

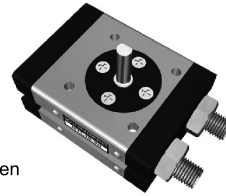
## Rotary actuators

### RTL

Male Pivot Gear (Standard Type)

### RTL-D

Male Pivot Gear (Double End Rod Type)

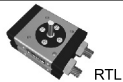




- The body is manufactured in anodized aluminium alloy, and has been designed looking at the harmonious aesthetic development.
- Pinion and rack produced from carbon steel reduces backlash within the mechanism.
- Rotation adjustment screw.

## Specification

Type	RTL		RTL-D	
Bore sizes (mm)	φ 16	φ 20	φ 25	φ 30
Standard rotation	90±5° · 180±5°			
Rotating shaft dia. (mm)	φ 6	φ 8	φ 10	φ 12
Initial position of slot (mm)	See dimensional feature			
Power fluid	Filtered air with or without lubrication			
The range of pressure (MPa)	0.13~0.7			
The range of temperature (°C)	-10~+60			
Max. allowable axial thrust (kg)	0.013	0.022	0.041	0.060

## How to order

<b>RTL</b>	<b>20</b>	/	<b>90</b>	<b>D</b>	-	<b>LN01D</b>	×	<b>2</b>
Type	Bore		Rotation	End rod type		Sensor switch		Quantity
	16—φ 16mm 20—φ 20mm 25—φ 25mm 30—φ 30mm		90—90° 180—180°	 D: Double end rod type		 LN01D: Suited for φ 16~φ 30		1: 1pc 2: 2pcs

Note:

- 1.Can choose NPN or PNP type (3-Wire type, 24VDC).
- 2.Can choose plug-in cable.
- 3.For details see page 4-1.3.

## Compressed air consumption for a complete cycle



Unit: L / cycle

Type	Rotation	Operating pressure (MPa)									
		0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0
RTL 16	90°	0.0075	0.0113	0.0150	0.0188	0.0225	0.0263	0.0300	0.0338	0.0375	0.0413
	180°	0.0150	0.0226	0.0300	0.0376	0.0450	0.0526	0.0600	0.0676	0.0751	0.0826
RTL 20	90°	0.0157	0.0235	0.0313	0.0391	0.0470	0.0548	0.0626	0.0704	0.0782	0.0860
	180°	0.0314	0.0470	0.0626	0.0783	0.0939	0.1095	0.1251	0.1408	0.1564	0.1720
RTL 25	90°	0.0307	0.0459	0.0612	0.0765	0.0917	0.1070	0.1222	0.1375	0.1527	0.1680
	180°	0.0614	0.0919	0.1223	0.1529	0.1834	0.2140	0.2445	0.2750	0.3055	0.3360
RTL 30	90°	0.0552	0.0827	0.1101	0.1376	0.1651	0.1926	0.2201	0.2475	0.2750	0.3024
	180°	0.1104	0.1654	0.2203	0.2753	0.3302	0.3852	0.4401	0.4950	0.5500	0.6050

Type	RTL			
Bore (mm)	16	20	25	30
Constant K	0.1047	0.1396	0.1744	0.2181

## The method of calculation (Compressed air consumption)

$$Q = 2 \times K \times A \times n \times Dg \times \frac{P + 0.101}{0.101} \times 10^{-6}$$

Q: Compressed air consumption (L / cycle)

A: Piston area (mm<sup>2</sup>)

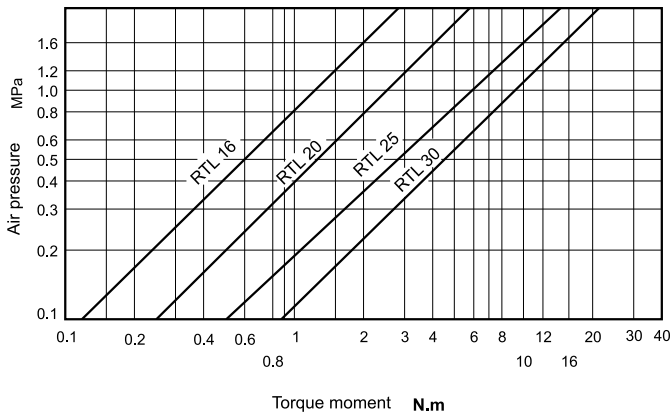
Dg: Rotation

P: Operating pressure (MPa)

