



Pressures

Ø	10 - 14		18 - 20	
	min	max	min	max
bar	1,5	7	1	10



Temperature

- 10 °C
+ 60 °C



Output Nm (pressure = 0,5 MPa)

Ø	Output Nm			
	10	15	20	30
bar	0,3	0,75	1,8	3,1



Bores

Ø	Bores			
	10	15	20	30
mm	10	14	18	20



Allowable kinetic energy

Ø	Without cushion		Rubber bumper	Rotation time s/90°
	mJ	mJ	mJ	
10	-	-	0,25	0,2 ± 0,7
15	-	-	0,39	0,2 ± 0,7
20	25	-	-	0,2 ± 1
30	48	-	-	0,2 ± 1



Sensors recommended

DC 02 PM8 - DC 02 P2M - DC 03 PM8 - DC 03 P2M
DC 04 PM8 - DC 04 P2M - DC 05 PM8 - DC 05 P2M



Angle of rotation

90° = 80° ÷ 100°
180° = 170° ÷ 190°



Angle adjustnebt

± 5°



Reference Standard

1907/2006
REACH ✓

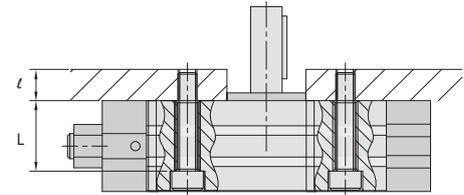
2011/65/CE
RoHS ✓

SILICON
FREE



Allowable kinetic energy

Ø	L	ℓ	Screw
10	13	8	M4 x 20
15	16	8	M4 x 25
20	22,5	12	M6 x 35
30	24,5	15	M8 x 40



CHARACTERISTICS

Fluids: Air (Lubrication not necessary).

Male Shaft

Mounting hole from 2 direction

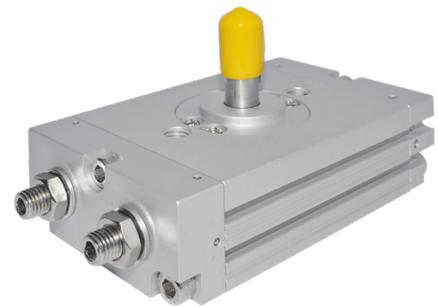
Easy angle adjusting mechanism (±5°)

