Precision Reduction Gear RV™

N series

Operation Manual

<Applicable model>

RV-□N△

□ above indicates the torque code.
△ above indicates the series code.
For the applicable models, refer to “Model” indicated on the shipping label of the product.

This manual must be thoroughly read and understood before using the product.

Be sure to deliver this operation manual to the system manager and the person in charge of the operation.

Keep this manual in the specified location so that it can be immediately referred to whenever necessary.

Nabtesco Corporation

ERD15003
May 1, 2015

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NABTESCO CONTACT INFORMATION

Important Information

1. Intended use of this product

This product was designed and manufactured as a reduction gear that decelerates the rotation of the motor and transmits the rotational torque. Do not use this product for other purposes.

WARNING

- Do not modify the reduction gear or use it outside its specified range. This could cause injury or damage to the reduction gear.
- The specifications indicated in the product catalog are based on Nabtesco evaluation methods. This product should only be used after confirming that it is appropriate for the operating conditions of your system. Failure to do so could cause injury or damage to the reduction gear.

2. Rules to ensure safe use of this product

It is impossible for Nabtesco Corporation (referred to as “Nabtesco” hereafter) to foresee any potential hazards related to this product and hazards caused by human errors or peripheral devices.

There are also various points that must be observed and operations that are prohibited in relation to the use of this product, but it is also impossible to note all of them in this manual.

For this reason, it is necessary to take appropriate safety measures when operating this product, in addition to the points noted in this manual.

The particularly important information for safe handling of this product is noted below. This information applies to all workers involved, including the manager and supervisor of this product.

The “procedures” referred to in this manual indicate all the acts performed on this product during transportation, installation, operation, and maintenance/inspection.

Be sure to read this manual

Before using this product, thoroughly read this manual and understand all the content of this manual. Also, observe the safety precautions described in this manual.

Conditions for workers

- The worker must have a fundamental knowledge of this product
- The worker must be aware of the potential hazards of this product and have adequate knowledge to avoid hazardous situations
- The worker must be able to take appropriate measures to avoid hazardous situations

Observe the relevant laws, regulations, ordinances, and bylaws.

Observe the relevant laws, regulations, ordinances, and bylaws enacted by the related countries and local governments.

Prevention of accidents

To prevent accidents, do not perform any procedures not noted in this manual. Also, do not use this product for any purposes other than those noted at the beginning of this manual.

If any abnormalities are found, take appropriate measures immediately to prevent any accidents, serious injury, or damage.

- Everyone, including workers and supervisors, must voluntarily take measures to ensure safety and well-being, as this can prevent accidents.

3. Sharing of hazard information with users

When selling or transferring this product embedded in a device, etc., hand this manual to the person who actually uses or manages the device (the person/group in charge). Or, add the necessary information concerning handling and maintenance procedures for preventing the accidents and failures described in this manual to the contents of the operation manual of the device.

4. Product disposal

When disposing of this product, drain the lubricant completely and handle it according to the ordinances of the local government and entrust the disposal to an industrial waste disposal specialist.

5. Other important notes

It is strictly prohibited to reverse-engineer the internal parts of this product.

About This Manual

1. Users of this manual

This manual is intended for native speakers of English. If this product is operated by non-native speakers of English, the customer is responsible for conducting safety training and giving operation instructions to those workers.

2. Copyrights

The copyright for this manual belongs to Nabtesco Corporation. Unauthorized reprinting, reproduction, copying, or translation of this manual in whole or in part is strictly prohibited.

Warranty

1. In the case where Nabtesco confirms that a defect of the Product was caused due to Nabtesco's design or manufacture within the Warranty Period of the Product, Nabtesco shall repair or replace such defective Product at its cost. The Warranty Period shall be from the delivery of the Product by Nabtesco or its distributor to you ("Customer") until the end of one (1) year thereafter, or the end of two thousand (2,000) hours running of the Product installed into Customer's equipment, whichever comes earlier.

2. Unless otherwise expressly agreed between the parties in writing, the warranty obligations for the Product shall be limited to the repair or replacement set forth herein. OTHER THAN AS PROVIDED HEREIN, THERE ARE NO WARRANTIES ON THE PRODUCT, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

3. The warranty obligation under Section 1 above shall not apply if:
   a) the defect was caused due to the use of the Product deviated from the Specifications or the working conditions provided by Nabtesco;
   b) the defect was caused due to exposure to foreign substances or contamination (dirt, sand etc.);
   c) lubricant or spare part other than the ones recommended by Nabtesco was used in the Product;
   d) the Product was used in an unusual environment (such as high temperature, high humidity, a lot of dust, corrosive/volatile/inflammable gas, pressurized/depressurized air, under water/liquid or others except for those expressly stated in the Specifications);
   e) the Product was disassembled, re-assembled, repaired or modified by anyone other than Nabtesco;
   f) the defect was caused due to the equipment into which the Product was installed;
   g) the defect was caused due to an accident such as fire, earthquake, lightning, flood or others; or
   h) the defect was due to any cause other than the design or manufacturing of the Product.

4. The warranty period for the repaired/replaced Product/part under Section 1 above shall be the rest of the initial Warranty Period of the defective Product subjected to such repair/replace.

Glossary

Rated service life

The lifetime resulting from the operation with the rated torque and the rated output speed is referred to as the “rated service life”.

Allowable acceleration/deceleration torque

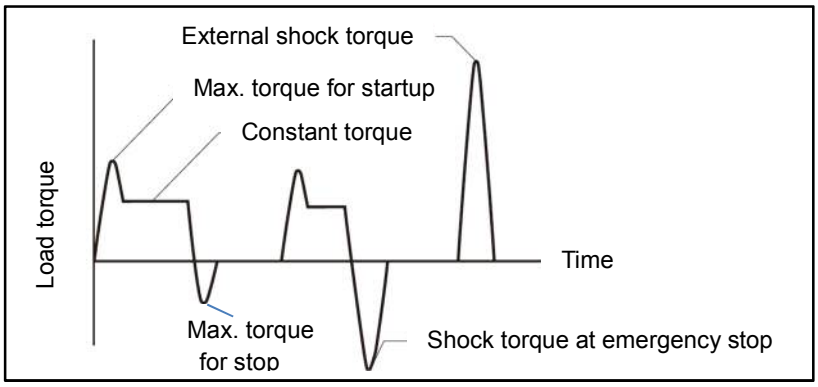
When the machine starts or stops, the load torque to be applied to the reduction gear is larger than the constant-speed load torque due to the effect of the inertia torque of the rotating part. In such a situation, the allowable torque during acceleration/deceleration is referred to as “allowable acceleration/deceleration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

Note: Be careful that the load torque, which is applied at startup and stop, does not exceed the allowable acceleration/deceleration torque.

Momentary maximum allowable torque

A large torque may be applied to the reduction gear due to execution of emergency stop or by an external shock. In such a situation, the allowable value of the momentary applied torque is referred to as “momentary maximum allowable torque”.

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



Allowable output speed

The allowable value for the reduction gear’s output speed during operation without a load is referred to as the “allowable output speed”.

Note: Depending on the conditions of use (duty ratio, load, ambient temperature), the reduction gear surface temperature may exceed 60°C even when the speed is under the allowable output speed. In such a case, either take cooling measures or use the reduction gear at a speed that keeps the surface temperature at 60°C or lower.

Allowable Moment and Maximum Thrust Load

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

Note 1: The above specification values are noted in the catalog or separately provided specification sheet.

Note 2: The “reduction gear” described in this manual indicates the N series of the product.

Chapter 1 About Safety

The safety precautions noted in this chapter should be used as guidelines to prevent injury of workers who perform transportation, installation, operation, and maintenance of this product, as well as damage to the product.

1.1. About warnings

This manual alerts workers to hazardous situations and precautions related to this product in the following manner:

1. Safety regulations are described in Chapter 1 “About safety” in this manual
2. Warning statements are noted in this manual

1.2. Type and indication of warning

Warnings for potential hazards during operation are given according to the following four categories in this manual. If you fail to observe these warning statements, it could result in lethal injury or serious damage and malfunction of the product.

DANGER	Indicates a hazardous situation that, if not avoided, is highly likely to result in death or serious injury.
WARNING	Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.
Note	Indicates a potentially hazardous situation that, if not avoided, could result in physical damage.

Important Provides important information for correct use of this product, as well as supplemental explanation for the main body of the text or other information that helps to prevent erroneous operation.

1.3. General precautions

This section describes general precautions for safe use of this product. For precautions concerning transportation, installation, operation, maintenance, and inspection, be sure to confirm the contents of the relevant chapter.

WARNING

- Do not modify or disassemble the reduction gear in a manner not described in this manual. It could cause injury or damage to the reduction rear.
- Transportation, installation, operation, maintenance, and inspection of the reduction gear must be performed by personnel who fully understand this manual. The person in charge of the operation and manager of the reduction gear must not allow anyone without an understanding of the contents of this manual to operate it. It could cause injury or damage to the reduction gear.
- Do not put your fingers or any object into the opening of the reduction gear. If a belt or chain is used for connection of the drive sections, do not put your fingers or any object into the clearance of the protective cover, etc., as it could cause injury.
- If any abnormalities or damage to the reduction gear are found, stop the operation immediately. Incorrect motion could cause injury.

CAUTION

- The reduction gear could be extremely hot during operation. After stopping the operation, never touch the reduction gear before it is completely cooled. Touching the reduction gear could cause burns.
- Handle the lubricant according to the instructions given in this manual. Failure to do so could impair your health.

Note

- This reduction gear is not filled with lubricant. Fill the reduction gear with an appropriate amount of Nabtesco-recommended lubricant before use. Failure to do so could cause damage to the reduction gear.
- Return the tools and other necessary items to the specified location after use. If a tool, bolt, nut, or other foreign object is trapped in the system, it could cause damage to the reduction gear.
- Avoid excessive impact or vibration of the reduction gear. It could cause damage to the reduction gear.

Chapter 2 Product Overview

This chapter describes provides an overview of this product.

2.1. Name of each section

This section provides an explanation of the name of each section.

If the shape of the actual section differs from the illustration below, refer to the separately provided "External dimensions" drawings and specification sheet.

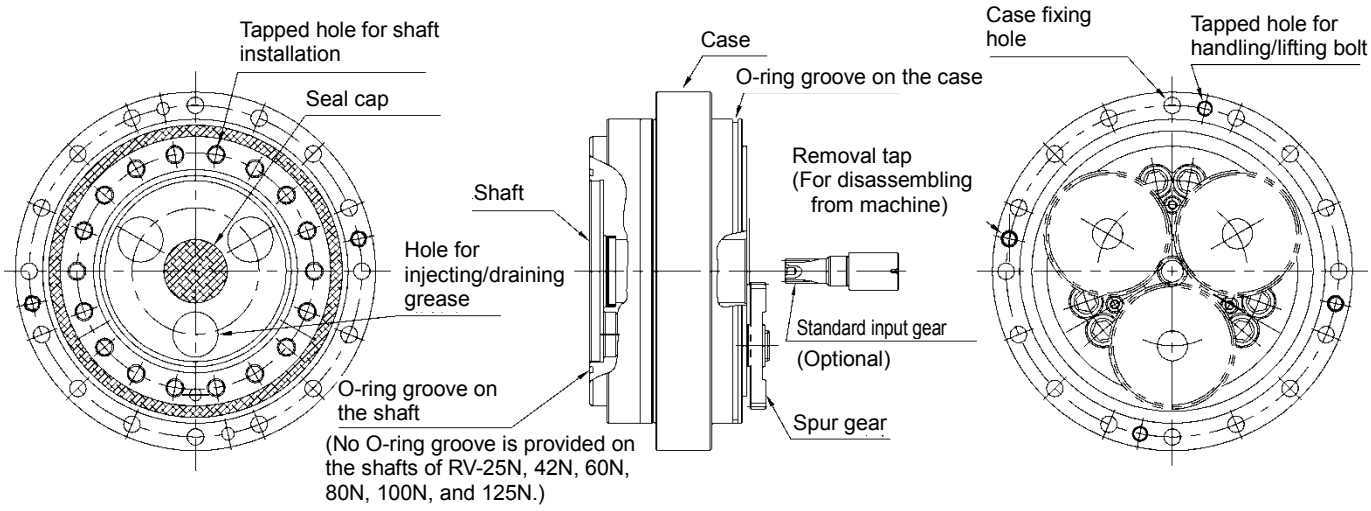


Fig. 2-1

Important

- The shape of the reduction gear may differ from the illustration below depending on the ordered specifications.

2.2. Parts codes of catalog products

The parts codes are assigned as follows for the N series catalog products.

For detailed specifications of those products not included in the catalog, refer to the separately provided "External dimensions" drawings and specification sheet. If anything is unclear, refer to our contact information.

<Parts codes of catalog products>

Example) P40AN001B00, P40AN001D00

The third digit from the end of the parts number ("B" or "D") indicates a catalog product.
Any other codes indicate products not included in the catalog.
For the parts number, check "Parts number" indicated on the shipping label of the product (Fig. 4-4).

Note: The last two digits of the parts code, are within the range from 00 to 99 ("00" in the above parts code), indicate the revision code.

Chapter 3 Transportation and Storage of Product

This chapter describes the transportation and storage of this product.

3.1. Transportation

- Transport the product in an appropriate manner according to the weights indicated in the separately provided "External dimensions" drawings and specifications.
- If the reduction gear needs to be lifted after unpacking, also refer to "4.4 Lifting of this product".
- For the catalog products described in "2.2. Parts codes of catalog products", refer to the weights of the reduction gears listed in Table 3-1.
- Do not stack the packing boxes containing this product too high.
- Avoid excessive impact or vibration of the reduction gear.

Table 3-1

Model	Weight (kg)	Model	Weight (kg)
RV-25N	3.8	RV-125N	13.9
RV-42N	6.3	RV-160N	22.1
RV-60N	8.9	RV-380N	44
RV-80N	9.3	RV-500N	57.2
RV-100N	13.0	RV-700N	102

WARNING

- If the packing boxes containing the reduction gear are stacked too high during transportation, they may collapse and fall down, and cause injury or damage to the reduction gear.

Note

- Applying excessive impact or vibration to the reduction gear could cause damage to the reduction gear.

Important

- Each weight listed in the above table, as well as in the separately provided "External dimensions" drawings and specification sheet, indicates the weight of the reduction gear only. It does not include the weight of the packing box or optional parts, etc.
- The actual weight of the reduction gear may slightly differ from that listed in the above table, depending on the specifications.

3.2. Storage

To avoid rust, corrosion, or deterioration of the sealing material, etc., and collapse of stored packing boxes, store the product in the following location.

- Location where the ambient temperature is between -10°C to 40°C
- Location where the humidity is less than 85% and no condensation occurs
- Location that is not directly affected by wind and rain
- Location that is free from combustible/volatile/corrosive gas or dust.
- Stable location that is free from any danger of collapse
- Location with little vibration

WARNING

- When storing the reduction gears, do not stack too many packing boxes. They may collapse and fall down, causing injury or damage to the reduction gear.

Note

- Store the reduction gear under the same conditions as those before unpacking. If it is left upside down, it could cause damage to the reduction gear.
- Although the reduction gear is coated with rust prevention oil before shipping, it is not designed for long-term storage. If it is stored for a long period, check the condition of the reduction gear periodically and perform rust prevention treatment as necessary. If rust occurs, it could cause the leakage of lubricant or premature damage to the reduction gear.
- If the reduction gear is used or operated after it has not been used for a long period of time, confirm that it is free from rust or corrosion and that the sealing material is free from deformation or cracks beforehand. If the reduction gear is used without checking these points, it could cause the leakage of lubricant or premature damage to the reduction gear.

Chapter 4 Preparations for Installation

This chapter describes the preparation for installing this product.

Before designing the equipment, take care regarding the following precautions.

- When the reduction gear is used for human transportation equipment, install an effective safety unit as a fail-safe mechanism, in case of an unexpected failure in the reduction gear.
- When the reduction gear is used for elevating equipment, install an effective safety unit for preventing falls caused by idle running as a fail-safe mechanism, in case of an unexpected failure in the reduction gear.
- Install an oil receiver, etc., to prevent damage in case of lubricant leakage due to a failure or lifetime expiration.
- As this product may have residual rust prevention agent coated on it before shipping, wipe it off as necessary.

DANGER

- When the reduction gear is used for human transportation equipment, install an effective safety unit as a fail-safe mechanism, in case of an unexpected failure in the reduction gear. If you fail to install it, it could cause injury in case the equipment goes out of control or falls off.
- When the reduction gear is used for elevating equipment, install an effective safety unit for preventing falls caused by idle running as a fail-safe mechanism, in case of an unexpected failure in the reduction gear. If you fail to install it, it could cause injury in case the elevating unit falls off.

4.1. Installation environment

Use this product under the following environment:

- Location where the ambient temperature is between -10°C to 40°C
- Location where the humidity is less than 85% and no condensation occurs
- Location where the altitude is less than 1,000 m
- Well-ventilated location

Do not install the reduction gear at the following locations.

