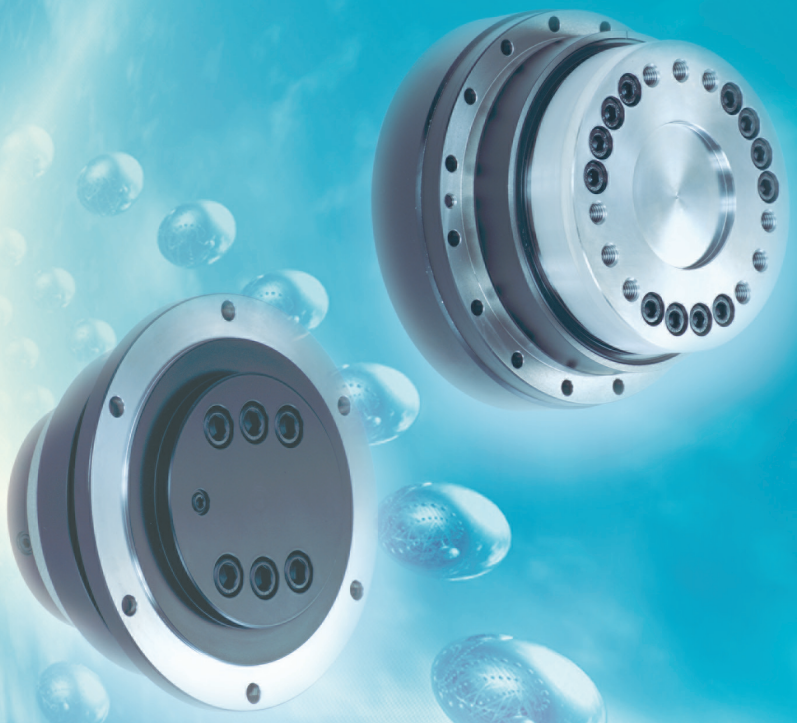
VIGO DRIVE™

ISO 9001
JQA-1190

RA SERIES

High Precision Gearheads



Nabtesco

The RA SERIES includes gearheads for high precision control of ATC magazines, ATC arms, APC, and turret drives of lathe machining centers.

RA-EA Series

RA-EC Series

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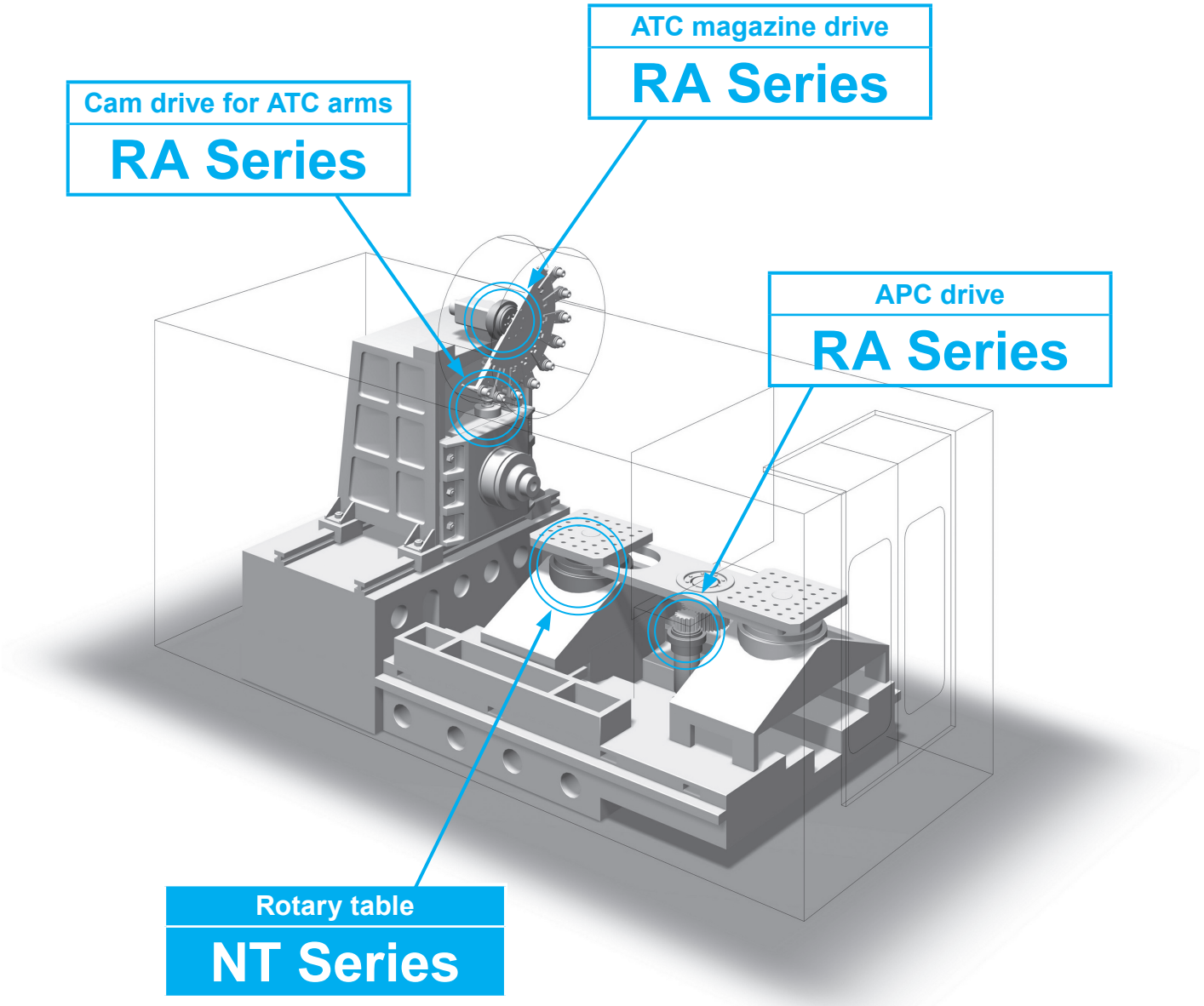
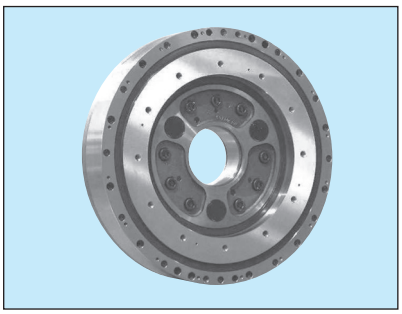
Examples of Use

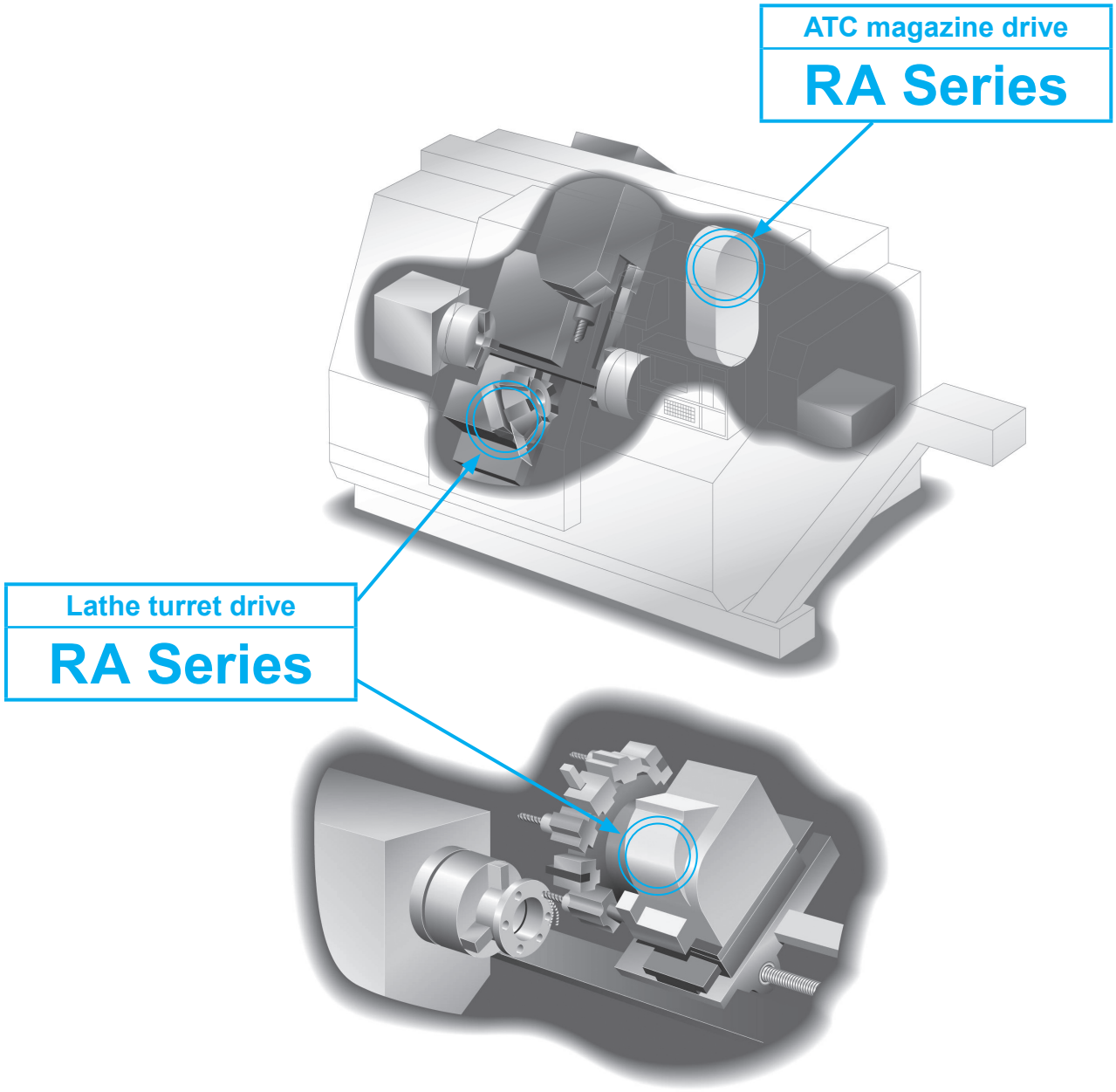
For Machining Center

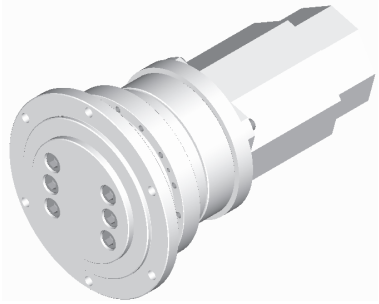




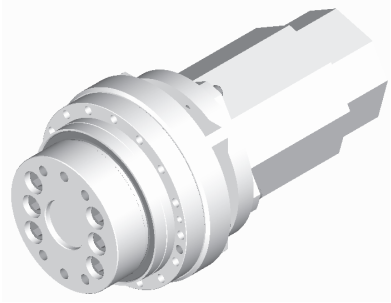
Contact us for NT Series rotary tables.