Pin hole for positioning

Mounting sensor mountable on the both side

Easy Centering

Piping port: can be installed from one end



Series

R T 0 3 S

Ø mm

0 1 0

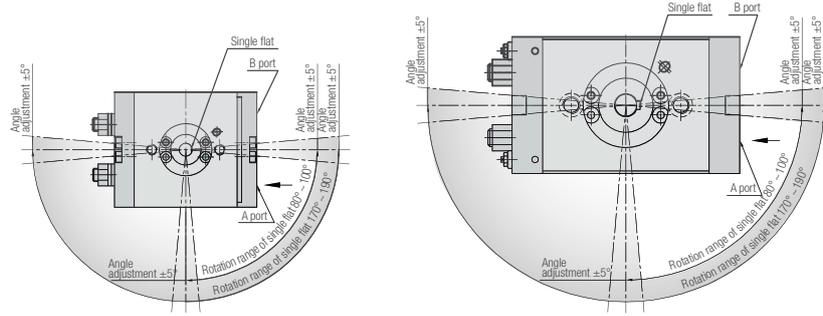
010 020
015 030

Rotation

0 9 0

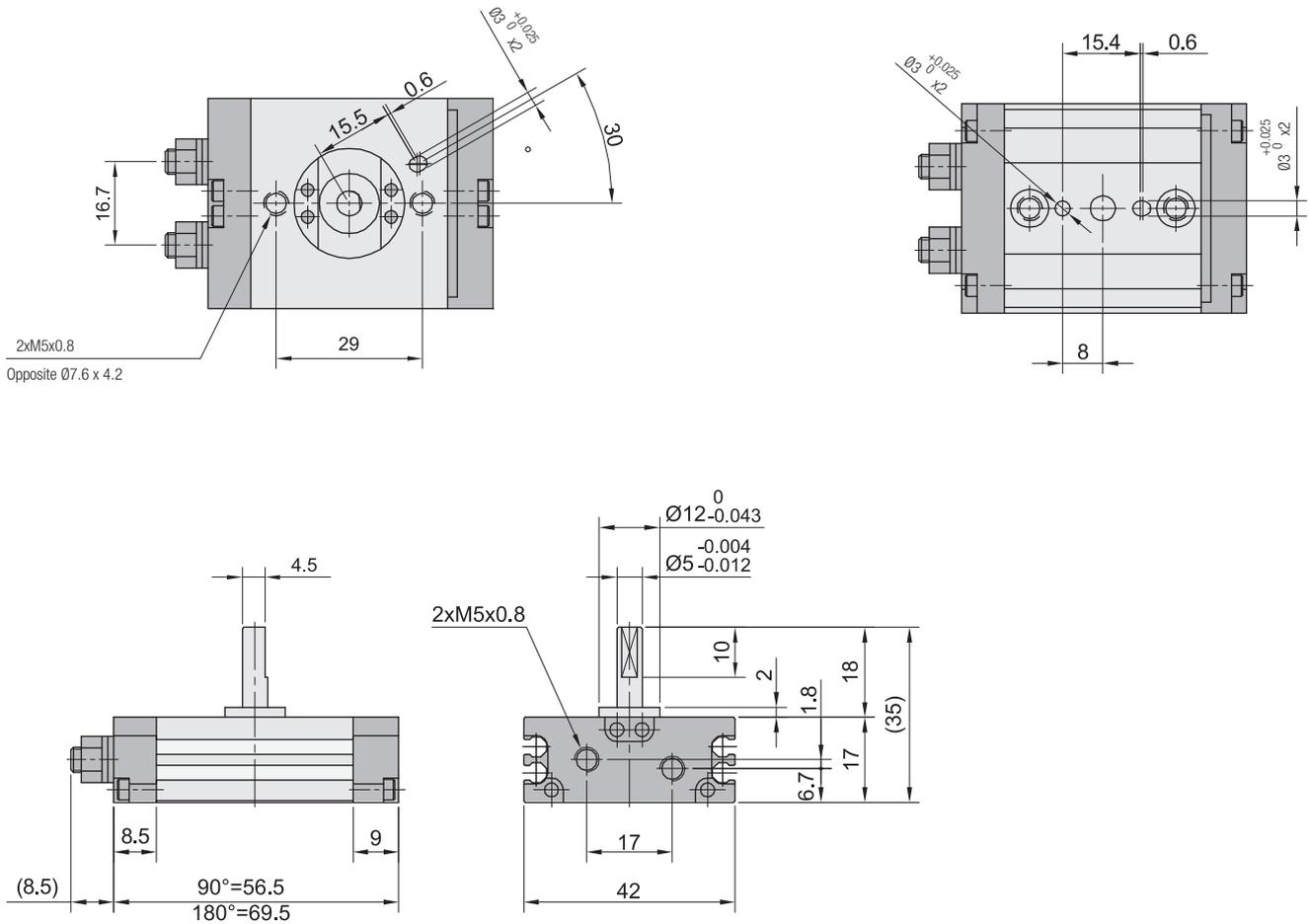