- Location where a lot of dust is collected
- Outdoors that can be directly affected by wind and rain
- Location near the environment that contains combustible/explosive/corrosive gases and flammable materials
- Location where the magnetic fields or vibration occur

Important

- If the required installation environment cannot be established / met, refer to our contact information in advance.
- When using this product under special conditions (clean room, equipment for food, medical equipment, concentrated alkali, high-pressure steam, etc.), refer to our contact information in advance.

4.2. Preparation of required components

- The following components and materials are required for installing this product. Check the components/materials and prepare them at each customer's site.
- If the shape of the actual section differs from the illustration below, refer to the separately provided "Outer dimensions" drawings and specification sheet.
- Prepare the input gear, motor mounting flange, case installation component, and shaft installation component that have been designed and manufactured based on the separately provided "External dimensions" drawings, specification sheet, and catalog.

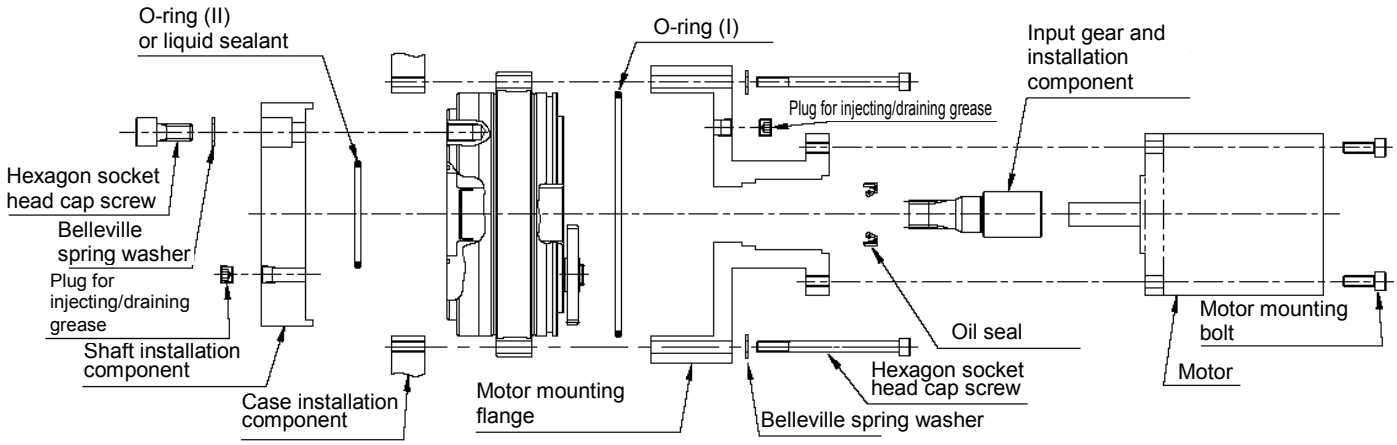


Fig. 4-1

Important

- If O-ring (II) and high-torque seal washer cannot be used, use the liquid sealants.
- The actual components may differ from the required components shown in the above illustration, depending on the customer's equipment.

4.2.1. Input gear

- Prepare the input gear for motor rotation into the reduction gear. For the design of the input gear, refer to “Appendix: Design Scheme of Input Gear”.

WARNING

- The prepared gear teeth must meet the specifications and materials described in “Appendix: Design Scheme of Input Gear”. An operation error due to damage or wear of the gear teeth could cause injury.

Note

- If the input gear has an oil sealing surface, take extra care so that no scratch will be made on the oil sealing surface when handling the input gear. Any scratches could cause the leakage of lubricant.
- Take extra care so that no scratch will be made on the gear tooth section when handling the input gear. Any scratches could cause abnormal noise.

Important

- The customer is requested to prepare the oil seals used for sealing the circumference of the input gear.
- The standard input gear, which is an optional component, is not provided with installation components such as bolts and keys. Prepare them as necessary at each customer’s site.

4.2.2. Flange and its installation components

- **Motor mounting flange**

• Prepare the motor mounting flange for fixing the motor on the reduction gear input side.

• In order to avoid contact with reduction gear components, refer to the sizes indicated in the “External dimensions” drawings when designing the motor mounting flange.

• Confirm that a tapped hole for injecting/draining grease is installed in the motor mounting flange. It will be necessary for filling or replacing the lubricant after installing the reduction gear.

• Design the motor mounting flange to the following accuracy. If the installation accuracy is poor, it will result in vibration, noise, and increase in backlash. If a model other than those listed below is used, refer to our contact information.

<Installation accuracy>

Table 4-1

Model	Concentricity tolerance a (mm)	Model	Concentricity tolerance a (mm)
RV-25N	MAX ϕ 0.03	RV-125N	MAX ϕ 0.03
RV-42N	MAX ϕ 0.03	RV-160N	MAX ϕ 0.03
RV-60N	MAX ϕ 0.03	RV-380N	MAX ϕ 0.05
RV-80N	MAX ϕ 0.03	RV-500N	MAX ϕ 0.05
RV-100N	MAX ϕ 0.03	RV-700N	MAX ϕ 0.05

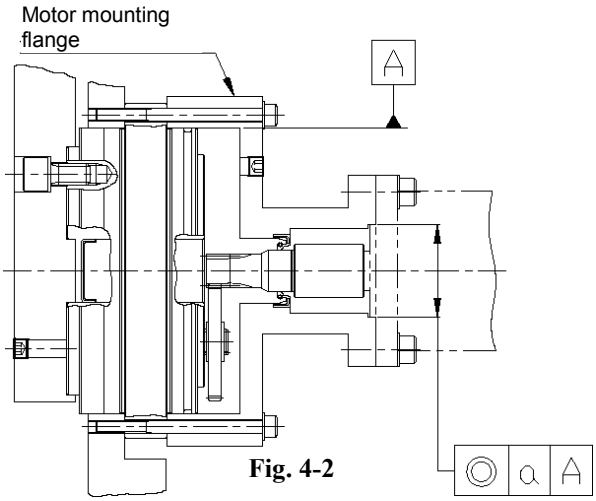


Fig. 4-2

CAUTION

- Confirm that the design of the prepared motor mounting flange conforms to the size and quantity of the case mounting bolts indicated in the separately provided “External dimensions” drawings and specification sheet. For the catalog products described in “2.2. Parts codes of catalog products”, refer to the size and quantity of the bolts listed in Table 4-2 in “4.2.3 Reduction gear mounting bolts”.
- If no tapped hole for injecting/draining grease is installed in the motor mounting flange, the lubricant cannot be filled/replaced after installing the reduction gear.

● Case installation component

Prepare the case installation component for the reduction gear. The component can also be embedded in the motor mounting flange.

CAUTION

- Confirm that the design of the prepared case installation component conforms to the size and quantity of the case mounting bolts indicated in the separately provided “External dimensions” drawings and specification sheet. For the catalog products described in “2.2. Parts codes of catalog products”, refer to the size and quantity of the bolts listed in Table 4-2 in “4.2.3 Reduction gear mounting bolts”.

● Shaft installation component

- Prepare the installation component for the output shaft of the reduction gear.
- Confirm that the component is structured so that the lubricant can be sealed with an O-ring or liquid sealant.
- Confirm that a tapped hole for injecting/draining grease is installed in the shaft installation component. It will be necessary for filling or replacing the lubricant after installing the reduction gear.

CAUTION

- Confirm that the design of the prepared shaft installation component conforms to the size and quantity of the shaft mounting bolts indicated in the separately provided “External dimensions” drawings and specification sheet. For the catalog products described in “2.2. Parts codes of catalog products”, refer to the size and quantity of the bolts listed in Table 4-3 in “4.2.3 Reduction gear mounting bolts”.
- If no tapped hole for injecting/draining grease is installed in the shaft installation component, the lubricant cannot be filled/replaced after installing the reduction gear.

4.2.3. Reduction gear installation bolts

- Prepare bolts according to the size and quantity of the motor mounting flange, case installation bolts and shaft installation bolts indicated in the separately provided “External dimensions” drawings and specification sheet.
- For the catalog products described in “2.2. Parts codes of catalog products”, refer to the size and quantity of the bolts listed in Table 4-2 and Table 4-3.
- Select the appropriate bolt length based on the mounting dimensions of the components prepared by the customer and the reduction gear.
- Prepare the following bolts recommended by Nabtesco:

Hexagon socket head cap screw	JIS B 1176: 2006
Strength class	JIS B 1051: 2000 12.9
Thread	JIS B 0209: 2001 6 g

For motor mounting flange and case installation component

Table 4-2

Model	Nominal size × pitch (mm)	Required Qty.
RV-25N	M5 × 0.8	16
RV-42N	M6 × 1.0	16
RV-60N	M6 × 1.0	20
RV-80N	M8 × 1.25	16
RV-100N	M8 × 1.25	18
RV-125N	M10 × 1.5	16
RV-160N	M10 × 1.5	16
RV-380N	M12 × 1.75	24
RV-500N	M12 × 1.75	28
RV-700N	M12 × 1.75	32

For shaft installation component

Table 4-3

Model	Nominal size × pitch (mm)	Required Qty.
RV-25N	M6 × 1.0 M10 × 1.5	3 6
RV-42N	M10 × 1.5	9
RV-60N	M8 × 1.25	23
RV-80N	M8 × 1.25	24
RV-100N	M10 × 1.5	21
RV-125N	M10 × 1.5	21
RV-160N	M12 × 1.75	18
RV-380N	M12 × 1.75	33
RV-500N	M12 × 1.75	33
RV-700N	M16 × 2.0	26

4.2.4. Serrated lock washer for hexagon socket head cap screw

Prepare the following Serrated lock washer for a hexagon socket head cap screw recommended by Nabtesco.

Name: Belleville spring washer (made by Heiwa Hatsujyo Industry Co., Ltd.)
Corporation symbol: CDW-H, CDW-L (Only for M5)
Material: S50C to S70C
Hardness: HRC40 to 48

Table 4-4

(Unit: mm)

Nominal size	ID and OD of Belleville spring washer		t	H
	ød	øD		
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
18	18.9	27	2.6	3.15
20	20.9	30	2.8	3.55

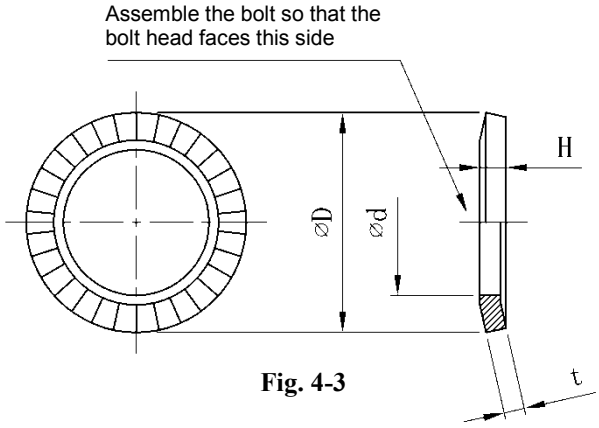


Fig. 4-3

Important

- When using any equivalent washer, select it with special care given to its outside diameter (D).

4.2.5. O-rings

Use the O-rings indicated in the separately provided “External dimensions” drawings and specification sheet. If there is no indication, select the size of the O-ring appropriate for the surface to be sealed.

For the catalog products described in “2.2. Parts codes of catalog products”, prepare the O-rings with the numbers listed in Table 4-5 and Table 4-6.

Note

- If it is difficult to purchase the O-rings in the table below, select an O-ring based on the design standard of each manufacturer by referring to the listed dimensions. Selecting an inappropriate O-ring could cause leakage of the lubricant.

● O-ring (I)

Prepare an O-ring (I) for sealing the installation section of the reduction gear and motor mounting flange. The O-rings applicable to the O-ring (I) for the catalog products described in “2.2 Parts codes of catalog products” are listed in the table below. If an O-ring cannot be used due to the structure, seal the section using a liquid sealant, etc.

(Reference: “4.2.6 Liquid sealant”)

O-ring (I) JIS B 2401: 2012, SAE AS568

Table 4-5

(Unit: mm)

Model	O-ring number	O-ring dimensions	
		Inside diameter	Width
RV-25N	S110*	ø109.5	ø2.0
RV-42N	AS568-159	ø126.67	ø2.62
RV-60N	AS568-258	ø151.99	ø3.53
RV-80N	AS568-258	ø151.99	ø3.53
RV-100N	AS568-166	ø171.12	ø2.62

(Unit: mm)

Model	O-ring number	O-ring dimensions	
		Inside diameter	Width
RV-125N	AS568-167	ø177.47	ø2.62
RV-160N	AS568-170	ø196.52	ø2.62
RV-380N	AS568-272	ø240.89	ø3.53
RV-500N	AS568-275	ø266.29	ø3.53
RV-700N	G340	ø339.3	ø5.7

* S110 is the manufacturer’s own standard.

● O-ring (II)

Prepare an O-ring (II) for sealing the mounting surface of the reduction gear and shaft installation component. The O-rings applicable to the O-ring (II) for the catalog products described in “2.2 Parts codes of catalog products” are listed in the table below. If an O-ring cannot be used due to the model and the structure, seal the section using a liquid sealant, etc.

(Reference: “4.2.6 Liquid sealant”)

<For RV-160N, 380N, 500N and 700N models>

O-ring (II) JIS B 2401: 2012

Table 4-6

(Unit: mm)

Model	O-ring number	O-ring dimensions	
		Inside diameter	Width
RV-160N	G130	ø129.4	ø3.1
RV-380N	G145	ø144.4	ø3.1
RV-500N	G185	ø184.3	ø5.7
RV-700N	G200	ø199.3	ø5.7

4.2.6. Liquid sealant

When sealing the shaft mounting surface of the reduction gear and shaft installation component using liquid sealants, prepare the following liquid sealants recommended by Nabtesco.

Table 4-7

Brand specified by Nabtesco	Manufacturer	Characteristics and applications
ThreeBond 1211	ThreeBond	• Silicone-based, solventless type • Semi-dry gasket
HermeSeal SS-60F	Nihon Hermetics Co.	• One-part, non-solvent elastic sealant • Metal contact side (flange surface) seal • Any product basically equivalent to ThreeBond 1211
Loctite 515	Henkel	• Anaerobic flange sealant • Metal contact side (flange surface) seal

Note

- Do not use the above liquid sealants if the component of the customer's device is made of copper or copper alloy.

4.2.7. Lubricant

- Prepare the Nabtesco-specified lubricant. For purchase of the lubricant, refer to our contact information.
- Do not mix it with other lubricants.

Table 4-8

Brand	VIGOGREASE* RE0
Operating temperature range (ambient temperature)	-10 to 40°C

* VIGOGREASE is registered trademark of Nabtesco Corporation.

Note

- In order to take advantage of the performance of this product, use the Nabtesco-specified lubricant. Using other types of lubricant could cause deterioration of performance and premature damage.
- Mixing with other lubricants could cause deterioration of performance, generation of abnormal noise, and premature damage.

4.2.8. Plug for injecting/draining grease

Prepare a plug for injecting/draining grease used for the motor mounting flange and shaft installation component. Also prepare seal tapes and other necessary items.

4.3. Unpacking

Check the following points when unpacking.

- Before using this product, check the contents of the packing box and confirm that all the ordered items are included.
- Check the top and bottom direction of the packing box and unpack it.

CAUTION

- When transporting the reduction gear, take extra care so that it will not fall down or topple over. It could cause injury to the workers or damage to the reduction gear.
- Before using this product, check the contents of the packing box and confirm that all the ordered items are included. If an incorrect part is installed, it could cause injury to the workers or damage to the customer's device and the reduction gear.

Note

- If the packing box is left upside down, it could cause damage to the reduction gear.
- When unpacking, the internal parts of the reduction gear remain exposed. Take extra care so that no foreign matter adheres to the reduction gear when it is installed in the customer's equipment and filled with lubricant. If foreign matter adheres, it may lead to deterioration of reduction gear performance and also to deterioration of durability or premature damage.

Important

- The reduction gear is coated with rust prevention oil before shipping. Therefore, if it is used as it is, the rust prevention oil could ooze from the bolt hole or flange mating face during operation. In addition, the rust prevention oil makes the reduction gear slippery. Wipe it off as necessary before use.

4.3.1. Checking the shipping label

Check the shipping label to confirm that it matches the product you have ordered.

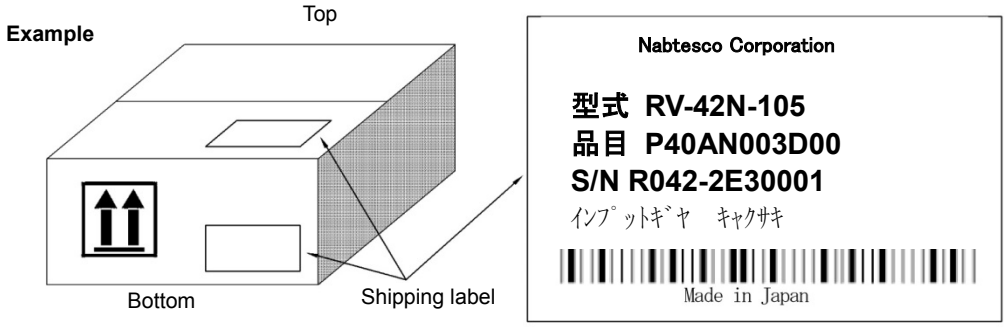


Fig. 4-4

Important

- When inquiring about this product, the model, parts name, and S/N (serial number) indicated on the shipping label are needed. Write them down when unpacking and keep them for cases in which they are needed.