K: Constant

n: Cycle of operation (cycle / min)

## Output torque table



DA

DP

DS

DQ

DB

DN

BN

ST

NT

DU

DJ

TA

GP

GS

GM

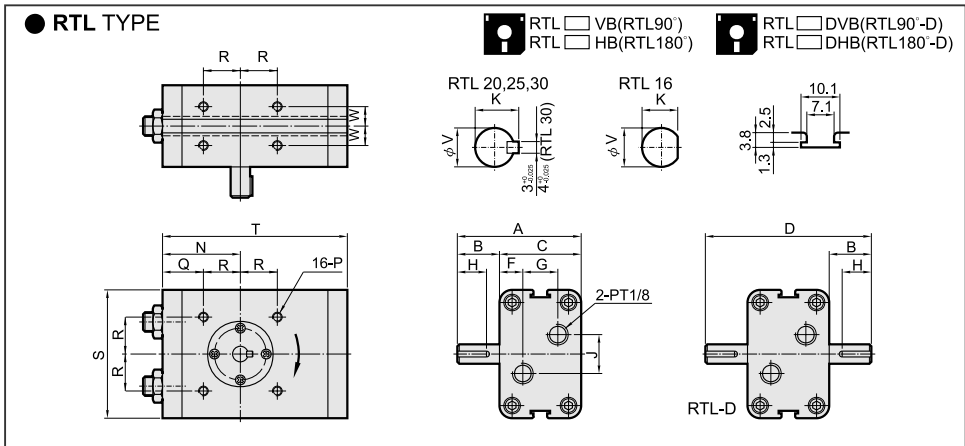
GT

RT

CT

CH

## Dimensional features

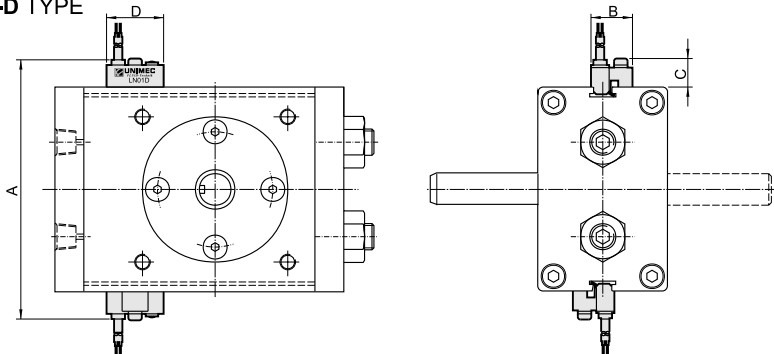


## Dimensional Table

Type	A	B	C	D	F	G	H	J	K	N	P	Q	R	S	T	V	W	
RTL16/90	52	20	32	72	11	10	10	10	16	5.5	30.5	M5×0.8, dp7	14.5	16	52	70	6	8
RTL16/180	52	20	32	72	11	10	10	10	16	5.5	35.5	M5×0.8, dp7	19.5	16	52	86	6	8
RTL20/90	61	25	36	86	11	14	19	14	9.2	34.5	M5×0.8, dp7	17.5	17	56	81	8	9	
RTL20/180	61	25	36	86	11	14	19	14	9.2	44	M5×0.8, dp7	27	17	56	103	8	9	
RTL25/90	72	30	42	102	12	18	19	20	11.2	40	M5×0.8, dp7	21	19	66	94	10	10	
RTL25/180	72	30	42	102	12	18	19	20	11.2	52	M5×0.8, dp7	33	19	66	120	10	10	
RTL30/90	90	40	50	130	12	26	19	36	13.2	50	M6×1.0, dp8	22	28	78	110	12	15	
RTL30/180	90	40	50	130	12	26	19	36	13.2	71	M6×1.0, dp8	43	28	78	150	12	15	

