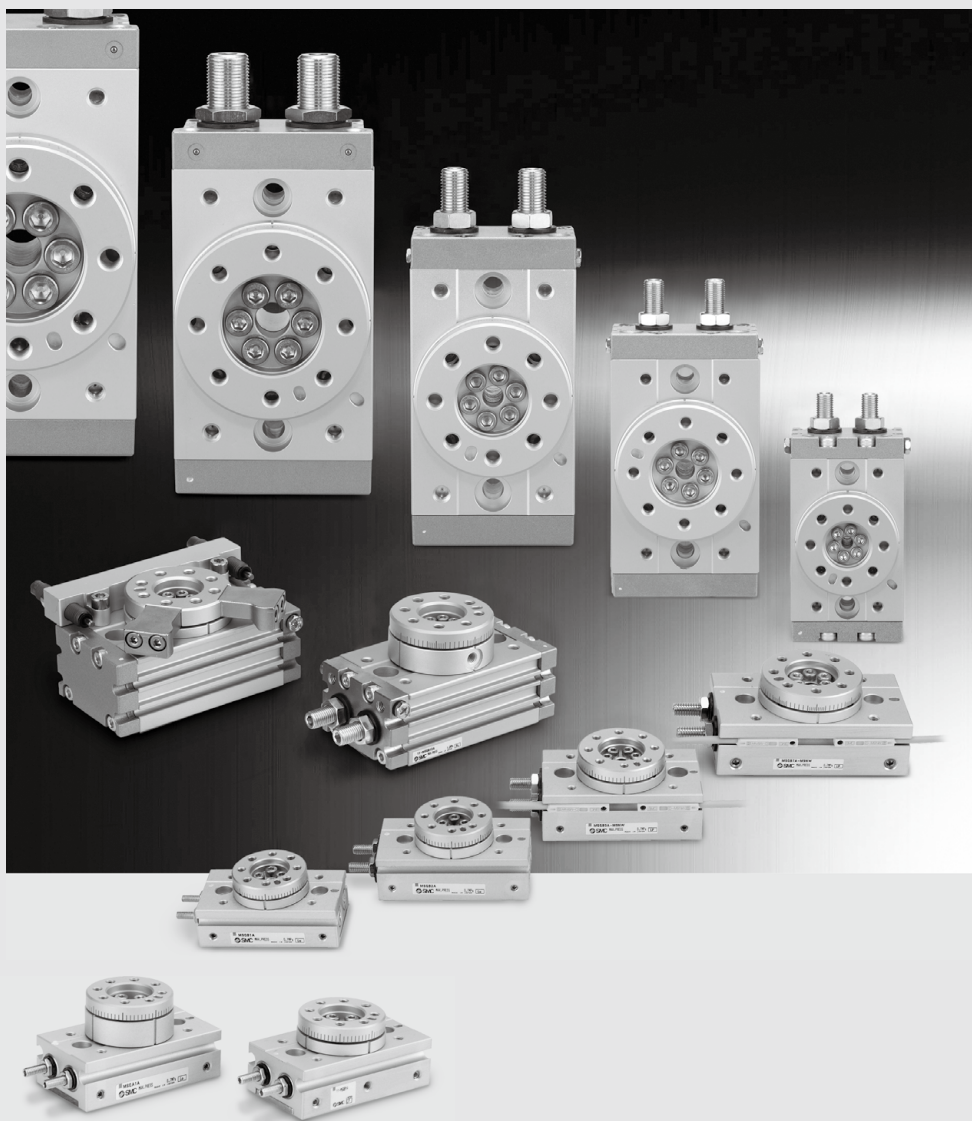


Rotary Table/Rack & Pinion Type

MSQ Series

Size: 1, 2, 3, 7, 10, 20, 30, 50, 70, 100, 200



CRB□2

CRB1

MSU

CRJ

CRA1

CRQ2

MSQ

MSZ

CRQ2X
MSQX

MRQ

D-□

Compact Rotary Table with Low Table Height

Easy mounting of workpiece.

- **Table I.D/O.D tolerances**
Basic type: **MSQB H9/h9**
High precision type: **MSQA H8/h8**
- **Positioning pin hole**
- **Hollow axis**
Accommodates wiring and piping for equipment mounted on the table

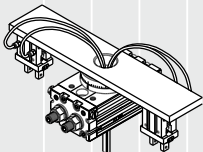


Table inside and outside diameters
For alignment of rotation center and work piece

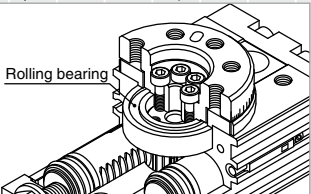
Positioning pin hole
For position of rotation direction

Hollow axis					
Size	1	2	3	7	
Hollow axis	ø3.5	ø3.8	ø5	ø6	

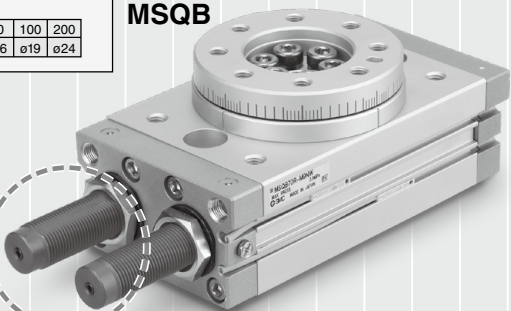
Size	10	20	30	50	70	100	200
Hollow axis	ø6	ø9	ø12	ø13	ø16	ø19	ø24

Large rolling element bearing

3 to 4 times higher axial load
(compared with the CRQ series)



Basic type
MSQB



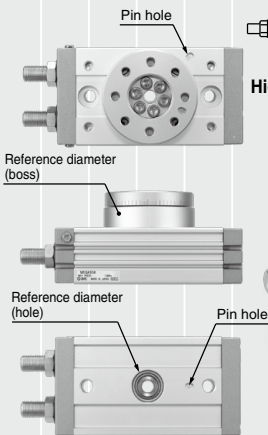
Pivoting angle adjustment range: 0 to 190°

With internal shock absorber

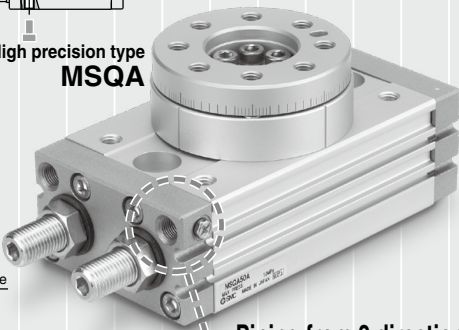
2 to 5 times more kinetic energy
(compared with an adjustment bolt)

Easy mounting of body

- Reference dia: Boss, Hole
- Positioning pin hole
- Mounting from 2 directions



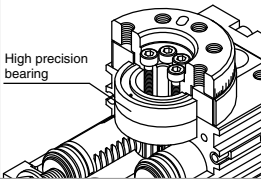
High precision type
MSQA



Movement in direction of table's radial thrust: **0.01mm or less**

By using high precision bearing, the movement in the direction of table's radial thrust is reduced.

High precision type

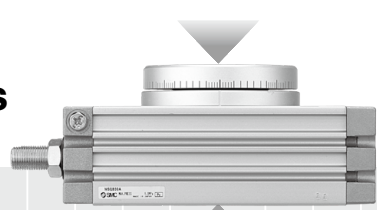


Piping from 2 directions (front and side) is possible

Piping position can be selected to accommodate mounting conditions

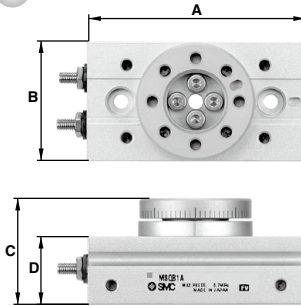


Rotary Table MSQ Series Rack & Pinion Type

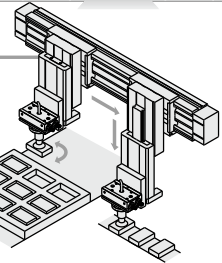
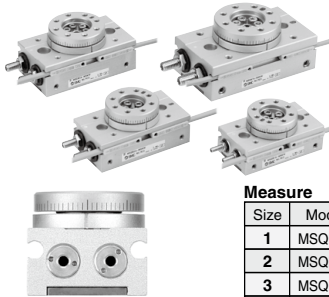


Small sizes 1, 2, 3, and 7

Small size and light weight



Full size (Picture of MSQB1A)

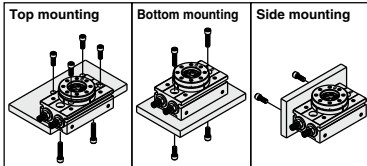


Measure		mm			
Size	Model	A	B	C	D
1	MSQB1A	50.5	28	25	16
2	MSQB2A	56	30	28	18
3	MSQB3A	60	34.5	30.5	20.5
7	MSQB7A	73.5	41	34.5	23
					Weight (g)
					70
					105
					150
					250

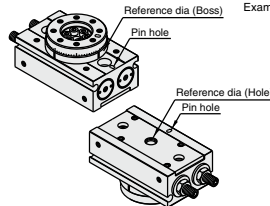
Variety of installation options for space saving

Offers maximum space saving installation by taking advantage of the compact body, space saving wiring and piping.