For NC lathe or combined lathe





RA-EA Series



RA-EC Series

Features and Configurations

High shock load capability
High rigidity
High precision
High torque

The double-ended support design and unique pin gear mechanism provide the following advantages:

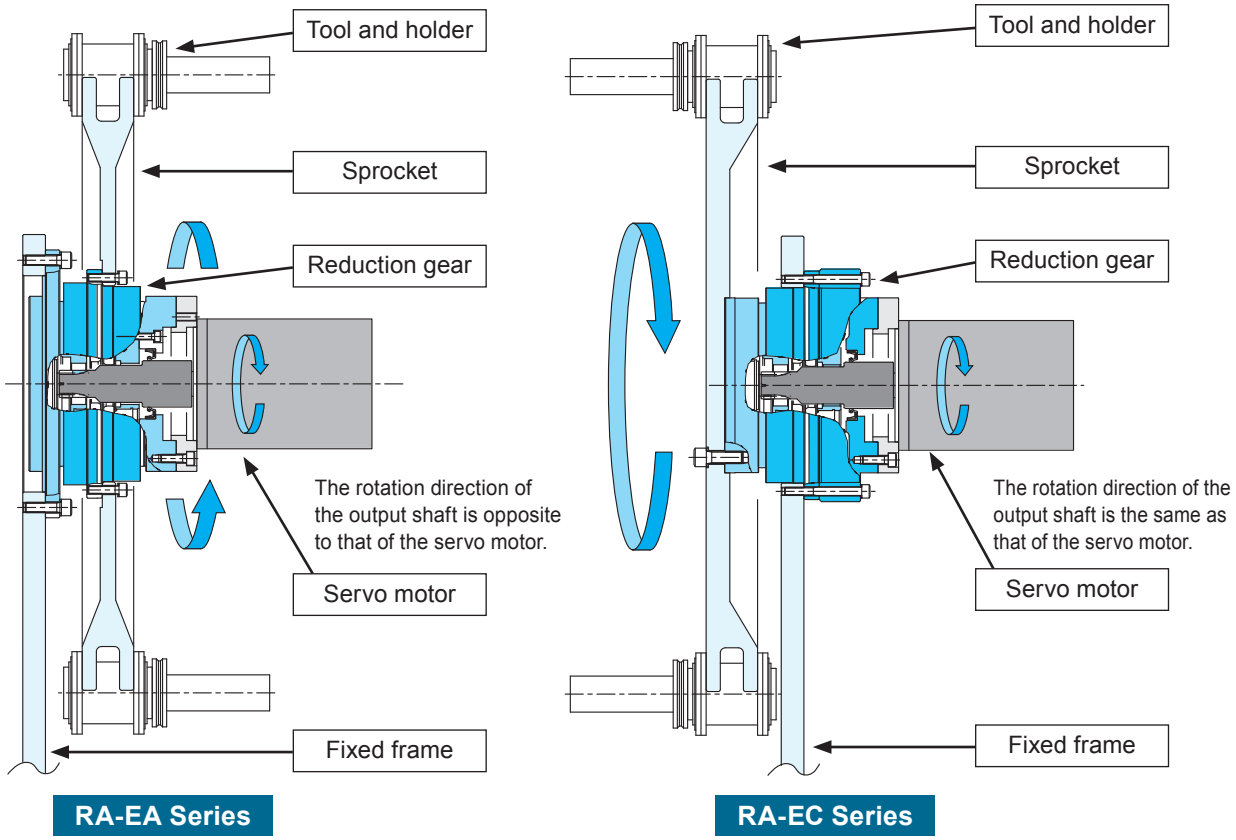
(1) Capable of high shock load 5 times the rated torque
(2) High torsional rigidity
(3) Small backlash [1 arc.min]
(4) High torque density (capable of high torque with downsized gear)

Heavy load support

A set of internal main bearings (large angular ball bearings) enables complete support of heavy external loads.

Three benefits due to the above features

1. **Maintenance: Trouble free**
2. **Compact design with a reduced number of parts**
3. **Reduced man-hours (for design, assembly, and adjustment)**



Principle of Operation

1. Rotation of the servo motor is transmitted through the input gear to the spur gears, and the speed is reduced according to the gear ratio between the input gear and the spur gears. <Fig. 1>

2. Since the crankshafts are directly connected to the spur gears, they have the same rotational speed as the spur gears. <Fig. 1>

3. Two RV gears are mounted around the needle bearings on the eccentric section of the crankshaft. (In order to balance the equal amount of force, two RV gears are mounted.) <Fig. 2>

4. When the crankshafts rotate, the two RV gears mounted on the eccentric sections also revolve eccentrically around the input axis (crank movement). <Fig. 2>

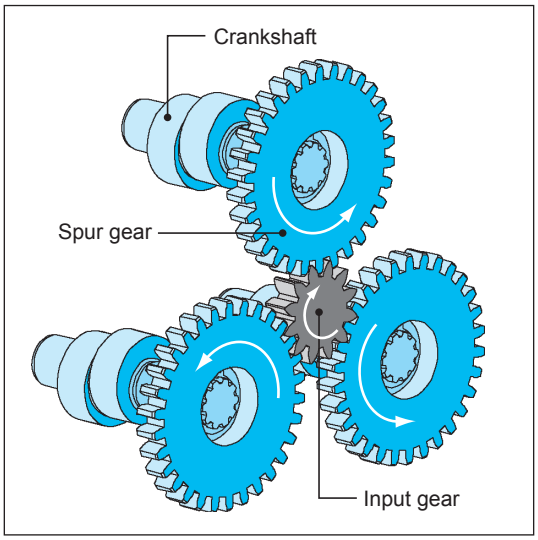
5. Pins are arrayed in a constant pitch in the grooves inside the case. The number of pins is just one larger than the number of RV gear teeth. <Fig. 3>

6. As the crankshafts revolve one complete rotation, the RV gears revolve eccentrically one pitch of a pin (crank movement), with all the RV teeth in contact with all of the pins. As a result, 1 RV gear tooth moves in the opposite direction of the crankshaft rotation. <Fig. 3>

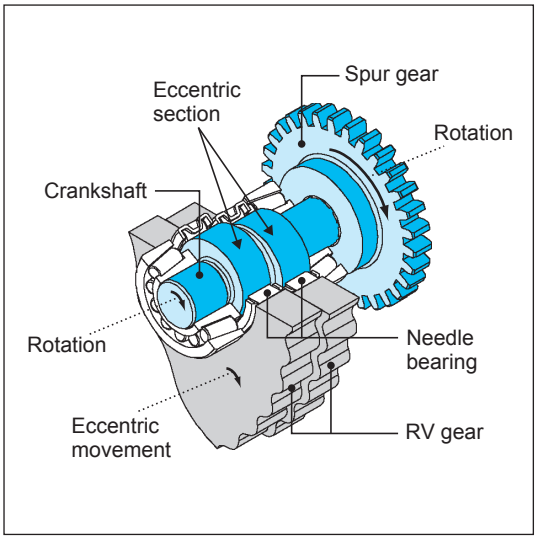
7. The rotation is then output to the shaft (output shaft) via the crankshaft so that the crankshaft rotation speed can be reduced in proportion to the number of pins. <Fig. 3>

8. The total reduction ratio is the product of the first reduction ratio multiplied by the second reduction ratio.

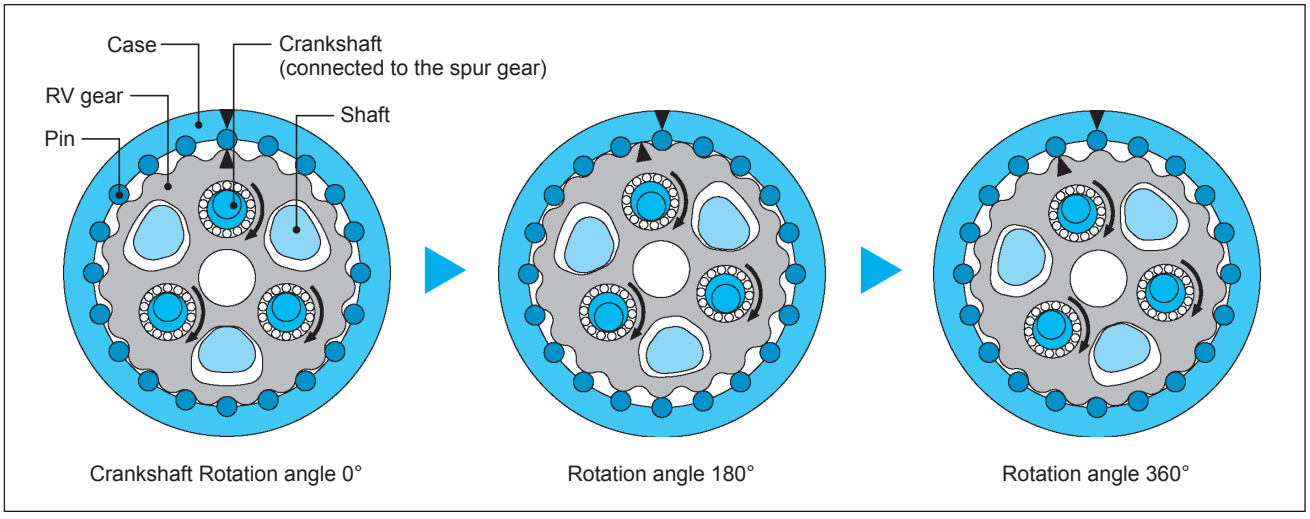
■ **Fig. 1. First reduction section**



■ **Fig. 2. Crankshaft section**



■ **Fig. 3. Second reduction section**



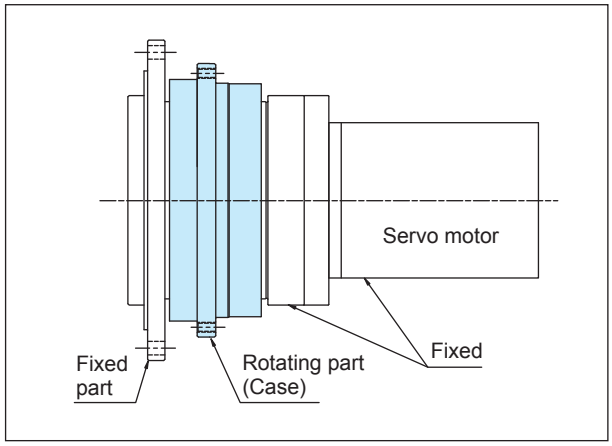
Rating Table

Model	Speed Ratio					To Rated Torque N-m (kgf-m)	No Rated Output Speed rpm	K Rated Life Hr	Ts1 Allowable Acceleration/ Deceleration Torque N-m (kgf-m)	Ts2 Momentary Maximum Allowable Torque N-m (kgf-m)
RA-EA Series										
RA-20EA	80	104	120	140	160	167 (17)	15	6000	412 (42)	833 (85)
RA-40EA	80	104	120	152		412 (42)	15	6000	1029 (105)	2058 (210)
RA-80EA	80	100	120	152		784 (80)	15	6000	1960 (200)	3920 (400)
RA-160EA	80	100	128	144	170	1568 (160)	15	6000	3920 (400)	7840 (800)
RA-EC Series										
RA-20EC	81	105	121	141	161	167 (17)	15	6000	412 (42)	833 (85)
RA-40EC	81	105	121	153		412 (42)	15	6000	1029 (105)	2058 (210)
RA-80EC	81	101	121	153		784 (80)	15	6000	1960 (200)	3920 (400)
RA-160EC	81	101	129	145	171	1568 (160)	15	6000	3920 (400)	7840 (800)

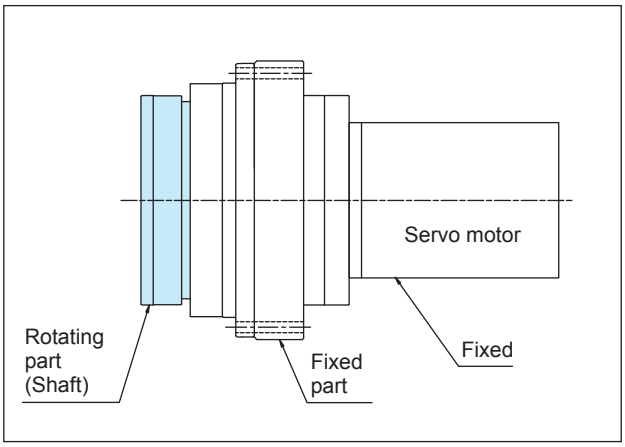
Note: 1. The Rating Table shows the specification values of each individual reduction gear.
2. The allowable output speed may be limited by heat depending on the operating rate.
3. For the inertia moment of the reduction gears, refer to the Product Summary Sheet.
4. For dimensions α and L, refer to “Allowable Moment and Maximum Thrust Load.”

Ns1 Allowable Output Speed [Continuous] Note 2 rpm	Ns2 Allowable Output Speed [Intermittent] Note 2 rpm	Backlash arc.min.	Lost Motion arc.min.	Torsional Rigidity (Spring Constant) N-m/arc.min. (kgf-m/arc.min.)	Capacity of main bearing					Mass kg
					Mo Allowable Moment N-m (kgf-m)	Ms1 Momentary Maximum Allowable Moment N-m (kgf-m)	Fo Maximum Thrust Load N (kgf)	α Dimension α Note 4 mm	L Dimension L Note 4 mm	
45	75	1.0	1.0	49 (5)	882 (90)	1764 (180)	3920 (400)	63.1	113.3	10
42	70	1.0	1.0	108 (11)	1666 (170)	3332 (340)	5194 (530)	83.1	143.7	18.5
42	70	1.0	1.0	196 (20)	2156 (220)	4312 (440)	7840 (800)	81.5	166	28
27	45	1.0	1.0	392 (40)	3920 (400)	7840 (800)	14700 (1500)	93.8	210.9	58
45	75	1.0	1.0	49 (5)	882 (90)	1764 (180)	3920 (400)	122.2	113.3	9.5
42	70	1.0	1.0	108 (11)	1666 (170)	3332 (340)	5194 (530)	148.1	143.7	20
42	70	1.0	1.0	196 (20)	2156 (220)	4312 (440)	7840 (800)	158.4	166	27
27	45	1.0	1.0	392 (40)	3920 (400)	7840 (800)	14700 (1500)	201.8	210.9	59

RA-EA Series (Case rotating type)



RA-EC Series (Shaft rotating type)



Glossary

Life Rating

The life time when driven at the rated torque and rated output speed is called the “life rating.”

