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KOGANEI

ACTUATORS GENERAL CATALOG

ROTARY ACTUATORS VANE TYPE RAK SERIES CONTENTS

Domestic sales only

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Caution

Before use, be sure to read the "Safety Precautions" on p. 57.

**A medium- to large-size product range offers easy application and wide variety.
Rotary actuator vane type demonstrates superior performance even at low pressure
and low speeds.**

RAK Series

■ The medium- and large-sized rotary actuators available in single vane and double vane types.

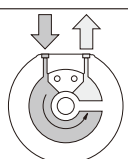
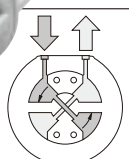
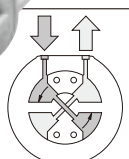
Achieves an effective high torque of 4.7~201.52N·m [3.5~148.6ft·lbf] with a line-up of 3 swing angles, 90°, 180°, and 270°. Moreover, sensor switches, shock absorbers, and other sub-units enable diversified equipment design through easy application and easy selection.

■ Ensures stable operation and high durability.

A highly rigid vane rod and damper mechanism are built-in. Moreover, the superior sealing mechanism demonstrates durability and achieves low friction with low air leakage. And mounting a shock absorber unit makes it possible to handle even heavier loads.



Basic Model and Configuration

Rotary actuator single vane type RAK Series		Rotary actuator double vane type RAKD Series	
			
			
RAK50 Nominal torque 4.7N·m [3.5ft·lbf] RAK150 Nominal torque 14.7N·m [10.8ft·lbf] RAK300 Nominal torque 27.94N·m [20.6ft·lbf] RAK800 Nominal torque 100.32N·m [74.0ft·lbf]		RAKD50 Nominal torque 10.19N·m [7.5ft·lbf] RAKD150 Nominal torque 34.32N·m [25.3ft·lbf] RAKD300 Nominal torque 66.68N·m [49.2ft·lbf] RAKD800 Nominal torque 201.52N·m [148.6ft·lbf]	

● With sensor switch unit



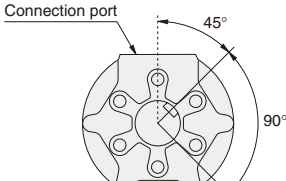
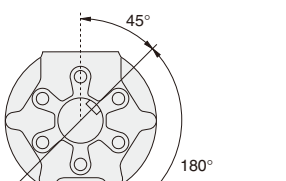
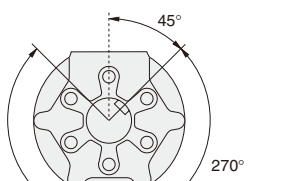
● With shock absorber unit



● With sensor switch and shock absorber unit

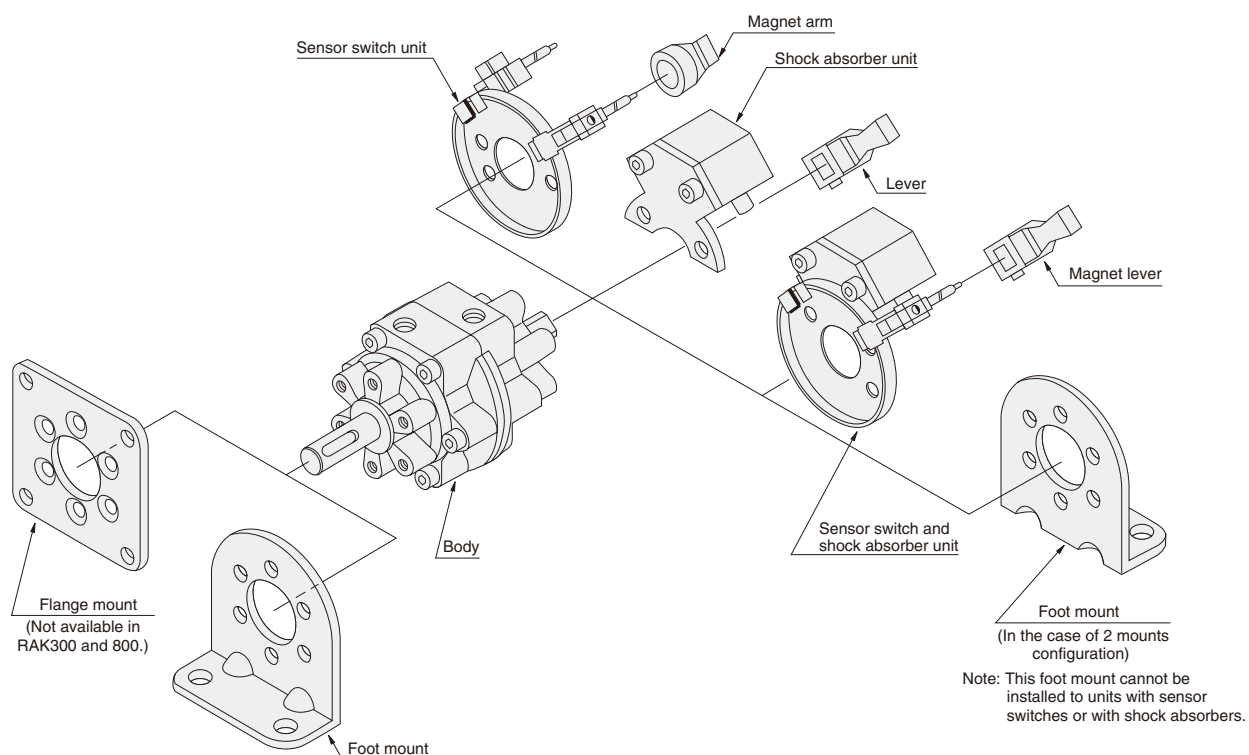


Relationship between Swing Angle and Keyseat Location (Starting Point of Swing: 45°)

90° Specification ^{Note}	180° Specification	270° Specification
 Starting point of swing: 45°	 Starting point of swing: 45°	 Starting point of swing: 45°

Note: Double vane type available for 90° specification only.

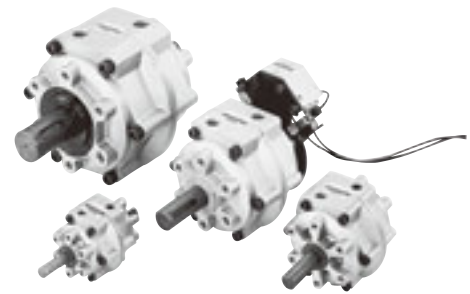
The RAK series responds to system design with flexible applications.



Mounting Type

■ Nose mount (direct front mounting)	■ Foot mount (using foot mounting bracket)
	
■ Flange mount (using flange mounting bracket)	
	

ROTARY ACTUATORS



Specifications

● Single vane type

Item	Basic model	RAK50	RAK150	RAK300	RAK800
Operation type		Double acting single vane type			
Effective torque ^{Note1}	N·m [ft·lbf]	4.7 [3.5]	14.7 [10.8]	27.94 [20.6]	100.32 [74.0]
Swing angle (Tolerance $^{+3}_{0}$ °)		90°, 180°, 270°			
Media		Air			
Port size		Rc1/8	Rc1/4	Rc3/8	Rc1/2
Operating pressure range	MPa [psi.]	0.2~1 [29~145]			
Proof pressure	MPa [psi.]	1.5 [218]			
Operating temperature range (Atmosphere and media)	°C[°F]	5~60 [41~140]			
Internal capacity ^{Note2}	cm ³ [in. ³]	51 [3.11] (61 [3.72])	146 [8.91] (179 [10.92])	244 [14.89] (352 [21.48])	754 [46.01] (1036 [63.22])
Allowable energy	mJ [in·lbf]	49 [0.434]	225.4 [1.995]	1078 [9.541]	3920 [34.70]
Allowable radial load	N [lbf.]	588 [132]	1176 [264]	1960 [441]	4900 [1102]
Allowable thrust load ^{Note3}	N [lbf.]	44.1 [9.9]	88.2 [19.8]	147 [33]	490 [110]
Lubrication		Not required			
Sensor switch ^{Note4}		Applicable sensor switch: ZG530□, ZG553□, CS3M□, CS4M□, CS5M□			

● Double vane type

Item	Basic model	RAKD50	RAKD150	RAKD300	RAKD800
Operation type		Double acting double vane type			
Effective torque ^{Note1}	N·m [ft·lbf]	10.19 [7.5]	34.32 [25.3]	66.68 [49.2]	201.52 [148.6]
Swing angle (Tolerance $^{+3}_{0}$ °)		90°			
Media		Air			
Port size		Rc1/8	Rc1/4	Rc3/8	Rc1/2
Operating pressure range	MPa [psi.]	0.2~1 [29~145]			
Proof pressure	MPa [psi.]	1.5 [218]			
Operating temperature range (Atmosphere and media)	°C[°F]	5~60 [41~140]			
Internal capacity ^{Note2}	cm ³ [in. ³]	42 [2.56]	127 [7.75]	244 [14.89]	754 [46.01]
Allowable energy	mJ [in·lbf]	49 [0.434]	225.4 [1.995]	1078 [9.541]	3920 [34.70]
Allowable radial load	N [lbf.]	588 [132]	1176 [264]	1960 [441]	4900 [1102]
Allowable thrust load ^{Note3}	N [lbf.]	44.1 [9.9]	88.2 [19.8]	147 [33]	490 [110]
Lubrication		Not required			
Sensor switch ^{Note4}		Applicable sensor switch: ZG530□, ZG553□, CS3M□, CS4M□, CS5M□			

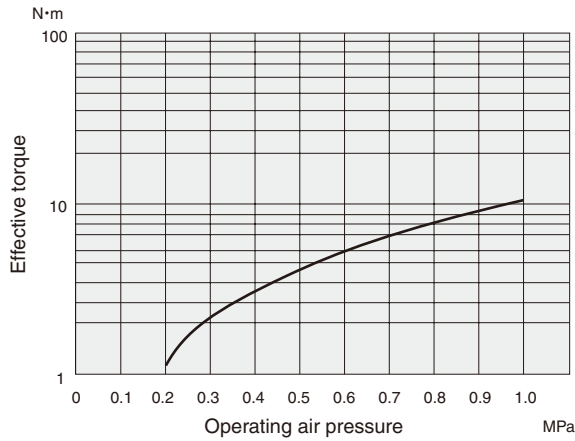
Notes: 1. Values are obtained when the air pressure is 0.49 MPa [71psi]. 2. Values are obtained when the swing angle is 90°. Values in parentheses () are at the maximum swing angle. 3. Numerical values are reference values, not guaranteed values. For details, see p.1301. 4. For details of sensor switches, see p.1544.