4.3.2. Checking the contents

Confirm that the contents of the packing box match the items in the illustration below when unpacking.

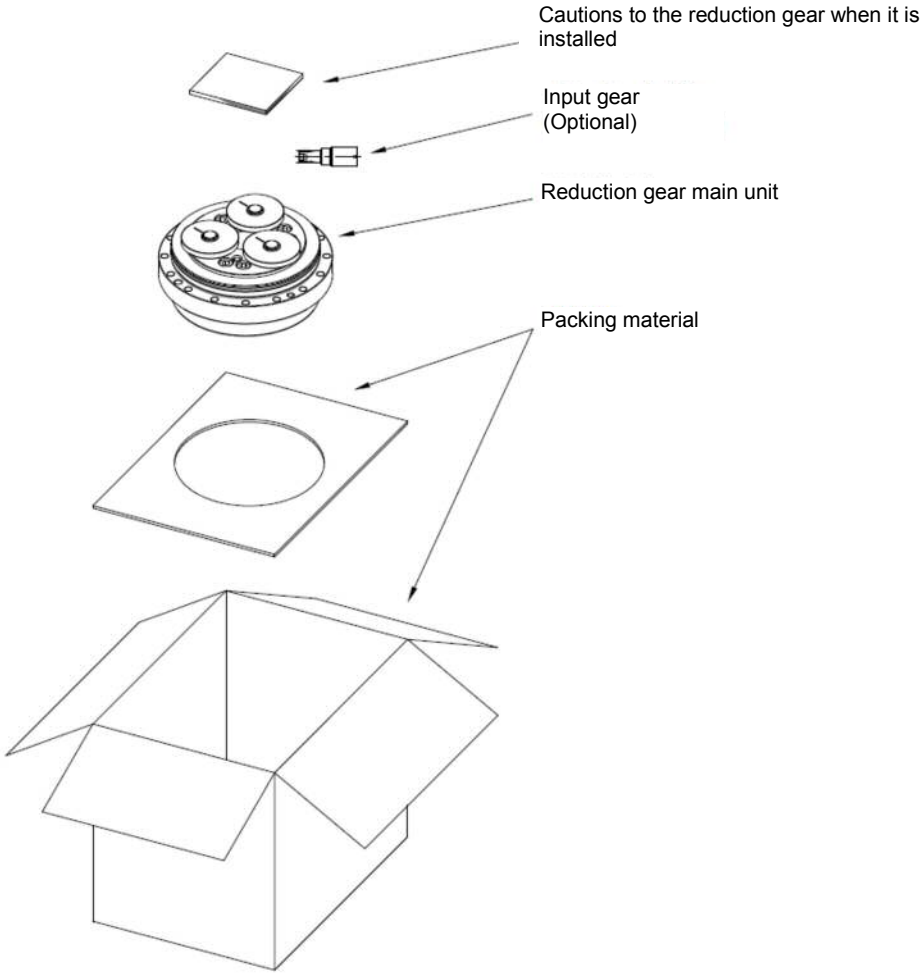


Fig. 4-5

Important

- The contents of the packing box and shape of the reduction gear may differ from the illustration above depending on the ordered specifications.
- The input gear is optional.

4.4. Lifting of this product

- When lifting the product, use the tap holes for the handling/lifting bolts described in the separately provided "External dimensions" drawings and specifications.
- Do not enter the area under the reduction gear when lifting the reduction gear.
- When lifting the reduction gear, be sure to use a lifter that can withstand the weight of the reduction gear.
- For the weights of the catalog products described in "2.2. Parts codes of catalog products", refer to the separately provided "External dimensions" drawings and specification sheet.
- For the catalog products described in "2.2. Parts codes of catalog products", use the following handling/lifting bolts.

Table 4-9

Model	Hanging bolt Nominal size × pitch (mm)	Qty.	Weight (kg)
RV-25N	M5 × 0.8	2	3.8
RV-42N	M6 × 1.0	2	6.3
RV-60N	M6 × 1.0	2	8.9
RV-80N	M8 × 1.25	2	9.3
RV-100N	M8 × 1.25	2	13.0
RV-125N	M10 × 1.5	2	13.9
RV-160N	M10 × 1.5	2	22.1
RV-380N	M10 × 1.5	2	44
RV-500N	M8 × 1.25	2	57.2
RV-700N	M12 × 1.75	2	102

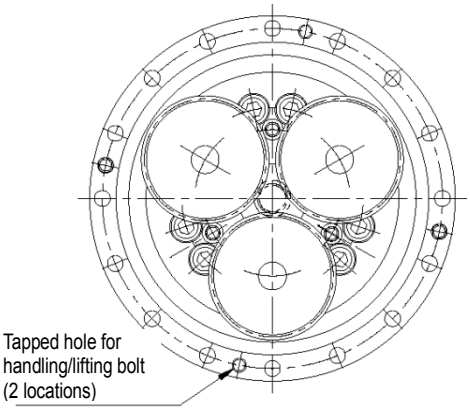


Fig. 4-6

WARNING

- Do not enter the area under the reduction gear when lifting the reduction gear. If the reduction gear falls down, it could cause injury.
- When lifting the reduction gear, be sure to use a lifter that can withstand the weight of the reduction gear. Otherwise, the lifter is will be damaged, and the reduction gear could fall down and topple over, which may result in injury.
- The actual weight of the reduction gear may slightly differ from that listed in the above table, depending on the specifications.

Chapter 5 Installation

This chapter describes the installation of this product.
Before installation, take care regarding the following precautions.

- Do not stand on top of the reduction gear or put anything on it.
- Be sure to install the reduction gear with the correct orientation.

Note

- Standing on top of the reduction gear or putting something on it could cause damage to the reduction gear.
- Installing the reduction gear with an incorrect orientation could cause damage to the customer's device and the reduction gear.

5.1. Bolt tightening torque

- Use the Nabtesco-recommended bolts for installing the reduction gear and tighten them with the specified tightening torque.
- Use the serrated lock washer for a hexagon socket head cap screw to prevent the bolt from loosening and protect the bolt seat surface from flaws.

(Reference: "4.2.3 Reduction gear installation bolts" and "4.2.4 Serrated lock washer for hexagon socket head cap screw")

The following are the bolt tightening torques specified by Nabtesco. Be sure to check the following when tightening the bolts.

Table 5-1

Nominal size × pitch (mm)	Tightening torque* (Nm)	Tightening force (N)
M5 × 0.8	9.01 ± 0.49	9,310
M6 × 1.0	15.6 ± 0.78	13,180
M8 × 1.25	37.2 ± 1.86	23,960
M10 × 1.5	73.5 ± 3.43	38,080
M12 × 1.75	129 ± 6.37	55,100
M14 × 2.0	205 ± 10.2	75,860
M16 × 2.0	319 ± 15.9	103,410
M18 × 2.5	441 ± 22.0	126,720
M20 × 2.5	493 ± 24.6	132,170

* The tightening torque values listed are for steel or cast iron material.

Important

- If softer material, such as aluminum or stainless steel, is used, limit the tightening torque. When tightening the bolt with the limited torque, confirm that there is no strength problem by taking the transmission torque and load moment into due consideration.

5.2. Installation work

Important

- The installation procedure may differ from the contents of this manual, depending on the shape of the components designed by the customer.

5.2.1. Installing the reduction gear

The following describes the installation of the reduction gear.
Perform steps 1 to 7 by taking care regarding the following precautions.

- The reduction gear is coated with rust prevention oil before shipping. Wipe off the rust prevention oil as necessary during installation. In particular, be sure to wipe it off from the mounting surface and bolt seat surface.

Step 1 Align the case mounting holes of the reduction gear with the positions of the tapped holes for the case installation component, and then attach the reduction gear to the case installation component.

- Confirm that the centering location of the reduction gear (case section) is correctly fitted into the centering location of the case installation component.
- Check that there is no foreign matter adhering to the mounting surface.

Note

- If there is foreign matter adhering to the mounting surface, the mounting surface of the reduction gear may be deformed, which could cause deterioration of performance and durability.
- The shape of the reduction gear may differ from the illustration below depending on the ordered specifications.

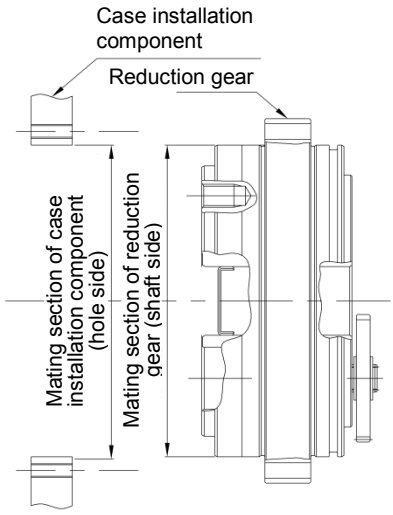


Fig. 5-1

Step 2 Insert the O-ring (I) into the groove on the case for the reduction gear.
(Reference: “4.2.5 O-rings”)

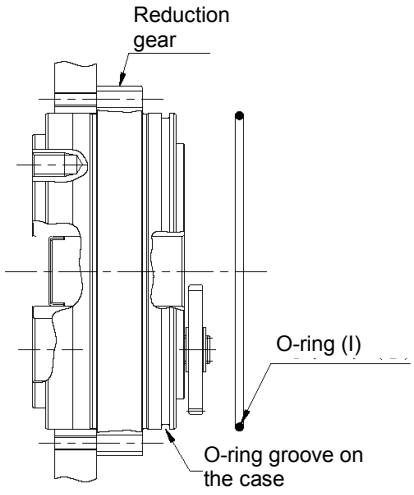


Fig. 5-2

Note

- Some reduction gear may not have O-rings (I) groove, depending on the ordered specifications. In such a case, prepare a groove on the customer’s component, or seal the area with a liquid sealant indicated in “4.2.6 Liquid sealant”.
- When a liquid sealant is used, take extra care so that it will not leak into the reduction gear. If it leaks into the reduction gear, it could cause deterioration of performance, such as abnormal noise, vibration, and torque irregularity. Also, if the liquid sealant adheres to the lip of the oil seal, it could cause leakage of the lubricant.
- When a liquid sealant is used, take extra care so that it will not leak into the case installation bolt section. It could deteriorate the bolt tightening force, and could result in deterioration of the transmission torque.
- When a liquid sealant is used, follow the instructions of the detailed coating method given by the manufacturer of the sealant to be used.

Step 3 Align the mounting holes of the motor mounting flange with the mounting holes of the reduction gear (case section) and positions of the tapped holes for the case installation component, and then attach the motor mounting flange to the reduction gear.

- Take extra care so that the O-ring is not caught by the mating section.
- Confirm that the centering location of the reduction gear (case section) is correctly fitted into the mating hole of the motor mounting flange.
- Check that there is no foreign matter adhering to the mounting surface.

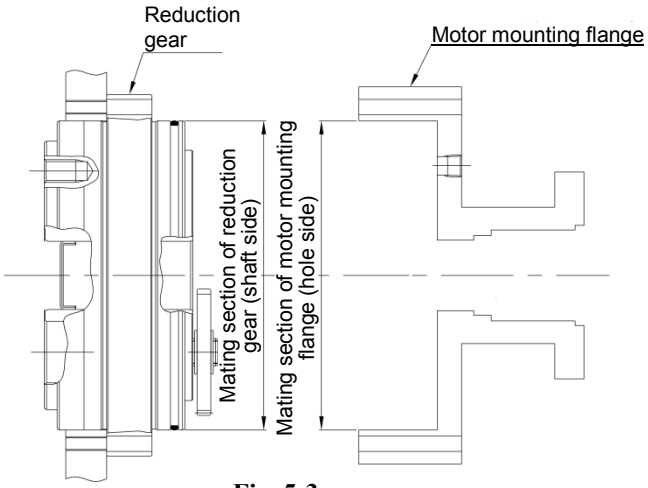


Fig. 5-3

Note

- If the O-ring is caught by the mating section, it could cause leakage of the lubricant.
- If there is foreign matter adhering to the mounting surface, the mounting surface of the reduction gear may be deformed, which could cause deterioration of performance and durability.
- The shape of the motor mounting flange may differ from the illustration above, depending on the customer's equipment or shape of the reduction gear.

Step 4 Using the hexagonal socket head cap screw and serrated lock washer for a hexagon socket head cap screw, tighten each component.

- Be sure to tighten the specified number of hexagonal socket head cap screws with the specified tightening torque.
  (Reference: "4.2.3. Reduction gear mounting bolts", "4.2.4. Serrated lock washer for hexagon socket head cap screw", and "5.1. Bolt tightening torque")

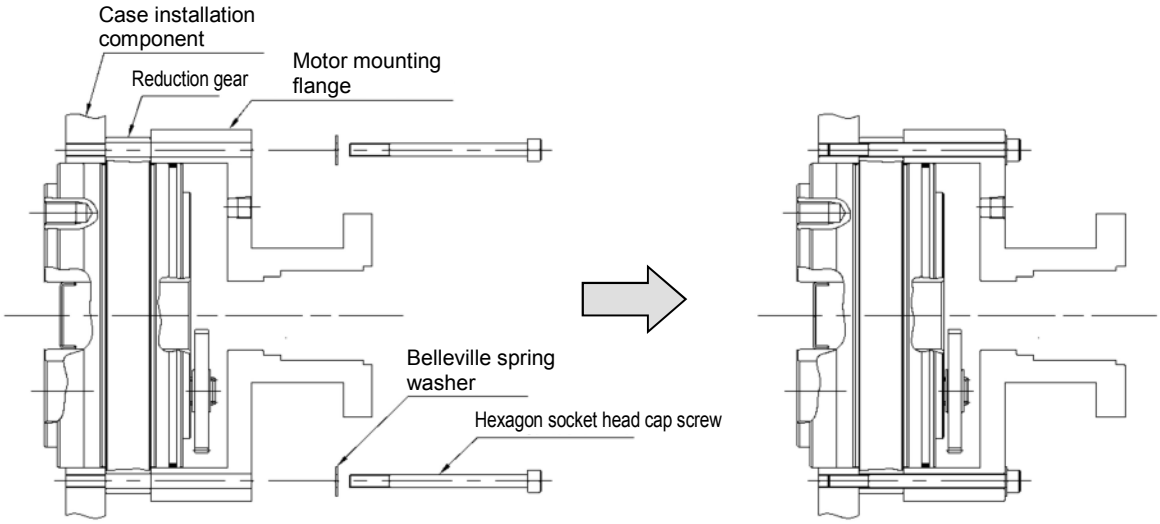


Fig. 5-4

CAUTION

- If the hexagonal socket head cap screw is not tightened with the specified torque, the reduction gear does not deliver the designed performance. In addition, it could cause injury and damage to the customer's device and the reduction gear.

Step 5 Attach the O-ring to the shaft mounting surface of the reduction gear.

- If the model does not have an O-ring groove or an O-ring cannot be used due to its structure, seal the section by using a liquid sealant, etc.

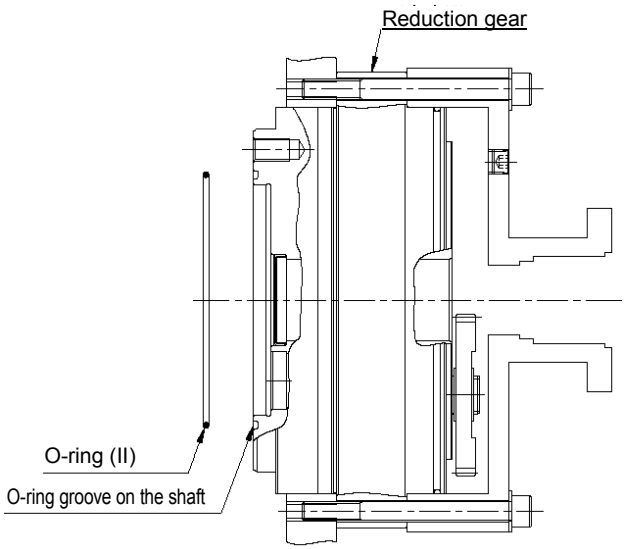


Fig. 5-5

● When sealing with an O-ring

- For models RV-160N, 380N, 500N, and 700N of the catalog products described in "2.2 Parts codes of catalog products", an O-ring groove is provided on the shaft mounting surface.
- When sealing the section with an O-ring, fit the O-ring into the groove at the shaft edge.

(Reference: "4.2.5 O-rings")

Note

- An O-ring (II) groove may also be provided on some products not included in the catalog. In such a case, attach the O-rings indicated in the separately provided "External dimensions" drawings and specification sheet.

● When sealing with a liquid sealant

- When sealing the section with a liquid sealant, coat the liquid sealant onto the ▨ section at the shaft edge. For the coating area, refer to the illustration on the right.
- Apply coating seamlessly in the coating area.
- Take extra care so that the liquid sealant will not leak into the reduction gear or mounting bolt section.
- For the detailed coating procedure, follow the instructions given by the manufacturer of the sealant to be used.

