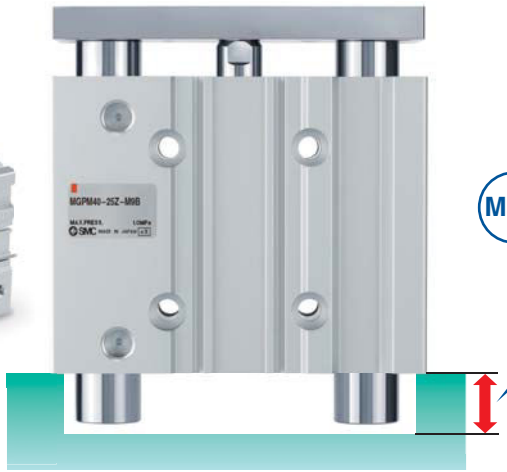
# Compact Guide Cylinder (Basic type) New

## ø12, ø16, ø20, ø25, ø32, ø40, ø50, ø63, ø80, ø100

**Up to 17% Weight reduced!**

**Weight reduced by up to 17% with a shorter guide rod and thinner plate**



**Guide rod shortened**

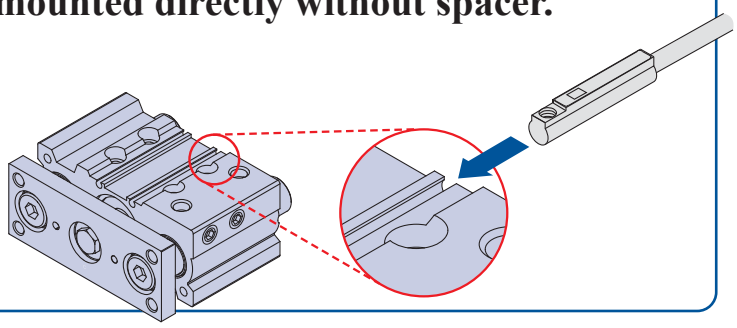
for MGPM40-25 stroke

**Max. 22mm**

Space required between the bottom of the cylinder body and your equipment is **reduced.**

**Space saving**

**Round type auto switches can be mounted directly without spacer.**



**3 types of bearing can be selected.**

- **Slide bearing**
  Series MGPM
- **Ball bushing**
  Series MGPL
- **High precision ball bushing**
  Series MGPA

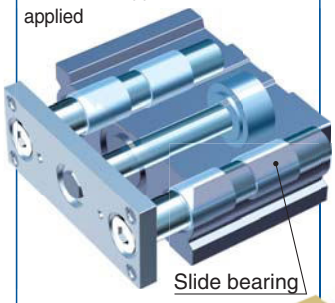
## *Series MGP*

SMC

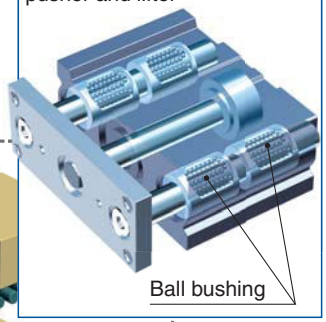
CAT.EUS20-219AA-UK

## 3 types of bearing can be selected.

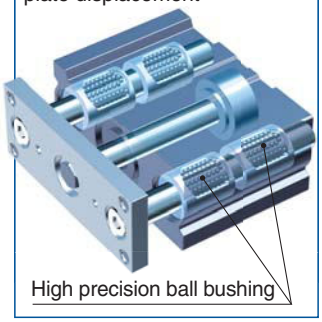
**Slide bearing**
**Series MGPM**
Suitable for lateral load applications such as a stopper where shock is applied

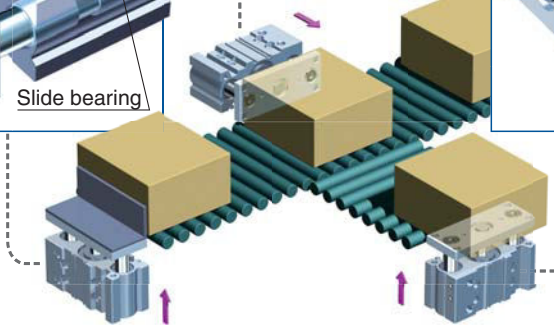


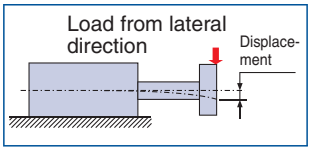

**Ball bushing**
**Series MGPL**
Smooth operation suitable for pusher and lifter




**High precision ball bushing**
**Series MGPA**
Suitable for minimising plate displacement





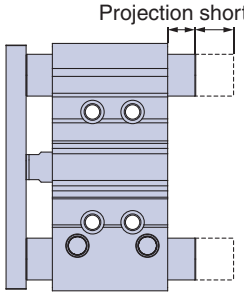

## Weight reduced

| Bore size | Reduction rate [%] | Weight [kg] |
|---|---|---|
| ø12 | 11 | 0.25 |
| ø16 | 3 | 0.37 |
| ø20 | 12 | 0.59 |
| ø25 | 12 | 0.84 |
| ø32 | 17 | 1.41 |
| ø40 | 16 | 1.64 |
| ø50 | 17 | 2.79 |
| ø63 | 17 | 3.48 |
| ø80 | 17 | 5.41 |
| ø100 | 13 | 9.12 |

* Compared with slide bearing type, ø12 to ø25-20 stroke
* Compared with slide bearing type, ø32 to ø100-25 stroke

## Guide rod shortened

Projection shortened



[mm]

| Bore size | Guide rod | |
|---|---|---|
| | Shortened by | New dimension |
| ø32 | 22 | 15.5 |
| ø40 | 22 | 9 |
| ø50 | 18 | 16.5 |
| ø63 | 18 | 11.5 |
| ø80 | 10.5 | 8 |
| ø100 | 10.5 | 10.5 |

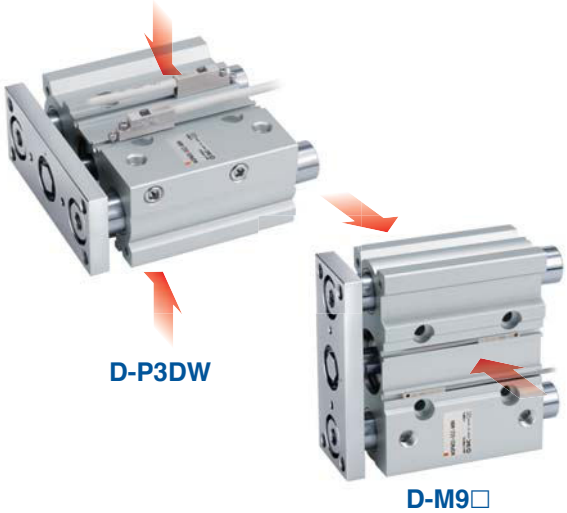
* Compared with slide bearing type, 25 stroke (ø32 to ø100)
(No projection for ø12 to ø25-25 stroke)

## Performance, strength (rigidity), and mounting dimensions are equivalent to the conventional MGP series.

## Small auto switches or magnetic field resistant auto switches can be mounted on 2 surfaces.

D-M9□ | D-A9□ | D-P3DW

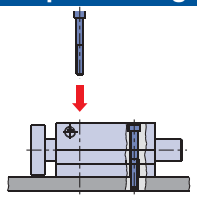
* The D-Y7 and D-Z7 auto switches are not mountable.



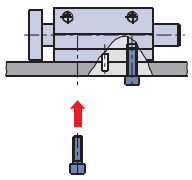

## 4 types of mounting are possible.

Easy positioning
Knock pin holes provided on each mounting surface

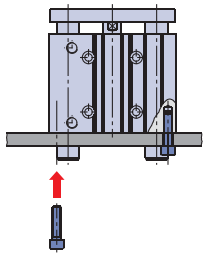
**1. Top mounting**



**2. Side mounting**

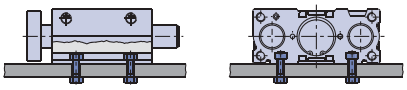


**4. Bottom mounting**



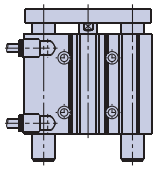
**3. T-slot side mounting**

Easy adjustment of workpiece and cylinder mounting

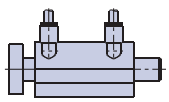


## Piping is possible from 2 directions.

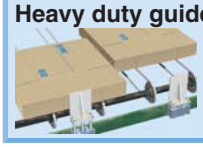
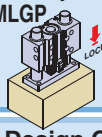
**1. Top ported**



**2. Side ported**



## Compact Guide Cylinders, Series Variations

| Series | Bearing | Bore size [mm] | Page |
|---|---|---|---|
| Basic type/MGP (New, Remodeled)  | Slide bearing<br>Ball bushing<br>High precision ball bushing | 6, 10, 12, 16, 20, 25, 32, 40, 50, 63, 80, 100 | Page 3 of this catalogue |
| With air cushion/MGP-A   | | 16, 20, 25, 32, 40, 50, 63, 80, 100 | Digital Catalogue www.smc.eu |
| With end lock/MGP-H/R   | | 20, 25, 32, 40, 50, 63, 80, 100 | Digital Catalogue www.smc.eu |
| Clean series/12/13-MGP  | Ball bushing | 12, 16, 20, 25, 32, 40, 50, 63 | Digital Catalogue www.smc.eu |
| Water-resistant/MGP R/V   | Slide bearing | 20, 25, 32, 40, 50, 63, 80, 100 | Digital Catalogue www.smc.eu |
| Heavy duty guide rod/MGPS   | | 50, 80 | Digital Catalogue www.smc.eu |
| Miniature Guide Rod Cylinder/MGJ   | | 6, 10 | Digital Catalogue www.smc.eu |
| Compact Guide Cylinder with Lock/MLGP    | Slide bearing<br>Ball bushing | 20, 25, 32, 40, 50, 63, 80, 100 | Digital Catalogue www.smc.eu |
| Hygienic Design Cylinder/HYG   | Slide bearing | 20, 25, 32, 40, 50, 63 | Digital Catalogue www.smc.eu |

## New Series MGP (Basic type), Stroke Variations

| Bearing type | Bore size [mm] | Stroke [mm] |
|---|---|---|
| MGPM Slide bearing<br>MGPL Ball bushing<br>MGPA High precision ball bushing | 12, 16, 20, 25, 32, 40, 50, 63, 80, 100 | 10, 20, 25, 30, 40, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400 |

# Combination of Standard Products and Made to Order Specifications

## Series MGP

● : Standard
◎ : Made to Order specifications
○ : Special product (Contact SMC for details.)
— : Not available

| Symbol | Specification | Applicable bore size | Basic type | | |
|---|---|---|---|---|---|
| Series | | | Basic type | | |
| Bearing | | | Slide bearing | Ball bushing | High precision ball bushing |
| Type | | | MGPM | MGPL | MGPA |
| | | | ø12 to ø100 | | |
| 20- | Copper and Fluorine-free Note 1) | ø12 to ø100 | ● | ● Note 3) | ● Note 3) |
| -XA□ | Change of guide rod end shape | | ◎ | ◎ | ◎ |
| -XB6 | Heat resistant cylinder (-10 to 150°C) Note 2) | | ◎ | — | — |
| -XB10 | Intermediate stroke (Using exclusive body) | | ◎ | ◎ | ◎ |
| -XB13 | Low speed cylinder (5 to 50 mm/s) | | ◎ | ◎ | ○ |
| -XC22 | Fluororubber seals Note 2) | | ◎ | — | — |
| -XC79 | Machining tapped hole, drilled hole and pin hole additionally. | | ◎ | ◎ | ◎ |
| -XC82 | Bottom mounting style | | ◎ | — | — |
| -X144 | Symmetrical port position | | ◎ | ◎ | ◎ |
| -X867 | Lateral piping type (Change of plug position) | | ◎ | ◎ | ◎ |

Note 1) Refer to SMC website for details.
Note 2) Without cushion.
Note 3) Copper and fluorine-free are available as standard products. MGPL-Z and MGPA-Z are already copper and fluorine-free, so it's not possible to order 20-MGPL-Z or 20-MGPA-Z.

# *Series MGP*
# Specific Product Precautions 1

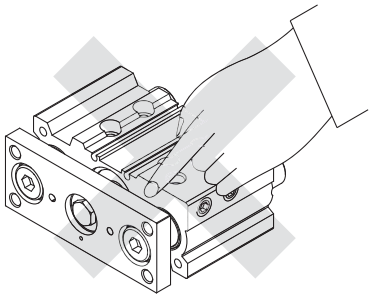
**Be sure to read before handling. Refer to back cover for Safety Instructions, "Handling Precautions for SMC Products" (M-E03-3) and the Operation Manual for Actuator Precautions and Auto Switch Precautions. Please download it via our website. http://www.smcworld.com**

## Mounting

## ⚠Warning

**1. Never place your hands or fingers between the plate and the body.**

Be very careful to prevent your hands or fingers from getting caught in the gap between the cylinder body and the plate when air is applied.



## ⚠Caution

**1. Use cylinders within the piston speed range.**

An orifice is set for this cylinder, but the piston speed may exceed the operating range if the speed controller is not used. If the cylinder is used outside the operating speed range, it may cause damage to the cylinder and shorten the service life. Adjust the speed by installing the speed controller and use the cylinder within the limited range.

**2. Pay attention to the operating speed when the product is mounted vertically.**

When using the product in the vertical direction, if the load factor is large, the operating speed can be faster than the control speed of the speed controller (i.e. quick extension).
In such cases, it is recommended to use a dual speed controller.

**3. Do not scratch or gouge the sliding portion of the piston rod and the guide rod.**

Damaged seals, etc. will result in leakage or malfunction.

**4. Do not dent or scratch the mounting surface of a body and a plate.**

The flatness of the mounting surface may not be maintained, which would cause an increase in sliding resistance.

**5. Make sure that the cylinder mounting surface has a flatness of 0.05 mm or less.**

Insufficient flatness of a workpiece or bracket mounted on the mounting surface or plate of the cylinder and other parts can cause defective operation and an increase in the sliding resistance.

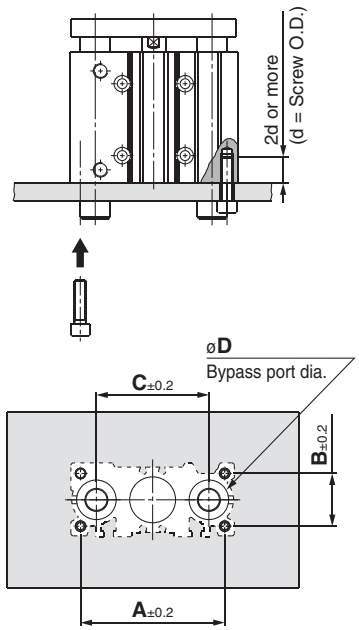
## Mounting

## ⚠Caution

**6. Bottom of cylinder**

The guide rods protrude from the bottom of the cylinder at the end of the retracting stroke, and therefore, in cases where the cylinder is to be bottom mounted, it is necessary to provide bypass ports in the mounting surface for the guide rods, as well as holes for the hexagon socket head cap screws which are used for mounting.

Moreover, in applications where impact occurs from a stopper, etc., the mounting screws should be inserted to a depth of 2d or more.




| Bore size [mm] | A [mm] | B [mm] | C [mm] | D [mm] | | Hexagon socket head cap screw |
|---|---|---|---|---|---|---|
| | | | | MGPM | MGPL/A | |
| **12** | 50 | 18 | 41 | 10 | 8 | M4 x 0.7 |
| **16** | 56 | 22 | 46 | 12 | 10 | M5 x 0.8 |
| **20** | 72 | 24 | 54 | 14 | 12 | M5 x 0.8 |
| **25** | 82 | 30 | 64 | 18 | 15 | M6 x 1.0 |
| **32** | 98 | 34 | 78 | 22 | 18 | M8 x 1.25 |
| **40** | 106 | 40 | 86 | 22 | 18 | M8 x 1.25 |
| **50** | 130 | 46 | 110 | 27 | 22 | M10 x 1.5 |
| **63** | 142 | 58 | 124 | 27 | 22 | M10 x 1.5 |
| **80** | 180 | 54 | 156 | 33 | 28 | M12 x 1.75 |
| **100** | 210 | 62 | 188 | 39 | 33 | M14 x 2.0 |

# *Series MGP*
# Specific Product Precautions 2

**Be sure to read before handling. Refer to back cover for Safety Instructions, "Handling Precautions for SMC Products" (M-E03-3) and the Operation Manual for Actuator Precautions and Auto Switch Precautions. Please download it via our website. http://www.smcworld.com**

## Piping

## ⚠Caution

**Depending on the operating conditions, piping port positions can be changed by using a plug.**

**1. M5**

After tightening by hand, tighten additional 1/6 to 1/4 rotation with a tightening tool.

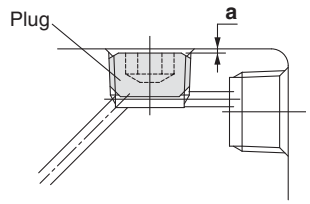
**2. Tapered thread for Rc port (MGP) and NPT port (MGP□□TN)**

Use the correct tightening torques listed below.

Before tightening the plug, wrap pipe tape around it. Also, with regard to the sunk dimension of a plug (dimension "a" in the drawing), use the stipulated figures as a guide and confirm the air leakage before operation.

∗ If tightening plugs on the top mounting port with more than the proper tightening torque, plugs will be screwed much deeply and air passage will be squeezed. Consequently, the cylinder speed will be restricted.

| Connection thread (plug) size | Proper tightening torque [N·m] | **a** dimension |
|---|---|---|
| 1/8 | 7 to 9 | 0.5 mm or less |
| 1/4 | 12 to 14 | 1 mm or less |
| 3/8 | 22 to 24 | 1 mm or less |




**3. Parallel pipe thread for G port (MGP□□TF)**

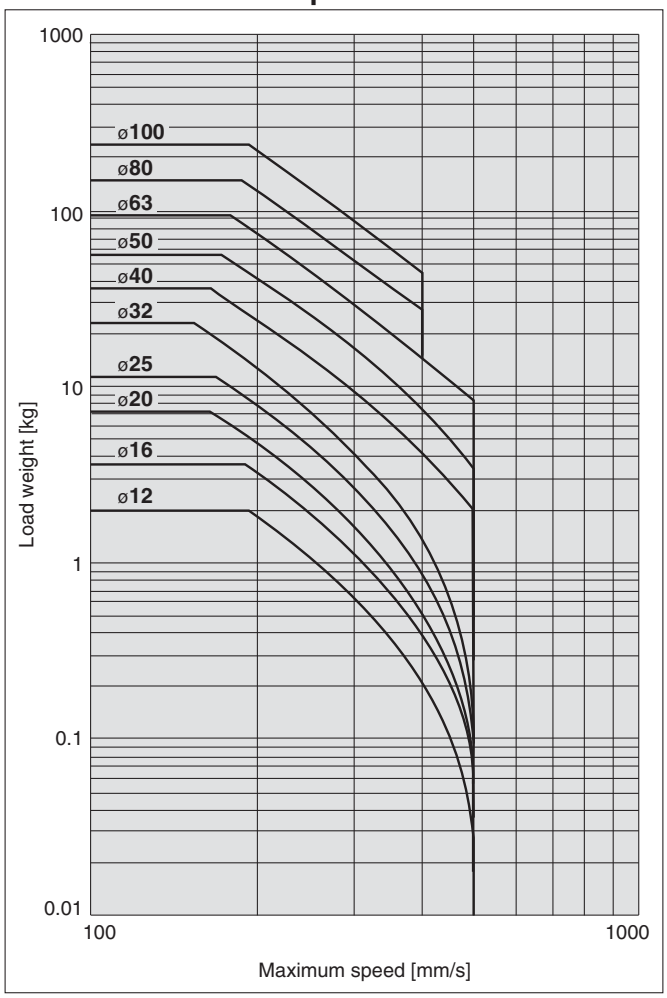
Screw in the plug to the surface of the body (dimension "a" in the drawing) by checking visually instead of using the tightening torque shown in the table.

## Allowable Kinetic Energy

## ⚠Caution

**Load weight and a maximum speed must be within the ranges shown in the graphs below.**

### MGP with rubber bumper



# Compact Guide Cylinder

# *Series MGP*

## ø12, ø16, ø20, ø25, ø32, ø40, ø50, ø63, ø80, ø100

## How to Order

**Compact Guide Cylinder** **MGP M 25 □ – 30 Z – M9BW □ – □**

**Compact Guide Cylinder**

**Bearing type**

| | |
|---|---|
| **M** | Slide bearing |
| **L** | Ball bushing |
| **A** | High precision ball bushing |

**Bore size**

| | | | |
|---|---|---|---|
| **12** | 12 mm | **40** | 40 mm |
| **16** | 16 mm | **50** | 50 mm |
| **20** | 20 mm | **63** | 63 mm |
| **25** | 25 mm | **80** | 80 mm |
| **32** | 32 mm | **100** | 100 mm |

**Port thread type**

| | |
|---|---|
| **—** | M5 x 0.8 |
| | Rc |
| **TN** | NPT |
| **TF** | G |

∗ For bore sizes with ø12 and ø16, only M5 x 0.8 is available.

**Cylinder stroke [mm]**
Refer to "Standard Strokes" on page 4.

**Auto switch**

| | |
|---|---|
| **—** | Without auto switch (Built-in magnet) |

∗ For applicable auto switch model, refer to the table below.

**Number of auto switches**

| | |
|---|---|
| **—** | 2 pcs. |
| **S** | 1 pc. |
| **n** | n pcs. |

**Made to Order specification**
For details, refer to page 4.

**Applicable Auto Switches**/Refer to Auto Swicth Guide for further information on auto switches.

| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | | Load voltage AC | Auto switch model Perpendicular | Auto switch model In-line | Lead wire length [m] 0.5 (—) | 1 (M) | 3 (L) | 5 (Z) | Pre-wired connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Solid state auto switch | — | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V,12 V | — | **M9NV** | **M9N** | ● | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | **M9PV** | **M9P** | ● | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **M9BV** | **M9B** | ● | ● | ● | ○ | ○ | — | |
| | Diagnostic indication (2-colour display) | | | 3-wire (NPN) | | 5 V,12 V | | **M9NWV** | **M9NW** | ● | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **M9PWV** | **M9PW** | ● | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **M9BWV** | **M9BW** | ● | ● | ● | ○ | ○ | — | |
| | Water-resistant (2-colour display) | | | 3-wire (NPN) | | 5 V,12 V | | **M9NAV**∗∗∗ | **M9NA**∗∗∗ | ○ | ○ | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **M9PAV**∗∗∗ | **M9PA**∗∗∗ | ○ | ○ | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **M9BAV**∗∗∗ | **M9BA**∗∗∗ | ○ | ○ | ● | ○ | ○ | | |
| | Magnetic field resistant (2-colour display) | | | 2-wire (Non-polar) | | — | | — | **P3DW**∗∗ | ● | — | ● | ● | ○ | — | |
| Reed auto switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | **A96V** | **A96** | ● | — | ● | — | — | IC circuit | — |
| | | | No | 2-wire | 24 V | 12 V | 100 V | **A93V** | **A93** | ● | — | ● | ● | — | — | Relay, PLC |
| | | | | | | | 100 V or less | **A90V** | **A90** | ● | — | ● | — | — | IC circuit | |

∗∗∗Water-resistant type auto switch can be mounted to the models with the above mentioned part numbers, but this does not guarantee the water resistance of the cylinder. A water-resistant type cylinder is recommended for use in an environment which requires water resistance. However, please contact SMC for water-resistant products of ø12 and ø16.