Free mount

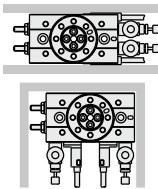


Easy center alignment at mounting



Wiring and piping can be selected according to mounting conditions

Example of auto switch and speed controller mounting



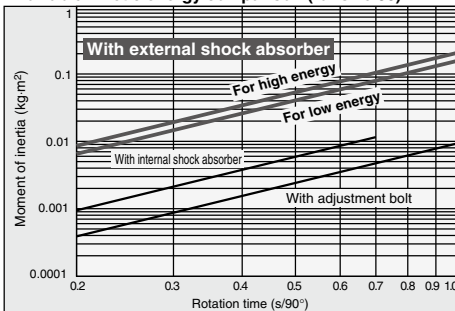
External shock absorber types

4 to 10 times more allowable kinetic energy

(Compared with internal shock absorber type)

2 types of shock absorbers are available, for low energy and high energy.

Allowable kinetic energy comparison (for size 30)



Total length shortened

Longitudinal mounting space is reduced because there is no protrusion from adjustment bolts or internal shock absorbers.

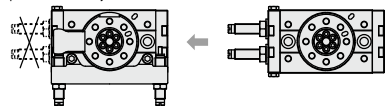
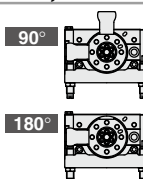


Table height is the same for both types with adjustment bolts or internal shock absorbers.

Rotation angle: 90°, 180°



Left / Right symmetric type

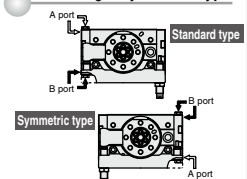
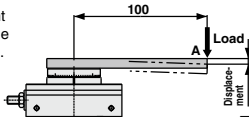
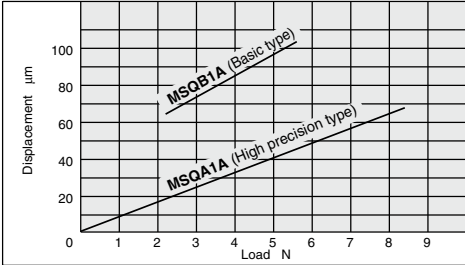


Table Displacement (Reference values)

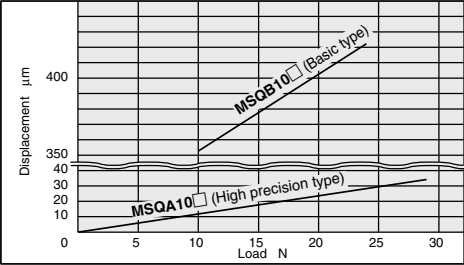
•The following graphs show the displacement at point A, which is 100 mm apart from the center of rotation, where the load is applied.



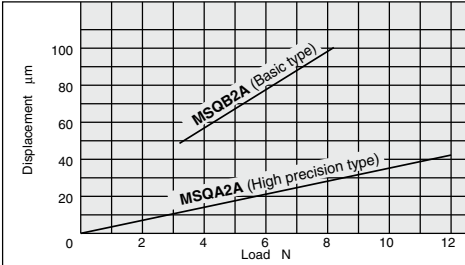
MSQ□1A



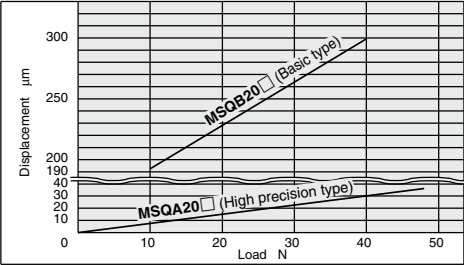
MSQ□10□



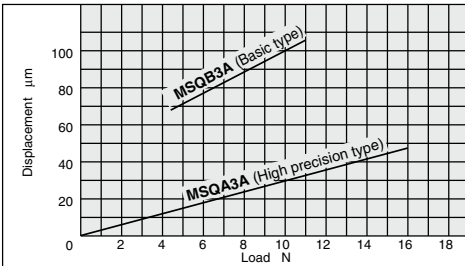
MSQ□2A



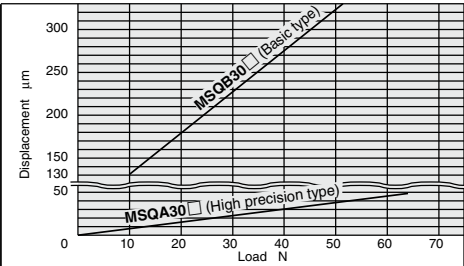
MSQ□20□



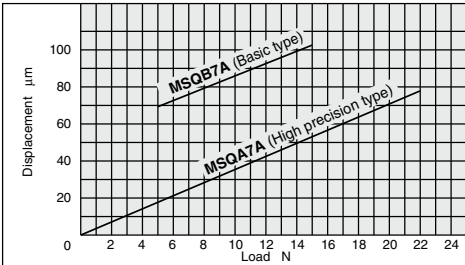
MSQ□3A



MSQ□30□



MSQ□7A



MSQ□50□

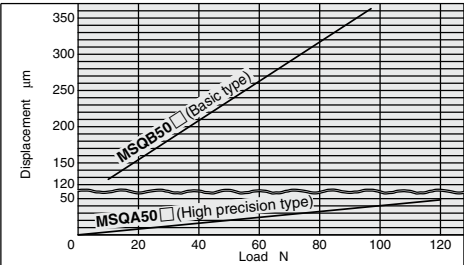
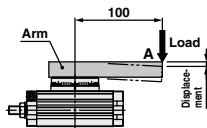
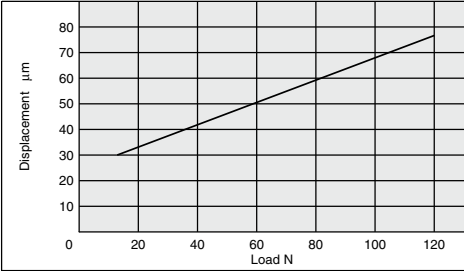


Table Displacement (Reference values)

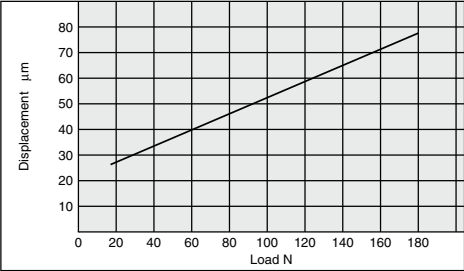
•The following graphs show the displacement at point A, which is 100 mm apart from the center of rotation, where the load is applied.



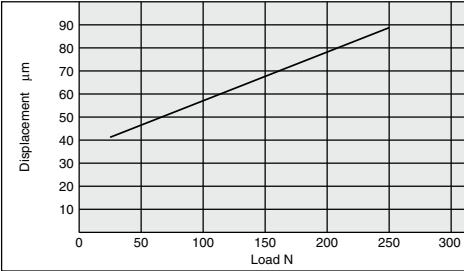
MSQB70



MSQB100



MSQB200



CRB□2

CRB1

MSU

CRJ

CRA1

CRQ2

MSQ

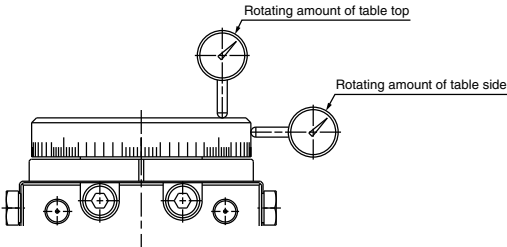
MSZ

CRQ2X

MSQX

MRQ

Rotation Accuracy: Displacement Values at 180° (Reference values)



Measuring plate	MSQA	MSQB	mm
Rotating amount of table top	0.03	0.1	
Rotating amount of table side	0.03	0.1	

Values in the table are actual values and not guaranteed values.

D-□

Rotary Table/Rack & Pinion Type

MSQ Series

Size: 1, 2, 3, 7

How to Order

High precision type

MSQA 1 A [] - M9BW []

Basic type

MSQB 1 A [] - M9BW []

Size

1
2
3
7

A With adjustment bolt

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	n pcs.

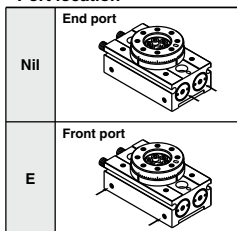
Auto switch type

Nil	Without auto switch (built-in magnet)
-----	---------------------------------------

*Refer to the table below for auto switch types.

*The auto switch is included in the package (unmounted).

Port location



* The port location cannot be changed after the delivery of the product.

Moisture Control Tube IDK Series



When operating an actuator with a small diameter and a short stroke at a high frequency, the dew condensation (water droplet) may occur inside the piping depending on the conditions.

Simply connecting the moisture control tube to the actuator will prevent dew condensation from occurring. For details, refer to [the IDK series in the Best Pneumatics No. 6](#).

Applicable Auto Switches

Refer to pages 797 to 850 for detailed auto switch specification.

Appendix 4-1 Auto switch selection chart for 16-bit digital output operation																	
Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)*				Pre-wired connector	Applicable load			
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)					
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5 V, 12 V	24 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC	
				F8N				—	●	—	●	○	—				
				M9PV				M9P	●	●	●	○	○				
				F8P				—	●	—	●	○	—				
	Diagnostic indication (2-color indicator)			2-wire	12 V			M9BV	M9B	●	●	●	○	○	—		—
				3-wire (NPN)	5 V, 12 V			F8B	—	●	—	●	○	—			
				3-wire (PNP)				M9NVV	M9NV	●	●	●	○	○	IC circuit		
				2-wire				M9PWV	M9PW	●	●	●	○	○			
	Water resistant (2-color indicator)			3-wire (NPN)				5 V, 12 V	M9BWW	M9BW	●	●	●	○			○
				3-wire (PNP)	M9NAV**				M9NA**	○	○	●	○	○			IC circuit
				2-wire	M9PAV**				M9PA**	○	○	●	○	○			
				2-wire	M9BAV**				M9BA**	○	○	●	○	○			

**Although it is possible to mount water resistant type auto switches, note that the rotary actuator itself is not of water resistant construction.