090°
180°

Rotation range example

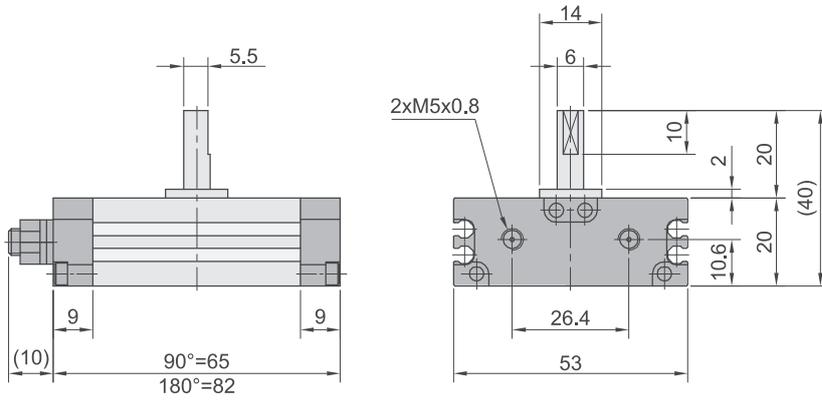
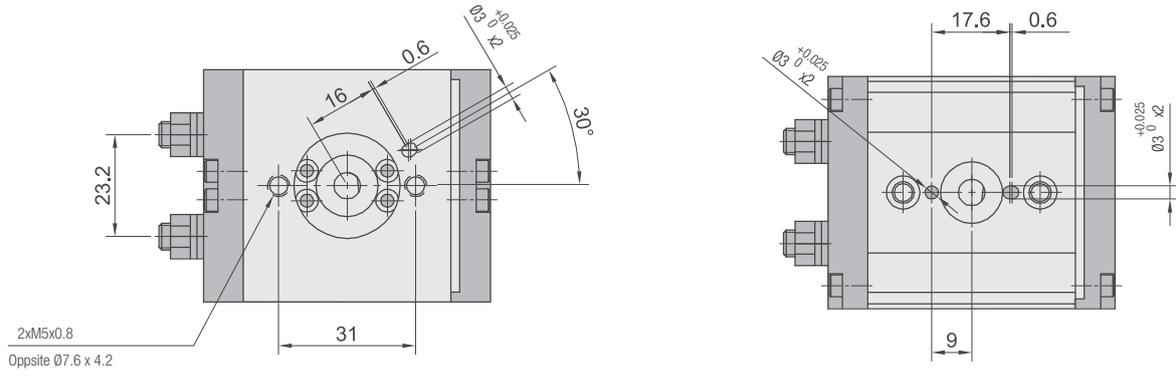


When pressurized from the port indicated by the arrow.

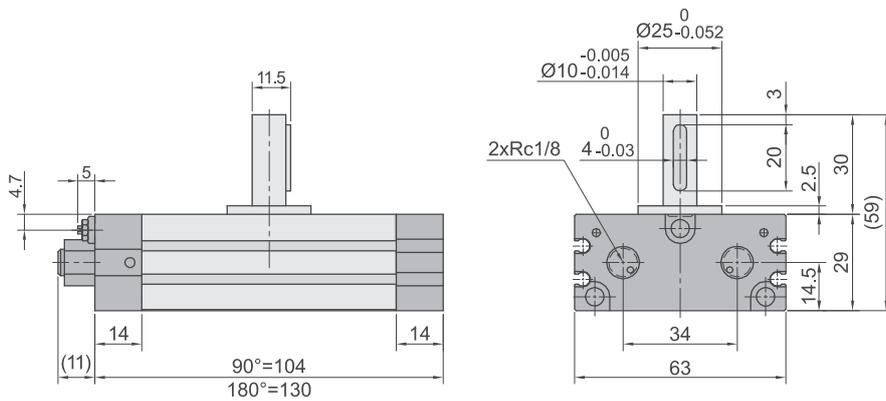
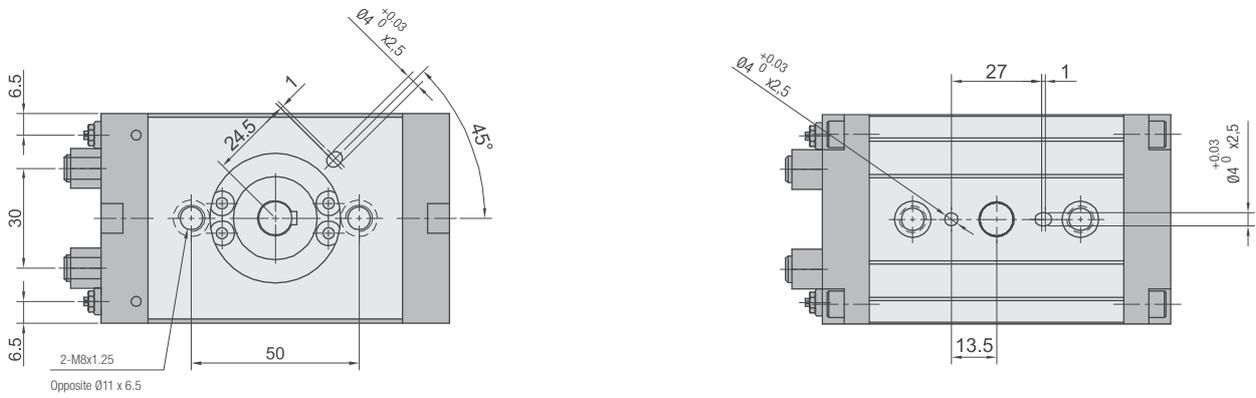
RT03S - 010