∗ Lead wire length symbols: 0.5 m..... — (Example) M9NW
1 m..... M (Example) M9NWM
3 m..... L (Example) M9NWL
5 m..... Z (Example) M9NWZ

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗∗ Bore sizes ø32 to ø100 are available for the D-P3DW.

∗ Since there are other applicable auto switches than listed, refer to page 22 for details.
∗ For details about auto switches with pre-wired connector, refer to Auto Switch Guide. For D-P3DW, refer to the D-P3DW catalogue.
∗ Auto switches are shipped together, (but not assembled).

## Specifications

| Bore size | ø12 | ø16 | ø20 | ø25 | ø32 | ø40 | ø50 | ø63 | ø80 | ø100 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Action** | Double acting | | | | | | | | | |
| **Fluid** | Air | | | | | | | | | |
| **Proof pressure** | 1.5 MPa | | | | | | | | | |
| **Maximum operating pressure** | 1.0 MPa | | | | | | | | | |
| **Minimum operating pressure** | 0.12 MPa | 0.1 MPa | | | | | | | | |
| **Ambient and fluid temperature** | -10 to 60°C (No freezing) | | | | | | | | | |
| **Piston speed** Note) | 50 to 500 mm/s | | | | | | | | 50 to 400 mm/s | |
| **Cushion** | Rubber bumper on both ends | | | | | | | | | |
| **Lubrication** | Not required (Non-lube) | | | | | | | | | |
| **Stroke length tolerance** | $^{+1.5}_{0}$ mm | | | | | | | | | |

Note) Maximum speed with no load.
Make a model selection, considering a load according to the graph on pages 8 to 14.

## Standard Strokes

| Bore size [mm] | Standard stroke [mm] |
|---|---|
| **12, 16** | 10, 20, 30, 40, 50, 75, 100, 125, 150, 175, 200, 250 |
| **20, 25** | 20, 30, 40, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400 |
| **32 to 100** | 25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400 |

## Manufacture of Intermediate Strokes

| | | | | |
|---|---|---|---|---|
| Description | Spacer installation type<br>Spacers are installed in the standard stroke cylinder.<br>• ø12 to 32: Available by the 1 mm stroke interval.<br>• ø40 to 100: Available by the 5 mm stroke interval. | | Exclusive body (-XB10)<br>Dealing with the stroke by making an exclusive body.<br>• All bore sizes are available by the 1 mm interval. | |
| Part no. | Refer to "How to Order" for the standard model numbers. | | Suffix "-XB10" to the end of standard part number. | |
| Applicable stroke [mm] | ø12, ø16 | 1 to 249 | ø12, ø16 | 11 to 249 |
| | ø20, ø25, ø32 | 1 to 399 | ø20, ø25 | 21 to 399 |
| | ø40 to ø100 | 5 to 395 | ø32 to ø100 | 26 to 399 |
| Example | Part no.: MGPM20-39Z<br>A spacer 1 mm in width is installed in a MGPM20-40. C dimension is 77 mm. | | Part no.: MGPM20-39Z-XB10<br>Special body manufactured for 39 stroke. C dimension is 76 mm. | |

## Theoretical Output

OUT IN

[N]

| Bore size [mm] | Rod size [mm] | Operating direction | Piston area [mm²] | Operating pressure [ MPa] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| **12** | 6 | OUT | 113 | 23 | 34 | 45 | 57 | 68 | 79 | 90 | 102 | 113 |
| | | IN | 85 | 17 | 25 | 34 | 42 | 51 | 59 | 68 | 76 | 85 |
| **16** | 8 | OUT | 201 | 40 | 60 | 80 | 101 | 121 | 141 | 161 | 181 | 201 |
| | | IN | 151 | 30 | 45 | 60 | 75 | 90 | 106 | 121 | 136 | 151 |
| **20** | 10 | OUT | 314 | 63 | 94 | 126 | 157 | 188 | 220 | 251 | 283 | 314 |
| | | IN | 236 | 47 | 71 | 94 | 118 | 141 | 165 | 188 | 212 | 236 |
| **25** | 10 | OUT | 491 | 98 | 147 | 196 | 245 | 295 | 344 | 393 | 442 | 491 |
| | | IN | 412 | 82 | 124 | 165 | 206 | 247 | 289 | 330 | 371 | 412 |
| **32** | 14 | OUT | 804 | 161 | 241 | 322 | 402 | 483 | 563 | 643 | 724 | 804 |
| | | IN | 650 | 130 | 195 | 260 | 325 | 390 | 455 | 520 | 585 | 650 |
| **40** | 14 | OUT | 1257 | 251 | 377 | 503 | 628 | 754 | 880 | 1005 | 1131 | 1257 |
| | | IN | 1103 | 221 | 331 | 441 | 551 | 662 | 772 | 882 | 992 | 1103 |
| **50** | 18 | OUT | 1963 | 393 | 589 | 785 | 982 | 1178 | 1374 | 1571 | 1767 | 1963 |
| | | IN | 1709 | 342 | 513 | 684 | 855 | 1025 | 1196 | 1367 | 1538 | 1709 |
| **63** | 18 | OUT | 3117 | 623 | 935 | 1247 | 1559 | 1870 | 2182 | 2494 | 2806 | 3117 |
| | | IN | 2863 | 573 | 859 | 1145 | 1431 | 1718 | 2004 | 2290 | 2576 | 2863 |
| **80** | 22 | OUT | 5027 | 1005 | 1508 | 2011 | 2513 | 3016 | 3519 | 4021 | 4524 | 5027 |
| | | IN | 4646 | 929 | 1394 | 1859 | 2323 | 2788 | 3252 | 3717 | 4182 | 4646 |
| **100** | 26 | OUT | 7854 | 1571 | 2356 | 3142 | 3927 | 4712 | 5498 | 6283 | 7069 | 7854 |
| | | IN | 7323 | 1465 | 2197 | 2929 | 3662 | 4394 | 5126 | 5858 | 6591 | 7323 |

Note) Theoretical output [N] = Pressure [MPa] x Piston area [mm²]

Order Made

**Made to Order Specification**
**(For details, refer to pages 25 to 30.)**

| Symbol | Specifications |
|---|---|
| **-XA□** | Change of guide rod end shape |
| **-XB6** | Heat resistant cylinder (-10 to 150°C) |
| **-XB10** | Intermediate stroke (Using exclusive body) |
| **-XB13** | Low speed cylinder (5 to 50 mm/s) |
| **-XC22** | Fluororubber seals |
| **-XC79** | Machining tapped hole, drilled hole and pin hole additionally. |
| **-XC82** | Bottom mounting style |
| **-X144** | Symmetrical port position |
| **-X867** | Lateral piping type (Change of plug position) |

Refer to pages 21 to 23 for cylinders with auto switches.

- Auto switch proper mounting position (detection at stroke end) and mounting height
- Minimum stroke for auto switch mounting
- Operating range
- Auto switch mounting brackets/Part no.

## Weight

### Slide Bearing: MGPM12 to 100

[kg]

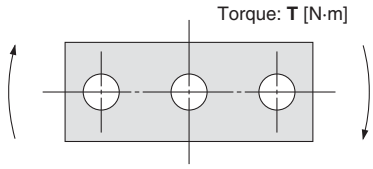
| Bore size [mm] | Standard stroke [mm] | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 25 | 30 | 40 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 250 | 300 | 350 | 400 |
| **12** | 0.22 | 0.25 | — | 0.29 | 0.33 | 0.36 | 0.46 | 0.55 | 0.66 | 0.75 | 0.84 | 0.93 | 1.11 | — | — | — |
| **16** | 0.32 | 0.37 | — | 0.42 | 0.46 | 0.51 | 0.66 | 0.78 | 0.94 | 1.06 | 1.18 | 1.31 | 1.55 | — | — | — |
| **20** | — | 0.59 | — | 0.67 | 0.74 | 0.82 | 1.06 | 1.24 | 1.43 | 1.61 | 1.80 | 1.99 | 2.42 | 2.79 | 3.16 | 3.53 |
| **25** | — | 0.84 | — | 0.94 | 1.04 | 1.14 | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 3.35 | 3.85 | 4.34 | 4.84 |
| **32** | — | — | 1.41 | — | — | 1.77 | 2.22 | 2.57 | 2.93 | 3.29 | 3.65 | 4.00 | 4.90 | 5.61 | 6.33 | 7.04 |
| **40** | — | — | 1.64 | — | — | 2.04 | 2.52 | 2.92 | 3.32 | 3.71 | 4.11 | 4.50 | 5.47 | 6.26 | 7.06 | 7.85 |
| **50** | — | — | 2.79 | — | — | 3.38 | 4.13 | 4.71 | 5.30 | 5.89 | 6.47 | 7.06 | 8.55 | 9.73 | 10.9 | 12.1 |
| **63** | — | — | 3.48 | — | — | 4.15 | 4.99 | 5.67 | 6.34 | 7.02 | 7.69 | 8.37 | 10.0 | 11.4 | 12.7 | 14.1 |
| **80** | — | — | 5.41 | — | — | 6.26 | 7.41 | 8.26 | 9.10 | 9.95 | 10.8 | 11.6 | 13.9 | 15.6 | 17.3 | 19.0 |
| **100** | — | — | 9.12 | — | — | 10.3 | 12.0 | 13.2 | 14.4 | 15.6 | 16.9 | 18.1 | 21.2 | 23.6 | 26.1 | 28.5 |

### Ball Bushing: MGPL12 to 100, High Precision Ball Bushing: MGPA12 to 100

[kg]

| Bore size [mm] | Standard stroke [mm] | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 25 | 30 | 40 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 250 | 300 | 350 | 400 |
| **12** | 0.21 | 0.24 | — | 0.27 | 0.32 | 0.35 | 0.43 | 0.50 | 0.59 | 0.67 | 0.75 | 0.83 | 0.99 | — | — | — |
| **16** | 0.31 | 0.35 | — | 0.40 | 0.47 | 0.51 | 0.62 | 0.72 | 0.85 | 0.96 | 1.06 | 1.17 | 1.38 | — | — | — |
| **20** | — | 0.60 | — | 0.66 | 0.79 | 0.85 | 1.01 | 1.17 | 1.36 | 1.52 | 1.68 | 1.84 | 2.17 | 2.49 | 2.81 | 3.13 |
| **25** | — | 0.87 | — | 0.96 | 1.12 | 1.20 | 1.41 | 1.62 | 1.86 | 2.06 | 2.27 | 2.48 | 2.92 | 3.33 | 3.75 | 4.16 |
| **32** | — | — | 1.37 | — | — | 1.66 | 2.08 | 2.37 | 2.74 | 3.03 | 3.31 | 3.60 | 4.25 | 4.82 | 5.39 | 5.97 |
| **40** | — | — | 1.59 | — | — | 1.92 | 2.38 | 2.70 | 3.11 | 3.44 | 3.77 | 4.09 | 4.81 | 5.46 | 6.11 | 6.76 |
| **50** | — | — | 2.65 | — | — | 3.14 | 3.85 | 4.34 | 4.97 | 5.47 | 5.96 | 6.45 | 7.57 | 8.56 | 9.54 | 10.5 |
| **63** | — | — | 3.33 | — | — | 3.91 | 4.71 | 5.29 | 6.01 | 6.59 | 7.17 | 7.75 | 9.05 | 10.2 | 11.4 | 12.5 |
| **80** | — | — | 5.27 | — | — | 6.29 | 7.49 | 8.21 | 8.92 | 9.64 | 10.4 | 11.1 | 12.9 | 14.3 | 15.7 | 17.2 |
| **100** | — | — | 8.62 | — | — | 10.1 | 11.8 | 12.9 | 13.9 | 15.0 | 16.0 | 17.1 | 19.6 | 21.7 | 23.8 | 25.9 |

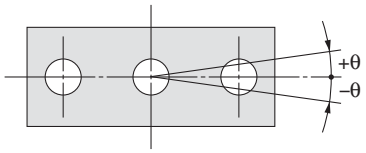
## Allowable Rotational Torque of Plate




**T** [N·m]

| Bore size [mm] | Bearing type | Stroke [mm] | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 20 | 25 | 30 | 40 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 250 | 300 | 350 | 400 |
| **12** | **MGPM** | 0.39 | 0.32 | — | 0.27 | 0.24 | 0.21 | 0.43 | 0.36 | 0.31 | 0.27 | 0.24 | 0.22 | 0.19 | — | — | — |
| | **MGPL/A** | 0.61 | 0.45 | — | 0.35 | 0.58 | 0.50 | 0.37 | 0.29 | 0.24 | 0.20 | 0.18 | 0.16 | 0.12 | — | — | — |
| **16** | **MGPM** | 0.69 | 0.58 | — | 0.49 | 0.43 | 0.38 | 0.69 | 0.58 | 0.50 | 0.44 | 0.40 | 0.36 | 0.30 | — | — | — |
| | **MGPL/A** | 0.99 | 0.74 | — | 0.59 | 0.99 | 0.86 | 0.65 | 0.52 | 0.43 | 0.37 | 0.32 | 0.28 | 0.23 | — | — | — |
| **20** | **MGPM** | — | 1.05 | — | 0.93 | 0.83 | 0.75 | 1.88 | 1.63 | 1.44 | 1.28 | 1.16 | 1.06 | 0.90 | 0.78 | 0.69 | 0.62 |
| | **MGPL/A** | — | 1.26 | — | 1.03 | 2.17 | 1.94 | 1.52 | 1.25 | 1.34 | 1.17 | 1.03 | 0.93 | 0.76 | 0.65 | 0.56 | 0.49 |
| **25** | **MGPM** | — | 1.76 | — | 1.55 | 1.38 | 1.25 | 2.96 | 2.57 | 2.26 | 2.02 | 1.83 | 1.67 | 1.42 | 1.24 | 1.09 | 0.98 |
| | **MGPL/A** | — | 2.11 | — | 1.75 | 3.37 | 3.02 | 2.38 | 1.97 | 2.05 | 1.78 | 1.58 | 1.41 | 1.16 | 0.98 | 0.85 | 0.74 |
| **32** | **MGPM** | — | — | 6.35 | — | — | 5.13 | 5.69 | 4.97 | 4.42 | 3.98 | 3.61 | 3.31 | 2.84 | 2.48 | 2.20 | 1.98 |
| | **MGPL/A** | — | — | 5.95 | — | — | 4.89 | 5.11 | 4.51 | 6.34 | 5.79 | 5.33 | 4.93 | 4.29 | 3.78 | 3.38 | 3.04 |
| **40** | **MGPM** | — | — | 7.00 | — | — | 5.66 | 6.27 | 5.48 | 4.87 | 4.38 | 3.98 | 3.65 | 3.13 | 2.74 | 2.43 | 2.19 |
| | **MGPL/A** | — | — | 6.55 | — | — | 5.39 | 5.62 | 4.96 | 6.98 | 6.38 | 5.87 | 5.43 | 4.72 | 4.16 | 3.71 | 3.35 |
| **50** | **MGPM** | — | — | 13.0 | — | — | 10.8 | 12.0 | 10.6 | 9.50 | 8.60 | 7.86 | 7.24 | 6.24 | 5.49 | 4.90 | 4.43 |
| | **MGPL/A** | — | — | 9.17 | — | — | 7.62 | 9.83 | 8.74 | 11.6 | 10.7 | 9.83 | 9.12 | 7.95 | 7.02 | 6.26 | 5.63 |
| **63** | **MGPM** | — | — | 14.7 | — | — | 12.1 | 13.5 | 11.9 | 10.7 | 9.69 | 8.86 | 8.16 | 7.04 | 6.19 | 5.52 | 4.99 |
| | **MGPL/A** | — | — | 10.2 | — | — | 8.48 | 11.0 | 9.74 | 13.0 | 11.9 | 11.0 | 10.2 | 8.84 | 7.80 | 6.94 | 6.24 |
| **80** | **MGPM** | — | — | 21.9 | — | — | 18.6 | 22.9 | 20.5 | 18.6 | 17.0 | 15.6 | 14.5 | 12.6 | 11.2 | 10.0 | 9.11 |
| | **MGPL/A** | — | — | 15.1 | — | — | 23.3 | 22.7 | 20.6 | 18.9 | 17.3 | 16.0 | 14.8 | 12.9 | 11.3 | 10.0 | 8.94 |
| **100** | **MGPM** | — | — | 38.8 | — | — | 33.5 | 37.5 | 33.8 | 30.9 | 28.4 | 26.2 | 24.4 | 21.4 | 19.1 | 17.2 | 15.7 |
| | **MGPL/A** | — | — | 27.1 | — | — | 30.6 | 37.9 | 34.6 | 31.8 | 29.3 | 27.2 | 25.3 | 22.1 | 19.5 | 17.3 | 15.5 |

## Non-rotating Accuracy of Plate




Non-rotating accuracy θ when retracted and when no load is applied should be not more than the values shown in the table.

| Bore size [mm] | Non-rotating accuracy θ | | |
|---|---|---|---|
| | **MGPM** | **MGPL** | **MGPA** |
| **12** | ±0.07° | ±0.05° | ±0.01° |
| **16** | | | |
| **20** | ±0.06° | ±0.04° | |
| **25** | | | |
| **32** | ±0.05° | ±0.03° | |
| **40** | | | |
| **50** | ±0.04° | ±0.03° | |
| **63** | | | |
| **80** | ±0.03° | ±0.03° | |
| **100** | | | |

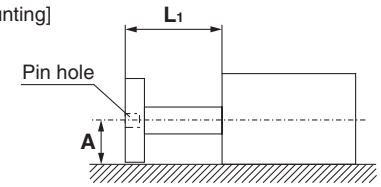
## High Precision Ball Bushing/MGPA

### ⚠Caution

**Positioning accuracy for pin hole on the plate**

Dispersion of dimensions when machining each component will be accumulated in the plate pin hole positioning accuracy when mounting this cylinder. Values below are referred as a guide.

[Side mounting]

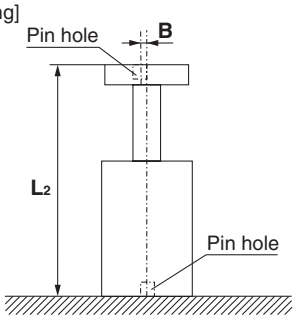



**A** = Catalogue dimension ± (0.1 + **L1** x 0.0008) [mm]

∗ : To be 0.15 for ø80, ø100

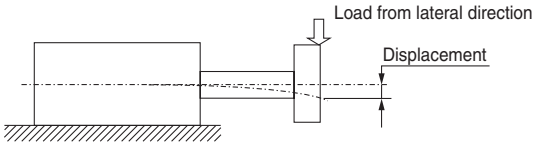
Note) Displacement by load and self-weight deflection by plate and guide rod are not included.

