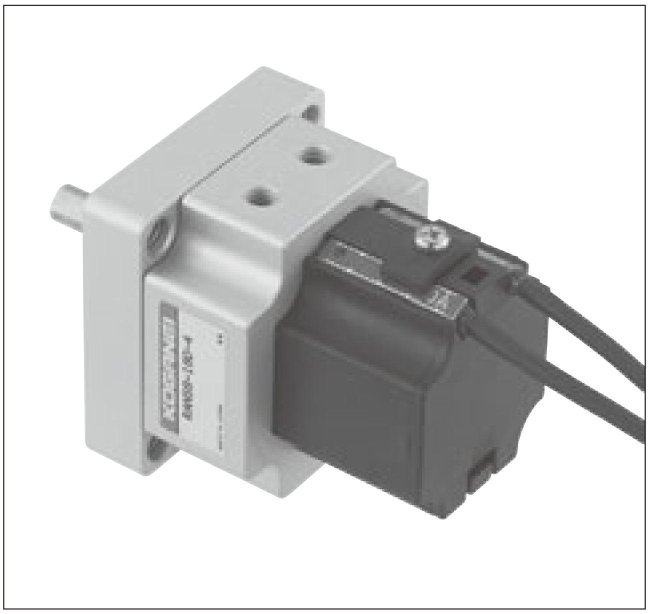
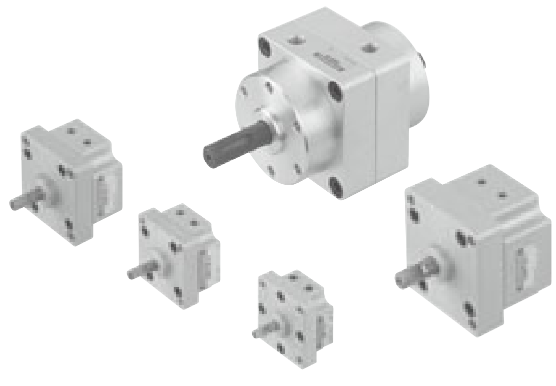
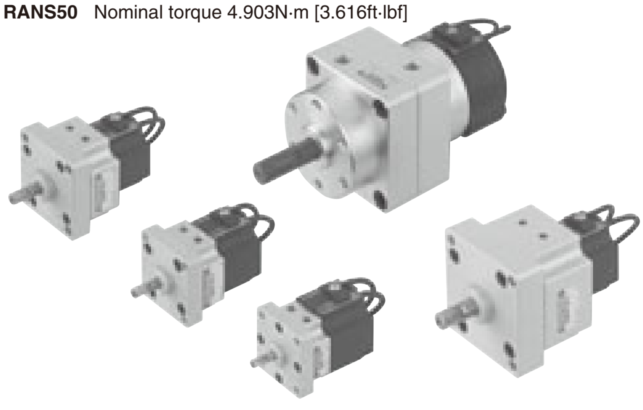
New design enhances ease of use.
High performance, compact rotary actuator offers space savings and high torque.
Rotary actuators vane type
RAN Series



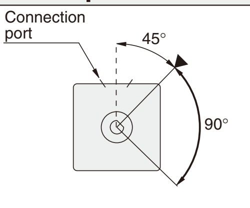
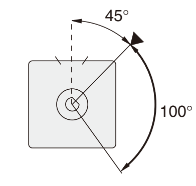
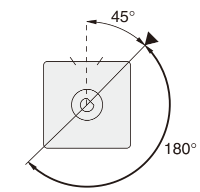
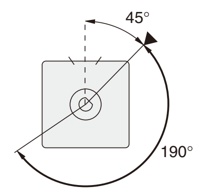
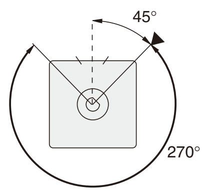
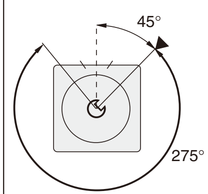
- Featuring an aluminum alloy body. Precision machining and special surface treatment of the inner surface, specially shaped seals, and bearings using oil impregnated metal, etc., result in a non-lubrication, long-life rotary actuator with high-torque and high-performance that is also compact and lightweight, with extremely little air leakage.
- The series is finely categorized according to the nominal torque. The range also includes units with compact sensor switches that increases its application flexibility and different possible devices you can design.

Basic Model and Configuration

Rotary actuator vane type **RAN** Standard type	Rotary actuator vane type **RANS** With sensor switch
RAN1 Nominal torque 0.098N·m [0.072ft·lbf] **RAN3** Nominal torque 0.294N·m [0.217ft·lbf] **RAN8** Nominal torque 0.785N·m [0.579ft·lbf] **RAN20** Nominal torque 1.961N·m [1.446ft·lbf] **RAN50** Nominal torque 4.903N·m [3.616ft·lbf]	**RANS1** Nominal torque 0.098N·m [0.072ft·lbf] **RANS3** Nominal torque 0.294N·m [0.217ft·lbf] **RANS8** Nominal torque 0.785N·m [0.579ft·lbf] **RANS20** Nominal torque 1.961N·m [1.446ft·lbf] **RANS50** Nominal torque 4.903N·m [3.616ft·lbf]
	

- **RAN□ 1, 3, 8, 20** are each available in swing angle specifications of 90°, 100°, 180°, (190°), and 270°.
  RAN□ 50 is available in swing angle specifications of 90°, 100°, 180°, 190°, and 275°.
  Note: Items in parentheses ( ) are made to order.

Relationship between Swing Angle and Keyseat Location

90° Specification	100° Specification	180° Specification	190° Specification Note	270° Specification	275° Specification
					
Starting point of swing: 45°	Starting point of swing: 45° (RAN50 is 40°)	Starting point of swing: 45°	Starting point of swing: 45° (RAN50 is 40°)	Starting point of swing: 45°	Starting point of swing: 45°

Note: 190° specification is made to order.

Mounting Type

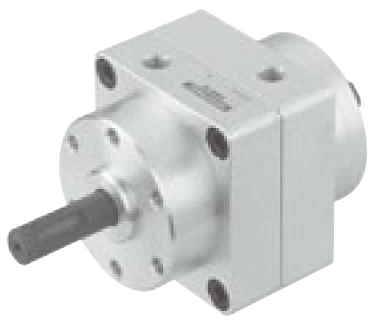
Both the direct mounting and bracket mounting (for **RAN□50** only) types are designed to ensure a high degree of precision in the parallelism to the mounting surface for the rod center or perpendicularity to the rod center.

RAN□1, 3, 8, 20

■Front mount (direct front mounting)	■Side mount (direct side mounting)
	

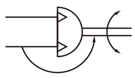
Remark: **RAN□1, 3, 8** and **20** are direct mounting only.

RAN□50

■Nose mount (direct front mounting)	■Foot mount (using foot mounting brackets)
	

■Flange mount (using flange mounting bracket)


Symbol

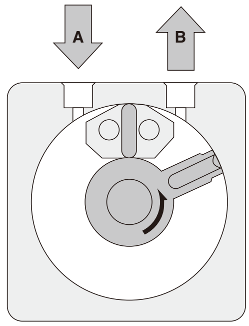


Specifications

Item \ Basic model	RAN□1	RAN□3	RAN□8	RAN□20	RAN□50
Operation type	Double acting single vane type				
Effective torque Note1 N·m [ft·lbf]	0.118 [0.087]	0.294 [0.217]	0.785 [0.579]	1.961 [1.446]	5.197 [3.833]
Swing angle Note2 (Tolerance $^{+3°}_{0}$)	90°, 100°, 180°, (190°), 270° (190° is made to order.)				90°, 100°, 180°, 190°, 275°
Media	Air				
Port size	M5×0.8			M5×0.8	Rc1/8
Rod diameter mm [in.]	4 [0.157]	5 [0.197]	6 [0.236]	8 [0.315]	12 [0.472]
Operating pressure range MPa [psi.]	0.25～0.7 [36～102]	0.2～0.7 [29～102]			
Proof pressure MPa [psi.]	1.03 [149]				
Operating temperature range °C [°F] (Atmosphere and media)	5～60 [41～140]				
Internal capacity Note3 cm^3 [$in.^3$]	2.04 [0.124] (4.07 [0.248])	4.48 [0.273] (8.96 [0.547])	11.05 [0.674] (22.1 [1.35])	27.2 [1.66] (54.4 [3.32])	56 [3.42] (75 [4.58])
Allowable energy J [in·lbf]	0.0004 [0.0035]	0.002 [0.018]	0.005 [0.044]	0.015 [0.133]	0.06 [0.53]
Allowable radial load N [lbf]	19.6 [4.41]	39.6 [8.90]	58.8 [13.2]	294.2 [66.1]	588.4 [132.3]
Allowable thrust load Note4 N [lbf]	2.0 [0.45]	3.9 [0.88]	5.9 [1.33]	29.4 [6.61]	98.1 [22.1]
Lubrication	Not required				
Cushion	None	Rubber bumper			None
Sensor switch Note5	The sensor switch can be installed on type RANS□. Applicable sensor switch: ZC130□, ZC153□, CS5T□, CS11T□				