## Installation of sensor switches

● **RTL RTL-D TYPE**



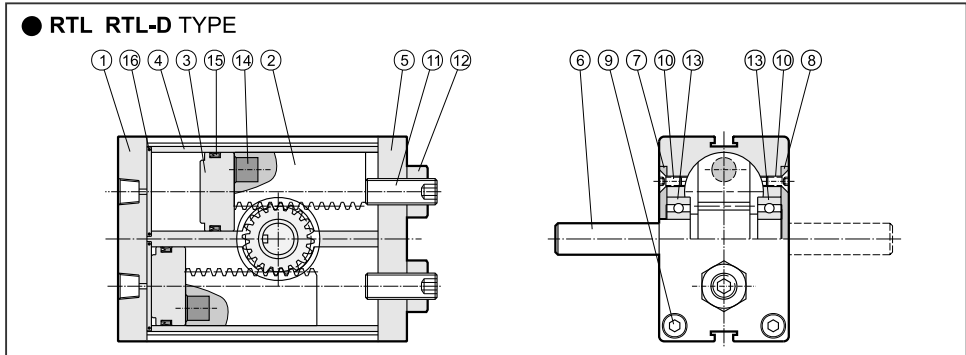
## Dimensional Table

Bore	Sensor switch	A	B	C	D
φ 16	LN01D	74	16	11	22
φ 20	LN01D	78	16	11	22
φ 25	LN01D	88	16	11	22
φ 30	LN01D	100	16	11	22

How to order the seal kit

RTLSK

Bore	Seal kit
16	RTLSK16 - Including No.15,16
20	RTLSK20 - Including No.15,16
25	RTLSK25 - Including No.15,16
30	RTLSK30 - Including No.15,16



### Parts List

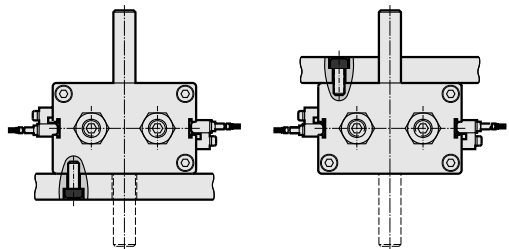
No.	Part name	Quantity	No.	Part name	Quantity	No.	Part name	Quantity
1	End cover	1	7	End cover	1	13	Bearing	2
2	Rack	2	8	End cover	1	14	Magnet	2
3	Piston	2	9	Hexagon socket head screw	8	15	Piston packing	2
4	Cylinder barrel	1	10	Flat socket head screw	8	16	Cover gasket	2
5	End cover	1	11	Adjusting screw	2	17	Key(RTL_D=2)	1
6	Piston shaft	1	12	Lock nut	2			

### Rotary actuators weight

Unit: kg

Bore	RTL		RTL-D		Sensor switch
	90°	180°	90°	180°	
φ 16	0.32	0.38	0.33	0.39	0.033
φ 20	0.43	0.52	0.44	0.53	0.033
φ 25	0.67	0.80	0.69	0.82	0.033
φ 30	1.13	1.47	1.17	1.51	0.033

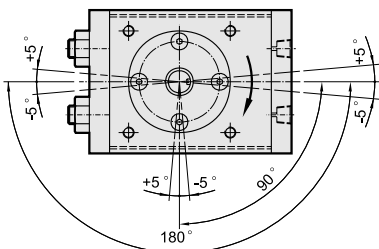
### Mounting type



Bottom mounting

Top mounting

### Rotating direction and adjustable angle



DA

DP

DS

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TA

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RT

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CH

## Rotary actuators

### RTH

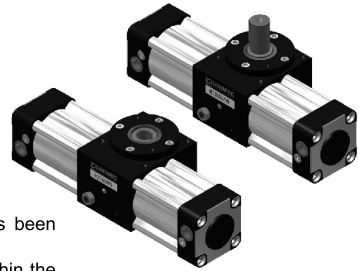
Male Pivot Gear (Standard Type)

### RTH-D

Male Pivot Gear (Double End Rod Type)

### RTF

Female Pivot Gear







- The body is manufactured in anodized aluminium alloy, and has been designed looking at the harmonious aesthetic development.
- Pinion and rack produced from carbon steel reduces backlash within the mechanism.
- Rotation adjustment screw.

