

ASTERO® Right Angle Gearhead Maintenance Manual

- The gearhead and motor should be handled, installed and maintained by trained technicians. Carefully read this manual and all accompanying documents before use.
- A copy of this manual should be sent to the actual user of the gear unit.
- This manual should be maintained by the user.

1. Safety and other precautions

CAUTION

General

- The gearhead and motor should be operated only under the specification indicated in name plate and catalogue; otherwise, electric shock, injury or damage to system may occur.
- Keep hands and all foreign objects from the internal moving part of the gear unit and motor; otherwise, electric shock, injury, fire or damage to system may occur.
- Damaged units should be taken off-line; otherwise, injury or fire may occur.
- Do not remove nameplate.
- Any modifications or alterations of any kind, to the unit, will void the warranty and all subsequent claims.

Transport

- Exercise ample care not to drop the unit and fall during transport.

Installation

- Do not place any inflammables around the gearhead and motor; otherwise, fire may result.
- Do not place any objects that will hinder ventilation around motor; otherwise, cooling effect is reduced, and may lead to a possible fire hazard and a burn due to excessive heat built-up.
- Do not touch the key way at the shaft end or on the inside of the gear unit and motor; otherwise, injury may result.
- When the unit is used in food processing applications vulnerable to oil contamination, install an oil pan or other such device to deal with oil leak which rarely happen. Otherwise, oil leakage may damage products.

Coupling with other machines

- Install appropriate guard devices around rotation parts; otherwise, injury may result.
- Confirm the direction of rotation before coupling the unit with its driven machine. Difference in the direction of rotation may cause injury or damage to the system.

Wiring

- Do not touch lead wire when measuring the insulation resistance. Electric shock may result.

DANGER

Wiring

- Connect a power cable to the motor according to the connection diagram or maintenance manual; otherwise, electric shock or fire may result. (For motors without terminal box, exercise insulation in the connecting part.)
- Do not forcibly curve, pull or clamp the power cable and lead wires; otherwise, electric shock may result.
- Correctly ground the grounding bolt; otherwise, electric shock may result.
- Use power source stated in the nameplate; otherwise, motor may burn or fire.

Operation

- Never approach or touch any rotating parts (shaft, etc.) during operation; otherwise, loose clothing caught in these rotation parts may result in severe injury to humans.
- When the power supply is interrupted, be sure to turn off the power switch. Unexpected resumption of power may cause injury or damage to the equipment.

Daily inspection and maintenance

- Never approach or touch any rotating parts (shaft, etc.) during maintenance; otherwise, loose clothing caught in these rotating parts may result in severe injury to humans.

Inspection upon delivery

- Verify that the unit received is relevant to the order. When a different product is installed, injury or damage to the system may result.

2. Combination of motor and gearhead

The following tables show the proper combination of the motor model and gearhead model. Other combinations except those shown by the tables are not permitted. Be careful.

Table 1. Combination of motor and gearhead

| Motor capacity | Motor mode | Gearhead model |
|----------------|---------------|----------------|
| 25W | A8 * 25 * * * | R8 * * |
| 40W | A9 * 40 * * * | R9A * * |
| 60W | A9 * 60 * H * | R9B * * |
| 90W | A9 * 90 * H * | |

Table 2. When the intermediate gearhead is used

| Motor capacity | Motor mode | Intermediate gearhead model | Gearhead model |
|----------------|---------------|-----------------------------|----------------|
| 25W | A8 * 25 * * * | G8X*H10 | R8 * * |
| 40W | A9 * 40 * * * | G9A*H10 | R9A * * |
| 60W | A9 * 60 * H * | G9B*H10H | R9B * * |
| 90W | A9 * 90 * H * | | |

A symbol that depends on the model or reduction ratio is inserted into the * part.

3. Allowable maximum torque


Allowable maximum torque is maximum torque during motor operation. It is limited by rated motor torque, temperature rise, and strength of gearhead combined. This torque depends on reduction ratio. Please refer to catalogue for details.

4. Rotating direction

The rotating direction of the gearhead output shaft is shown by the following table. The rotating direction of intermediate gearhead is the same as the motor shaft.

Table 3. Combination of motor and gearhead

| Model | Reduction ratio | Rotating direction |
|----------------|---|----------------------------|
| R8Y □ | 5, 7.5, 10, 12, 80, 100, 120, 160, 200, 240 | 15, 20, 25, 30, 40, 50, 60 |
| R9AY □, R9BY □ | 5, 7.5, 10, 12, 80, 100, 120, 150, 200, 240 | 15, 20, 25, 30, 40, 50, 60 |



8. How to install motor and gearhead

Install motor and gearhead by the following procedure.