Notes: 1. Value when the air pressure is 0.5MPa [73psi].
2. Angle tolerance is the value at the maximum swing angle for the specification. Note, however, that RAN1 is $^{+4°}_{0}$.
3. Values when swing angle is 90°. Values in parentheses ( ) are at the maximum swing angle for the specification.
4. Numerical values are reference values, not guaranteed values. For details, see p.1281.
5. For details of sensor switches, see p.1544.

Operation Principle



When air supplied from Port A pushes against the vane and generates torque, the vane rod rotates. Air in opposite side of the vane is exhausted from Port B.
Air supplied from Port B will generate torque in the opposite direction from the diagram shown above. Air in opposite side of the vane is exhausted from Port A.

Mass

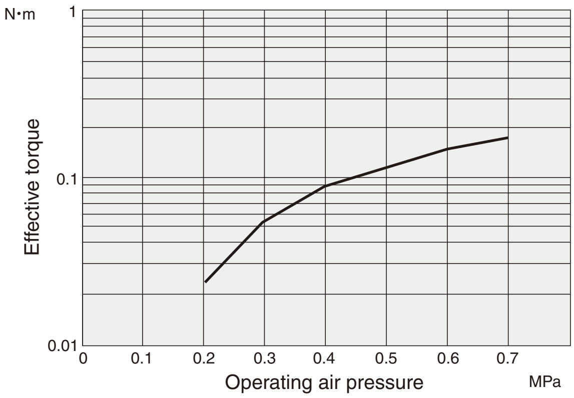
g [oz.]

Basic model and swing angle		Main body mass: Side mount	Main body mass: Front mount (RAN□50 is nose mount)	Additional mass, For RANS□: With 1 sensor switch (ZC130, ZC153, CS5T, CS11T)	Additional mass, For RANS□: With 2 sensor switches (ZC130, ZC153, CS5T, CS11T)	Mounting bracket: Foot mount	Mounting bracket: Flange mount
RAN□1	All swing angles	50 [1.76]	45 [1.59]	A: 40 [1.41] B: 70 [2.47]	A: 60 [2.12] B: 120 [4.23]	——	——
RAN□3	All swing angles	105 [3.70]	75 [2.65]				
RAN□8	All swing angles	180 [6.35]	130 [4.59]				
RAN□20	180° or less	350 [12.35]	270 [9.52]				
	270°	345 [12.17]	265 [9.35]				
RAN□50	190° or less	——	950 [33.51]	A: 80 [2.82]	A: 100 [3.53]	185 [6.53]/pc.	200 [7.05]/pc.
	275°	——	910 [32.10]	B: 110 [3.88]	B: 160 [5.64]		

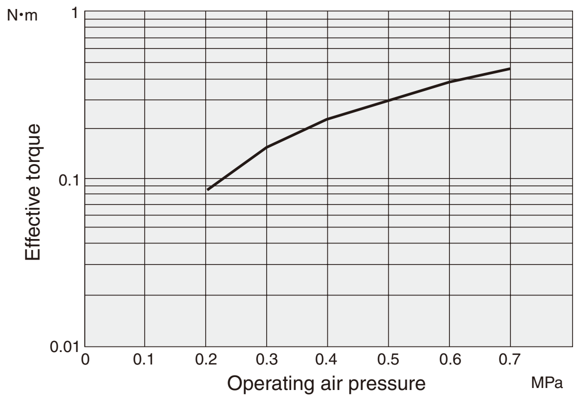
Calculation example: Mass of RANS1-90-2 (side-mounted) with 2 sensor switches (lead wire length A), 50＋60＝110g [3.88oz.]
Remark: There are 2 types of sensor switch lead wire lengths.
A: 1000mm [39in.], B: 3000mm [118in.]

Output Characteristics (Effective torque)

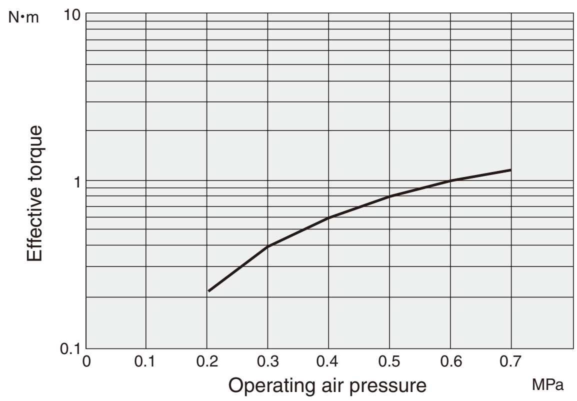
●RAN□1



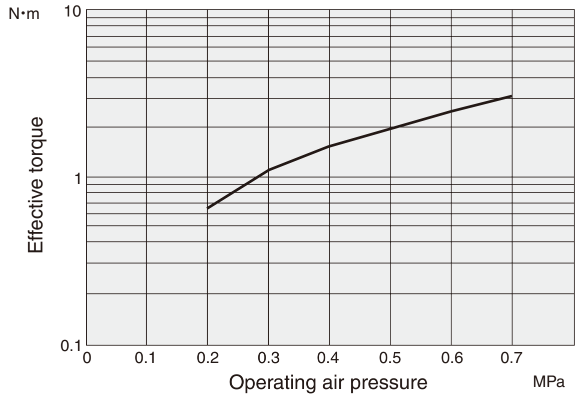
●RAN□3



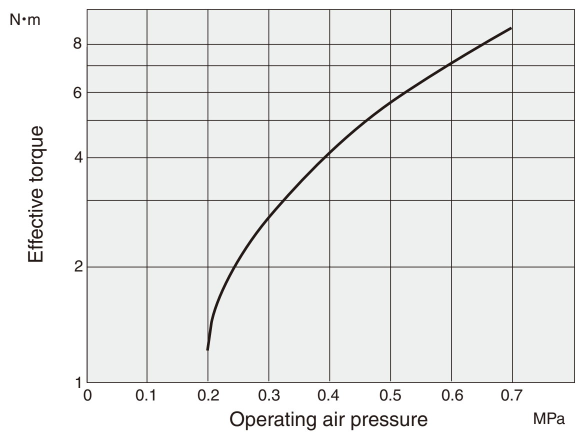
●RAN□8



●RAN□20



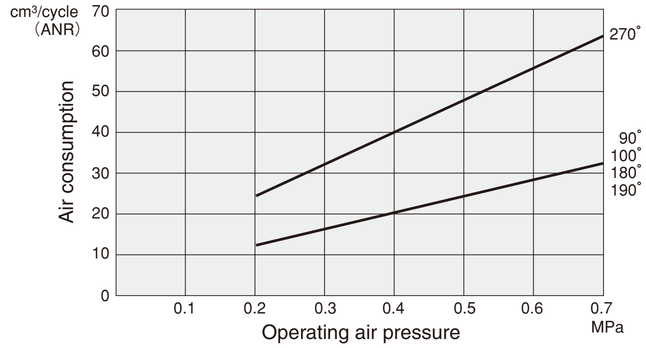
●RAN□50



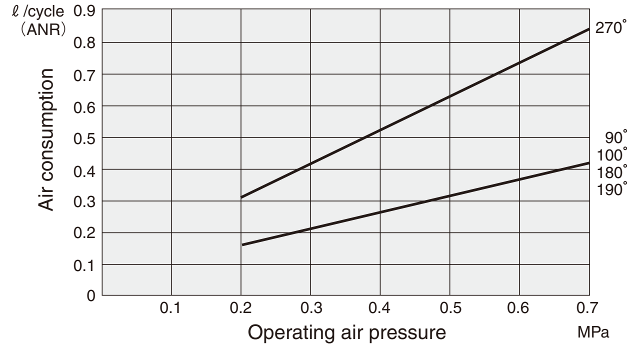
1N·m = 0.7376ft·lbf
1MPa = 145psi.