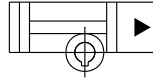
## Specification

Type	RTF . RTH . RTH-D		
Bore sizes (mm)	φ 40	φ 63	φ 80
Standard rotation	90±5° , 180±5°		
Rotating shaft dia. (mm)	φ 16	φ 24	φ 28
Initial position of slot (mm)	See dimensional feature		
Power fluid	Filtered air with or without lubrication		
The range of pressure (MPa)	0.13-0.7		
The range of temperature (°C)	-10~+60		
Max. allowable axial thrust (kg)	10	12	20
Cushion angle	74°	75°	80°

## How to order

<b>RTH</b>	<b>40</b> / <b>90</b>	<b>D</b>	<b>LN01A</b>	<b>2</b>
Type	Bore	Rotation	Sensor switch	Quantity
	40—φ 40mm 63—φ 63mm 80—φ 80mm	90— 90° 180—180°		1: 1pc 2: 2pcs
			LN01A: Suited for φ 40 LN02A: Suited for φ 63 LN03A: Suited for φ 80	
		D: Double end rod type	Note: 1.Can choose NPN or PNP type (3-Wire type, 24VDC). 2.Can choose plug-in cable. 3.For details see page 4-1.1.	

## Compressed air consumption for a complete cycle



Unit: L / cycle

Type	Rotation	Operating pressure (MPa)									
		0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0
RTH40 RTF40	90°	0.1571	0.2352	0.3133	0.3915	0.4696	0.5477	0.6259	0.7040	0.7821	0.8603
	180°	0.3141	0.4704	0.6267	0.7829	0.9392	1.0955	1.2517	1.4080	1.5643	1.7205
RTH63 RTF63	90°	0.4383	0.6564	0.8744	1.0925	1.3105	1.5286	1.7466	1.9647	2.1828	2.4008
	180°	0.8766	1.3127	1.7488	2.1850	2.6211	3.0572	3.4933	3.9294	4.3655	4.8016
RTH80 RTF80	90°	0.8480	1.2698	1.6917	2.1135	2.5354	2.9572	3.3791	3.8009	4.2228	4.6447
	180°	1.6959	2.5396	3.3834	4.2271	5.0708	5.9145	6.7582	7.6019	8.4456	9.2893

Type	RTH RTF		
Bore (mm)	40	63	80
Constant K	0.3491	0.3927	0.4712

## The method of calculation (Compressed air consumption)

$$Q = 2 \times K \times A \times n \times Dg \times \frac{P + 0.101}{0.101} \times 10^{-6}$$

Q: Compressed air consumption (L / cycle)

A: Piston area (mm<sup>2</sup>)

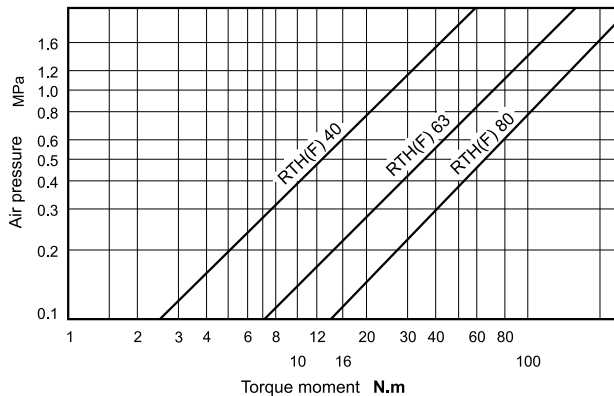
Dg: Rotation

P: Operating pressure (MPa)

K: Constant

N: Cycle of operation (cycle / min)

## Output torque table



DA

DP

DS

DQ

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RT

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CH

# RTH.RTF Inside Structure and Parts List

## How to order the seal kit

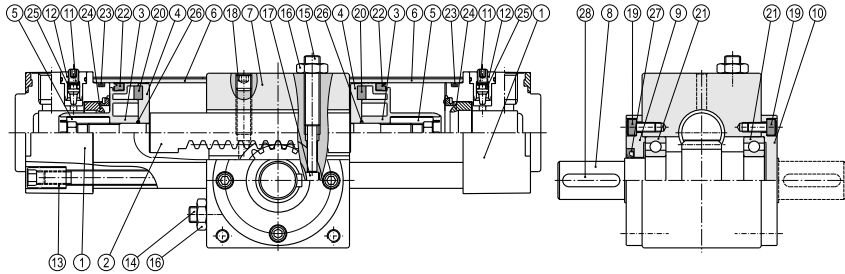
RT  SK

H  
F

Bore	Seal kit
40	RTHSK40 - Including No.22,23,24,26,27
63	RTFSK63 - Including No.22,23,24,26,27
80	RTFSK80 - Including No.22,23,24,26,27

