

- The rotary actuators come in five cylinder bores from 32 to 80 mm and three mounting styles, SD, FA and FB.
- The unique backlash eliminating mechanism prevents backlash at the rotating ends.
- The rotating angle can be adjusted in the range of ±5° by the rotation angle fine adjustment mechanism.
- Versatile magnetic proximity sensors of AX and AZ types are standardized.
- The external dimensions and mounting dimensions are completely identical with those of 35RP.
- Since the piston contains a magnet, a sensor can be mounted after installation.
(The same sensors as those of 35H-3R can be used.)



Main Body Specifications

Type	35RP2
Series Variation	Rack and pinion type
Bore (mm)	φ32·φ40·φ50·φ63·φ80
Rotating angle	90°·180°
Angle adjustment	±5°
Rated torque (at 3.5 MPa)	φ32: 60N·m φ40: 106N·m φ50: 220N·m φ63: 436N·m φ80: 840N·m
Maximum allowable pressure	3.5 MPa
Proof test pressure	5 MPa
Minimum operating pressure	0.5 MPa
Working temperature range	+10 to +60°C (ambient/fluid temperature)
Adaptable fluid	Petroleum-based fluid (When using another fluid, refer to the table of fluid adaptability.)
Gear oil	JIS 2219, Class 2 (gear oil equivalent to ISO VG680)
Tolerance for thread	JIS 6g/6H
Mounting style	SD, FA, FB

Adaptability of Fluid

Adaptable fluid				
Petroleum-based fluid	Water-glycol fluid	Phosphate ester fluid	Water in oil fluid	Oil in water fluid
○	×	×	△	△

Note) ○: Applicable, ×: Inapplicable, Consult us before using the △-marked items.

Amount of Fluid Necessary for Rotation Unit: ml

Rotating angle Bore mm	Rotating angle	
	90°	180°
φ32	28.3	53.4
φ40	51.9	99.5
φ50	104.3	202.6
φ63	203.8	399.9
φ80	410.5	788.3

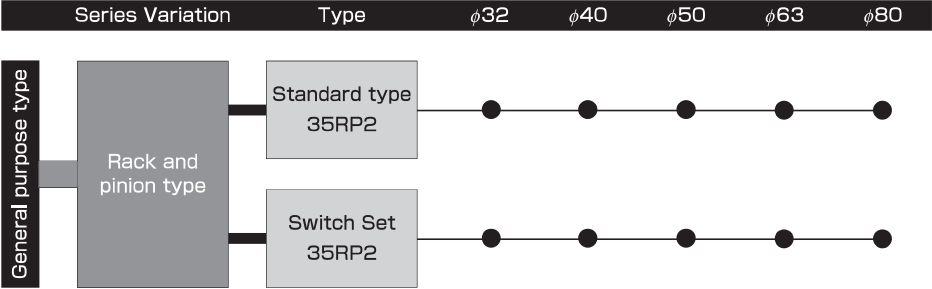
Terminologies

Maximum allowable pressure
Maximum allowable pressure generated in a cylinder (surge pressure, etc.).

Proof test pressure
Test pressure against which a cylinder can withstand without unreliable performance at the return to nominal pressure.

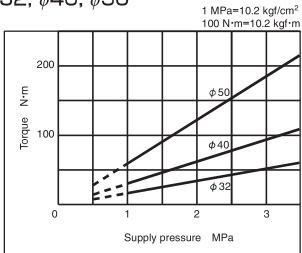
Minimum operating pressure
Minimum pressure at which cylinder installed horizontally operates under no load.