Air Consumption

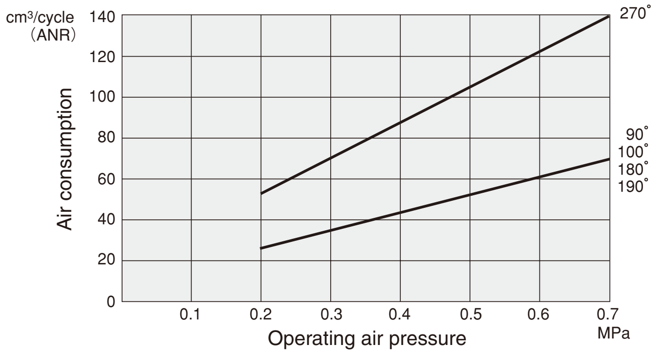
●RAN□1



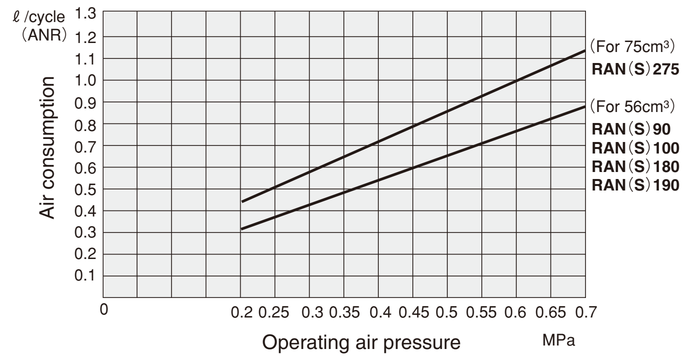
●RAN□20



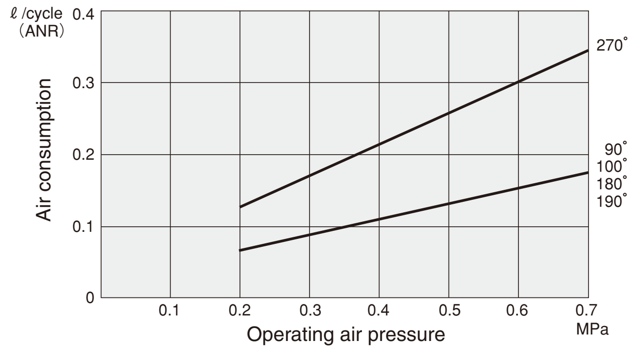
●RAN□3



●RAN□50



●RAN□8



1cm³/cycle = 0.0610in³/cycle
1 ℓ /cycle = 0.0353ft³/cycle
1MPa = 145psi.

Air consumption per cycle of the rotary actuator can be found by the following calculation formula.

$$Q = 2 \times V \times 10^{-3} \times \left(\frac{(P + 0.1013)}{0.1013} \right)$$

Q : Air consumption per 1 cycle [ℓ /cycle (ANR)]
V : Internal capacity (cm³)
P : Operating air pressure (MPa)

$$Q' = 2 \times V' \times \frac{1}{1728} \times \left(\frac{(P' + 14.696)}{14.696} \right)$$

Q' : Air consumption per 1 cycle [ft³/cycle (ANR)※]
V' : Internal capacity (in³)
P' : Operating air pressure (psi.)

※Refer to p.54 for an explanation of ANR.

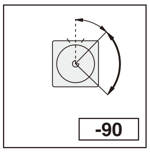
Rotary Actuator Standard Type

Order Codes

RAN1, 3, 8, 20

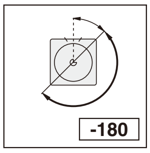
■ Swing angle

90°



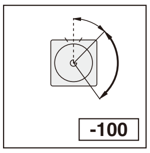
● Starting point of swing: 45°

180°



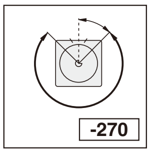
● Starting point of swing: 45°

100°



● Starting point of swing: 45°

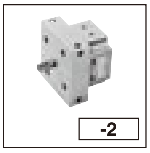
270°



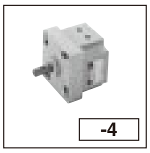
● Starting point of swing: 45°

■ Mounting type

Side mount



Front mount

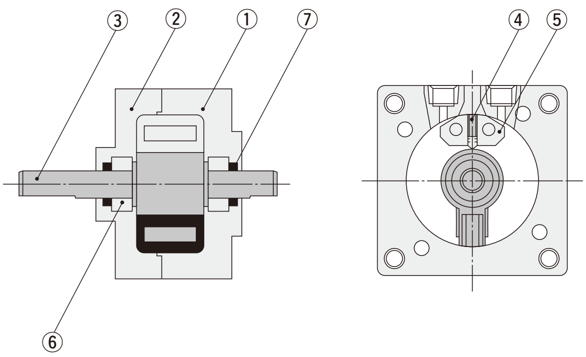


Basic model	Nominal torque		
RAN	1 3 8 20	-90 -100 -180 -270	-2 -4

●190° swing angle specification can be made to order.

Inner Construction, Major Parts and Materials

RAN1, 3, 8, 20



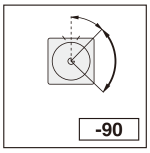
No.	Parts	Materials
①	Main body A	Aluminum alloy (anodized)
②	Main body B	Aluminum alloy (anodized)
③	Vane rod (output shaft)	Carbon steel (nitriding processing)
	Vane rod (rotor)	Plastic
	Vane rod (seal)	Synthetic rubber (NBR)
④	Shoe seal	Synthetic rubber (NBR)
⑤	Shoe	Plastic
⑥	Sliding bearing	Oil impregnated sintered alloy
⑦	O-ring	Synthetic rubber (NBR)

Order Codes

RAN50

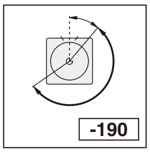
■ Swing angle

90°



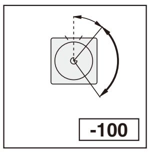
● Starting point of swing: 45°

190°



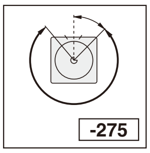
● Starting point of swing: 40°

100°



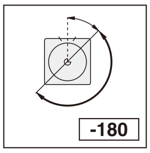
● Starting point of swing: 40°

275°



● Starting point of swing: 45°

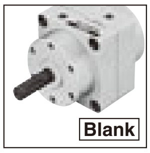
180°



● Starting point of swing: 45°

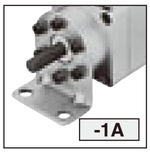
■ Mounting type

Nose mount

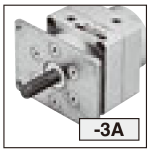


● Direct front mounting

Foot mount

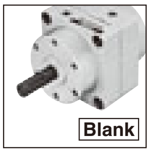


Flange mount



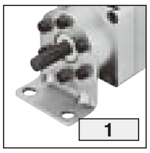
■ Number of mounting brackets

No mounting bracket

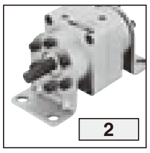


● Side mounting

With 1 bracket



With 2 brackets



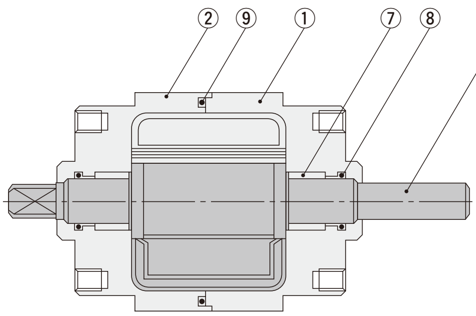
● For foot mount only.