Bore	Seal kit
40	RTFSK40 - Including No.22,23,24,26,27
63	RTFSK63 - Including No.22,23,24,26,27
80	RTFSK80 - Including No.22,23,24,26,27

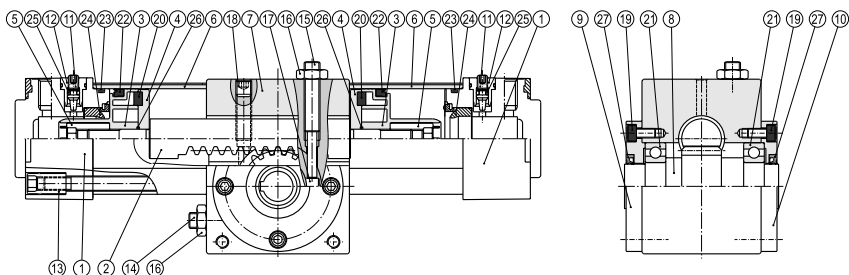
### ● RTH RTH-D TYPE



### Parts List

No.	Part name	Quantity	No.	Part name	Quantity	No.	Part name	Quantity
1	End cap	2	11	Cushion needle	2	21	Ball bearing	2
2	Rack	1	12	Cushion plug	2	22	Piston packing	2
3	Piston	2	13	Tie bolt	8	23	Cylinder gasket	2
4	Magnet holder	2	14	Adjusting screw	1	24	Cushion packing	2
5	Piston nut	2	15	Adjusting screw	1	25	O-ring	2
6	Cylinder tube	2	16	Lock nut	2	26	Piston gasket	2
7	Housing	1	17	Stopper pin	1	27	Rod packing	1
8	Pinion shaft	1	18	Set screw	1	28	Key(RTH_D=2)	1
9	End cover	1	19	Hexagon socket head screw	8			
10	End cover	1	20	Magnet	2			