- Take out the motor and gearhead from the package. Then, remove the cap from the end of the shaft on each of motor and gearhead.

*Make sure that grease is applied to the concave portion at the center of shaft on gearhead.

※ Note: When removing the cap, the teeth of motor shaft may injure your hand. Be careful for handling.

- Fit the motor shaft to the gearhead shaft. Then, as rotating the motor little by little, install it onto the gearhead.

※ Note: Be careful not to catch the lead wire between the contact surfaces of motor and gearhead.

If an excessive force is applied to the motor shaft or if the motor shaft bumps against the inside of gearhead, an abnormal noise may be caused by the broken gear and the operating life may be shortened. Be careful for handling. Make sure that there is no "space" between the motor flange surface and the gearhead flange surface. If there is a "space", do not install the motor and gearhead to each other forcibly but check if a lead wire or foreign matter is caught by the units.

- Use the four HEX socket bolts, which are packaged with the motor and gearhead. Tighten the bolts uniformly with the torque shown in the following table.

| Motor capacity | Gearhead size | Bolt size | Tightening torque |
|----------------|---------------|-----------|-------------------|
| 25W | R8 | M5 × 18 | 3.4Nm |
| 40,60,90W | R9 | M6 × 22 | 5.7Nm |

※ Note: Oils may ooze from the contact surfaces of the motor and gearhead. The oozing oils do not cause any problem for the gearhead operation. However, if oozing of oils hinders the use of gearhead, apply liquid packing to the contact surfaces of the motor and gearhead when installing them.

When installing the motor and gearhead to each other, the motor is sometimes protruded from the flange surface of gearhead. Install the motor and gearhead not to deviate □ on the motor contact surface from □ on the gearhead contact surface.

When fixing power transmission components (chain, pulley, sprocket, etc.) on the gearhead shaft with keyway, use the accessory key by processing keyway on the transmission component side.

9. Hollow shaft (R8Y □, R9AY □, R9BY □)

There are (1) Torque arm mounting and (2) Flange and On-bed mounting for Hollow shaft.

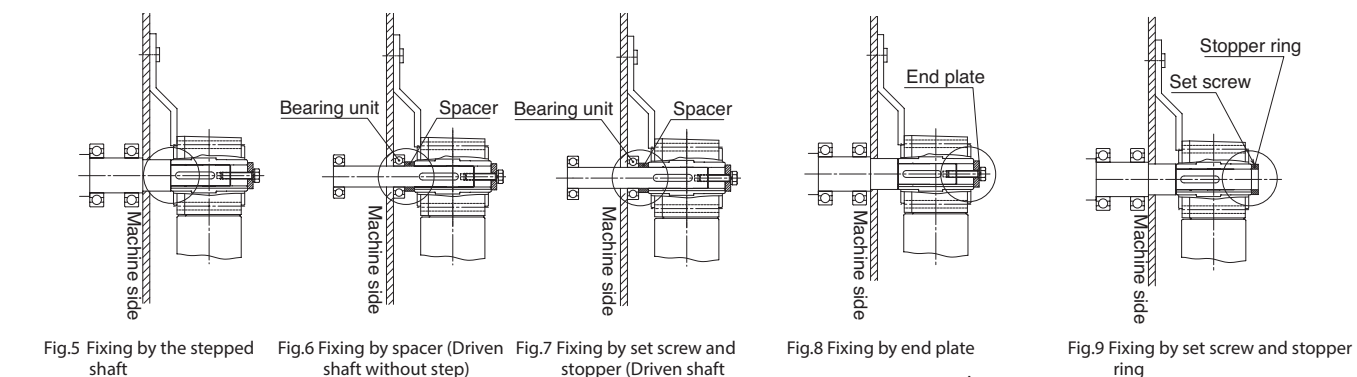
(1) Torque arm mounting

(a-1) How to set the shaft

Apply molybdenum disulfide grease to the surface of a driven shaft and the inner surface of a hollow shaft. Then insert the Drive into the driven shaft. If the fitting is too tight, lightly knock the end face of a hollow output shaft with a wooden hammer for smooth insertion. Do avoid knocking the casing. We recommend making a jig shown Fig. 2. Using this jig, you can insert the Drive smoothly.