[Bottom mounting]

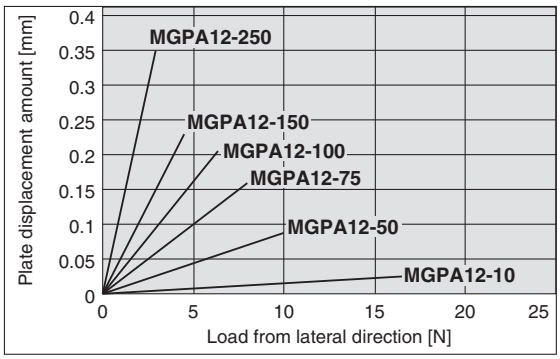



**B** = ± (0.045 + **L2** x 0.0016) [mm]

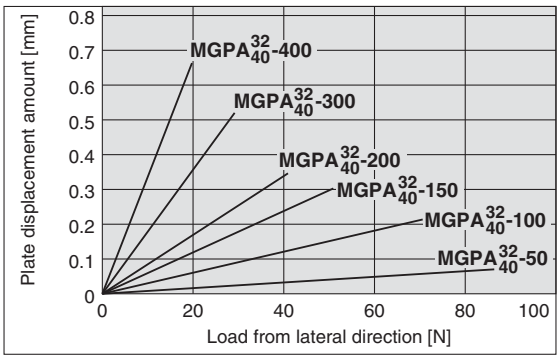
## High Precision Ball Bushing/MGPA Plate Displacement Amount (Reference Values)



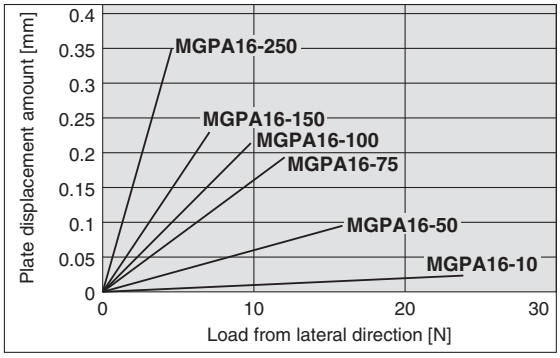

### MGPA12



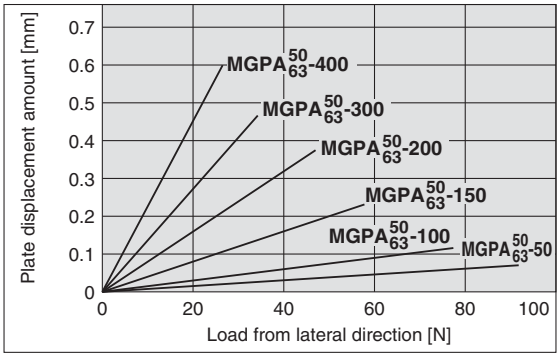

### MGPA32/40



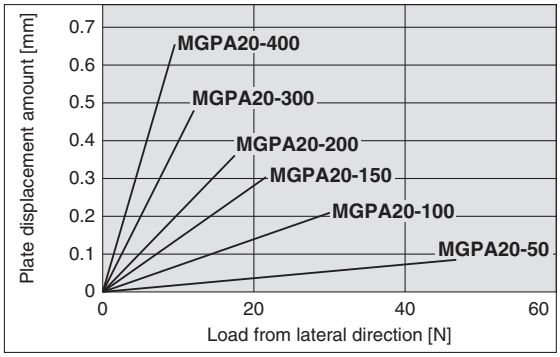

### MGPA16



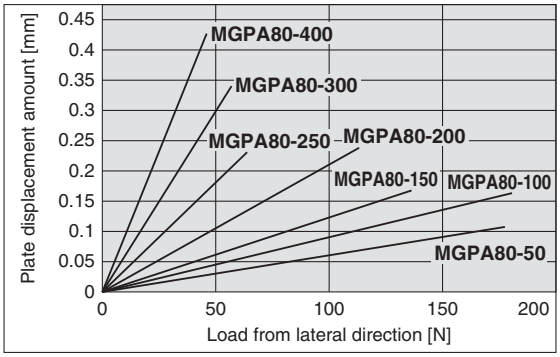

### MGPA50/63



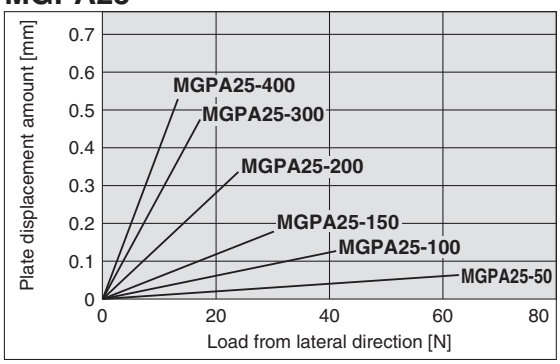

### MGPA20



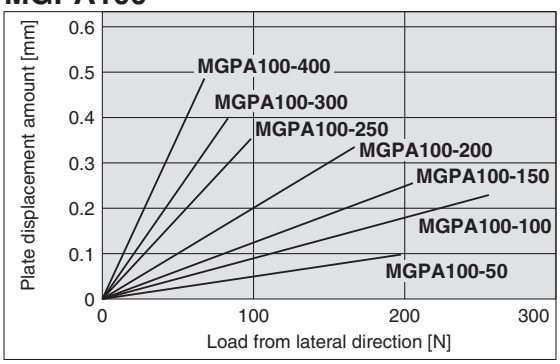

### MGPA80




### MGPA25



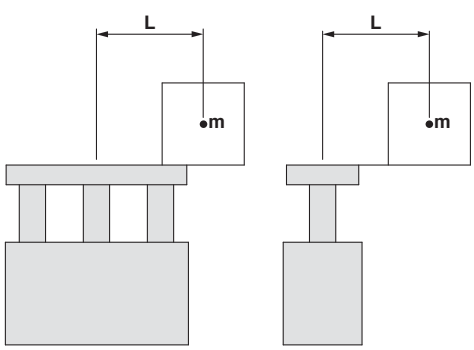
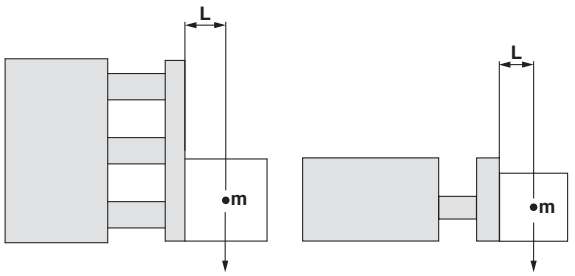

### MGPA100




Note 1) The guide rod and self-weight for the plate are not included in the above displacement values.
Note 2) Allowable rotating torque, and operating range when used as a lifter, are the same as MGPL series.

# *Series MGP*
# Model Selection

## Selection Conditions

| | Vertical | | Horizontal | |
|---|---|---|---|---|
| Mounting orientation |  | |  | |
| Maximum speed [mm/s] | 200 or less | 400 | 200 or less | 400 |
| Graph (Slide bearing type) | (1), (2) | (3), (4) | (13), (14) | (15), (16) |
| Graph (Ball bushing type) | (5) to (8) | (9) to (12) | (17), (18) | (19), (20) |

## Selection Example 1 (Vertical Mounting)

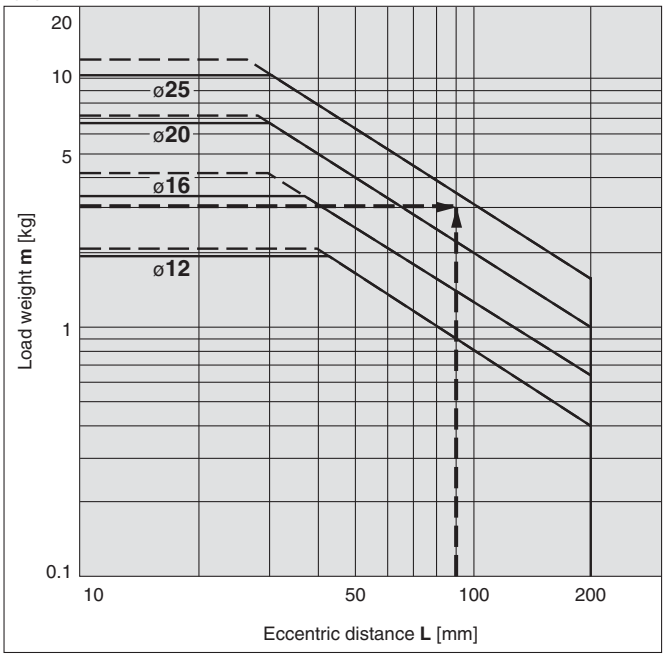
**Selection conditions**

Mounting: Vertical
Bearing type: Ball bushing
Stroke: 30 stroke
Maximum speed: 200 mm/s
Load weight: 3 kg
Eccentric distance: 90 mm

Find the point of intersection for the load weight of 3 kg and the eccentric distance of 90 mm on graph (5), based on vertical mounting, ball bushing, 30 stroke, and the speed of 200 mm/s.

→**MGPL25-30** is selected.

(5) Less than 40 stroke, V = 200 mm/s or less




## Selection Example 2 (Horizontal Mounting)

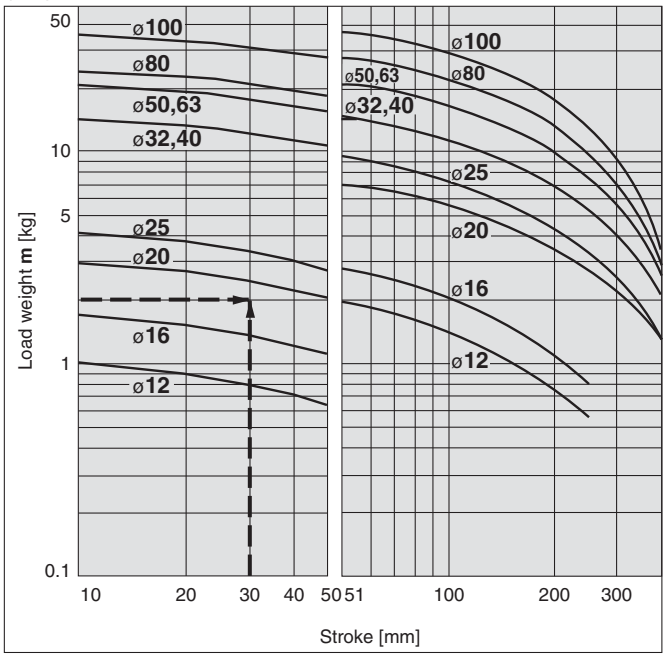
**Selection conditions**

Mounting: Horizontal
Bearing type: Slide bearing
Distance between plate and load centre of gravity: 50 mm
Maximum speed: 200 mm/s
Load weight: 2 kg
Stroke: 30 stroke

Find the point of intersection for the load weight of 2 kg and 30 stroke on graph (13), based on horizontal mounting, slide bearing, the distance of 50 mm between the plate and load centre of gravity, and the speed of 200 mm/s.

→**MGPM20-30** is selected.

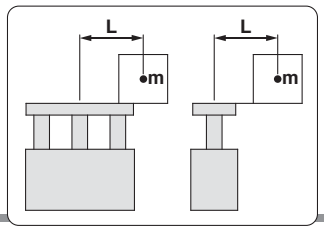
(13) L = 50 mm, V = 200 mm/s or less




· When the maximum speed exceeds 200 mm/s, the allowable load weight is determined by multiplying the value shown in the graph at 400 mm/s by the coefficient listed in the table below.

| Max. speed | Up to 300 mm/s | Up to 400 mm/s | Up to 500 mm/s |
|---|---|---|---|
| Coefficient | 1.7 | 1 | 0.6 |

· Use the “Guide Cylinder Selection Software”, when the eccentric distance is 200 mm or more.



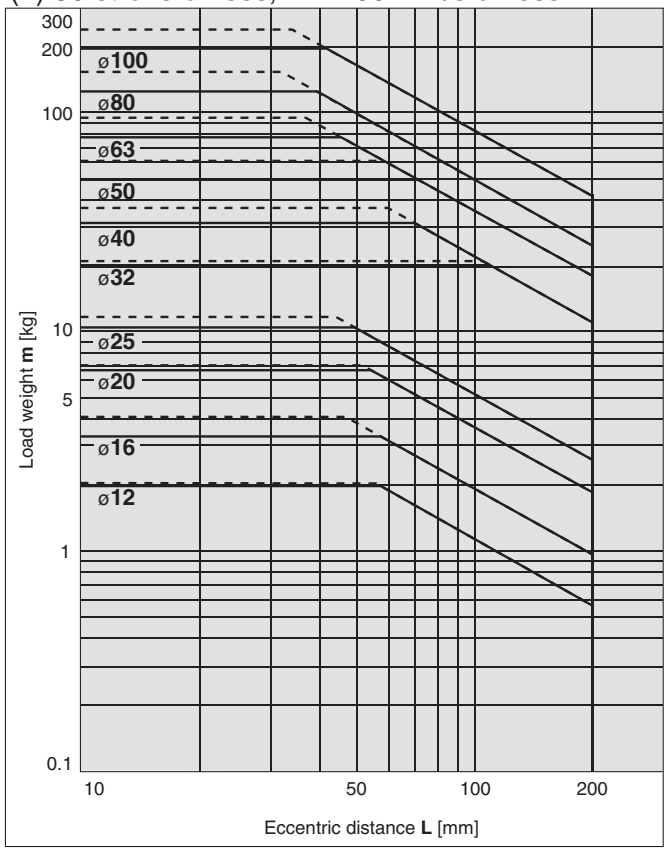

## Vertical Mounting

Slide Bearing

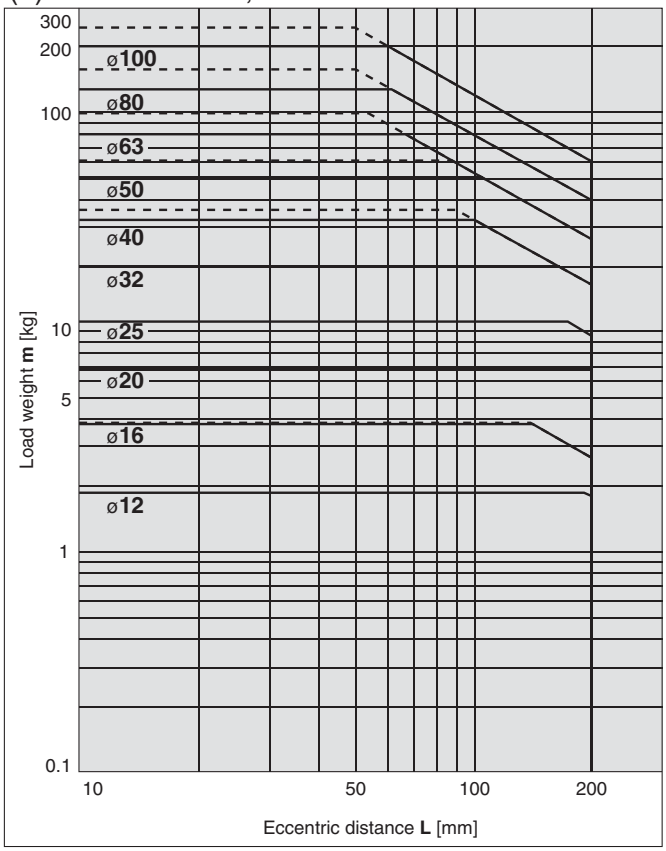
Operating pressure 0.4 MPa
Operating pressure 0.5 MPa or more

### MGPM12 to 100

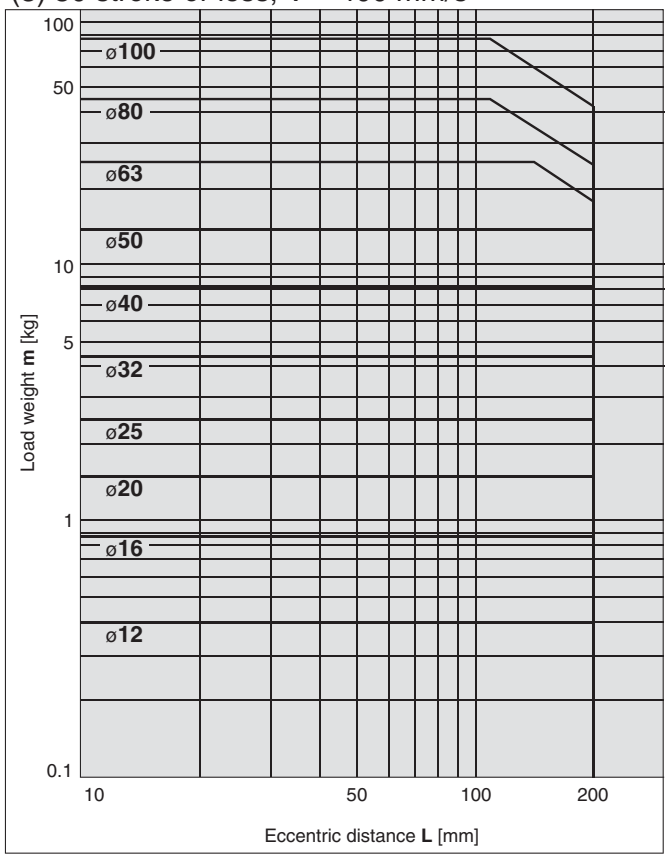
(1) 50 stroke or less, V = 200 mm/s or less



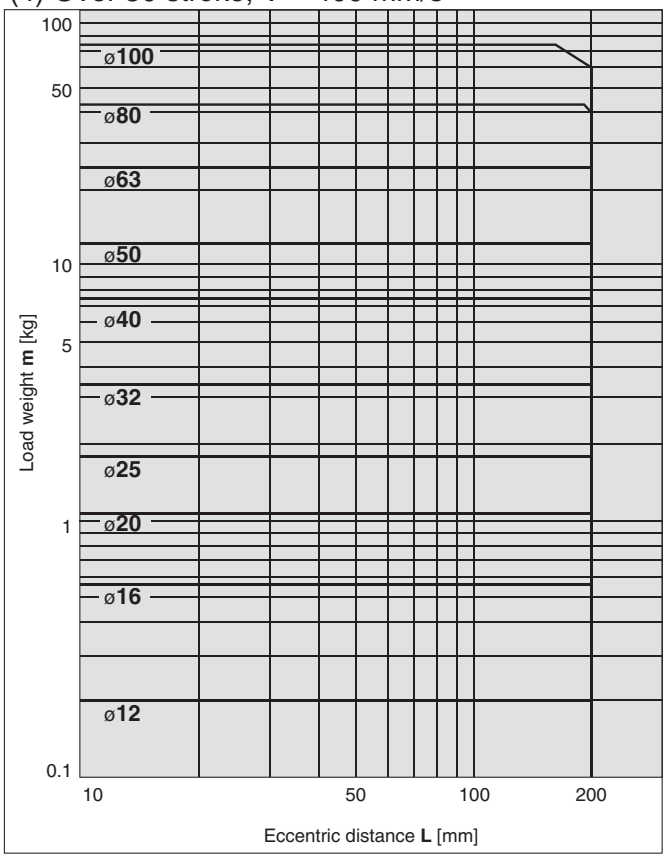

(2) Over 50 stroke, V = 200 mm/s or less



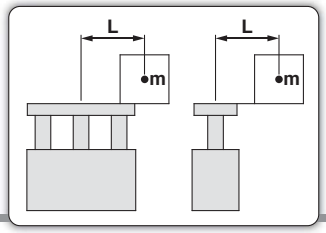

(3) 50 stroke or less, V = 400 mm/s




(4) Over 50 stroke, V = 400 mm/s




· Use the “Guide Cylinder Selection Software”, when the eccentric distance is 200 mm or more.



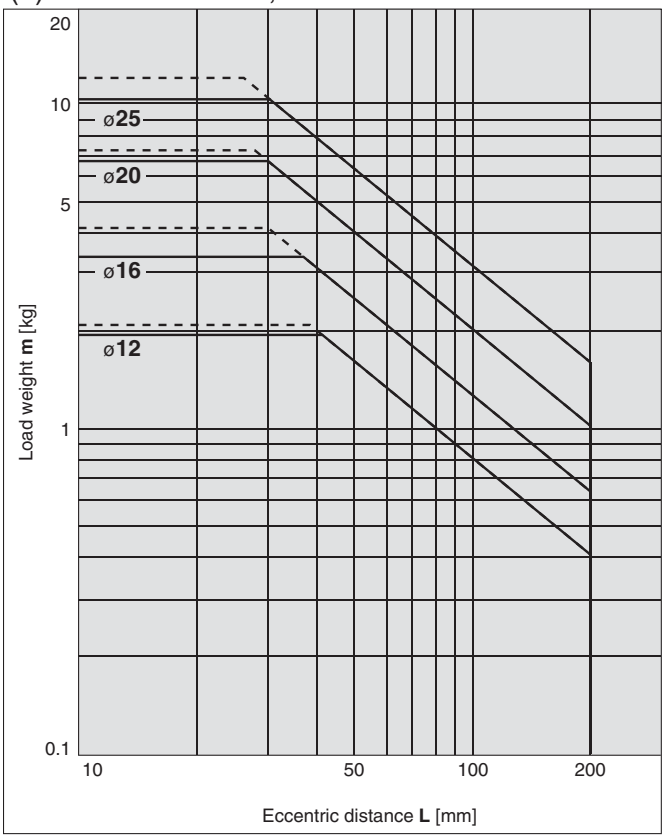

## Vertical Mounting

**Ball Bushing**

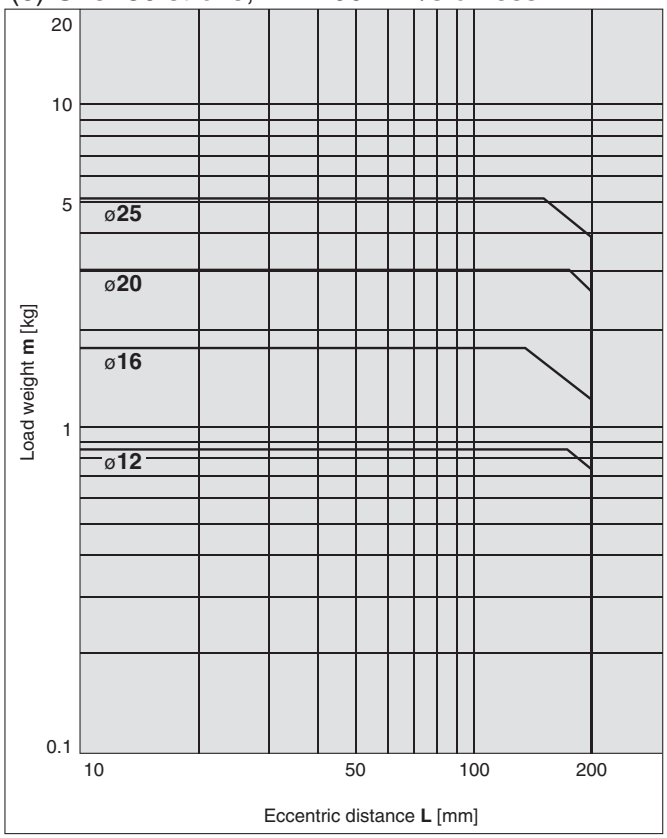
Operating pressure 0.4 MPa
Operating pressure 0.5 MPa or more

### MGPL12 to 25, MGPA12 to 25

(5) 30 stroke or less, V = 200 mm/s or less

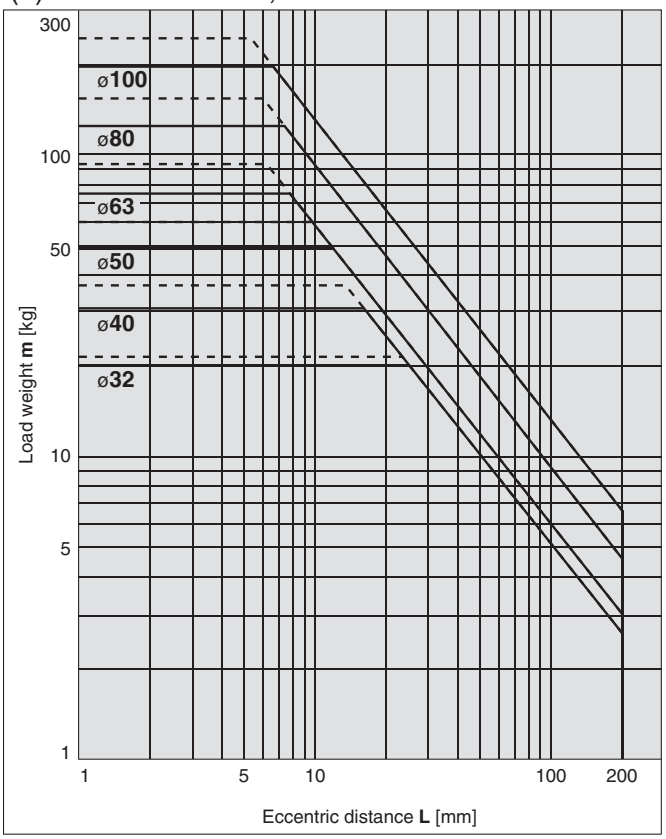



(6) Over 30 stroke, V = 200 mm/s or less

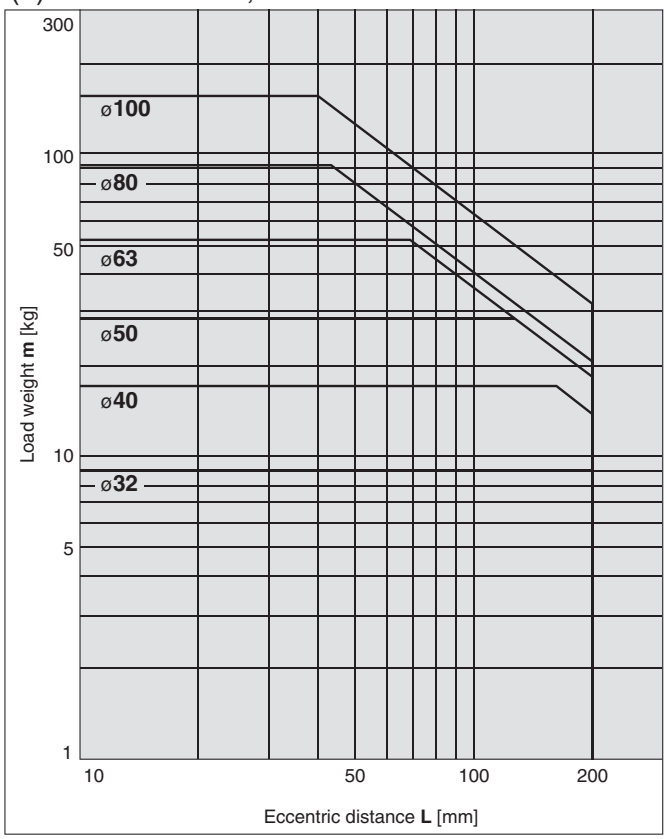



### MGPL32 to 100, MGPA32 to 100

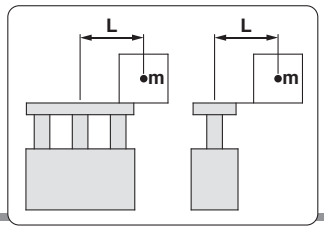
(7) 50 stroke or less, V = 200 mm/s or less




(8) Over 50 stroke, V = 200 mm/s or less




· Use the “Guide Cylinder Selection Software”, when the eccentric distance is 200 mm or more.