* Lead wire length symbols: 0.5 m Nil (Example) M9NW

1 m M (Example) M9NWM

3 m L (Example) M9NWL

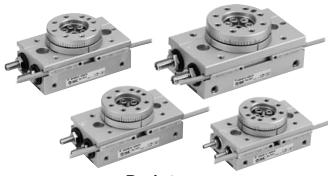
5 m Z (Example) M9NWZ

*Auto switches marked with "○" are made to order specification.

*Refer to pages 837 and 838 for the details of solid state auto switch with pre-wired connector.

Note 1) When using D-F8□, mount it at a distance of 10 mm or more from magnetic substances such as iron.

* Auto switches are shipped together, (but not assembled).



Basic type



High precision type

Symbol



Specifications

Size	1	2	3	7
Fluid	Air (non-lube)			
Maximum operating pressure	0.7 MPa			
Minimum operating pressure	0.1 MPa			
Ambient and fluid temperature	0 to 60°C (with no freezing)			
Cushion	None		Rubber bumper	
Angle adjustment range	0 to 190°			
Maximum rotation	190°			
Cylinder bore size	ø6	ø8	ø10	ø12
Port size	M3 x 0.5			M5 x 0.8

Allowable Kinetic Energy and Rotation Time Adjustment Range

Size	Allowable kinetic energy (J)	Rotation time adjustment range for suitable operation (s/90°)
1	0.001	0.2 to 0.7
2	0.0015	
3	0.002	
7	0.006	0.2 to 1.0

Note) If operated where the kinetic energy exceeds the allowable value, this may cause damage to the internal parts and result in product failure. Please pay special attention to the kinetic energy levels when designing and during operation to avoid exceeding the allowable limit.

Weight

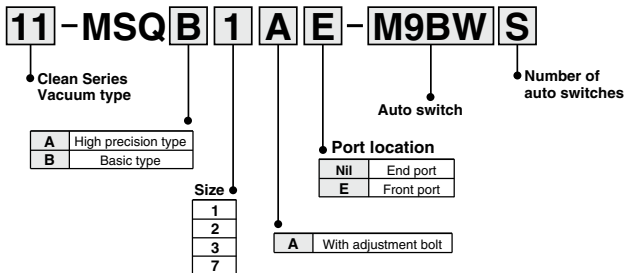
Size	1	2	3	7
Basic type	75	105	150	250
High precision type	80	115	165	265

Note) Excluding the weight of auto switches

Clean Series

Prevents dispersion of the particles generated inside of the product into the clean room by sucking them out of the vacuum port on the body side.

How to Order



Dimensions

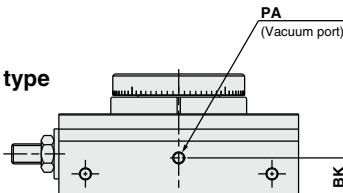
Clean series products do not have a hollow axis.

Basic type

11-MSQB□A

High precision type

11-MSQA□A



Specifications

Cleanliness class (ISO class)	Suction flow rate (example)
Class 3 Note 1)	1 L/min (ANR)

11-MSQA is identical to the high precision type and 11-MSQB is identical to the basic type.

Note 1) Please refer to "Pneumatic Clean Series (CAT.E02-23)" catalog for further details.

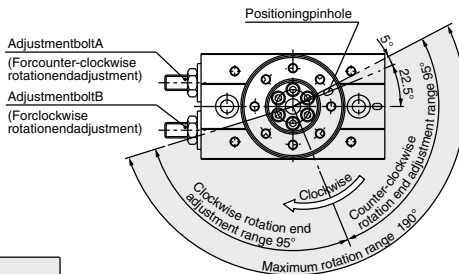
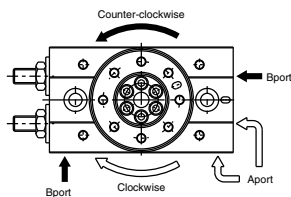


Size	BK	PA
1	5.3	M3 x 0.5
2	7.5	M3 x 0.5
3	9.5	M3 x 0.5
7	7	M5 x 0.8

Dimensions other than above are identical to the basic type and the high precision type.

Rotation Direction and Rotation Angle

- The rotatory table turns in the clockwise direction when the A port is pressurized, and in the counter-clockwise direction when the B port is pressurized.
- By adjusting the adjustment bolt, the rotation end can be set within the ranges shown in the drawing.



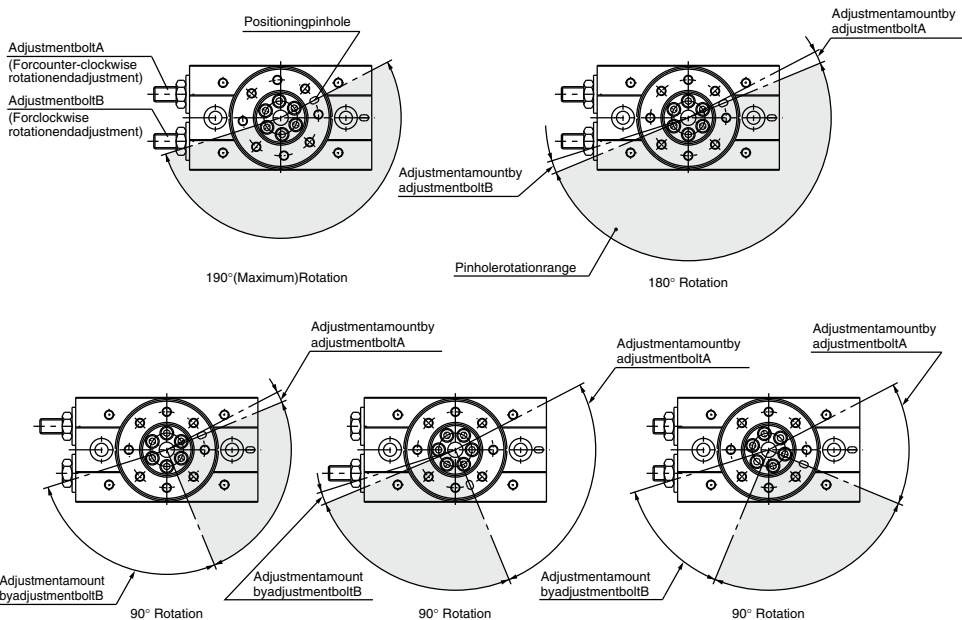
With adjustment bolt, internal shock absorber

Size	Adjustment angle per rotation of angle adjustment screw
1	8.2°
2	10.0°
3	10.9°
7	10.2°

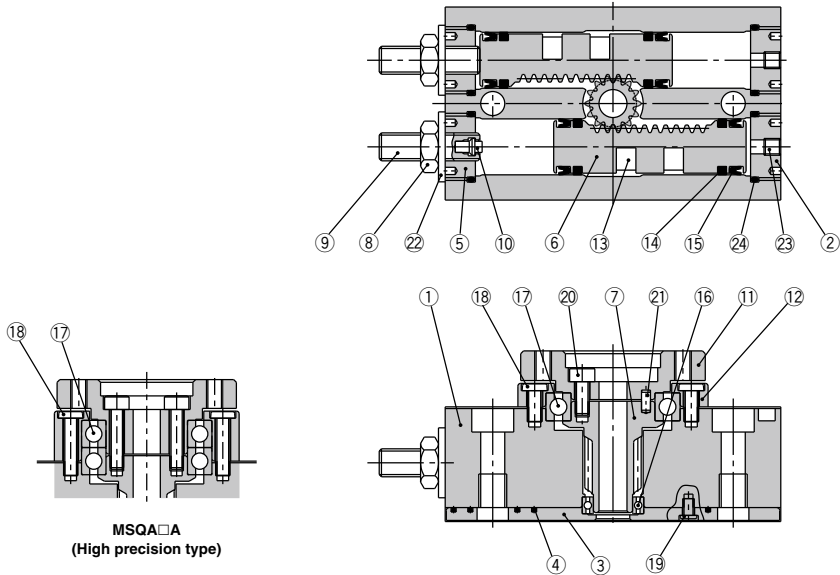
- (Note)
- The drawings show the rotation range of the positioning pinhole.
 - The pinhole position in the drawings shows the counter-clockwise rotation end when the adjustment bolts A and B are tightened equally and the rotation is adjusted 180°.

Rotation Range Example

- Various rotation ranges are possible as shown in the drawings below using adjustment bolts A and B. (The drawings also show the rotation ranges of the positioning pinhole.)



Construction



Component Parts

No.	Description			Material	Note
1	Body			Aluminium alloy	Anodized
2	Cover			Aluminium alloy	Anodized
3	Plate			Aluminium alloy	Chromated
4	Seal			NBR	
5	End cover			Aluminium alloy	Anodized
6	Piston			Stainless steel	
7	Pinion			Chrome molybdenum steel	
8	Hexagon nut			Steel wire	
9	Adjustment bolt			Steel wire	
10	Cushion pad	Size: 3, 7		Rubber material	
11	Table			Aluminium alloy	Anodized
12	Bearing retainer			Aluminium alloy	Anodized
13	Magnet			—	
14	Wear ring			Resin	
15	Piston seal			NBR	
16	Deep groove ball bearing			Bearing steel	
17	Deep groove ball bearing	Basic type		Bearing steel	
	Special bearing	High precision type			
18	Round head Philips screw No.0	Basic type	Size: 1 to 3	Steel wire	
	Round head Philips screw				
	Round head Philips screw	High precision type			
19	Round head Philips screw No.0			Steel wire	
20	Hexagon socket head set bolt			Stainless steel	
21	Parallel pin			Carbon steel	
22	Seal washer			NBR	
23	Hexagon socket head set screw			Stainless steel	
24	O-ring			NBR	

*23 The hexagon socket head set screws are tightened at different positions depending on the position of the connecting port.