Product Lineup

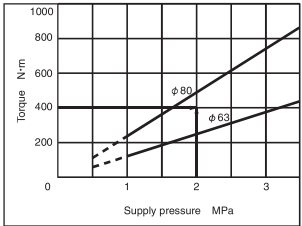


Theoretical Output Torque Charts

● Bore φ32, φ40, φ50



● Bore φ63, φ80



How to read the graph

When a torque of 400 N·m is required at a working pressure of 2 MPa, determine the intersection of the lines extended from the vertical axis of supply pressure and the horizontal axis of torque. Find the bore above this intersection, and the bore of 80 mm can be selected.
Note) Determine the effective torque based on the following data.
When the inertia force is low: 60 to 80%
When the inertia force is high: 25 to 35%

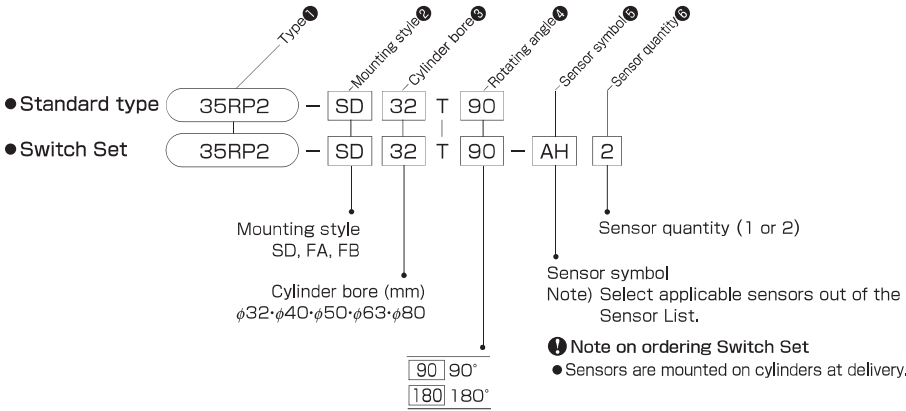
Weight Table

Unit: kg

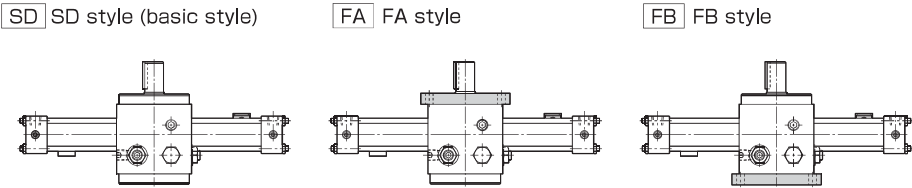
Bore	Basic weight (SD style)	Mounting accessory weight	Sensor additional weight
Rotating angle	Standard type	FA style FB style	1 piece
φ32-90°	5.0	0.94	AX/AZ type Cord length 1.5 m: 0.05 Cord length 5 m: 0.13 With connector: 0.04 SR405 Cord length 5 m: 0.22
φ32-180°	5.2		
φ40-90°	8.8	1.57	
φ40-180°	9.2		
φ50-90°	13.9	2.09	
φ50-180°	14.7		
φ63-90°	24.2	3.56	
φ63-180°	25.8		
φ80-90°	41.0	6.54	
φ80-180°	44.1		

Calculation formula : Weight of rotary actuator (kg)
=basic weight+mounting accessory weight
+ sensor additional weight× sensor quantity
Calculation example: Standard type, bore φ40, rotating angle 180°, FA style, 2 pcs of AX215 (cord length 5 m)
9.2+1.57+0.13×2=11.03kg