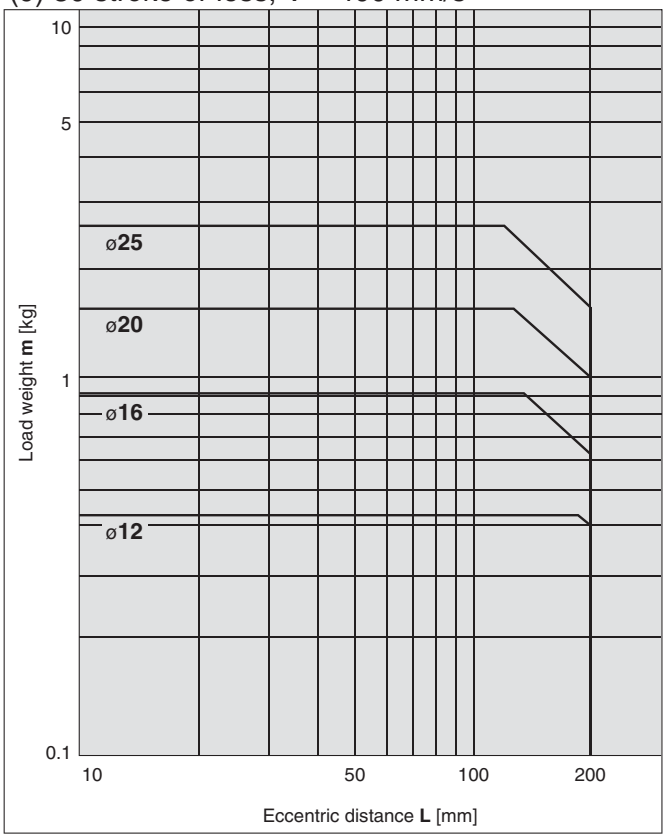

## Vertical Mounting

Ball Bushing

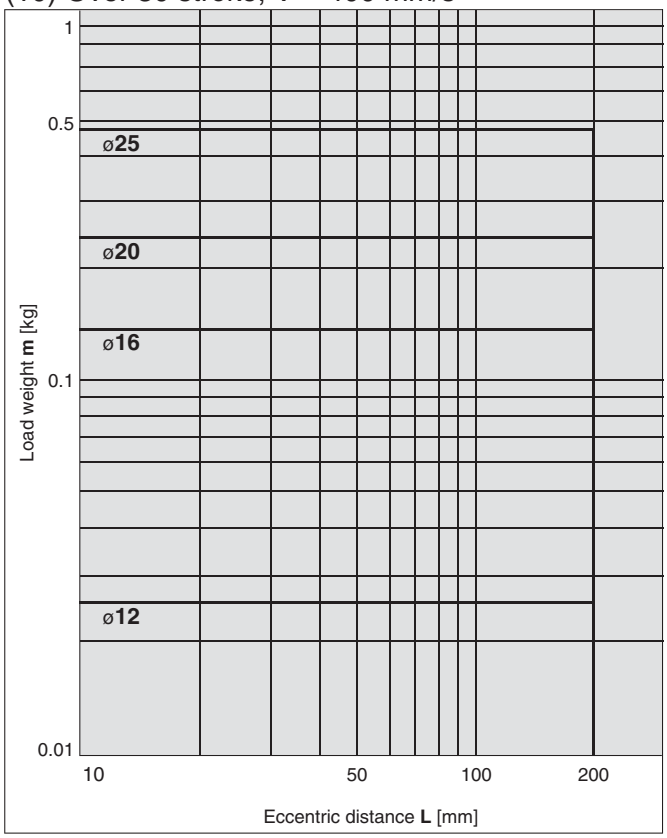
Operating pressure 0.4 MPa

### MGPL12 to 25, MGPA12 to 25

(9) 30 stroke or less, V = 400 mm/s

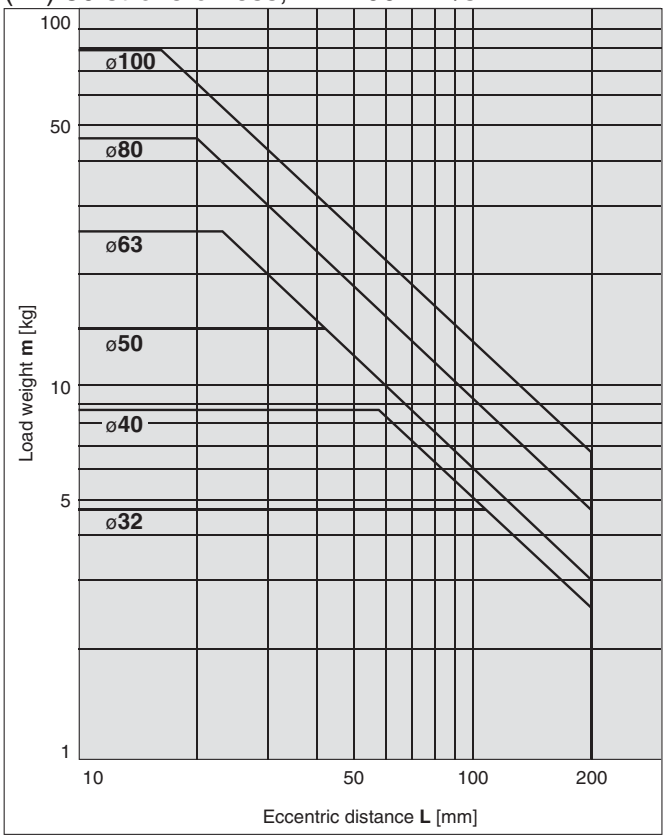



(10) Over 30 stroke, V = 400 mm/s

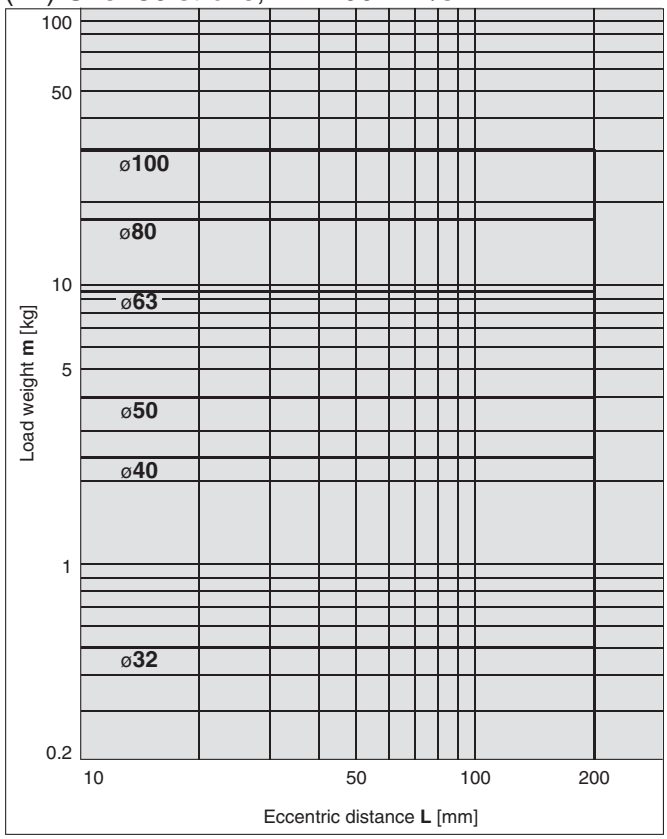



### MGPL32 to 100, MGPA32 to 100

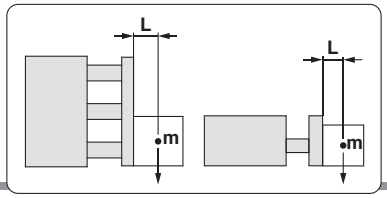
(11) 50 stroke or less, V = 400 mm/s




(12) Over 50 stroke, V = 400 mm/s




· Use the “Guide Cylinder Selection Software”, when the eccentric distance is 200 mm or more.