Mass

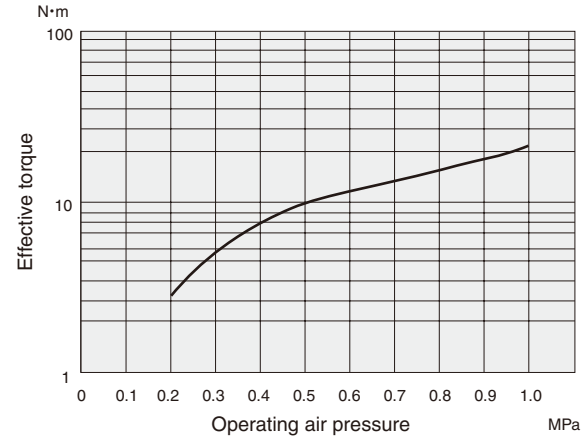
Basic model and swing angle		Main body mass	Additional mass			
		Mounting type	Mounting bracket		Sensor switch unit	Sensor switch and shock absorber unit
		Nose mount	Foot mount	Flange mount		
RAK50	90°	0.82 [1.81]	0.254 [0.560]	0.186 [0.410]	0.08 [0.18]	0.375 [0.827]
	180°	0.79 [1.74]				0.375 [0.827]
	270°	0.73 [1.61]				0.35 [0.77]
RAK150	90°	2.0 [4.4]	1.1 [2.4]	0.475 [1.047]	0.127 [0.280]	0.68 [1.50]
	180°	1.9 [4.2]				0.675 [1.488]
	270°	1.7 [3.7]				0.64 [1.41]
RAK300	90°	3.7 [8.2]	1.93 [4.26]	—	0.205 [0.452]	1.285 [2.833]
	180°	3.7 [8.2]				1.295 [2.855]
	270°	3.7 [8.2]				1.195 [2.635]
RAK800	90°	12.7 [28.0]	4.47 [9.86]	—	0.292 [0.644]	2.975 [6.560]
	180°	12.2 [26.9]				2.985 [6.582]
	270°	11.2 [24.7]				2.735 [6.031]
RAKD50	90°	0.82 [1.81]	0.254 [0.560]	0.186 [0.410]	0.08 [0.18]	0.375 [0.827]
RAKD150	90°	2.0 [4.4]	1.1 [2.4]	0.475 [1.047]	0.127 [0.280]	0.68 [1.499]
RAKD300	90°	4.3 [9.5]	1.93 [4.26]	—	0.205 [0.452]	1.285 [2.833]
RAKD800	90°	12.7 [28.0]	4.47 [9.86]	—	0.292 [0.644]	2.975 [6.560]

Output Characteristics (Effective torque)

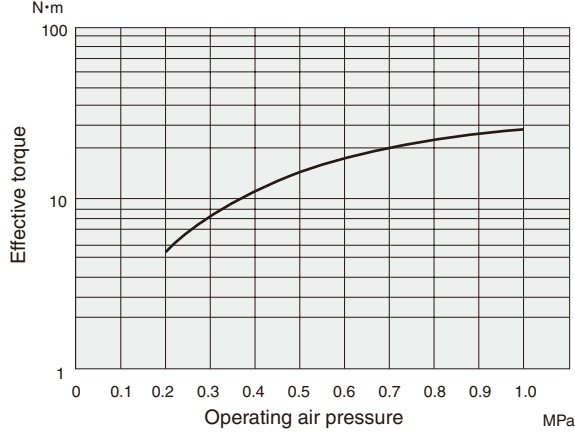
● RAK50



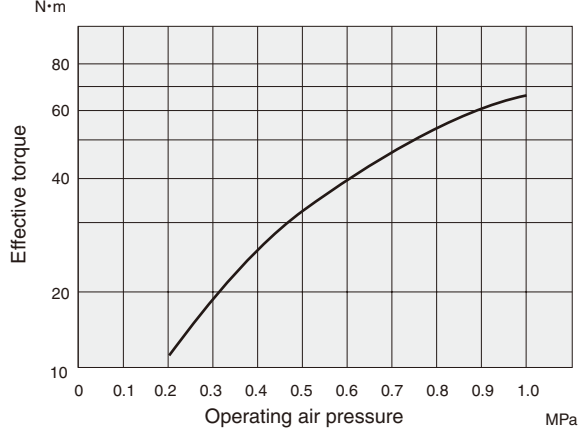
● RAKD50



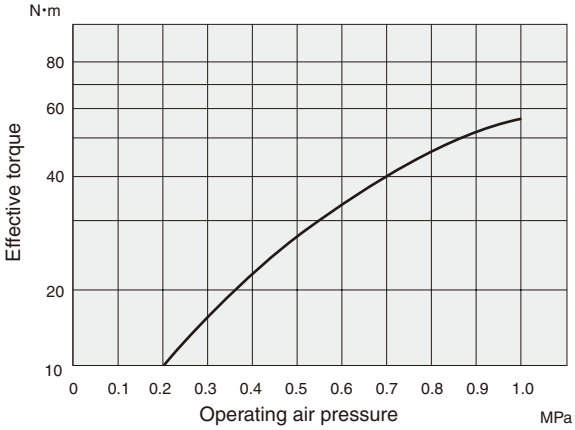
● RAK150



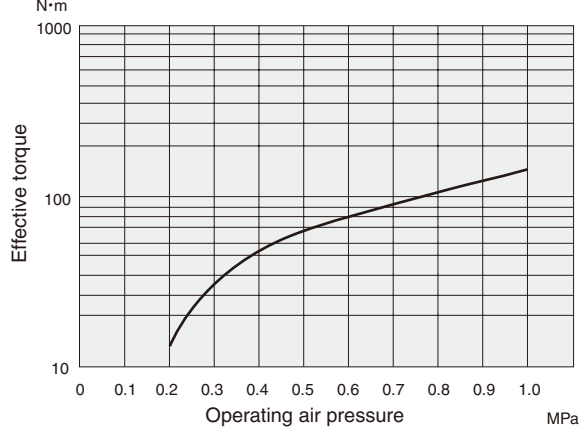
● RAKD150



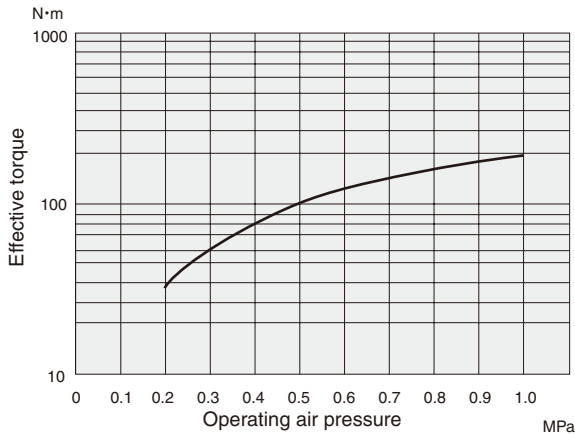
● RAK300



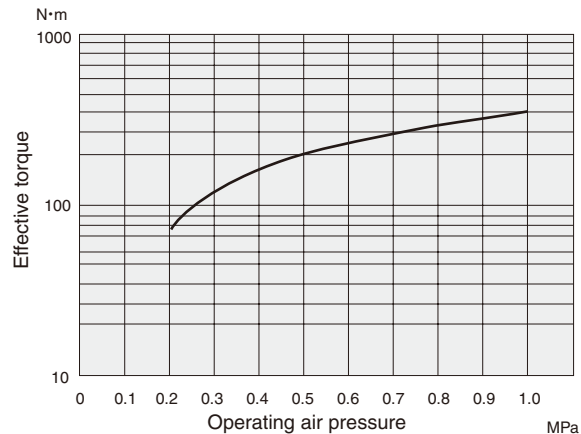
● RAKD300



● RAK800



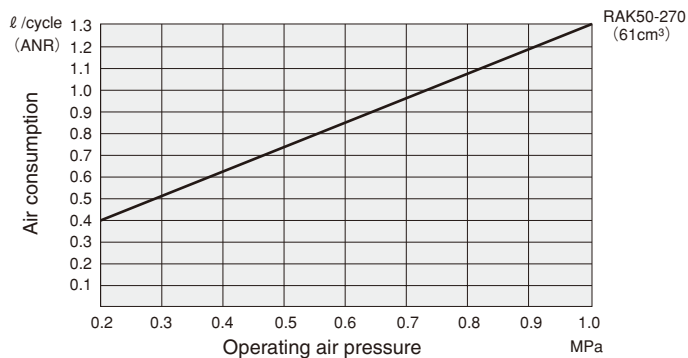
● RAKD800



1N·m = 0.7376ft·lbf, 1MPa = 145psi.

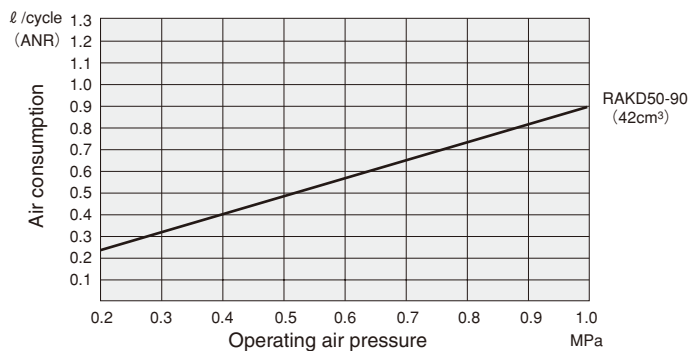
Air Consumption

● RAK50

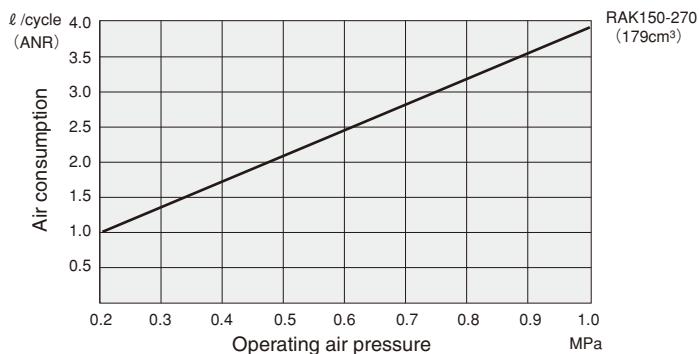


● RAKD50

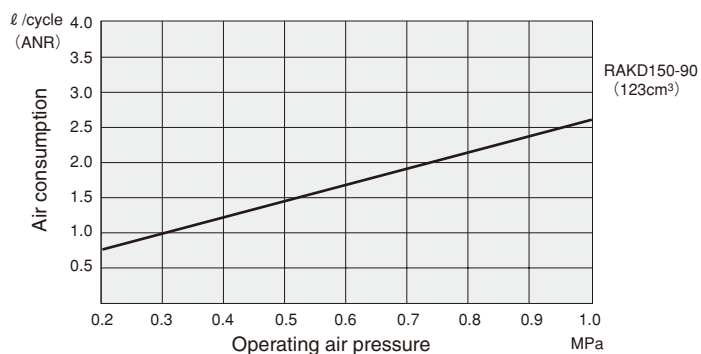
SI unit conversion/1MPa $\approx$ 10.2kgf/cm²



