

### Chapter 1 Concerning Safety

◇ This manual describes the standard directions and safety precautions in order to use this product safely. Please be aware that the use of this product in a manner other than those described in this manual may cause unforeseen problems or accidents with this product, and TS Corporation cannot be held responsible for the results.

◇ Please register with the Nabtesco Corporation service contact shown in the back of this manual in case this manual is lost or destroyed.

#### 1-1. Terminology and Types of Warnings

◇ Depending on the degree of risk (or severity of accident) of the contents, caution is required for the following 2 levels of warning terminology.

◇ Please understand the meaning of the warning terminology, and always follow those directions.

Warning Terminology	Definition
<b>⚠Warning</b>	Used when there is a possibility of death or severe injury to the user if mishandled.
<b>⚠Caution</b>	Used when there is a possibility of minor or intermediate injury to the user, or a possibility of physical damage if mishandled.

◇ Items which are marked with **⚠Caution** or **!Note** may lead to a serious accident depending on the situation, so always follow these instructions.

◇ Furthermore, similar to the warning terminology, sentences which have been added to the procedures or descriptions have been classified by the following identification words according to the importance of the contents.

Identification word	Definition
<b>!Note</b>	Warns of damage to this product, or the waste of time and materials. Always follow these instructions.
<b>Memo</b>	Supplemental information and information to prevent operating mistakes are recorded.

#### 1-2. Safety Precautions

##### ----- ⚠Warning -----

###### <General>

◆ Only persons who understand this manual should mount, operate, maintain, or inspect this product. Failure to comply may result in injury.

◆ Operating supervisors should not allow operation by persons who do not understand this product. Failure to comply may result in injury.

◆ Industrial equipment manufacturers must reflect the precautions for operating, maintaining, and inspecting the gear head in the users manual for the end-user of the industrial equipment. Failure to comply may result in injury.

###### <Installation>

◆ If the gear head is suspended in order to transport or mount, no one must be allowed to stand under the gear head. Failure to comply may result in injury.

###### <Operations>

◆ Never touch rotating parts during operation. Failure to comply may result in injury.

###### <Maintenance and Inspection>

◆ Never touch rotating parts during maintenance or inspection. Failure to comply may result in injury.

◆ Carefully restrain rotation of the drive train and the object to be driven before performing maintenance or inspections. Failure to comply may result in injury.

##### ----- ⚠Caution -----

###### <General>

◆ Always read and follow the instructions in this manual before mounting, operating, maintaining, or inspecting. Failure to comply may result in injury or damage to gear head.

◆ Do not use gear head outside of the specification. Failure to comply may result in injury or damage to gear head.

◆ Do not insert fingers or other objects into the opening of the gear head. Furthermore, if belts or chains are used in the drive train, do not insert fingers or other objects into the gap around the cover. Failure to comply may result in injury or damage to gear head.

◆ Do not use a damaged gear head. Failure to comply may result in injury or damage to gear head.

◆ Do not make modifications to or disassemble gear head. Failure to comply may result in injury or damage to gear head. Nabtesco Corporation will not be responsible for modifications to the gear head made by the customer that are outside of the warranty.

◆ Gear head should not be subjected to strong impact or vibration. Failure to comply may result in injury or damage to gear head.

### <Opening Package>

- ◆ Please confirm that this product is as ordered. Installing the wrong gear head may result in injury or damage to equipment.

### <Transportation>

- ◆ When transporting the gear head, be careful that the gear head does not drop or fall. Failure to comply may result in injury or damage to gear head.

### <Mounting>

- ◆ Do not climb on or place heavy objects on top of gear head. Failure to comply may result in injury or damage to gear head.
- ◆ Tighten the gear head mounting bolts to the torque recommended by Nabtesco Corporation. Injury or damage to the industrial equipment may result if the bolt loosens and the gear head drops or moves out of position
- ◆ Take care that the gear head does not fall during mounting. Failure to comply may result in injury.

### <Operations>

- ◆ Gear head may become hot during operation. After operation is stopped, do not touch gear head until it has been allowed to cool. Failure to comply may result in burns.
- ◆ If a problem is found with the gear head, do not operate until countermeasures have been taken. Failure to comply may result in injury or damage to gear head.
- ◆ Do not use in a flammable environment or near combustible materials. Doing so may result in fire.