● How to order



Mounting Style



Sensor List

Type	Sensor symbol	Load voltage range	Load current range	Max. switching capacity	Protective circuit	Indicating lamp	Wiring method	Cord length	Applicable load
Reed sensor	AF AX101CE	DC:5 to 30 V AC:5 to 120 V	DC:5 to 40 mA AC:5 to 20 mA	DC: 1.5 W AC: 2 VA	None	LED (Lights in red when sensing)	0.3 mm ² , 2-core, outer dia. φ 4 mm, rear wiring	1.5 m	Small relay, programmable controller
	AG AX105CE				5 m				
	AH AX111CE				1.5 m				
	AJ AX115CE	DC: 30 V or less AC: 120 V or less	DC: 40 mA or less AD: 20 mA or less		Provided	None		5 m	
	AE AX125CE				5 m				
	AK AX11ACE				AC:5 to 120 V			5 to 20 mA	
	AL AX11BCE	DC:5 to 30 V	5 to 40 mA	1.5 W	0.5 m				
	AP AZ101CE	DC:5 to 30 V AC:5 to 120 V	DC:5 to 40 mA AC:5 to 20 mA	DC: 1.5 W AC: 2 VA	None	LED (Lights in red when sensing)	0.3 mm ² , 2-core, outer dia. φ 4 mm, upper wiring	1.5 m	
	AR AZ105CE				5 m				
	AS AZ111CE				1.5 m				
	AT AZ115CE	DC: 30 V or less AC: 120 V or less	DC: 40 mA or less AD: 20 mA or less		Provided	None		5 m	
	AN AZ125CE				5 m				
	AU AZ11ACE				AC:5 to 120 V			5 to 20 mA	
	AW AZ11BCE	DC:5 to 30 V	5 to 40 mA	1.5 W	0.5 m				
	AM AX135CE	AC/DC: 90 to 240 V	5 to 300 mA	B contact output	Provided	LED (Lights in red when not sensing)	0.3 mm ² , 2-core, outer dia. φ 4 mm, rear wiring	5 m	
	AY AZ135CE							0.3 mm ² , 2-core, outer dia. φ 4 mm, upper wiring	
	S SR405	AC: 80 to 220 V	2 to 300 mA	30 VA	Provided	Neon lamp (Lights when not sensing)	0.5 mm ² , 2-core, outer dia. φ 6 mm, rear wiring	5 m	
Solid state sensor	BE AX201CE-1	DC: 5 to 30V	5 to 40 mA	—	Provided	LED (Lights in red when sensing)	0.3 mm ² , 2-core, outer dia. φ 4 mm, rear wiring	1.5 m	Small relay, programmable controller
	BF AX205CE-1					LED (2-LED type in red/green)		5 m	
	CE AX211CE-1							1.5 m	
	CF AX215CE-1					LED (Lights in red when sensing)	0.3 mm ² , 2-core, outer dia. φ 4 mm, upper wiring	5 m	
	BM AZ201CE-1							1.5 m	
	BN AZ205CE-1					LED (2-LED type in red/green)		5 m	
	CM AZ211CE-1							1.5 m	
	CN AZ215CE-1					LED (2-LED type in red/green)	0.3 mm ² , 2-core, outer dia. φ 4 mm, rear wiring	5 m	
	CT AX211CE-1							1.5 m	
	CU AX215CE-1							5 m	
	CV AX21BCE-1						4-pin connector type, rear wiring	0.5 m	
	CW AZ211CE-1							1.5 m	
	CX AZ215CE-1							5 m	
	CY AZ21BCE-1							4-pin connector type, upper wiring	

Notes) ● For the sensors without a protective circuit, be sure to provide a protective circuit (SK-100) with the load when using any induction load (relay, etc.).

● The output logic of AX and AZ135CE is B contact. When the piston is detected, the sensor contact turns off (the lamp turns on).

● The cutting oil proof WR and WS type sensors can be mounted. (However, the rotary actuator bodies are not cutting oil proof.) For the details of the sensors, be sure to see the sensor specifications at the end of this catalog.

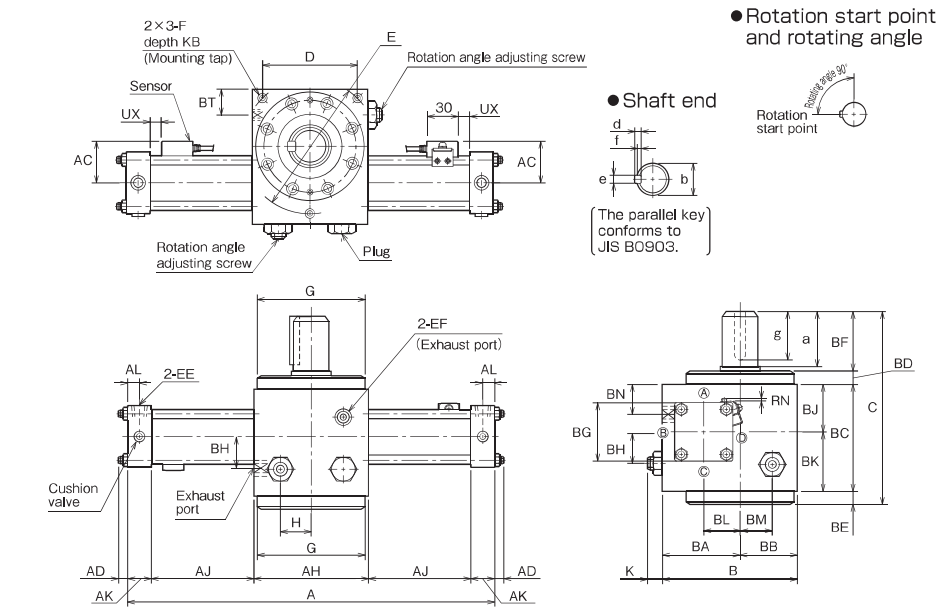
● We recommend AND Unit (AU series) for multiple sensors connected in series. For details, refer to AND Unit at the end of this catalog.