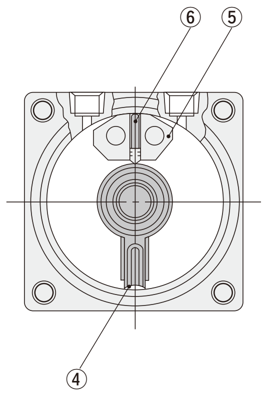
Basic model	Nominal torque			
RAN	50	-90 -100 -180 -190 -275	-1A -3A	1 2

● For the order code of mounting brackets only, see p.1272.

Inner Construction, Major Parts and Materials

RAN50





No.	Parts	Materials
①	Main body A	Aluminum alloy (anodized)
②	Main body B	Aluminum alloy (anodized)
③	Vane rod	Alloy steel (nitriding processing)
④	Vane seal	Synthetic rubber (NBR)
⑤	Shoe	Plastic
⑥	Shoe seal	Synthetic rubber (NBR)
⑦	Sliding bearing	Oil impregnated sintered alloy
⑧	O-ring Note1	Synthetic rubber (NBR)
⑨	O-ring Note2	
	Foot mounting bracket	Mild steel
	Flange mounting bracket	Mild steel

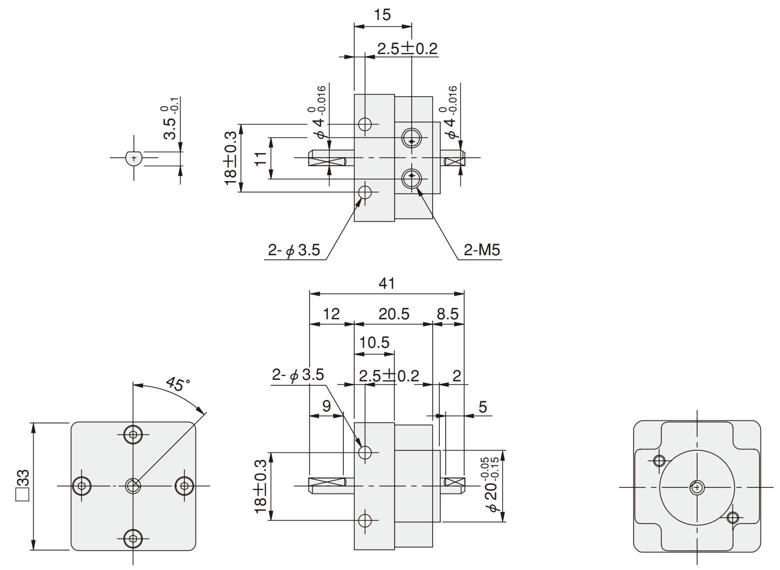
Notes: 1. P14 or equivalent: 2 pcs.
2. ϕ 62.5 × ϕ 2: 1 pc.

Dimensions of RAN1 (mm)

Side mount (Direct side mounting)

RAN1- Swing angle -2

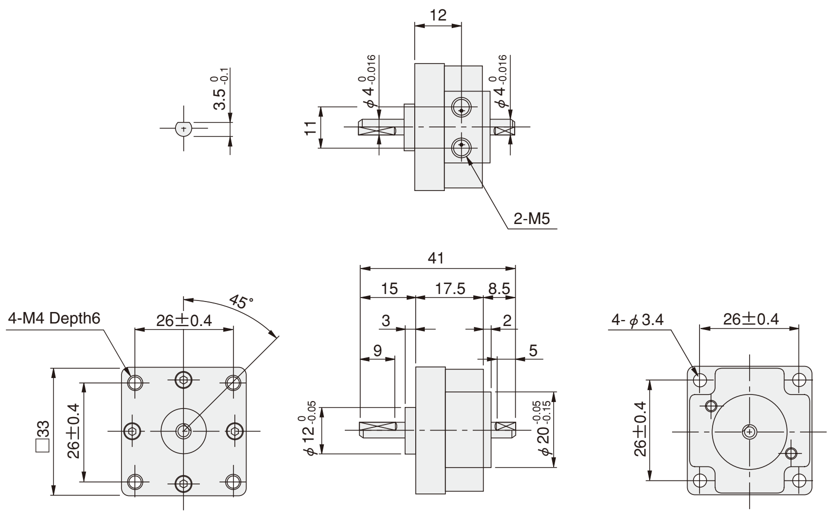
CAD RAN1-2



Front mount (Direct front mounting)

RAN1- Swing angle -4

CAD RAN1-4



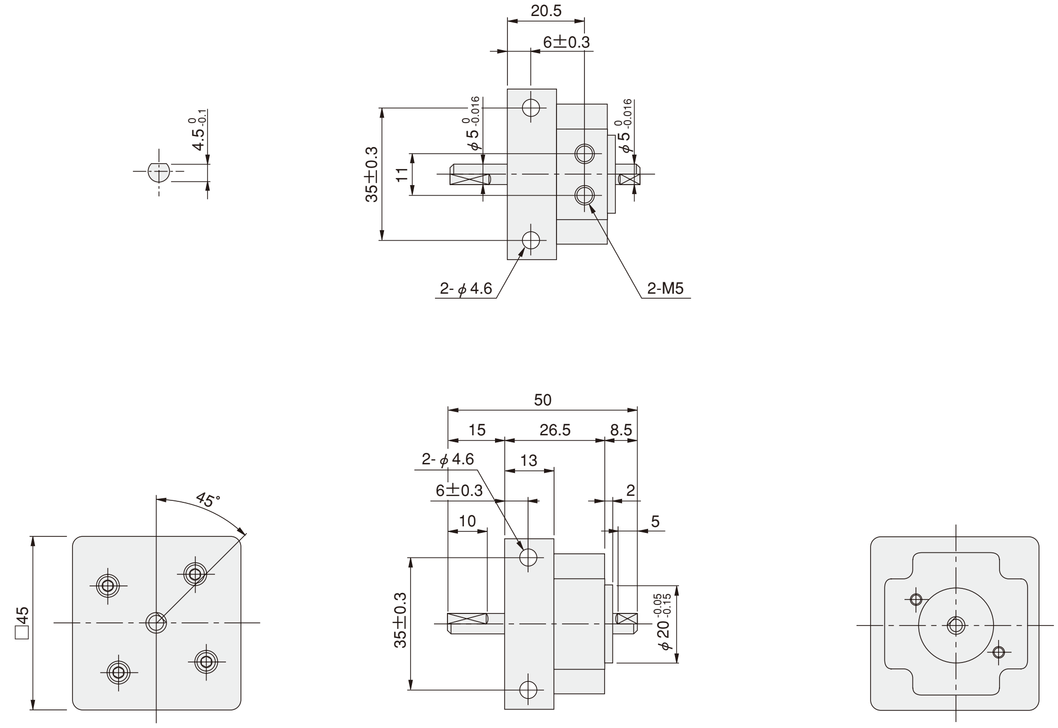
ROTARY ACTUATORS VANE TYPE RAN SERIES

Dimensions of RAN3 (mm)

Side mount (Direct side mounting)