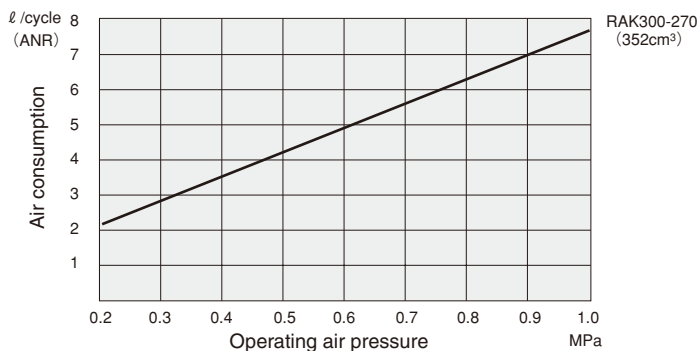
● RAK150



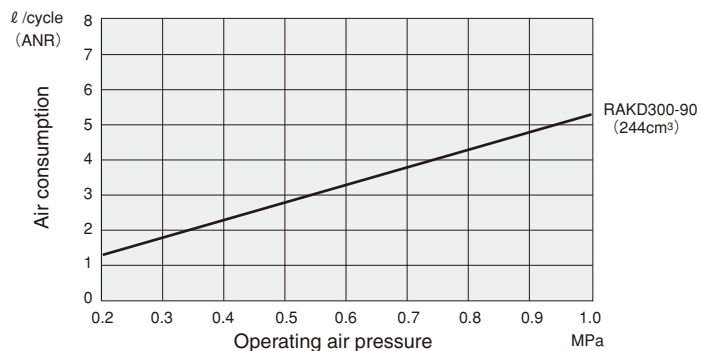
● RAKD150



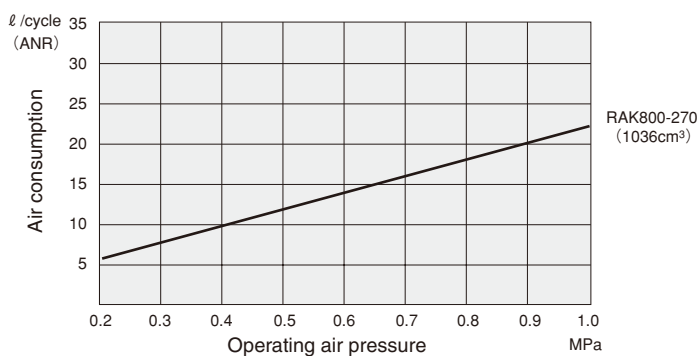
● RAK300



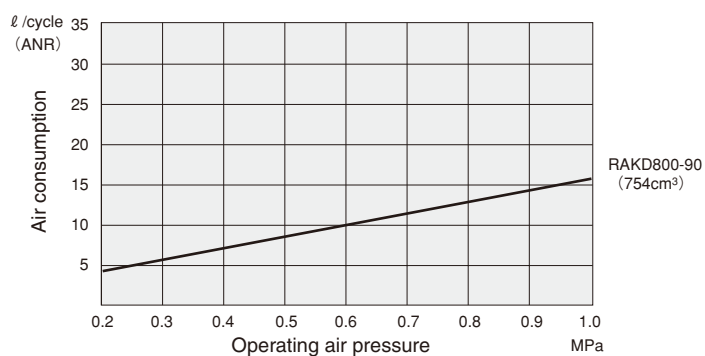
● RAKD300



● RAK800



● RAKD800

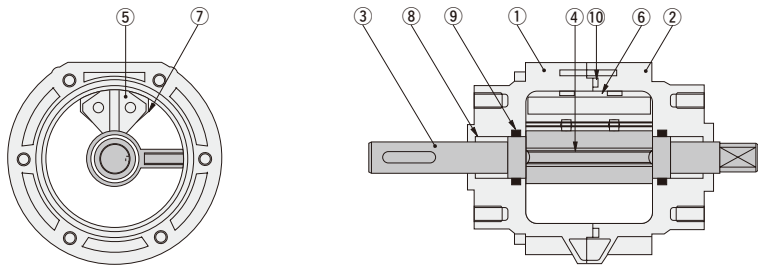


1 l/cycle = 0.0353ft.³/cycle, 1cm³ = 0.0610in.³, 1MPa = 145psi.

Inner Construction, Major Parts and Materials

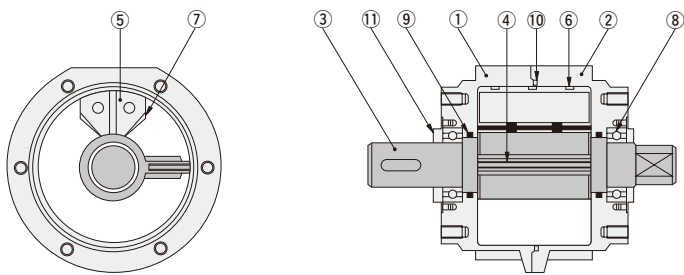
●RAK single vane type

RAK50, 150, 300



No.	Parts	Materials
①	Main body A	ADC (AC for 300)
②	Main body B	ADC (AC for 300)
③	Vane rod	SCM
④	Vane seal	Synthetic rubber (NBR)
⑤	Shoe	ZDC
⑥	Shoe seal	Synthetic rubber (NBR)
⑦	Damper	Urethane
⑧	Sliding bearing	Oil impregnated sintered alloy
⑨	O-ring	Synthetic rubber (NBR)
⑩	O-ring	Synthetic rubber (NBR)

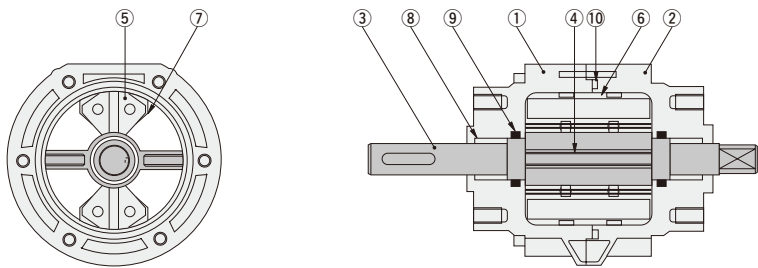
RAK800



No.	Parts	Materials
①	Main body A	AC
②	Main body B	AC
③	Vane rod	SCM
④	Vane seal	Synthetic rubber (NBR)
⑤	Shoe	ZDC
⑥	Shoe seal	Synthetic rubber (NBR)
⑦	Damper	Urethane
⑧	Bearing	Steel
⑨	O-ring	Synthetic rubber (NBR)
⑩	O-ring	Synthetic rubber (NBR)
⑪	Cover plate	Steel

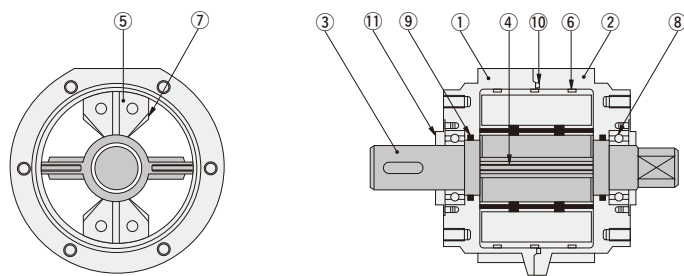
●RAKD double vane type

RAKD50, 150, 300



No.	Parts	Materials
①	Main body A	ADC (AC for 300)
②	Main body B	ADC (AC for 300)
③	Vane rod	SCM
④	Vane seal	Synthetic rubber (NBR)
⑤	Shoe	ZDC
⑥	Shoe seal	Synthetic rubber (NBR)
⑦	Damper	Urethane
⑧	Sliding bearing	Oil impregnated sintered alloy
⑨	O-ring	Synthetic rubber (NBR)
⑩	O-ring	Synthetic rubber (NBR)

RAKD800



No.	Parts	Materials
①	Main body A	AC
②	Main body B	AC
③	Vane rod	SCM
④	Vane seal	Synthetic rubber (NBR)
⑤	Shoe	ZDC
⑥	Shoe seal	Synthetic rubber (NBR)
⑦	Damper	Urethane
⑧	Bearing	Steel
⑨	O-ring	Synthetic rubber (NBR)
⑩	O-ring	Synthetic rubber (NBR)
⑪	Cover plate	Steel

Order Codes

Type of vane	Swing angle	Mounting type	Number of mounting brackets	Type of sub-unit	Sensor switch (Model, lead wire length, quantity)					
Single vane type	90°  ● Starting point of swing: 45°	Nose mount 	No mounting bracket 	No sub-unit 	No sensor switch 					
Double vane type	180°  ● Starting point of swing: 45°	Foot mount 	With 1 mounting bracket 	With shock absorber unit 	ZG530 	CS3M 				
	270°  ● Starting point of swing: 45°	Flange mount 	With 2 mounting brackets 	With sensor switch unit 	ZG553 	CS4M 				
	● Double vane type available in 90° only.	Note: Flange mount available in RAK(D)50 and RAK(D)150 only ● For the order codes of mounting brackets only, see p.1290. Flange mount available in RAK(D)50 and RAK(D)150 only	Note: The sub-unit cannot be mounted with 2 foot mounts attached. ● For the foot mount only.	With sensor switch and shock absorber unit 	● Solid state type with indicator lamp 2-lead wire DC10~28V ZG530 ● Solid state type with indicator lamp 3-lead wire DC4.5~28V ZG553 ● For the order code of sensor switches only, see p.1294.	CS5M  ● Reed switch type with indicator lamp DC10~30V AC85~230V CS3M ● Reed switch type with indicator lamp DC10~30V AC85~115V CS4M ● Reed switch type without indicator lamp DC3~30V AC85~115V CS5M				
Basic model	Type									
RAK	D	50 150 300 800	-90 -180 -270	-1A -3A	1 2	-UK -US -USK	-ZG530 -ZG553 -CS3M -CS4M -CS5M	A B	1 2	

● Lead wire length
A : 1000mm [39in.]
B : 3000mm [118in.]