The hollow shaft is made according to the tolerances of JIS H8. If you experience impact or notice a large radial load with the hollow shaft, further tighten the fitting between the hollow shaft and the driven shaft. (We recommend JIS j6 or k6 as the tolerance of a driven shaft.)

(b-1) Method to avoid the Drive from slipping away from a driven machine. (Fig.3-5)



(c-1) How to set a torque arm

Mount a torque arm on the driven machine side of the Drive casing. Use hexagon socket head bolts for mounting. (See Table 4 for bolt sizes.)

Torque arm anti-rotation stopper should be designed so as to allow movement of the torque arm to make sure that the contact surface between the Drive and shaft are free from excess force.

Don't fix the torque arm by anti-rotation bolts.

For such applications as requiring frequent start and stop or frequent reversing of the rotating direction, insert a rubber bushing between the torque arm and securing bolt (or spacer) in order to relax impact load.

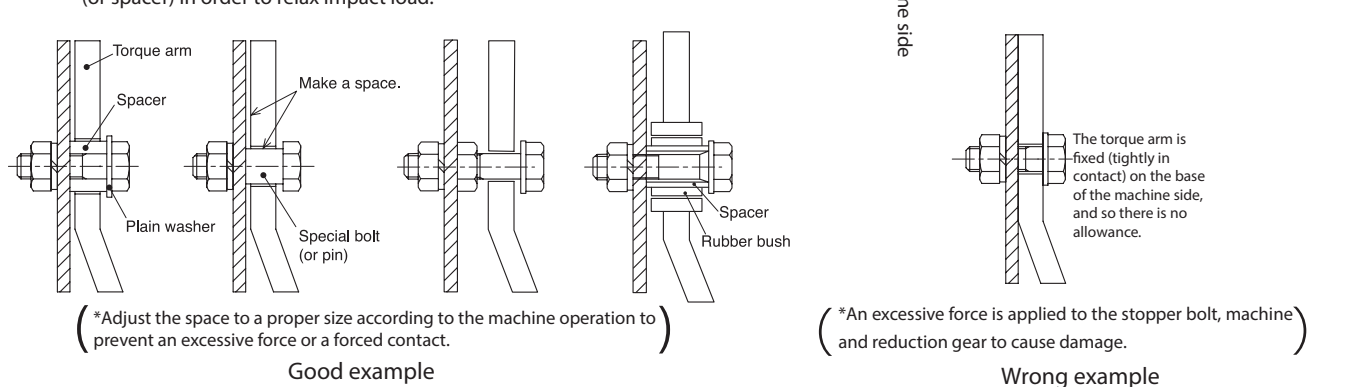
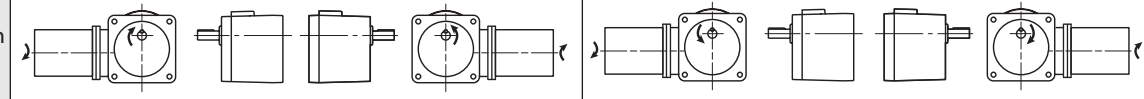


Fig.11 Example for installing stopper ("A" part)

| Model | Reduction ratio | Rotating direction |
|----------------------------------|---|----------------------------|
| R8L □, R8R □ | 5, 7.5, 10, 12, 80, 100, 120, 160, 200, 240 | 15, 20, 25, 30, 40, 50, 60 |
| R9AL □, R9AR □ R9BL □, R9BR □ | 5, 7.5, 10, 12, 80, 100, 120, 150, 200, 240 | 15, 20, 25, 30, 40, 50, 60 |



5. Operation life & service factor (SF) of gearhead

- Apply each service factor corresponding to the load type (Refer to Table 2).
- The operating life of gearhead with service factor 1.0 would be 5,000hrs.

Table 4. Service factor & load type

| Load type | Example of load | Service factor |
|----------------|-----------------------------|----------------|
| Uniform load | Continuous running | 1.0 |
| Moderate shock | Frequent start/stop running | 1.5 |
| Heavy shock | Frequent cw/ccw running | 2.0 |

6. Radial load & axial load

Radial load can be obtained by following formula.

$$Pr = P \cdot l \cdot Cf \cdot SF / R \cdot Lf$$

Where Pr : Radial load [N]
 P l : Actual transmitted torque on output shaft [N · m]
 Cf : Coupling factor (Refer to Table 3)
 SF : Service factor (Refer to Table 2)
 R : Radius of gear or pulley [m]
 Lf : Radial load location factor

- When gearhead is used with load exceeding the allowable value (Table 4), bearing's short-term damage, bend of output shaft, and fatigue damage by repeating loads may result.
- Make sure not to exceed allowable radial and axial load on the shaft when coupling gear, which generates axial load at the output shaft of the gearhead.

