13: OMRON Corp.
	Small proximity sensor (b-contact point)	3		2	E2S-W14: OMRON Corp.
②	Sensor dog	2	2	2	
③	Sensor plate	3	3	3	
④	Nut for sensor	3	3	3	M3
⑤	Cross-recessed pan-head machine screw	3	3	3	M3
⑥	Cross-recessed pan-head machine screw with flat washer	3	3	3	M3
⑦	Cross-recessed countersunk head screw	2	2	2	M2

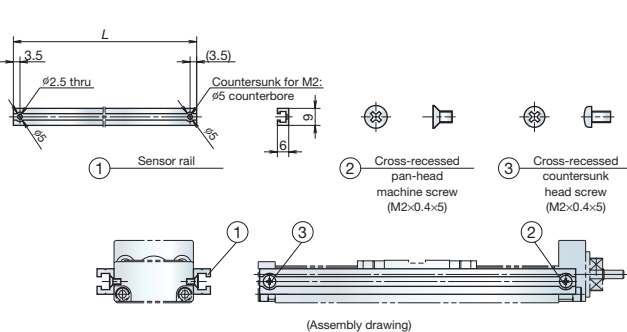
Components for sensor rail

No.	Part name	Quantity	Remarks
①	Sensor rail	1	
②	Cross-recessed pan-head machine screw	1	M2×5
③	Cross-recessed countersunk head screw	1	M2×5

Sensor rail's reference number uses its last four-digit number to indicate approximate length of the body's [L<sub>2</sub>].

## Sensor rail

MC-SRL2-xxxx



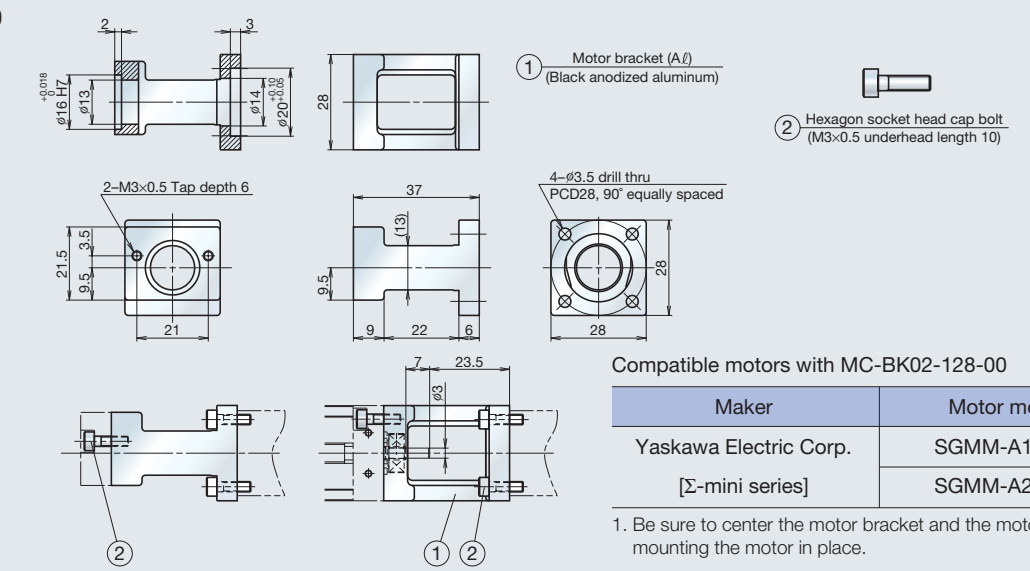
Unit: mm

Stroke	Reference number	L
50	MC-SRL2-0100	111.5
100	MC-SRL2-0150	161.5
150	MC-SRL2-0200	211.5