Allowable Acceleration/Deceleration Torque

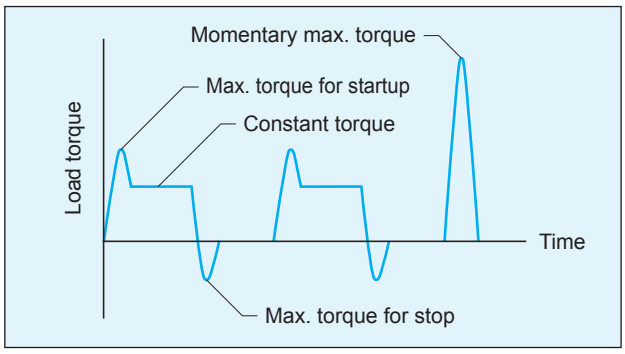
When the machine starts or stops, the load torque to be applied to the reduction gear is larger than the constant-speed load torque due to the effect of the inertia torque of the rotating part. In such a situation, the allowable torque during acceleration/deceleration is referred to as “allowable acceleration/deceleration torque.”

Note: Be careful so that the load torque, which is applied during normal operation, does not exceed the allowable acceleration/deceleration torque.

Momentary Maximum Allowable Torque

A large torque may be applied to the reduction gear due to an emergency stop or an external shock. The allowable value of the momentary applied torque at this time is referred to as “momentary maximum allowable torque.”

Note: Be careful so that the momentary excessive torque does not exceed the momentary maximum allowable torque.



Allowable Output Speed [Continuous]

The allowable output speed when the machine starts and stops repeatedly is referred to as “allowable output speed [Continuous].”

Note: Maintain the environment and operation conditions so that the temperature of the reduction gear case is 60ºC or lower.

Allowable Output Speed [Intermittent]

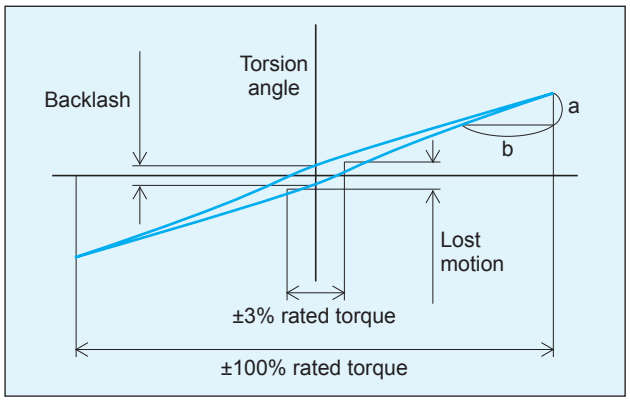
The allowable output speed during the operation in which the reduction gear is not activated frequently is referred to as “allowable output speed [Intermittent].”

Note: Maintain the environment and operation conditions so that the temperature of the reduction gear case is 60ºC or lower.

Torsional Rigidity, Lost Motion, Backlash

When a torque is applied to the output shaft while the input shaft is fixed, torsion is generated according to the torque value. The torsion can be shown in the hysteresis curve.
The value of b/a is referred to as “torsional rigidity.”
The torsion angle at the mid point of the hysteresis curve width within ±3% of the rated torque is referred to as “lost motion.”
The torsion angle when the torque indicated by the hysteresis curve is equal to zero is referred to as “backlash.”

■ Hysteresis curve



Calculation of torsion angle

Taking RA-160E as an example, the torsion angle will be calculated when torque is added in one direction.

1) When the load torque is 30 N-m .... Torsion angle (ST1)
   ● When the load torque is within the lost motion area

$$ST1 = \frac{30}{47} \times \frac{1\ (\text{arc.min.})}{2} = 0.32\ \text{arc.min or less}$$

2) When the load torque is 1,300 N-m .... Torsion angle (ST2)
   ● When the load torque is within the rated torque area

$$ST2 = \frac{1}{2} + \frac{1300-47.0}{392} = 3.70\ \text{arc.min.}$$

Note: 1. The torsion angles that are calculated above are for a single reduction gear.
2. For the customized specifications of the lost motion, contact us.

Models	Torsional rigidity (Spring Constant) N-m/arc.min.	Lost motion		Backlash arc.min.
		Lost motion arc.min.	Measured torque N-m	
RA-20E	49	1.0	± 5.0	1.0
RA-40E	108		± 12.3	
RA-80E	196		± 23.5	
RA-160E	392		± 47.0	

Allowable Moment and Maximum Thrust Load

The external load moment may be applied to the reduction gear during normal operation. . The allowable values of the external moment and the external axial load at this time are each referred to as “allowable moment” and “maximum thrust load.”

Mc : Load moment (N-m)
W1, W2 : Load (N)
L1, L2 : Distance to the point of load application (mm)
α : Designated dimension (mm) (Refer to the Rating Table.)
L : Designated dimension (mm) (Refer to the Rating Table.)

$$Mc = \frac{W1 \times (L1 + \alpha) + W2 \times L2}{1000}$$

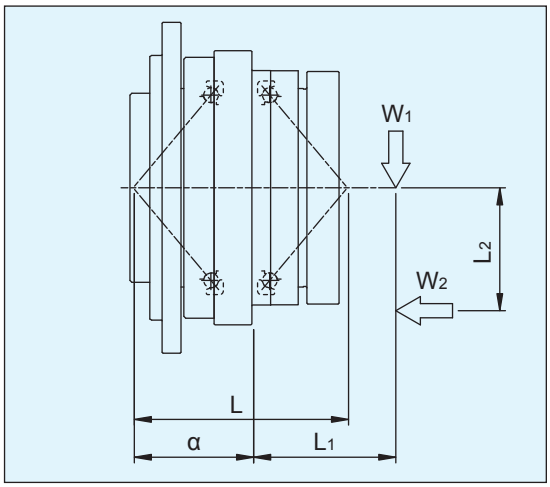
Mc ≤ Allowable moment

Note: 1. When the load moment and the thrust load are applied concurrently, ensure that the reduction gear is used within the corresponding allowable moment range, which is indicated in the allowable moment diagram.

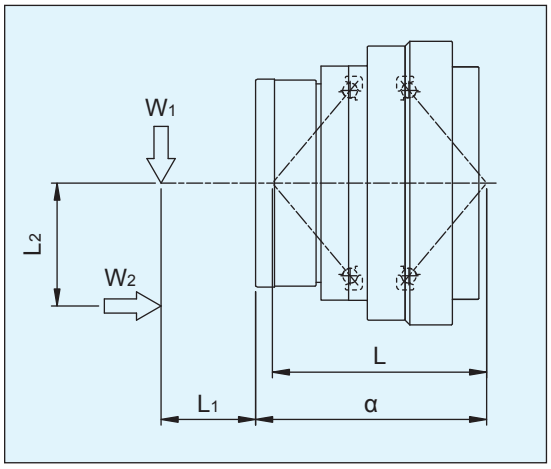
2. When W1 load is applied in the area of the dimension L, use it within the allowable radial load, calculated using the formula below.

$$\text{Allowable radial load} = \frac{\text{Allowable moment}}{L} : (N)$$

RA-EA



RA-EC

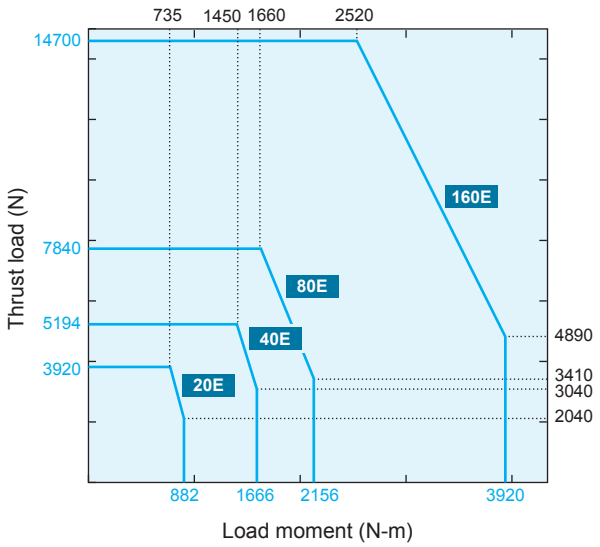


Momentary Maximum Allowable Moment

A large moment may be applied to the reduction gear due to an emergency stop or external shock. The allowable value of the momentary applied moment at this time is referred to as “momentary maximum allowable moment.”

Note: Be careful so that the momentary excessive moment does not exceed the momentary maximum allowable moment.