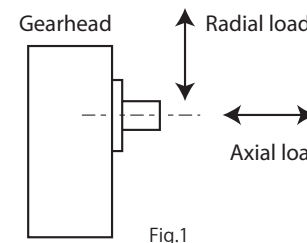


Table 5. Coupling factor for operating type

| Operating type | Cf |
|-----------------|------|
| Chain, sprocket | 1 |
| Gear | 1.25 |
| Pulley | 1.5 |

Table 6. Allowable radial & axial loads

| Type | Reduction ratio | Max. allowable torque [Nm] | Allowable radial load [N] | Allowable axial load [N] |
|--------------|-----------------|----------------------------|---------------------------|--------------------------|
| Hollow-shaft | R8Y □ | 5 ~ 240 | 539 | 294 |
| | R9AY □ | 5 ~ 10 | 637 | |
| | R9BY □ | 12 ~ 20 | 834 | |
| Solid-shaft | R8L □ | 5 ~ 240 | 343 | 294 |
| | R9AL □ | 5 ~ 15 | 441 | |
| | R9AR □ | 20 ~ 240 | 588 | |
| | R9BL □ | 5 ~ 10 | 539 | |
| | R9BR □ | 12 ~ 20 | 686 | |

※ Note: The allowable radial load shows the value of the following position.

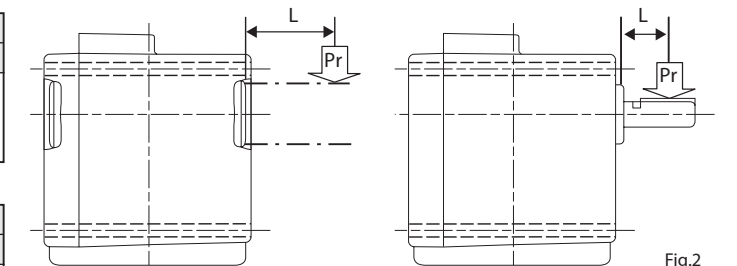
Hollow-shaft type: 20mm from the shaft end
 Solid-shaft type: Center of shaft

Table 7. Radial load location factor: Lf (Hollow-shaft)

| Model | Distance from shaft end L(mm) | | | | | |
|--------|-------------------------------|-----|-----|-----|-----|-----|
| | 10 | 20 | 30 | 40 | 50 | 60 |
| R8Y □ | 1.0 | 1.0 | 1.2 | 1.3 | 1.4 | 1.5 |
| R9AY □ | | | | | | |
| R9BY □ | | | | | | |

Table 8. Radial load location factor: Lf (Solid-shaft)

| Model | Distance from the stepped part on shaft L(mm) | | | | | |
|--------|---|-----|----|-----|-----|-----------|
| | 5 | 10 | 15 | 20 | 25 | Shaft end |
| R8L □ | 0.9 | 0.9 | 1 | 1.1 | 1.1 | 1.2 |
| R8R □ | | | | | | |
| R9AL □ | 0.9 | 1 | 1 | 1.1 | 1.1 | 1.2 |
| R9AR □ | | | | | | |
| R9BL □ | 0.9 | 1 | 1 | 1.1 | 1.1 | 1.2 |
| R9BR □ | | | | | | |



When radial load and axial load exist together

$$\left[\frac{Pr \cdot Lf}{Pr0} + \frac{Ps}{Ps0} \right] \cdot Cf \cdot SF$$

Pr: Actual radial load
 Pr0: Allowable radial load
 Ps: Actual axial load
 Ps0: Allowable axial load

7. Load moment of inertia

Load moment of inertia on motor shaft can be obtained by following formula.

$$JM = J / i^2 \quad \text{Ratio} \leq 50 \quad J: \text{Load moment of inertia [kgm}^2\text{]}$$

$$JM = J / 50^2 \quad 50 < \text{Ratio} \quad JM: \text{Load moment of inertia on motor shaft [kgm}^2\text{]}$$

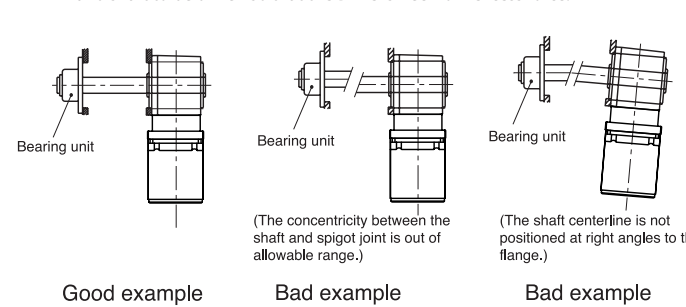
When gearhead is used with moment of inertia exceeding the allowable value (Table 5), gear's and bearing's short-term damages may result.