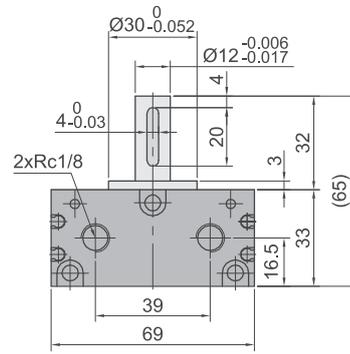
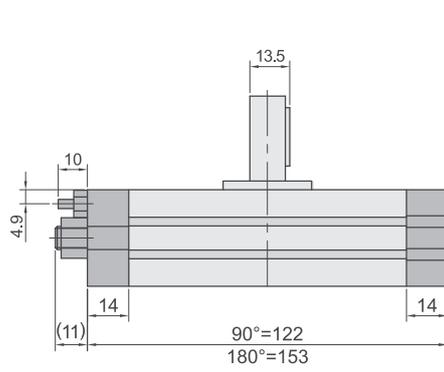
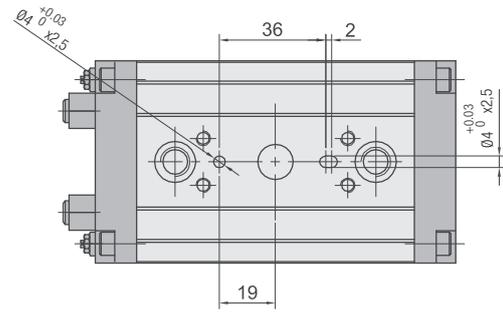
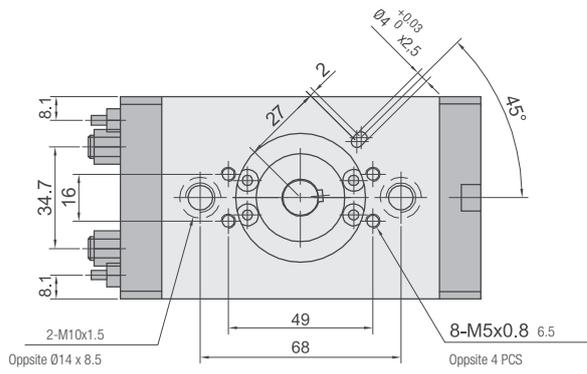
RT03S - 015



RT03S - 020



RT03S - 030



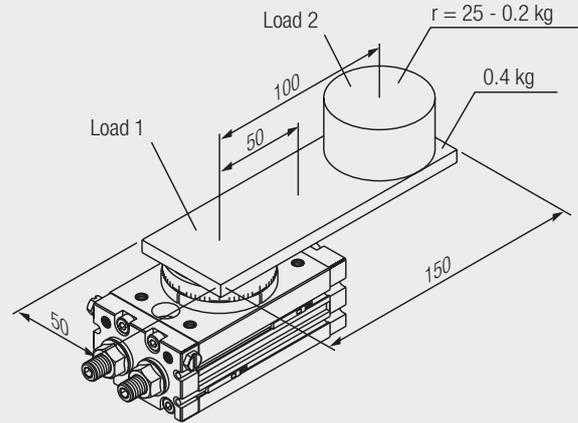
model selection steps - Select a model and follow next steps

KEY

P (MPa)	Working pressure	m (kg)	Mass of the load	ω (rad/s ²)	Angular acceleration
T (Nm)	Load type	μ	Friction coefficient	$\dot{\omega}$ (rad/s)	Angular speed
T _s (Nm)	Static Load	t (sec)	Rotation Time		
T _f (Nm)	Resistance Load	θ (rad)	Rotation Angle		
T _a (Nm)	Inertial Load	M (Nm)	Permitted Load		
T _c (Nm)	T _f +T _a Total Load	I (kgm ²)	Moment of Inertia		

Temporary selected Model:
 Working Pressure: 3 bar
 Mounting position: Verticale
 t = 6 s
 $\theta = 180^\circ$

RT01 010



1 Calculation of Inertial Moment I

Calculate the model of the total inertial load

I (kg·m²) = I₁ + I₂ + I₃ + ...