* The component parts cannot be shipped individually.

CRB□2

CRB1

MSU

CRJ

CRA1

CRQ2

MSQ

MSZ

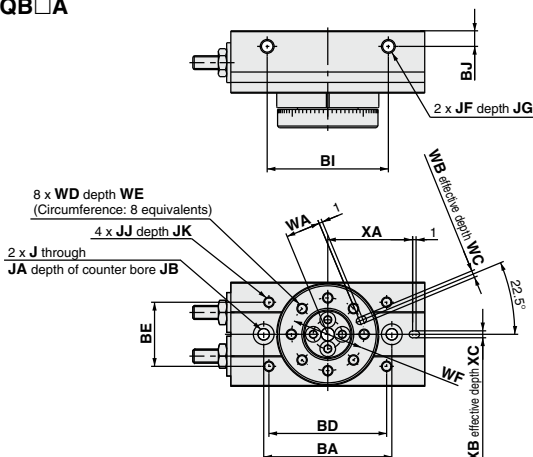
CRQ2X
MSQX

MRQ

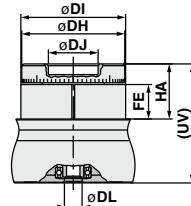
D-□

Dimensions/Size 1, 2, 3, 7

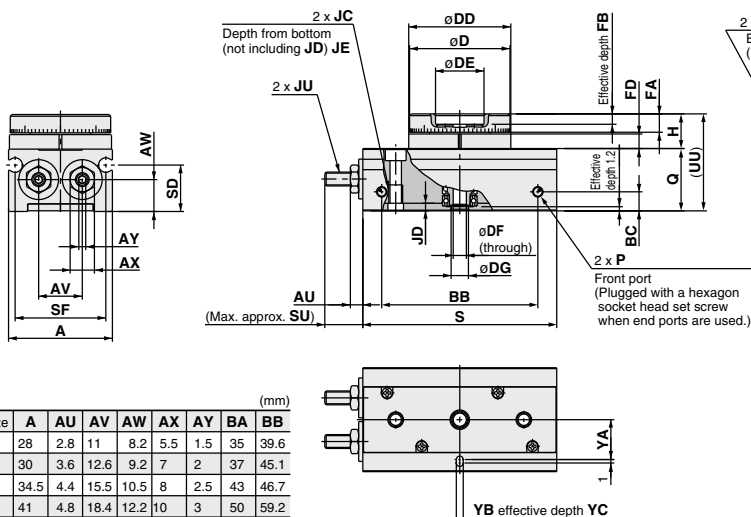
Basic type/MSQB□A



**High precision type/
MSQA□A**



	(mm)						
Size	DH	DI	DJ	DL	FE	HA	UV
1	27h8	27.5h8	14H8	4.5H8	8.2	13.5	29.5
2	29h8	29.5h8	14H8	5 H8	9.7	15.5	33.5
3	33h8	34h8	17H8	6 H8	9.7	15.5	36
7	39h8	40h8	20H8	7 H8	9.5	16.5	39.5



	(mm)							
Size	A	AU	AV	AW	AX	AY	BA	BB
1	28	2.8	11	8.2	5.5	1.5	35	39.6
2	30	3.6	12.6	9.2	7	2	37	45.1
3	34.5	4.4	15.5	10.5	8	2.5	43	46.7
7	41	4.8	18.4	12.2	10	3	50	59.2

	(mm)																							
Size	BC	BD	BE	BG	BH	BI	BJ	D	DD	DE	DF	DG	FA	FB	FD	H	J	JA	JB	JC	JD	JE	JF	JG
1	4.5	32	17	11	8.2	30	4.5	27H9	27.5h9	14H9	3.5	4.5H9	4.8	2	3.7	9	3.3	6	3.5	M4 x 0.7	2.2	5.3	M4 x 0.7	4
2	5.5	34	18.5	12.6	9.2	35	4.5	29H9	29.5h9	14H9	3.8	5 H9	5.3	2.5	4.2	10	3.3	6	3.5	M4 x 0.7	2.2	5.3	M4 x 0.7	4
3	5.5	38	23	15.5	10.5	40	4.5	33H9	34 h9	17H9	5	6 H9	5.3	2.5	4.2	10	4.2	7.5	4.5	M5 x 0.8	2.5	6	M4 x 0.7	4
7	5.5	45	30	18.4	12.2	50	5	39H9	40 h9	20H9	6	7 H9	6.5	2.5	4.5	11.5	4.2	7.5	4.5	M5 x 0.8	2.5	6	M5 x 0.8	5

(mm)																						
Size	JJ	JU	P	Q	S	SD	SF	SU	UU	WA	WB	WC	WD	WE	WF	XA	XB	XC	YA	YB	YC	
1	M3 x 0.5	3.5	M3 x 0.5	M3 x 0.5	16	50.5	10.8	24.4	9.4	25	9.5	2H9	2	M3 x 0.5	4.8	20	22.5	2H9	2	11	2H9	2
2	M3 x 0.5	3.5	M4 x 0.7	M3 x 0.5	18	56	13.4	26.2	11.3	28	10	2H9	2	M3 x 0.5	5.3	21	24.5	2H9	2	11.5	2H9	2
3	M3 x 0.5	3.5	M5 x 0.8	M3 x 0.5	20.5	60	15.2	31	11.8	30.5	12	2H9	2	M3 x 0.5	5.3	25	27	2H9	2	13.5	2H9	2
7	M4 x 0.7	4.5	M6 x 1	M5 x 0.8	23	73.5	15.4	37.4	14.9	34.5	14	3H9	3	M4 x 0.7	6.5	29	32.5	3H9	3	15.5	3H9	3

Rotary Table/Rack & Pinion Type

MSQ Series

Size: 10, 20, 30, 50, 70, 100, 200

How to Order

Size

10
20
30
50

High Precision Type **MSQ A 10 A - M9BW**

Basic Type **MSQ B 10 A - M9BW**

Size

10
20
30
50
70
100
200

Thread type

End port type	Size
Nil	M 5 10, 20
Nil	Rc 1/8 30, 50,
-XF	G 1/8 70, 100,
-XN	NPT 1/8 200

*Side ports are all M5.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	n pcs.

Auto switch type

Nil	Without auto switch (built-in magnet)
-----	---------------------------------------

*Refer to the table below for auto switch types.

A With adjustment bolt
R With internal shock absorber

Applicable Auto Switches

Refer to pages 797 to 850 for detailed auto switch specification.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load		
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)				
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC	
	3-wire (PNP)			M9PV			M9P	●	●	●	○	○				
	2-wire			12 V	M9BV		M9B	●	●	●	○	○	—			
	3-wire (NPN)			5 V, 12 V	M9NWW		M9NW	●	●	●	○	○	IC circuit			
	3-wire (PNP)				M9PWW		M9PW	●	●	●	○	○				
	2-wire			12 V	M9BWW		M9BW	●	●	●	○	○	—			
	3-wire (NPN)			5 V, 12 V	M9NAV ^{*1}		M9NA ^{*1}	○	○	○	○	○	IC circuit			
	3-wire (PNP)				M9PAV ^{*1}		M9PA ^{*1}	○	○	●	○	○				
	2-wire			12 V	M9BAV ^{*1}		M9BA ^{*1}	○	○	●	○	○	—			
	Water resistant (2-color indicator)			3-wire (NPN)	5 V, 12 V	M9NAV ^{*1}	M9NA ^{*1}	○	○	○	○	○	IC circuit			
				3-wire (PNP)		M9PAV ^{*1}	M9PA ^{*1}	○	○	●	○	○				
Reed auto switch	—	Grommet	Yes	3-wire (NPN equiv.)	—	5 V	—	A96V	A96	●	—	●	—	—	IC circuit	—
				No	2-wire	24 V	12 V	100 V	A93V ^{*2}	A93	●	●	●	●	—	—
						100 V or less	A90V	A90	●	—	●	—	—	—	IC circuit	

*1 Although it is possible to mount water resistant type auto switches, note that the rotary actuator itself is not of water resistant construction.

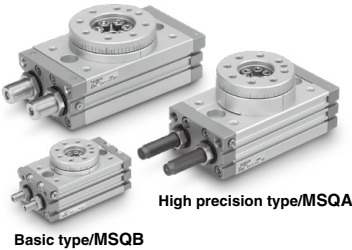
*2 1 m type lead wire is only applicable to D-A93.

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

* Auto switches marked with a "○" are produced upon receipt of orders.

* Refer to pages 837 and 838 for the details of solid state auto switch with pre-wired connector.

* Auto switches are shipped together, (but not assembled).



Symbol



Specifications

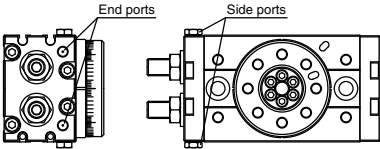
Size		10	20	30	50	70	100	200
Fluid		Air (non-lube)						
Maximum operating pressure	With adjustment bolt	1 MPa						
	With internal shock absorber	0.6 MPa ^{Note 1)}						
Minimum operating pressure	Basic type	0.1 MPa						
	High precision type	0.2 MPa	0.1 MPa			—		
Ambient and fluid temperature		0 to 60°C (with no freezing)						
Cushion	With adjustment bolt	Rubber bumper						
	With internal shock absorber	Shock absorber						
	Shock absorber model	RBA0805-X692	RBA1006-X692	RBA1411-X692	RBA2015-X821	RBA2725-X821		
Angle adjustment range		0 to 190° ^{Note 2)}						
Maximum rotation		190°						
Cylinder bore size		ø15	ø18	ø21	ø25	ø28	ø32	ø40
Port size	End ports	M5 x 0.8			Rc 1/8, G 1/8, NPT 1/8			
	Side ports	M5 x 0.8						

Note 1) The maximum operating pressure of the actuator is restricted by the maximum allowable thrust of the shock absorber.