Allowable Moment Diagram

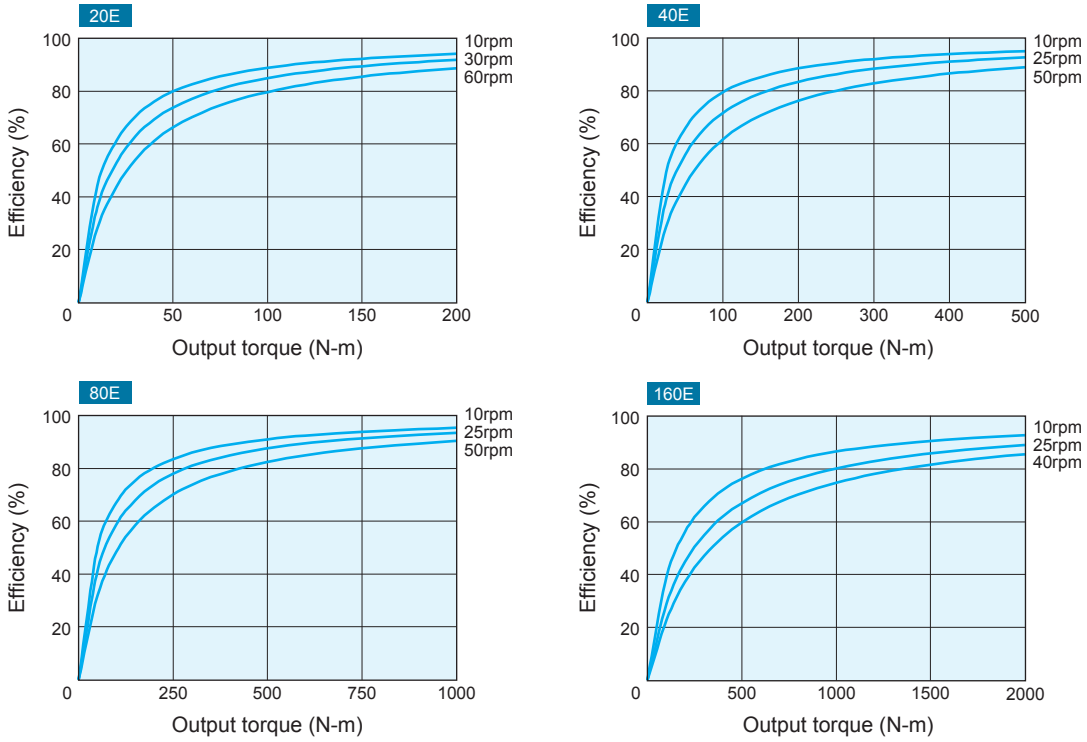


Performance

Efficiency

RA Sries

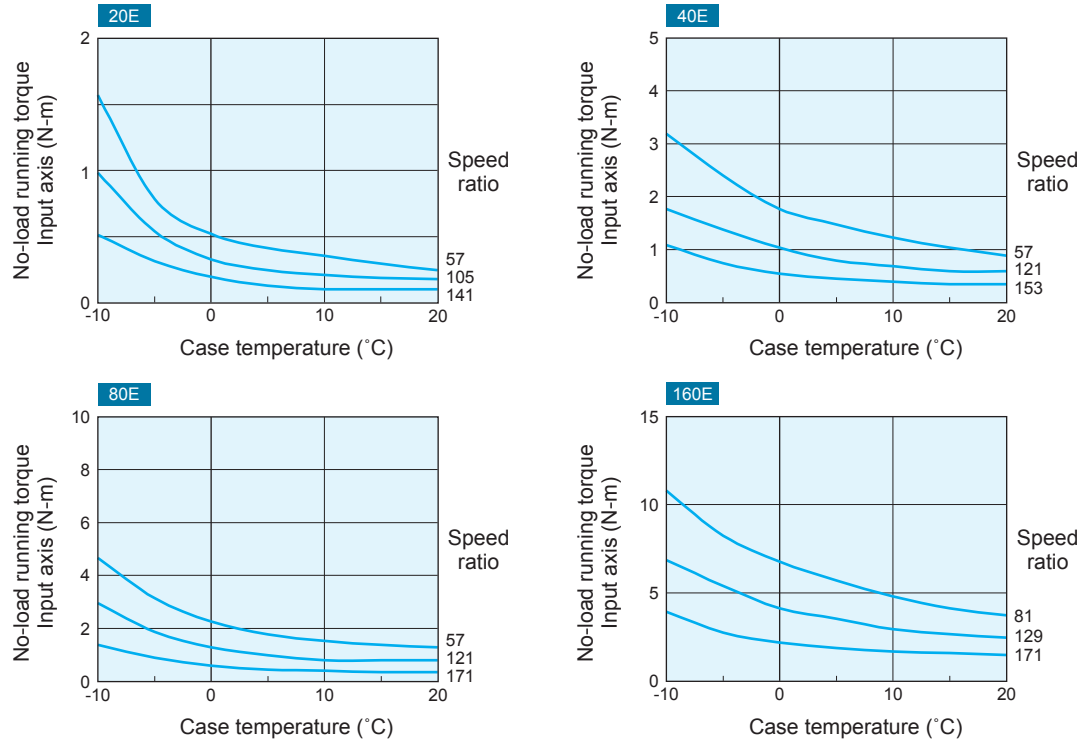
Case temperature: 30°C
Lubricant: Grease (Molywhite RE00)



Low-temperature characteristics (No-load running torque for low-temperature range)

RA Series

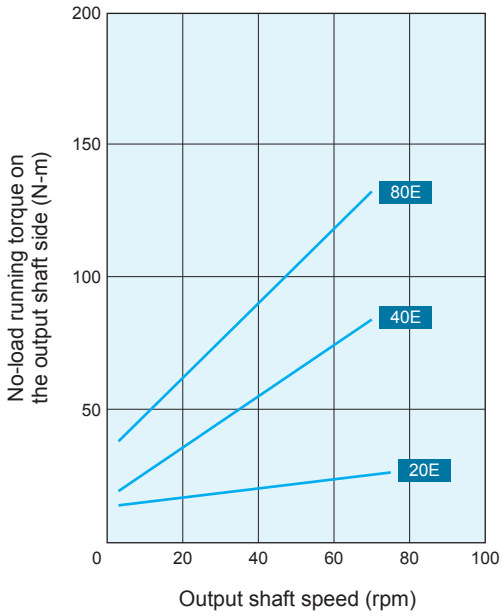
RA Series: Input speed
Lubricant: Grease (Molywhite RE00)

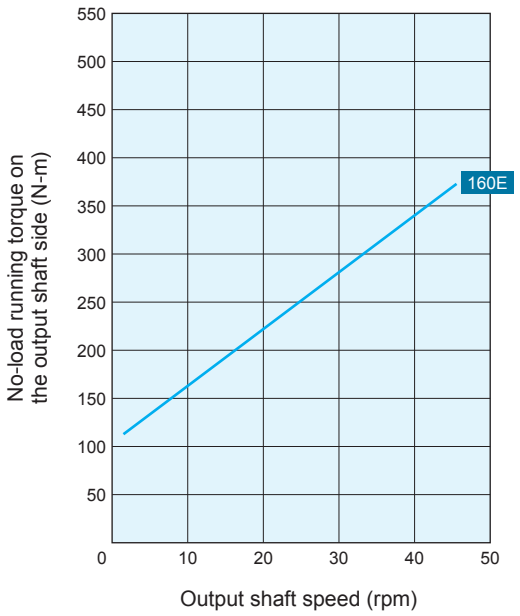


No-load running torque

RA Series

Case temperature: 30°C
Lubricant: Grease (Molywhite RE00)





The no-load running torque that is converted to the input shaft side value should be calculated using the following equation:

$$\text{No-load running torque on the input shaft side (N-m)} = \frac{\text{No-load running torque on the output shaft side (N-m)}}{\text{Speed ratio}}$$

Selection Flowchart

(1)
Examine the load characteristics

Check the load torque applied to the reduction gear.
An example is shown in the load cycle diagram.

- Examine the average load torque (Tm)
- Examine the average output speed (Nm)

$$Tm = \sqrt[\frac{10}{3}]{\frac{t_1 \cdot N_1 \cdot T_1^{\frac{10}{3}} + t_2 \cdot N_2 \cdot T_2^{\frac{10}{3}} + \ldots\ldots tn \cdot Nn \cdot Tn^{\frac{10}{3}}}{t_1 \cdot N_1 + t_2 \cdot N_2 + \ldots\ldots tn \cdot Nn}}$$

$$Nm = \frac{t_1 \cdot N_1 + t_2 \cdot N_2 + \ldots\ldots tn \cdot Nn}{t_1 + t_2 + \ldots\ldots tn}$$

Decrease the load

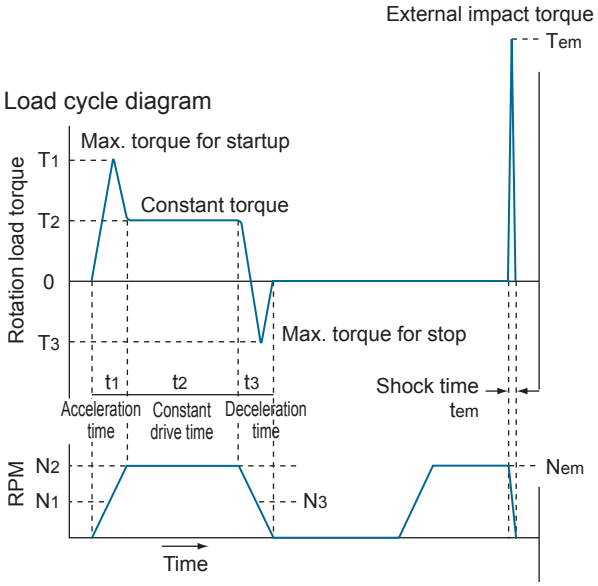
Temporary selection of the model from the rating table

Increase the model number of the reduction gear

Calculation of life (Lh)

$$Lh = 6000 \times \frac{No}{Nm} \times \left(\frac{To}{Tm}\right)^{\frac{10}{3}}$$

Load cycle diagram



NO — Lh ≥ Required life — YES

Examine the input speed

Input speed / Speed Ratio ≤ Maximum allowable output speed — YES / NO

Examine the acceleration/deceleration torque (T1, T3)

T1 or T3 ≤ Allowable acceleration/deceleration torque — YES / NO

Examine the external impact torque (Tem) due to an emergency stop

Tem ≤ Momentary maximum allowable torque — YES / NO

Calculation of allowable applied speed (Cem)

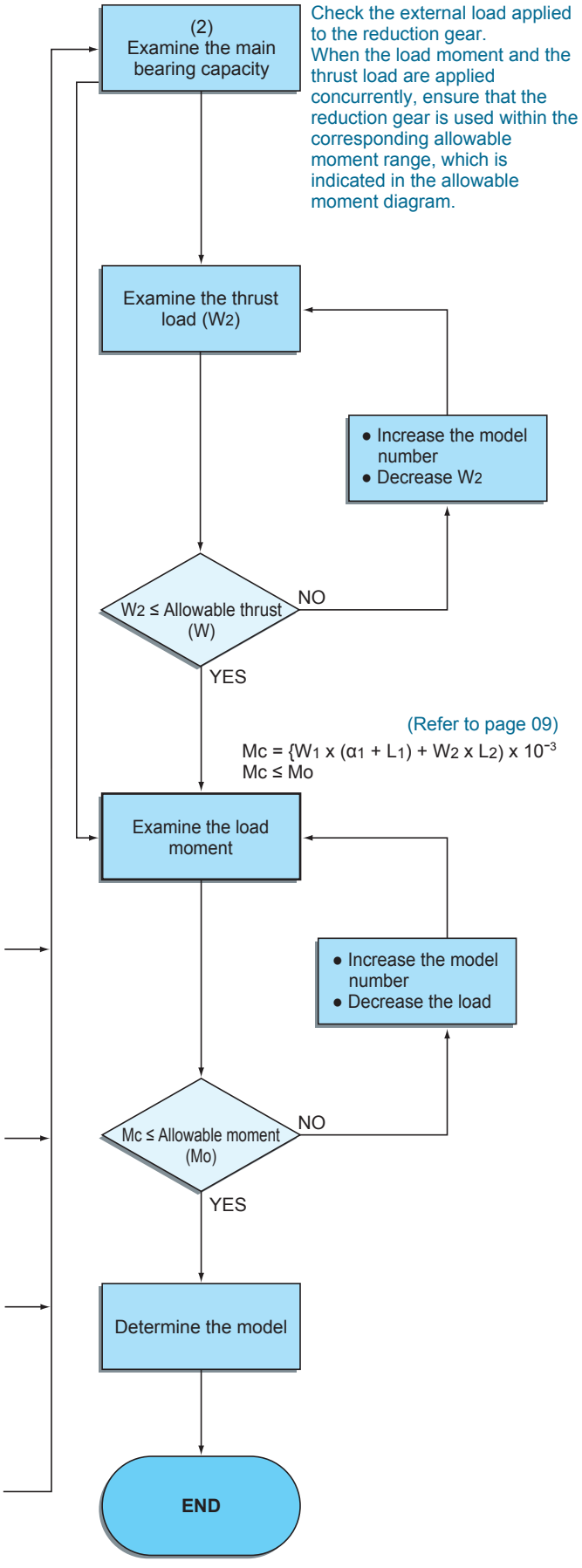
Actual applied speed ≤ Cem — YES / NO

$$Cem = \frac{775 \times \left(\frac{5 \times To}{Tem}\right)^{\frac{10}{3}}}{40 \times \frac{Nem}{60} \times tem}$$

Examine the external impact torque (Tout) when motor shaft is not rotating.

Tout: Assumed values

Tout ≤ Momentary maximum allowable torque — YES / NO



Selection examples

(1) Examine the load characteristics

- **Usage conditions**

  T_1 = 2,500N-m T_2 = 500N-m T_3 = 1,500N-m Tem = 7,000N-m
  t_1 = 0.2sec t_2 = 0.5sec t_3 = 0.2sec tem = 0.05sec
  N_1 = N_3 = 10r.p.m. N_2 = 20r.p.m. Nem = 20r.p.m.