(Reference: "4.2.6 Liquid sealant")

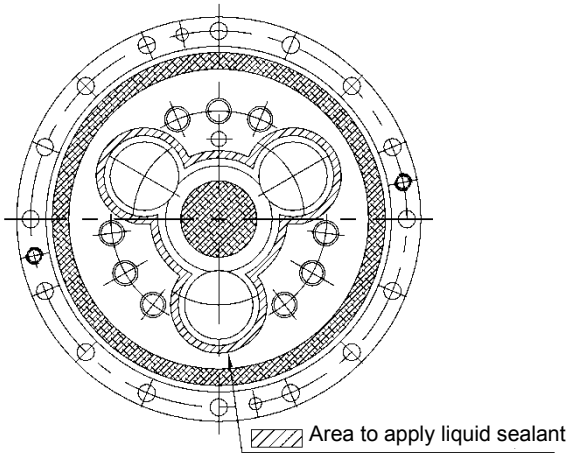


Fig. 5-6

Note

- If a coating is not applied at some points within the coating range, it could cause leakage of the lubricant.
- When a liquid sealant is used, if it leaks into the reduction gear, it could cause deterioration of performance, such as abnormal noise, vibration, and torque irregularity. Also, if the liquid sealant adheres to the lip of the oil seal, it could cause leakage of the lubricant.
- When a liquid sealant is used, if it leaks into the shaft mounting bolt section, it could deteriorate the bolt tightening force, and eventually result in deterioration of the transmission torque.

Step 6 Align the mounting holes of the shaft installation component with the positions of the tapped holes of the reduction gear (shaft section), and then attach the shaft mounting component to the reduction gear.

- When an O-ring is used, take extra care so that the O-ring is not caught by the mounting surface.
- Confirm that the centering location of the reduction gear (shaft section) is correctly fitted into the centering location of the shaft mounting flange.
- Check that there is no foreign matter adhering to the mounting surface.

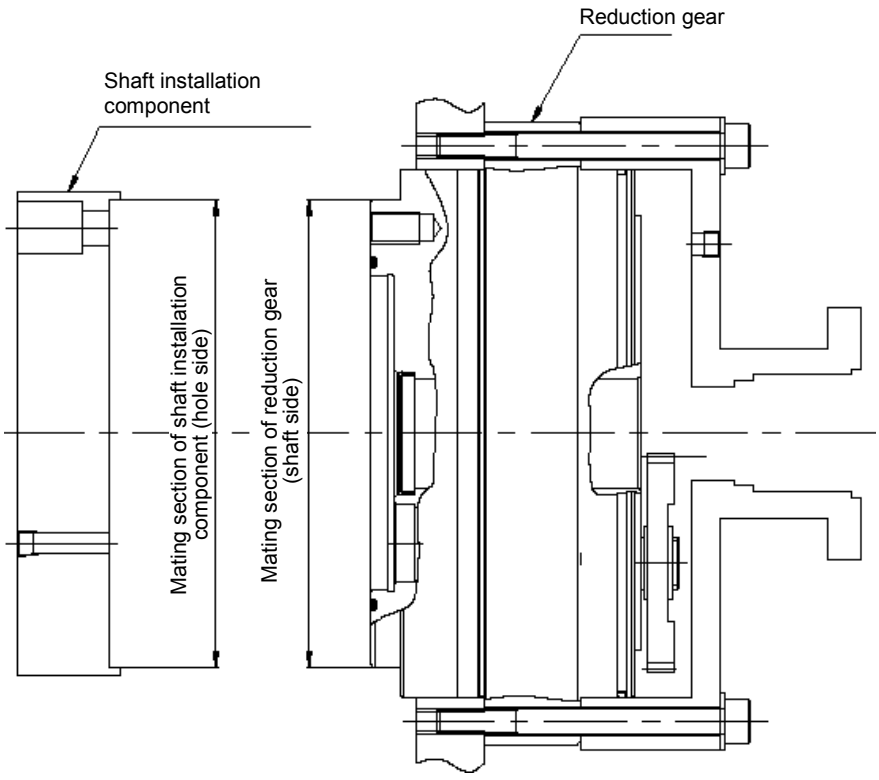


Fig. 5-7

Note

- If the O-ring is caught by the mating section, it could cause leakage of the lubricant.
- If there is foreign matter adhering to the mounting surface, the mounting surface of the reduction gear may be deformed, which could cause deterioration of performance and durability.
- The shape of the shaft installation component may differ from the illustration above, depending on the customer's equipment or shape of the reduction gear.

Step 7 Using the hexagonal socket head cap screw and serrated lock washer for a hexagon socket head cap screw, fix the shaft installation component to the reduction gear.

- Be sure to tighten the specified number of hexagonal socket head cap screws with the specified tightening torque.
  (Reference: "4.2.3. Reduction gear mounting bolts", "4.2.4. Serrated lock washer for hexagon socket head cap screw", and "5.1. Bolt tightening torque")

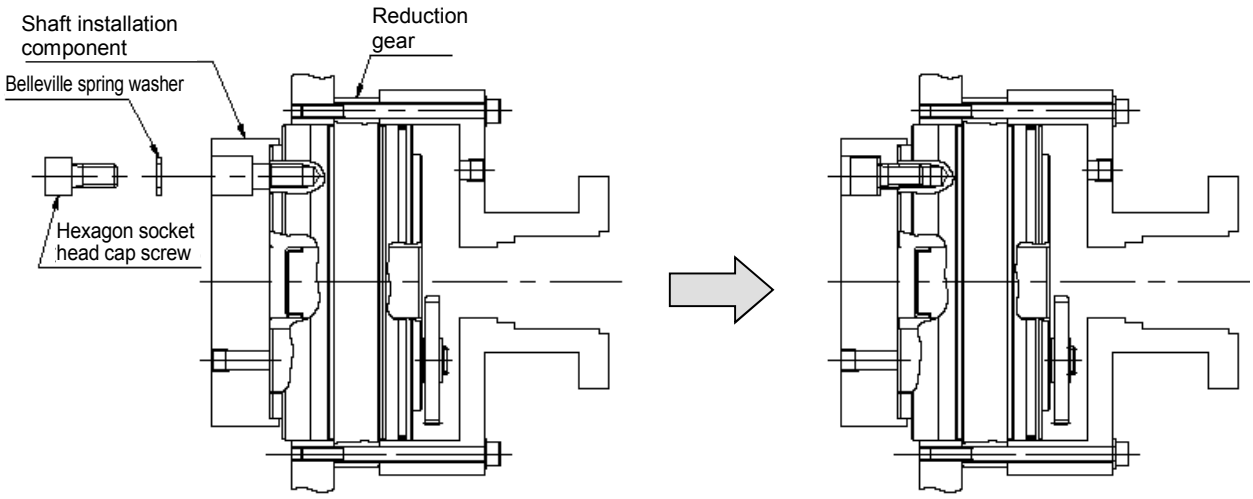


Fig. 5-8

CAUTION

- If the hexagonal socket head cap screw is not tightened with the specified torque, the reduction gear does not deliver the designed performance. In addition, it could cause injury and damage to the customer's device and the reduction gear.

5.2.2. Installing the input gear

● For straight shafts (attached to motor shaft tip)

The following is an example when fixing the input gear to the motor shaft using a bolt.

Perform steps 1 to 3 by taking care regarding the following precautions.

- Avoid impact to the motor shaft when attaching the input gear.
- The outer diameters of the bolt head and seal washer should be smaller than the root circle diameter of the input gear.

Note

- Avoid impact to the motor shaft when attaching the input gear, as it could damage the motor.
- If the outer diameters of the bolt head and seal washer are larger than the root circle diameter of the input gear, the bolt and seal washer will interfere with the spur gear, and therefore, the gear cannot be installed or could be damaged.

Step 1 Attach a key to the motor shaft.

Step 2 Attach the input gear to the motor shaft.

- Check that there is no foreign matter adhering to the mounting surface.

Note

- If foreign matter adheres to the mounting surface, appropriate installation accuracy cannot be obtained. It could lead to premature damage of the reduction gear or motor.

Step 3 Fix the input gear to the motor shaft using a hexagonal socket head cap screw.

Using a thread-locking sealant for screws, lock the hexagonal socket head cap screw.

Important

- If necessary, seal the area with a seal washer, etc.

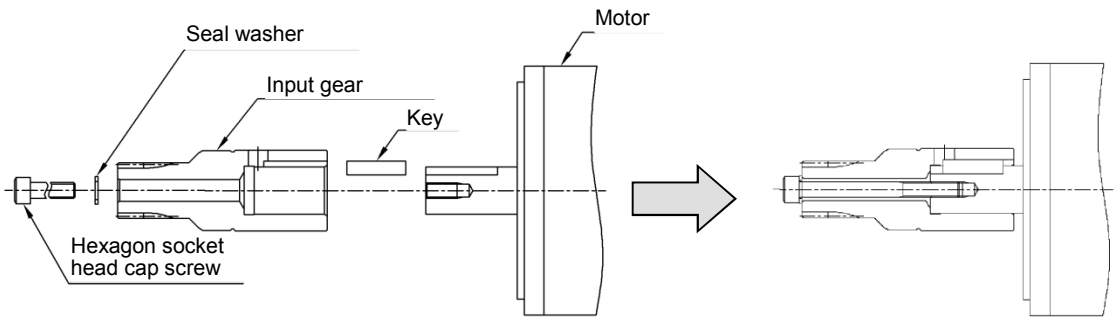


Fig. 5-9

For straight shafts (attached to motor shaft base)

The following is an example when fixing the input gear to the motor shaft using a set screw.

Perform steps 1 to 3 by taking care regarding the following precautions.

- Avoid impact to the motor shaft when attaching the input gear.
- Keep in mind that the mounting surface is clean, degreased and dry.

Note

- Avoid impact to the motor shaft when attaching the input gear, as it could damage the motor.
- If any particle adheres to the mounting surface, appropriate installation accuracy cannot be obtained. It could lead to premature damage of the reduction gear or motor.

Step 1 Attach a key to the motor shaft.

Step 2 Attach the input gear to the motor shaft.

Step 3 Tighten the input gear to the motor shaft using the set screw.

Using the locking agent for screws, lock the set screw.

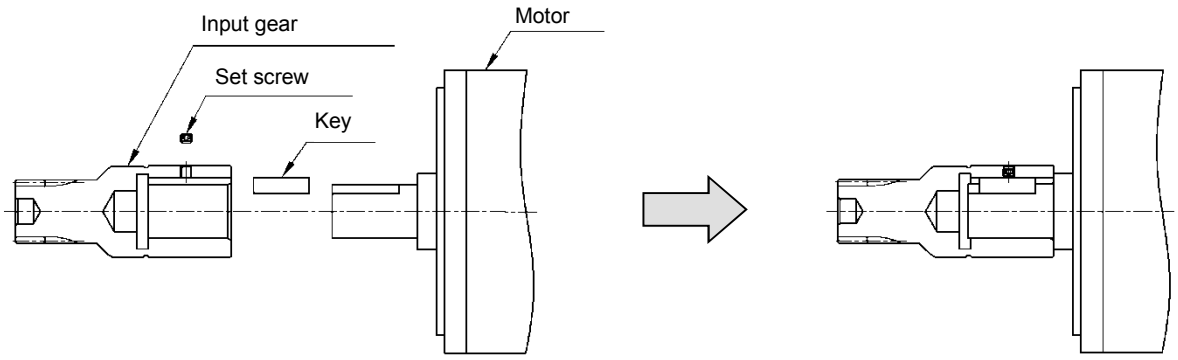


Fig. 5-10

Note

- If a thread-locking sealant is not used for the set screw, a clearance will be generated in the keyway, which could cause deterioration of performance, such as abnormal noise and vibration, and also lead to damage of the motor.

For tapered shafts

The following is an example when fixing the input gear to the motor shaft using a draw bolt and hexagonal nut.

Perform steps 1 to 4 by taking care regarding the following precautions.

- Avoid impact to the motor shaft when attaching the input gear.
- Check that there is no foreign matter adhering to the mounting surface.
- The outer diameters of the hexagonal nut and seal washer should be smaller than the root circle diameter of the input gear.

Note

- Avoid impact to the motor shaft when attaching the input gear, as it could damage the motor.
- If foreign matter adheres to the mounting surface, appropriate installation accuracy cannot be obtained. It could lead to premature damage of the reduction gear or motor.
- If the outer diameters of the hexagonal nut and seal washer are larger than the diameter of the teeth bottom of the input gear, the hexagonal nut and seal washer will interfere with the spur gear, and therefore, the gear cannot be installed or could be damaged.

Step 1 Attach the draw bolt to the motor shaft.

Step 2 Attach the Woodruff key to the motor shaft.

Step 3 Attach the input gear to the motor shaft.

Step 4 Tighten the hexagonal nut into the draw bolt.

Using a double nut and locking agent, etc., lock the hexagonal nut.

Important

- If necessary, seal the area with a seal washer, etc.

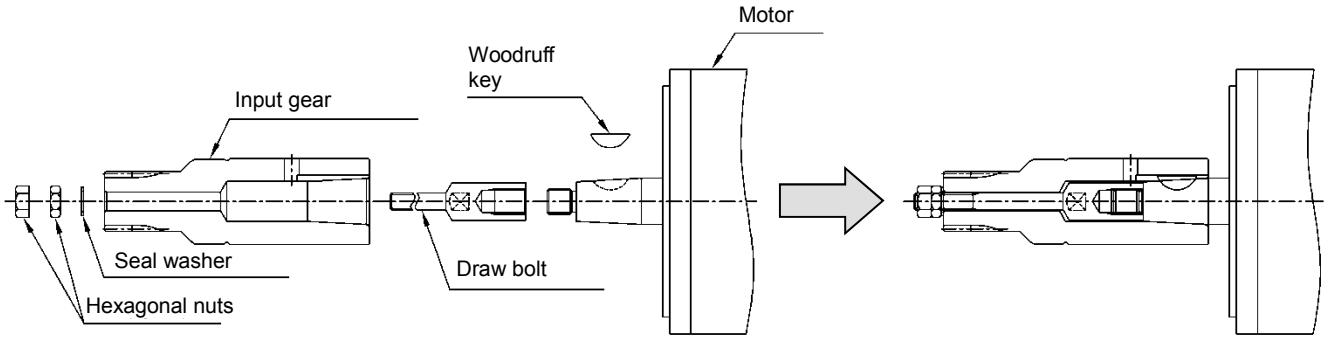


Fig. 5-11

5.2.3. Installing the motor

Install the motor with an attached input gear in the reduction gear already mounted with the motor mounting flange.

The following is an installation example when sealing the input gear with an oil seal.

Perform steps 1 to 3 by taking care regarding the following precautions.

Step 1 Attach an oil seal to the motor mounting flange.

Step 2 Install the input gear on to the motor shaft, and then directly insert the motor into the reduction gear.

- Do not forcibly press down on the motor.
- Take extra care so that the gear section of the input gear does not scratch the lip surface of the oil seal.
- Take extra care so that no scratch will be made on the gear section due to interference between the input gear and spur gear.

Note

- If the motor is forcibly pressed down, it could damage the input gear, spur gear, and motor.
- If the gear section of the input gear scratches the lip surface of the oil seal, it could cause leakage of the lubricant.
- If the gear section is scratched due to interference between the input gear and spur gear, it could cause abnormal noise.

Step 3 Using the hexagonal socket head cap screw, fix the motor to the motor mounting flange.

- Confirm that the centering location of the motor is correctly fitted into the centering location of the motor mounting flange.
- Check that there is no foreign matter adhering to the mounting surface.

Note

- If foreign matter adheres to the mounting surface, appropriate installation accuracy cannot be obtained. It could lead to premature damage of the reduction gear or motor.

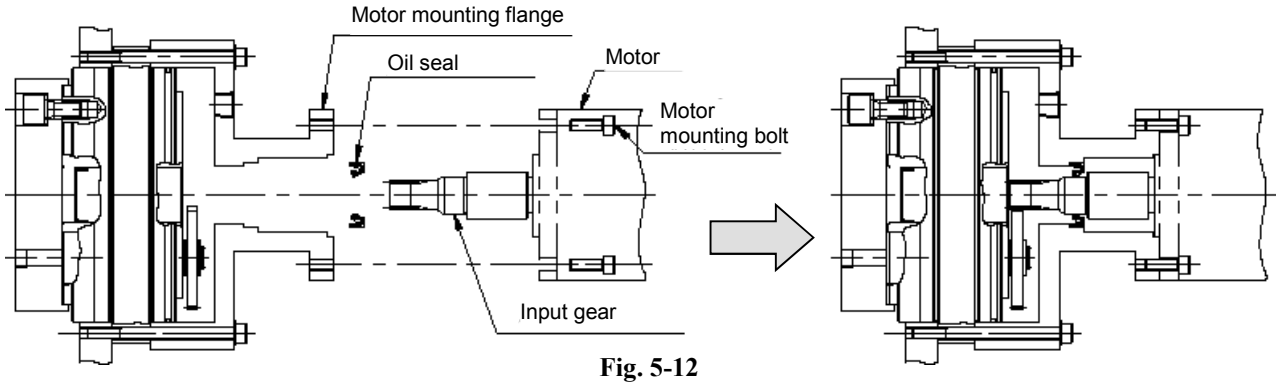


Fig. 5-12

Note: There are various ways to install the motor, depending on the shape of the reduction gear or customer's equipment. For the installation methods other than the above examples, check the "External dimensions" drawings and delivery specifications. If anything is unclear, refer to our contact information.