### <Maintenance>

- ◆ When changing the grease or making repairs to the gear head, make certain that the power to the industrial equipment is turned OFF. Failure to comply may result in injury or damage to gear head.
- ◆ If the safety cover is removed to change the grease or to make repairs, be certain that the safety cover is returned to its original position after the operation is completed (for gear heads which have a safety cover attached). Failure to comply may result in injury or damage to the gear head.

### ! Note

### <General>

- ◆ Do not store in a humid or corrosive environment. Failure to comply may result in gear head damage by corrosion.

### <Opening Package>

- ◆ Please confirm top and bottom before opening package. Failure to comply may result in damage to gear head.

### <Mounting>

- ◆ Use equipment which can sufficiently support the weight of the gear head when suspending it. Failure to comply may result in damage to the suspension equipment, and the gear head may fall.
- ◆ Always confirm that there is no foreign matter between the gear head and the mounting surface before mounting. Failure to comply may cause deformation to the mounting surface, and then proper mounting precision cannot be obtained.
- ◆ Carefully observe the mounting direction. Failure to comply may result in damage to gear head.

### <Maintenance>

- ◆ Please contact Nabtesco Corporation for repairs. Product may become unusable if disassembled.

## Chapter 2 Assembly Guidelines

### 2-1. Mounting Clamp Couplings

⇒ The clamp couplings are included in the box.

### ! Note

- ◆ The input shaft insertion opening spline hole is coated with grease (Pyronoc Universal N6B). If the input shaft is inserted to the spline hole without the grease applied, the spline may be damaged.

⇒ Wipe the outside of the motor shaft and the clamp surface with a waste rag.

### ! Note

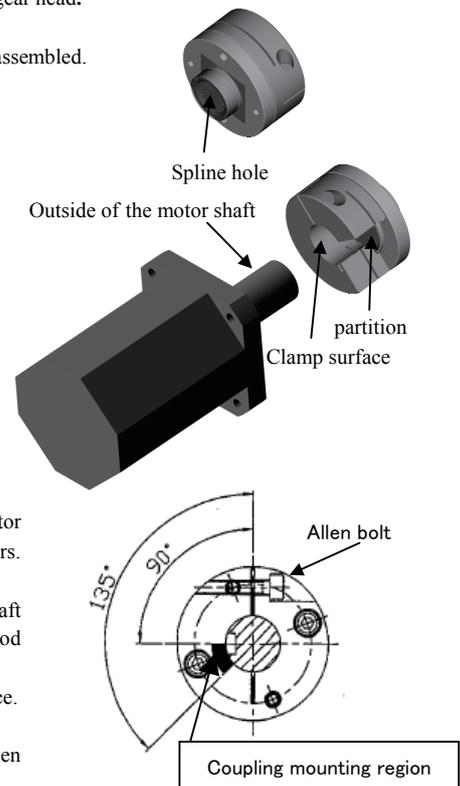
- ◆ If foreign matter or oil is adhered to the motor shaft clamp surface of the clamp coupling or the outside of the shaft, a proper tightening force will not be possible.

⇒ Insert the motor shaft into the clamp coupling. At this stage, be sure that the tip of the motor shaft has reached the partition in the coupling. Note that you can easily insert the motor shaft at first, but will feel greater pressure while inserting it the last several millimeters.

### ! Note

- ◆ If the motor shaft has a key groove, remove the key, and align the phase of the motor shaft key groove center to the key groove shaft coupling mounting region, or else a good tightening force will not be obtained.
- ◆ The coupling may become damaged if the motor shaft is inserted with unreasonable force.
- ◆ If the motor shaft is not inserted up to the partition, the gear head may be damaged.

⇒ After confirming that the motor shaft has been inserted up to the partition, tighten the Allen bolts to the designated tightening torque.