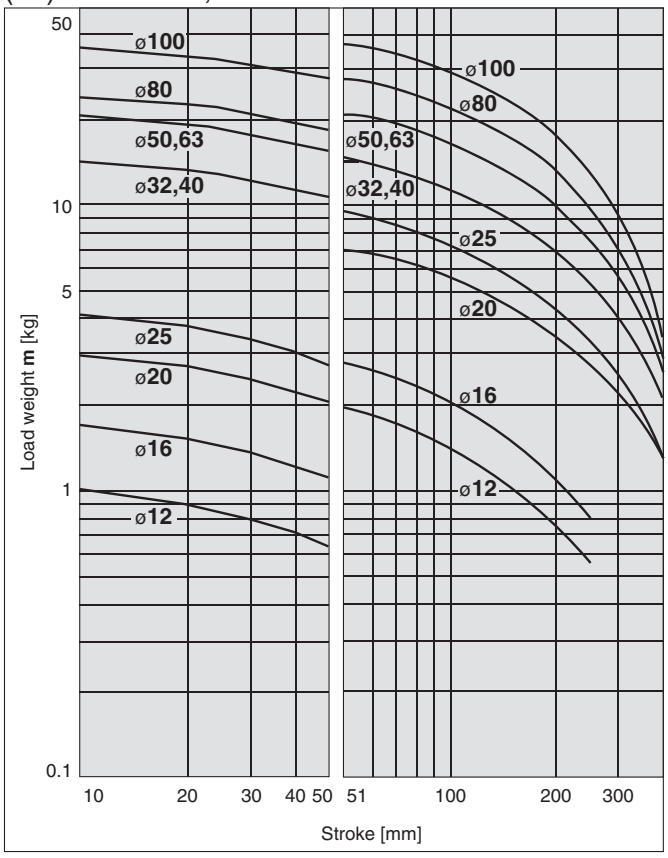



## Horizontal Mounting

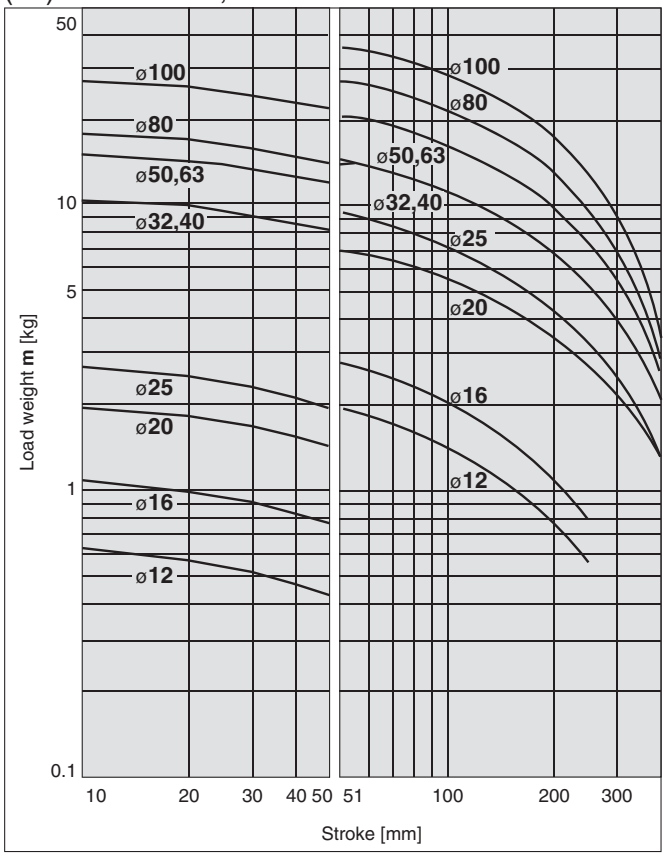
Slide Bearing

### MGPM12 to 100

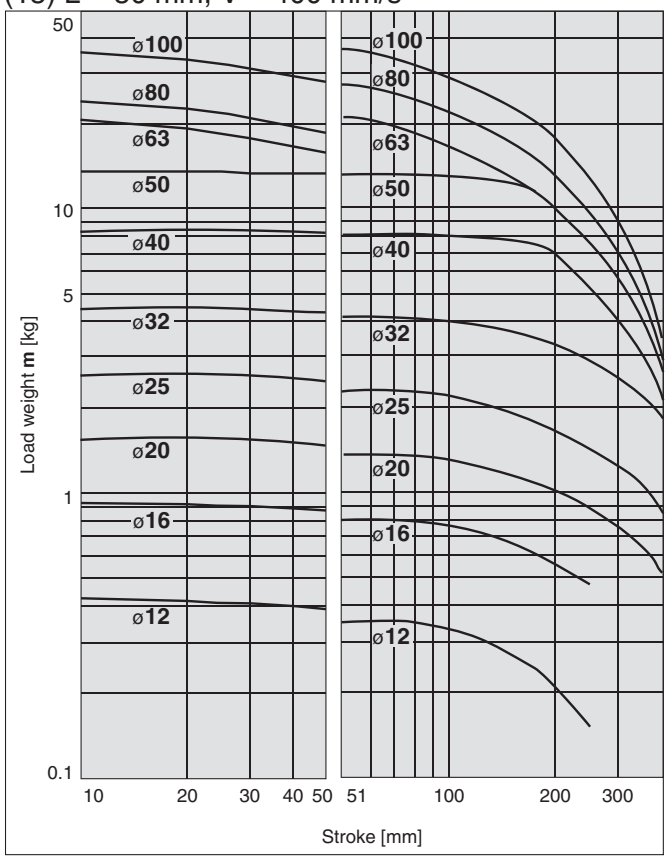
(13) L = 50 mm, V = 200 mm/s or less



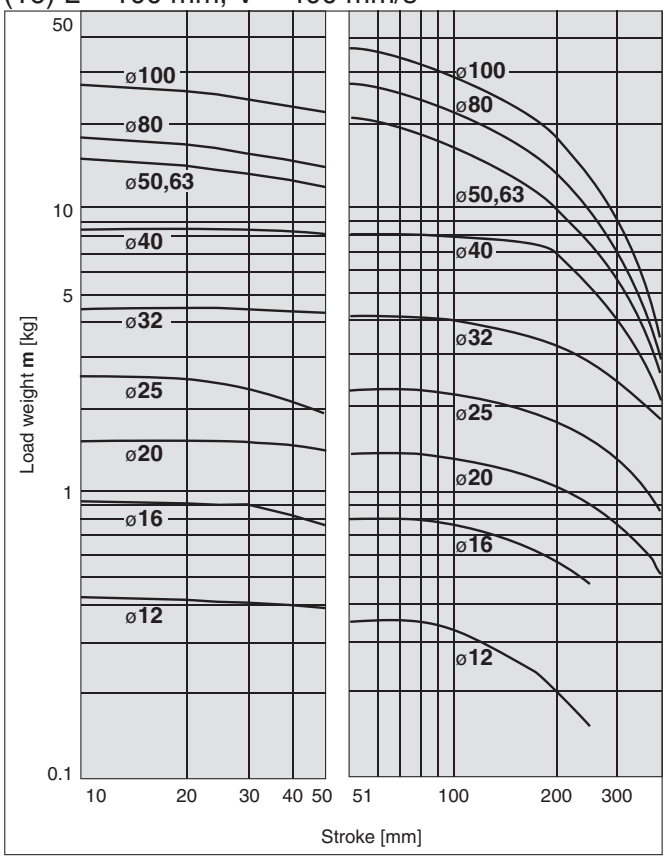

(14) L = 100 mm, V = 200 mm/s or less

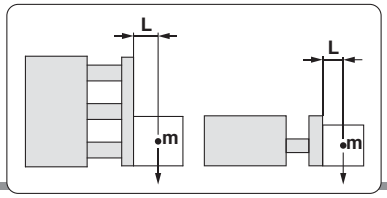



(15) L = 50 mm, V = 400 mm/s




(16) L = 100 mm, V = 400 mm/s



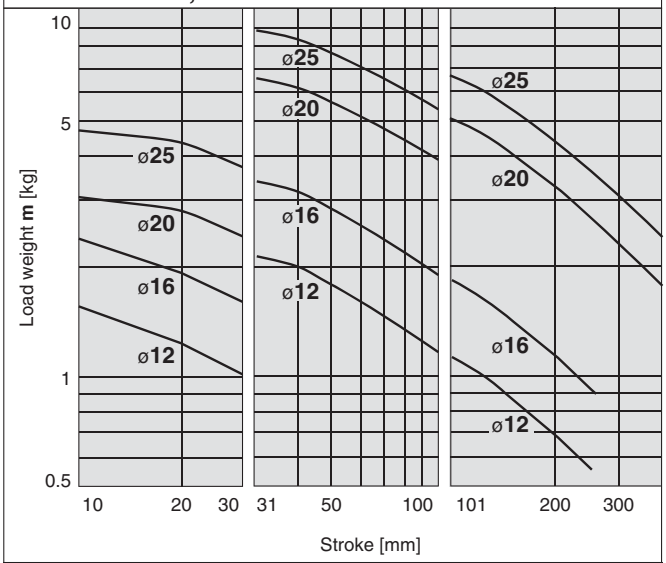



## Horizontal Mounting

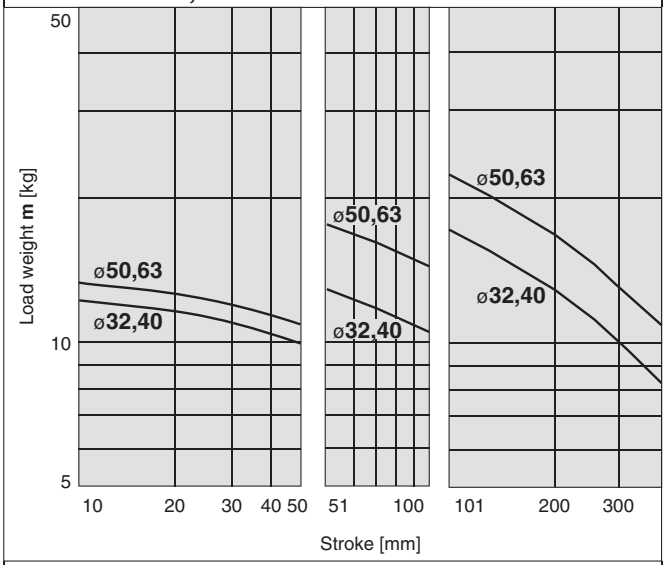
Ball Bushing

(17) L = 50 mm, V = 200 mm/s or less

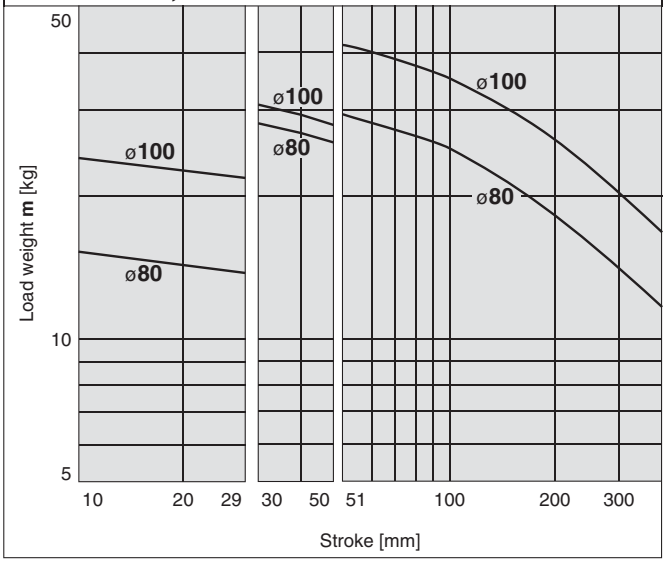
### MGPL12 to 25, MGPA12 to 25




### MGPL32 to 63, MGPA32 to 63

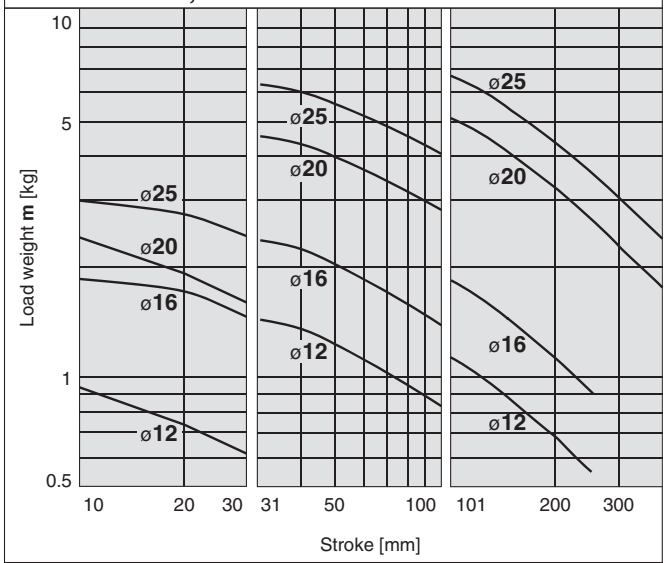



### MGPL80/100, MGPA80/100

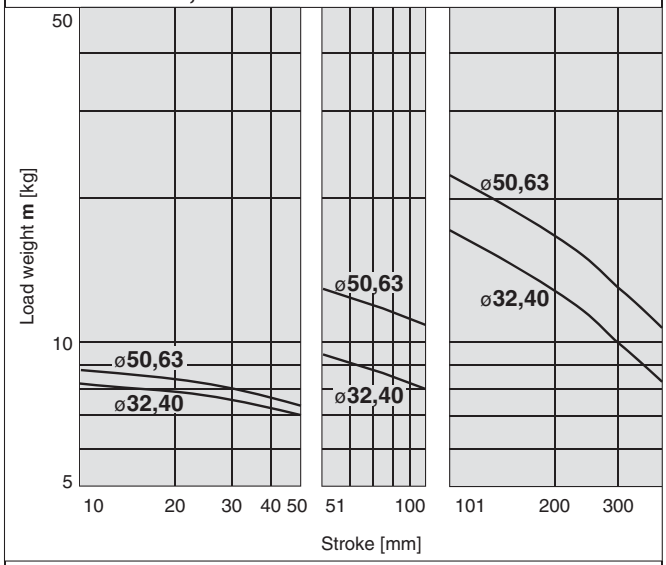



(18) L =100 mm, V = 200 mm/s or less

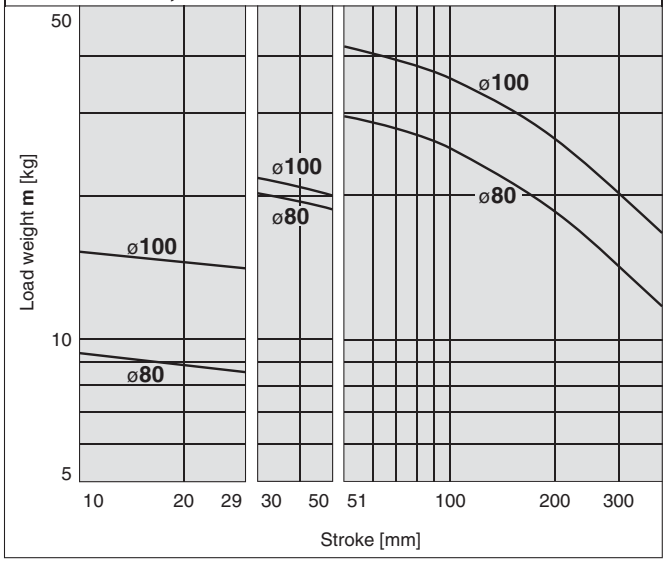
### MGPL12 to 25, MGPA12 to 25

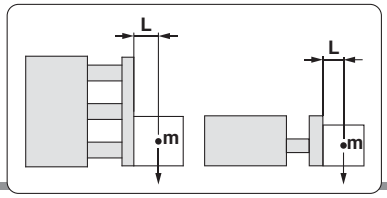



### MGPL32 to 63, MGPA32 to 63




### MGPL80/100, MGPA80/100



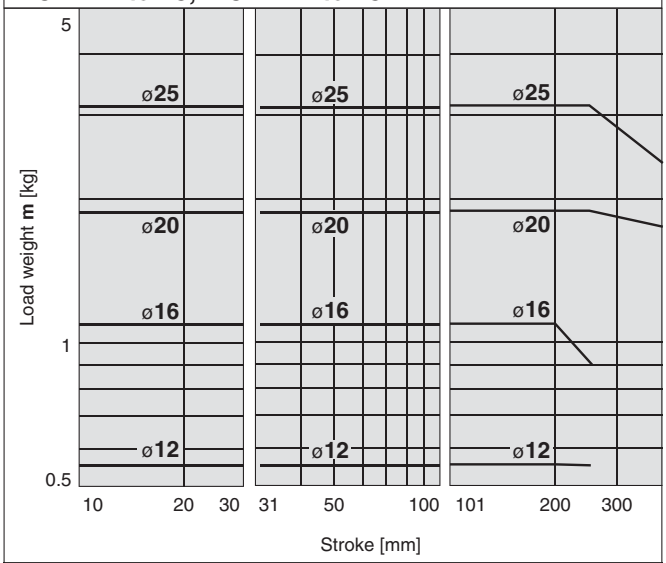



## Horizontal Mounting

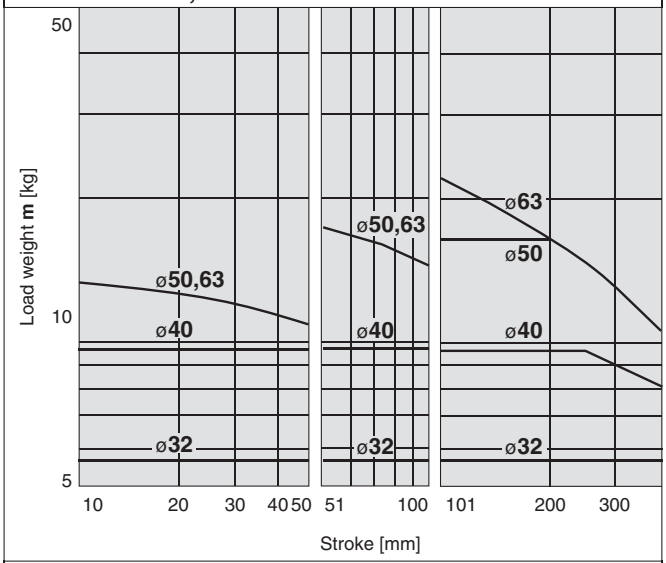
**Ball Bushing**

(19) L = 50 mm, V = 400 mm/s

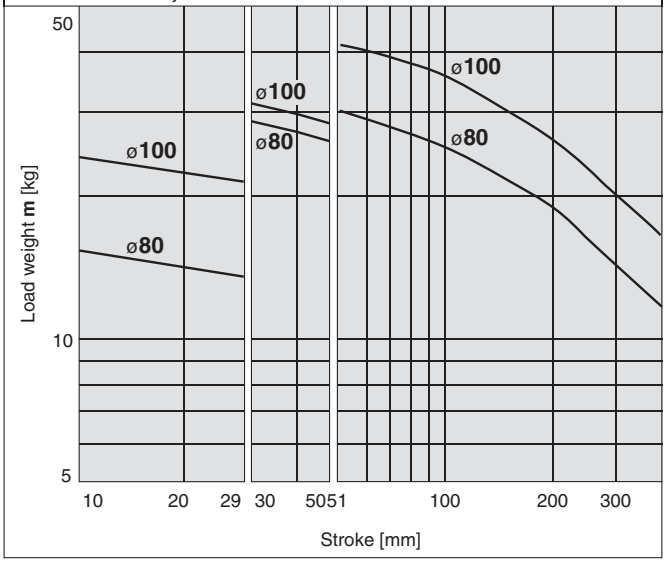
### MGPL12 to 25, MGPA12 to 25




### MGPL32 to 63, MGPA32 to 63

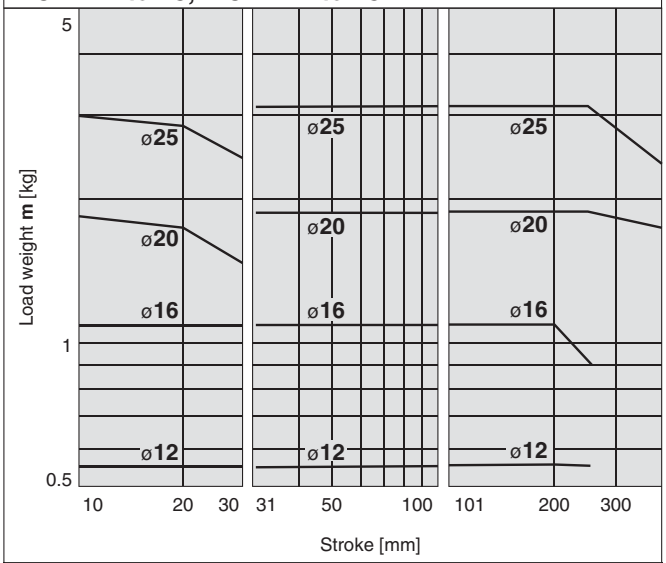



### MGPL80/100, MGPA80/100

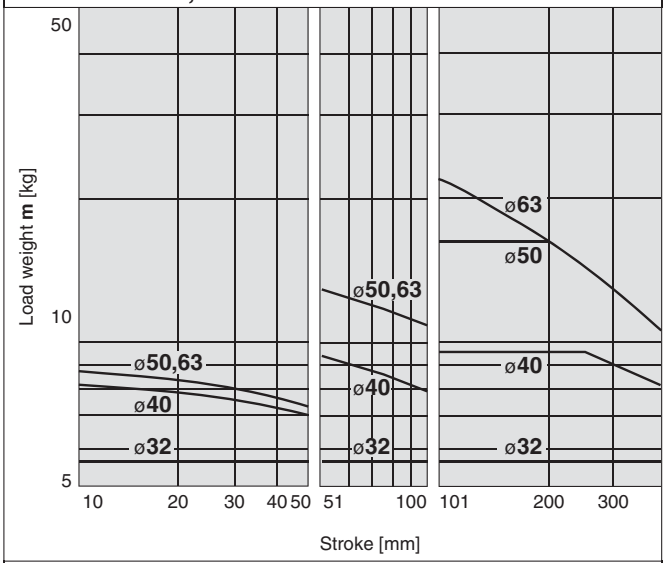



(20) L =100 mm, V = 400 mm/s

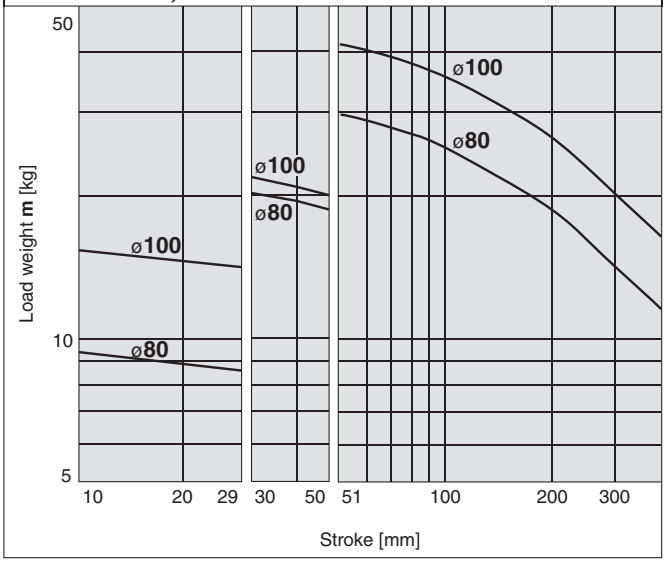
### MGPL12 to 25, MGPA12 to 25




### MGPL32 to 63, MGPA32 to 63

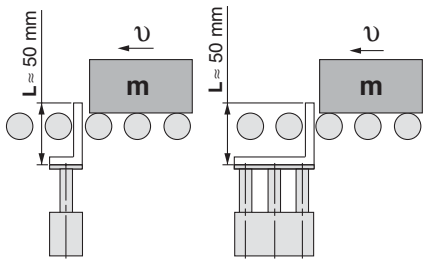



### MGPL80/100, MGPA80/100



## Operating Range when Used as Stopper

### Bore Size: ø12 to ø25/MGPM12 to 25 (Slide bearing)




∗ When selecting a model with a longer **L** dimension, be sure to choose a bore size which is sufficiently large.

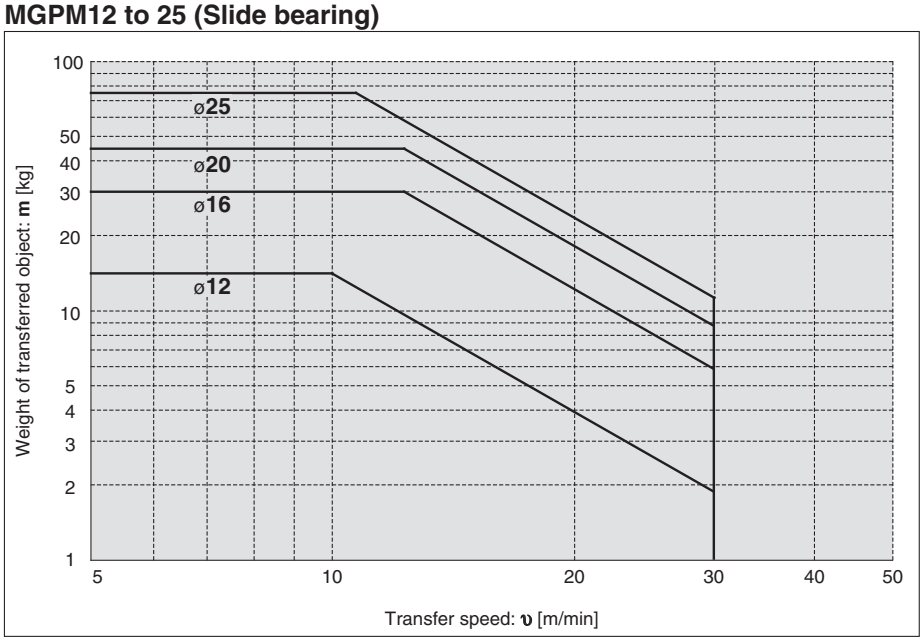
**⚠Caution**

**Caution on handling**

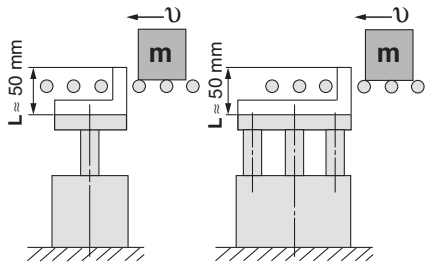
Note 1) When using as a stopper, select a model with 30 stroke or less.

Note 2) The MGPL (Ball bushing) and the MGPA (High precision ball bushing) cannot be used as a stopper.

**MGPM12 to 25 (Slide bearing)**




### Bore Size: ø32 to ø100/MGPM32 to 100 (Slide bearing)




∗ When selecting a model with a longer **L** dimension, be sure to choose a bore size which is sufficiently large.

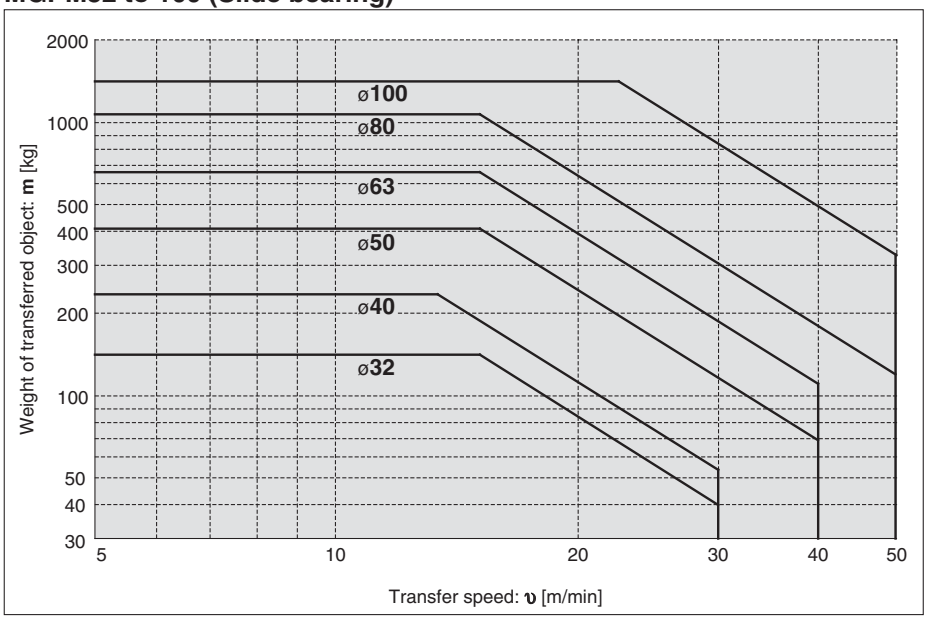
**⚠Caution**

**Caution on handling**

Note 1) When using as a stopper, select a model with 50 stroke or less.

Note 2) The MGPL (Ball bushing) and the MGPA (High precision ball bushing) cannot be used as a stopper.

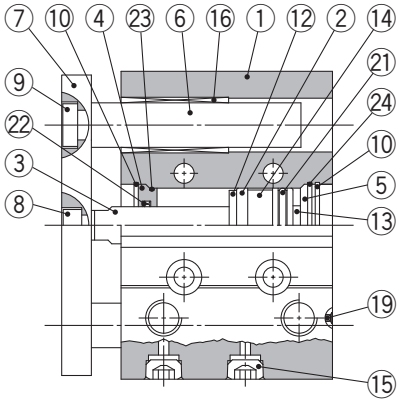
**MGPM32 to 100 (Slide bearing)**

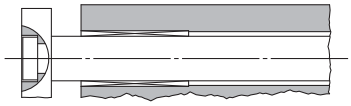



∗ Refer to graphs (13) and (15) if line pressure is applied by a roller conveyor after the workpiece is stopped.

## Construction/Series MGPM

### MGPM12 to 25

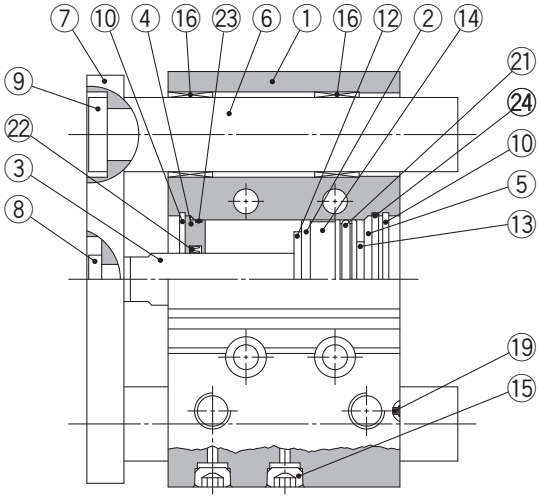


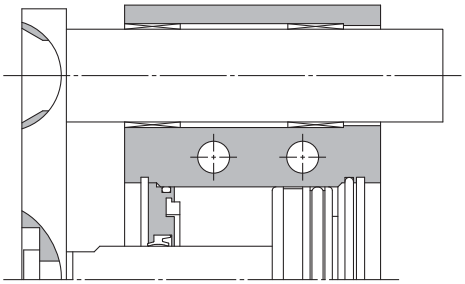
ø12 to ø25 50 stroke or less

ø12 to ø25 Over 50 stroke

### MGPM32 to 100




ø63 or more



ø50 or more

### Component Parts

| No. | Description | Material | Note | |
|---|---|---|---|---|
| 1 | **Body** | Aluminium alloy | Hard anodised | |
| 2 | **Piston** | Aluminium alloy | Chromated | |
| 3 | **Piston rod** | Stainless steel | ø12 to ø25 | |
| | | Carbon steel | ø32 to ø100 | Hard chrome plated |
| 4 | **Collar** | Aluminium alloy | Chromated | |
| 5 | **Head cover** | Aluminium alloy | ø12 to ø63 | Chromated |
| | | | ø80, ø100 | Painted |
| 6 | **Guide rod** | Carbon steel | Hard chrome plated | |
| 7 | **Plate** | Carbon steel | Nickel plated | |
| 8 | **Plate mounting bolt** | Carbon steel | Nickel plated | |
| 9 | **Guide bolt** | Carbon steel | Nickel plated | |
| 10 | **Retaining ring** | Carbon tool steel | Phosphate coated | |
| 11 | **Retaining ring** | Carbon tool steel | Phosphate coated | |
| 12 | **Bumper A** | Urethane | | |
| 13 | **Bumper B** | Urethane | | |
| 14 | **Magnet** | — | | |
| 15 | **Plug** | Carbon steel | ø12, ø16 | Nickel plated |
| | Hexagon socket head plug | | ø20 to ø100 | |
| 16 | **Slide bearing** | Babbitt | | |

### Component Parts

| No. | Description | Material | Note | |
|---|---|---|---|---|
| 17 | **Ball bushing** | | | |
| 18 | **Spacer** | Aluminium alloy | | |
| 19 | **Steel ball** | Carbon steel | ø12 to ø50 | |
| 20 | **Plug** | Carbon steel | ø63 to ø100 | Nickel plated |
| 21 * | **Piston seal** | NBR | | |
| 22 * | **Rod seal** | NBR | | |
| 23 * | **Gasket A** | NBR | | |
| 24 * | **Gasket B** | NBR | | |

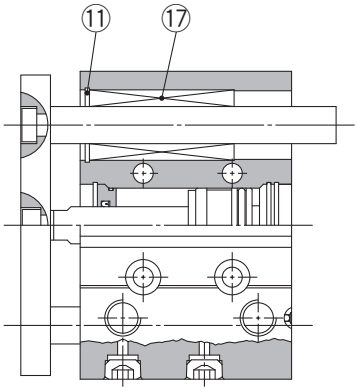
### Replacement Parts/Seal Kit

| Bore size [mm] | Kit no. | Contents | Bore size [mm] | Kit no. | Contents |
|---|---|---|---|---|---|
| **12** | MGP12-Z-PS | Set of nos. above ㉑, ㉒, ㉓, ㉔ | **40** | MGP40-Z-PS | Set of nos. above ㉑, ㉒, ㉓, ㉔ |
| **16** | MGP16-Z-PS | | **50** | MGP50-Z-PS | |
| **20** | MGP20-Z-PS | | **63** | MGP63-Z-PS | |
| **25** | MGP25-Z-PS | | **80** | MGP80-Z-PS | |
| **32** | MGP32-Z-PS | | **100** | MGP100-Z-PS | |

* Seal kit includes ㉑ to ㉔. Order the seal kit, based on each bore size.
* Since the seal kit does not include a grease pack, order it separately.
**Grease pack part no.: GR-S-010** (10 g)

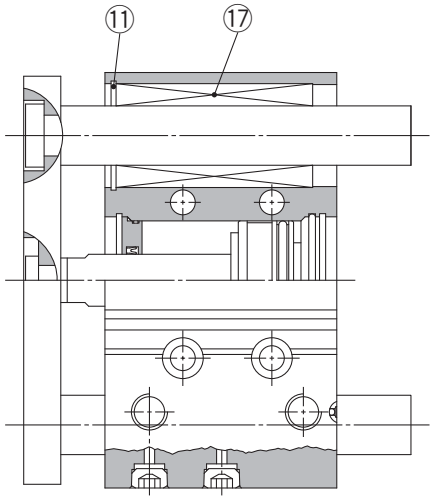
## Construction/Series MGPL, Series MGPA