- **Calculation of average load torque**

$$Tm = \sqrt[\frac{10}{3}]{\frac{0.2 \times 10 \times 2{,}500^{\frac{10}{3}} + 0.5 \times 20 \times 500^{\frac{10}{3}} + 0.2 \times 10 \times 1{,}500^{\frac{10}{3}}}{0.2 \times 10 + 0.5 \times 20 + 0.2 \times 10}}$$

$$= 1{,}475\text{N-m}$$

- **Calculation of average output speed**

$$Nm = \frac{0.2 \times 10 + 0.5 \times 20 + 0.2 \times 10}{0.2 + 0.5 + 0.2} = 15.6\text{r.p.m.}$$

- **Tentative selection of frame number**

  Temporarily select RA-160EC from the Tm and Nm values.
  1,475N-m < 1,568N-m, 15.6r.p.m. < 27r.p.m.
  (1,568N-m: Rated torque of RA-160EC; 27r.p.m.: Maximum allowable output speed of RA-160EC)

- **Calculation of life**

$$Lh = 6000 \times \frac{15}{15.6} \times \left(\frac{1{,}568}{1{,}475}\right)^{\frac{10}{3}} = 7{,}073\text{Hr}$$

  7,073 > 5,000 (5,000: Required life)

- **Examine the maximum output speed**

  20r.p.m. < 27r.p.m. (27r.p.m.: Maximum allowable output speed of RA-160EC [Continuous])

- **Examine the acceleration/deceleration torque**

  $T_{max} = T_1$ = 2,500N-m < 3,920N-m (3,920N-m: Allowable acceleration/deceleration torque of RA-160EC)

- **Examine the emergency stop and external impact torque**

  Tem = 7,000N-m < 7,840N-m (7,840N-m: Momentary maximum allowable torque of RA-160EC)

$$Cem = \frac{775 \times \left(\frac{5 \times 1{,}568}{7{,}000}\right)^{\frac{10}{3}}}{40 \times \frac{20}{60} \times 0.05} = 1696\text{ times}$$

  150 times < 1696 times (150 times: Actual applied speed)

(2) Examine the main bearing capacity

- **External load conditions**

  W_1 = 3,000N L_1 = 500mm
  W_2 = 1,500N L_2 = 200mm

- **Examine the thrust load**

  1,500N < 14,700N (14,700N: Maximum thrust load of RA-160EC)

- **Examine the load moment (RA-160EC)**

$$Mc = 3{,}000 \times \frac{(201.8 + 500)}{1{,}000} + 1{,}500 \times \frac{200}{1{,}000}$$

$$= 2{,}405.4\text{N-m}$$

  2,405.4N-m < 3,920N-m (3,920N-m: Allowable moment of RA-160EC)

- **RA-160EC is selected (All conditions are met)**

Engineering Notes

1. Installation of the reduction gear and mounting it to the output shaft

- When installing the reduction gear and mounting it to the output shaft, use hexagon socket head cap screws and tighten them with the torque as specified below, in order to satisfy the momentary maximum allowable torque, which is noted in the rating table.
  Employment of the Belleville Spring Washer is recommended to prevent the hexagon socket head cap screws and protect their seat surface from flaws.

(1) Bolt tightening torque and tightening force

Hexagon socket head cap screw Nominal size x pitch	Tightening torque (N-m)	Tightening force F (N)	Bolt specifications
M5 x 0.8	9.01 ± 0.49	9310	◆ Hexagon socket head cap screw JIS B 1176 ◆ Strength class JIS B 1051 12.9 ◆ Thread JIS B 0205 6g or class 2
M6 x 1.0	15.6 ± 0.78	13180	
M8 x 1.25	37.2 ± 1.86	23960	
M10 x 1.5	73.5 ± 3.43	38080	
M12 x 1.75	128.4 ± 6.37	55100	
M14 x 2.0	204.8 ± 10.2	75860	
M16 x 2.0	318.5 ± 15.9	103410	

Note: 1. The tightening torque values listed are for steel or cast iron material.
2. If softer material, such as aluminum or stainless steel, is used, limit the tightening torque. Also, pay attention to the system requirements of the transmission torque.

(2) Calculation of allowable transmission torque of bolts.

$$T = F \times \frac{D \times 10^{-3}}{2} \times \mu \times n$$

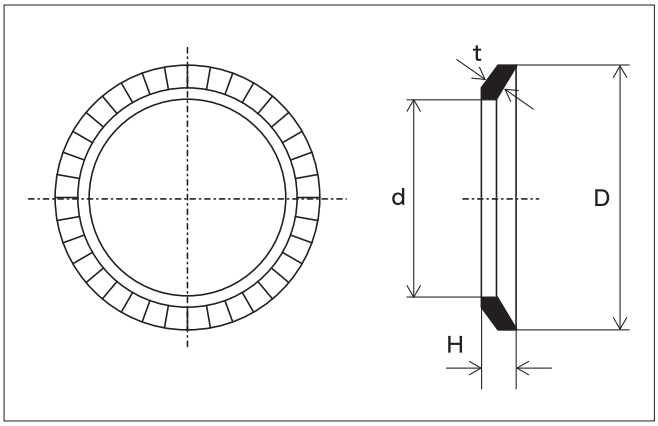
T	Allowable transmission torque by tightening bolt (N-m)
F	Bolt tightening force (N)
D	Bolt mounting P.C.D (mm)
μ	Friction factor μ=0.15... When grease remains on the mating face μ=0.20 .. When grease has been removed from the mating face
n	Number of bolts (pcs)

(3) Serrated lock washer for hexagon socket head cap screw

Name : Belleville Spring Washer (made by Heiwa Hatsujyo Industry Co., Ltd.)
Corporation symbol : Bell SW-2H (nominal size)
Material : S50CM to S65CM
Hardness : HRC40 to 48

(Unit: mm)

Normal size	ID and OD of Belleville Spring Washer		t	H
	d Basic size	D		
5	5.25	8.5	0.6	0.85
6	6.4	10	1.0	1.25
8	8.4	13	1.2	1.55
10	10.6	16	1.5	1.9
12	12.6	18	1.8	2.2
14	14.6	21	2.0	2.5
16	16.9	24	2.3	2.8

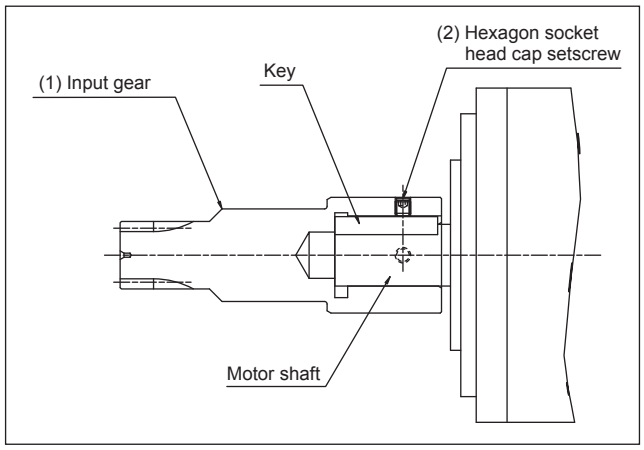


Note: When using any equivalent washer, select it with special care given to its outer diameter.

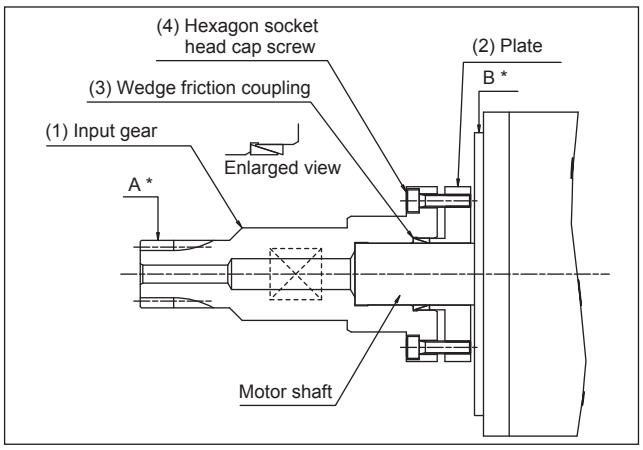
2. Mounting the input gear

● The following is a representative case for connecting an input gear to a servo motor shaft.

(1) For straight shaft (with key)

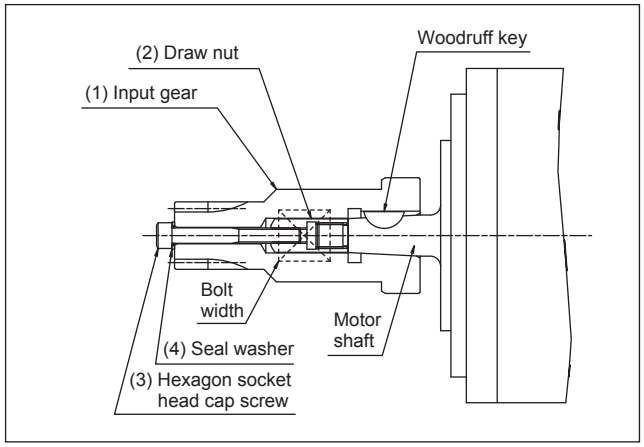


(2) For straight shaft (without key)



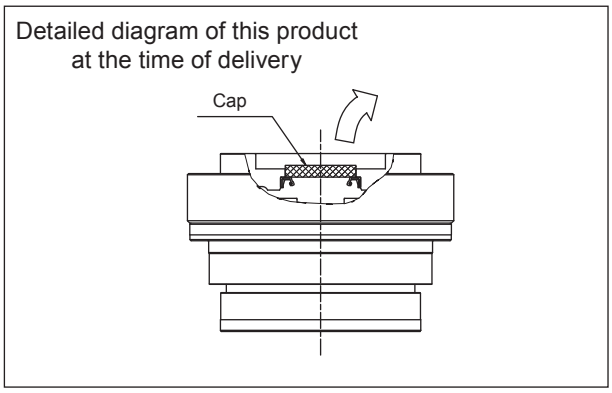
* Adjust the deviation of “A” at the edge of the input gear to 70μm or less against “B” on the motor mounting pilot diameter.

(3) For 1/10 tapered shaft

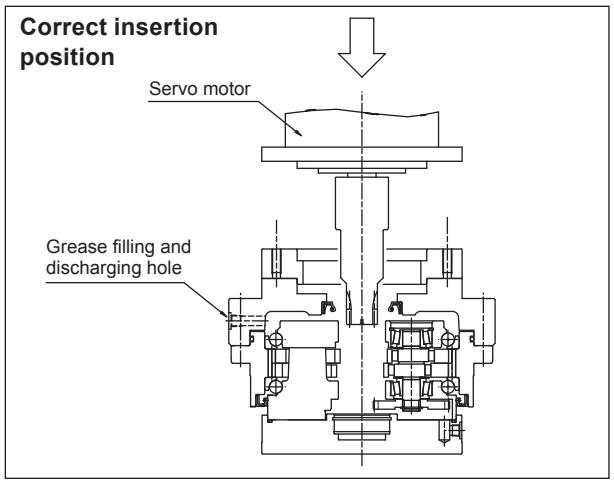


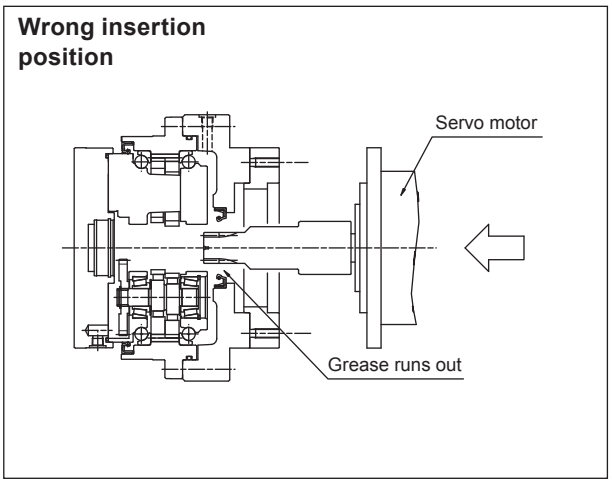
3. Notes when assembling an input gear

(1) Remove the cap when assembling an input gear.

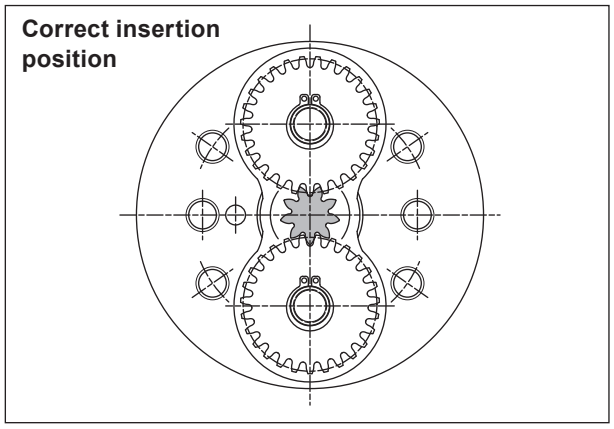


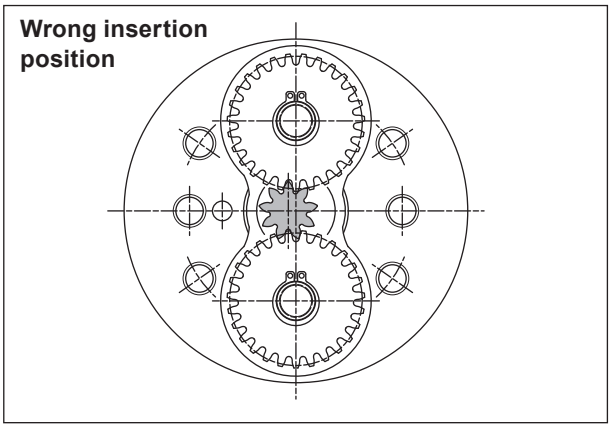
(2) Insert the input gear directly downward with the reduction gear held vertical.
If the reduction gear is in a horizontal state, grease will run out from the input gear insertion area.
After inserting the input gear, remove one of the hexagon plugs (one of two) from the grease filling and discharging hole to release the increased pressure inside the reduction gear, and then re-wrap the sealing tape to re-install the gear.
At that time, tighten the hexagon plug (PT1/8) with a tightening torque of 12.3 N-m.