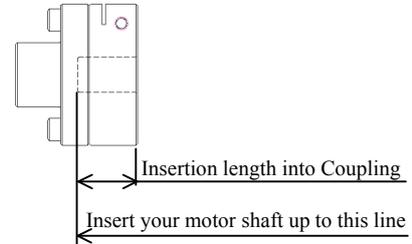


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Coupling outside diameter (mm)	φ 44	φ 56	φ 68	φ 82	φ 94	φ 126
Bolt Size	M4	M5	M6	M8	M8	M10
Tightening Torque (N-m)	3.4±0.17	7±0.35	14±0.7	30±1.5	30±1.5	60±3.0
Insertion length into Coupling (mm)	18.5	23.5	27.5	33.5	38.5	43.5

**! Note**

- ◆ In case the motor shaft is tapered, use the included shaft adapter, which is tapered on the inside and straight outside. Then, follow the instructions above.



### 2-2. Mounting Servo Motor

- ⇒ When inserting the servo motor into the gear head motor flange, lower the motor straight down from directly above the gear head.
- ⇒ Hold the motor by the outside surface, and insert while lightly rotating back and forth between 30° to 45°. Do not insert with unreasonable force under any circumstances.
- ⇒ Confirm that the servo motor is positively inserted into the gear head motor flange, and that the motor flange surface and the gear head motor mounting surface are in contact and not skewed. If the mating region is not properly inserted, there will be a gap between the motor and the mating surface.
- ⇒ Secure the servo motor to the gear head using the Allen bolts. Tighten the opposing side bolts evenly to the tightening torque designated by the servo motor manufacturer.

**! Note**

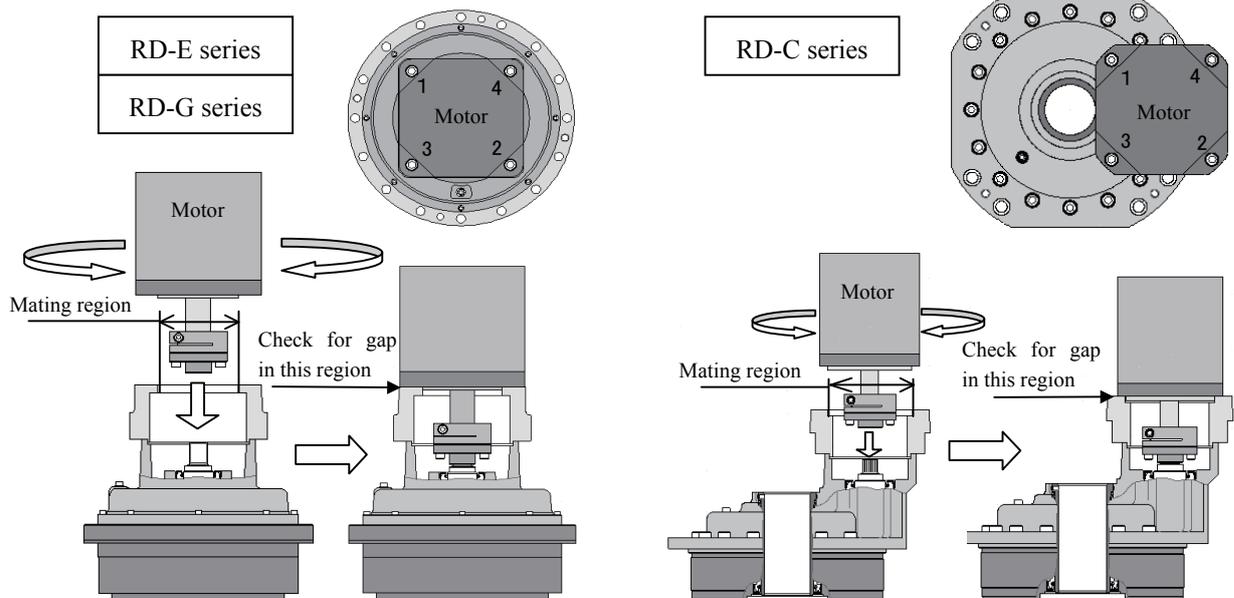
- ◆ The product may become damaged if the motor is inserted with unreasonable force.

**Memo**

- ◆ The Allen bolts for mounting the servo motor are not included with this product. The customer should prepare these.