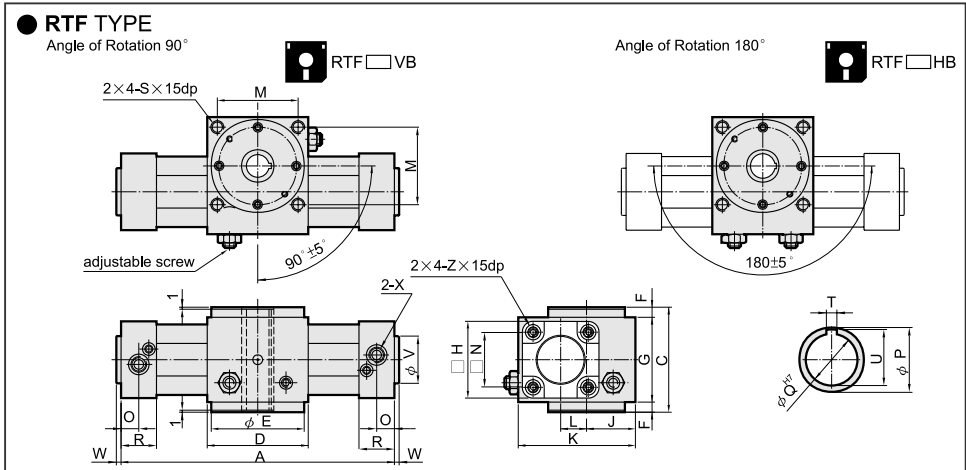
### ● RTF TYPE



### Parts List

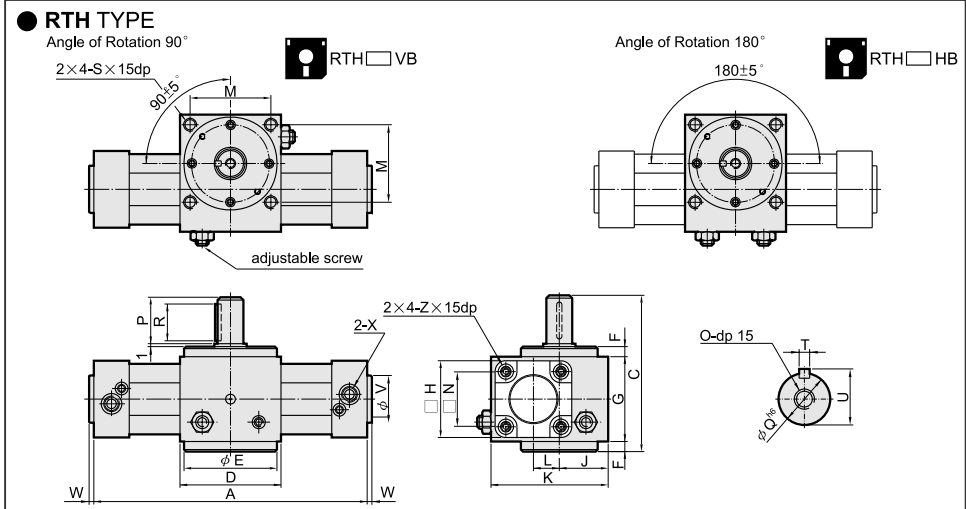
No.	Part name	Quantity	No.	Part name	Quantity	No.	Part name	Quantity
1	End cap	2	10	End cover	1	19	Hexagon socket head screw	8
2	Rack	1	11	Cushion needle	2	20	Magnet	2
3	Piston	2	12	Washer	2	21	Ball bearing	2
4	Magnet holder	2	13	Tie bolt	8	22	Piston packing	2
5	Piston nut	2	14	Adjusting screw	1	23	Cylinder gasket	2
6	Cylinder tube	2	15	Adjusting screw	1	24	Cushion packing	2
7	Housing	1	16	Lock nut	2	25	O-ring	2
8	Pinion shaft	1	17	Stopper pin	1	26	Piston gasket	2
9	End cover	1	18	Set screw	1	27	Rod packing	2

## Dimensional features



### Dimensional Table

Type	A		C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Z
	90°	180°																						
RTF40	263	326	81	75	72	8	65	53	37.5	93	27.5	60	38	15	25	14	30	M6	5	16.5	35	4	G1/4	M6
RTF63	306	377	95	90	82	10	75	75	42.5	110	30	70	56.5	16	30	19	32	M8	6	22	45	5	G3/8	M8
RTF80	343	428	119	105	96	12	95	95	51.5	135	36	82	72	19	35	24	38	M10	6	27.5	45	6	G3/8	M10



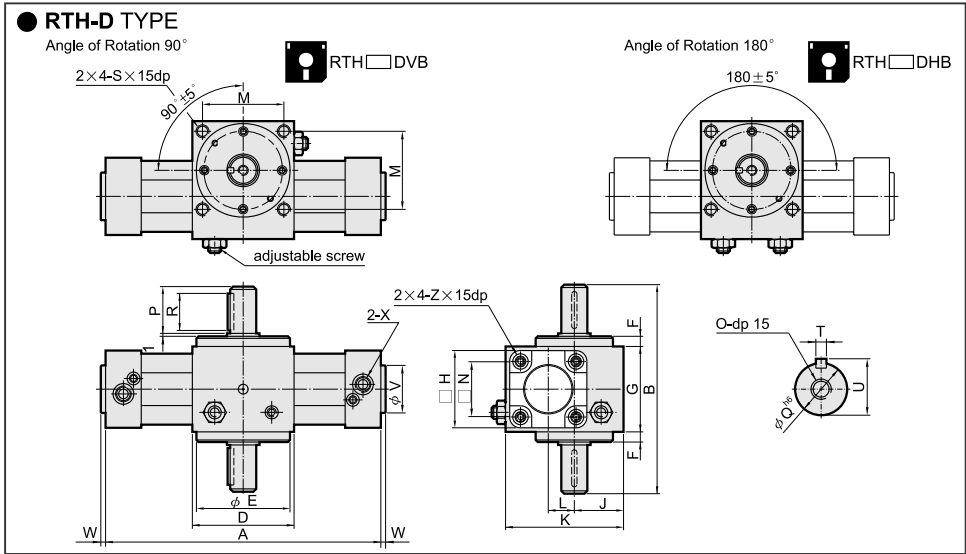
### Dimensional Table

Type	A		C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Z
	90°	180°																						
RTH40	263	326	112	75	72	8	65	53	37.5	93	27.5	60	38	M5	30	16	25	M6	5	18	35	4	G1/4	M6
RTH63	306	377	138	90	82	10	75	75	42.5	110	30	70	56.5	M8	42	24	36	M8	8	27	45	5	G3/8	M8
RTH80	343	428	170	105	96	12	95	95	51.5	135	36	82	72	M8	50	28	45	M10	8	31	45	6	G3/8	M10