● Number
1 : With 1 sensor switch
2 : With 2 sensor switches

Caution: All mounting brackets, sub-units, and sensor switches are included at shipping.
For the sub-unit mounting procedure, see p.1299~1300 for mounting.
Note that a "Instruction Manual" containing an instruction of the mounting procedure is included with the sub-unit.

● The codes -US and -USK come with 2 sensor brackets and 2 sensor holders.

Order Codes for Additional Parts (To be ordered separately)

● Order codes for shock absorber units (with levers)

UK-RAK		-	
	Type		Swing angle
	50		90 : 90°
	150		180 : 180°
	300		270 : 270°
	800		

● Order codes for shock absorbers only (without lever)

UKN-RAK	
	Type
	50
	150
	300
	800

● Order codes for shock absorber unit levers only

UKT-RAK		-	
	Type		Swing angle
	50		90 : 90°
	150		180 : 180°
	300		270 : 270°
	800		

● Order codes for sensor switch units

US-RAK	
	Type
	50
	150
	300
	800

Remarks: 1. Two sensor brackets and sensor holders are supplied.
2. Order the sensor switches separately.

● Order codes for base brackets only

USB-RAK	
	Type
	50
	150
	300
	800

(RAK800 comes with sensor bracket)

● Order codes for magnet arms only

USA-RAK	
	Type
	50
	150
	300
	800

● Order codes for sensor switch brackets only

G5-RAK	
	Type
	50
	150
	300

Remark: Comes with sensor holder.

● Order codes for sensor switch and shock absorber units (with levers)

USK-RAK		-	
	Type		Swing angle
	50		90 : 90°
	150		180 : 180°
	300		270 : 270°
	800		

Remarks: 1. Two sensor brackets and sensor holders are supplied.
2. Order the sensor switches separately.

● Order codes for magnet levers only

USA-RAK		-		-	USK
	Type		Swing angle		
	50		90 : 90°		
	150		180 : 180°		
	300		270 : 270°		
	800				

● Order codes for base brackets only

USB-RAK	
	Type
	50
	150
	300

Remark: Not available in RAK800.

● Order codes for sensor switch brackets only

G5-RAK		-USK
	Type	
	50	
	150	
	300	

Remark: Comes with sensor holder.

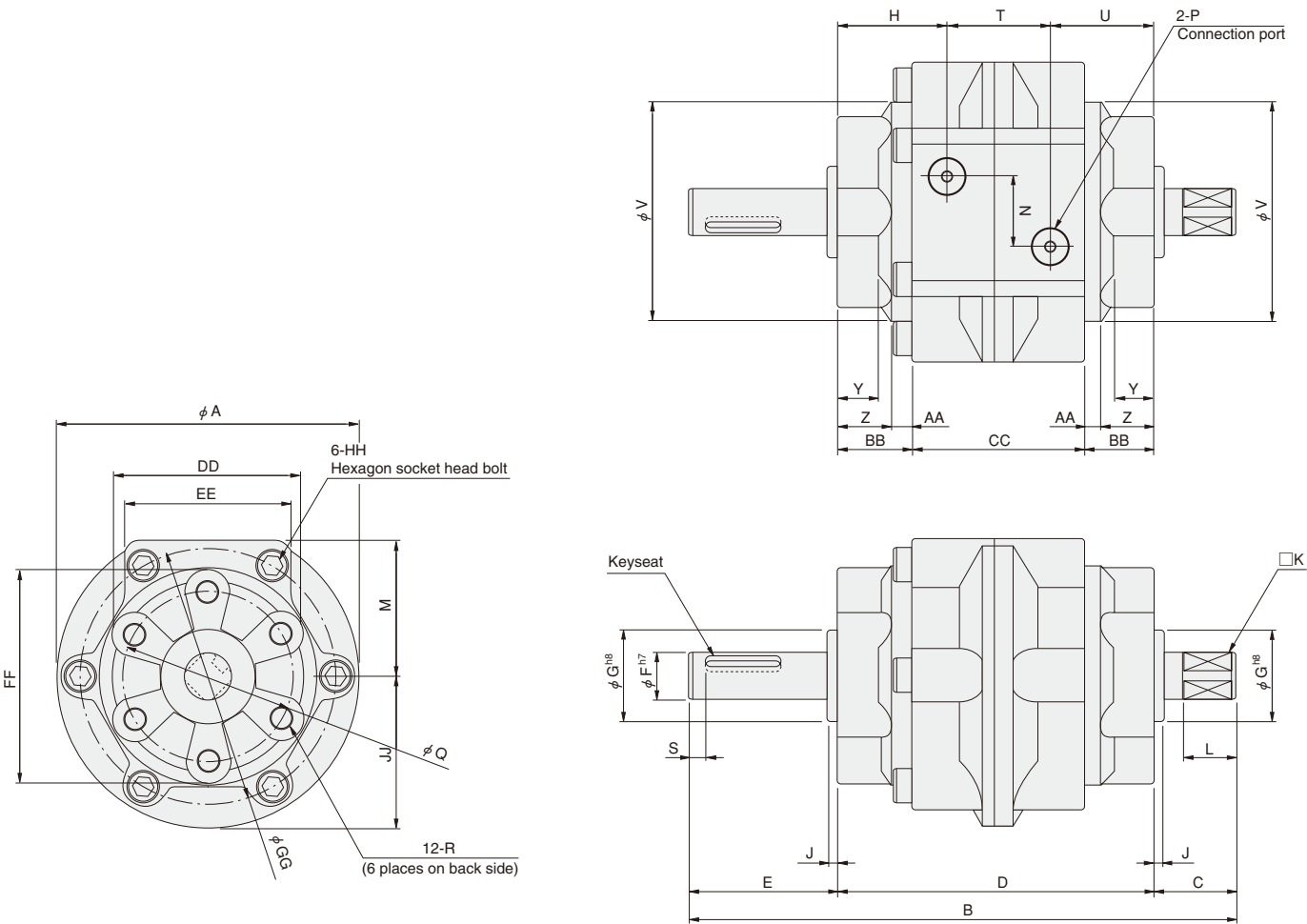
● Order codes for mounting brackets only

	- RAK	
	Types of mounting bracket	Type
	1A : Foot mounting type	50
	3A : Flange mounting type	150
	(For RAK50 and 150 only)	300
		800

Dimensions of RAK, RAKD (mm)

Remark: The dimensions of double vane type RAKD are the same as the single vane type RAK.

Nose mount (Direct front mounting)



Model	Code	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
RAK(D)50		79	145	19.5	86	39.5	12	25	29	2.5	10	13	36	16	Rc1/8	45	M6X1 Depth9	5	28
RAK(D)150		110	180	23.5	103	53.5	17	30	34.5	3	13	16	51	24	Rc1/4	70	M8X1.25 Depth12	5	34
RAK(D)300		141.5	220	30	125	65	25	45	41.5	3.5	19	22	66	32	Rc3/8	80	M10X1.5 Depth15	5	42
RAK(D)800		196	285	44.5	171	69.5	40	70	53.5	4.5	32	35	90	44	Rc1/2	120	M12X1.75Depth18	10	64

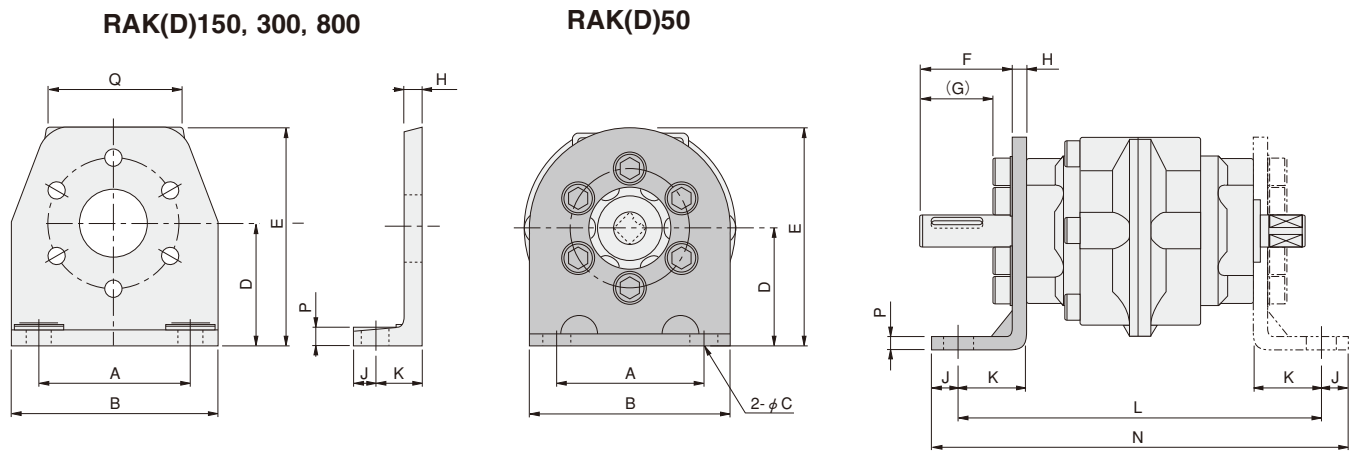
Model	Code	U	V	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	JJ	Keyseat	WidthXDepthXLength
RAK(D)50		29	58	11	14	6	20	46	51	44	57	68	M5X30 l	39.5	4	$0_{-0.03}^{+0.1} \times 2.5 \times 20$
RAK(D)150		34.5	85.2	10.5	15.5	8	23.5	56	75	61	85	97	M6X35 l	55	5	$0_{-0.03}^{+0.1} \times 3 \times 36$
RAK(D)300		41.5	110	13	17.5	10	27.5	70	88.5	78	98.5	125	M8X45 l	70.5	7	$0_{-0.036}^{+0.2} \times 4 \times 40$
RAK(D)800		53.5	152	14.5	21.1	11.4	32.5	106	130	110	145	173	M12X70 l	98	12	$0_{-0.043}^{+0.2} \times 5 \times 40$

Dimensions of RAK, RAKD (mm)

Remark: The dimensions of double vane type RAKD are the same as the single vane type RAK.