**! Note**

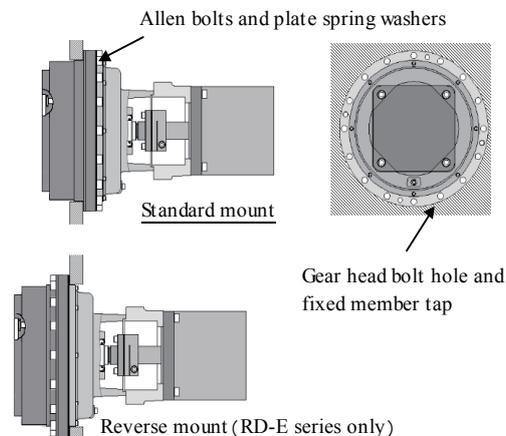
- ◆ If the outside diameter of the coupling is larger than the inside diameter of the motor flange and the coupling can not go through the motor flange, first remove the motor flange from the gear reducer and attach the motor flange to your motor, and then attach the coupling to the motor shaft.
- ◆ If your motor flange code starts with R (e.g. RST, RSF, RSL, RSM, ...), first attach the included adapter ring to the motor flange and then attach the coupling to the motor shaft.



### 2-3. Mounting Gear Head

- ⇒ Attach the gear head in the designated position. At this time, align the phase of the fixed part tap with the gear head bolt holes.
- ⇒ Tighten the Allen bolts with plate spring washers evenly to the designated tightening torque.

Bolt Size	Tightening Torque (N-m)	Bolt Details
M5	9.01±0.49	Allen Bolt JIS B 1176
M6	15.6±0.78	
M8	37.2±1.86	Strength Classification JIS B 1051 12.9
M10	73.5±3.43	Screw JIS B 0205 6g or Class 2
M12	128.4±6.37	
M14	204.8±10.2	
M16	318.5±15.9	



#### ! Note

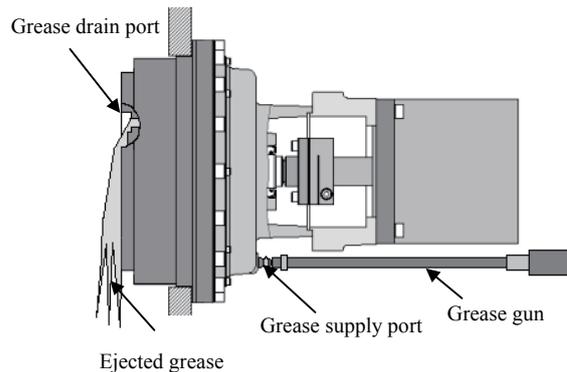
- ◆ The gear head is delivered with the motor flange attached. As shown below, there are situations where the motor flange must be removed in order to properly mount the gear head. In these cases, remove the motor flange before mounting the gear head to the equipment.
  - Cases where the motor flange interferes during standard mounting so that a torque wrench cannot be used.
  - Cases where the motor flange is larger than the fit hole during reverse mounting.
- ◆ Do not apply any load on the hollow part of RD-C series. The oil seal can become deformed.

## Chapter 3 Maintenance

### 3-1. Changing the Grease

#### ! Note

- ◆ When the gear head is operated with the appropriate amount of grease, the grease should normally be changed every 20,000 hours. Please change grease at shorter intervals when operating in hot environments (over 40°C).
- ⇒ There is one grease supply port on the motor mount side and one grease drain port on the output shaft side.
- ⇒ Remove the Allen bolt which has the grease supply port seal washer, and attach one of the grease nipples (provided by the customer).
- ⇒ Remove the flange plug or Allen bolt with seal washer from the grease drain port.
- ⇒ Make sure that the grease nipple is in the bottom, and that the grease drain port is at the top. Inject the appropriate amount of grease, using a grease gun through the grease nipple on the grease supply port side. If grease begins to be ejected from the grease drain port, temporarily stop injection, replace the flange plug or Allen bolt with seal washer and run the motor at low speed (around 500 rpm) for approximately 1 minute. Repeat this operation several times until the appropriate amount of grease is injected.