# Monocarrier® MCM02, MCM03

## Motor bracket

MC-BK02-128-00

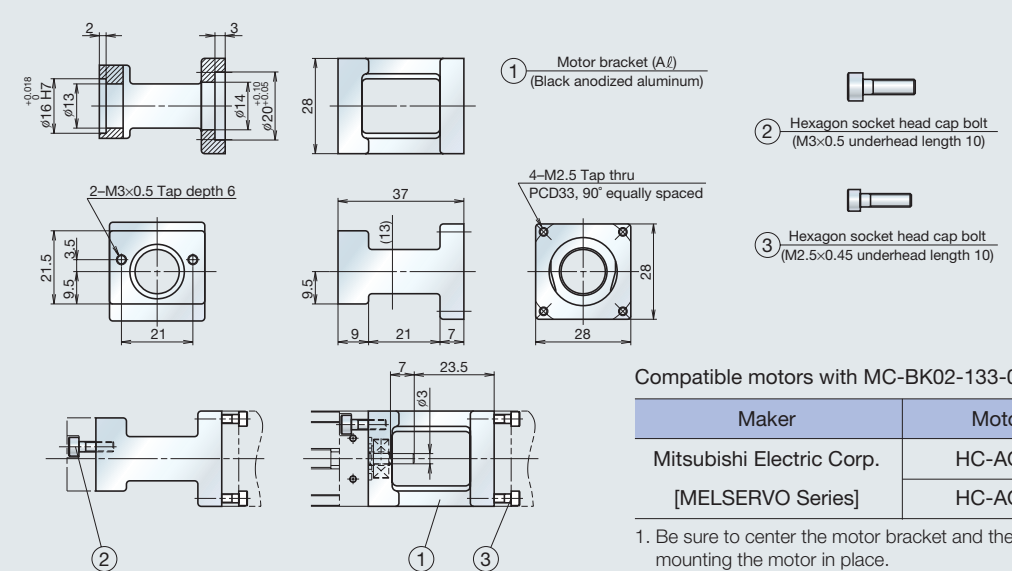


Compatible motors with MC-BK02-128-00

Maker	Motor models
Yaskawa Electric Corp. [Σ-mini series]	SGMM-A1 [10W] SGMM-A2 [20W]

1. Be sure to center the motor bracket and the motor when mounting the motor in place.

MC-BK02-133-00

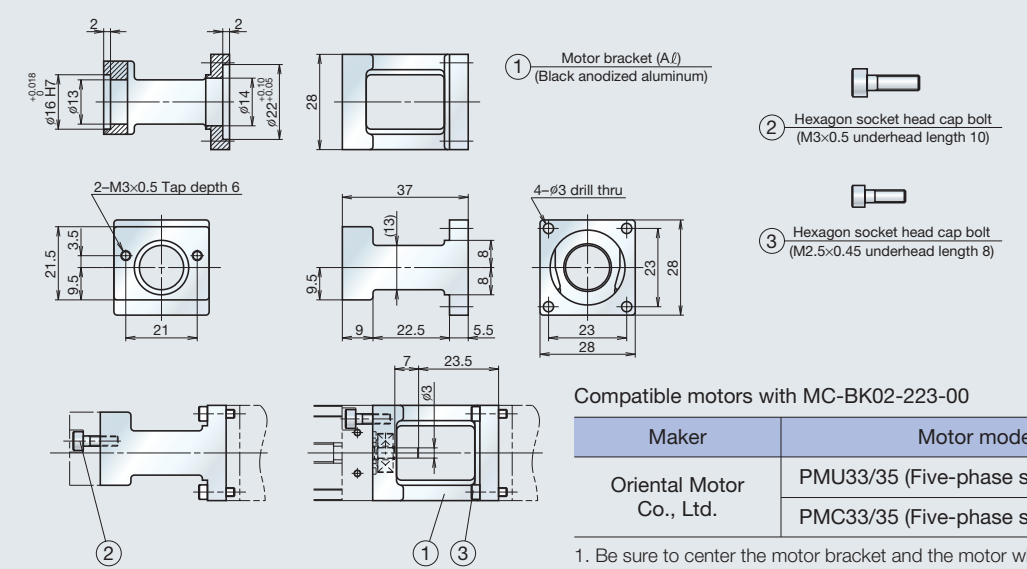


Compatible motors with MC-BK02-133-00

Maker	Motor models
Mitsubishi Electric Corp. [MELSERVO Series]	HC-AQ013 [10W] HC-AQ023 [20W]

1. Be sure to center the motor bracket and the motor when mounting the motor in place.

MC-BK02-223-00



Compatible motors with MC-BK02-223-00

Maker	Motor models
Oriental Motor Co., Ltd.	PMU33/35 (Five-phase stepping motor) PMC33/35 (Five-phase stepping motor)