Foot mount (Using foot mounting brackets)

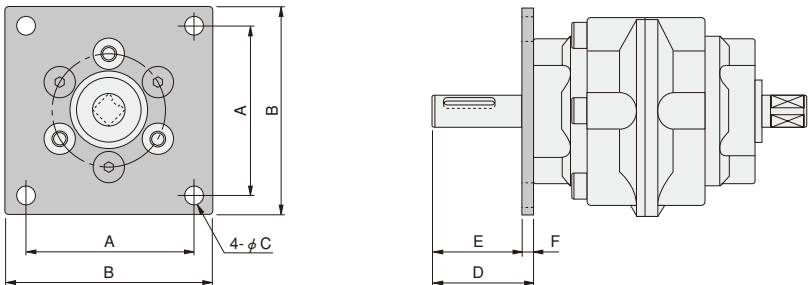
 For RAK800: RAK800FT
(RAK50~300 are included in RAK Model .)



Model Code	A	B	C	D	E	F	G	H	J	K	L	N	P	Q
RAK(D)50	55	75	11	45	82.5	35	27.5	4.5	10	25	136	156	4.5	—
RAK(D)150	80	110	13	65	115	43.5	33.5	10	12	28	159	183	10.5	70
RAK(D)300	100	140	15	80	135	53	40.5	12	13	32	189	215	12	80
RAK(D)800	140	200	15	110	185	54.5	39.5	15	15	35	241	271	15	120

Remarks: 1. Foot mounting brackets can be mounted every 60° of rotation.
2. The square rod side is used only for the case of using 2 foot mounting brackets.

Flange mount (Using flange mounting bracket)

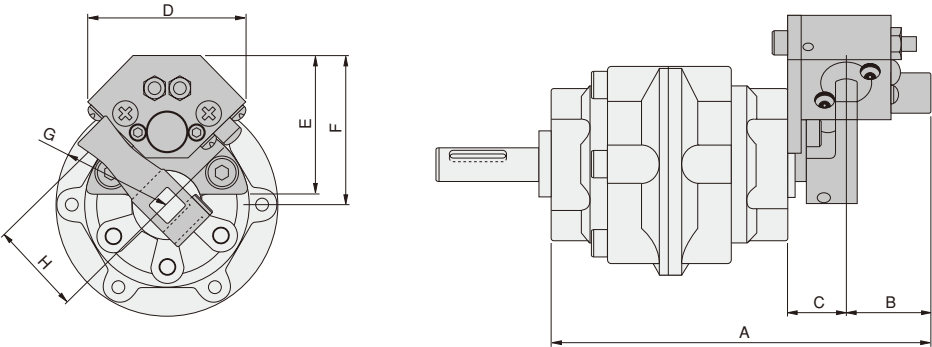


Model Code	A	B	C	D	E	F
RAK(D)50	64	80	7	39.5	35	4.5
RAK(D)150	88	110	9	53.5	47.5	6

Remark: Flange mounting bracket can be mounted every 60° of rotation.

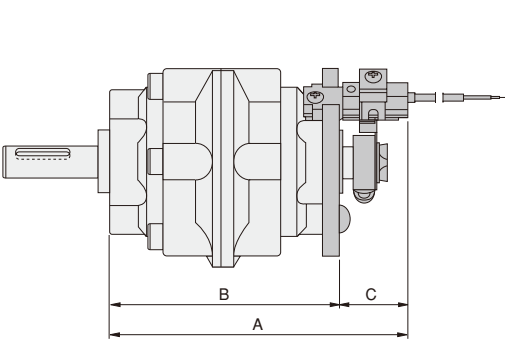
Dimensions (mm)

With shock absorber unit

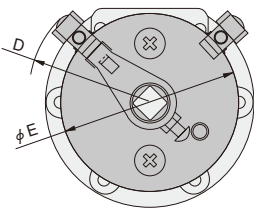


Model	Code	A	B	C	D	E	F	G	H
RAK50		136.5	30	20.5	56	50	54	R38	34
RAK150		159.5	34	22.5	80	62	71.5	R51	46
RAK300		187.5	37	25.5	95	87	96	R68	62
RAK800		244	42	31	130	118	135	R78	90

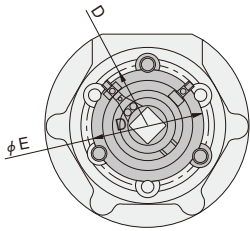
With sensor switch unit



RAK50, 150, 300

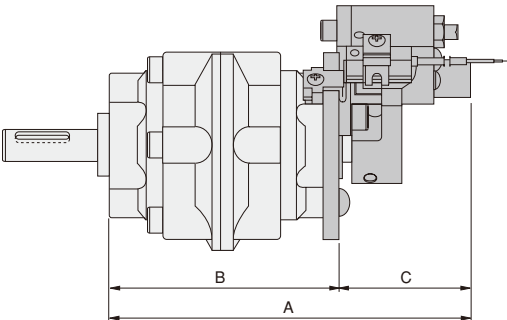


RAK800

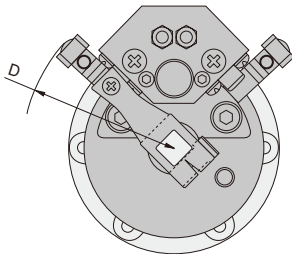


Model	Code	A	B	C	D	E
RAK50		110.7	87.2	23.5	R47	69
RAK150		127.7	104.2	23.5	R61	97
RAK300		159.7	126.2	33.5	R69	113
RAK800		213.2	174.2	39.0	R60	108

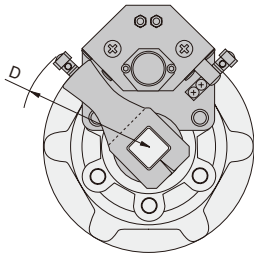
With sensor switch and shock absorber unit



RAK50, 150, 300



RAK800



Model	Code	A	B	C	D
RAK50		137.7	87.2	50.5	R58.2
RAK150		160.7	104.2	56.5	R72.2
RAK300		188.7	126.2	62.5	R88.2
RAK800		244	174.2	69.8	R118.5

SENSOR SWITCHES

Solid State Type, Reed Switch Type



Order Codes for Sensor Switches Only

				Sensor switch model	Lead wire length
Solid state type	2-lead wire	with indicator lamp	DC10~28V	ZG530	A B
Solid state type	3-lead wire	with indicator lamp	DC4.5~28V	ZG553	
Reed switch type	2-lead wire	with indicator lamp	DC10~30V AC85~230V	CS3M	A B
Reed switch type	2-lead wire	with indicator lamp	DC10~28V AC85~115V	CS4M	
Reed switch type	2-lead wire	without indicator lamp	DC 3~30V AC85~115V	CS5M	

● For details of sensor switches, see p.1544.

● A: 1000mm [39in.]
B: 3000mm [118in.]

Sensor Switch Operating Range, Response Differential, and Maximum Sensing Location

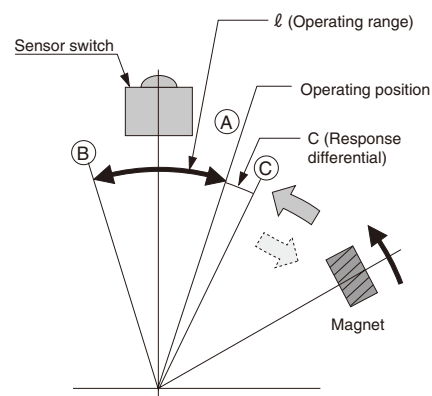
● Operating range: ℓ

The switch turns ON when the vane rod rotates in the $\Rightarrow$ direction, and the magnet comes to the position A. The operating range is the path A-B while the switch is ON.

● Response differential: C

When the magnet comes to the position A to turn the switch ON, and then rotates in the opposite direction $\Leftarrow$, the switch remains ON until the magnet reaches the position C. The path A-C is the response differential.

Model		ZG530□, ZG553□		CS3M□, CS4M□, CS5M□	
		Operating range: ℓ	Response differential: C	Operating range: ℓ	Response differential: C
RAK50	Basic type	About 25°	About 1°	About 29°	About 4°
	With shock absorber type	About 19°	About 1°	About 21°	About 3°
RAK150	Basic type	About 17°	About 1°	About 19°	About 3°
	With shock absorber type	About 14°	About 1°	About 16°	About 2°
RAK300	Basic type	About 14°	About 1°	About 16°	About 2°
	With shock absorber type	About 11°	About 1°	About 12°	About 2°
RAK800	Basic type	About 18°	About 1°	About 20°	About 3°
	With shock absorber type	About 7°	About 1°	About 8°	About 1°



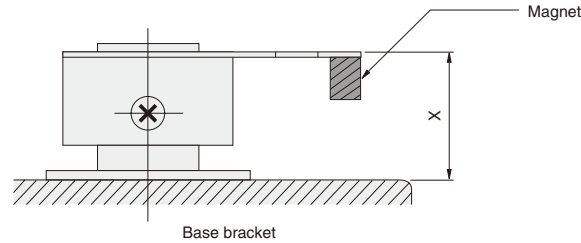
Moving and Adjusting Sensor Switch

Since the maximum sensing location of the sensor switch will vary depending on the model, follow the instructions below for moving and adjusting the sensor switch during mounting.

1. When mounting a sensor switch, install the magnet arm and magnet lever as shown in the diagram below.

●When a shock absorber unit is not mounted

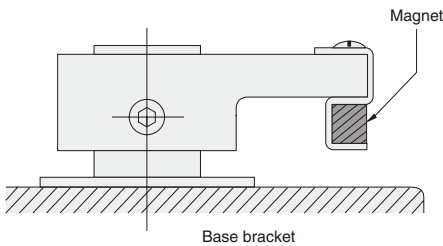
Install as the magnet comes to position X.



Model	X (mm [in.])
RAK50	16.5 [0.650]
RAK150	16.5 [0.650]
RAK300	26.5 [1.043]
RAK800	30.0 [1.181]

●When a shock absorber unit is mounted

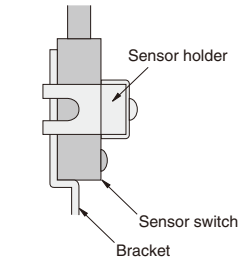
Insert the magnet lever until it is firmly contacted to the base of the bracket side.