● General purpose type



SD

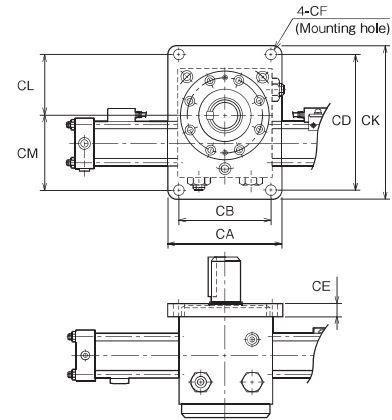
35RP2- SD Bore T90- Sensor symbol Sensor quantity



- The standard type and Switch Set Cylinders have the same external dimensions.
- UX is the sensor mounting dimension for detection of rotating end.

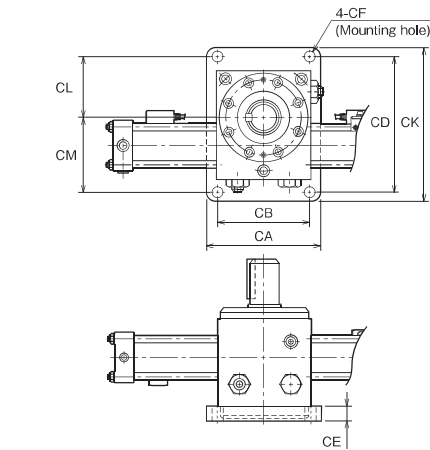
FA

35RP2- FA Bore T90- Sensor symbol Sensor quantity



FB

35RP2- FB Bore T90- Sensor symbol Sensor quantity



Dimensional Table

Symbol Bore	A	AC	AD	AH	AJ	AK	AL	B	BA	BB	BC	BD	BE	BF	BG	BH	BJ	BK
φ 32	302	37 or less	7	88	82	25	11	102	58	44	82	12	12	38	□ 44	24	36	46
φ 40	333	40 or less	7	106	88.5	25	11	125	72	53	97	13	14	60	□ 50	30	43	54
φ 50	383	45 or less	9	120	106.5	25	11	140	80	60	112	15	15	60	□ 62	34	50	62
φ 63	455	51 or less	10	144	130.5	25	11	168	96	72	133	14	16	84	□ 76	40	60	73
φ 80	518	59 or less	10	168	143	32	14	200	116	84	156	18	20	84	□ 94	53	68	88

Symbol Bore	BL	BM	BN	BT	C	CA	CB	CD	CE	CF	CK	CL	CM	D	E	EE
φ 32	24	20	24.5	24	144	105	85	125	13	φ9	145	55	70	71.4	101	Rc1/4
φ 40	30	27	27	26	184	125	100	150	15	φ9	180	65	85	86.3	122	Rc3/8
φ 50	40	33	30	27	202	145	120	170	16	φ11	195	75	95	98.3	139	Rc3/8
φ 63	50	40	34	32	247	175	140	210	18	φ14	240	90	120	116.7	165	Rc3/8
φ 80	59	48	35	36	278	210	170	250	22	φ16	290	110	140	137.9	195	Rc1/2