EXAMPLE

$$I_1 = 0,4 \cdot \frac{0,15^2 \cdot 0,05^2}{12} + 0,4 \cdot 0,05^2 = 0,001833 \text{ Kg} \cdot \text{m}^2$$

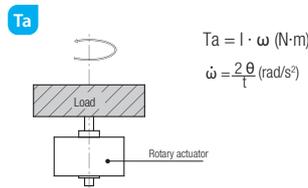
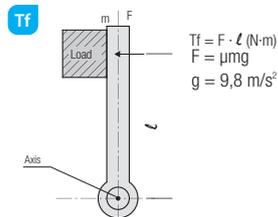
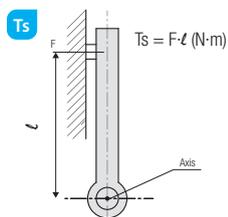
$$I_2 = 0,2 \cdot \frac{0,025^2}{2} + 0,2 \cdot 0,1^2 = 0,002063 \text{ Kg} \cdot \text{m}^2$$

$$I_{\text{tot}} = I_1 + I_2 = 0,003896 \text{ Kg} \cdot \text{m}^2$$

2 Calculation of Torque

Check Torque T necessary and correspondent to the load type and make sure it stays the effective torque range.

$T = T_a \times 10$ or $T = T_f \times (3 \div 5) + T_a \times 10$ T (Nm) < Effective torque OK



EXAMPLE

$$T_c = T_a \cdot 10 \quad T_a = 0,003896 \cdot \left(\frac{2\pi}{4}\right) = 0,0015 \text{ Nm}$$

$$T_o = I_{\text{tot}} \cdot \omega \quad T_c = 0,0015 \cdot 10 = 0,015 \text{ Nm}$$

$$\dot{\omega} = \frac{2 \cdot \theta}{t^2} \cdot \frac{\text{rad}}{\text{s}^2}$$

3

Rotation Time

It must respect times as per TAB.3. In the calculation, if time is longer than 2sec to make 90°, consider anyway a time of 2 sec to make 90°. Convert always into 90° to compare. For example, 6 sec/180° converted into 3sec/90°.

4

Calculation Kinetic Energy

Kinetic Energy of Load must respect the permissible values.

$$E = \frac{1}{2} \cdot I \cdot \omega^2 \quad E (J) < \text{Permissible energy OK}$$

EXAMPLE

$$E = \frac{1}{2} I \omega^2$$

$$\omega = \frac{2 \cdot \theta}{t}$$

$$E = \frac{1}{2} \cdot 0,003896 \cdot \left(\frac{2\pi}{4} \right)^2 = 0,048 J = 48 \text{ mJ}$$

5

Permissible Load Control

Check if Load applied to product respects the permissible range.
M < Permissible load OK

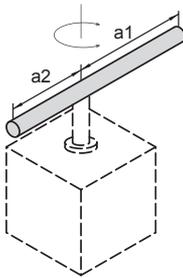
EXAMPLE

$$M = T_{b1} + T_{b2} = (0,4 \cdot 9,8 \cdot 0,05) + (0,2 \cdot 9,8 \cdot 0,1) = 0,392 \text{ Nm}$$

1

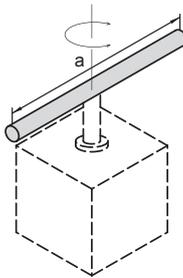
Calculation of Inertial Moment I

1 Shaft
Position of rotational axis:
Perpendicular to the shaft through one end.



$$I = m1 \cdot \frac{a1^2}{3} + m2 \cdot \frac{a2^2}{3}$$

2 Shaft
Position of rotational axis:
Through the shaft's center of gravity.

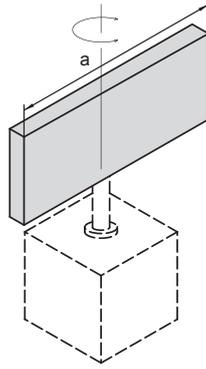


$$I = m1 \cdot \frac{a^2}{12}$$

1

3 Rectangular plate

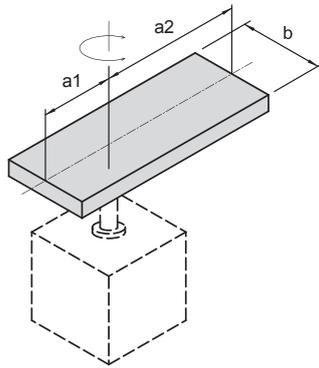
Position of rotational axis:
Through the plate's center of gravity