2. When mounting a sensor switch on the sensor bracket, install it according to the instructions below.

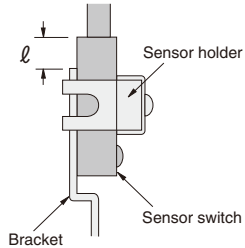
●RAK50, 150

- ① Use a bracket to temporarily secure the sensor switch, and set the magnet directly underneath the sensor switch.
- ② Push the sensor switch against the deep end of the bracket, and confirm the point where it turns ON. After confirmation, secure the bracket in place.



●RAK300, 800

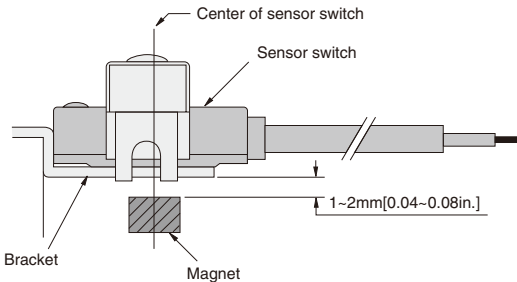
- ① Use a bracket to temporarily secure the sensor switch, and set the magnet directly underneath the sensor switch.
- ② Set the distance between the bracket end and the case end of the sensor switch (lead wire side) to the length ℓ shown in the diagram.



Model		ℓ (mm [in.])
RAK50	Basic type	—
	With shock absorber type	0
RAK150	Basic type	—
	With shock absorber type	1.5 [0.059]
RAK300	Basic type	3.0 [0.118]
	With shock absorber type	1.0 [0.039]
RAK800	Basic type	-2.0 [-0.079] ^{Note}
	With shock absorber type	6.0 [0.236]

Note: Minus sign of ℓ on the value means that the sensor switch should be pulled back from the bracket end point.

3. When mounting the sensor switch, adjust the bracket with a certain amount of bending until the gap between the sensor switch and the bracket is within the dimensions (1~2mm[0.04~0.08in.]) shown in the diagram below.



SHOCK ABSORBER UNITS



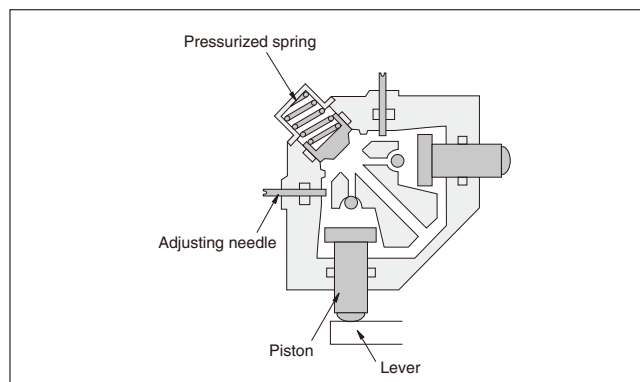
Specifications

Basic model		UKN-RAK50	UKN-RAK150	UKN-RAK300	UKN-RAK800
Item					
Load range	kg·cm ² [lbf·in·sec. ²]	981 [0.868] or less	2942 [2.60] or less	5884 [5.21] or less	19613 [17.36] or less
Maximum energy absorption	mJ [in·lbf]	2942 [26.0]	9807 [86.8]	19613 [173.6]	58840 [520.8]
Maximum impact angle velocity	Degrees/s	850	750	650	550
Maximum energy absorption per minute	mJ/min [in·lbf/min.]	19613 [173.6]	70608 [625.0]	137293 [1215]	353039 [3125]
Ambient temperature range	°C [°F]	5~50 [41~122]			
Absorption angle (One side)	Degrees	11	12	14	15
Mass	g [oz.]	240 [8.5]	420 [14.8]	780 [27.5]	1620 [57.1]

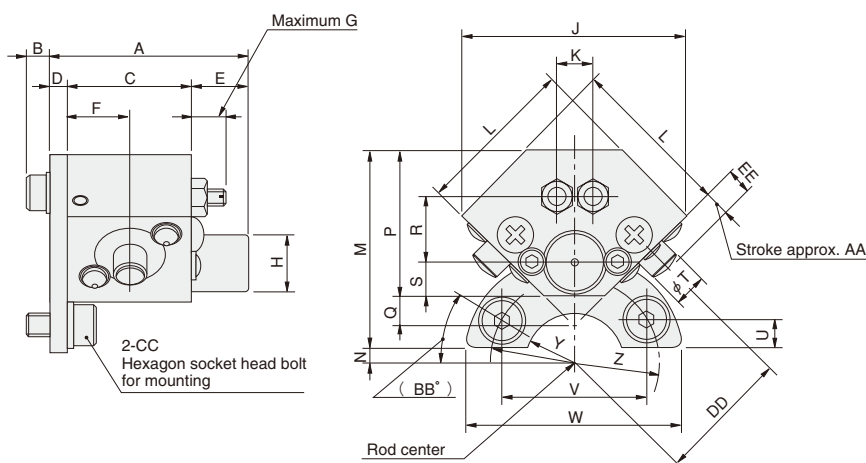
Remarks: 1. Energy capacity per minute = Absorbed energy × 2N [N: Operating frequency (cycles/min)]
 2. When using with a shock absorber, set the rotary actuator air pressure to 0.29MPa [42psi.] or higher.

Operation Principle

When the lever installed on the rotary actuator's vane rod collides against the piston, impact energy is converted into pressure (hydraulic pressure) applied to the back side of the piston. This pressure energy turns into heat energy when oil passes through gaps between the piston and the inner surface of the cylinder, and also through the adjusting needle portion, and is completely consumed by the time the piston stops at the end of the stroke. The piston in the opposite side returns to the origin point by hydraulic pressure generated by spring force.



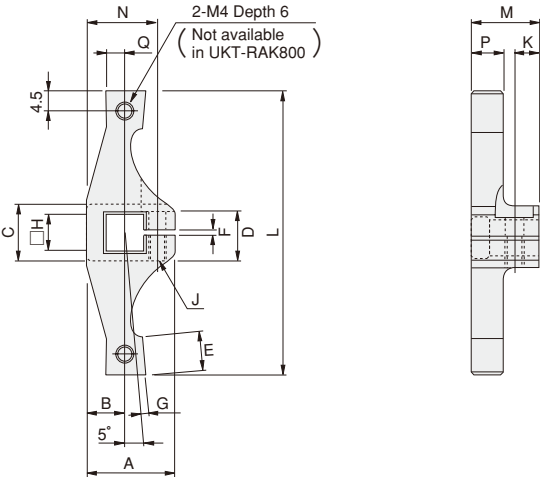
Dimensions of Shock Absorber (mm)



Model	Code	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	Y	Z	AA	BB	CC	DD	EE
UKN-50		50.5	6	32	4.5	14	16	8.5	14.4	56.6	9.9	40	50	4	37	7.1	17	9.2	8	7.2	39	56	R12.5	R45	6.5	30	M4×12ℓ	34	8
UKN-150		56.5	7.2	36	4.5	16	18	8.5	18.4	70.7	11.3	50	62	9.5	49	8.4	25.5	11.4	10	8	60.6	80	R15	R70	10	30	M8×16ℓ	46	12
UKN-300		62.5	7.2	42	4.5	16	21	12	22.5	91.9	12.7	65	87	8	61	14.2	33.2	14.1	12	12	69.2	95	R22.5	R80	15	30	M10×20ℓ	62	18
UKN-800		73	7.2	50	6	17	25	12	32.5	127	14.2	90	118	17	82	24.7	46.7	20.6	16	13	103.9	130	R35	R120	24	30	M12×20ℓ	90	27.5

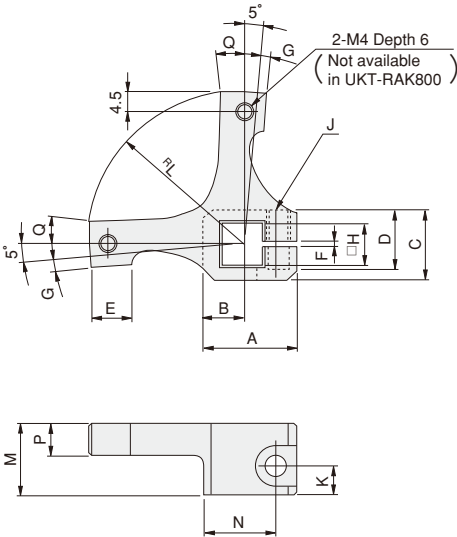
Dimensions of Shock Absorber Unit Lever (mm)

For swing angle 90°



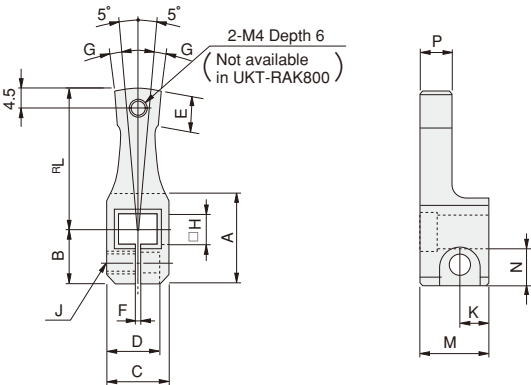
Model	Code	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
UKT-RAK50-90		23	10	16	13.7	10	1.2	2.5	10	M5	7	76	18	18.5	8	5
UKT-RAK150-90		28	12	24	19.5	12	1.2	4	13	M6	7.5	102	20	23	10	5
UKT-RAK300-90		40	18	35	30.5	14	1.2	5.4	19	M8	9	136	23.5	33.5	12	9
UKT-RAK800-90		63	29	58	49	18	1.2	8	32	M10	14.5	196	29.5	55	16	14

For swing angle 180°



Model	Code	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
UKT-RAK50-180		23	10	16	13.7	10	1.2	2.5	10	M5	7	38	18	18.5	8	5
UKT-RAK150-180		28	12	24	19.5	12	1.2	4	13	M6	9	51	20	23	10	5
UKT-RAK300-180		40	18	35	30.5	14	1.2	5.4	19	M8	11	68	23.5	33.5	12	9
UKT-RAK800-180		63	29	58	49	18	1.2	8	32	M10	14.5	98	29.5	55	16	14