1. Be sure to center the motor bracket and the motor when mounting the motor in place.

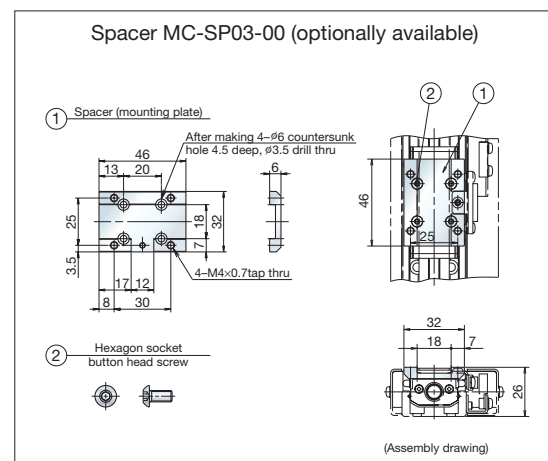
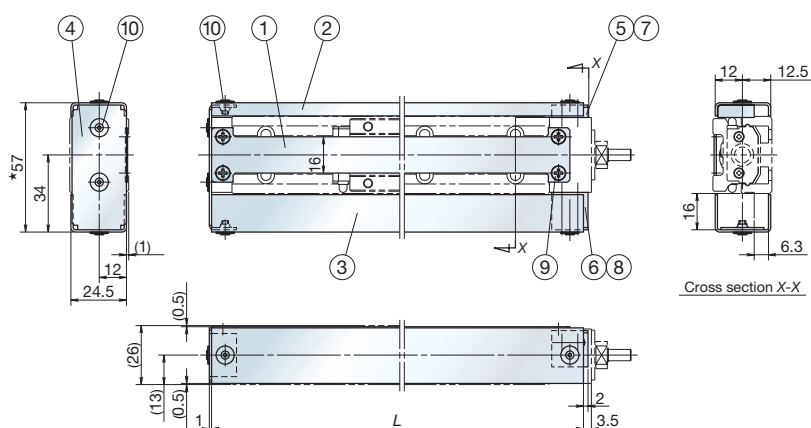
# Optional Components for MCM03

Monocarrier MCM03 offers optional parts as standard inventory to quickly meet various requirements.

# Monocarrier<sup>®</sup> MCM02, MCM03

## Cover unit

MC-CV030xx-00



No.	Part name	Quantity per set	Remarks
①	Top cover	1	Baked finish (Black)
②	Side cover	1	
③	Side cover	1	
④	Cover-mounting plate	1	Black anodized aluminum
⑤	Cover-mounting plate	1	
⑥	Cover-mounting plate	1	
⑦	Hexagon socket head cap bolts	2	
⑧	Hexagon socket head cap bolts	2	
⑨	Countersunk-head machine screws	4	
⑩	Hexagon socket-brazier head cap bolts	6	

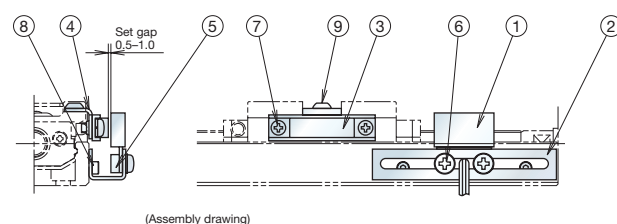
Unit: mm

Strokes	Reference numbers	L
50	MC-CV03005-00	139
100	MC-CV03010-00	214
150	MC-CV03015-00	264
200	MC-CV03020-00	314
250	MC-CV03025-00	364

- Units that are specified to use 1-mm or 2-mm lead require optional spacer (MC-SP03-00).
- When a sensor is not required, a symmetrical cover unit (MC-CV03\*\*\*-00) is available. In this case, the dimension marked with ★ should be 46 mm.

## Sensor unit

MC-SR03-xx

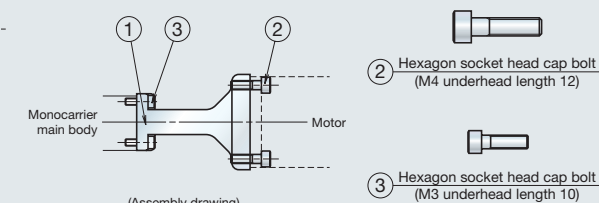
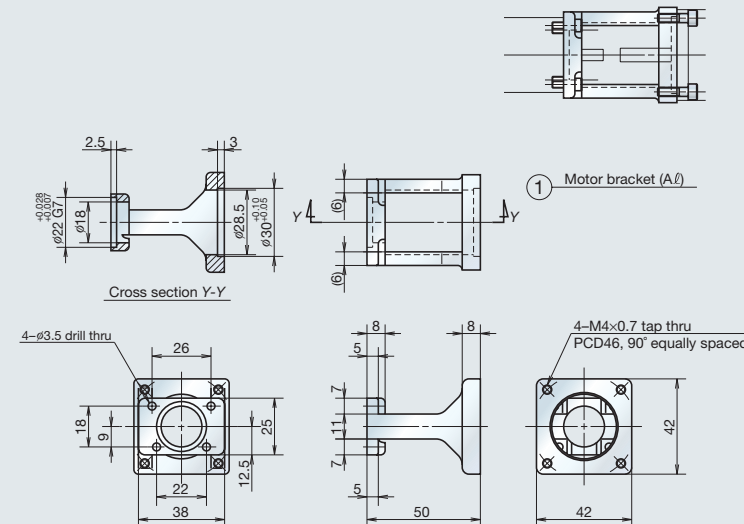


No.	Part name	Quantity			Remarks
		MC-SR02-00	MC-SR03-01	MC-SR03-02	
①	Sensor (a-contact point)		3	1	
	Sensor (b-contact point)	3		2	
②	Sensor-mounting plate	2	2	2	
③	Magnet yoke	1	1	1	
④	Plate for mounting magnet yoke	1	1	1	
⑤	Nut for sensor	3	3	3	
⑥	Cross-recessed pan-head machine screw with flat washer	5	5	5	M3
⑦	Cross-recessed pan-head machine screw with spring washer	2	2	2	M2
⑧	Hexagon socket head cap bolt	4	4	4	M2.5
⑨	Hexagon socket button head screw	1	1	1	M3

- Units that are specified to use 1-mm or 2-mm lead require optional spacer (MC-SP03-00).