Note 2) Be careful if the rotation angle of a type with internal shock absorber is set below the value in the table below, the piston stroke will be smaller than the shock absorber's effective stroke, resulting in decreased energy absorption ability.

Size	10	20	30	50	70	100	200
Minimum rotation angle that will not allow decrease of energy absorption ability	52°	43°	40°	60°	71°	62°	82°

The service life of the shock absorber may be different from the rotary table body depending on the operating conditions. Refer to Specific Product Precautions for the suitable replacement period.



Allowable Kinetic Energy and Rotation Time Adjustment Range

Size	Allowable kinetic energy (J) ^{Note 1)}		Rotation time adjustment range for stable operation (s/90°)	
	With adjustment bolt	With internal shock absorber	With adjustment bolt	With ^{Note 2)} internal shock absorber
10	0.007	0.039	0.2 to 1.0	0.2 to 0.7
20	0.025	0.116		
30	0.048	0.116		
50	0.081	0.294		
70	0.240	1.100	0.2 to 1.5	0.2 to 1.0
100	0.320	1.600	0.2 to 2.0	
200	0.560	2.900	0.2 to 2.5	

Note 1) If operated where the kinetic energy exceeds the allowable value, this may cause damage to the internal parts and result in product failure. Please pay special attention to the kinetic energy levels when designing and during operation to avoid exceeding the allowable limit.

Note 2) When the rotation time of the type with an internal absorber is set longer than the time shown in the table above, energy absorption of the shock absorber greatly decreases.

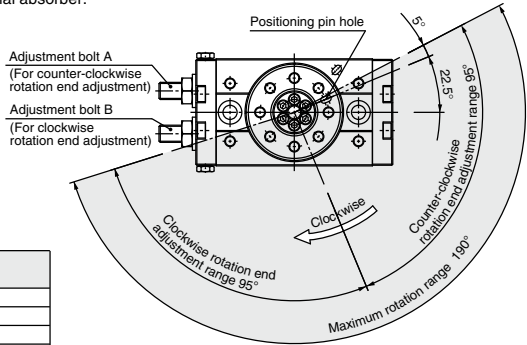
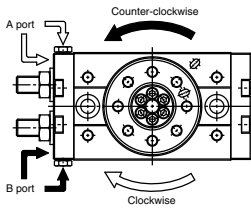
Weight

Size		10	20	30	50	70	100	200
Basic type	With adjustment bolt	500	940	1230	1990	2880	4090	7580
	With internal shock absorber	510	940	1230	2010	2890	4100	7650
High precision type	With adjustment bolt	530	1040	1350	2150			
	With internal shock absorber	540	1040	1350	2170	—		

Note) Values above do not include auto switch weight.

Rotation Direction and Rotation Angle

- The rotary table turns in the clockwise direction where the A port is pressurized, and in the counter-clockwise direction when the B port is pressurized.
- By adjusting the adjustment bolt, the rotation end can be set within the ranges shown in the drawing.
- The rotation angle can also be set on a type with internal absorber.



With adjustment bolt, internal shock absorber

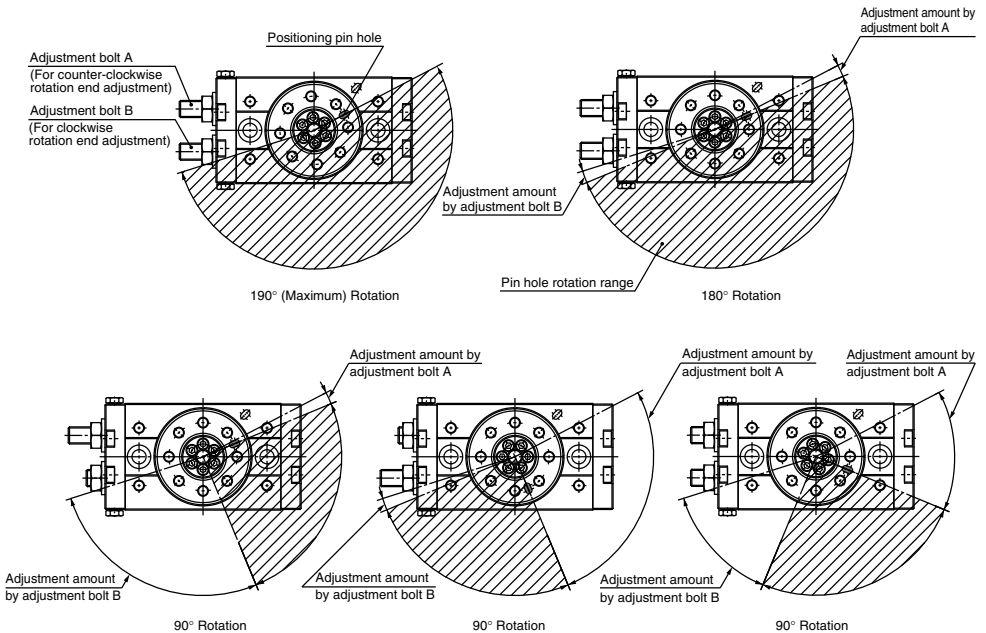
Size	Adjustment angle per rotation of angle adjustment screw
10	10.2°
20	7.2°
30	6.5°
50	8.2°
70	7.0°
100	6.1°
200	4.9°

Note) • The drawing shows the rotation range of the positioning pin hole.

- The pin hole position in the drawing shows the counter-clockwise rotation end when the adjustment bolts A and B are tightened equally and the rotation is adjusted 180°.

Rotation Range Example

- Various rotation ranges are possible as shown in the drawings below using adjustment bolts A and B.
(The drawings also show the rotation ranges of the positioning pin hole.)
- The rotation angle can also be set on a type with inertial absorber.



CRB□2
CRB1
MSU
CRJ
CRA1
CRQ2
MSQ
MSZ
CRQ2X
MSQX
MRQ

D-□

MSQ Series

Clean Series

Prevents dispersion of the particles generated inside of the product into the clean room by sucking them out of the vacuum port on the body side.

How to Order

11-MSQB10A-M9BW

Clean series Vacuum type

Number of auto switches

A High precision type

B Basic type

Size

10

20

30

50

A With adjustment bolt

R Shock absorber

Auto switch type

Nil Without auto switch (built-in magnet)

*Refer to page 271 for auto switch types.

Thread type

End port type	Size
Nil	M 5
Nil	Rc 1/8
-XF	G 1/8
-XN	NPT 1/8

*Side ports are all M5.

Specifications

Cleanliness class (ISO class)	Suction flow rate (example)
Class 3 ^{Note 1)}	1 L/min (ANR)

11-MSQA is identical to the high precision type and 11-MSQB is identical to the basic type.

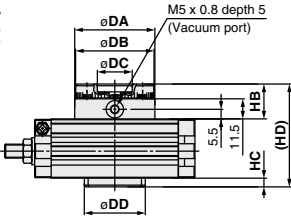
Note 1) Please refer to "Pneumatic Clean Series (CAT.E02-23)" catalog for further details.

Dimensions

Clean series products do not have a hollow axis.

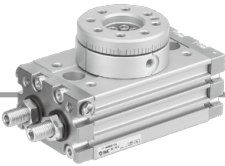
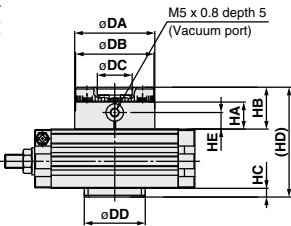
Basic type

11-MSQB□A
11-MSQB□R



High precision type

11-MSQA□A
11-MSQA□R



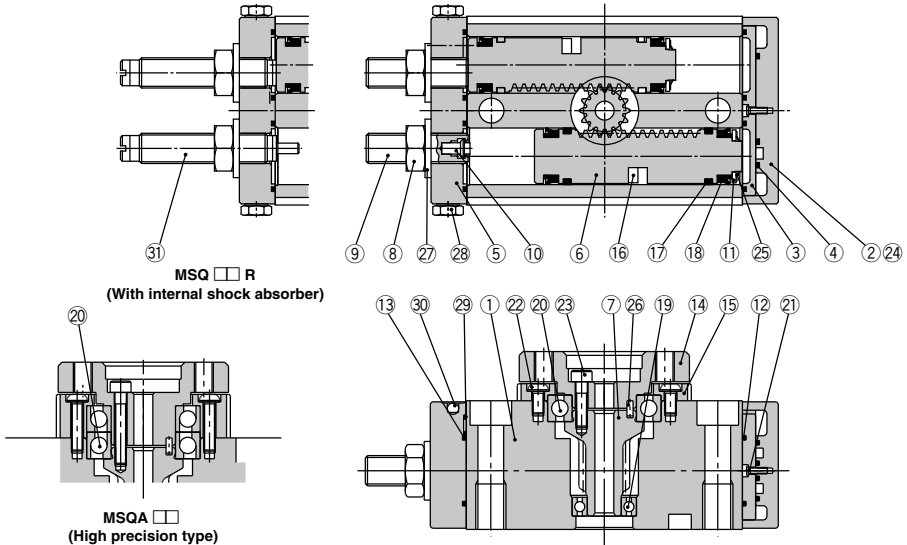
Size	DA(h9)	DB(h9)	DC(H9)	DD(h9)	HB	HC	HD
10	46	45	20	35	20	5	59
20	61	60	28	40	22	6	65
30	67	65	32	48	22	6	68
50	77	75	35	54	24	7	77

Dimensions other than above are identical to the basic type.