- DA
- DP
- DS
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- RT
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- CH



## Dimensional features

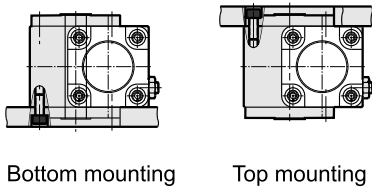


## Dimensional Table

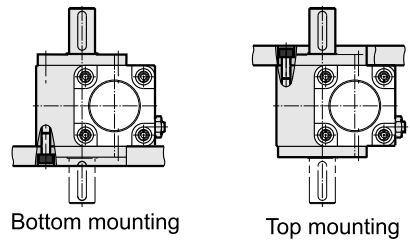
Type	A		B	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Z
	90°	180°																						
RTH40-D	263	326	143	75	72	8	65	53	37.5	93	27.5	60	38	M5	30	16	25	M6	5	18	35	4	G1/4	M6
RTH63-D	306	377	181	90	82	10	75	75	42.5	110	30	70	56.5	M8	42	24	36	M8	8	27	45	5	G3/8	M8
RTH80-D	343	428	221	105	96	12	95	95	51.5	135	36	82	72	M8	50	28	45	M10	8	31	45	6	G3/8	M10

## Mounting type

### ● RTF TYPE

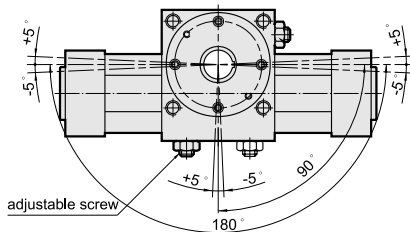


### ● RTH RTH-D TYPE

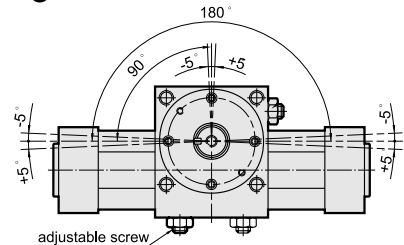


## Rotating direction and adjustable angle

### ● RTF TYPE

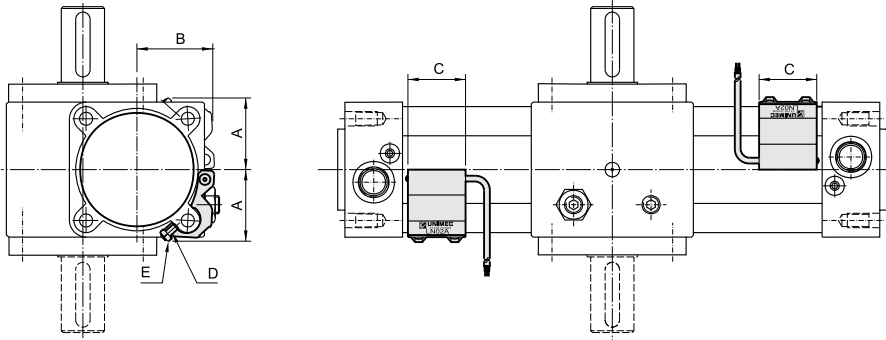


### ● RTH RTH-D TYPE

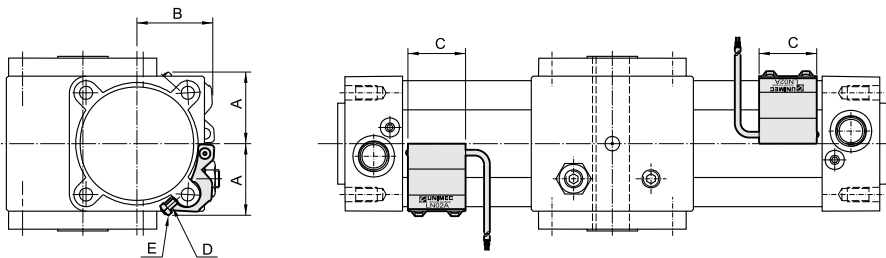


## Installation of sensor switches

### ● RTH RTH-D TYPE



### ● RTF TYPE



### Dimensional Table

Bore	Sensor switch	A	B	C	D	E
φ 40	LN01A	29	32	32	M4 × 12L	M4
φ 63	LN02A	40	43	32	M4 × 12L	M4
φ 80	LN03A	49.5	52	32	M4 × 12L	M4