## Motor bracket

MC-BK03-146-00

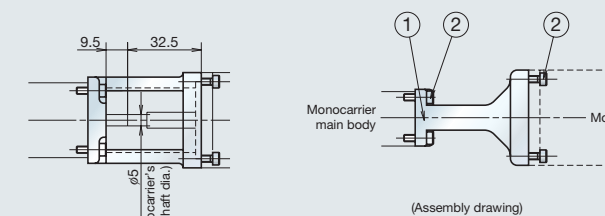
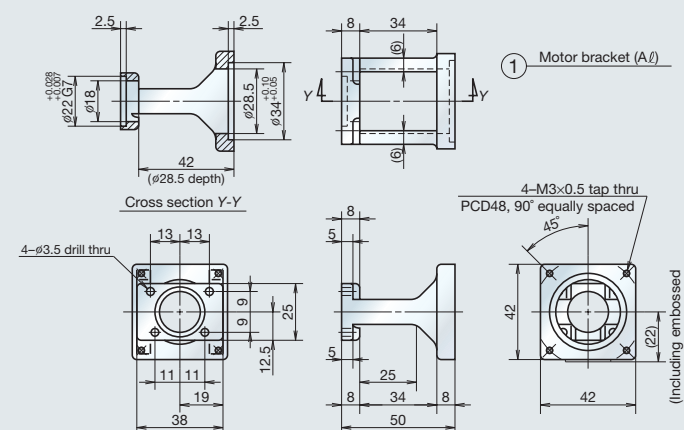


Compatible motors with MC-BK03-146-00

Makers	Motor models
Yaskawa Electric Corp.	SGMAH-A3 [30W]
	SGMAH-A5 [50W]
	SGMAH-01 [100W]
Mitsubishi Electric Corp.	HC-MFS053 [50W]
	HC-MFS13 [100W]
	HC-KFS053 [50W]
Sanyo Denki Co., Ltd.	HC-KFS13 [100W]
	P30B04003 [30W]
	P30B04005 [50W]
	P30B04010 [100W]

- Be sure to center the motor bracket and the motor when mounting the motor in place.

MC-BK03-148-01

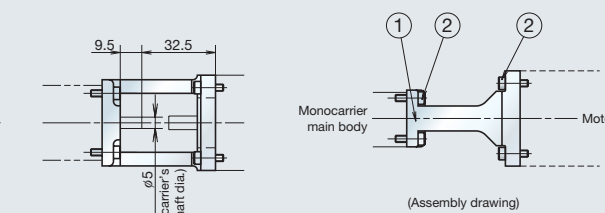
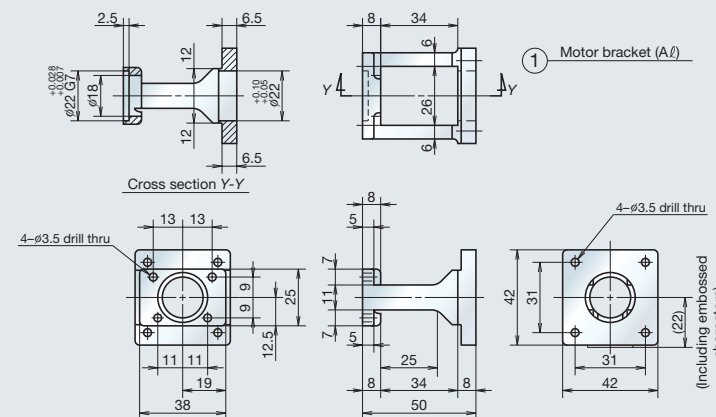


Compatible motors with MC-BK03-148-01

Maker	Motor models
Sanyo Denki Co., Ltd.	P50B04006 [60W]
	P50B04010 [100W]

- Be sure to center the motor bracket and the motor when mounting the motor in place.

MC-BK03-231-00



Compatible motors with MC-BK03-231-00

Maker	Motor models
Oriental Motor Co., Ltd.	AS46, ASC46, PK54, UPK54
	CSK54*, CFK54*

- Be sure to center the motor bracket and the motor when mounting the motor in place.