

ASTERO® 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

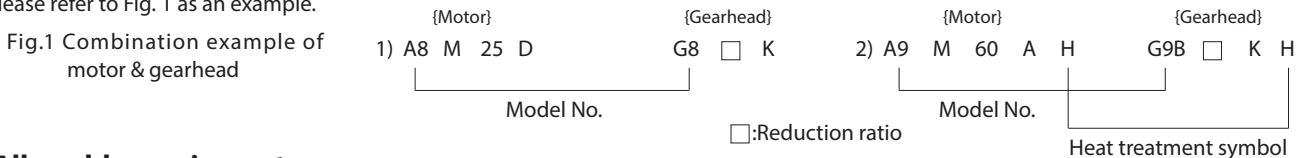
- Never approach or touch any rotating parts (shaft, etc.) during maintenance; otherwise, loose clothing caught in these rotating parts may result in severe injury to humans.

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. Inspection upon delivery

- Gearhead and motor with same model number and same heat treatment symbols can be combined.
- Please refer to Fig. 1 as an example.



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

- There are two rotating directions for output shaft of gearhead, same direction as motor and counter-direction, determined by reduction ratio. Refer to (table 1).
- Direction of intermediate gearhead (1/10) is the same as a single unit.

Table 1. Rotating direction of gearhead output shaft

Model \ Ratio	3	3.6	5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	
G6 <input type="checkbox"/> D																									
G7 <input type="checkbox"/> K																									
G8 <input type="checkbox"/> K																									
G9A <input type="checkbox"/> K																									
G9B <input type="checkbox"/> KH																									

: Reduction ratio

: Same direction as motor

: Reverse-direction

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 2. 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.
 $P_r = P_l \times C_f \times S.F. / R$

Where Pr: Radial load [N]
 Pl : 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]

- 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.

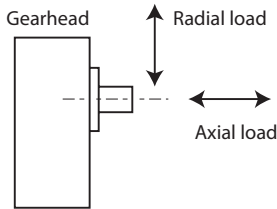


Table 3. Coupling factor for operating type

Operating type	Cf
Chain, sprocket	1
Gear	1.25
Pulley	1.5

Table 4. Allowable radial & axial loads

Model	Reduction ratio	Max.allowable torque [Nm]	Allowable radial load [N]	Allowable axial load [N]
G6□D	3-18	0.10-0.60	60	30
	20-250	0.60-2.90	150	
G7□K	3-18	0.30-1.80	100	40
	20-200	2.00-4.90	200	
G8□K	3-18	0.20-2.50	120	50
	20-200	2.90-7.80	240	
G9A□K	3-18	0.40-3.90	290	100
	20-200	3.90-9.80	360	
G9B□KH	3-10	0.80-3.90	440	150
	12.5-20	3.90-7.80	510	
	25-60	4.90-19.60	590	
	75-200			

※ Note: Allowable maximum torque depends on reduction ratio.

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.

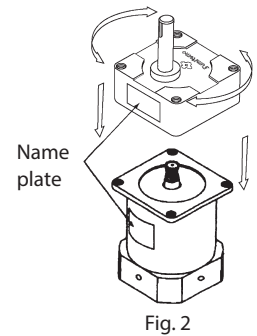
Table 5. Allowable load moment of inertia on motor shaft [10^{-4} kgm²]

Model	Capacity[W]	1-phase	3-phase
A6□06	6	0.05	-
A7□15	15	0.15	-
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

8. How to install motor and gearhead

- Install motor and gearhead, putting both contact surfaces together as in Fig. 2 while rotating them little by little. Forcing into motor shaft and bumping into the inside of gearhead, at assembly, may cause abnormal noise by broken gear and shorten the operating life.
- Use accessory key by processing keyway on the transmission component side, when fixing power transmission components (chain, pulley, sprocket, etc.) on the gearhead shaft with keyway.
- When holding transfer fittings down to gearhead shaft, applying impacts may cause damages or shortening operation life of gearhead. Please do not hit the gearhead shaft.

Motor capacity	Gearhead size	Screw size	Tightening torque
6W	G6	M4	2N·m
15, 25W	G7, G8	M5	2.5N·m
40, 60, 90W	G9	M6	3N·m



9. Ambient conditions

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.

10. 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, during which 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. When this product is disassembled or modified by the customer, or the parts are replaced 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. 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.