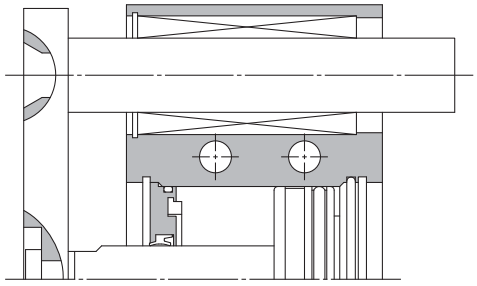
**MGPL12 to 25**
**MGPA12 to 25**



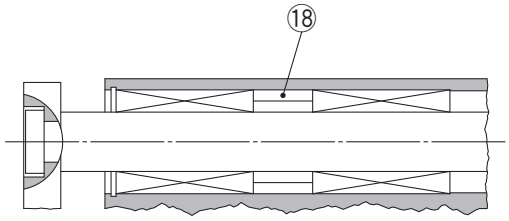

**ø12 to ø25 Over 100 stroke**

**MGPL32 to 100**
**MGPA32 to 100**



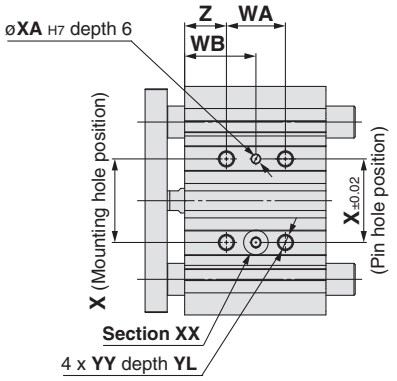



**ø50 or more**

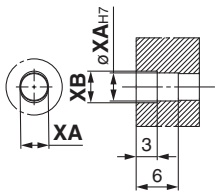



**ø32 to ø63 Over 100 stroke**
**ø80, ø100 Over 200 stroke**

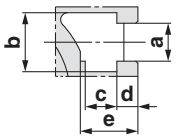
# ø12 to ø25/MGPM, MGPL, MGPA




**Section XX details**

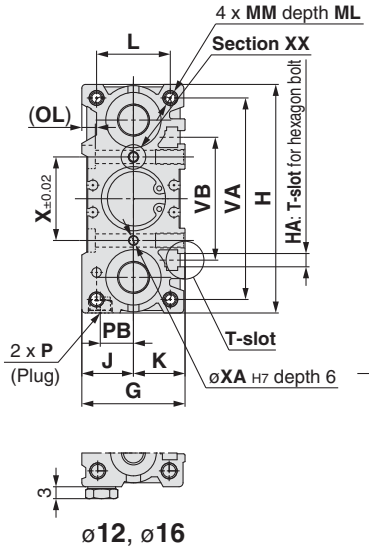


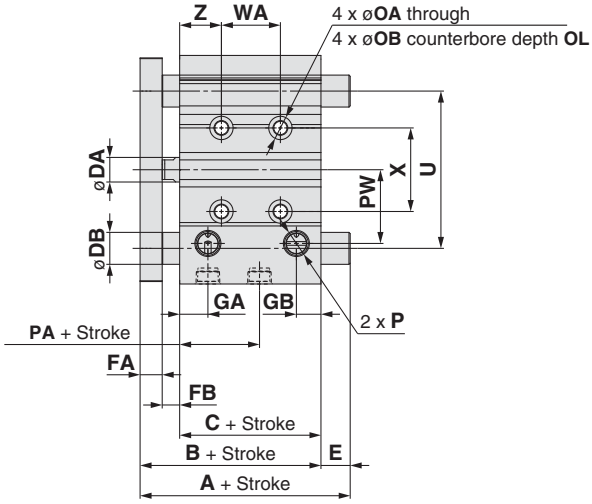

**T-slot dimensions**

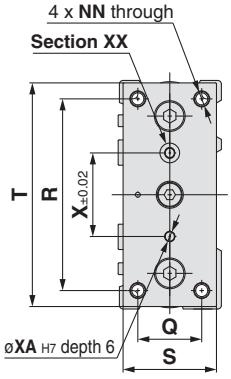



[mm]

| Bore size [mm] | a | b | c | d | e |
|---|---|---|---|---|---|
| 12 | 4.4 | 7.4 | 3.7 | 2 | 6.2 |
| 16 | 4.4 | 7.4 | 3.7 | 2.5 | 6.7 |
| 20 | 5.4 | 8.4 | 4.5 | 2.8 | 7.8 |
| 25 | 5.4 | 8.4 | 4.5 | 3 | 8.2 |




∗ The use of a slot (width XA, length XB, depth 3) allows for a relaxed pin pitch tolerance, with the pin hole (øXAH7, depth 6) as the reference, without affecting mounting accuracy.
∗ For intermediate strokes other than standard strokes, refer to "Manufacture of Intermediate Strokes" on page 4.
∗ Bore size ø12 and ø16: M5 x 0.8 port, Bore size ø20 or more: RC port.

## MGPM, MGPL, MGPA Common Dimensions

[mm]

| Bore size [mm] | Standard stroke [mm] | B | C | DA | FA | FB | G | GA | GB | H | HA | J | K | L | MM | ML | NN | OA | OB | OL | P | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | — | TN | TF |
| 12 | 10,20,30,40,50,75,100 | 42 | 29 | 6 | 7 | 6 | 26 | 10 | 7 | 58 | M4 | 13 | 13 | 18 | M4 x 0.7 | 10 | M4 x 0.7 | 4.3 | 8 | 4.5 | M5 x 0.8 | — | — |
| 16 | 125,150,175,200,250 | 46 | 33 | 8 | 7 | 6 | 30 | 10.5 | 7.5 | 64 | M4 | 15 | 15 | 22 | M5 x 0.8 | 12 | M5 x 0.8 | 4.3 | 8 | 4.5 | M5 x 0.8 | — | — |
| 20 | 20,30,40,50,75,100,125,150 | 53 | 37 | 10 | 8 | 8 | 36 | 11.5 | 9 | 83 | M5 | 18 | 18 | 24 | M5 x 0.8 | 13 | M5 x 0.8 | 5.4 | 9.5 | 5.5 | Rc1/8 | NPT1/8 | G1/8 |
| 25 | 175,200,250,300,350,400 | 53.5 | 37.5 | 10 | 9 | 7 | 42 | 11.5 | 10 | 93 | M5 | 21 | 21 | 30 | M6 x 1.0 | 15 | M6 x 1.0 | 5.4 | 9.5 | 5.5 | Rc1/8 | NPT1/8 | G1/8 |

| Bore size [mm] | PA | PB | PW | Q | R | S | T | U | VA | VB | WA | | | | | WB | | | | | X | XA | XB | YY | YL | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 30 st or less | Over 30 st 100 st or less | Over 100 st 200 st or less | Over 200 st 300 st or less | Over 300 st | 30 st or less | Over 30 st 100 st or less | Over 100 st 200 st or less | Over 200 st 300 st or less | Over 300 st | | | | | | |
| 12 | 13 | 8 | 18 | 14 | 48 | 22 | 56 | 41 | 50 | 37 | 20 | 40 | 110 | 200 | — | 15 | 25 | 60 | 105 | — | 23 | 3 | 3.5 | M5 x 0.8 | 10 | 5 |
| 16 | 14.5 | 10 | 19 | 16 | 54 | 25 | 62 | 46 | 56 | 38 | 24 | 44 | 110 | 200 | — | 17 | 27 | 60 | 105 | — | 24 | 3 | 3.5 | M5 x 0.8 | 10 | 5 |
| 20 | 13.5 | 10.5 | 25 | 18 | 70 | 30 | 81 | 54 | 72 | 44 | 24 | 44 | 120 | 200 | 300 | 29 | 39 | 77 | 117 | 167 | 28 | 3 | 3.5 | M6 x 1.0 | 12 | 17 |
| 25 | 12.5 | 13.5 | 30 | 26 | 78 | 38 | 91 | 64 | 82 | 50 | 24 | 44 | 120 | 200 | 300 | 29 | 39 | 77 | 117 | 167 | 34 | 4 | 4.5 | M6 x 1.0 | 12 | 17 |

## MGPM (Slide bearing) A, DB, E Dimensions

[mm]

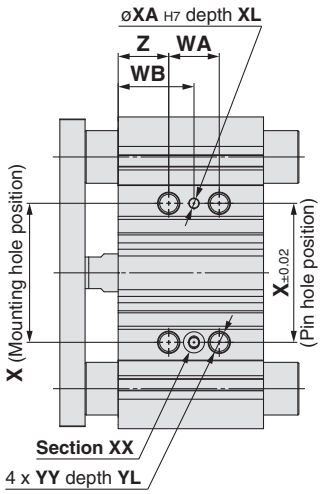
| Bore size [mm] | A | | | | DB | E | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 50 st or less | Over 50 st 100 st or less | Over 100 st 200 st or less | Over 200 st | | 50 st or less | Over 50 st 100 st or less | Over 100 st 200 st or less | Over 200 st |
| 12 | 42 | 60.5 | 82.5 | 82.5 | 8 | 0 | 18.5 | 40.5 | 40.5 |
| 16 | 46 | 64.5 | 92.5 | 92.5 | 10 | 0 | 18.5 | 46.5 | 46.5 |
| 20 | 53 | 77.5 | 77.5 | 110 | 12 | 0 | 24.5 | 24.5 | 57 |
| 25 | 53.5 | 77.5 | 77.5 | 109.5 | 16 | 0 | 24 | 24 | 56 |

## MGPL (Ball bushing)
## MGPA (High precision ball bushing) A, DB, E Dimensions

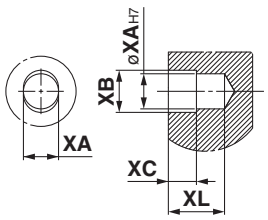
[mm]

| Bore size [mm] | A | | | | DB | E | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 30 st or less | Over 30 st 100 st or less | Over 100 st 200 st or less | Over 200 st | | 30 st or less | Over 30 st 100 st or less | Over 100 st 200 st or less | Over 200 st |
| 12 | 43 | 55 | 84.5 | 84.5 | 6 | 1 | 13 | 42.5 | 42.5 |
| 16 | 49 | 65 | 94.5 | 94.5 | 8 | 3 | 19 | 48.5 | 48.5 |
| 20 | 59 | 76 | 100 | 117.5 | 10 | 6 | 23 | 47 | 64.5 |
| 25 | 65.5 | 81.5 | 100.5 | 117.5 | 13 | 12 | 28 | 47 | 64 |

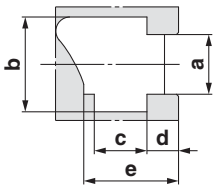
# ø32 to ø63/MGPM, MGPL, MGPA




**Section XX details**

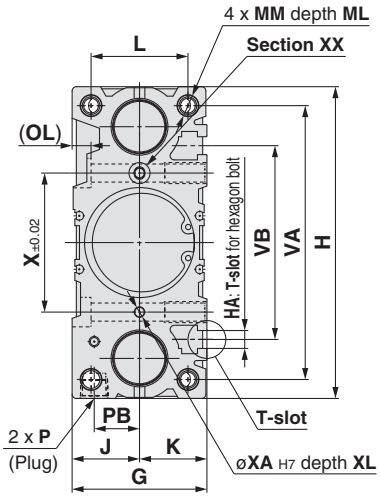


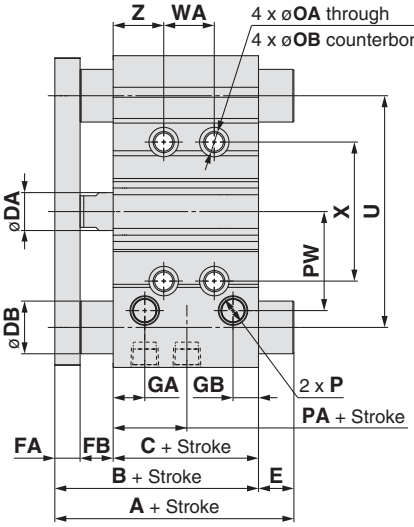

**T-slot dimensions**

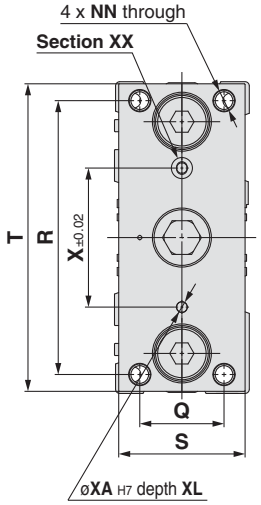



[mm]

| Bore size [mm] | a | b | c | d | e |
|---|---|---|---|---|---|
| **32** | 6.5 | 10.5 | 5.5 | 3.5 | 9.5 |
| **40** | 6.5 | 10.5 | 5.5 | 4 | 11 |
| **50** | 8.5 | 13.5 | 7.5 | 4.5 | 13.5 |
| **63** | 11 | 17.8 | 10 | 7 | 18.5 |




∗ The use of a slot (width XA, length XB, depth XC) allows for a relaxed pin pitch tolerance, with the pin hole (øXA H7, depth XL) as the reference, without affecting mounting accuracy.
∗ For intermediate strokes other than standard strokes, refer to “Manufacture of Intermediate Strokes” on page 4.
∗ Rc port only.

### MGPM, MGPL, MGPA Common Dimensions

[mm]

| Bore size [mm] | Standard stroke [mm] | B | C | DA | FA | FB | G | GA | GB | H | HA | J | K | L | MM | ML | NN | OA | OB | OL | P | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | — | TN | TF |
| **32** | 25,50,75 | 59.5 | 37.5 | 14 | 10 | 12 | 48 | 12 | 9 | 112 | M6 | 24 | 24 | 34 | M8 x 1.25 | 20 | M8 x 1.25 | 6.7 | 11 | 7.5 | Rc1/8 | NPT1/8 | G1/8 |
| **40** | 100,125,150 | 66 | 44 | 14 | 10 | 12 | 54 | 15 | 12 | 120 | M6 | 27 | 27 | 40 | M8 x 1.25 | 20 | M8 x 1.25 | 6.7 | 11 | 7.5 | Rc1/8 | NPT1/8 | G1/8 |
| **50** | 175,200,250 | 72 | 44 | 18 | 12 | 16 | 64 | 15 | 12 | 148 | M8 | 32 | 32 | 46 | M10 x 1.5 | 22 | M10 x 1.5 | 8.6 | 14 | 9 | Rc1/4 | NPT1/4 | G1/4 |
| **63** | 300,350,400 | 77 | 49 | 18 | 12 | 16 | 78 | 15.5 | 13.5 | 162 | M10 | 39 | 39 | 58 | M10 x 1.5 | 22 | M10 x 1.5 | 8.6 | — | 9 | Rc1/4 | NPT1/4 | G1/4 |

| Bore size [mm] | PA | PB | PW | Q | R | S | T | U | VA | VB | WA | | | | | WB | | | | | X | XA | XB | XC | XL | YY | YL | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 25 st or less | Over 25 st 100 st or less | Over 100 st 200 st or less | Over 200 st 300 st or less | Over 300 st | 25 st or less | Over 25 st 100 st or less | Over 100 st 200 st or less | Over 200 st 300 st or less | Over 300 st | | | | | | | | |
| **32** | 6.5 | 16 | 35.5 | 30 | 96 | 44 | 110 | 78 | 98 | 63 | 24 | 48 | 124 | 200 | 300 | 33 | 45 | 83 | 121 | 171 | 42 | 4 | 4.5 | 3 | 6 | M8 x 1.25 | 16 | 21 |
| **40** | 13 | 18 | 39.5 | 30 | 104 | 44 | 118 | 86 | 106 | 72 | 24 | 48 | 124 | 200 | 300 | 34 | 46 | 84 | 122 | 172 | 50 | 4 | 4.5 | 3 | 6 | M8 x 1.25 | 16 | 22 |
| **50** | 9 | 21.5 | 47 | 40 | 130 | 60 | 146 | 110 | 130 | 92 | 24 | 48 | 124 | 200 | 300 | 36 | 48 | 86 | 124 | 174 | 66 | 5 | 6 | 4 | 8 | M10 x 1.5 | 20 | 24 |
| **63** | 13 | 28 | 58 | 50 | 130 | 70 | 158 | 124 | 142 | 110 | 28 | 52 | 128 | 200 | 300 | 38 | 50 | 88 | 124 | 174 | 80 | 5 | 6 | 4 | 8 | M10 x 1.5 | 20 | 24 |

### MGPM (Slide bearing) A, DB, E Dimensions

[mm]

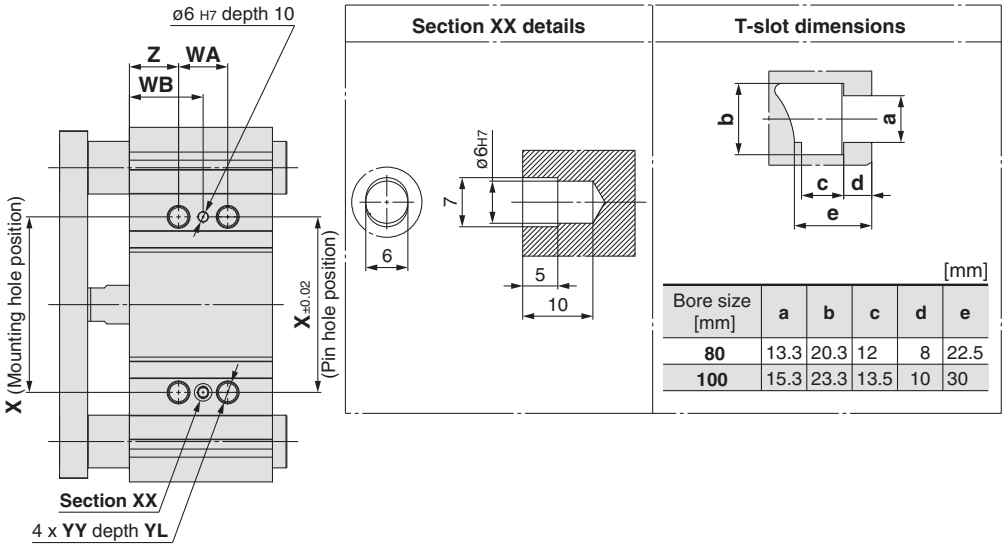
| Bore size [mm] | A | | | DB | E | | |
|---|---|---|---|---|---|---|---|
| | 50 st or less | Over 50 st 200 st or less | Over 200 st | | 50 st or less | Over 50 st 200 st or less | Over 200 st |
| **32** | 75 | 93.5 | 129.5 | 20 | 15.5 | 34 | 70 |
| **40** | 75 | 93.5 | 129.5 | 20 | 9 | 27.5 | 63.5 |
| **50** | 88.5 | 109.5 | 150.5 | 25 | 16.5 | 37.5 | 78.5 |
| **63** | 88.5 | 109.5 | 150.5 | 25 | 11.5 | 32.5 | 73.5 |

### MGPL (Ball bushing)
### MGPA (High precision ball bushing) A, DB, E Dimensions

[mm]

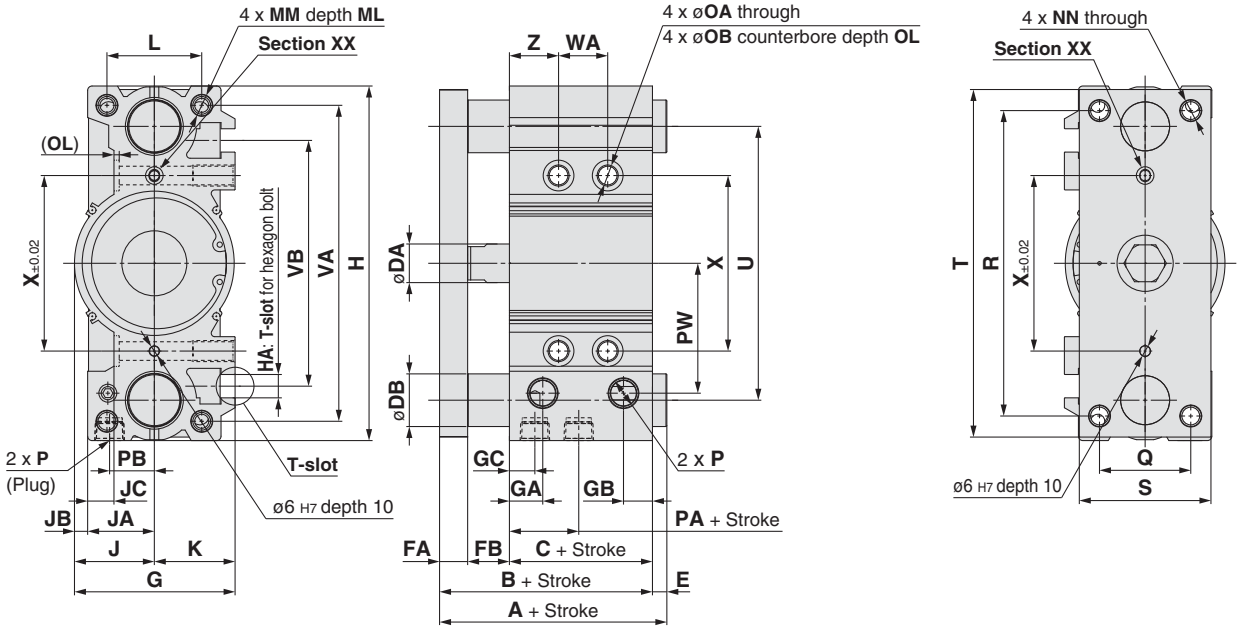
| Bore size [mm] | A | | | | DB | E | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 50 st or less | Over 50 st 100 st or less | Over 100 st 200 st or less | Over 200 st | | 50 st or less | Over 50 st 100 st or less | Over 100 st 200 st or less | Over 200 st |
| **32** | 79.5 | 96.5 | 116.5 | 138.5 | 16 | 20 | 37 | 57 | 79 |
| **40** | 79.5 | 96.5 | 116.5 | 138.5 | 16 | 13.5 | 30.5 | 50.5 | 72.5 |
| **50** | 91.5 | 112.5 | 132.5 | 159.5 | 20 | 19.5 | 40.5 | 60.5 | 87.5 |
| **63** | 91.5 | 112.5 | 132.5 | 159.5 | 20 | 14.5 | 35.5 | 55.5 | 82.5 |

# ø80, ø100/MGPM, MGPL, MGPA




[mm]

| Bore size [mm] | a | b | c | d | e |
|---|---|---|---|---|---|
| **80** | 13.3 | 20.3 | 12 | 8 | 22.5 |
| **100** | 15.3 | 23.3 | 13.5 | 10 | 30 |




∗ The use of a slot (width X6, length 7, depth 5) allows for a relaxed pin pitch tolerance, with the pin hole (ø6H7, depth 10) as the reference, without affecting mounting accuracy.
∗ For intermediate strokes other than standard strokes, refer to “Manufacture of Intermediate Strokes” on page 4.
∗ Rc port only.