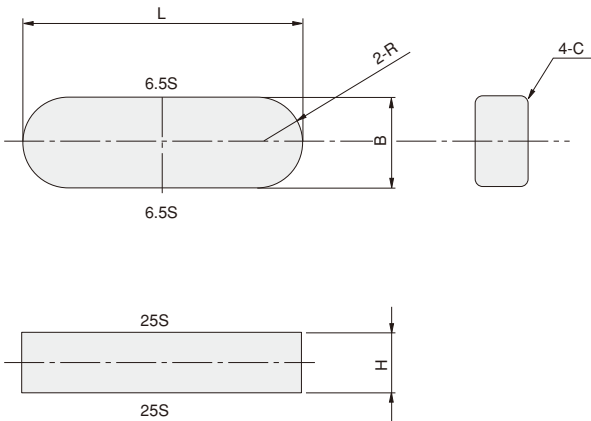
For swing angle 270°



Model	Code	A	B	C	D	E	F	G	H	J	K	L	M	N	P
UKT-RAK50-270		23	13	16	13.7	10	1.2	2.6	10	M5	7	38	18	4.5	8
UKT-RAK150-270		28	16	24	19.5	12	1.2	4.1	13	M6	9	51	20	5	10
UKT-RAK300-270		40	22	35	30.5	14	1.2	5.5	19	M8	11	68	23.5	6.5	12
UKT-RAK800-270		63	34	58	49	18	1.2	8	32	M10	14.5	98	29.5	8	16

Dimensions of Key for RAK (mm)

The following key is supplied at shipping for the **RAK** series.
 JIS B 1301 Parallel keys B×H×L Crossing S50C



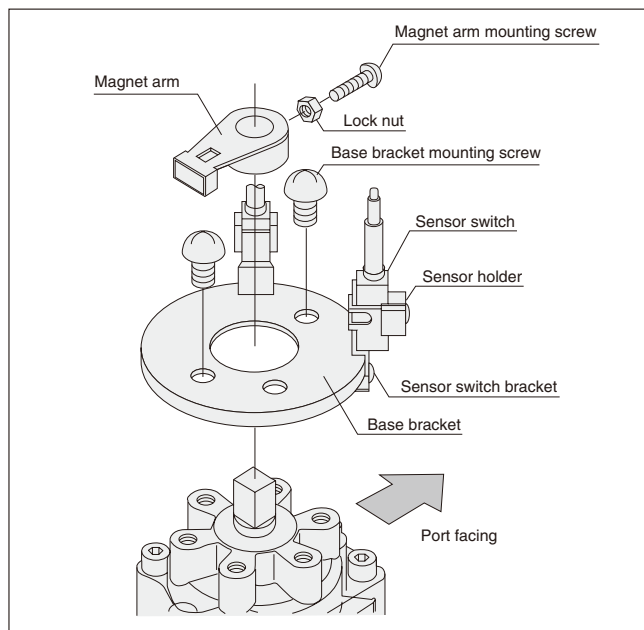
mm [in.]						
Model	Nominal dimension	B	H	L	C	R
RAK50 RAKD50	4×4×20	$4 \begin{smallmatrix} 0 \\ -0.03 \end{smallmatrix}$ [0.1575 $\begin{smallmatrix} 0 \\ -0.0012 \end{smallmatrix}$]	$4 \begin{smallmatrix} 0 \\ -0.03 \end{smallmatrix}$ [0.1575 $\begin{smallmatrix} 0 \\ -0.0012 \end{smallmatrix}$]	$20 \begin{smallmatrix} 0 \\ -0.21 \end{smallmatrix}$ [0.7874 $\begin{smallmatrix} 0 \\ -0.0083 \end{smallmatrix}$]	0.16~0.25 (R0.16~0.25) [0.0063~0.0098] ([R0.0063~0.0098])	2 [0.079]
RAK150 RAKD150	5×5×36	$5 \begin{smallmatrix} 0 \\ -0.03 \end{smallmatrix}$ [0.1969 $\begin{smallmatrix} 0 \\ -0.0012 \end{smallmatrix}$]	$5 \begin{smallmatrix} 0 \\ -0.03 \end{smallmatrix}$ [0.1969 $\begin{smallmatrix} 0 \\ -0.0012 \end{smallmatrix}$]	$36 \begin{smallmatrix} 0 \\ -0.25 \end{smallmatrix}$ [1.4173 $\begin{smallmatrix} 0 \\ -0.0098 \end{smallmatrix}$]	0.25~0.40 (R0.25~0.40) [0.0098~0.0157] ([R0.0098~0.0157])	2.5 [0.098]
RAK300 RAKD300	7×7×40	$7 \begin{smallmatrix} 0 \\ -0.036 \end{smallmatrix}$ [0.2756 $\begin{smallmatrix} 0 \\ -0.0014 \end{smallmatrix}$]	$7 \begin{smallmatrix} 0 \\ -0.036 \end{smallmatrix}$ [0.2756 $\begin{smallmatrix} 0 \\ -0.0014 \end{smallmatrix}$]	$40 \begin{smallmatrix} 0 \\ -0.25 \end{smallmatrix}$ [1.5748 $\begin{smallmatrix} 0 \\ -0.0098 \end{smallmatrix}$]	0.25~0.40 (R0.25~0.40) [0.0098~0.0157] ([R0.0098~0.0157])	3.5 [0.138]
RAK800 RAKD800	12×8×40	$12 \begin{smallmatrix} 0 \\ -0.043 \end{smallmatrix}$ [0.4724 $\begin{smallmatrix} 0 \\ -0.0017 \end{smallmatrix}$]	$8 \begin{smallmatrix} 0 \\ -0.09 \end{smallmatrix}$ [0.3150 $\begin{smallmatrix} 0 \\ -0.0035 \end{smallmatrix}$]	$40 \begin{smallmatrix} 0 \\ -0.25 \end{smallmatrix}$ [1.5748 $\begin{smallmatrix} 0 \\ -0.0098 \end{smallmatrix}$]	0.40~0.60 (R0.40~0.60) [0.0157~0.0236] ([R0.0157~0.0236])	6 [0.236]

Sensor Switch Unit

● Applicable models: RAK(D)50, 150, 300

- ① Mount the base bracket on the square rod side of the rotary actuator by using 2 mounting screws.
- ② Attach the magnet arm by using a magnet arm mounting screw. At this time, confirm that the vane rod of the rotary actuator is at the swing start position.
- ③ Mount sensor switch brackets at the swing start position and the opposite swing end position. (See the diagrams on p.1283 "Relationship between Swing Angle and Keyseat Location.")
- ④ For sensor switch mounting, moving, and adjusting, and for magnet arm mounting and adjusting, see p.1295 "Moving and Adjusting Sensor Switch."

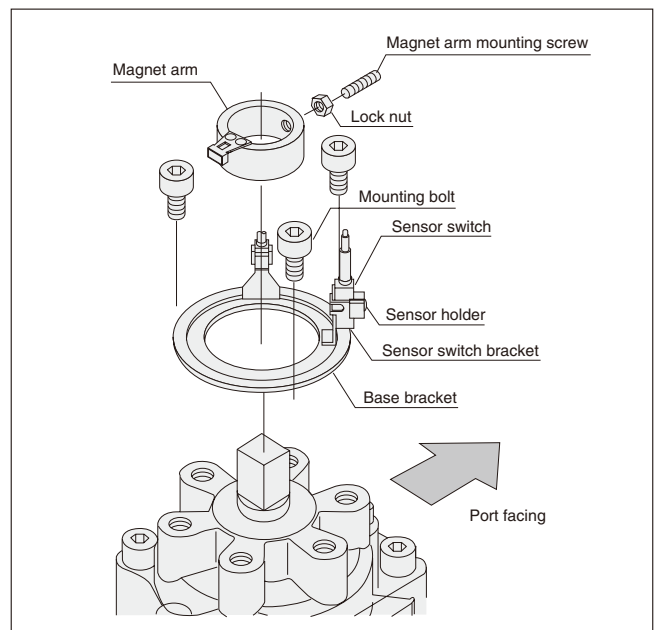
Note : In locations subjected to strong magnetic fields nearby, take measures by a steel plate, etc., as a magnetic shield.
In addition, do not bring strong magnetic objects (iron, etc.) close to the rotary actuator body and the sensor switch (within about 20mm [0.79in.]).



● Applicable models: RAK(D)800

- ① Temporarily set 2 base brackets on the square rod side of the rotary actuator by using 3 mounting bolts.
- ② Attach the magnet arm by using a magnet arm mounting screw. At this time, confirm that the vane rod of the rotary actuator is at the swing start position.
- ③ Rotate and move the base brackets so that the sensor switch brackets come to the swing start position and the opposite swing end position. (See the diagrams on p.1283 "Relationship between Swing Angle and Keyseat Location.") Once the position has been determined, firmly secure it with the 3 mounting bolts.
- ④ For sensor switch mounting, moving, and adjusting, and for magnet arm mounting and adjusting, see p.1295 "Moving and Adjusting Sensor Switch."

Note : In locations subjected to strong magnetic fields nearby, take measures by a steel plate, etc., as a magnetic shield.
In addition, do not bring strong magnetic objects (iron, etc.) close to the rotary actuator body and the sensor switch (within about 20mm [0.79in.]).



Shock Absorber Unit

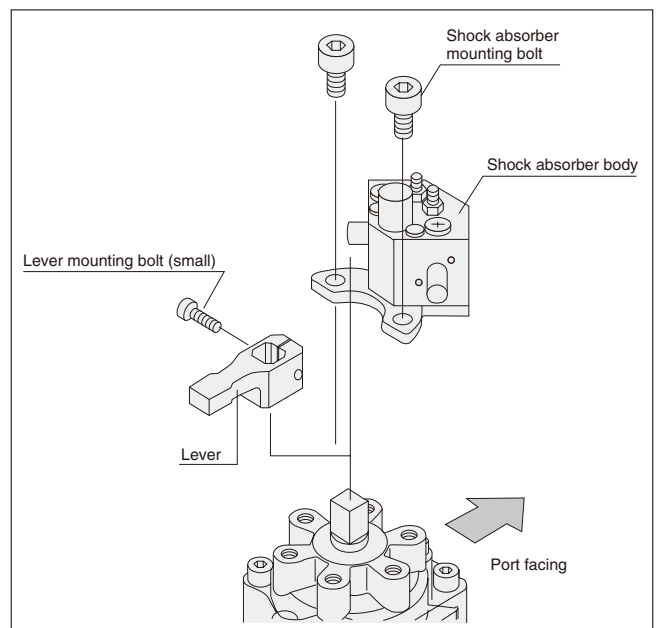
● Applicable models : RAK50, 150, 300, 800

- ① Mount the shock absorber unit on the square rod side of the rotary actuator by using mounting holes on the shock absorber body.
- ② For the mounting position, install the shock absorber body above the connection port of the rotary actuator, as shown in the diagram.
- ③ Attach the shock absorber lever by using a hexagon socket head bolt (small). At this time, confirm that the vane rod of the rotary actuator is at the swing start position. (See the position on p.1283 "Relationship between Swing Angle and Keyseat Location.")
- ④ The shock absorber lever cannot be inserted at the swing start position since it bumps against the piston on the shock absorber body. Rotate the vane rod in a counterclockwise direction until it reaches a position where the lever can be inserted to install.
- ⑤ Do not use the shock absorber as a stopper.