Size	DA(h8)	DB(h8)	DC(H8)	DD(h8)	HA	HB	HC	HD	HE
10	46	45	20	35	15.5	24	5	63	9.5
20	61	60	28	40	19.5	30	6	73	13.5
30	67	65	32	48	19.5	30	6	76	13.5
50	77	75	35	54	21.5	34	7	87	15.5

Dimensions other than above are identical to the high precision type.

Construction



CRB□2

CRB1

MSU

CRJ

CRA1

CRQ2

MSQ

MSZ

CRQ2X
MSQX

MRQ

Parts list

No.	Description	Material	Note
1	Body	Aluminium alloy	Anodized
2	Cover	Aluminium alloy	Nickel plated
3	Plate	Aluminium alloy	Plated
4	Seal	NBR	Chromated
5	End cover	Aluminium alloy	Nickel plated
6	Piston	Stainless steel	Plated
7	Pinion	Chrome molybdenum steel	
8	Compact hexagon nut	Steel wire	
9	Hexagon nut	Steel wire	
10	Adjustment bolt	Chrome molybdenum steel	Chromated
11	Cushion pad	Rubber material	
12	Seal retainer	Aluminium alloy	Chromated
13	Gasket	NBR	
14	Gasket	NBR	
15	Table	Aluminium alloy	Anodized
16	Bearing retainer	Aluminium alloy	Anodized
17	Magnet	—	
18	Wear ring	Resin	
19	Piston seal	NBR	

No.	Description	Material	Note
19	Bearing	Size: 10 to 50	Bearing steel
20	Needle bearing	Size: 70 to 200	Bearing steel
21	Bearing	Basic type	Bearing steel
22	Angular bearing	High precision type	Bearing steel
23	Round head phillips screw No.0	Size: 20 to 50	Steel wire
24	Round head phillips screw	Size: 70 to 200	Stainless steel
25	Hexagon thin socket head bolt	Size: 10	Steel wire
26	Hexagon socket head set bolt	Size: 20 to 50	Steel wire
27	Hexagon socket head set bolt	Size: 70 to 200	Stainless steel
28	Hexagon socket head set bolt	Size: 10 to 70	Stainless steel
29	Hexagon socket head set bolt	Size: 100 to 200	Steel wire
30	Bushing nut	Size: 10 to 50	Stainless steel
31	Type CS retaining ring	Size: 70 to 200	Carbon steel
32	Parallel pin	Size: 10 to 50	Carbon steel
33	Parallel key	Size: 70 to 200	Carbon steel
34	Seal washer	NBR	
35	Plug	Steel wire	Nickel plated
36	O-ring	Size: 70 to 200 only	NBR
37	Steel balls	Size: 70 to 200 only	Stainless steel
38	Shock absorber	—	

* The component parts cannot be shipped individually.

Replacement parts

Description		Size																	
		10		20		30		50		70		100		200					
Seal kit		P523010-5		P523020-5		P523030-5		P523040-5		P391050-5		P391060-5		P391070-5					
Parts included in seal kit	No.	Description	Qty.	No.	Description	Qty.	No.	Description	Qty.	No.	Description	Qty.	No.	Description	Qty.	No.	Description	Qty.	
	4	Seal	1	4	Seal	1	4	Seal	1	4	Seal	1	4	Seal	1	4	Seal	1	
	12	Gasket	1	12	Gasket	1	12	Gasket	1	12	Gasket	4	12	Gasket	4	12	Gasket	4	
	13	Gasket	1	13	Gasket	1	13	Gasket	1	13	Gasket	1	17	Wear ring	4	17	Wear ring	4	
	17	Wear ring	4	17	Wear ring	4	17	Wear ring	4	17	Wear ring	4	18	Piston seal	4	18	Piston seal	4	
	18	Piston seal	4	18	Piston seal	4	18	Piston seal	4	18	Piston seal	4	27	Seal washer	2	27	Seal washer	2	
	27	Seal washer	2	27	Seal washer	2	27	Seal washer	2	27	Seal washer	2	29	O-ring	4	29	O-ring	4	

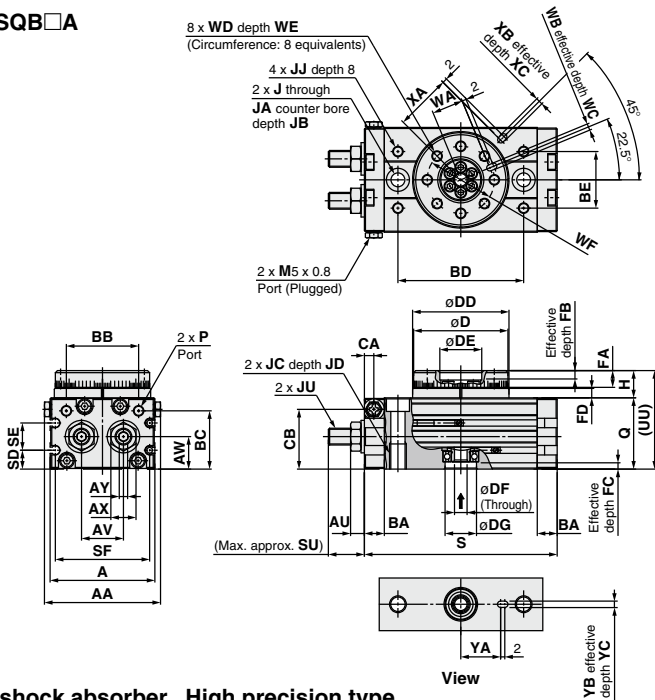
A grease pack (10 g) is included. When only a grease pack is needed, order with the following part number.

Grease pack part no: GR-S-010 (10 g)

MSQ Series

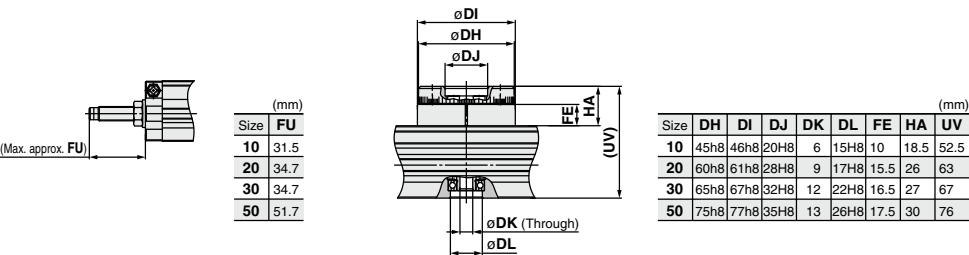
Dimensions/Size 10, 20, 30, 50

Basic type/MSQB□A



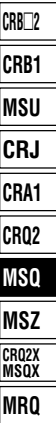
With internal shock absorber
MSQA□R
MSQB□R

High precision type
MSQA□A/With adjustment bolt
MSQA□R/With internal shock absorber

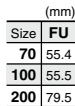


* In addition to Rc 1/8, G 1/8 and NPT 1/8 are also available.

Basic type/MSQB□A



MSQB□R

D-☐

* In addition to Rc 1/8, G 1/8 and NPT 1/8 are also available.

Rotary Table/Rack & Pinion Type

MSQ Series

With External Shock Absorber

Size: 10, 20, 30, 50

How to Order

MSQ B 10 L 2 - **M9BW**

Port location/Rotation

2	Standard type	180°
3	Symmetric type	90°
4	Symmetric type	180°
5	Symmetric type	90°

Refer to the table to the right.

Shock absorber type

L	Shock absorber for low energy
H	Shock absorber for high energy

Size

10
20
30
50

Auto switch type

Nil	Without auto switch (Built-in magnet)
------------	---------------------------------------

• **Made to Order or port type**
Refer to page 284 for the Made to Order details.

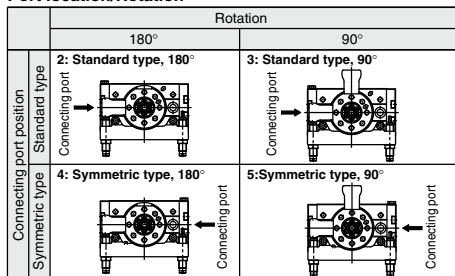
End port type	Size
Nil	M 5
Nil	Rc 1/8
-XF	G 1/8
-XN	NPT 1/8

*Side ports are all M5.
*Combination with Made to Order is not available.

• **Number of auto switch**

Nil	2 pcs.
S	1 pc.
n	n pcs.

Port location/Rotation



Applicable Auto Switches

Refer to pages 797 to 850 for detailed auto switch specification.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)			Pre-wired connector	Applicable load	
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)		
Solid state auto switch	Diagnostic indication (2-color indicator)	Grommet	Yes	3-wire (NPN)	24 V	—	M9NV	M9N	●	●	●	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9PV	M9P	●	●	●	○		
				2-wire			M9BV	M9B	●	●	●	○		
				3-wire (NPN)			M9NVW	M9NW	●	●	●	○		
	Water resistant (2-color indicator)	Grommet	Yes	3-wire (PNP)	24 V	—	M9PWV	M9PW	●	●	●	○		
				2-wire			M9BWV	M9BW	●	●	●	○		
				3-wire (NPN)			M9NAV ^{*1}	M9NA ^{*1}	○	○	○	○		
				3-wire (PNP)			M9PAV ^{*1}	M9PA ^{*1}	○	○	●	○		
Reed auto switch	—	Grommet	Yes	2-wire	24 V	12 V	M9BAV ^{*1}	M9BA ^{*1}	○	○	●	○	IC circuit	—
				3-wire (NPN equiv.)			A96V	A96	●	—	●	—		
				2-wire			A93V ^{*2}	A93	●	●	●	—		
			No	2-wire	24 V	12 V	A90V	A90	●	●	●	—	IC circuit	Relay, PLC

*1 Although it is possible to mount water resistant type auto switches, note that the rotary actuator itself is not of water resistant construction.