## MGPM, MGPL, MGPA Common Dimensions

[mm]

| Bore size [mm] | Standard stroke [mm] | B | C | DA | FA | FB | G | GA | GB | GC | H | HA | J | JA | JB | JC | K | L | MM | ML | NN | OA | OB | OL | P | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | | | | — | TN | TF |
| **80** | 25,50,75,100 125,150,175,200 250,300,350,400 | 96.5 | 56.5 | 22 | 16 | 24 | 91.5 | 19 | 16.5 | 14.5 | 202 | M12 | 45.5 | 38 | 7.5 | 15 | 46 | 54 | M12 x 1.75 | 25 | M12 x 1.75 | 10.6 | 17.5 | 3 | Rc3/8 | NPT3/8 | G3/8 |
| **100** | | 116 | 66 | 26 | 19 | 31 | 111.5 | 22.5 | 20.5 | 18 | 240 | M14 | 55.5 | 45 | 10.5 | 10 | 56 | 62 | M14 x 2.0 | 31 | M14 x 2.0 | 12.5 | 20 | 8 | Rc3/8 | NPT3/8 | G3/8 |

| Bore size [mm] | PA | PB | PW | Q | R | S | T | U | VA | VB | WA | | | | | WB | | | | | X | YY | YL | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 25 st or less | Over 25 st 100 st or less | Over 100 st 200 st or less | Over 200 st 300 st or less | Over 300 st | 25 st or less | Over 25 st 100 st or less | Over 100 st 200 st or less | Over 200 st 300 st or less | Over 300 st | | | | |
| **80** | 14.5 | 25.5 | 74 | 52 | 174 | 75 | 198 | 156 | 180 | 140 | 28 | 52 | 128 | 200 | 300 | 42 | 54 | 92 | 128 | 178 | 100 | M12 x 1.75 | 24 | 28 |
| **100** | 17.5 | 32.5 | 89 | 64 | 210 | 90 | 236 | 188 | 210 | 166 | 48 | 72 | 148 | 220 | 320 | 35 | 47 | 85 | 121 | 171 | 124 | M14 x 2.0 | 28 | 11 |

## MGPM (Slide bearing) A, DB, E Dimensions

[mm]

| Bore size [mm] | A | | | DB | E | | |
|---|---|---|---|---|---|---|---|
| | 50 st or less | Over 50 st 200 st or less | Over 200 st | | 50 st or less | Over 50 st 200 st or less | Over 200 st |
| **80** | 104.5 | 131.5 | 180.5 | 30 | 8 | 35 | 84 |
| **100** | 126.5 | 151.5 | 190.5 | 36 | 10.5 | 35.5 | 74.5 |

## MGPL (Ball bushing)
## MGPA (High precision ball bushing) A, DB, E Dimensions

[mm]

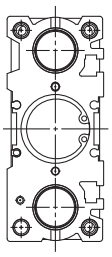
| Bore size [mm] | A | | | | DB | E | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 25 st or less | Over 25 st 50 st or less | Over 50 st 200 st or less | Over 200 st | | 25 st or less | Over 25 st 50 st or less | Over 50 st 200 st or less | Over 200 st |
| **80** | 104.5 | 128.5 | 158.5 | 191.5 | 25 | 8 | 32 | 62 | 95 |
| **100** | 119.5 | 145.5 | 178.5 | 201.5 | 30 | 3.5 | 29.5 | 62.5 | 85.5 |

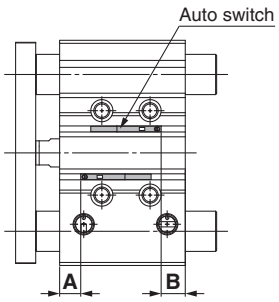
# Auto Switch Mounting 1

## Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

**D-A9□**
**D-A9□V**
**D-M9□**
**D-M9□V**
**D-M9□W**
**D-M9□WV**
**D-M9□A**
**D-M9□AV**

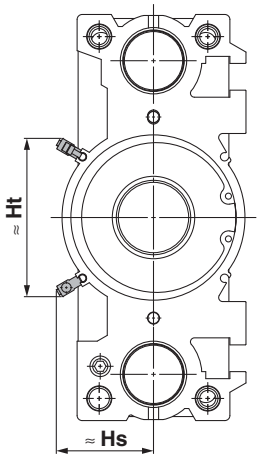
**ø12 to ø100**



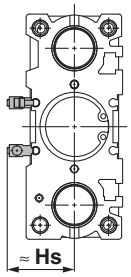


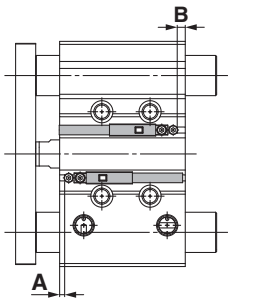

**D-P3DW**

**ø80, ø100**




**ø32 to ø63**




**Auto Switch Proper Mounting Position**
**Applicable Cylinder Series: MGP**

[mm]

| Auto switch model / Bore size [mm] | D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV | | D-A9□ D-A9□V | | D-P3DW | |
|---|---|---|---|---|---|---|
| | A | B | A | B | A | B |
| **12** | 7.5 | 9.5 | 3.5 | 5.5 | — | — |
| **16** | 10.5 | 10.5 | 6.5 | 6.5 | — | — |
| **20** | 12.5 | 12.5 | 8.5 | 8.5 | — | — |
| **25** | 11.5 | 14 | 7.5 | 10 | — | — |
| **32** | 12.5 | 13 | 8.5 | 9 | 3 | 3.5 |
| **40** | 15.5 | 16.5 | 11.5 | 12.5 | 6 | 7 |
| **50** | 14.5 | 17 | 10.5 | 13 | 5.5 | 8 |
| **63** | 16.5 | 20 | 12.5 | 16 | 7 | 11 |
| **80** | 18 | 26 | 14 | 22 | 8.5 | 17 |
| **100** | 21.5 | 32.5 | 17.5 | 28.5 | 12 | 23 |

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

**Auto Switch Mounting Height**

[mm]

| Auto switch model / Bore size [mm] | D-A9□V | | D-M9□V D-M9□WV D-M9□AV | | D-P3DW | |
|---|---|---|---|---|---|---|
| | Hs | Ht | Hs | Ht | Hs | Ht |
| **12** | 17 | — | 19.5 | — | — | — |
| **16** | 19.5 | — | 22 | — | — | — |
| **20** | 22 | — | 24.5 | — | — | — |
| **25** | 24 | — | 26 | — | — | — |
| **32** | 26.5 | — | 29 | — | 33 | — |
| **40** | 30.5 | — | 33 | — | 37 | — |
| **50** | 36 | — | 38.5 | — | 42.5 | — |
| **63** | 43 | — | 45.5 | — | 49.5 | — |
| **80** | 43 | 71.5 | 45 | 74 | 48 | 78.5 |
| **100** | 53 | 83 | 55 | 85.5 | 58 | 90 |

## Minimum Stroke for Auto Switch Mounting

[mm]

| Auto switch model | No. of auto switches mounted | ø12 | ø16 | ø20 | ø25 | ø32 | ø40 | ø50 | ø63 | ø80 | ø100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **D-A9□** | 1 pc. | 5 Note 1) | | 5 | | | | | | | |
| | 2 pcs. | 10 Note 1) | | 10 | | | | | | | |
| **D-A9□V** | 1 pc. | 5 | | | | | | | | | |
| | 2 pcs. | 10 | | | | | | | | | |
| **D-M9□V** | 1 pc. | 5 | | | | | | | | | |
| | 2 pcs. | 5 | | | | | | | | | |
| **D-M9□** | 1 pc. | 5 Note 1) | | | | 5 | | | | | |
| | 2 pcs. | 10 Note 1) | | 10 | | | | | | | |
| **D-M9□W** | 1 pc. | 5 Note 2) | | | | | | | | | |
| | 2 pcs. | 10 Note 2) | | 10 | | | | | | | |
| **D-M9□WV**<br>**D-M9□AV** | 1 pc. | 5 Note 2) | | | | | | | | | |
| | 2 pcs. | 10 | | | | | | | | | |
| **D-M9□A** | 1 pc. | 5 Note 2) | | | | | | | | | |
| | 2 pcs. | 10 Note 2) | | | | | | | | | |
| **D-P3DW** | 1 pc. | — | | | | 15 | | | | | |
| | 2 pcs. | — | | | | 15 | | | | | |

Note 1) Confirm that it is possible to secure the minimum bending radius of 10 mm of the auto switch lead wire before use.
Note 2) Confirm that it is possible to securely set the auto switch(es) within the range of indicator green light ON range before use.
For in-line entry type, please also consider Note 1) shown above.
Note 3) The D-P3DW can be mounted on bore sizes ø32 to ø100.
Note 4) Bore sizes available with end-lock are ø20 to ø100.

## Operating Range

[mm]

| Auto switch model | Bore size | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **12** | **16** | **20** | **25** | **32** | **40** | **50** | **63** | **80** | **100** |
| **D-A9□/A9□V** | 7 | 9 | 9 | 9 | 9.5 | 9.5 | 9.5 | 11 | 10.5 | 10.5 |
| **D-M9□/M9□V**<br>**D-M9□W/M9□WV**<br>**D-M9□A/M9□AV** | 3.5 | 5 | 5 | 5 | 6 | 6 | 6 | 6.5 | 6 | 7 |

∗ Since the operating range is provided as a guideline including hysteresis, it cannot be guaranteed (assuming approximately ±30% dispersion). It may vary substantially depending on an ambient environment.
∗ Please consult SMC for magnetic field resistant auto switch D-P3DW.

**Other than the applicable auto switches listed in "How to Order", the following auto switches are mountable.**
Consult with SMC for detailed specifications.

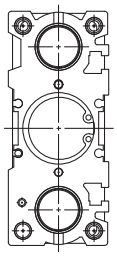
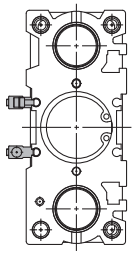
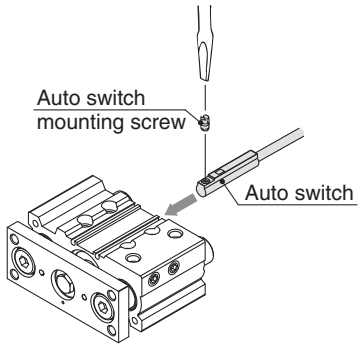
| Type | Model | Electrical entry | Features |
|---|---|---|---|
| **Solid state switch** | D-P4DW□ | Grommet (In-line) | Diagnostic indication (2-colour display)<br>Bore size: ø32 to ø100 |

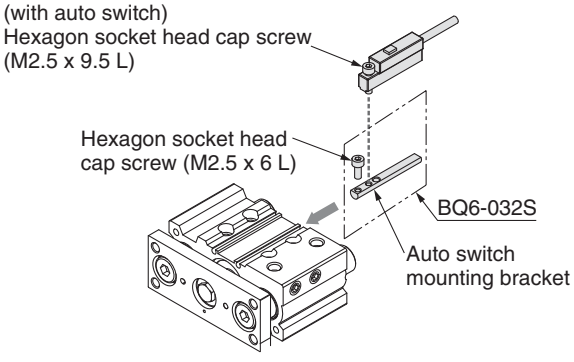
∗ With pre-wired connector is also available for solid state auto switches. For details, consult with SMC.
∗ Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H) are also available. For details, consult with SMC.
∗ When installing the D-P4DW□, use the BMG7-032 auto switch mounting bracket.

# Auto Switch Mounting 2

## Auto Switch Mounting Brackets/Part No.

### Applicable Cylinder Series: MGPM, MGPL

<table>
<tr><td>Applicable auto switches</td><td>D-M9□/M9□V<br>D-M9□W/M9□WV<br>D-M9□A/M9□AV<br>D-A9□/A9□V</td><td>D-P3DW</td></tr>
<tr><td>Bore size [mm]</td><td>ø12 to ø100</td><td>ø32 to ø100</td></tr>
<tr><td>Auto switch mounting bracket part no.</td><td>—</td><td>BQ6-032S</td></tr>
<tr><td>Auto switch mounting bracket fitting parts lineup/Weight</td><td>—</td><td>• Hexagon socket head cap screw (M2.5 x 6 L)<br>• Auto switch mounting bracket (nut)<br>Weight: 5 g</td></tr>
<tr><td rowspan="2">Auto switch mounting surfaces</td><td>Surfaces with auto switch mounting slot</td><td>Surfaces with auto switch mounting slot</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Mounting of auto switch</td><td> 

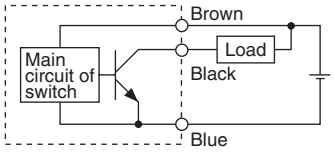
• When tightening the auto switch mounting screw, use a watchmakers' screwdriver with a handle 5 to 6 mm in diameter.
Tightening Torque for Auto Switch Mounting Screw [N·m]
<table>
<tr><th>Auto switch model</th><th>Tightening torque</th></tr>
<tr><td>D-M9□(V)<br>D-M9□W(V)<br>D-M9□A(V)</td><td>0.05 to 0.15</td></tr>
<tr><td>D-A9□(V)</td><td>0.10 to 0.20</td></tr>
</table></td><td>① Fix the auto switch and the auto switch mounting bracket temporarily by tightening the attached hexagon socket head cap screw (M2.5 x 9.5 L) 1 to 2 turns.<br>② Insert the temporarily tightened mounting bracket into the mating groove of the cylinder tube, and slide the auto switch onto the cylinder tube through the groove.<br>Insert the auto switch onto the cylinder/actuator through the groove with the back part of the auto switch (lead wire side) and the back part of the auto switch mounting bracket.<br>③ Check the detecting position of the auto switch and fix the auto switch firmly with the hexagon socket head cap screw (M2.5 x 6 L, M2.5 x 9.5 L).*<br>④ If the detecting position is changed, go back to step ②.<br>* The hexagon socket head cap screw (M2.5 x 6 L) is used to fix the mounting bracket and cylinder tube. This enables the replacement of the auto switch without adjusting the auto switch position.<br>Note 1) Ensure that the auto switch is covered with the mating groove to protect the auto switch.<br>Note 2) The tightening torque for the hexagon socket head cap screw (M2.5 x 6 L, M2.5 x 9.5 L) is 0.2 to 0.3 N·m.<br>Note 3) Tighten the hexagon socket head cap screws evenly.

</td></tr>
</table>

Note) Auto switch mounting brackets and auto switches are enclosed with the cylinder for shipment.
For an environment that needs the water-resistant auto switch, select the D-M9□A(V) type.

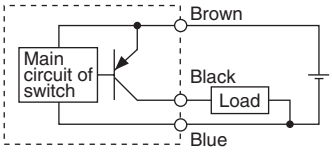
# Prior to Use
## Auto Switch Connection and Example

### Basic Wiring

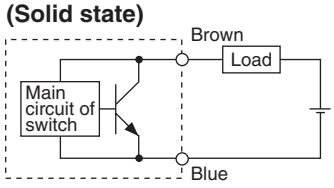
**Solid state 3-wire, NPN**



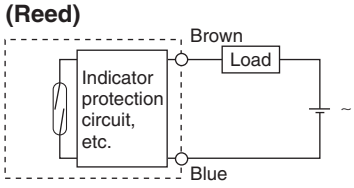

**Solid state 3-wire, PNP**



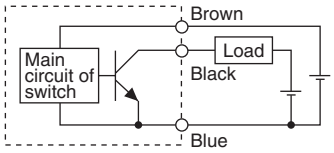

**2-wire (Solid state)**

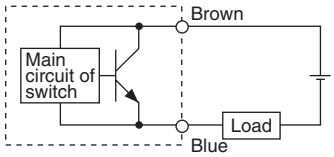


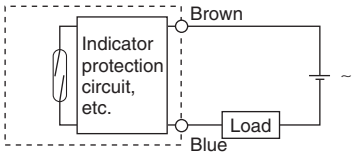

**2-wire (Reed)**




(Power supply for switch and load are separate.)

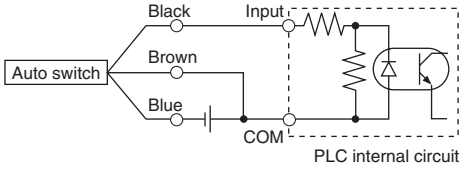


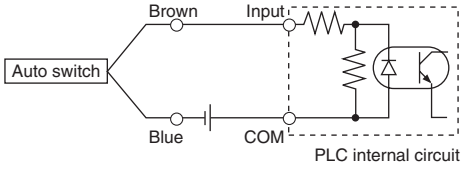




### Example of Connection with PLC (Programmable Logic Controller)

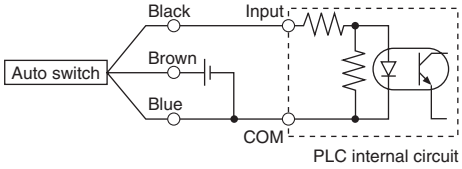
**• Sink input specifications**
**3-wire, NPN**



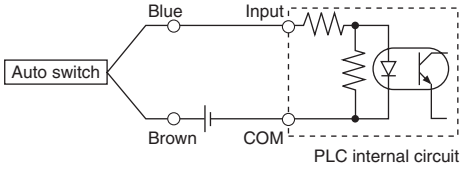

**2-wire**




**• Source input specifications**
**3-wire, PNP**




**2-wire**

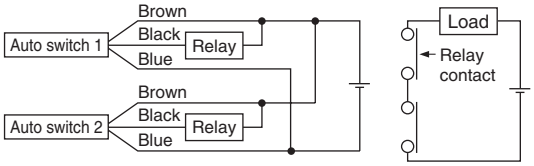



Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

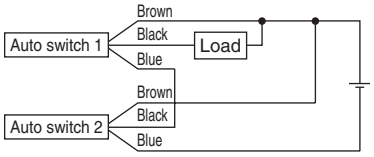
### Example of AND (Series) and OR (Parallel) Connection

**• 3-wire**

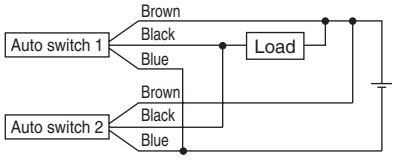
**AND connection for NPN output (Using relays)**




**AND connection for NPN output (Performed with auto switches only)**



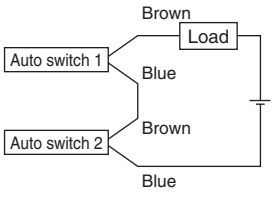

**OR connection for NPN output**




The indicator lights will light up when both of the auto switches are in the ON state.

**• 2-wire**

**2-wire with 2-switch AND connection**

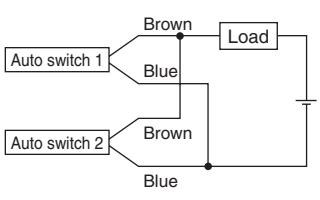



When two auto switches are connected in series, malfunction may occur because the load voltage will decrease in the ON state. The indicator lights will light up when both of the auto switches are in the ON state.

Load voltage at ON = Power supply voltage – Residual voltage x 2 pcs.
= 24 V – 4 V x 2 pcs.
= 16 V

Example: Power supply voltage 24 VDC
Auto switch internal voltage drop 4 V

**2-wire with 2-switch OR connection**




(Solid state)
When two auto switches are connected in parallel, malfunction may occur because the load voltage will increase in the OFF state.

Load voltage at OFF = Leakage current x 2 pcs. x Load impedance
= 1 mA x 2 pcs. x 3 kΩ
= 6 V

Example: Load impedance 3 kΩ
Auto switch leakage current 1 mA

(Reed)
Because there is no leakage current, the load voltage will not increase in the OFF state. However, depending on the number of auto switches in the ON state, the indicator lights may sometimes grow dim or not light up, due to the dispersion and reduction of the current flowing to the auto switches.

# Simple Specials

These changes are dealt with Simple Specials System. Consult with SMC.

Made to Order

## 1 Change of Guide Rod End Shape

Symbol **-XA1/6/17/21**

### Applicable Series

| Series | | Model | Action | Symbol for change of rod end shape |
|---|---|---|---|---|
| MGP | Standard type | MGPM | Slide bearing | XA1,6,17,21 |
| | | MGPL | Ball bushing bearing | XA1,6 |
| | | MGPA | High precision ball bushing bearing | |

### ⚠ Precautions

- Ensure that the cylinder's overall length should not exceed the allowable overall length. In the case of exceeding the allowable overall length, it will be available as specials.
- In fig. (1), (2) below, E´ dimension cannot make it into E dimension or less of the standard products. Confirm by referring to catalogue.
- SMC will make appropriate arrangements if no dimension, tolerance, or finish instructions are given in the diagram.
- ∗ dimension should be the guide rod diameter (D) – 2 mm. In the case that the preferred dimension is different, fill in that dimension.

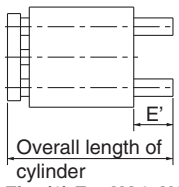



**Fig. (1) For XA1, XA6**

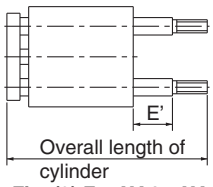


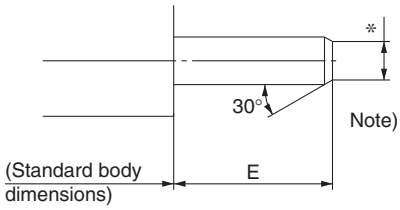

**Fig. (2) For XA17, XA21**

[mm]

| Bore size [mm] | Allowable overall length of cylinder |
|---|---|
| 12,16 | 345 |
| 20 to 32 | 540 |
| 40 to 63 | 561 |
| 80,100 | 603 |

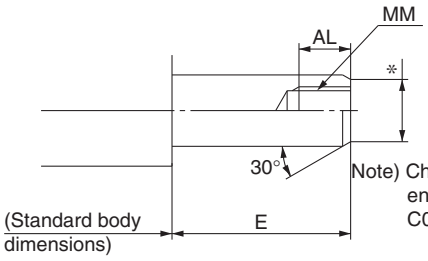
### Guide Rod End Shape Pattern

**-XA1**



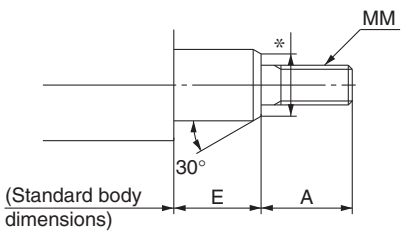

Note) Chamfer of the guide rod end shape for MGPL is C0.5, not 30°.