Chapter 6 Filling the Lubricant

This chapter describes the filling of lubricant.
Before filling the lubricant, take care regarding the following precautions.

- This product is not filled with lubricant when shipped from Nabtesco. Before operating the product, be sure to fill it with an appropriate amount of lubricant specified by Nabtesco.
- When pneumatic pressure is used for filling the lubricant, set the pressure below 0.03 MPa.
- Be sure to leave a space about 10% of the total volume to be filled with the lubricant.

Note

- If the internal pressure of the reduction gear increases, an oil seal could fall off or lubricant could leak.
- If overfilled, the temperature increases during operation and the internal pressure also increases. As a result, an oil seal could fall off or lubricant could leak.
- If the filling amount of the lubricant is insufficient, it could cause premature damage to the reduction gear.

6.1. Precautions when handling the lubricant

This section describes the precautions when handling lubricants.

⚠ CAUTION

- Before handling the lubricant, read the precautions described on the container of the lubricant and use it correctly. Improper use could impair your health.
- Wear protective goggles to protect your eyes from the lubricant. If it gets into your eyes, it could cause inflammation.
- Wear rubber gloves to protect your skin from the lubricant. If it touches your skin, it could cause inflammation.
- Do not eat or put the lubricant into your mouth. If it gets into your mouth, it could cause diarrhea or vomiting.

Important

- If anything is unclear, refer to the Safety Data Sheet. If it is not available, refer to our contact information.

Emergency remedy

- If the lubricant gets into your eyes, rinse your eyes with clean water for 15 minutes and consult a physician.
- If the lubricant contacts the skin, wipe it off completely and thoroughly rinse the affected area with water and soap.
- If the lubricant is inhaled, move to a fresh air location and cover your body with a blanket to keep yourself warm and calm. Then, consult a physician.
- If the lubricant is swallowed, do not force yourself to vomit and consult a physician.

Disposal of waste grease and container

- It is required by law to dispose of the grease and container in the specified manner. Dispose of the grease and container appropriately according to the law.
- If anything is unclear, check the disposal precautions described in the Safety Data Sheet or refer to our contact information.

Storage

- To prevent particles and moisture from being mixed into the container, seal it tightly.
- Keep it away from the direct sunlight, fire, and heat sources, and store it in a cool and dark place.

6.2. Reduction gear mounting direction and amount of lubricant

The amount of lubricant the reduction gear requires will differ according to the direction in which the gear is installed. The amount of lubricant required and the target range (the ■ areas in the diagram) for each mounting direction of the catalog products described in "2.2 Parts codes of catalog products" are indicated below. Set the amount of lubricant according to the customer's installation environment based on this information.

6.2.1. Horizontal shaft installation

The amount of lubricant the reduction gear requires and the target range (the ■ areas in the diagram) when the reduction gear is installed in the horizontal shaft are indicated below. Each amount does not include the space (the ▨ areas in the diagram) on the motor mounting side. Therefore, if there is a blank space, also fill the space. Leave a space about 10% of the total volume of the "internal capacity of the reduction gear" (the ▨ areas in the diagram) and the "space for the installation component" (the ■ areas in the diagram). For the amount of lubricant for the catalog products described in "2.2 Parts codes of catalog product", refer to our contact information.

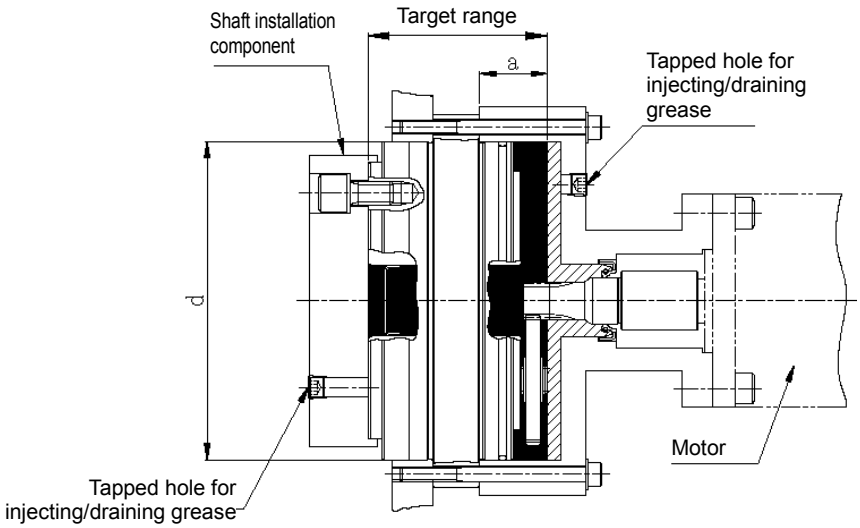


Fig. 6-1

Table 6-1

Model	Internal capacity of reduction gear (cc)	Required amount (cc)	(g) *1	Dimensions a *2 (mm)
RV-25N	223	185	(167)	32.2
RV-42N	377	313	(282)	32.5
RV-60N	459	381	(343)	32.3
RV-80N	607	504	(454)	37.6
RV-100N	849	705	(635)	36.9

Model	Internal capacity of reduction gear (cc)	Required amount (cc)	(g) *1	Dimensions a *2 (mm)
RV-125N	887	736	(662)	40.7
RV-160N	1,036	860	(774)	40.1
RV-380N	2,182	1,811	(1,630)	54.2
RV-500N	2,704	2,245	(2,021)	53.4
RV-700N	4,554	3,780	(3,402)	62.2

*1. Density of VIGOGREASE RE0: 0.9 g/cc

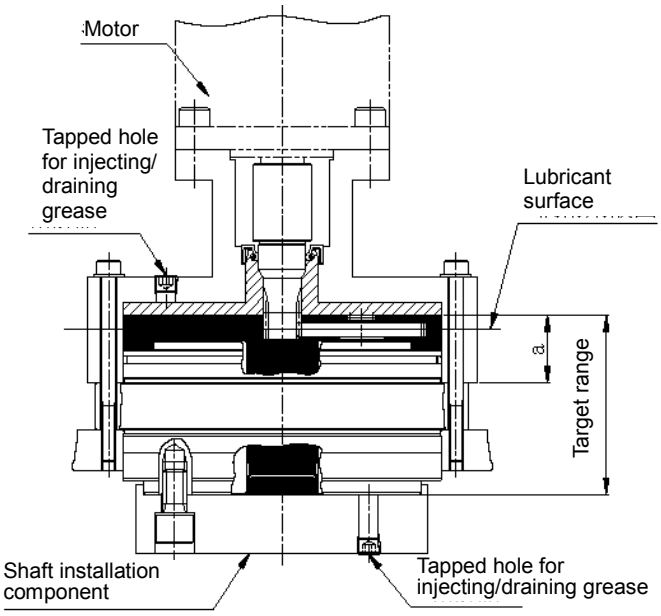
*2. "a" does not correspond to the crank shaft tip position.

Note

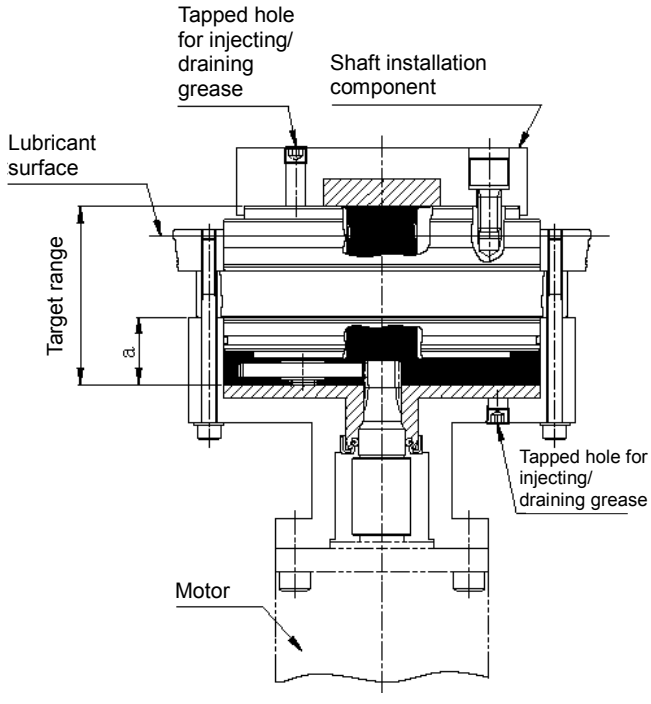
- Be sure to leave a space about 10% of the total volume. If overfilled, the temperature increases during operation and the internal pressure also increases. As a result, an oil seal could fall off or lubricant could leak.
- The shape of the reduction gear may differ from the illustration in Fig. 6-1 above, depending on the ordered specifications. For details on the shape, refer to the catalog and the separately provided "External dimensions" drawings and specification sheet.
- If the filling amount of the lubricant is insufficient, it could cause premature damage to the reduction gear.

6.2.2. Vertical shaft installation

The amount of lubricant the reduction gear requires and the target range (the ■ areas in the diagram) when the reduction gear is installed in the vertical shaft are indicated below. Each amount does not include the space (the ▨ areas in the diagram) on the motor mounting side. Therefore, if there is a blank space, also fill the space. Leave a space about 10% of the total volume of the "internal capacity of the reduction gear" (the ■ areas in the diagram) and the "space for the installation component" (the ▨ areas in the diagram). For the amount of lubricant for the catalog products described in "2.2 Parts codes of catalog products", refer to our contact information.



Vertical shaft installation (with shaft facing downward)



Vertical shaft installation (with shaft facing upward)

Fig. 6-2

Table 6-2

Model	Internal capacity of reduction gear (cc)	Required amount (cc)	(g) *1	Dimensions a *2 (mm)
RV-25N	223	211	(190)	32.2
RV-42N	377	358	(322)	32.5
RV-60N	459	436	(392)	32.3
RV-80N	607	577	(519)	37.6
RV-100N	849	807	(726)	36.9

Model	Internal capacity of reduction gear (cc)	Required amount (cc)	(g) *1	Dimensions a *2 (mm)
RV-125N	887	843	(759)	40.7
RV-160N	1,036	984	(886)	40.1
RV-380N	2,182	2,073	(1,866)	54.2
RV-500N	2,704	2,569	(2,312)	53.4
RV-700N	4,554	4,327	(3,894)	62.2

*1. Density of VIGOGREASE RE0: 0.9 g/cc

*2. “a” does not correspond to the crank shaft tip position.

Note

- Be sure to leave a space about 10% of the total volume. If overfilled, the temperature increases during operation and the internal pressure also increases. As a result, an oil seal could fall off or lubricant could leak.
- The shape of the reduction gear may differ from the illustration in Fig. 6-2 above, depending on the ordered specifications. For details on the shape, refer to the catalog and the separately provided “External dimensions” drawings and specification sheet.
- If the filling amount of the lubricant is insufficient, it could cause premature damage to the reduction gear.

6.3. Lubricant filling procedure

This section describes how to fill the lubricant.

Perform steps 1 to 7 by taking care regarding the following precautions.

- When handling the lubricant, be sure to wear protective goggles and rubber gloves.

⚠ CAUTION

- If the lubricant gets in your eyes or touches your skin, it could cause inflammation.

Step 1 Remove both of the plugs for injecting/draining grease, and attach a grease nipple, etc., and then attach the injector.

Important

- If the filler is attached with the supply side down, air is less likely to accumulate in the reduction gear, which facilitates the lubricant filling procedure.

Step 2 Fill the specified lubricant using the filler.

- When filling the lubricant, be sure to remove the plug for injecting/draining grease on the drain side.
- When pneumatic pressure is used for filling the lubricant, set the pressure below 0.03 MPa.

Note

- If you fail to remove the plug for injecting/draining grease on the drain side, the internal pressure increases. As a result, the oil seal could fall off or the oil seal lip could be reversed.
- If the internal pressure of the reduction gear increases, an oil seal could fall off or lubricant could leak.
- The shape of the reduction gear may differ from the illustration in Fig. 6-3 above, depending on the ordered specifications. For details on the shape, refer to the catalog and the separately provided “External dimensions” drawings and specification sheet.

Step 3 If the lubricant overflows from the tapped hole for injecting/draining grease on the drain side during filling, temporarily stop the filling.

Step 4 Remove the filler from the grease nipple and plug the tapped hole for injecting/draining grease on both the greasing and drain sides.

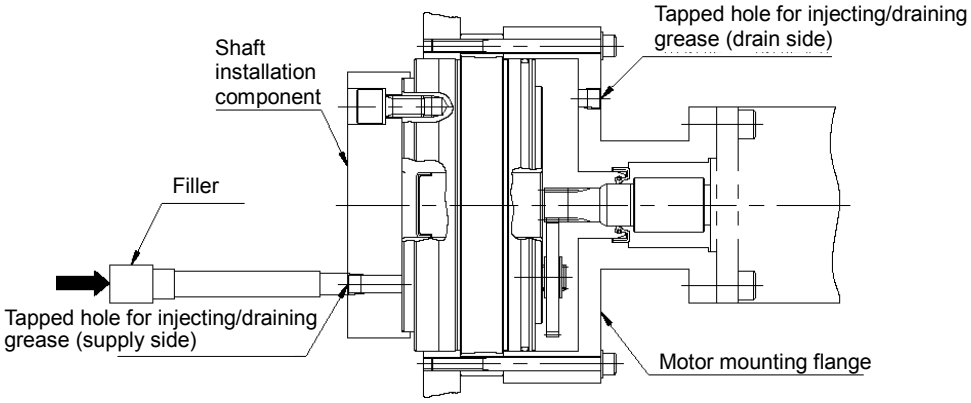
Step 5 Rotate the output shaft of the reduction gear by 1 or 2 turns.

WARNING

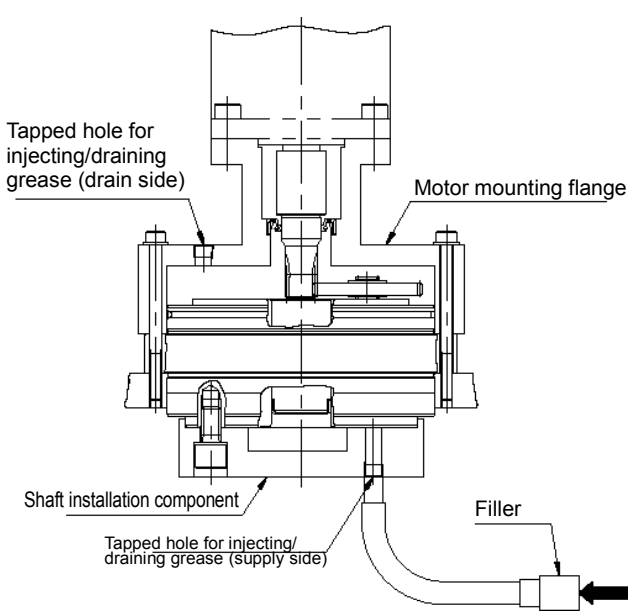
- Do not use the motor to rotate the output shaft of the reduction gear for safety, if possible. If the motor is used by necessity, run the motor at a low speed and never touch the rotation section. Otherwise, you could be caught by the rotation section, which will result in serious injury.

Step 6 Repeat **steps 1 to 5** until the lubricant is filled up to the specified level.

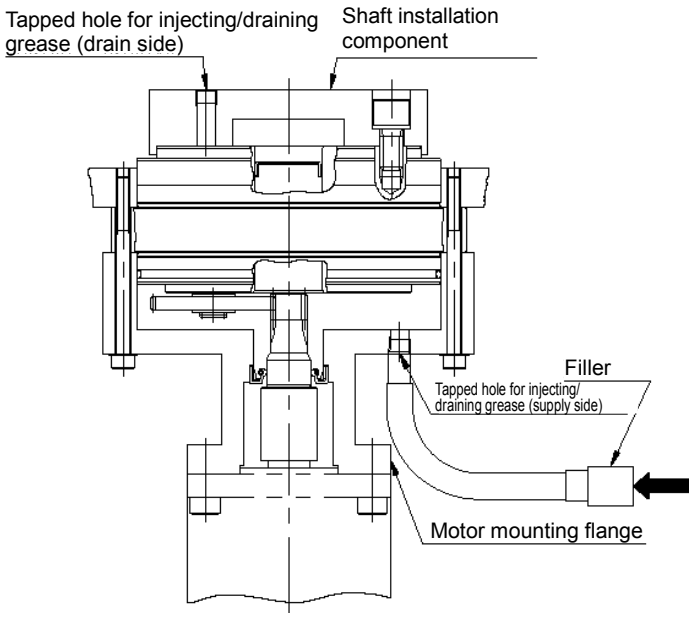
Step 7 After filling the lubricant up to the specified level, wipe the lubricant off from the tapped holes for injecting/draining grease and cap them with plugs sealed with a seal tape, etc.