### Cylinder weight

Bore	RTH		RTH-D		RTF		Sensor switch
	90°		180°		90°		
	180°		90°		180°		
φ 40	3.00	3.10	3.05	3.15	2.84	2.94	0.065
φ 63	5.40	5.80	5.55	5.95	5.07	5.47	0.066
φ 80	9.75	10.30	9.99	10.54	9.19	9.74	0.086

Unit: kg

DA

DP

DS

DQ

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DN

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RT

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## Kinetic Energy Of Rotation motion

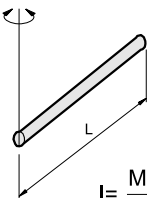
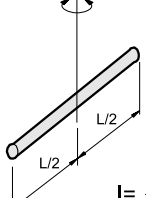
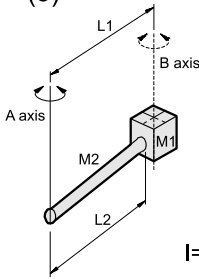
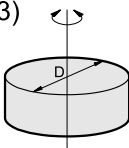
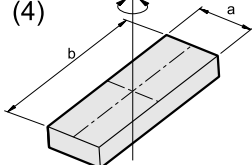
$$E = \frac{1}{2} I \omega^2$$

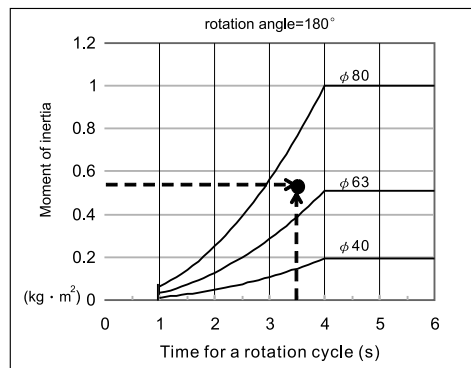
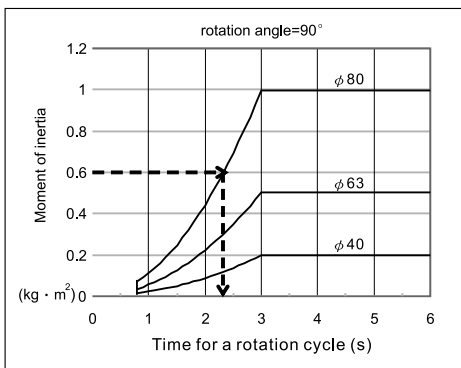
E=Kinetic Energy (J)

I=Moment Of Inertia (Kg · m<sup>2</sup>)

ω=Angle Speed (rad/s)

## Equation Table moment of inertia

<p>(1)</p>  $I = \frac{M L^2}{3}$	<p>(2)</p>  $I = \frac{M L^2}{12}$	<p>(5)</p>  $I = I_1 + M_1 L_1^2 + \frac{M_2 L_2^2}{3}$ <p><math>I_1</math> = Obtain the center of gravity of the load (<math>M_1</math>) as <math>I_1</math>, a provisional shaft(B).</p> <p><math>I(I_1)</math>=Moment Of Inertia (Kg · m<sup>2</sup>)</p> <p><math>M(M_1, M_2)</math>=Load mass (Kg)</p> <p>L, a, b=Side Length (m)</p> <p>D=Diameter (m)</p>
<p>(3)</p>  $I = \frac{M D^2}{8}$	<p>(4)</p>  $I = \frac{M}{12} (a^2 + b^2)$	



How to read the graph: only when the dimension of the load is ....

Example 1: When there are constraints for the moment of inertia of load, but not for rotation time. From "rotation angle=90°", RT\_80, to operate at the load moment of inertia 0.6 kg · m<sup>2</sup>: RT\_80 will be 2.3 seconds or higher.

Example 2: When there are constraints for the moment of inertia of load and rotation time. From "rotation angle=180°", to operate at the load moment of inertia 0.5 kg · m<sup>2</sup> and at the rotation time setting of 3.5 seconds: The model will be RT\_80.