$$I = m \cdot \frac{a^2}{12}$$

4 Rectangular plate

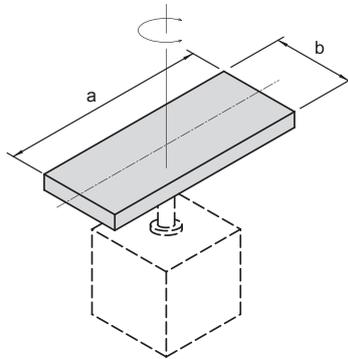
Position of rotational axis:
Perpendicular to the plate through one end (also the same in case of a thicker plate).



$$I = m \cdot \frac{4a_1^2 + b^2}{12} + \frac{4a_2^2 + b^2}{12}$$

5 Rectangular plate

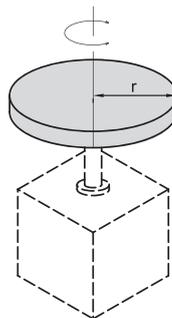
Position of rotational axis:
Through the center of gravity and perpendicular to the plate (also the same in case of a thicker plate).



$$I = m \cdot \frac{a^2 + b^2}{12}$$

6 Cylinder

Position of rotational axis: Central axis.

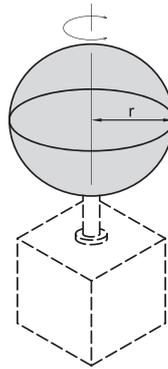


$$I = m \cdot \frac{r^2}{2}$$

1

7 Solid Sphere

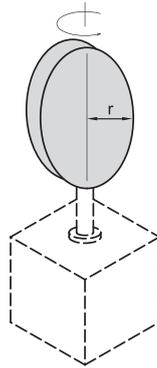
Position of rotational axis:
diameter.



$$I = m \cdot \frac{2r^2}{5}$$

8 Round plate

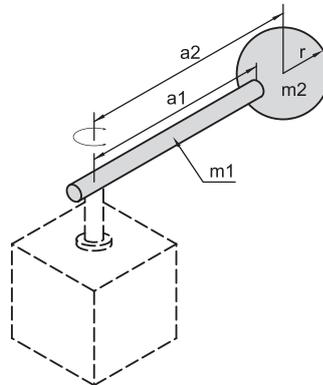
Position of rotational axis:
diameter.



$$I = m \cdot \frac{r^2}{4}$$

9 Carico alla fine della leva

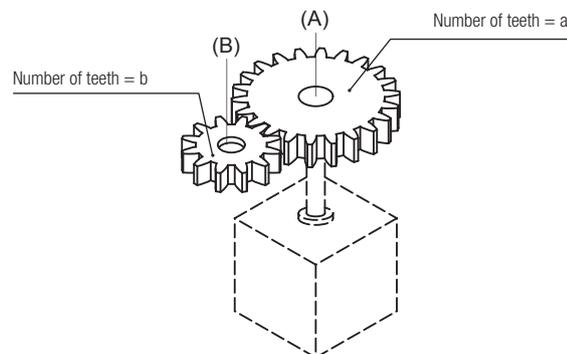
When shape of m2 is a sphere refer to 7, and $K = M2 \cdot \frac{2r^2}{5}$



$$I = m1 \cdot \frac{a1^2}{3} + m2 \cdot a2^2 + K$$

10 Gear Transmission

- Find the inertial moment IB for the rotation of shaft (B).
- Next, IB is entered to find IA to find IA the inertial moment for the rotation of shaft (A) as $I_A = \left(\frac{a}{b}\right) \cdot I_B$