Note : Do not use the shock absorber as a stopper.
For intermediate position stops, always use an external stopper.

Handling precautions

- ① Do not disassemble, or loosen any part other than the adjusting needle. Such action could cause oil leakage.
- ② Do not turn the adjusting needle's hexagon nut, since it is not a lock nut. It could cause oil leakage.
- ③ Avoid use in locations subjected to dust or metal chips, or to dripping fluids such as water or oil. It could result in decreased durability, and/or malfunctions.

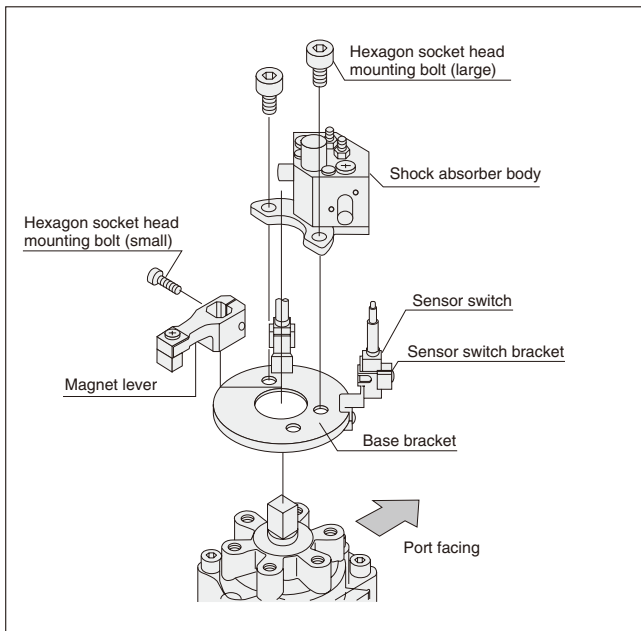


Sensor switch and shock absorber unit

● Applicable models: RAK(D)50, 150, 300

- ① Mount a base bracket and shock absorber body, in that order, on the square rod side of the rotary actuator by using 2 hexagon socket head mounting bolts (large).
- ② For the mounting position, mount the shock absorber body so that it faces in the same direction as the connection port of the rotary actuator, as shown in the diagram.
- ③ Attach the magnet lever by using a hexagon socket head mounting bolt (small). At this time, confirm that the vane rod of the rotary actuator is at the swing start position.
- ④ The shock absorber lever cannot be inserted at the swing start position since it bumps against the piston on the shock absorber body. Rotate the vane rod in a counterclockwise direction until it reaches a position where the lever can be inserted to install.
- ⑤ Mount sensor switch brackets on the swing start position and the opposite swing end position. (See the diagrams on p.1283 "Relationship between Swing Angle and Keyseat Location.")
- ⑥ For sensor switch mounting, moving, and adjusting, and for magnet lever mounting and adjusting, see p.1295 "Moving and Adjusting Sensor Switch."

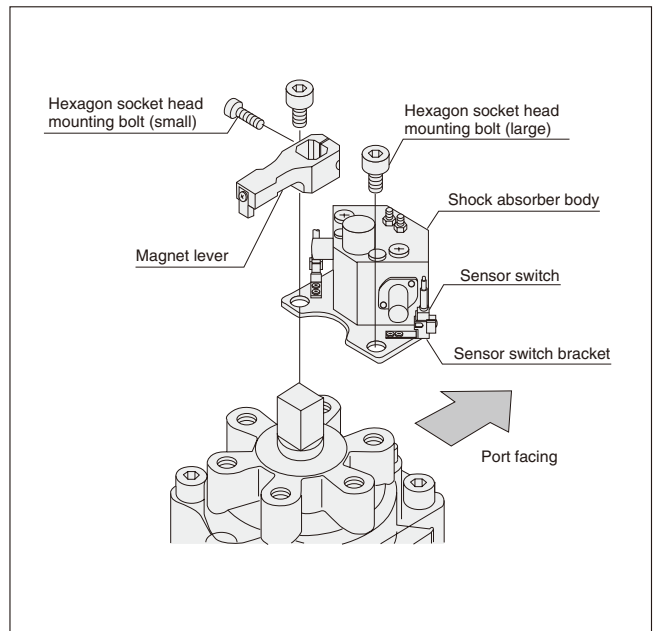
Note : Do not use the shock absorber as a stopper. For intermediate position stops, always use an external stopper.



● Applicable models: RAK(D)800

- ① Mount a shock absorber body on the square rod side of the rotary actuator by using 2 hexagon socket head mounting bolts (large).
- ② For the mounting position, mount the shock absorber body so that it faces in the same direction as the connection port of the rotary actuator, as shown in the diagram.
- ③ Attach the magnet lever by using a hexagon socket head mounting bolt (small). At this time, confirm that the vane rod of the rotary actuator is at the swing start position. (See the diagrams on p.1283 "Relationship between Swing Angle and Keyseat Location.")
- ④ The magnet lever cannot be inserted at the swing start position since it bumps against the piston on the shock absorber body. Rotate the vane rod in a counterclockwise direction until it reaches a position where the lever can be inserted to install.
- ⑤ The sensor switch brackets have been already attached on the swing start position and the opposite swing end position.
- ⑥ For sensor switch mounting, moving, and adjusting, and for magnet lever mounting and adjusting, see p.1295 "Moving and Adjusting Sensor Switch."

Note : Do not use the shock absorber as a stopper. For intermediate position stops, always use an external stopper.



Handling Instructions and Precautions



Mounting

Shock absorber

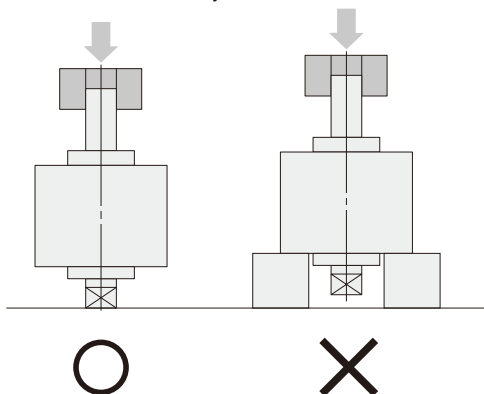
1. Do not disassemble, or loosen any part other than the adjusting needle. Such action could cause oil leakage.
2. Do not turn the adjusting needle's hexagon nut, since it is not a lock nut. It could cause oil leakage.
3. If using in locations subject to dripping water, dripping oil, etc., use a cover to protect the unit.

Impact energy

1. Find the mass moment of inertia from the size of the load, and confirm whether it is within the load range.
2. Confirm whether it is within the impact angular velocity range.
 $\omega_0 \div 1.2 \omega$
 ω_0 : Impact angular velocity (Degrees/s)
 ω : Average angular velocity (Degrees/s)
3. Find the impact energy from the load and impact angular velocity.
 $E_1 = 1/2 J \omega_0^2 \times 10^{-1} (\text{mJ})$ $E'_1 = (1/2) J' \omega_0'^2 [\text{in} \cdot \text{lbf}]$
 J : Mass moment of inertia (kg·cm²) J' : Mass moment of inertia [lbf·in·sec²]
 ω_0 : Impact angular velocity (rad/s) ω_0' : Impact angular velocity [rad/sec.]
4. Find the energy from the rotary actuator torque.
 $E_2 = 1/2 T \theta \times 10 (\text{mJ})$ $E'_2 = (1/2) T' \theta [\text{in} \cdot \text{lbf}]$
 T : Rotary actuator torque (N·cm) T' : Rotary actuator torque [in·lbf]
 θ : Absorption angle (one side) (rad) θ : Absorption angle (one side) [rad]
5. Confirm that $E_1 + E_2$ [$E'_1 + E'_2$] is at or below the maximum energy.
6. Find the energy per minute from the operating frequency.
 $E_m = 2N (E_1 + E_2)$ $E'_m = 2N (E'_1 + E'_2)$
 N : Operating frequency (cycle/min) N : Operating frequency [cycle/min.]
 Confirm that E_m [E'_m] is at or below the maximum energy absorption per minute.
7. In calculating the energy, convert the "Degrees" in the impact angular velocity and absorption angle into "rad."
 $1^\circ = 0.0174 \text{ rad}$

Precautions concerning the loading direction

1. Since thrust loads applied in the axial direction on the vane type rotary actuator can result in improper operation or reductions in durability, take adequate precautions for mounting and operating the product.
 The allowable thrust load listed in this catalog is a reference value only, and not a guaranteed value.
2. While radial loads perpendicular to the rod can be considered to be static loads within the specification values, dynamic loads are limited to loads within the allowable energy.
 Moreover, since eccentric loads perpendicular to the rod can result in improper friction or damage to the sliding bearings, use flexible couplings for connections as much as possible.
3. During mounting, set loads or select fittings to avoid applying stresses or loads to the body.



Selection

Selection of swing time

1. Use a swing time that is within the range in the table below.
 Smooth operation cannot be obtained when used beyond the range.
2. Consult us if a swing time outside the scope of the range in the table below must be used.

● Swing time

Model	Swing angle		
	90°	180°	270°
RAK50	0.08~0.8	0.16~1.6	0.24~2.4
RAK150	0.12~1.2	0.24~2.4	0.36~3.6
RAK300	0.16~1.6	0.32~3.2	0.48~4.8
RAK800	0.22~2.2	0.44~4.4	0.66~6.6

Remark: The swing time in the above table is the time it takes to reach the end of swing stroke from starting movement.



General precautions

1. Always thoroughly blow off (use compressed air) the tubing before piping. Entering metal chips, sealing tape, rust, etc., generated during piping work could result in air leaks or other defective operation.
2. Use air for the media. For the use of any other media, consult us.
3. The product cannot be used when the media or ambient atmosphere contains any of the substances listed below.
 Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, or acids, etc.
4. If using in locations subject to dripping water, dripping oil, etc., or to large amounts of dust, use a cover to protect the unit.