RD-E series	Amount of Grease (cc)	RD-C series	Amount of Grease (cc)	RD-G series	Amount of Grease (cc)
RD-006E	92	RD-010C	259	RD-07G	157
RD-020E	149	RD-027C	432	RD-17G	232
RD-040E	335	RD-050C	719	RD-40G	282
RD-080E	582	RD-100C	979		
RD-160E	924	RD-200C	2360		
RD-320E	1647	RD-320C	3877		

#### ⚠ Caution

- ◆ Do not touch rotating parts while the motor is operating. Also, keep rags away from rotating parts. Failure to comply may result in injury.
- ⇒ Wipe away the remaining grease that has been ejected from the output shaft side, and replace the flange plug or Allen bolt with seal washer into the grease drain port.

----- *Memo* -----

- ◆ Leaving the grease nipple in the grease supply port will not affect the function of the gear head, but if it is a hindrance to the end user, remove the grease nipple and replace it with the original Allen bolt with seal washer. Tighten the Allen bolt and the flange plug to the designated tightening torque.

Flange plug	M8 × P1	M10 × P1	Allen bolt (seal washer)	M6
Tightening torque (N-m)	15.6	19.6	Tightening torque (N-m)	9.4

### 3-2. About the Grease

----- *⚠Caution* -----

<Precautions for Handling Grease>

- ◆ Always read and follow the instructions regarding the grease before handling. Improper use may lead to serious accident.
- ◆ Use protective glasses to prevent contact with eyes. Contact with eyes may result in inflammation.
- ◆ Use rubber gloves to prevent contact with skin. Contact with skin may result in inflammation.
- ◆ Do not ingest. (Ingesting may result in diarrhea and vomiting.)
- ◆ For questions, please refer to the Material Safety Data Sheet (MSDS).

<Emergency Measures>

- ◆ In case of contact with eyes, flush eye with pure water for 15 minutes and seek medical attention.
- ◆ In case of contact with skin, wash thoroughly with soap and water.
- ◆ If ingested, do not induce vomiting, but rather seek prompt medical attention.

<Disposal of Waste Grease and Containers>

- ◆ Disposal methods are dictated by law. Please dispose appropriately in accordance with the law.
- ◆ For questions, please consult the supplier.

<Storage Method>

- ◆ After use, store in a sealed container to prevent contamination and moisture.
- ◆ Store in a cool location away from direct sunlight, flame, and heating sources.

### 3-3. Gear Head Storage

----- *! Note* -----

- ◆ To prevent rusting or corrosion of the gear head, or to prevent degradation of the seals, do not store the gear head in the following environments.
  - High temperature, high humidity, or freezing conditions
  - Outdoors subject to direct wind and rain
  - Near chemicals such as organic solvents, acids, or bases, or where it can be affected by volatile gases
  - Places with large temperature fluctuations where there is a chance of condensation

### 3-4. Disposal Method

----- *! Note* -----

- ◆ When disposing of the gear head, remove all of the grease, and dispose through a standard industrial equipment scrap operator.

### Chapter 4 Other Notes

#### 4-1. Caution for use of RD SERIES

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

#### 4-2. Guarantee

- ◇Nabtesco Corporation guarantees that the RD Gear Heads are free from defects in material and workmanship.
- ◇The term of guarantee shall be one year after delivery or 2,000 hours of operation after the installation on an actual machine, whichever comes first, on condition that the product is operated under the rated operation conditions specified by us, under normal assembly and lubrication conditions.
- ◇If any defect in materials or workmanship is detected during the above guarantee term, the product will be repaired or replaced at our expense, provided that the number of man-hours required for demounting and remounting the product from the machine, transportation expenses for re-delivery, warehousing and other incidental expenses shall be excluded from our obligation..
- ◇No compensation will be provided for the lost opportunities or any other type of loss due to a shutdown of operation that was caused by a defect in the product.
- ◇If obligations under the guarantee are discharged monetarily, the upper limit of the amount shall not exceed the selling price of the product, which is the subject of the claim.

#### 4-3. Service Contact

- ◇For inquiries concerning the RD Gear Head, or to request service, please contact our offices listed below.
- ◇When requesting service, please provide the information (model number, serial number) shown on the nameplate attached to the product.

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