(3) RA-20E and 40E have two spur gears. Please remember this particularly when assembling the input gear.
If the input gear does not align with the spur gears, insert the input gear while changing the angle a little toward the circumference. Then, without tilting the input gear, make sure there is no gap between the mounting surfaces. At this time, do not tighten the input gear with bolts or the like.
If the flange surface is tilted, it may be in the state shown in the figure below.





4. Lubrication

- The standard lubrication method for the RA reduction gears is greasing.
  Before the reduction gear is shipped, it is filled with our recommended grease (VIGO GREASE RE0).
  When operating a reduction gear filled with the appropriate amount of grease, the standard replacement time due to deterioration of the grease is 20,000 hours.
  When using the gear with deteriorated grease or under an inappropriate ambient temperature condition (40ºC or more), check the deterioration condition of the grease and determine the appropriate replacement cycle.
- Specified grease name

Grease name	VIGOGREASE RE0
Manufacturer	Nabtesco Corporation
Ambient temperature	-10 to 40ºC

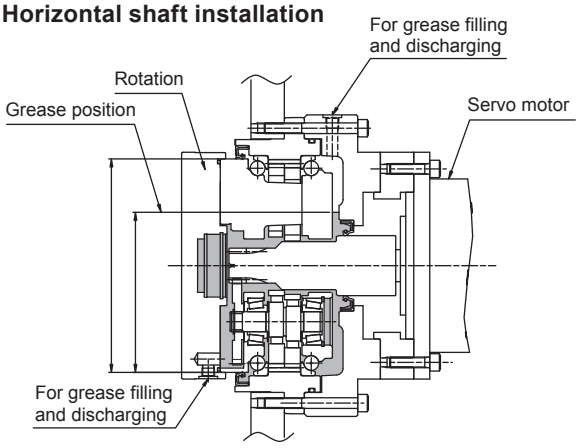
- Amount of grease in the reduction gear

Models	Required input amount					
	Horizontal shaft installation		Vertical shaft installation (1)		Vertical shaft installation (2)	
	cc	(g)	cc	(g)	cc	(g)
RA-EA Series						
RA-20EA	86	(75)	85	(74)	71	(62)
RA-40EA	169	(147)	167	(145)	148	(128)
RA-80EA	381	(331)	383	(333)	324	(281)
RA-160EA	655	(570)	656	(571)	647	(563)
RA-EC Series						
RA-20EC	169	(147)	163	(142)	176	(153)
RA-40EC	299	(260)	264	(230)	309	(269)
RA-80EC	473	(412)	427	(371)	439	(382)
RA-160EC	689	(599)	546	(474)	690	(600)

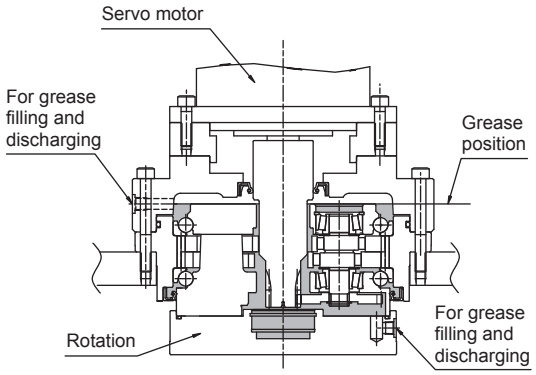
Note: After replacement, fill the reduction gear with the required amount of our recommended lubricant.
If it is filled excessively, however, the internal pressure increases and the oil seal may be damaged.

- Greasing position

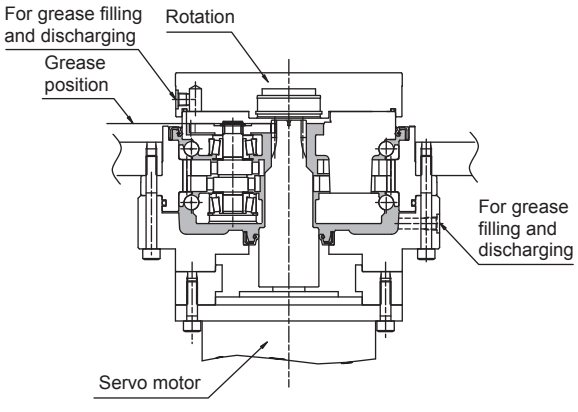
Horizontal shaft installation



Vertical shaft installation (1)



Vertical shaft installation (2)



Appendix 1

Quick Selection Table of Product Codes

Quick Selection Table of Product Codes

[How to select]

For example, an order item number, when the RA-40EA-120 is used with the servo motor xx/xxxxx that has a straight shaft (with key), can be selected as described below.

(1) Refer to the relevant Quick Selection Table. (Ex.: RA-EA Series & Straight shaft (with key))
(2) The order item number will be found in the box, where the columns of the servo motor xx/xxxxx and RA-40 EA-120 are crossed, as in the directions of arrows in the table below.
(3) Order using the selected order item number (Ex.: 31RA003B).

■RA-EA Series & Straight shaft (with key)

Model	Speed Ratio	Order item number	Inertia moment (I=GD^2/4) Input axis converted value kg-m^2	Applicable m		
				******	Page	
	**	** **	**×**-*			
	**	** **	**×**-*	**/****		
	**	** **	**×**-*	**/****		
	**	** **	**×**-*	**/****		
	**	** **	**×**-*	**/****		
	**	** **	**×**-*			
	**	** **	**×**-*			
	**	** **	**×**-*	**/****		
	**	** **	**×**-*			
	**	** **	**×**-*			
	**	** **	**×**-*			
-*	**	** **	**×**-*		**	
	**	** **	**×**-*		**	
	**	** **	**×**-*			
	**	** **	**×**-*			
	**	** **	**×**-*			
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	**	** **	**×**-*			
	**	** **	**×**-*			
	**	** **	**×**-*			
	**	** **	**×**-*			
	**	** **	**×**-*			
	**	** **	**×**-*			
	**	** **	**×**-*	□□/□□□□□		
	120	31RA003B*	-*			
	**	** **	**×**-*	**/****		
	**	******	**×**-*			
	**	******	**×**-*	**/****		
	**	******	**×**-*	**/****		
	**	******	**×**-*			
	**	******	**×**-*			
RA-40EA	**	******	**×**-*		**	
	**	******	**×**-*		**	
	**	******	**×**-*			

Note: 1. If the value achieved, by multiplying the momentary maximum torque of the motor by the speed ratio and efficiency of reduction gear, exceeds the momentary maximum torque of the reduction gear, or always exceeds the allowable accelera-tion/deceleration torque, then restrict the motor torque.
2. The total length of the selected product is the value achieved by adding the total length of the outside dimension drawing (of the reduction gear) and dimension “D” of the outside dimension drawing (of the motor flange).
3. The inertia moment “I” includes the values for both the reduction gear and the input gear.
4. The matching verification between the reduction gear and the motor in this quick selection table should be used as a refer-ence; this is because they are matched based only on the torque comparisons during operation of the reduction gear. For a more precise motor selection, the effective torque, load inertia moment, brake torque, and regene-rative ability, and so forth, must also be considered.

RA-EA Series
(Case rotating type)

Quick Selection Table of Produkt Codes

■RA-EA Series & Straight shaft (with key)

Model	Speed Ratio	Order item number	Inertia moment (I=GD^2/4) Input axis converted value kg-m^2	Applicable motor					
				FANUC	Page	MITSUBISHI	Page	SIEMENS	Page
RA-20EA	80	21RA001B*	2.87×10^-5	α 1/5000i α 2/5000i α 2/5000is β 2/4000is	32				
	104	21RA002B*	2.65×10^-5						
	120	21RA003B*	2.56×10^-5						
	140	21RA004B*	2.48×10^-5						
	160	21RA005B*	2.43×10^-5						
	80	21RA051B*	4.63×10^-5	β 4/4000is	34				
	104	21RA052B*	4.47×10^-5						
	120	21RA053B*	4.32×10^-5						
	140	21RA054B*	4.24×10^-5						
	160	21RA055B*	4.19×10^-5						
	80	21RA011B*	1.43×10^-4			HC-SFS52K HC-SFS102K	80		
	104	21RA012B*	1.41×10^-4						
	120	21RA013B*	1.40×10^-4						
	140	21RA014B*	1.39×10^-4						
	160	21RA015B*	1.38×10^-4						
	80	21RA016B*	6.38×10^-5					1FK7040-5AK71-1 1FK7042-5AF71-1 1FK7042-5AK71-1	100
	104	21RA017B*	6.16×10^-5						
	120	21RA018B*	6.07×10^-5						
	140	21RA019B*	5.99×10^-5						
	160	21RA020B*	5.94×10^-5						
	80	21RA021B*	1.49×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	102
	104	21RA022B*	1.47×10^-4						
	120	21RA023B*	1.46×10^-4						
	140	21RA024B*	1.46×10^-4						
	160	21RA025B*	1.45×10^-4						
RA-40EA	80	31RA001B*	9.54×10^-5	α 4/4000i α 8/3000i α 8/4000is β 8/3000is	36				
	104	31RA002B*	8.79×10^-5						
	120	31RA003B*	8.47×10^-5						
	152	31RA004B*	8.06×10^-5						
	80	31RA005B*	7.59×10^-5	α 4/5000is β 4/4000is	39				
	104	31RA006B*	6.84×10^-5						
	120	31RA007B*	6.52×10^-5						
	152	31RA008B*	6.11×10^-5						
	80	31RA009B*	1.90×10^-4			HC-SFS102K HC-SFS152K	82		
	104	31RA010B*	1.82×10^-4						
	120	31RA011B*	1.79×10^-4						
	152	31RA012B*	1.75×10^-4						
	80	31RA013B*	1.73×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	104
	104	31RA014B*	1.65×10^-4						
	120	31RA015B*	1.62×10^-4						
	152	31RA016B*	1.58×10^-4						
	80	31RA017B*	2.85×10^-4					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	106
	104	31RA018B*	2.78×10^-4						
	120	31RA019B*	2.75×10^-4						
	152	31RA020B*	2.71×10^-4						
RA-80EA	80	41RA001B*	1.67×10^-4	α 8/3000i α 8/4000is β 8/3000is	41				
	100	41RA002B*	1.53×10^-4						
	120	41RA003B*	1.45×10^-4						
	152	41RA004B*	1.35×10^-4						
	80	41RA049B*	6.30×10^-4	α 12/3000i	44	HC-SFS202K HC-SFS352K	84		
	100	41RA050B*	6.17×10^-4						
	120	41RA051B*	6.08×10^-4						
	152	41RA052B*	5.99×10^-4						
	80	41RA009B*	2.49×10^-4	β 12/3000is α 12/4000is	47				
	100	41RA010B*	2.36×10^-4						
	120	41RA011B*	2.27×10^-4						
	152	41RA012B*	2.17×10^-4						
	80	41RA013B*	2.59×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	108
	100	41RA014B*	2.46×10^-4						
	120	41RA015B*	2.37×10^-4						
	152	41RA016B*	2.27×10^-4						
	80	41RA017B*	4.02×10^-4					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	110
	100	41RA018B*	3.89×10^-4						
	120	41RA019B*	3.80×10^-4						
	152	41RA020B*	3.70×10^-4						
RA-160EA	80	51RA041B*	1.06×10^-3	α 12/3000i α 22/3000i α 22/4000is β 22/2000is	49	HC-SFS352K HC-SFS502K	86		
	100	51RA042B*	1.01×10^-3						
	128	51RA043B*	9.69×10^-4						
	144	51RA044B*	9.49×10^-4						
	170	51RA045B*	9.35×10^-4						
	80	51RA006B*	5.25×10^-4	α 12/4000is β 12/3000is	52				
	100	51RA007B*	4.79×10^-4						
	128	51RA008B*	4.39×10^-4						
	144	51RA009B*	4.19×10^-4						
	170	51RA010B*	4.05×10^-4						
	80	51RA011B*	7.47×10^-4					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	112
	100	51RA012B*	7.01×10^-4						
	128	51RA013B*	6.61×10^-4						
	144	51RA014B*	6.41×10^-4						
	170	51RA015B*	6.27×10^-4						