Horizontal shaft installation



Vertical shaft installation (with shaft facing downward)



Vertical shaft installation (with shaft facing upward)

Fig. 6-3

Chapter 7 Operation

This chapter describes the operation of the product.

7.1. Checking before operation

After installing this product in the customer's device, check the following points before starting operation.

- The lubricant is filled correctly.
- Components are fixed with each other correctly.
- The mounting bolts are tightened securely.
- The rotation section rotates in the desired direction.

7.2. Break-in operation

We recommend performing the break-in operation after filling the Nabtesco-specified lubricant.

Important

- After filling the lubricant, abnormal noise or torque irregularity may occur during operation. If such symptoms are cleared when you perform the break-in operation for more than 30 minutes (until the surface temperature of the reduction gear reaches about 50°C), there is no problem with its quality.
- During the break-in operation, check the items in Table 8-1.

7.3. Precautions for operation

Once the pre-operation checks and break-in operation are completed, operate the device safely by observing the following precautions.

WARNING

- Keep away from the rotation section during operation of the device or until it is completely stopped. You could get caught by the rotation section, which will result in serious injury.
- If any abnormalities, such as abnormal noise or excessive vibration are found, stop the operation immediately. Do not start the operation before the cause of the error is identified and corrective measures are taken. Incorrect motion could cause injury.

⚠ CAUTION

- The reduction gear could be extremely hot during operation. After stopping the operation, never touch the reduction gear until it is completely cooled. Touching the reduction gear could cause burns.
- Do not operate the reduction gear under a condition that exceeds the allowable acceleration/deceleration torque, allowable moment, and allowable output speed. Otherwise, it could cause injury to the workers and damage to the reduction gear.

Note

- Operate the reduction gear while the surface temperature is below 60°C. Failure to do so could cause premature damage.

  When the reduction gear is used with the surface temperature within 40 to 60°C, refer to “8.3.1 Replacement period of lubricant”.

Chapter 8 Maintenance and Inspection

This chapter describes how to perform maintenance and inspection.

8.1. Precautions on maintenance

WARNING

- Keep away from the rotation section during maintenance/inspection of the device currently in operation. You could get caught by the rotation section, which will result in serious injury.
- If any abnormalities, such as abnormal noise or excessive vibration are found, stop the operation immediately. Do not start the operation before the cause of the error is identified and corrective measures are taken. Incorrect motion could cause injury.

CAUTION

- The reduction gear could be extremely hot during operation. After stopping the operation, never touch the reduction gear until it is completely cooled. Touching the reduction gear could cause burns.

When performing maintenance, observe the following precautions and ensure safety.

- Wear appropriate clothing and protective gear, including the protective goggles, gloves, and safety shoes.
- Organize the surrounding area and ensure safety to prevent secondary accidents.
- To maintain the condition in which the device is completely stopped, turn OFF the power to the customer's device and take extra care so that the power will not be turned ON by accident.

8.2. Daily inspection

Check the following items every day before starting the operation.

Table 8-1

Inspection item	Description
Noise	Check for abnormal noise or sudden change of noise.
Vibration	Check for excessive vibration or any sudden change.
Surface temperature	Check for an excessively hot surface of the reduction gear (normally below 60°C) or any sudden change.
Bolts	Check for looseness of each mounting bolt.
Leakage of lubricant	Check for leakage of lubricant from the mating face or oil seal section in the vicinity of the reduction gear.

Note: Check the above items indirectly at a distance from the rotation section, such as connecting members.

WARNING

- If it is necessary to access the device for inspection while the device is in operation, cover the rotation section. Otherwise, you could get caught by the rotation section, which could result in serious injury.

8.3. Lubricant replacement

8.3.1. Lubricant replacement time

When this product is operated with an appropriate amount of lubricant filled, the standard lubricant replacement time due to lubricant degradation is 20,000 hours. However, when operation involves a reduction gear surface temperature above 40°C (the area in the right diagram), the state of degradation of the lubricant should be checked in advance and the lubricant replaced earlier as necessary. For the lubricants specified by Nabtesco, refer to "4.2.7 Lubricants".

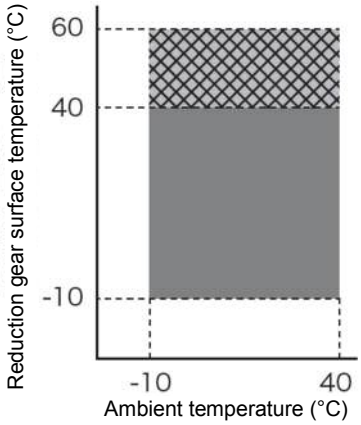


Fig. 8-1

8.3.2. Lubricant replacement procedure

This section describes how to replace lubricants.
Perform steps 1 to 7 by taking care regarding the following precautions.

• When handling the lubricant, be sure to wear protective goggles and rubber gloves.

WARNING

- When replacing the lubricant, turn OFF the power source (e.g., power supply) and execute lock-out/tag-out so that the power will not be turned ON by accident. Otherwise, you could be caught by the rotation section, which could result in injury.

CAUTION

- If the lubricant gets in your eyes or touches your skin, it could cause inflammation.
- When the safety cover near the reduction gear has been removed for replacement/maintenance of lubricant, be sure to return them to their original positions after the procedure.

Note

- If the lubricant is overfilled, there is a possibility of high internal pressure and that an oil seal could fall off, the lip could be reversed, or lubricant could leak. If the lubricant is insufficient, a lubrication failure could occur and the reduction gear could be damaged.
- The shape of the reduction gear may differ from the illustration in Fig. 8-2, depending on the ordered specifications. For details on the shape, refer to the catalog and the separately provided “External dimensions” drawings and specification sheet.
- If the filling amount of the lubricant is insufficient, it could cause premature damage to the reduction gear.

Step 1 Rotate the output shaft of the reduction gear so that the tapped holes for injecting/draining grease are positioned diagonally.
(When rotating the output shaft using electric power, do not approach the equipment and reduction gear. When rotating the output shaft without using electric power, perform step 2 first.)

Step 2 Turn OFF the power to the device and confirm that the device is completely stopped.

Step 3 Remove both of the plugs for the tapped holes for injecting/draining grease, and drain the lubricant from the upper tapped hole for injecting/draining grease.

- Check the amount of drained lubricant by catching it with a container, etc., in order to control the same amount of lubricant to be drained and filled.
- Always drain the lubricant while the reduction gear is cooled.

⚠ CAUTION

- If the tapped hole for injecting/draining grease is unplugged while the reduction gear is still hot, high-temperature lubricant sprays out, which could cause burns.

Step 4 Attach a grease nipple, etc. to the tapped hole for injecting/draining grease and then attach the injector. (Refer to Fig. 8-2)

Step 5
- Using the injector or the like, fill the lubricant through the tapped hole for injecting/draining grease on the supply side.
- When filling the lubricant, be sure to remove the plug for the tapped hole for injecting/draining grease on the drain side.
- When pneumatic pressure is used for filling the lubricant, set the pressure below 0.03 MPa.

Note

- If you fail to remove the plug for tapped hole for injecting/draining grease on the drain side, the internal pressure increases. As a result, oil seals could fall off or the oil seal lip could be reversed.
- If the internal pressure of the reduction gear increases, oil seals could fall off or lubricant could leak.

Step 6 • Inject the lubricant until it overflows from the tapped hole for injecting/draining grease on the drain side.

Step 7 • Remove the injector from the grease nipple and plug the tapped holes for injecting/draining grease on both the greasing and drain sides.

Step 8 • Rotate the output shaft of the reduction gear by 1 or 2 turns.

WARNING

- Do not use the motor to rotate the output shaft of the reduction gear for safety, if possible. If the motor is used by necessity, run the motor at a low speed and never touch the rotation section. Otherwise, you could be caught by the rotation section, which will result in serious injury.

Step 9 • Repeat steps 3 to 8 until the reduction gear is filled with the same amount of lubricant as that was drained.

Step 10 • It is recommended that the inside of the reduction gear is flushed so that the lubricant can be replaced more efficiently.

• Remove the injector from the fitting on the supply side, and attach a hexagon socket head cap plug to the fitting on the drain side. Calculate output shaft conversion and set the motor rotation speed so that the output shaft rotation speed is 5 to 10 rpm. Then, rotate the motor for about one minute.

Important

- Set the rotation speed based on the output shaft conversion by taking the customer's operation conditions into account.

Step 11 Perform steps 1 and 9 again.

Step 12 Attach the hexagon socket head cap plug to the tapped hole for injecting/draining grease. Replace the seal tape with a new one.

Step 13 Wipe off the lubricant adhering to the surrounding completely.

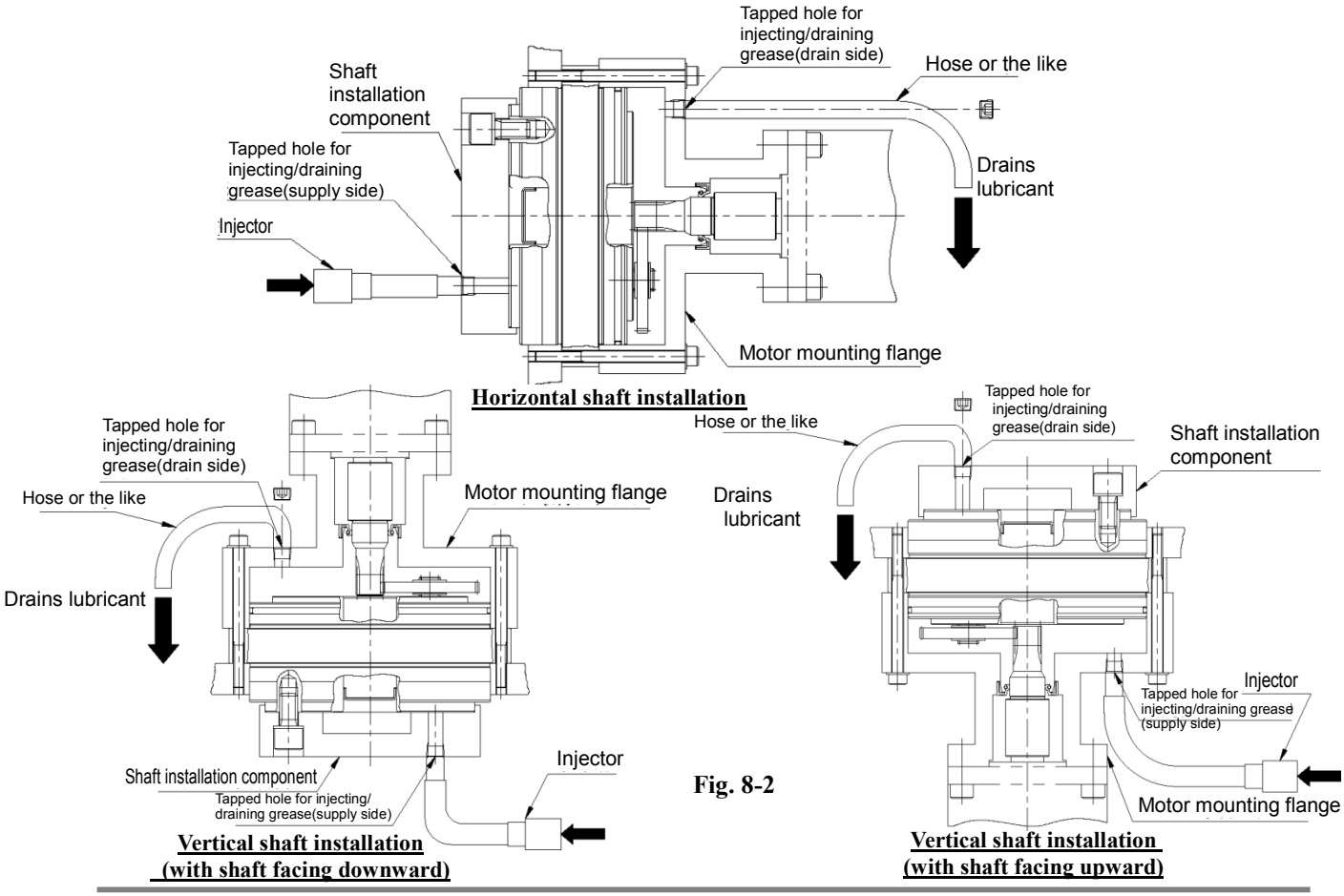


Fig. 8-2

8.4. Troubleshooting checksheet

Check the following items in the case of trouble like abnormal noise, vibration, or malfunctions.
When it is not possible to resolve an abnormality even after verifying the corresponding checkpoint, obtain a "Reduction Gear Investigation Request Sheet" from our Website, fill in the necessary information, and contact us via the agent from which you bought the device.

http://precision.nabtesco.com/documents/request.html

● The trouble started immediately after installation of the reduction gear

Check column	Item
	Make sure the equipment's drive section (the motor side or the reduction gear output surface side) is not interfering with another component.
	Make sure the equipment is not under a greater than expected load (torque, moment load, thrust load).
	Make sure the required number of bolts are tightened uniformly with the specified tightening torque.
	Make sure the reduction gear, motor, or your company's components are not installed at a slant.
	Make sure the specified amount of Nabtesco-specified lubricant has been added.
	Make sure there are no problems with the motor's parameter settings.
	Make sure there are no components resonating in unity.
	Make sure the input gear is appropriately installed on the motor.
	Make sure there is no damage to the surface of the input gear teeth.
	Make sure the input gear specifications (precision, number of teeth, module, shift coefficient, dimensions of each part) are correct.
	Make sure the flange and other components are designed and manufactured with the correct tolerances.

● The trouble started during operation

Check column	Item
	Make sure the equipment has not been in operation longer than the calculated service life.
	Make sure the surface temperature of the reduction gear is not higher than normal during operation.
	Make sure the operation conditions have not been changed.
	Make sure there are no loose or missing bolts.
	Make sure the equipment is not under a greater than expected load (torque, moment load, thrust load).
	Make sure the equipment's drive section is not interfering with another component.
	Make sure an oil leak is not causing a drop in the amount of lubricant.
	Make sure there are no external contaminants in the gear, such as moisture or metal powder.
	Make sure no lubricant other than that specified is being used.

When the reduction gear is embedded in the customer's equipment, create your own troubleshooting checksheet based on the above checkpoints.

Appendix

Design scheme of input gear

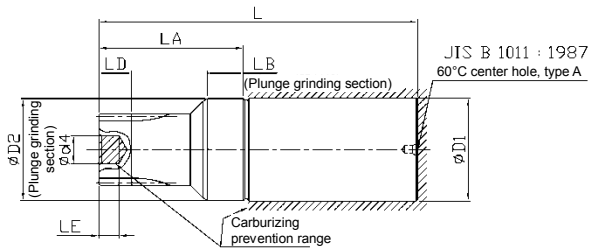
We have a variety of standard input gears for each model and reduction ratio that can be additionally machined by the customer. Please machine and install the standard input gear based on the customer's intended use, by referring to the following examples.

Note: For the model and reduction speed ratio provided with the standard input gears, refer to "Standard input gear dimensions" on page 48.

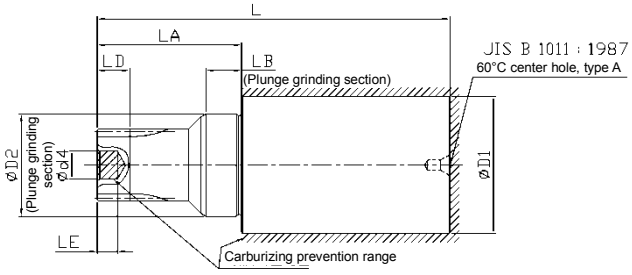
Standard input gear specifications

Material	
Heat treatment	Carburizing, quenching and tempering
Surface hardness	HRC58 to 62 (excluding the carburizing prevention range)
Material	SCM415 Normalizing or equivalent material

<Standard input gear A: For small motors>



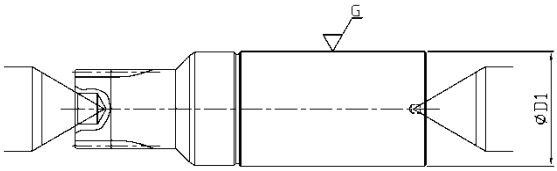
<Standard input gear B: For large motors>



Note: The above drawing shows the shape before the additional machining is performed. Check the dimensions of each section in the "Dimensions" table on pages 48 and 49.

• Reference for additional machining

Standard input gears come equipped with center holes.
When modifying them, be sure to grind the boss outer diameter (D1) with reference to the center hole, and use it as the reference surface.