*2 1 m type lead wire is only applicable to D-A93.

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

* Auto switches marked with a "○" are produced upon receipt of orders.

* Refer to pages 837 and 838 for the details of solid state auto switch with pre-wired connector.

* Auto switches are shipped together, (but not assembled).

Specifications

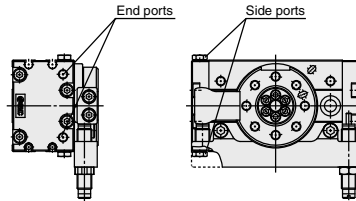


Symbol



Size	10	20	30	50
Fluid	Air (non-lube)			
Maximum operating pressure	1 MPa			
Minimum operating pressure	0.2 MPa			
Ambient and fluid temperature	0 to 60°C (with no freezing)			
Cushion	Shock absorber			
Shock absorber type	For low energy	RB0805	RB1006	RB1411
	For high energy	RB0806	RB1007	RB1412
Rotation	90°, 180°			
Angle adjusting range	Each rotation end $\pm 3^\circ$			
Cylinder bore size	$\phi 15$	$\phi 18$	$\phi 21$	$\phi 25$
Port size	End ports	M5 x 0.8		Rc 1/8, G 1/8, NPT 1/8
	Side ports	M5 x 0.8		

The service life of the shock absorber may be different from the rotary table body depending on the operating conditions. Refer to Specific Product Precautions for the suitable replacement period.



Made to Order
(Refer to page 284 for details)

Symbol	Specifications/Description
-X232	With external adjustment bolt

Allowable Kinetic Energy and Rotation Time Adjustment Range

Size	Allowable kinetic energy (J) Note 1		Rotation time adjustment range for stable operation (s/90°)
	Shock absorber for low energy	Shock absorber for high energy	
10	0.161	0.231	0.2 to 1.0 Note 2
20	0.574	1.060	
30	0.805	1.210	
50	1.310	1.820	

Note 1) If operated where the kinetic energy exceeds the allowable value, this may cause damage to the internal parts and result in product failure. Please pay special attention to the kinetic energy levels when designing and during operation to avoid exceeding the allowable limit.

Note 2) Values above indicate the time between the start of rotation and the deceleration caused by the shock absorber. Although the time required by the rotary table to reach the rotation end after deceleration differs depending on the operating conditions (inertial moment of the load, rotation speed and operating pressure), approximately 0.2 to 2 seconds are required. The range of angles within which the shock absorber operates is between the rotation end and the values shown below.

Size	10	20	30	50
For low energy	7.1°	6.9°	6.2°	9.6°
For high energy	8.6°	8.0°	7.3°	10.5°

Weight

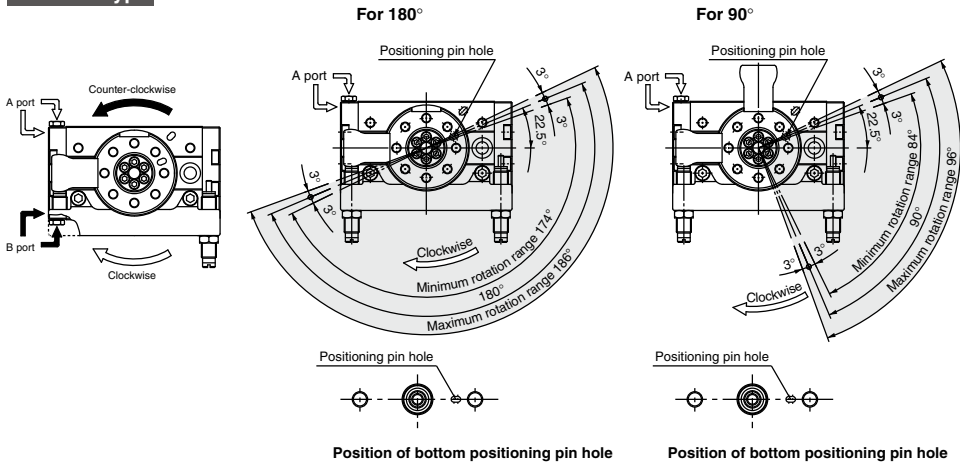
Size		10	20	30	50
Basic type	90° specification	600	1150	1460	2390
	180° specification	570	1090	1390	2280
High precision type	90° specification	670	1340	1690	2720
	180° specification	640	1290	1620	2600

Note) Values above do not include auto switch weight.

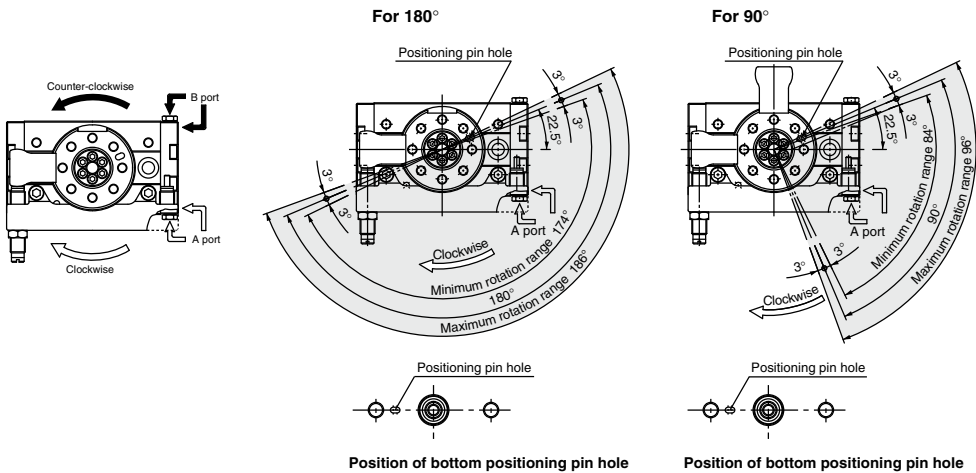
Rotation Direction and Rotation Angle

- The rotary table turns in the clockwise direction where the A port is pressurized, and in the counter-clockwise direction when the B port is pressurized.
- By adjusting the shock absorber, the rotation end can be set within the ranges shown in the drawing.

Standard type



Symmetric type

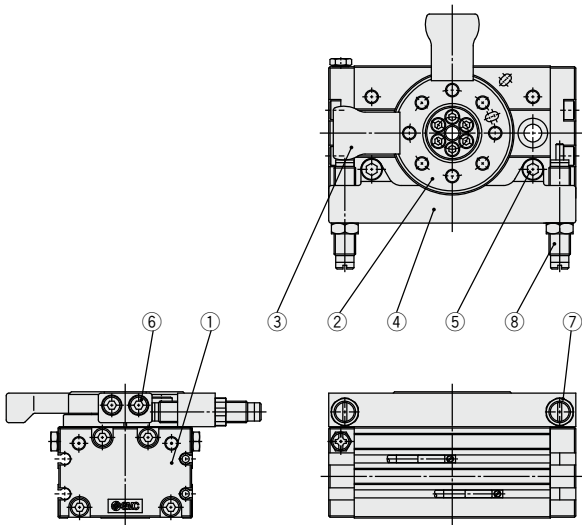


With external shock absorber

Size	Adjustment angle per rotation of angle adjustment screw
10	1.4°
20	1.2°
30	1.1°
50	1.3°

Note) · The drawings show the rotation range for the top positioning pin hole of the table.
· The pin hole position in the drawing shows the counter-clockwise rotation end when the shock absorbers are tightened equally and the rotation is adjusted to 180° and 90°.

Construction



CRB□2
CRB1
MSU
CRJ
CRA1
CRQ2
MSQ
MSZ
CRQ2X MSQX
MRQ

Component parts

No.	Description	Material	Note
1	End cover	Aluminium alloy	Painted
2	Table	Aluminium alloy	Anodized
3	Arm	Chrome molybdenum steel	Nickel plated
4	Shock absorber holder	Aluminium alloy	Anodized
5	Hexagon socket head set bolt	Stainless steel	
6	Hexagon socket head set bolt	Stainless steel	
7	Hexagon nut	Steel wire	
8	Shock absorber	—	

* The component parts cannot be shipped individually.

Replacement parts

Description	Kit no.				Note
	10	20	30	50	
Seal kit	P523010-6	P523020-6	P523030-6	P523040-6	Seal washer ② is excluded from the kit contents described on page 275.

A grease pack (10 g) is included. When only a grease pack is needed, order with the following part number.

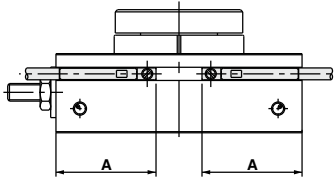
Grease pack part no: GR-S-010 (10 g)

D-□

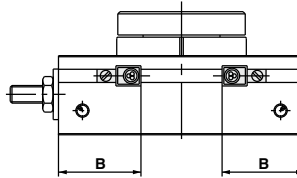
Dimensions/With External Shock Absorber Size: 10, 20, 30, 50

Proper Auto Switch Mounting Position at Rotation End

• Size: 1 to 7



When D-M9 is used



When D-F8 is used

Size	Rotation	Solid state auto switch					
		D-M9□(V), D-M9□W(V)			D-F8□		
		A	Operating angle θm	Hysteresis angle	B	Operating angle θm	Hysteresis angle
1	190°	20.9	49°	10°	16.9	20°	10°
2	190°	22.8	50°	10°	18.8	20°	10°
3	190°	24.4	47°	10°	20.4	15°	10°
7	190°	28.7	31°	10°	24.7	15°	10°

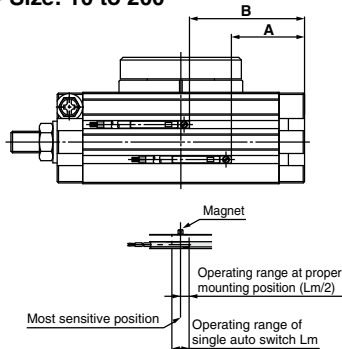
Operating angle θ m: Value of the operating range Lm of a single auto switch converted to an axial rotation angle.