■RA-EA Series & Straight shaft (without key)

Model	Speed Ratio	Order item number	Inertia moment (I=GD^2/4) Input axis converted value kg-m^2	Applicable motor					
				FANUC	Page	MITSUBISHI	Page	SIEMENS	Page
RA-20EA	80	21RA026B*	3.03×10^-4					1FK7040-5AK71-1 1FK7042-5AF71-1 1FK7042-5AK71-1	101
	104	21RA027B*	3.01×10^-4						
	120	21RA028B*	3.00×10^-4						
	140	21RA029B*	2.99×10^-4						
	160	21RA030B*	2.99×10^-4						
	80	21RA031B*	3.06×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	103
	104	21RA032B*	3.04×10^-4						
	120	21RA033B*	3.03×10^-4						
	140	21RA034B*	3.02×10^-4						
	160	21RA035B*	3.01×10^-4						
	80	21RA036B*	3.03×10^-4			HC-SFS52 HC-SFS102	81		
	104	21RA037B*	3.01×10^-4						
	120	21RA038B*	3.00×10^-4						
	140	21RA039B*	2.99×10^-4						
	160	21RA040B*	2.99×10^-4						
RA-40EA	80	31RA021B*	3.41×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	105
	104	31RA022B*	3.33×10^-4						
	120	31RA023B*	3.30×10^-4						
	152	31RA024B*	3.26×10^-4						
	80	31RA025B*	5.55×10^-4					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	107
	104	31RA026B*	5.47×10^-4						
	120	31RA027B*	5.44×10^-4						
	152	31RA028B*	5.40×10^-4						
	80	31RA029B*	3.34×10^-4	α 4/4000i	37				
	104	31RA030B*	3.27×10^-4	α 8/3000i					
	120	31RA031B*	3.24×10^-4	α 8/4000is					
	152	31RA032B*	3.20×10^-4	β 8/3000is					
	80	31RA033B*	3.35×10^-4			HC-SFS102 HC-SFS152	83		
	104	31RA034B*	3.27×10^-4						
	120	31RA035B*	3.24×10^-4						
	152	31RA036B*	3.20×10^-4						
RA-80EA	80	41RA021B*	5.45×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	109
	100	41RA022B*	5.32×10^-4						
	120	41RA023B*	5.23×10^-4						
	152	41RA024B*	5.14×10^-4						
	80	41RA025B*	6.06×10^-4					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	111
	100	41RA026B*	5.93×10^-4						
	120	41RA027B*	5.84×10^-4						
	152	41RA028B*	5.75×10^-4						
	80	41RA029B*	5.62×10^-4						
	100	41RA030B*	5.48×10^-4	α 8/3000i	42				
	120	41RA031B*	5.39×10^-4	α 8/4000is					
	152	41RA032B*	5.30×10^-4	β 8/3000is					
	80	41RA033B*	6.28×10^-4	α 12/3000i	45	HC-SFS202 HC-SFS352	85		
	100	41RA034B*	6.15×10^-4						
	120	41RA035B*	6.06×10^-4						
	152	41RA036B*	5.97×10^-4						
	80	41RA037B*	6.33×10^-4						
	100	41RA038B*	6.20×10^-4	β 12/3000is	48				
	120	41RA039B*	6.11×10^-4	α 12/4000is					
	152	41RA040B*	6.02×10^-4						
RA-160EA	80	51RA016B*	1.51×10^-3					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	113
	100	51RA017B*	1.46×10^-3						
	128	51RA018B*	1.42×10^-3						
	144	51RA019B*	1.40×10^-3						
	170	51RA020B*	1.39×10^-3						
	80	51RA021B*	1.71×10^-3	α 12/3000i	50	HC-SFS352 HC-SFS502	87		
	100	51RA022B*	1.67×10^-3	α 22/3000i					
	128	51RA023B*	1.62×10^-3	α 22/4000is					
	144	51RA024B*	1.61×10^-3	β 22/2000is					
	170	51RA025B*	1.59×10^-3						
	80	51RA026B*	1.51×10^-3						
	100	51RA027B*	1.47×10^-3	α 12/4000is	53				
	128	51RA028B*	1.43×10^-3	β 12/3000is					
	144	51RA029B*	1.41×10^-3						
	170	51RA030B*	1.39×10^-3						

Note: 1. Use the “Order item number” for your order.

2. If the value achieved, by multiplying the momentary maximum torque of the motor by the speed ratio and efficiency of reduction gear, exceeds the momentary maximum torque of the reduction gear, or always exceeds the allowable accele-ration/deceleration torque, then restrict the motor torque.
3. The total length of the selected product is the value achieved by adding the total length of the outside dimension drawing (of the reduction gear) and dimension “D” of the outside dimension drawing (of the motor flange).
4. The inertia moment “I” includes the values for both the reduction gear and the input gear.
5. The matching verification between the reduction gear and the motor in this quick selection table should be used as a reference; this is because they are matched based only on the torque comparisons during operation of the reduction gear. For a more precise motor selection, the effective torque, load inertia moment, brake torque, and regenerative ability, and so forth, must also be considered.

■RA-EA Series & 1/10 tapered shaft

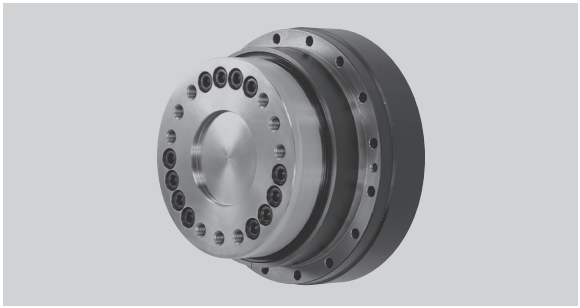
Model	Speed Ratio	Order item number	Inertia moment (I=GD^2/4) Input axis converted value kg-m^2	Applicable motor	
				FANUC	Page
RA-20EA	80	21RA041B*	2.85×10^-5	α 1/5000i α 2/5000i α 2/5000is β 2/4000is	33
	104	21RA042B*	2.63×10^-5		
	120	21RA043B*	2.54×10^-5		
	140	21RA044B*	2.46×10^-5		
	160	21RA045B*	2.41×10^-5		
	80	21RA046B*	4.00×10^-5	β 4/4000is	35
	104	21RA047B*	3.78×10^-5		
	120	21RA048B*	3.69×10^-5		
	140	21RA049B*	3.61×10^-5		
	160	21RA050B*	3.56×10^-5		
RA-40EA	80	31RA037B*	9.86×10^-5	α 4/4000i α 8/3000i α 8/4000is β 8/3000is	38
	104	31RA038B*	9.11×10^-5		
	120	31RA039B*	8.79×10^-5		
	152	31RA040B*	8.38×10^-5		
	80	31RA041B*	6.96×10^-5	α 4/5000is β 4/4000is	40
	104	31RA042B*	6.21×10^-5		
	120	31RA043B*	5.89×10^-5		
	152	31RA044B*	5.48×10^-5		
RA-80EA	80	41RA041B*	1.68×10^-4	α 8/3000i α 8/4000is β 8/3000is β 12/3000is	43
	100	41RA042B*	1.55×10^-4		
	120	41RA043B*	1.46×10^-4		
	152	41RA044B*	1.37×10^-4		
	80	41RA045B*	3.33×10^-4	α 12/3000i	46
	100	41RA046B*	3.20×10^-4		
	120	41RA047B*	3.11×10^-4		
	152	41RA048B*	3.02×10^-4		
RA-160EA	80	51RA031B*	6.38×10^-4	α 12/3000i α 22/3000i α 22/4000is β 22/2000is	51
	100	51RA032B*	5.92×10^-4		
	128	51RA033B*	5.52×10^-4		
	144	51RA034B*	5.32×10^-4		
	170	51RA035B*	5.18×10^-4		
	80	51RA036B*	5.09×10^-4	α 12/4000is β 12/3000is	54
	100	51RA037B*	4.63×10^-4		
	128	51RA038B*	4.23×10^-4		
	144	51RA039B*	4.03×10^-4		
	170	51RA040B*	3.89×10^-4		

Note: 1. Use the “Order item number” for your order.

2. If the value achieved, by multiplying the momentary maximum torque of the motor by the speed ratio and efficiency of reduction gear, exceeds the momentary maximum torque of the reduction gear, or always exceeds the allowable accele-ration/deceleration torque, then restrict the motor torque.
3. The total length of the selected product is the value achieved by adding the total length of the outside dimension drawing (of the reduction gear) and dimension “D” of the outside dimension drawing (of the motor flange).
4. The inertia moment “I” includes the values for both the reduction gear and the input gear.
5. The matching verification between the reduction gear and the motor in this quick selection table should be used as a reference; this is because they are matched based only on the torque comparisons during operation of the reduction gear. For a more precise motor selection, the effective torque, load inertia moment, brake torque, and regenerative ability, and so forth, must also be considered.

RA-EC Series
(Shaft rotating type)

Quick Selection Table of Produkt Codes



■RA-EC Series & Straight shaft (with key)

Model	Speed Ratio	Order item number	Inertia moment (I=GD^2/4) Input axis converted value kg-m^2	Applicable motor					
				FANUC	Page	MITSUBISHI	Page	SIEMENS	Page
RA-20EC	81	23RA001B*	2.87×10^-5	α 1/5000i α 2/5000i α 2/5000is β 2/4000is	56				
	105	23RA002B*	2.65×10^-5						
	121	23RA003B*	2.56×10^-5						
	141	23RA004B*	2.48×10^-5						
	161	23RA005B*	2.43×10^-5						
	81	23RA006B*	4.63×10^-5	β 4/4000is	58				
	105	23RA007B*	4.47×10^-5						
	121	23RA008B*	4.32×10^-5						
	141	23RA009B*	4.24×10^-5						
	161	23RA010B*	4.19×10^-5						
	81	23RA011B*	1.43×10^-4			HC-SFS52K HC-SFS102K	90		
	105	23RA012B*	1.41×10^-4						
	121	23RA013B*	1.40×10^-4						
	141	23RA014B*	1.39×10^-4						
	161	23RA015B*	1.38×10^-4						
	81	23RA016B*	6.38×10^-5					1FK7040-5AK71-1 1FK7042-5AF71-1 1FK7042-5AK71-1	116
	105	23RA017B*	6.16×10^-5						
	121	23RA018B*	6.07×10^-5						
	141	23RA019B*	5.99×10^-5						
	161	23RA020B*	5.94×10^-5						
	81	23RA021B*	1.49×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	118
	105	23RA022B*	1.47×10^-4						
	121	23RA023B*	1.46×10^-4						
	141	23RA024B*	1.46×10^-4						
	161	23RA025B*	1.45×10^-4						
RA-40EC	81	33RA001B*	9.54×10^-5	α 4/4000i α 8/3000i α 8/4000is β 8/3000is	60				
	105	33RA002B*	8.79×10^-5						
	121	33RA003B*	8.47×10^-5						
	153	33RA004B*	8.06×10^-5						
	81	33RA005B*	7.59×10^-5	α 4/5000is β 4/4000is	63				
	105	33RA006B*	6.84×10^-5						
	121	33RA007B*	6.52×10^-5						
	153	33RA008B*	6.11×10^-5						
	81	33RA009B*	1.90×10^-4			HC-SFS102K HC-SFS152K	92		
	105	33RA010B*	1.82×10^-4						
	121	33RA011B*	1.79×10^-4						
	153	33RA012B*	1.75×10^-4						
	81	33RA013B*	1.73×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	120
	105	33RA014B*	1.65×10^-4						
	121	33RA015B*	1.62×10^-4						
	153	33RA016B*	1.58×10^-4						
	81	33RA017B*	2.85×10^-4					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	122
	105	33RA018B*	2.78×10^-4						
	121	33RA019B*	2.75×10^-4						
	153	33RA020B*	2.71×10^-4						
RA-80EC	81	43RA001B*	1.67×10^-4	α 8/3000i α 8/4000is β 8/3000is	65				
	101	43RA002B*	1.53×10^-4						
	121	43RA003B*	1.45×10^-4						
	153	43RA004B*	1.35×10^-4						
	81	43RA005B*	6.30×10^-4	α 12/3000i	68	HC-SFS202K HC-SFS352K	94		
	101	43RA006B*	6.17×10^-4						
	121	43RA007B*	6.08×10^-4						
	153	43RA008B*	5.99×10^-4						
	81	43RA009B*	2.49×10^-4	β 12/3000is α 12/4000is	71				
	101	43RA010B*	2.36×10^-4						
	121	43RA011B*	2.27×10^-4						
	153	43RA012B*	2.17×10^-4						
	81	43RA013B*	2.59×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	124
	101	43RA014B*	2.46×10^-4						
	121	43RA015B*	2.37×10^-4						
	153	43RA016B*	2.27×10^-4						
	81	43RA017B*	4.02×10^-4					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	126
	101	43RA018B*	3.89×10^-4						
	121	43RA019B*	3.80×10^-4						
	153	43RA020B*	3.70×10^-4						
RA-160EC	81	53RA001B*	1.06×10^-3	α 12/3000i α 22/3000i α 22/4000is β 22/2000is	73	HC-SFS352K HC-SFS502K	96		
	101	53RA002B*	1.01×10^-3						
	129	53RA003B*	9.69×10^-4						
	145	53RA004B*	9.49×10^-4						
	171	53RA005B*	9.35×10^-4						
	81	53RA006B*	5.25×10^-4	α 12/4000is β 12/3000is	76				
	101	53RA007B*	4.79×10^-4						
	129	53RA008B*	4.39×10^-4						
	145	53RA009B*	4.19×10^-4						
	171	53RA010B*	4.05×10^-4						
	81	53RA011B*	7.47×10^-4					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	128
	101	53RA012B*	7.01×10^-4						
	129	53RA013B*	6.61×10^-4						
	145	53RA014B*	6.41×10^-4						
	171	53RA015B*	6.27×10^-4						