Table 9. Allowable load moment of inertia on motor shaft [10⁴ kgm²]

| Model | Capacity [W] | 1-phase | 3-phase |
|---------|--------------|---------|---------|
| A8 □ 25 | 25 | 0.30 | 0.30 |
| A9 □ 40 | 40 | 0.75 | 0.75 |
| A9 □ 60 | 60 | 1.00 | 1.00 |
| A9 □ 90 | 90 | 1.00 | 1.00 |

10. Ambient conditions

(2) Flange and On-bed mounting (optional)
 When installing the Drive, pay attention to the alignment between the Drive and shaft to be driven so that the Drive is free from excess force.



| Location | Indoors (Minimal dust and humidity) Consult us when mounting our equipment other than the conditions mentioned above. Special specification will be necessary. Install the equipment where it is easy to carry out inspection and maintenance. Install the equipment on a mount having sufficient rigidity. |
|-------------|--|
| Temperature | -10°C-40°C |
| Humidity | Under 85%RH with no condensation |
| Elevation | Under 1,000m |
| Atmosphere | Well ventilated location free of corrosive & explosive gases, vapors and dust. |

11. Storage

When storing Astero drives for any extended period of time, consider the following important points:

1) Storage Location

- Store the unit in a clean, dry place indoors.
- Avoid storage outdoors or in places with humidity, dust, sudden temperature changes or corrosive gas.

2) Storage Period

- Storage period should be less than 1 year.
- When the storage period exceeds 1 year, special rust prevention is necessary. Contact the factory for details.
- Export models need export rust prevention. Contact the factory for details.

3) Use After Storage

- Oil seals will deteriorate when exposed to high temperatures and UV rays. Inspect the oil seals before operation. Replace the oil seals after long-term storage if there is any sign of deterioration.
- After starting the Astero drives or reducer, verify that there is no abnormal sound, vibration or heat built-up. If supplied as a brakemotor verify that the brake operates properly. If any anomaly is observed, contact our nearest agent, distributor or sales office.

12. Warranty

The scope of warranty of our delivered products is limited only to what we manufactured.

Warranty (period and description)

| Warranty period | The warranty period applies only to new products and represents 18 months after the shipment or 12 months after the actual operation, whichever is shorter. |
|-----------------------------|--|
| Description | If the product failed within the warranty period, despite a proper mounting, connection and maintenance & administration are followed according to the maintenance manual, and the product is properly run based on the specification on the catalog or under conditions agreed separately, we will repair or provide an alternative product at our discretion for free of charge, except the exclusions below. However, as far as the product is connected with customers' other devices, we will not indemnify those expenses on dismounting from/mounting on the devices, etc. and other associated construction expenses, transportation expenses and opportunity loss and operation loss the customers suffered from, and other indirect damages. |
| Exclusion from the warranty | The following items will be excluded from the warranty: 1. A breakdown resulting from defects in the installation of the product and coupling with other devices, etc. 2. A breakdown resulting from insufficient maintenance & administration and improper handling of the product, including a case that the product is not stored according to our defined storage manual. 3. A breakdown resulting from operation which does not fall within our specification and other operation conditions and use status we hardly can know or a failure caused by the use of lubricant which we do not recommend. 4. A breakdown resulting from defects, special specification, etc of device prepared and connected by customer. 5. A breakdown resulting from disassembly, parts replacement, and modification conducted by the customer. 6. A breakdown resulting from defects in parts supplied or specified by customers. 7. A breakdown caused by inevitable force including earthquake, fire, flood disaster, salt damage, gas damage, and lightning strike, etc. 8. Warranty of natural wear and tear, abrasion, and deterioration of such relevant consumable parts as a bearing and oil seal, etc. under normal usage. 9. A breakdown caused for reasons not attributable to each of the above item. |

Specifications, dimensions, and other items are subject to change without prior notice.

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