RAN3- Swing angle -2

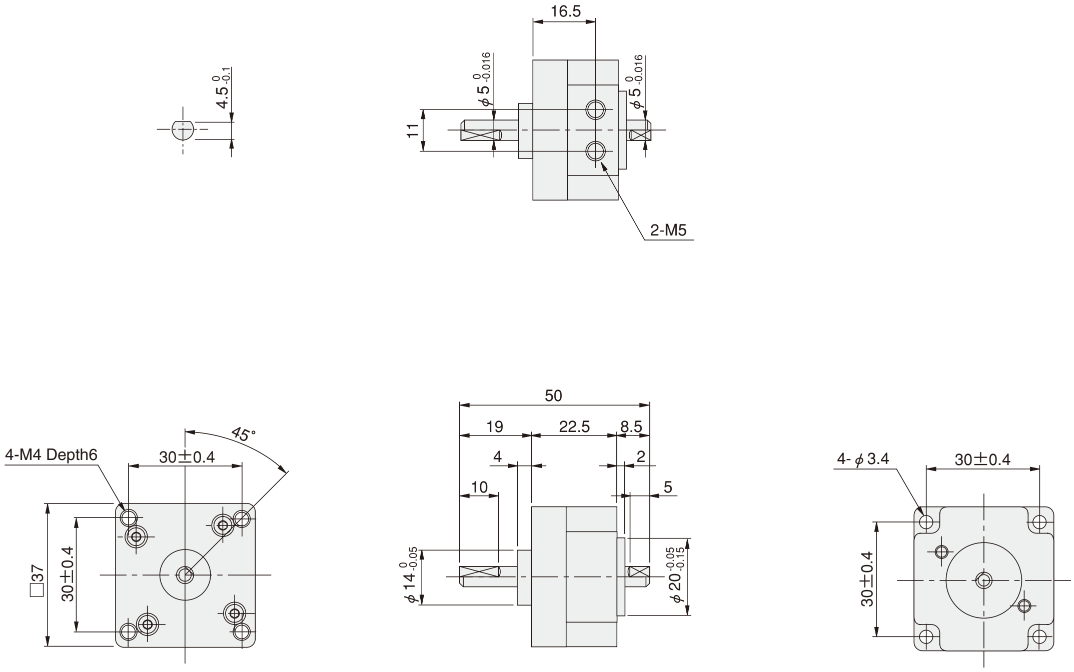
CAD RAN3-2



Front mount (Direct front mounting)

RAN3- Swing angle -4

CAD RAN3-4

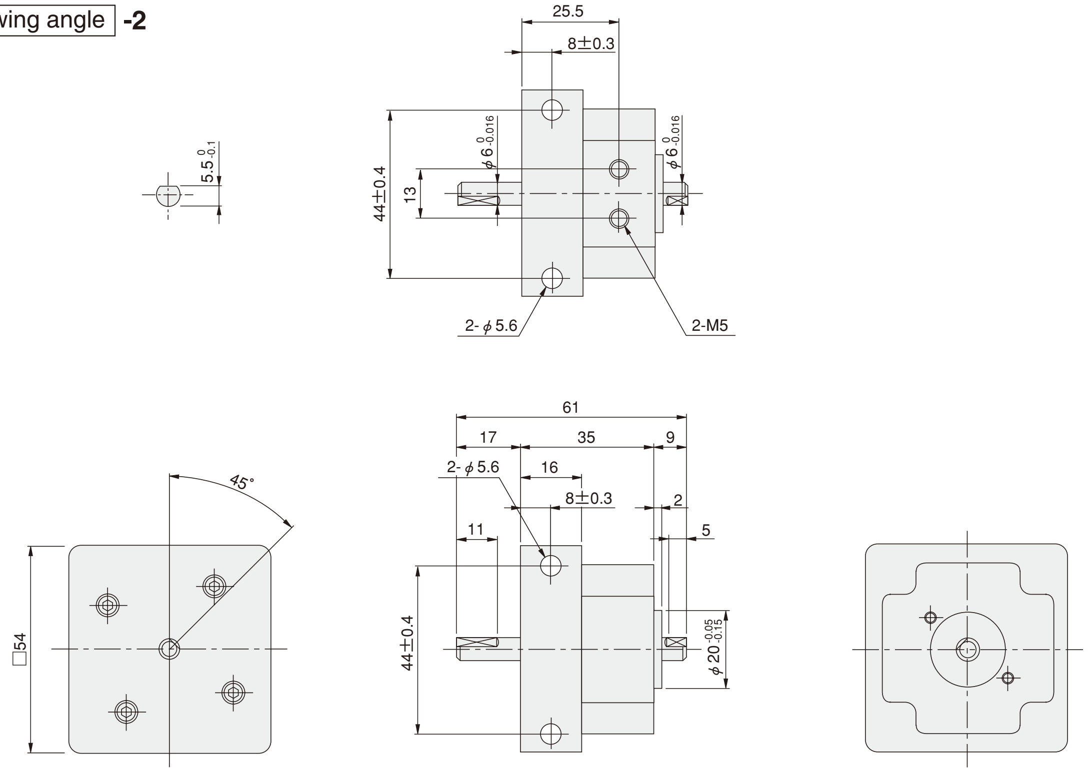


Dimensions of RAN8 (mm)

Side mount (Direct side mounting)

RAN8- Swing angle **-2**

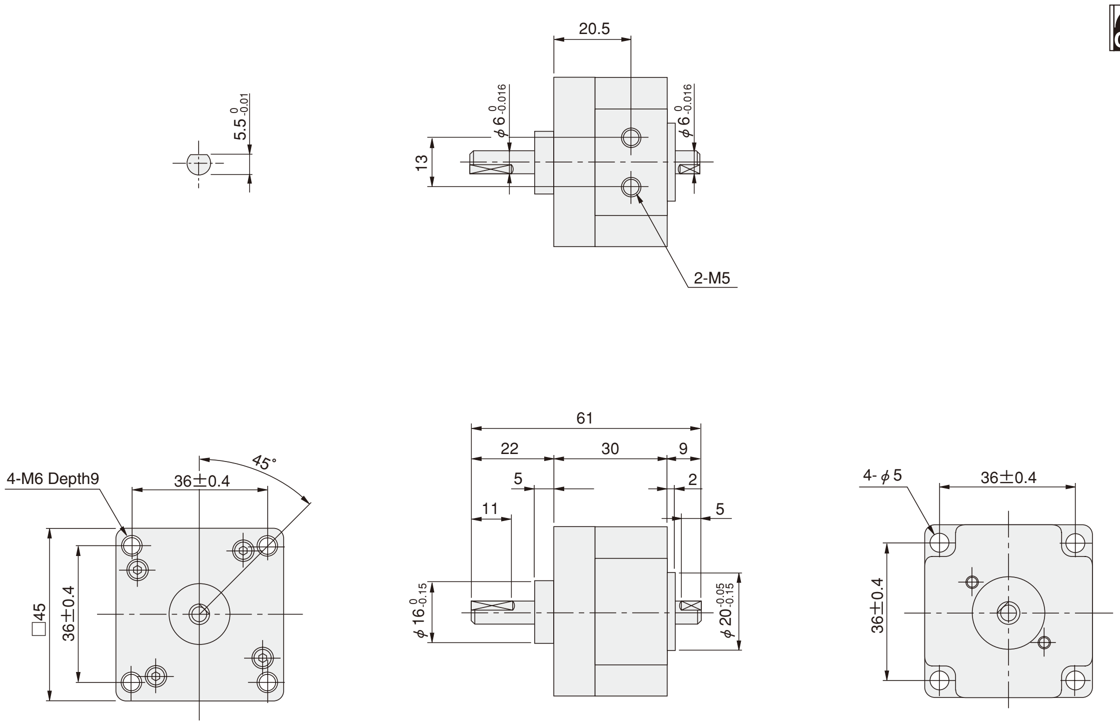
RAN8-2



Front mount (Direct front mounting)