■RA-EC Series & Straight shaft (without key)

Model	Speed Ratio	Order item number	Inertia moment (I=GD^2/4) Input axis converted value kg-m^2	Applicable motor					
				FANUC	Page	MITSUBISHI	Page	SIEMENS	Page
RA-20EC	81	23RA026B*	3.03×10^-4					1FK7040-5AK71-1 1FK7042-5AF71-1 1FK7042-5AK71-1	117
	105	23RA027B*	3.01×10^-4						
	121	23RA028B*	3.00×10^-4						
	141	23RA029B*	2.99×10^-4						
	161	23RA030B*	2.99×10^-4						
	81	23RA031B*	3.06×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	119
	105	23RA032B*	3.04×10^-4						
	121	23RA033B*	3.03×10^-4						
	141	23RA034B*	3.02×10^-4						
	161	23RA035B*	3.01×10^-4						
	81	23RA036B*	3.03×10^-4			HC-SFS52 HC-SFS102	91		
	105	23RA037B*	3.01×10^-4						
	121	23RA038B*	3.00×10^-4						
	141	23RA039B*	2.99×10^-4						
	161	23RA040B*	2.99×10^-4						
RA-40EC	81	33RA045B*	3.41×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	121
	105	33RA046B*	3.33×10^-4						
	121	33RA047B*	3.30×10^-4						
	153	33RA048B*	3.26×10^-4						
	81	33RA025B*	5.55×10^-4					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	123
	105	33RA026B*	5.47×10^-4						
	121	33RA027B*	5.44×10^-4						
	153	33RA028B*	5.40×10^-4						
	81	33RA029B*	3.34×10^-4	α 4/4000i	61				
	105	33RA030B*	3.27×10^-4	α 8/3000i					
	121	33RA031B*	3.24×10^-4	α 8/4000is					
	153	33RA032B*	3.20×10^-4	β 8/3000is					
	81	33RA033B*	3.35×10^-4			HC-SFS102 HC-SFS152	93		
	105	33RA034B*	3.27×10^-4						
	121	33RA035B*	3.24×10^-4						
	153	33RA036B*	3.20×10^-4						
RA-80EC	81	43RA021B*	5.45×10^-4					1FK7060-5AF71-1 1FK7060-5AH71-1 1FK7063-5AF71-1 1FK7063-5AH71-1	125
	101	43RA022B*	5.32×10^-4						
	121	43RA023B*	5.23×10^-4						
	153	43RA024B*	5.14×10^-4						
	81	43RA025B*	6.06×10^-4					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	127
	101	43RA026B*	5.93×10^-4						
	121	43RA027B*	5.84×10^-4						
	153	43RA028B*	5.75×10^-4						
	81	43RA029B*	5.62×10^-4						
	101	43RA030B*	5.48×10^-4	α 8/3000i	66				
	121	43RA031B*	5.39×10^-4	α 8/4000is					
	153	43RA032B*	5.30×10^-4	β 8/3000is					
	81	43RA033B*	6.28×10^-4	α 12/3000i	69	HC-SFS202 HC-SFS352	95		
	101	43RA034B*	6.15×10^-4						
	121	43RA035B*	6.06×10^-4						
	153	43RA036B*	5.97×10^-4						
	81	43RA037B*	6.33×10^-4	β 12/3000is α 12/4000is	72				
	101	43RA038B*	6.20×10^-4						
	121	43RA039B*	6.11×10^-4						
	153	43RA040B*	6.02×10^-4						
RA-160EC	81	53RA016B*	1.51×10^-3					1FK7080-5AF71-1 1FK7080-5AH71-1 1FK7083-5AF71-1 1FK7083-5AH71-1	129
	101	53RA017B*	1.46×10^-3						
	129	53RA018B*	1.42×10^-3						
	145	53RA019B*	1.40×10^-3						
	171	53RA020B*	1.39×10^-3						
	81	53RA021B*	1.71×10^-3	α 12/3000i α 22/3000i α 22/4000is β 22/2000is	74	HC-SFS352 HC-SFS502	97		
	101	53RA022B*	1.67×10^-3						
	129	53RA023B*	1.62×10^-3						
	145	53RA024B*	1.61×10^-3						
	171	53RA025B*	1.59×10^-3						
	81	53RA026B*	1.51×10^-3	α 12/4000is β 12/3000is	77				
	101	53RA027B*	1.47×10^-3						
	129	53RA028B*	1.43×10^-3						
	145	53RA029B*	1.41×10^-3						
	171	53RA030B*	1.39×10^-3						

Note: 1. Use the “Order item number” for your order.

2. If the value achieved, by multiplying the momentary maximum torque of the motor by the speed ratio and efficiency of reduction gear, exceeds the momentary maximum torque of the reduction gear, or always exceeds the allowable accele-ration/deceleration torque, then restrict the motor torque.
3. The total length of the selected product is the value achieved by adding the total length of the outside dimension drawing (of the reduction gear) and dimension “D” of the outside dimension drawing (of the motor flange).
4. The inertia moment “I” includes the values for both the reduction gear and the input gear.
5. The matching verification between the reduction gear and the motor in this quick selection table should be used as a reference; this is because they are matched based only on the torque comparisons during operation of the reduction gear. For a more precise motor selection, the effective torque, load inertia moment, brake torque, and regenerative ability, and so forth, must also be considered.

■RA-EC Series & 1/10 tapered shaft

Model	Speed Ratio	Order item number	Inertia moment (I=GD^2/4) Input axis converted value kg-m^2	Applicable motor	
				FANUC	Page
RA-20EC	81	23RA051B*	2.85×10^-5	α 1/5000i α 2/5000i α 2/5000is β 2/4000is	57
	105	23RA052B*	2.63×10^-5		
	121	23RA053B*	2.54×10^-5		
	141	23RA054B*	2.46×10^-5		
	161	23RA055B*	2.41×10^-5		
	81	23RA046B*	4.00×10^-5	β 4/4000is	59
	105	23RA047B*	3.78×10^-5		
	121	23RA048B*	3.69×10^-5		
	141	23RA049B*	3.61×10^-5		
	161	23RA050B*	3.56×10^-5		
RA-40EC	81	33RA037B*	9.86×10^-5	α 4/4000i α 8/3000i α 8/4000is β 8/3000is	62
	105	33RA038B*	9.11×10^-5		
	121	33RA039B*	8.79×10^-5		
	153	33RA040B*	8.38×10^-5		
	81	33RA041B*	6.96×10^-5	α 4/5000is β 4/4000is	64
	105	33RA042B*	6.21×10^-5		
	121	33RA043B*	5.89×10^-5		
	153	33RA044B*	5.48×10^-5		
RA-80EC	81	43RA041B*	1.68×10^-4	α 8/3000i α 8/4000is β 8/3000is β 12/3000is	67
	101	43RA042B*	1.55×10^-4		
	121	43RA043B*	1.46×10^-4		
	153	43RA044B*	1.37×10^-4		
	81	43RA045B*	3.33×10^-4	α 12/3000i	70
	101	43RA046B*	3.20×10^-4		
	121	43RA047B*	3.11×10^-4		
	153	43RA048B*	3.02×10^-4		
RA-160EC	81	53RA031B*	6.38×10^-4	α 12/3000i α 22/3000i α 22/4000is β 22/2000is	75
	101	53RA032B*	5.92×10^-4		
	129	53RA033B*	5.52×10^-4		
	145	53RA034B*	5.32×10^-4		
	171	53RA035B*	5.18×10^-4		
	81	53RA036B*	5.09×10^-4	α 12/4000is β 12/3000is	78
	101	53RA037B*	4.63×10^-4		
	129	53RA038B*	4.23×10^-4		
	145	53RA039B*	4.03×10^-4		
	171	53RA040B*	3.89×10^-4		

Note: 1. Use the “Order item number” for your order.

2. If the value achieved, by multiplying the momentary maximum torque of the motor by the speed ratio and efficiency of reduc-tion gear, exceeds the momentary maximum torque of the reduction gear, or always exceeds the allowable accele-ration/de-celeration torque, then restrict the motor torque.
3. The total length of the selected product is the value achieved by adding the total length of the outside dimension drawing (of the reduction gear) and dimension “D” of the outside dimension drawing (of the motor flange).
4. The inertia moment “I” includes the values for both the reduction gear and the input gear.
5. The matching verification between the reduction gear and the motor in this quick selection table should be used as a refe-rence; this is because they are matched based only on the torque comparisons during operation of the reduction gear. For a more precise motor selection, the effective torque, load inertia moment, brake torque, and regenerative ability, and so forth, must also be considered.

Cautions for use of RA Series

- If the end user of this product is a military interest or the product is to be used in the manufacture of weapons, the product may be subject to export regulations prescribed in the Foreign Exchange and Foreign Trade Control Law. Confirm these conditions before exporting the product and take the necessary steps.
- When using this product with devices (nuclear facilities, aerospace equipment, transportation equipment, medical equipment, safety devices, etc.) that may directly affect the human body or endanger human life due to an operational malfunction or failure, examination of individual situations is required. In such a case, contact an agent or our nearest business office.
- Although this product has been manufactured under strict quality control, if it is to be used in equipment that could cause serious injury or damage to facilities as a result of failure of the product, all appropriate safety measures must be taken.
- When this product is used in a special environment (clean room, food handling facilities, etc.), please contact an agent or our nearest business office.
- Disassembling the product and analyzing the inside is prohibited under reverse engineering and other related regulations.

Guarantee

- Nabtesco Corporation guarantees that the RA Gearheads are free from defects in materials and workmanship.
- The term of guarantee shall be one year after delivery or 2,000 hours of operation after the installation on an actual machine, whichever is earlier, on condition that the product is operated under the rated operation conditions specified by us, and under normal assembly and lubrication conditions.
- If any defect in the materials or workmanship is detected during the above guarantee term, the product will be repaired or replaced at our expense, provided that the number of man-hours required for demounting and remounting the product from the machine, transportation expenses for re-delivery, warehousings and other incidental expenses shall be excluded from our obligation.
- No compensation will be provided for the lost opportunities or any other type of loss due to a shutdown of operation that was caused by a defect in the product.
- If compensation under the guarantee is discharged monetarily, the upper limit of the amount shall not exceed the selling price of the product which is the subject of the claim.
- If any of the applicable units are disassembled/reassembled without prior notification to us, we shall not be held responsible for any problems related to performance or safety, etc. that result from their subsequent usage.

Rev. 002

Nabtesco

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