$$I = m \cdot \frac{r^2}{5}$$

2
Torque Calculation
SERIES RT01

Ø	Operating Pressure Bar									
	1	2	3	4	5	6	7	8	9	10
10	0,18	0,36	0,53	0,71	0,89	1,07	1,25	1,42	1,60	1,78
20	0,37	0,73	1,10	1,47	1,84	2,20	2,57	2,93	3,29	3,66
30	0,55	1,09	1,64	2,18	2,73	3,19	3,82	4,37	4,91	5,45
50	0,9	1,85	2,78	3,71	4,64	5,57	6,50	7,43	8,35	9,28
70	1,36	2,72	4,07	5,43	6,79	8,15	9,50	10,9	12,2	13,6
100	2,03	4,05	6,08	8,11	10,1	12,2	14,2	16,2	18,2	20,3

(Unit: N • m)

SERIES RT03

Ø	Operating Pressure Bar									
	1	2	3	4	5	6	7	8	9	10
10	-	0,09	0,18	0,2	0,30	0,36	0,42	-	-	-
15	-	0,22	0,45	0,60	0,75	0,90	1,04	-	-	-
20	0,37	0,55	1,10	1,47	1,84	2,20	2,57	2,93	3,29	3,66
30	0,62	0,94	1,87	2,49	3,11	3,74	4,37	4,99	5,60	6,24

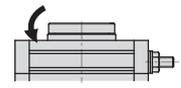
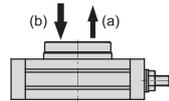
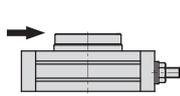
(Unit: N • m)

3
Rotation Time - Allowable Kinetic Energy
SERIES RT01

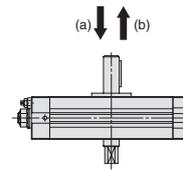
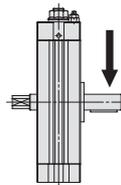
Ø	Allowable Kinetic Energy (mJ)		Rotation time adjustment range for stable operation (s/90°)
	without cushion	rubber cushion	
10	7	0,25	0,2 ÷ 1,0
20	25	0,39	
30	48	-	
50	81	-	
70	240	-	0,2 ÷ 1,5
100	320	-	0,2 ÷ 2,0

SERIES RT03

Ø	Allowable Kinetic Energy (mJ)		Rotation time adjustment range for stable operation (s/90°)
	without cushion	rubber cushion	
10	7	0,25	0,2 ÷ 0,7
15	25	0,39	0,2 ÷ 0,7
20	48	-	0,2 ÷ 1
30	81	-	0,2 ÷ 1

5
Effective Load
SERIES RT01


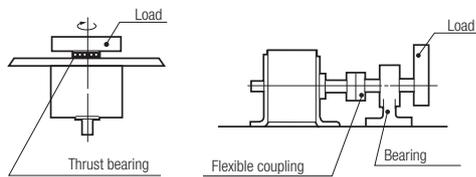
Ø	Allowable radial load	Allowable thrust load		Allowable moment
	N	(a)	N	(b)
10	78	74	78	2,4
20	147	137	137	4,0
30	196	197	363	5,3
50	314	296	451	9,7
70	333	296	476	12,0
100	390	493	708	18,0

SERIES RT03


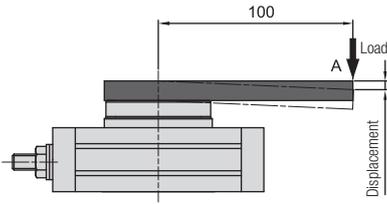
Ø	Allowable radial load	Allowable thrust load	
	N	(a)	N
10	14,7	15,7	7,8
15	19,6	19,6	9,8
20	49	49	29,4
30	78	98	49

Do not allow the load and moment applied to the table to exceed the allowable values shown in the tables.
 (Operation above the allowable values can cause adverse effects on service life, such as play in the table and loss of accuracy).

In order to further improve the operating conditions, a method such as that shown in below drawing is recommended so that a direct load is not applied to the shaft.