RAN8- Swing angle **-4**

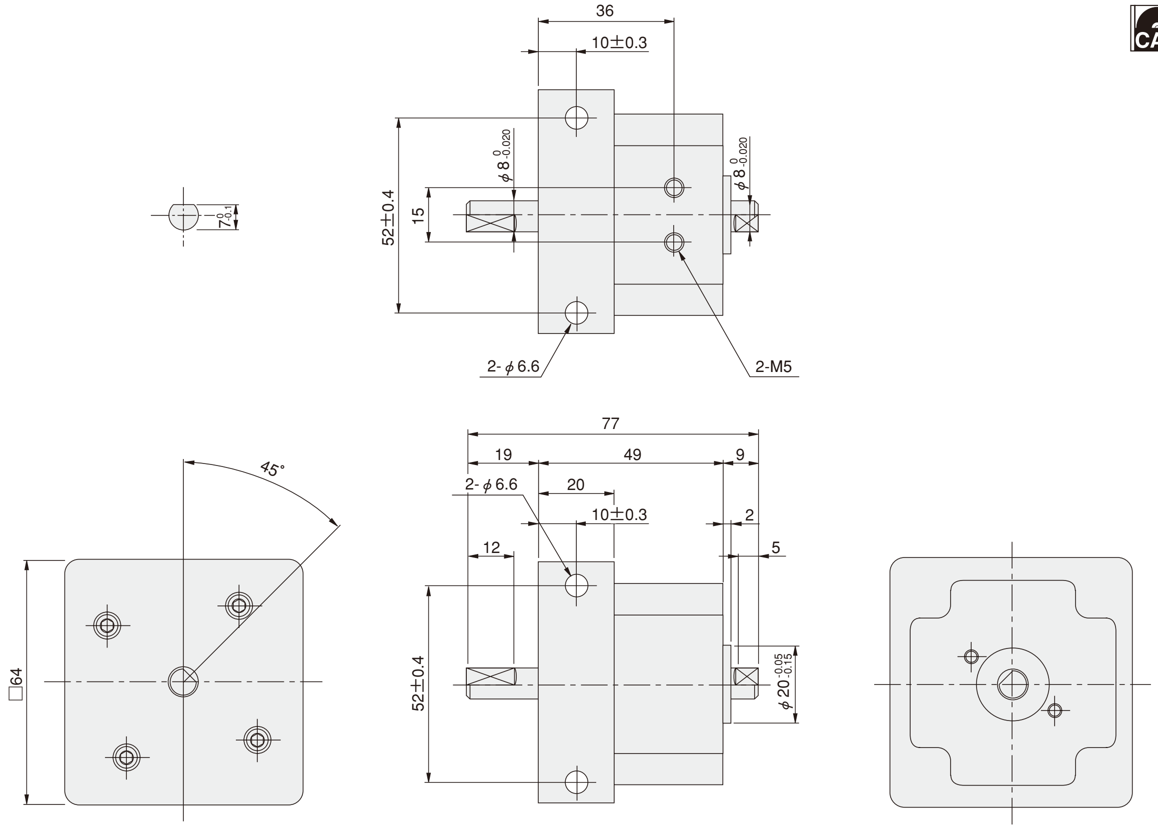
RAN8-4



Side mount (Direct side mounting)

RAN20- Swing angle -2

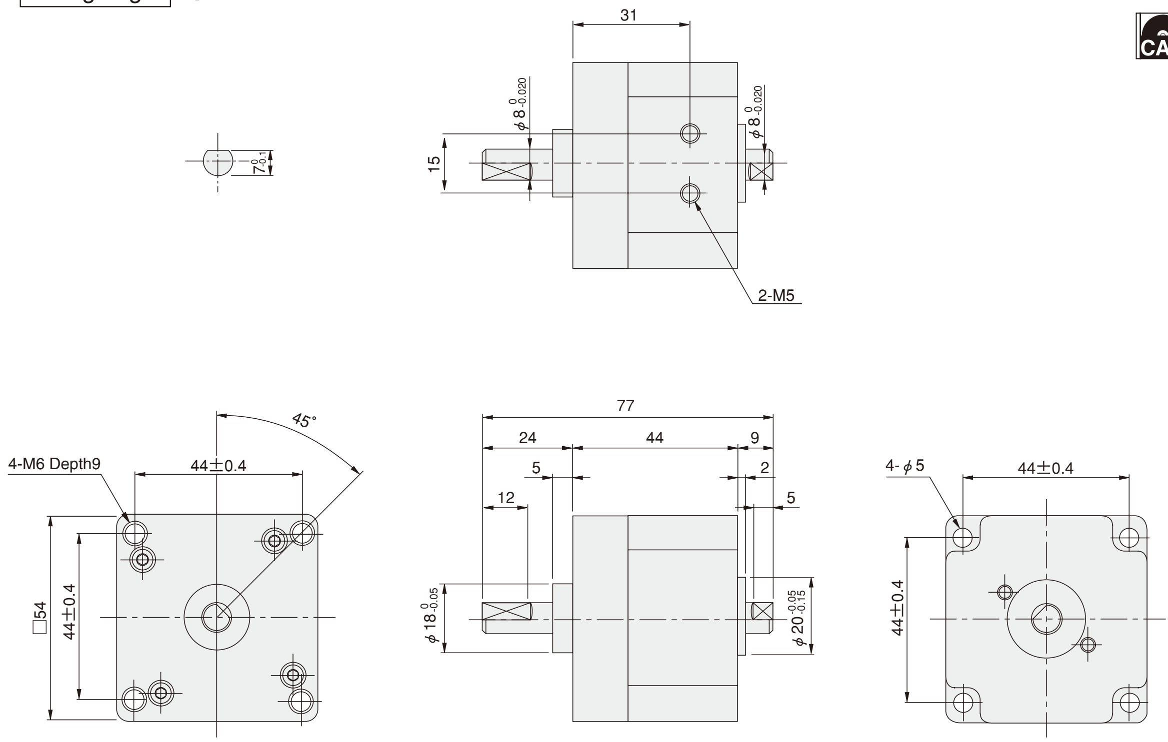
RAN20-2



Front mount (Direct front mounting)

RAN20- Swing angle -4

RAN20-4

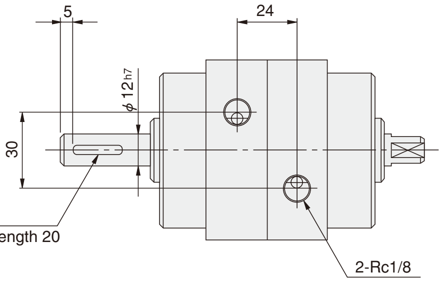


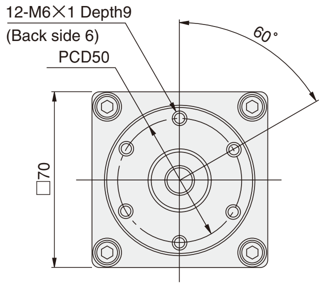
Dimensions of RAN50 (mm)

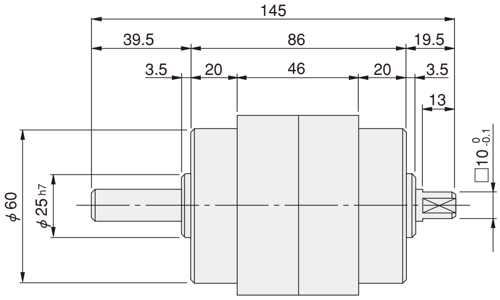
Nose mount (Direct front mounting)

RAN50- Swing angle

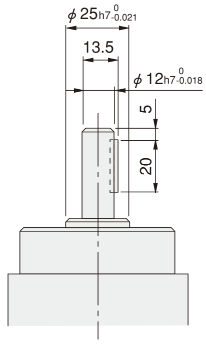
CAD RAN50







● **Dimensions of the key and keyseat**

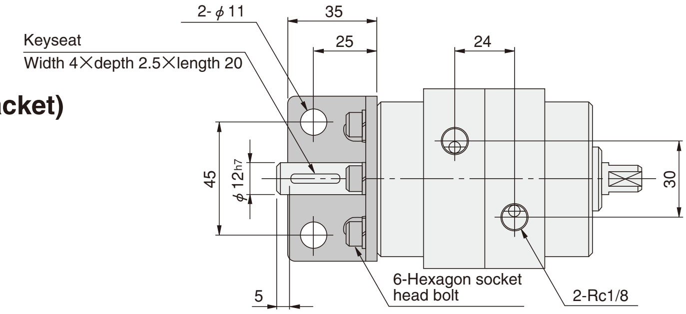


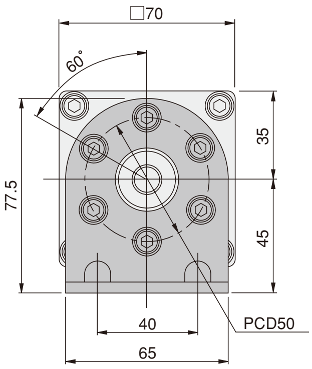
※ The position of the keyseat in the drawings varies from the actual product. For the positional relationship with the swing angle, see p.1259. The key is included at shipping.