**-XA6**

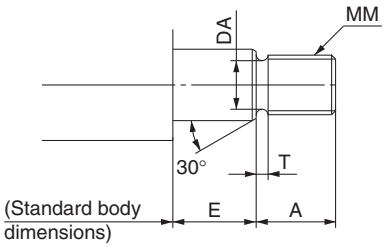



Note) Chamfer of the guide rod end shape for MGPL is C0.5, not 30°.

**-XA17**




**-XA21**



# Simple Specials

These changes are dealt with Simple Specials System. Consult with SMC for details.

Made to Order

Symbol

## 2 Tapped Hole, Drilled Hole, Pinned Hole Machined Additionally -XC79

This simple special is meant for machining additionally tapped hole, drilled hole, and pinned hole, as requested from customer, on parts designed largely for mounting a workpiece, etc. in the combined air cylinders.

But, for each model, since they have the portions which are impossible to machine additionally, refer to the additional machining limitation.

### Applicable Series

| Series | | Model | Action | Component parts applicable for additional machining |
|---|---|---|---|---|
| MGP | Standard type | MGPM | Slide bearing | Plate |
| | | MGPL | Ball bushing bearing | |
| | | MGPA | High precision ball bushing bearing | |

### ⚠ Precautions

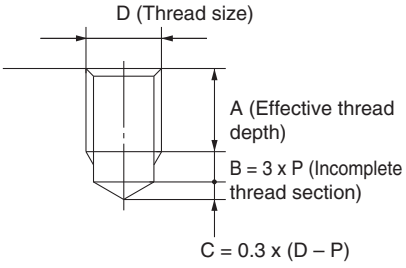
- We cannot take any responsibility as for the intensity of holes machined additionally and the effects of decreased intensity for the product itself.
- It will not be plated again for the machined part additionally.
- Be sure to fill in "through" for through-hole, and "effective depth" for blind hole.
- When using by machining through-hole additionally, ensure that the tip of the bolt, etc. for mounting workpiece should not stick into the cylinder side. It may result in an unexpected problem.
- Use caution not to interfere the existing mounting hole on the standard products with the hole to be machined additionally. But it is possible to drill additionally the larger size of hole at the same position as the existing hole.

### Common Complementary Explanation/Holes which can be additionally machined are the following 3 types.

**Tapped hole**

Designated nominal diameter and tapped hole of a pitch are machined additionally. (Maximum nominal thread diameter M20)

Blind hole is deep into the bottom of prepared hole which sums up A to C in Fig. 1 in contrast to the effective depth of tapped hole. When there is a condition which does not allow through-hole, etc., leave sufficient thickness in the inner part of hole.



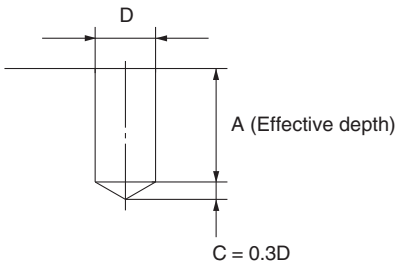

Note) P stands for thread pitch.

**Drilled hole**

Drilled hole of a designated internal diameter is machined.

(Maximum hole diameter 20 mm)

If you wish for blind hole, instruct us with effective depth. (Refer to Fig. 2.) Besides, dimensional accuracy for internal diameter will be 0.2 mm.

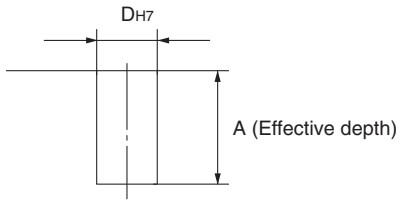



**Pinned hole**

Pinned hole of a designated diameter (reamer hole) is machined. (Maximum hole diameter 20 mm)

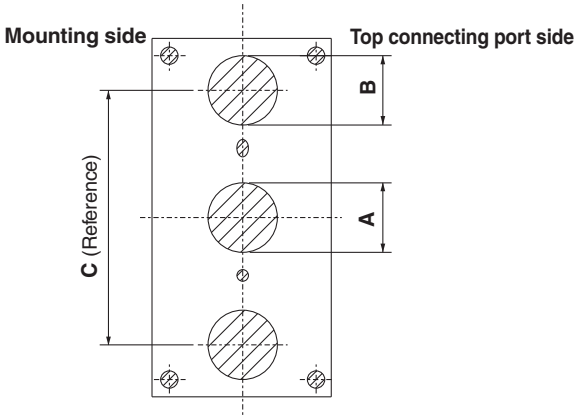
Internal dimension tolerates H7 tolerance to the designated hole diameter. (Refer to the table below.)

| Hole dia. | 3 or less | Over 3 to 6 | Over 6 to 10 | Over 10 to 18 | Over 18 to 20 |
|---|---|---|---|---|---|
| Tolerance | +0.01 0 | +0.012 0 | +0.015 0 | +0.018 0 | +0.021 0 |




### Limitation for Machining Additionally/Since the slanted lines denote the restricted range for machining additionally, design the dimensions, referring to below.

Plate material: Steel




**Dimensional Range Not Possible to Machine Additionally** [mm]

| Bore size [mm] | A | B | C |
|---|---|---|---|
| **12** | 8 | 11 | 41 |
| **16** | 10 | 13 | 46 |
| **20** | 12 | 15 | 54 |
| **25** | 14 | 21 | 64 |
| **32** | 25 | 25 | 78 |
| **40** | 25 | 25 | 86 |
| **50** | 30 | 30 | 110 |
| **63** | 30 | 30 | 124 |
| **80** | 34 | 34 | 156 |
| **100** | 42 | 42 | 188 |

# Made to Order Specification

Please contact SMC for detailed dimensions, specifications, and lead times.

Made to Order

## 3 Heat Resistant Cylinder (–10 to 150°C)

Symbol **-XB6**

Air cylinder which changed the seal material and grease, so that it could be used even at higher temperature up to 150 from –10°C.

### How to Order

**MGPM** [ **Standard model no.** ] **–XB6**

**Heat resistant cylinder**

### Specifications

| | |
|---|---|
| **Ambient temperature range** | –10 to 150°C |
| **Seals materials** | Fluororubber |
| **Grease** | Heat resistant grease |
| **Specifications other than above and external dimensions** | Same as standard type |

### Applicable Series

| Series | | Model | Action |
|---|---|---|---|
| **MGP** | Standard type | **MGPM** | Slide bearing |

Note 1) Operate without lubrication from a pneumatic system lubricator.
Note 2) Please contact SMC for details on the maintenance intervals for this cylinder, which differ from those of the standard cylinder.
Note 3) In principle, it is impossible to make built-in magnet type and the one with auto switch. But, as for the one with auto switch, and the heat resistant cylinder with heat resistant auto switch, since it will be differed depending on the series, please contact SMC.
Note 4) Piston speed is ranged from 50 to 500 mm/s.
But, MGP□80, 100, it will be 50 to 400 mm/s.

### ⚠ Warning

#### Precautions

Be aware that smoking cigarettes, etc. after your hands have come into contact with the grease used in this cylinder can create a gas that is hazardous to humans.

## 4 Intermediate Stroke (Using exclusive body)

Symbol **-XB10**

Cylinder which can reduce the mounting space by using an exclusive body which does not use a spacer to achieve that the full length dimension could be shortened when an intermediate stroke other than the standard stroke is required.

### How to Order

**MGP** [M / L / A] [ **Standard model no.** ] **–XB10**

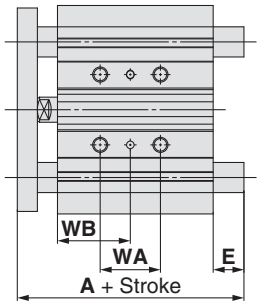
**Intermediate stroke**

### Specifications: Same as standard type.

### Applicable Series

| Series | | Model | Action |
|---|---|---|---|
| **MGP** | Standard type | **MGPM** | Slide bearing |
| | | **MGPL** | Ball bushing bearing |
| | | **MGPA** | High precision ball bushing bearing |

### Dimensions: Series MGP




#### Stroke Range

| Bore size [mm] | Stroke range [mm] |
|---|---|
| 12, 16 | 11 to 249 |
| 20, 25 | 21 to 399 |
| 32, 40, 50 63, 80, 100 | 26 to 399 |

∗ Specifications except the stroke range are the same as standard.
Note) Applicable stroke available by the 1 mm interval.

#### MGPM, MGPL, MGPA/WA, WB Dimensions

| Bore size [mm] | Stroke range [mm] | WA | | | | WB | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 11 to 39st | 41 to 99st | 101 to 199st | 201 to 249st | 11 to 39st | 41 to 99st | 101 to 199st | 201 to 249st |
| **12** | 11 to 249 | 20 | 40 | 110 | 200 | 15 | 25 | 60 | 105 |
| **16** | | 24 | 44 | 110 | 200 | 17 | 27 | 60 | 105 |

| Bore size [mm] | Stroke range [mm] | WA | | | | | WB | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 21 to 39st | 41 to 124st | 126 to 199st | 201 to 299st | 301 to 399st | 21 to 39st | 41 to 124st | 126 to 199st | 201 to 299st | 301 to 399st |
| **20** | 21 to 399 | 24 | 44 | 120 | 200 | 300 | 29 | 39 | 77 | 117 | 167 |
| **25** | | 24 | 44 | 120 | 200 | 300 | 29 | 39 | 77 | 117 | 167 |

| Bore size [mm] | Stroke range [mm] | WA | | | | | WB | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 26 to 49st | 51 to 124st | 126 to 199st | 201 to 299st | 301 to 399st | 26 to 49st | 51 to 124st | 126 to 199st | 201 to 299st | 301 to 399st |
| **32** | 26 to 399 | 24 | 48 | 124 | 200 | 300 | 33 | 45 | 83 | 121 | 171 |
| **40** | | 24 | 48 | 124 | 200 | 300 | 34 | 46 | 84 | 122 | 172 |
| **50** | | 24 | 48 | 124 | 200 | 300 | 36 | 48 | 86 | 124 | 174 |
| **63** | | 28 | 52 | 128 | 200 | 300 | 38 | 50 | 88 | 124 | 174 |
| **80** | | 28 | 52 | 128 | 200 | 300 | 42 | 54 | 92 | 128 | 178 |
| **100** | | 48 | 72 | 148 | 220 | 320 | 35 | 47 | 85 | 121 | 171 |

#### MGPM/A,E Dimensions

| Bore size [mm] | A | | | E | | |
|---|---|---|---|---|---|---|
| | 11 to 74st | 76 to 99st | 101 to 249st | 11 to 74st | 76 to 99st | 101 to 249st |
| **12** | 42 | 60.5 | 82.5 | 0 | 18.5 | 40.5 |
| **16** | 46 | 64.5 | 92.5 | 0 | 18.5 | 46.5 |

| Bore size [mm] | A | | | E | | |
|---|---|---|---|---|---|---|
| | 21 to 74st | 76 to 199st | 201 to 399st | 21 to 74st | 76 to 199st | 201 to 399st |
| **20** | 53 | 77.5 | 110 | 0 | 24.5 | 57 |
| **25** | 53.5 | 77.5 | 109.5 | 0 | 24 | 56 |

| Bore size [mm] | A | | | E | | |
|---|---|---|---|---|---|---|
| | 26 to 74st | 76 to 199st | 201 to 399st | 26 to 74st | 76 to 199st | 201 to 399st |
| **32** | 75 | 93.5 | 129.5 | 15.5 | 34 | 70 |
| **40** | 75 | 93.5 | 129.5 | 9 | 27.5 | 63.5 |
| **50** | 88.5 | 109.5 | 150.5 | 16.5 | 37.5 | 78.5 |
| **63** | 88.5 | 109.5 | 150.5 | 11.5 | 32.5 | 73.5 |
| **80** | 104.5 | 131.5 | 180.5 | 8 | 35 | 84 |
| **100** | 126.5 | 151.5 | 190.5 | 10.5 | 35.5 | 74.5 |

∗ Dimensions except mentioned above are the same as standard type.

#### MGPL, MGPA/A,E Dimensions

| Bore size [mm] | A | | | E | | |
|---|---|---|---|---|---|---|
| | 11 to 39st | 41 to 99st | 101 to 249st | 10 to 39st | 41 to 99st | 101 to 249st |
| **12** | 43 | 55 | 84.5 | 1 | 13 | 42.5 |
| **16** | 49 | 65 | 94.5 | 3 | 19 | 48.5 |

| Bore size [mm] | A | | | | E | | | |
|---|---|---|---|---|---|---|---|---|
| | 21 to 39st | 41 to 124st | 126 to 199st | 201 to 399st | 21 to 39st | 41 to 124st | 126 to 199st | 201 to 399st |
| **20** | 59 | 76 | 100 | 117.5 | 6 | 23 | 47 | 64.5 |
| **25** | 65.5 | 81.5 | 100.5 | 117.5 | 12 | 28 | 47 | 64 |

| Bore size [mm] | A | | | | E | | | |
|---|---|---|---|---|---|---|---|---|
| | 26 to 74st | 76 to 124st | 126 to 199st | 201 to 399st | 26 to 74st | 76 to 124st | 126 to 199st | 201 to 399st |
| **32** | 79.5 | 96.5 | 116.5 | 138.5 | 20 | 37 | 57 | 79 |
| **40** | 79.5 | 96.5 | 116.5 | 138.5 | 13.5 | 30.5 | 50.5 | 72.5 |
| **50** | 91.5 | 112.5 | 132.5 | 159.5 | 19.5 | 40.5 | 60.5 | 87.5 |
| **63** | 91.5 | 112.5 | 132.5 | 159.5 | 14.5 | 35.5 | 55.5 | 82.5 |

| Bore size [mm] | A | | | | E | | | |
|---|---|---|---|---|---|---|---|---|
| | 26 to 49st | 51 to 74st | 76 to 199st | 201 to 399st | 26 to 49st | 51 to 74st | 76 to 199st | 201 to 399st |
| **80** | 104.5 | 128.5 | 158.5 | 191.5 | 8 | 32 | 62 | 95 |
| **100** | 119.5 | 145.5 | 178.5 | 201.5 | 3.5 | 29.5 | 62.5 | 85.5 |

# Made to Order Specification

Please contact SMC for detailed dimensions, specifications, and lead times.

Made to Order

Symbol

## 5 Low Speed Cylinder (5 to 50 mm/s) -XB13

Even if driving at lower speeds 5 to 50 mm/s , there would be no stick-slip phenomenon and it can run smoothly.

### Applicable Series

| Series | | Model | Action |
|---|---|---|---|
| MGP | Standard type | MGPM | Slide bearing |
| | | MGPL | Ball bushing bearing |

### How to Order

MGP M/L **Standard model no.** **–XB13**

**Low speed cylinder**

### Specifications

| | |
|---|---|
| **Piston speed** | 5 to 50 mm/s |
| **Dimensions** | Same as standard type |
| **Additional specifications** | Same as standard type |

Note 1) Operate without lubrication from a pneumatic system lubricator.
Note 2) For the speed adjustment, use speed controllers for controlling at lower speeds. (Series AS-FM/AS-M)

### ⚠ Warning

#### Operating Precautions

Be aware that smoking cigarettes, etc. after your hands have come into contact with the grease used in this cylinder can create a gas that is hazardous to humans.

Symbol

## 6 Flourorubber Seals -XC22

### Applicable Series

| Series | | Model | Action |
|---|---|---|---|
| MGP | Standard type | MGPM | Slide bearing |

### How to Order

MGPM **Standard model no.** **–XC22**

**Fluororubber seals**

### Specifications

| | |
|---|---|
| **Seal material** | Fluororubber |
| **Ambient temperature range** | With auto switch : –10 to 60°C (No freezing)<br>Without auto switch : –10 to 70°C |
| **Specifications other than above and external dimensions** | Same as standard type for each series |

Note 1) Please confirm with SMC, as the type of chemical and the operating temperature may not allow the use of this product.
Note 2) Cylinders with auto switches can also be produced; however, auto switch related parts (auto switch units, mounting brackets, built-in magnets) are the same as standard products. Before using these, please contact SMC regarding their suitability for the operating environment.
Note 3) The MGP series are without a cushion. Confirm the kinetic energy.

# Made to Order Specification

Please contact SMC for detailed dimensions, specifications, and lead times.

Made to Order

## 7 Bottom Mounting Style

Symbol: **-XC82**

Since the guide rod does not protrude from the bottom at the retraction of the rod, relief holes for guide rods are not required.

### How to Order

**MGP M 32 – 50 Z – [ ] [ ] – XC82**

- **Compact guide cylinder**
- **Bearing Type [mm]**

| | |
|---|---|
| **M** | Slide bearing |

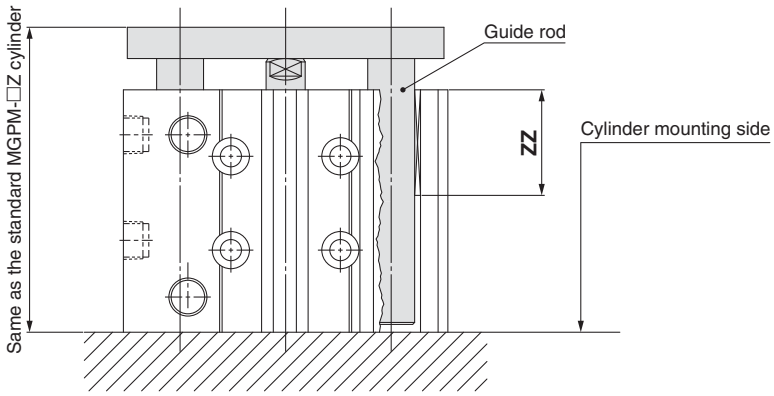
- **Bore size [mm]**

| | |
|---|---|
| **12** | 12 mm |
| **16** | 16 mm |
| **20** | 20 mm |
| **25** | 25 mm |
| **32** | 32 mm |
| **40** | 40 mm |
| **50** | 50 mm |
| **63** | 63 mm |
| **80** | 80 mm |
| **100** | 100 mm |

- **Cylinder stroke [mm]**

| Bore size [mm] | Applicable stroke [mm] |
|---|---|
| **12 to 25** | 75, 100 |
| **32 to 100** | 25, 50, 75, 100 |

- **Auto switch**
- **Suffix for auto switch**
- **Bottom mounting type**




Note) The total length (ZZ) of the guide rod bushing is shorter than the standard type.

# Made to Order Specification

Please contact SMC for detailed dimensions, specifications, and lead times.

Made to Order

## 8 Symmetrical Port Position

Symbol **-X144**

Ports are mounted symmetrically.

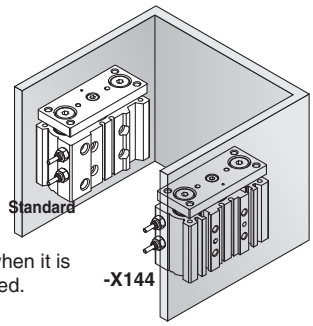
### Applicable Series

| Series | | Model | Action |
|---|---|---|---|
| **MGP** | Standard type | **MGPM** | Slide bearing |
| | | **MGPL** | Ball bushing bearing |
| | | **MGPA** | High precision ball bushing bearing |

### How to Order

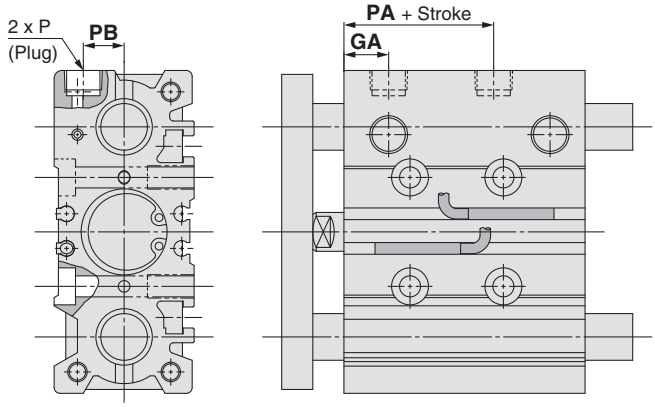
**MGP** M L A | **Standard model no.** | **−X144**

**Symmetrical port position**




This makes it easy to remove and rotate piping when it is mounted on a wall where mounting space is limited.

### Dimensions (Dimensions other than listed below are the same as standard type.)




**MGPM, MGPL Common Dimensions**

| Bore size [mm] | GA | PA | PB |
|---|---|---|---|
| **12** | 11 | 13 | 8 |
| **16** | 11 | 15 | 10 |
| **20** | 10.5 | 12.5 | 10.5 |
| **25** | 11.5 | 12.5 | 13.5 |
| **32** | 12.5 | 7 | 15 |
| **40** | 14 | 13 | 18 |
| **50** | 14 | 9 | 21.5 |
| **63** | 16.5 | 14 | 28 |
| **80** | 14.5 | 14.5 | 25.5 |
| **100** | 18 | 17.5 | 32.5 |

## 9 Lateral Piping Type (Plug location changed)

Symbol **-X867**

This is the type with the port on the top plugged in order to use the piping port on the side.

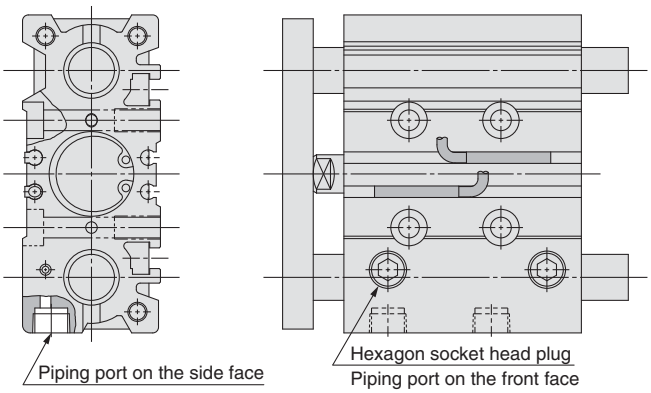
### Applicable Series

| Series | | Model | Action |
|---|---|---|---|
| **MGP** | Standard type | **MGPM** | Slide bearing |
| | | **MGPL** | Ball bushing bearing |
| | | **MGPA** | High precision ball bushing bearing |

### How to Order

**MGP** M L A | **Standard model no.** | **−X867**

**Lateral piping type (Plug location changed)**



# ⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

**⚠ Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

**⚠ Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

**⚠ Danger :** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots - Safety.
etc.

## ⚠ Warning

1. **The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**
Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. **Only personnel with appropriate training should operate machinery and equipment.**
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. **Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**
   1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
   2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
   3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. **Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
   1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
   2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalogue.
   3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
   4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

## ⚠ Caution

1. **The product is provided for use in manufacturing industries.**
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

# Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

## Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, wichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

*2) **Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

## Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

**⚠ Safety Instructions** | Be sure to read "Handling Precautions for SMC Products" (M-E03-3) before using.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