Symbol Bore	EF	F	G	H	K	KB	RN	Shaft end					
								a	b	d	e	f	g
φ 32	Rc1/4	M8×1.25	φ83h7	20	10	16	7 or less	36	φ22h6	6	6	3.5	32
φ 40	Rc3/8	M8×1.25	φ104h7	27	12	16	5 or less	58	φ30h6	7	8	4	50
φ 50	Rc3/8	M10×1.5	φ117h7	33	14	20	4 or less	58	φ38h6	8	10	5	50
φ 63	Rc1/2	M12×1.75	φ140h7	40	16	18	4 or less	82	φ50h6	9	14	5.5	70
φ 80	Rc1/2	M14×2	φ164h7	48	19	21	3 or less	82	φ55h6	10	16	6	70

Sensor Mounting Dimension

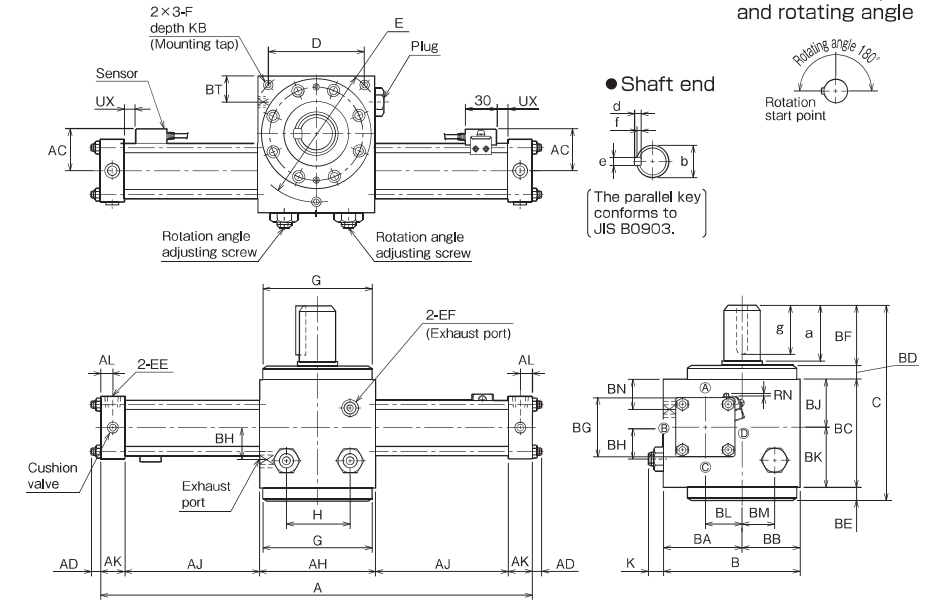
Bore	UX	
	AX/AZ type	SR type
φ 32	8	0
φ 40	9	0
φ 50	12	5
φ 63	13	7
φ 80	22	14

Operating Range and Hysteresis

Bore	Reed sensor				Solid state sensor	
	AX/AZ type		SR type		AX/AZ type	
	Operating range	Hysteresis	Operating range	Hysteresis	Operating range	Hysteresis
φ 32	5 to 9	1 or less	7 to 10	2 or less	3 to 5	1 or less
φ 40	5 to 9	1.5 or less	5 to 7		3 to 5	
φ 50	5 to 10	1 or less	7 to 11		4 to 6	
φ 63	5 to 10	1 or less	7 to 11		4 to 6	
φ 80	5 to 11	1 or less	8 to 12		4 to 6	

SD

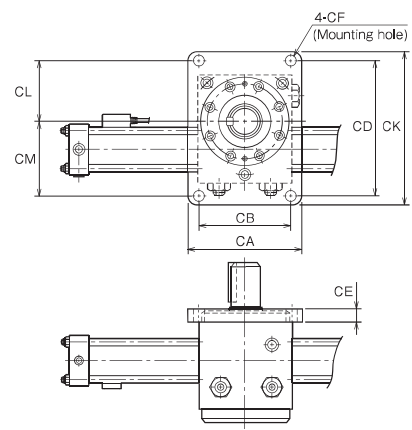
35RP2- SD Bore T180- Sensor symbol Sensor quantity



- The standard type and Switch Set Cylinders have the same external dimensions.
- UX is the sensor mounting dimension for detection of rotating end.