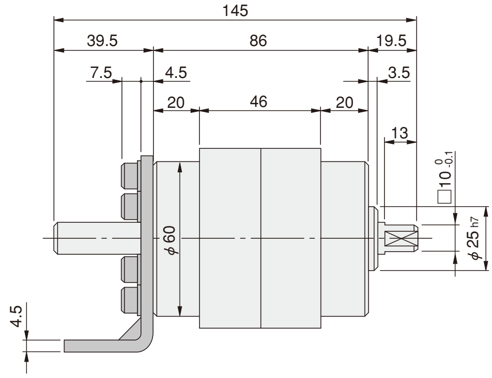
Foot mount (Using foot mounting bracket)

RAN50- Swing angle **-1A**

CAD RAN50-1A



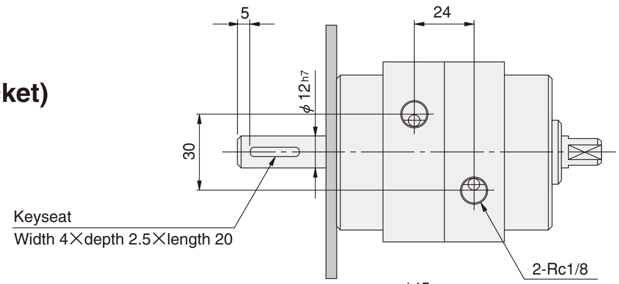


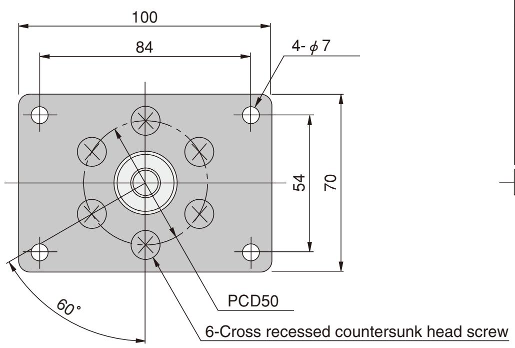


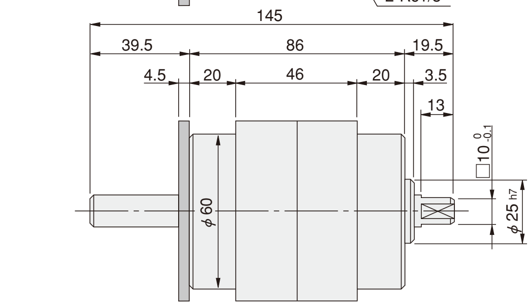
Flange mount (Using flange mounting bracket)

RAN50- Swing angle **-3A**

CAD RAN50-3A







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	**ZC130**	**A** **B**
Solid state type	3-lead wire	with indicator lamp	DC4.5～28V	**ZC153**	
Reed switch type	2-lead wire	without indicator lamp	DC5～28V AC85～115V	**CS5T**	**A** **B**
Reed switch type	2-lead wire	with indicator lamp	DC10～28V	**CS11T**	

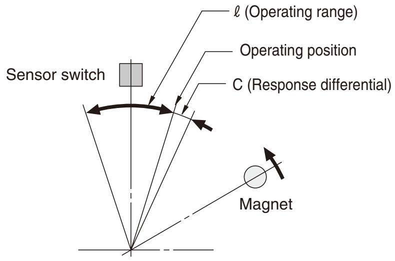
●For details of sensor switches, see p.1544.

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

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

● Operating range: ℓ
The angle the rotor travels in one direction, while the switch is in the ON position.

● Response differential: C
The angle between the point where the rotor turns the switch ON and the point where the switch is turned OFF as the rotor travels in the opposite direction.



RANS1, 3, 8, 20

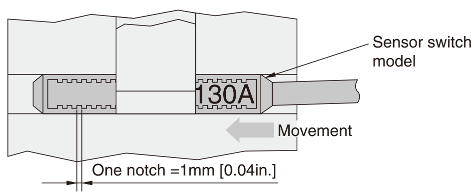
Sensor switch model	Solid state type	Reed switch type
	ZC130□, ZC153□	**CS5T□, CS11T□**
Operating range: ℓ	About 70°	About 36°
Response differential: C	About 1.5°	About 6°
Operating position	About 35°	About 18°

RANS50

Sensor switch model	Solid state type	Reed switch type
	ZC130□, ZC153□	**CS5T□, CS11T□**
Operating range: ℓ	About 29°	About 16°
Response differential: C	About 2°	About 3°
Operating position	About 14.5°	About 8°

Moving and Adjusting of Sensor Switch

Since the maximum sensing location of the sensor switch will vary depending on the model, use the guidelines below for moving and adjusting the sensor switch during mounting.
The **RANS** with sensor switches has been adjusted at the factory before shipping.



● Use a cover to temporarily secure the sensor switch, and set the magnet directly underneath the sensor switch.

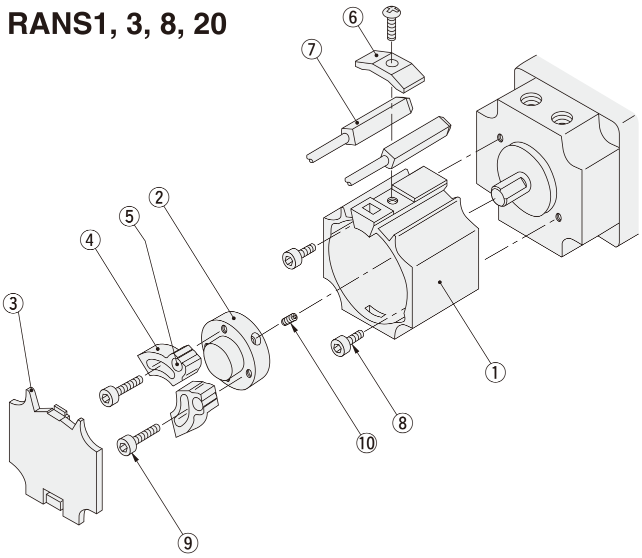
● Move the sensor switch from the rear portion of the cover in the direction of the body, and confirm the point where it turns ON (LED turns ON with indicator lamp type). Then, move it 1 notch further (about 1mm [0.04in]) for the solid state type **ZC130** and **ZC153** or 2 notches (about 2mm [0.08in]) for the reed switch type **CS5T** and **CS11T** toward the RANS body, and tighten the mounting screw to secure it in place.

● When installing the sensor switch, always mount so that the model marking surface faces upward.
Mounting with the model marking on the bottom or side surfaces could result in improper operation.

Sensor switches

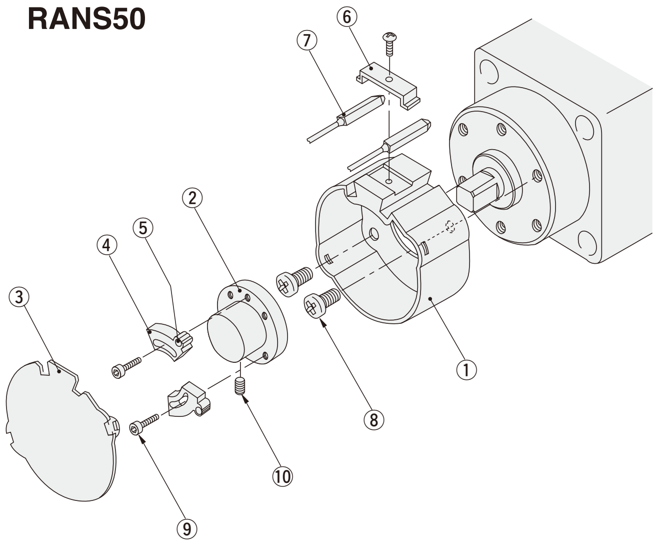
Parts in sensor cover

RANS1, 3, 8, 20



No.	Parts	No.	Parts
①	Cover	⑥	Sensor switch holder
②	Rotor	⑦	Sensor switch
③	End cover	⑧	Cover mounting bolt
④	Magnet holder	⑨	Magnet holder mounting bolt
⑤	Magnet	⑩	Rotor setscrew

RANS50



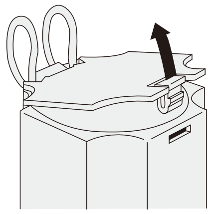
No.	Parts	No.	Parts
①	Cover	⑥	Sensor switch holder
②	Rotor	⑦	Sensor switch
③	End cover	⑧	Cover mounting bolt
④	Magnet holder	⑨	Magnet holder mounting bolt
⑤	Magnet	⑩	Rotor setscrew

1. **RANS** sensors are pre-adjusted to the swing angles at shipping from the factory. Do not attempt any unnecessary disassembly or removal.
   If readjustment is required, see "Arrangement of swing angle and magnet holder" on the next page.
2. Two magnet holders are mounted even with orders that do not have any **RANS** sensors or have just 1 unit.