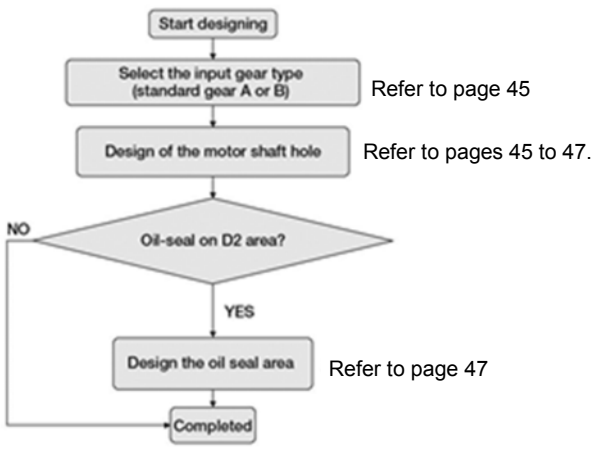


Design of the input gear

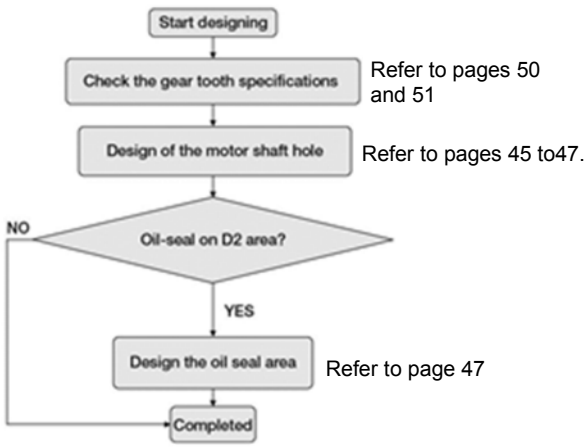
Please refer to the chart below. Use it as a reference when the customer designs an input gear on their own.

● Design flow

When modifying the standard input gear



When manufacturing a special input gear



● Selection of the input gear type

There are the following two types of standard input gear:
Standard input gear A: For small motors
Standard input gear B: For large motors

Select the type of input gear to be used by referring to the tables below.

Applicable motor shaft diameters for standard input gear (Unit: mm)

Model	Standard input gear A	Standard input gear B
RV-25N	Less than ø28	ø28 or more
RV-42N	Less than ø32	ø32 or more
RV-60N	Less than ø32	ø32 or more
RV-80N	Less than ø38	ø38 or more
RV-100N	ø42 or less	

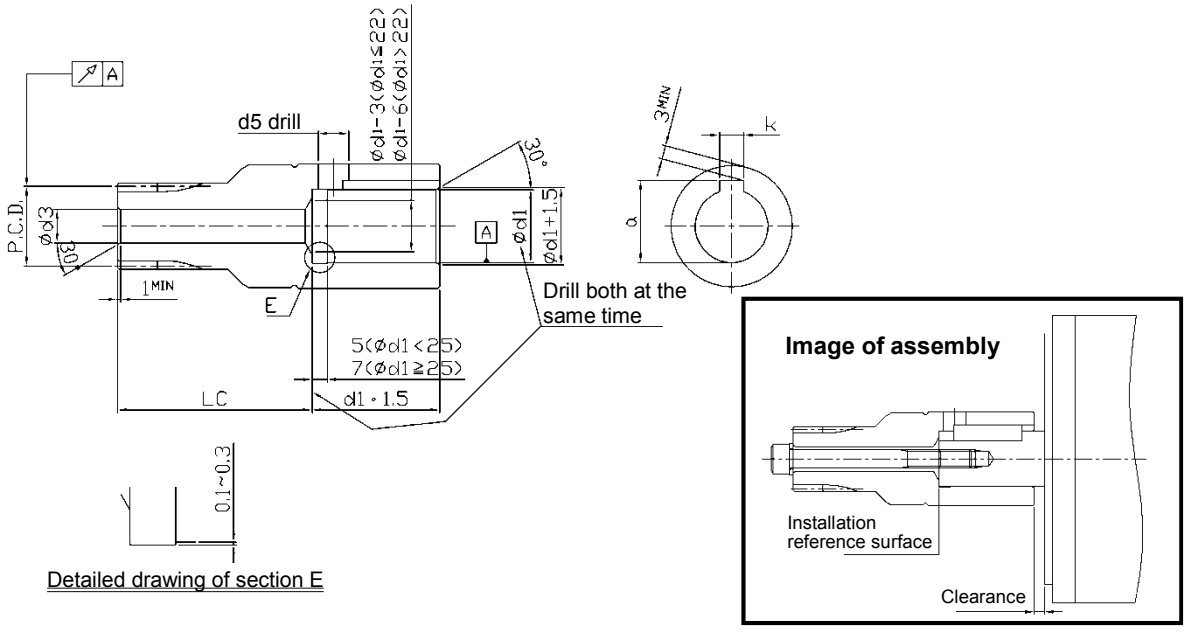
(Unit: mm)

Model	Standard input gear A	Standard input gear B
RV-125N	ø42 or less	
RV-160N	ø48 or less	
RV-380N	Less than ø55	ø55 or more
RV-500N	Less than ø55	ø55 or more
RV-700N	Less than ø55	ø55 or more

Note: Some models have only standard input gear A.

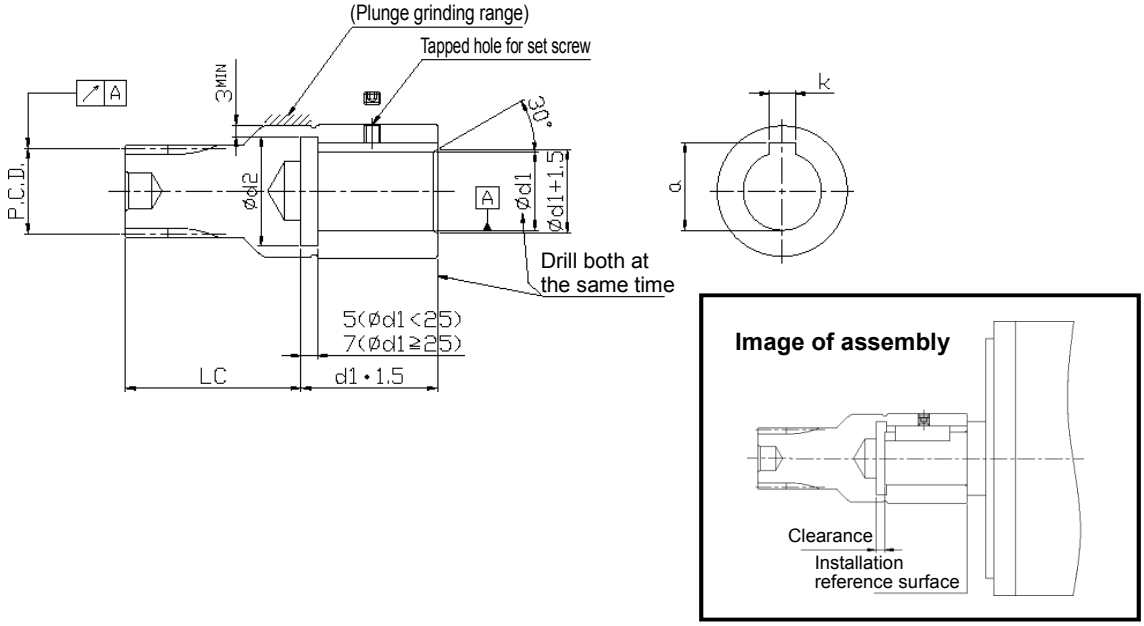
● Design of the motor shaft hole

(Design example 1: For straight shafts (attached to motor shaft tip)>

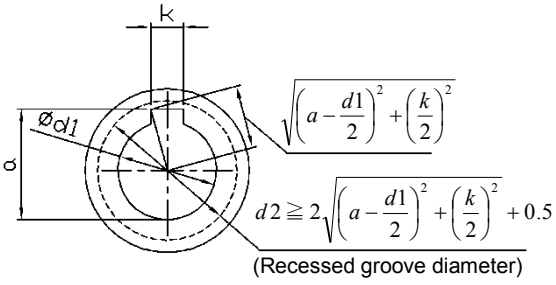


Note
1. When a tapped hole is used for the motor shaft, fix the input gear to the motor shaft with a bolt.
2. For the bolt through hole diameter (d3), radial runout, and the shaft hole position (LC), refer to “Dimensions after modification” in the “Dimensions” table on pages 48 and 49.
3. If the bolt through hole diameter (d3) is larger than the center hole diameter on the tooth surface side (d4), it is necessary to process the carburized surface. In such a case, confirm the applicable tools and processing conditions, etc.
4. The clearance hole diameter for the key slot (d5) is “key slot width (k) + 2 mm”, approximately. [The clearance hole diameter must be larger than the key slot width (k).]
5. Design the motor shaft hole diameter (d1) according to the motor shaft diameter to be used.
6. For the key slot width (k) and key slot height (a), refer to the specifications of the key to be used.

<Design example 2: For straight shafts (attached to motor shaft base)>



Note
1. When a tapped hole is not used for the motor shaft, fix the input gear to the motor shaft with a set screw.
2. If a clearance hole for the key slot cannot be drilled due to some reason, such as the plunge grinding area being located on the outer periphery, create a recessed groove instead.
3. For the radial runout and the shaft hole position (LC), refer to “Dimensions after modification” in the “Dimensions” table on pages 48 and 49.
4. Design the motor shaft hole diameter (d1) according to the motor shaft diameter to be used.
5. For the key slot width (k) and key slot height (a), refer to the specifications of the key to be used.
6. Design the diameter of the recessed groove for the key slot (d2) according to the following instructions.



• Recessed groove diameter for key slot

Set the diameter of the recessed groove (d2) so that it is larger than the corner of the key slot.

$$d2 \geqq 2\sqrt{\left(a-\frac{d1}{2}\right)^2+\left(\frac{k}{2}\right)^2}+0.5$$

Although the above calculation formula is used in this example, design the diameter using appropriate values, based on the key groove tolerance, processing tolerance, etc. The following is an example of when the diameter of the recessed groove is selected based on the above calculation formula. Use it as a reference when designing

Selection example of recessed groove diameter (d2)

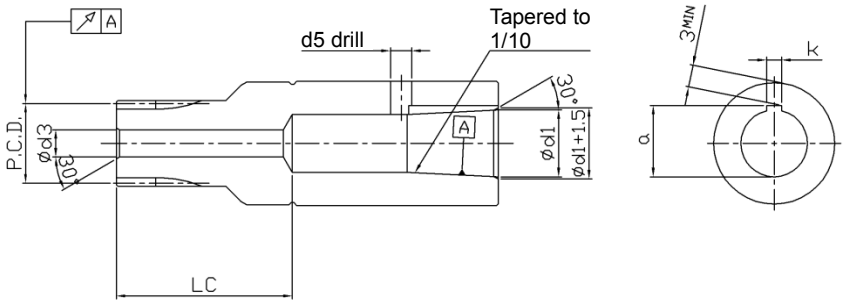
(Unit: mm)

Motor shaft hole diameter ød1	Key slot width k	Key slot height a	Recessed groove diameter ød2
8	3	9.4	12
9	3	10.4	13
10	4	11.8	15
11	4	12.8	16
14	5	16.3	20
15	5	17.3	21
16	5	18.3	22
17	6	19.8	24
19	6	21.8	26

(Unit: mm)

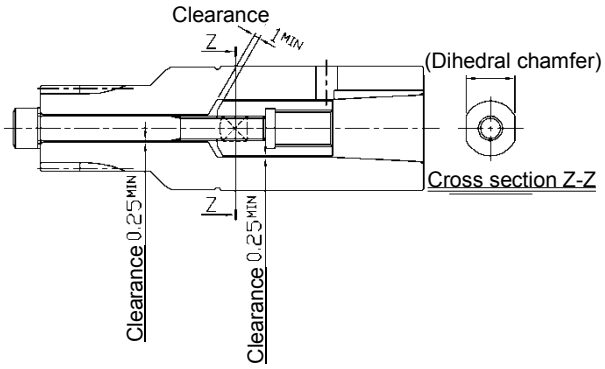
Motor shaft hole diameter ød1	Key slot width k	Key slot height a	Recessed groove diameter ød2
22	8	25.3	31
24	8	27.3	33
25	8	28.3	34
28	8	31.3	37
32	10	35.3	41
35	10	38.3	44
38	10	41.3	47
38	12	41.3	47
42	12	45.3	51

<Design example 3: For tapered shafts>

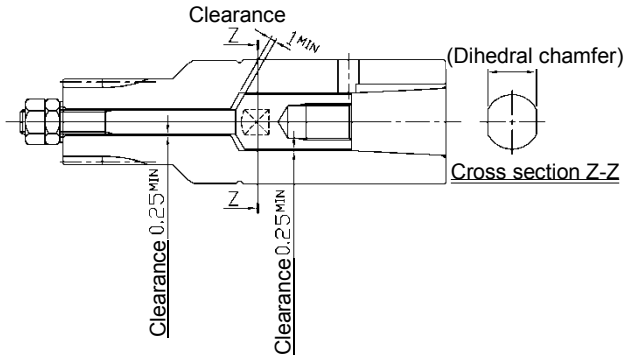


Note
1. For the bolt through hole diameter (d3), radial runout, and the shaft hole position (LC), refer to "Dimensions after modification" in the "Dimensions" table on pages 48 and 49.
2. Design the motor shaft hole diameter (d1) according to the motor shaft diameter to be used.
3. For the key slot width (k) and key slot height (a), refer to the specifications of the key to be used.
4. There are two ways to fix the tapered shaft to the motor shaft: draw nut and draw bolt. Fix the shaft using either of them, referring to the drawings below.
5. You can manufacture the draw nut and draw bolt on your own, or contact us.

• When fixing with a draw nut

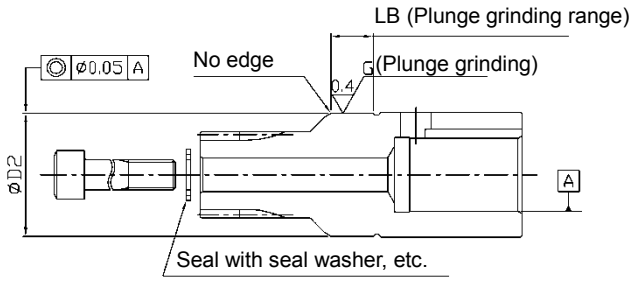


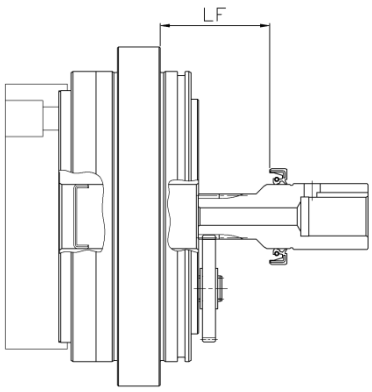
• When fixing with a draw bolt



● Design the oil seal area

<Design example 4>
The D2 section can be used as a lip surface for the oil seal by plunge grinding.





Note
1. The design specifications vary depending on the oil seal manufacturer. When designing, be sure to confirm with the manufacturer of the oil seal to be used.
2. If the plunge grinding diameter (D2) is processed using a value other than those listed in the "Dimensions" table on pages 48 and 49, appropriate surface hardness may not be obtained.
3. Rubber containing fluorine is recommended for the material of the oil seal.
4. When assembling the oil seal, be careful to avoid any contact between the lip section and the gear, as it causes scratches.
5. Design the oil seal with reference to the oil seal assembly position (LF), so that the lip section of the oil seal does not fall off from the plunge grinding range (LB). (Note that the dimensions of the plunge grinding range (LB) for standard input gear B include a recession width of 2.5 mm).