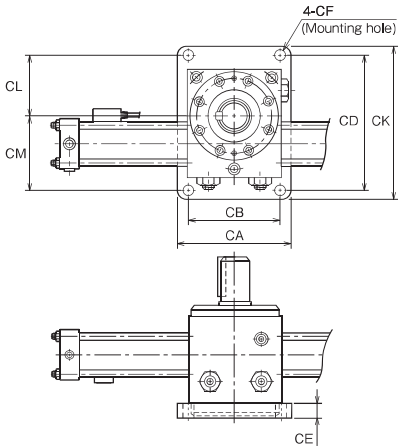
FA

35RP2- FA Bore T180- Sensor symbol Sensor quantity



FB

35RP2- FB Bore T180- Sensor symbol Sensor quantity



Dimensional Table

Symbol	A	AC	AD	AH	AJ	AK	AL	B	BA	BB	BC	BD	BE	BF	BG	BH	BJ	BK
Bore																		
φ 32	364	37 or less	7	88	113	25	11	102	58	44	82	12	12	38	□ 44	24	36	46
φ 40	409	40 or less	7	106	126.5	25	11	125	72	53	97	13	14	60	□ 50	30	43	54
φ 50	483	45 or less	9	120	156.5	25	11	140	80	60	112	15	15	60	□ 62	34	50	62
φ 63	581	51 or less	10	144	193.5	25	11	168	96	72	133	14	16	84	□ 76	40	60	73
φ 80	668	59 or less	10	168	218	32	14	200	116	84	156	18	20	84	□ 94	53	68	88

Symbol	BL	BM	BN	BT	C	CA	CB	CD	CE	CF	CK	CL	CM	D	E	EE
Bore																
φ 32	24	20	24.5	24	144	105	85	125	13	φ9	145	55	70	71.4	101	Rc1/4
φ 40	30	27	27	26	184	125	100	150	15	φ9	180	65	85	86.3	122	Rc3/8
φ 50	40	33	30	27	202	145	120	170	16	φ11	195	75	95	98.3	139	Rc3/8
φ 63	50	40	34	32	247	175	140	210	18	φ14	240	90	120	116.7	165	Rc3/8
φ 80	59	48	35	36	278	210	170	250	22	φ16	290	110	140	137.9	195	Rc1/2

Symbol	EF	F	G	H	K	KB	RN	Shaft end					
Bore								a	b	d	e	f	g
φ 32	Rc1/4	M8×1.25	φ83h7	40	10	16	7 or less	36	φ22h6	6	6	3.5	32
φ 40	Rc3/8	M8×1.25	φ104h7	54	12	16	5 or less	58	φ30h6	7	8	4	50
φ 50	Rc3/8	M10×1.5	φ117h7	66	14	20	4 or less	58	φ38h6	8	10	5	50
φ 63	Rc1/2	M12×1.75	φ140h7	80	16	18	4 or less	82	φ50h6	9	14	5.5	70
φ 80	Rc1/2	M14×2	φ164h7	96	19	21	3 or less	82	φ55h6	10	16	6	70

Sensor Mounting Dimension

Bore	UX	
	AX/AZ type	SR type
φ 32	8	0
φ 40	9	0
φ 50	12	5
φ 63	13	7
φ 80	22	14

Operating Range and Hysteresis

Bore	Reed sensor				Solid state sensor	
	AX/AZ type		SR type		AX/AZ type	
	Operating range	Hysteresis	Operating range	Hysteresis	Operating range	Hysteresis
φ 32	5 to 9	1 or less	7 to 10	2 or less	3 to 5	1 or less
φ 40	5 to 9	1.5 or less	5 to 7		3 to 5	
φ 50	5 to 10	1 or less	7 to 11		4 to 6	
φ 63	5 to 10	1 or less	7 to 11		4 to 6	
φ 80	5 to 11	1 or less	8 to 12		4 to 6	

Selection Materials

To select a type in 35RP2 Series, it is necessary to determine the following conditions.