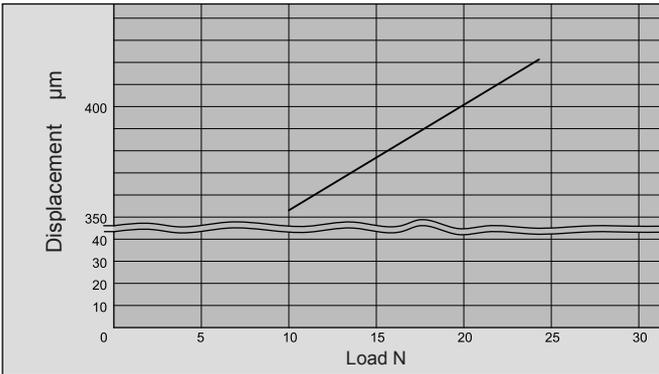


RT01 - Table displacement (reference values)

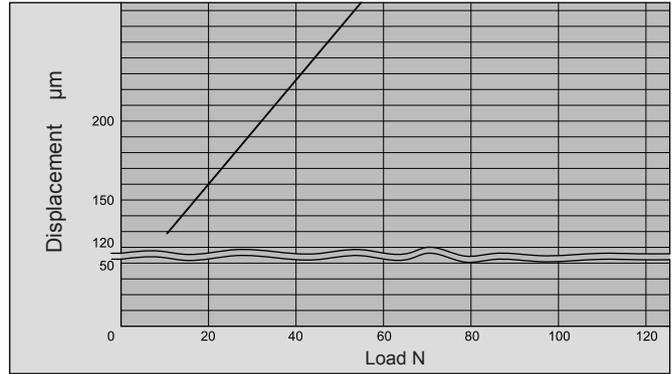


The following graphs show the displacement at point A, which is 100 mm apart from the center of rotation, where the load is applied.

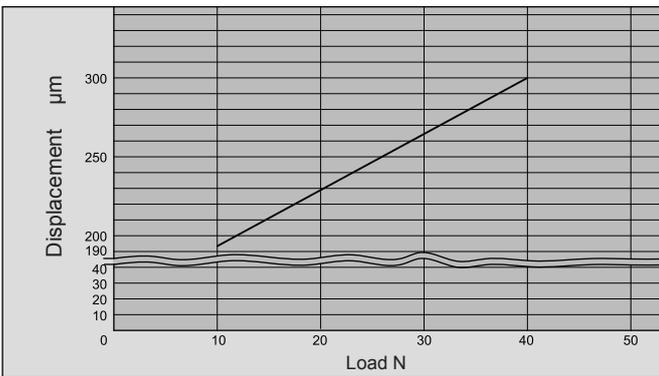
RT01 010



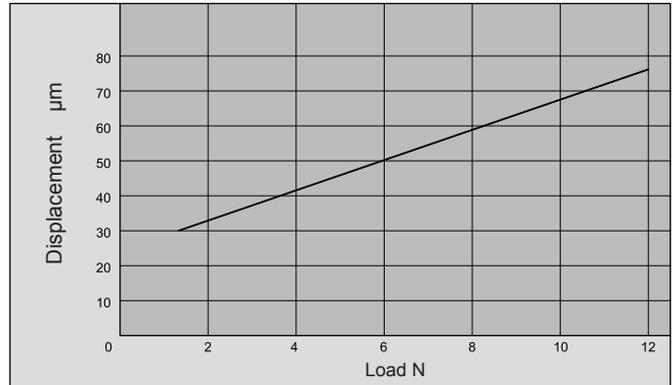
RT01 050



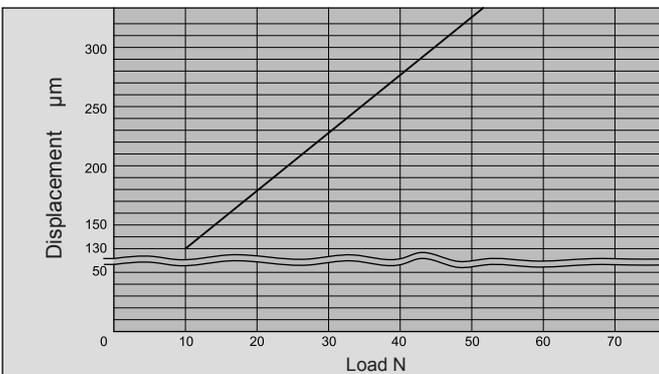
RT01 020



RT01 070



RT01 030



RT01 100