Hysteresis angle : Value of auto switch hysteresis converted to an angle.

Note) Since the above values are only provided as a guideline, they are not guaranteed.

In the actual setting, adjust them after confirming the auto switch operating condition.

• Size: 10 to 200



Size	Rotation	Solid state auto switch				Reed auto switch			
		D-M9□(V), D-M9□W(V)				D-A9□, D-A9□V			
		A	B	Operating angle θm	Hysteresis angle	A	B	Operating angle θm	Hysteresis angle
10	190°	31	49	37°	5°	27	45	53°	10°
20	190°	39	66	33°	5°	35	62	50°	10°
30	190°	43	72	29°	5°	39	68	43°	10°
50	190°	53	87	22°	5°	49	83	33°	10°
70	190°	58	99	21°	5°	54	95	30°	10°
100	190°	65	112	18°	5°	61	108	27°	10°
200	190°	85	143	15°	5°	81	139	21°	10°

Operating angle θ m: Value of the operating range Lm of a single auto switch converted to an axial rotation angle.

Hysteresis angle : Value of auto switch hysteresis converted to an angle.

Note) Since the above values are only provided as a guideline, they are not guaranteed.

In the actual setting, adjust them after confirming the auto switch operating condition.

MSQ Series

Made to Order

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



1 With External Adjustment bolt

Symbol

-X232

By reducing the effective stroke of the shock absorber, the absorption time will be reduced, enabling the cycle time to be improved.

How to Order

MSQ B 10 L 2 X - M9BW - X232

- A** High precision type
- B** Basic type
- Size**
 - 10
 - 20
 - 30
 - 50
- Shock absorber type**
 - L** Shock absorber for low energy
 - H** Shock absorber for high energy
- X** Made to Order
- Port location/Rotation**

2	Standard type	180°
3		90°
4	Symmetric type	180°
5		90°
- M9BW** Auto Switch
* Refer to page 278 for auto switch.
- X232** With External Adjustment bolt

Specifications

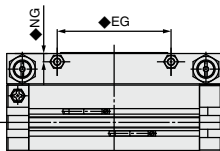
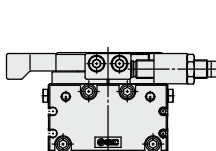
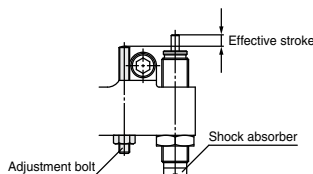
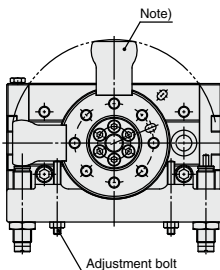
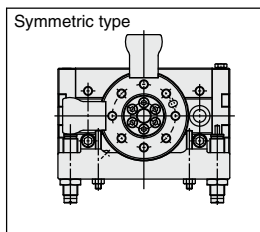
Size	Allowable kinetic energy (J)	
	Shock absorber for low energy	Shock absorber for high energy
10	0.161	0.231
20	0.574	1.060
30	0.805	1.210
50	1.310	1.820

Note 1) The allowable kinetic energy indicated in the table is the value for the case where the full stroke of the shock absorber is used. Note that if the effective stroke of the shock absorber is shortened using the adjustment bolt, the allowable energy will be lower than the value in the table.

Note 2) If you wish to adjust the stroke of the shock absorber in order to reduce the cycle time, first set the shock absorber to the position where the shock absorber is to be used in the full stroke, then while observing the operating condition of the product, gradually adjust the stroke in the direction such that the effective stroke decreases.

Note 3) The shock absorber is a consumable part. If there are signs, such as bounding of the shock absorber at the motion end point, that the energy absorption performance of the shock absorber has deteriorated, readjust the position of the shock absorber so as to increase its effective stroke. If bounding still occurs even when the full stroke is used, it is necessary to replace the shock absorber with a new one.

Dimensions



Size	(mm)	
	EG	NG
10	47.4	4.5
20	62	4.5
30	67.6	4.8
50	80	7

Note) This part is not available with 180° specification.

* Dimensions other than the above are the same as standard.



MSQ Series Rotary Table Specific Product Precautions 1

Be sure to read this before handling the products.

Speed Adjustment

⚠ Warning

1. Perform speed adjustment gradually from the low speed side.

Speed adjustment from the high speed side can cause product damage leading to human injury and damage to equipment and machinery.

⚠ Caution

1. When operating at high speed with a large load weight, a large amount of energy is applied to the actuator and can cause damage.

Refer to the model selection on page 22 to find the proper operating time.

2. Do not machine the fixed orifice of the port to enlarge its size. If the fixed orifice size is enlarged, the actuator operating speed and impact force will increase and cause damage.

Lubrication

⚠ Caution

1. Use the product without lubrication.

This product is lubricated with grease at the factory, and further lubrication will result in a failure to meet the product's specifications.

Rotation Adjustment

⚠ Caution

1. As a standard feature, the rotary table is equipped with a rotation adjustment screw (adjustment bolt or shock absorber) that can be used to adjust the rotation. The table below shows the rotation adjustment per single rotation of the rotation adjustment screw.

Please refer to following pages for the rotation direction, rotation angle and rotation angle range.

MSQ size1 to 7 → page 268

MSQ size10 to 200 → page 273

MSQ with external shock absorber → page 280

With adjustment bolt, With external shock absorber

Size	Rotation adjustment per single rotation of rotation adjustment screw
1	8.2°
2	10.0°
3	10.9°
7	10.2°
10	10.2°
20	7.2°
30	6.5°
50	8.2°
70	7.0°
100	6.1°
200	4.9°

With external shock absorber

Size	Rotation adjustment per single rotation of rotation adjustment screw
10	1.4°
20	1.2°
30	1.1°
50	1.3°

The rotation adjustment range for the external shock absorber is $\pm 3^\circ$ at each rotation end. When adjusted beyond this range, note that the shock absorber's durability may decrease.

Rotation Adjustment

⚠ Caution

2. MSQ Series is equipped with a rubber bumper or shock absorber. Therefore, perform rotation adjustment in the pressurized condition (minimum operation pressure: 0.1 MPa or more for adjustment bolt and internal shock absorber types, and 0.2 MPa or more for external shock absorber type.)

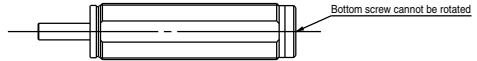
Shock Absorber

⚠ Caution

1. Refer to the table below for tightening torques of the shock absorber setting nut.

Size	10	20	30	50	70	100	200
Tightening torque N·m	1.67	3.14	10.8	23.5	62.8		

2. Never rotate the bottom screw of the shock absorber. (It is not an adjustment screw.) This may cause oil leakage.



3. When rotation of the rotary table with internal shock absorber is set at a value smaller than the table below, the piston stroke becomes smaller than the shock absorber's effective stroke and energy absorption capacity decreases.

Size	10	20	30	50	70	100	200
Minimum rotation without energy absorption capacity decrease	52°	43°	40°	60°	71°	62°	82°

4. Products with shock absorber are not designed to smooth stop but to absorb the kinetic energy of the load. If the load has to be stopped smoothly, a shock absorber of the optimum size meeting the operating conditions must be installed external to the equipment.
5. Shock absorbers are consumable parts. When a decrease in energy absorption capacity is noticed, it must be replaced.

With internal shock absorber

Size	Shock absorber model
10	RBA0805-X692
20	
30	RBA1006-X692
50	RBA1411-X692
70	
100	RBA2015-X821
200	RBA2725-X821

With external shock absorber

Size	Type	Shock absorber model
10	For low energy	RB0805
	For high energy	RB0806
20	For low energy	RB1006
	For high energy	RB1007
30	For low energy	RB1006
	For high energy	RB1007
50	For low energy	RB1411
	For high energy	RB1412



MSQ Series

Rotary Table

Specific Product Precautions 2

Be sure to read this before handling the products.

Service Life and Replacement Period of Shock Absorber

Caution

1. Allowable operation time under the specifications set in this catalog is 1 million.

Note) Specified service life (suitable replacement period) is the value at room temperature (20 to 25°C). The period may vary depending on the temperature and other conditions. In some cases the absorber may need to be replaced before the allowable operation time above.

External Shock Absorber

Caution

Abrasion powder may be generated from the part where the shock absorber collides with the arm. Do not use the product in a place where abrasion powder may affect adversely.

Speed Controller and Fittings

Caution

Size 1, 2, and 3 use M3 x 0.5 piping ports. When connecting a speed controller or fittings directly, use the following series.

- Speed controller
 - AS12□1F/Elbow type
 - AS13□1F/Universal type
- One-touch fitting
 - One-touch miniature fittings KQ2 series
- Miniature fittings M3 series

Auto switch

Caution

In case of sizes 1, 2, 3 and 7, when 2 pieces of auto switches are installed in one switch groove, the minimum detectable rotation angles are as follows.

Size	Minimum detectable rotation
1	25°
2	25°
3	20°
7	20°

Maintenance and Inspection

Caution

Since sizes 1, 2, 3 and 7 require special tools, they cannot be disassembled.

Since sizes 10, 20, 30 and 50 have the table press fit into an angular type bearing, they cannot be disassembled.