How to detach the end cover

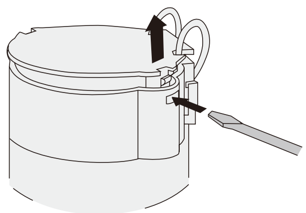
● **RANS1, 3, 8, 20**

Push up the end cover to remove, as shown in the diagram.



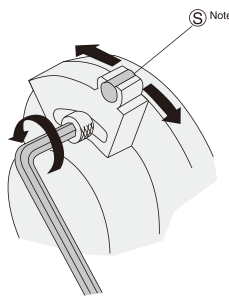
● **RANS50**

Operation is easily accomplished simply by inserting a flat blade screwdriver of appropriate size into the slot and pry it away lightly, as shown in the diagram.



Sensor operation beyond the set angle

Loosen the magnet holder's hexagon socket head bolt, as shown in the diagram, and move the holder to the required angle for operation.



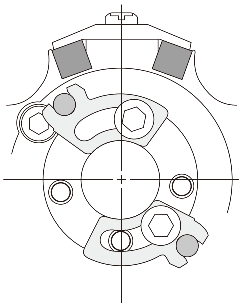
Note: If the holder has been removed, always mount it so that the magnet end surface with the [S] marking faces toward the **RAN** body. Mounting in the reverse direction could result in failure of the sensor switch to operate.

Arrangement of swing angle and magnet holder

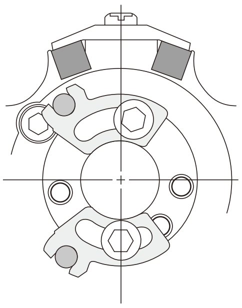
Caution: The diagrams show the starting points of swing (the end of left swing stroke). When viewed from the sensor cover side, it becomes the end of right swing stroke.

RANS1, 3, 8, 20

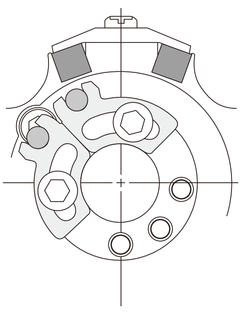
For ZC130□ and ZC153□



90°

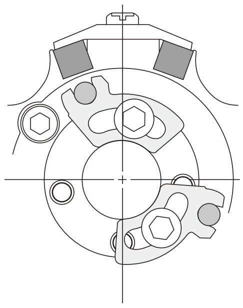


180°

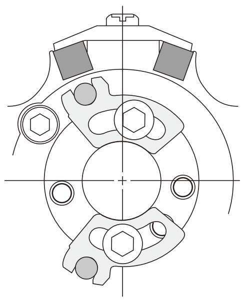


270°

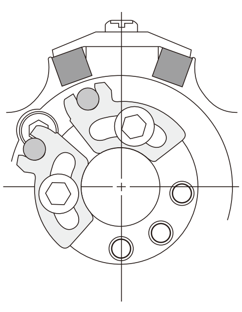
For CS5T□ and CS11T□



90°

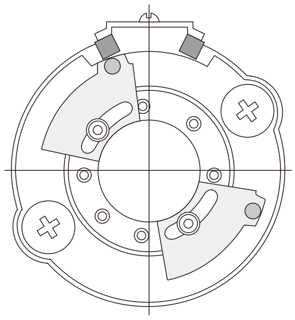


180°

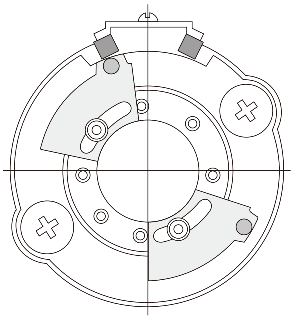


270°

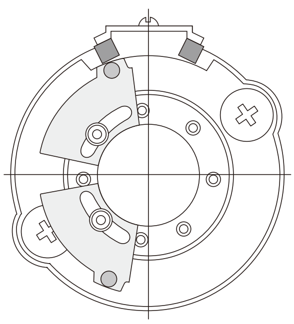
RANS50



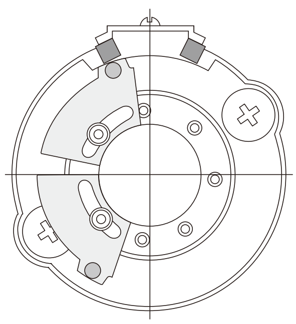
90°



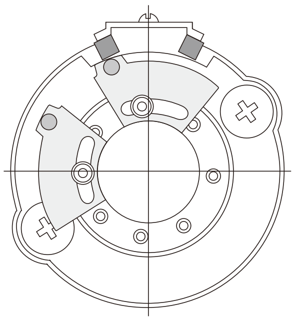
100°



180°

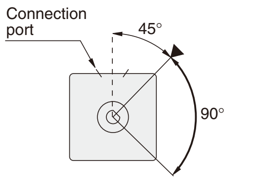
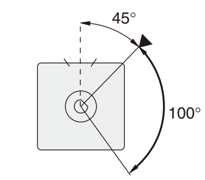
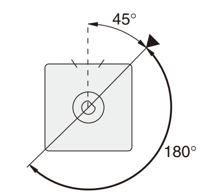
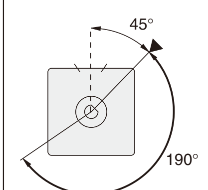
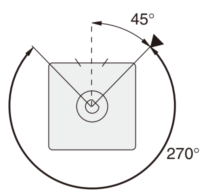
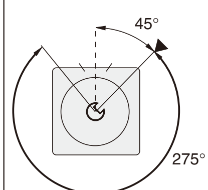


190°



275°

Relationship between swing angle and keyseat location

90° Specification	100° Specification	180° Specification	190° Specification Note	270° Specification	275° Specification
					
Starting point of swing: 45°	Starting point of swing: 45° (RAN50 is 40°)	Starting point of swing: 45°	Starting point of swing: 45° (RAN50 is 40°)	Starting point of swing: 45°	Starting point of swing: 45°

Note: 190˚ specification is made to order.

Selection

Selection

1. Allow plenty of margin for output (torque). Set the required torque at 80% or less (50% or less for fluctuating loads) of the effective torque.
   The inertia load becomes larger when the load mass is large, or during high operating speeds, it may exceed the rotary actuator's allowable kinetic energy. In this case, install a shock absorber to prevent the rotary actuator from inertia force being directly applied.
2. The positional relationship between the swing angle and the keyseat is as shown on p.1259. Even though tolerance of the swing angle is within the range of $^{+3°}_{0}$ to the specification angles, install an external stopper, etc., to maintain accurate positioning.
3. For the swing time of the rotary actuator (the time it takes to reach the end of swing stroke from starting movement), see the table below as a guideline.

●Swing time (as a guideline)

s

Swing angle / Model	90°, 100°	180°, 190°	270° Note
RAN1	0.03～0.3	0.06～0.6	0.08～0.8
RAN3	0.04～0.4	0.08～0.8	0.1～1.0
RAN8	0.05～0.5	0.1～1.0	0.15～1.5
RAN20	0.06～0.6	0.12～1.2	0.2～2.0
RAN50	0.08～1.0	0.16～1.8	0.2～3.0

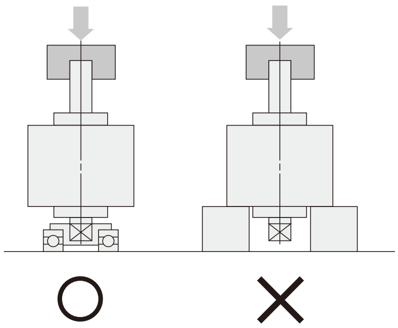
Remark : Conditions are air pressure at 0.5MPa [73psi.] and no load.
Note : RAN50 is 275° specification.

Caution: Excessively high kinetic energy could damage the rod of the rotary actuator. Always use within the allowable energy.

Mounting

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 (see p.1261), 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.



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.