Standard input gear dimensions

<Model: RV-25N> (Unit: mm)

Ratio code	Dimensions before modification (when shipped)												Dimensions after modification					Assembly dimensions
	ØD2	Ød4	LE	LD +2.0 0	[Standard input gear A]				[Standard input gear B]				ØD2	Ød3 MAX	Radial runout	[Standard input gear A]	[Standard input gear B]	LF
					L	LA	LB	ØD1	L	LA	LB	ØD1				LC MIN	LC MIN	
41	40.4	11	8	13	126.1	57.1	14	41	139.6	57.1	14	54	40h8	17.6	0.055	51.4	60.1	66
81		9	7	12	129	60			142.5	60				10.8	0.050	54.3	63	
107.66		9	7	12	129	60			142.5	60				9.6	0.047	54.3	63	
126		7	7	12	129	60			142.5	60				8.0	0.047	54.3	63	
137		7	7	12	129	60			142.5	60				7.2	0.043	54.3	63	
164.07		5.5	6	13	129	60			142.5	60				5.6	0.043	54.3	63	

<Model: RV-42N> (Unit: mm)

Ratio code	Dimensions before modification (when shipped)												Dimensions after modification					Assembly dimensions
	ØD2	Ød4	LE	LD +2.0 0	[Standard input gear A]				[Standard input gear B]				ØD2	Ød3 MAX	Radial runout	[Standard input gear A]	[Standard input gear B]	LF
					L	LA	LB	ØD1	L	LA	LB	ØD1				LC MIN	LC MIN	
41	50.4	11	8	15	135.6	61.6	15.5	50.4	146.6	64.1	18	57	50h8	26.8	0.055	57.7	58.7	67
81		11	8	12.5	138.5	64.5			149.5	67				15.6	0.050	60.6	61.6	
105		11	8	12.5	138.5	64.5			149.5	67				11.8	0.050	60.6	61.6	
126		9	7	12.5	138.5	64.5			149.5	67				10.5	0.047	60.6	61.6	
141		7	7	12.5	138.5	64.5			149.5	67				8.1	0.050	60.6	61.6	
164.07		7	7	12.5	138.5	64.5			149.5	67				7.5	0.047	60.6	61.6	

<Model: RV-60N> (Unit: mm)

Ratio code	Dimensions before modification (when shipped)												Dimensions after modification					Assembly dimensions
	ØD2	Ød4	LE	LD +2.0 0	[Standard input gear A]				[Standard input gear B]				ØD2	Ød3 MAX	Radial runout	[Standard input gear A]	[Standard input gear B]	LF
					L	LA	LB	ØD1	L	LA	LB	ØD1				LC MIN	LC MIN	
41	50.4	11	8	14	136.1	62.1	15.5	50.4	147.1	64.6	18	57	50h8	30.0	0.055	58.2	59.2	68
81		11	8	13.5	139	65			150	67.5				17.2	0.055	61.1	62.1	
102.17		11	8	13.5	139	65			150	67.5				13.7	0.050	61.1	62.1	
121		11	8	13.5	139	65			150	67.5				11.8	0.050	61.1	62.1	
145.61		7	7	13.5	139	65			150	67.5				8.7	0.050	61.1	62.1	
161		7	7	13.5	139	65			150	67.5				8.1	0.050	61.1	62.1	

<Model: RV-80N> (Unit: mm)

Ratio code	Dimensions before modification (when shipped)												Dimensions after modification					Assembly dimensions
	ØD2	Ød4	LE	LD +2.0 0	[Standard input gear A]				[Standard input gear B]				ØD2	Ød3 MAX	Radial runout	[Standard input gear A]	[Standard input gear B]	LF
					L	LA	LB	ØD1	L	LA	LB	ØD1				LC MIN	LC MIN	
41	55.4	11	8	17.5	146	65.5	15.5	55.4	185	68	18	60	55h8	30.7	0.055	61.6	64	74
81		11	8	16	148.9	68.4			187.9	70.9				17.6	0.055	64.5	66.9	
101		11	8	14.5	148.9	68.4			187.9	70.9				15.6	0.050	64.5	66.9	
129		11	8	14.5	148.9	68.4			187.9	70.9				11.8	0.050	64.5	66.9	
141		9	7	14.5	148.9	68.4			187.9	70.9				10.6	0.050	64.5	66.9	
171		7	7	14.5	148.9	68.4			187.9	70.9				8.1	0.050	64.5	66.9	

<Model: RV-100N> (Unit: mm)

Ratio code	Dimensions before modification (when shipped)												Dimensions after modification					Assembly dimensions
	ØD2	Ød4	LE	LD +2.0 0	[Standard input gear A]				[Standard input gear B]				ØD2	Ød3 MAX	Radial runout	[Standard input gear A]	[Standard input gear B]	LF
					L	LA	LB	ØD1	L	LA	LB	ØD1				LC MIN	LC MIN	
41	60.4	11	8	19	182.2	67.2	15.5	60.4					60h8	36.7	0.055	65.7		74
81		11	8	15	185.1	70.1								20.2	0.055	68.6		
102.17		11	8	15	185.1	70.1								17.2	0.055	68.6		
121		11	8	15	185.1	70.1								13.2	0.050	68.6		
141		11	8	15	185.1	70.1								13.1	0.050	68.6		
161		9	7	15	185.1	70.1								9.7	0.050	68.6		

<Model: RV-125N> (Unit: mm)

Ratio code	Dimensions before modification (when shipped)												Dimensions after modification					Assembly dimensions
	ØD2	Ød4	LE	LD +2.0 0	[Standard input gear A]				[Standard input gear B]				ØD2	Ød3 MAX	Radial runout	[Standard input gear A]	[Standard input gear B]	LF
					L	LA	LB	ØD1	L	LA	LB	ØD1				LC MIN	LC MIN	
41	60.4	11	8	19	182.2	67.2	15.5	60.4					60h8	36.7	0.055	65.7		77
81		11	8	15	185.1	70.1								21.7	0.055	68.6		
102.17		11	8	15	185.1	70.1								17.2	0.055	68.6		
121		11	8	15	185.1	70.1								14.2	0.050	68.6		
145.61		11	8	15	185.1	70.1								11.2	0.050	68.6		
161		9	7	15	185.1	70.1								9.7	0.050	68.6		

<Model: RV-160N> (Unit: mm)

Ratio code	Dimensions before modification (when shipped)												Dimensions after modification					Assembly dimensions
	ØD2	Ød4	LE	LD +2.0 0	[Standard input gear A]				[Standard input gear B]				ØD2	Ød3 MAX	Radial runout	[Standard input gear A]	[Standard input gear B]	LF
					L	LA	LB	ØD1	L	LA	LB	ØD1				LC MIN	LC MIN	
41	65.4	11	8	17	187.1	72.1	15.5	65.4					65h8	37.0	0.059	72.6		83
81		11	8	16.5	190	75								23.9	0.055	75.5		
102.81		11	8	16.5	190	75								20.6	0.055	75.5		
125.21		11	8	16.5	190	75								16.8	0.050	75.5		
156		11	8	16.5	190	75								13.1	0.050	75.5		
201		9	7	16.5	190	75								9.3	0.050	75.5		

<Model: RV-380N> (Unit: mm)

Ratio code	Dimensions before modification (when shipped)												Dimensions after modification					Assembly dimensions
	ØD2	Ød4	LE	LD +2.0 0	[Standard input gear A]				[Standard input gear B]				ØD2	Ød3 MAX	Radial runout	[Standard input gear A]	[Standard input gear B]	LF
					L	LA	LB	ØD1	L	LA	LB	ØD1				LC MIN	LC MIN	
75	65.4	11	8	21	190.1	75.1	15.5	65.4	196.6	77.6	18	72	65h8	33.0	0.059	75.6	80.6	97
93		11	8	21	190.1	75.1			196.6	77.6				27.0	0.059	75.6	80.6	
117		11	8	23.5	193	78			199.5	80.5				25.5	0.055	78.5	83.5	
139		11	8	23.5	193	78			199.5	80.5				22.5	0.055	78.5	83.5	
162		11	8	23.5	193	78			199.5	80.5				18.0	0.055	78.5	83.5	
185		11	8	23.5	193	78			199.5	80.5				18.0	0.047	78.5	83.5	

<Model: RV-500N> (Unit: mm)

Ratio code	Dimensions before modification (when shipped)												Dimensions after modification					Assembly dimensions
	ØD2	Ød4	LE	LD +2.0 0	[Standard input gear A]				[Standard input gear B]				ØD2	Ød3 MAX	Radial runout	[Standard input gear A]	[Standard input gear B]	LF
					L	LA	LB	ØD1	L	LA	LB	ØD1				LC MIN	LC MIN	
81	65.4	11	8	22.5	189.6	74.6	16.5	65.4	222.1	77.1	19	78	65h8	39.0	0.066	74.1	80.1	93
105		11	8	23	192.5	77.5			225	80				32.3	0.059	77	83	
123		11	8	22	192.5	77.5			225	80				30.7	0.055	77	83	
144		11	8	22	192.5	77.5			225	80				28.1	0.055	77	83	
159		11	8	23	192.5	77.5			225	80				25.6	0.055	77	83	
192.75		11	8	22	192.5	77.5			225	80				18.3	0.059	77	83	

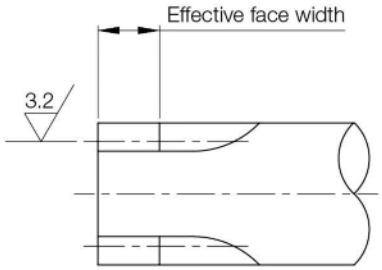
<Model: RV-700N> (Unit: mm)

Ratio code	Dimensions before modification (when shipped)												Dimensions after modification					Assembly dimensions
	ØD2	Ød4	LE	LD +2.0 0	[Standard input gear A]				[Standard input gear B]				ØD2	Ød3 MAX	Radial runout	[Standard input gear A]	[Standard input gear B]	LF
					L	LA	LB	ØD1	L	LA	LB	ØD1				LC MIN	LC MIN	
105	65.4	11	8	22	192.5	77.5	15.5	65.4	225	80	18	78	65h8	42.0	0.066	78	83	103
118		11	8	22	192.5	77.5			225	80				38.3	0.059	78	83	
142.44		11	8	22	192.5	77.5			225	80				33.2	0.059	78	83	
159		11	8	22	192.5	77.5			225	80				31.7	0.055	78	83	
183		11	8	22	192.5	77.5			225	80				23.6	0.059	78	83	
203.52		11	8	22	192.5	77.5			225	80				22.7	0.059	78	83	

Gear tooth specifications

Refer to the specifications and materials shown in the following tables when designing with a processed or non-standard input gear.

Common specifications	
Tooth profile	Full depth
Pressure angle (°)	20
Precision	JIS B 1702:1976, grade 5



Spur gear tooth surface hardness and material	
Heat treatment	Carburizing, quenching and tempering
Surface hardness	HRC 58 to 62
Effective case depth	0.3 to 0.7*1
Material	SCM415 Normalizing
Alternate material	SCM420 Normalizing

*1. The values for some RV-25N and RV-42N units will differ depending on the module.

Model	RV-25N		RV-42N	
Module	0.8	1.25	1.0	1.25
Effective case depth<Hv 513>(mm)	0.2 to 0.6	0.3 to 0.7	0.2 to 0.6	0.3 to 0.7

<Specifications by model>

Model	RV-25N					
Ratio code	41	81	107.66	126	137	164.07
Module	1.25	1.25	0.8	0.8	0.8	0.8
No. of teeth	21	14	18	16	15	13
Shift coefficient	-0.193	+0.6	+0.25	+0.25	+0.25	+0.25
Base tangent length(mm)	$5.738^{-0.017}_{-0.042}$	$9.984^{-0.017}_{-0.042}$	$6.243^{-0.017}_{-0.042}$	$6.220^{-0.017}_{-0.042}$	$6.210^{-0.017}_{-0.042}$	$3.825^{-0.017}_{-0.042}$
No. of teeth	(2)	(3)	(3)	(3)	(3)	(2)
Min. effective face width (mm)	13	12	12	12	12	13

Model	RV-42N					
Ratio code	41	81	105	126	141	164.07
Module	1.25	1.25	1.25	1.0	1.25	1.0
No. of teeth	27	18	15	16	12	13
Shift coefficient	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5
Base tangent length(mm)	$13.816^{-0.017}_{-0.042}$	$9.968^{-0.017}_{-0.042}$	$9.916^{-0.017}_{-0.042}$	$7.946^{-0.017}_{-0.042}$	$9.863^{-0.017}_{-0.042}$	$7.904^{-0.017}_{-0.042}$
No. of teeth	(4)	(3)	(3)	(3)	(3)	(3)
Min. effective face width (mm)	15	12.5	12.5	12.5	12.5	12.5

Model	RV-60N					
Ratio code	41	81	102.17	121	145.61	161
Module	1.25	1.5	1.25	1.25	1.25	1.25
No. of teeth	30	17	17	15	13	12
Shift coefficient	+0.25	+0.5	+0.25	+0.5	+0.25	+0.5
Base tangent length(mm)	$13.655^{-0.023}_{-0.061}$	$11.941^{-0.023}_{-0.061}$	$9.737^{-0.023}_{-0.061}$	$9.916^{-0.023}_{-0.061}$	$5.977^{-0.023}_{-0.061}$	$9.863^{-0.023}_{-0.061}$
No. of teeth	(4)	(3)	(3)	(3)	(2)	(3)
Min. effective face width (mm)	14	13.5	13.5	13.5	13.5	13.5

Model	RV-80N					
Ratio code	41	81	101	129	141	171
Module	1.5	1.25	1.25	1.25	1.25	1.25
No. of teeth	27	21	18	15	14	12
Shift coefficient	0	-0.193	+0.5	+0.5	+0.5	+0.5
Base tangent length(mm)	$16.065^{-0.023}_{-0.061}$	$5.738^{-0.023}_{-0.061}$	$9.968^{-0.023}_{-0.061}$	$9.916^{-0.023}_{-0.061}$	$9.898^{-0.023}_{-0.061}$	$9.863^{-0.023}_{-0.061}$
No. of teeth	(4)	(2)	(3)	(3)	(3)	(3)
Min. effective face width (mm)	17.5	16	14.5	14.5	14.5	14.5

Model	RV-100N					
Ratio code	41	81	102.17	121	141	161
Module	1.5	1.5	1.5	1.5	1.25	1.5
No. of teeth	30	20	17	15	16	12
Shift coefficient	+0.5	0	+0.5	+0.15	+0.5	+0.5
Base tangent length(mm)	$21.070^{-0.023}_{-0.061}$	$11.491^{-0.023}_{-0.061}$	$11.941^{-0.023}_{-0.061}$	$7.111^{-0.023}_{-0.061}$	$9.933^{-0.023}_{-0.061}$	$11.836^{-0.023}_{-0.061}$
No. of teeth	(5)	(3)	(3)	(2)	(3)	(3)
Min. effective face width (mm)	19	15	15	15	15	15

Model	RV-125N					
Ratio code	41	81	102.17	121	145.61	161
Module	1.5	1.5	1.5	1.5	1.5	1.5
No. of teeth	30	20	17	15	13	12
Shift coefficient	+0.5	+0.5	+0.5	+0.5	+0.5	+0.5
Base tangent length(mm)	$21.070^{-0.023}_{-0.061}$	$12.004^{-0.023}_{-0.061}$	$11.941^{-0.023}_{-0.061}$	$11.900^{-0.023}_{-0.061}$	$11.857^{-0.023}_{-0.061}$	$11.836^{-0.023}_{-0.061}$
No. of teeth	(5)	(3)	(3)	(3)	(3)	(3)
Min. effective face width (mm)	19	15	15	15	15	15

Model	RV-160N					
Ratio code	41	81	102.81	125.21	156	201
Module	2.0	1.5	1.25	1.25	1.25	1.25
No. of teeth	24	22	22	19	16	13
Shift coefficient	+0.5	+0.228	+0.5	+0.5	+0.5	+0.5
Base tangent length(mm)	$22.021^{-0.035}_{-0.085}$	$11.766^{-0.035}_{-0.085}$	$13.728^{-0.035}_{-0.085}$	$9.986^{-0.035}_{-0.085}$	$9.933^{-0.035}_{-0.085}$	$9.881^{-0.035}_{-0.085}$
No. of teeth	(4)	(3)	(4)	(3)	(3)	(3)
Min. effective face width (mm)	17	16.5	16.5	16.5	16.5	16.5

Model	RV-380N					
Ratio code	75	93	117	139	162	185
Module	2.0	2.0	1.5	1.25	1.5	1.0
No. of teeth	23	20	23	24	18	24
Shift coefficient	0	0	+0.25	+0.25	+0.25	+0.25
Base tangent length(mm)	$15.405^{-0.035}_{-0.085}$	$15.321^{-0.035}_{-0.085}$	$11.810^{-0.035}_{-0.085}$	$13.550^{-0.035}_{-0.085}$	$11.705^{-0.035}_{-0.085}$	$10.840^{-0.035}_{-0.085}$
No. of teeth	(3)	(3)	(3)	(4)	(3)	(4)
Min. effective face width (mm)	21	21	23.5	23.5	23.5	23.5

Model	RV-500N					
Ratio code	81	105	123	144	159	192.75
Module	2.0	1.75	1.5	1.25	1.25	1.75
No. of teeth	26	25	26	28	26	16
Shift coefficient	0	0	+0.5	+0.5	+0.5	+0.5
Base tangent length(mm)	$15.489^{-0.035}_{-0.085}$	$13.528^{-0.035}_{-0.085}$	$16.558^{-0.035}_{-0.085}$	$13.833^{-0.035}_{-0.085}$	$13.798^{-0.035}_{-0.085}$	$13.906^{-0.035}_{-0.085}$
No. of teeth	(3)	(3)	(4)	(4)	(4)	(3)
Min. effective face width (mm)	22.5	23	22	22	23	22

Model	RV-700N					
Ratio code	105	118	142.44	159	183	203.52
Module	2.0	2.0	1.75	1.5	2.0	1.75
No. of teeth	27	24	25	26	18	19
Shift coefficient	+0.25	+0.847	+0.25	+0.824	+0.15	+0.25
Base tangent length(mm)	$21.763^{-0.035}_{-0.085}$	$22.496^{-0.035}_{-0.085}$	$18.994^{-0.035}_{-0.085}$	$21.318^{-0.035}_{-0.085}$	$15.470^{-0.035}_{-0.085}$	$13.681^{-0.035}_{-0.085}$
No. of teeth	(4)	(4)	(4)	(5)	(3)	(3)
Min. effective face width (mm)	22	22	22	22	22	22

Nabtesco Contact information

For any inquires and requests for services related to this product, refer to our contact information as noted below.

In such a case, please inform us of the model, parts name, and S/N (serial number) indicated on the shipping label for the packing box.

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