- Supply pressure ● Magnitude and condition of load
- Rotating angle ● Rotating speed
- Frequency of operation ● Ambient conditions
- Place of use ● Existence of external stopper

Although 35RP2 Series has a built-in cushioning mechanism, energy which can be absorbed by the internal cushion is limited as in the case of cylinders. When the kinetic energy of a load is absorbed by the internal cushion without an

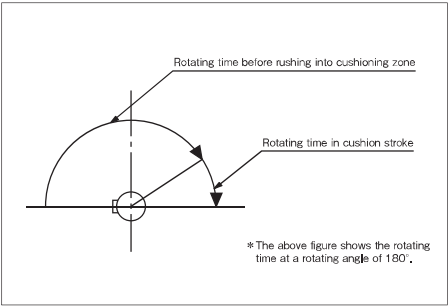
external stopper, the energy which can be absorbed depends on the inertia moment and the angular speed at the rotating end. In other words, the angular speed at the rotating end depends on the rotating time. The kinetic energy E of a load at the rotating end is expressed by the following formula:

$$E = \frac{1}{2} I \omega^2 (\text{J})$$

I : inertia moment (kg·m²)
ω : angular speed at rotating end (rad/s)

To correctly use 35RP2 Series, utilize the graph shown right. For the inertia moment, see the calculation table.

Rotating time



Working Rotating Time (not incl. cushioning zone) Unit: s

Rotating angle Bore mm	90°	180°
φ32	0.2 to 4	0.3 to 7
φ40	0.2 to 5	0.3 to 8
φ50	0.3 to 8	0.4 to 12
φ63	0.4 to 11	0.5 to 16
φ80	0.4 to 13	0.6 to 19

Setting of rotating time



Use the actuator within the range of rotating time shown in the above table. If it is used for more than the specified rotating time, smooth operation cannot be obtained due to stick-slip, etc. If the rotating time is less than the specified time, the actuator may be damaged.

1. Relationship between inertia moment and rotating time (not incl. cushioning zone) 1 kg·m²=10.2kgf·cm·sec²

Chart A -1
Rotating angle 90°/Bore φ32, φ40, φ50

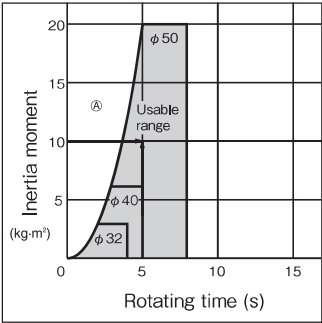


Chart A -2
Rotating angle 90°/Bore φ63, φ80

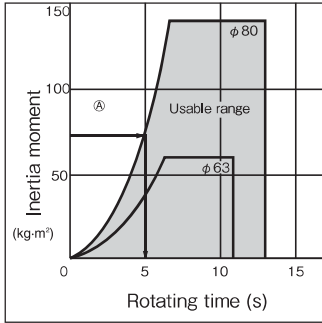


Chart A -3
Rotating angle 180°/Bore φ32, φ40, φ50

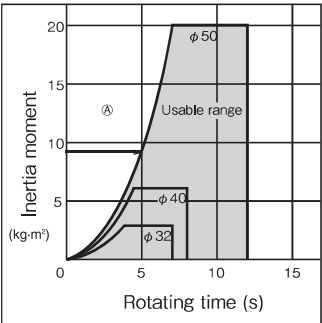
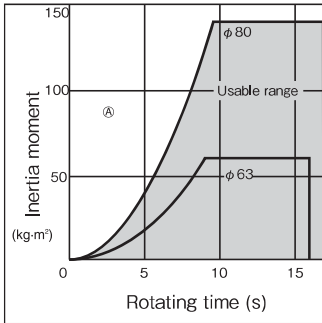


Chart A -4
Rotating angle 180°/Bore φ63, φ80



2. Relationship between inertia moment and rotating time (cushioning zone)

Chart B -1
Bore φ32, φ40, φ50

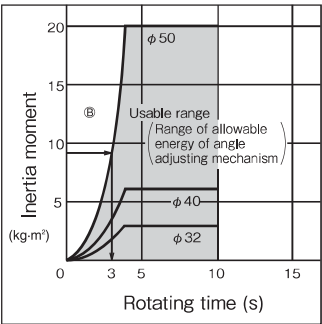


Chart B -2
Bore φ63, φ80

