

Motor Maintenance Manual

- The gear head 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 gear head and motor should be operated only within its name plate and catalogue ; otherwise, electric shock, injury or damage to a 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 a system may occur.
- Damaged units should be taken off-line; otherwise, injury or fire may occur.
- Do not remove the 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 gear head 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 cope with rare oil leaking. 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. (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's burning or fire may result.

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.
- 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.

Inspection upon delivery

- Verify that the unit received is in fact the one ordered. When a different product is installed, injury or damage to the system may result.

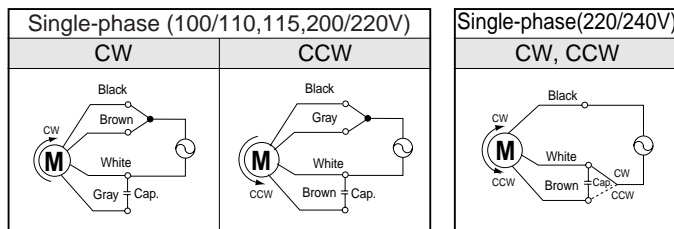
2. Wiring diagram

· Rotating direction viewed from the shaft end of motor.

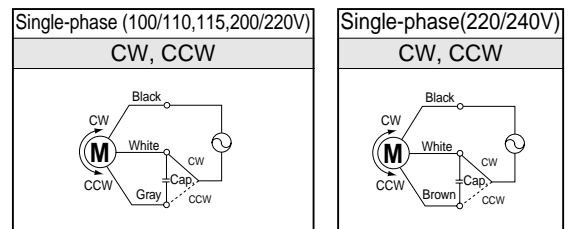
Fig.1 Wiring diagram

CW : clockwise
CCW : counter clockwise

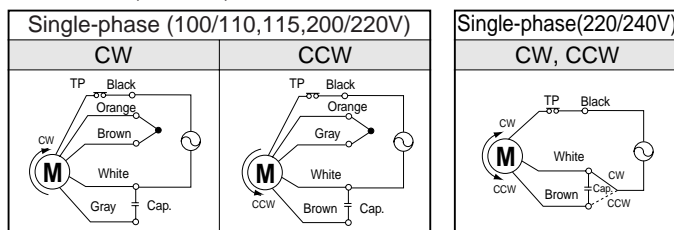
○ Induction (6W)



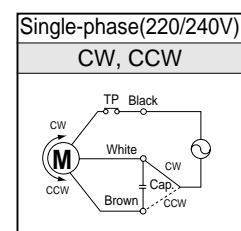
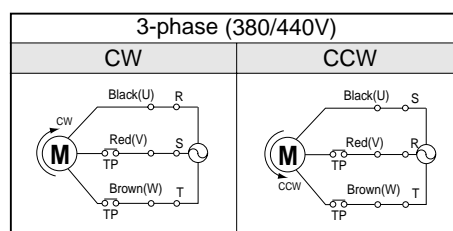
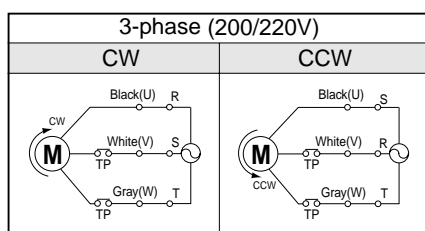
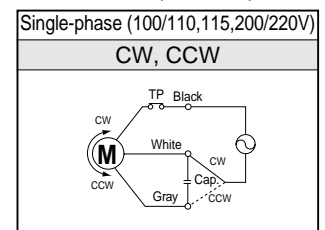
○ Reversible (6W)



○ Induction (15-90W)



○ Reversible (15-90W)



Note : Change the rotating direction of motor after motor stops completely.

When changing rotating direction during motor's running, it may take some time or it may be impossible to change it.

3. Inspection upon delivery

- Confirm the contents of nameplates for motor type and condenser.
 - Gearhead and motor which have same model No.s and same heat treatment symbols can be combined.
- Please refer to Fig.2 as an example.

Fig.2 Combination ex. of motor and gearhead

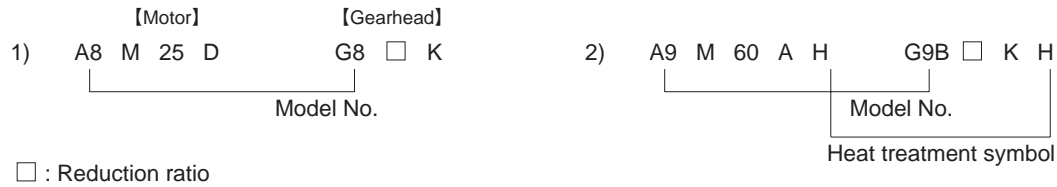


Table 1 Combination table of motor type and condenser

Induction motor

Motor Type	A6M06A	A6M06B	A6M06C	A6M06D	A7M15A	A7M15B	A7M15C	A7M15D	A8M25A	A8M25B	A8M25C	A8M25D
Condenser Type	DMF-25255	DMF-25205	DMF-45704	DMF-45604	DMF-25505	DMF-25405	DMF-45125	DMF-45904	DMF-25605	DMF-25455	DMF-45155	DMF-45135
Motor Type	A9M40A	A9M40B	A9M40C	A9M40D	A9M60AH	A9M60BH	A9M60CH	A9M60DH	A9M90AH	A9M90BH	A9M90CH	A9M90DH
Condenser Type	DMF-251006	DMF-25805	DMF-45255	DMF-45205	DMF-251506	DMF-251206	DMF-45405	DMF-45355	DMF-252506	DMF-252006	DMF-45605	DMF-45505

Reversible motor

Motor Type	A6R06A	A6R06B	A6R06C	A6R06D	A7R15A	A7R15B	A7R15C	A7R15D	A8R25A	A8R25B	A8R25C	A8R25D
Condenser Type	DMF-25305	DMF-25235	DMF-45804	DMF-45704	DMF-25605	DMF-25455	DMF-45155	DMF-45125	DMF-251006	DMF-25705	DMF-45255	DMF-45205
Motor Type	A9R40A	A9R40B	A9R40C	A9R40D	A9R60AH	A9R60BH	A9R60CH	A9R60DH	A9R90AH	A9R90BH	A9R90CH	A9R90DH
Condenser Type	DMF-251506	DMF-251206	DMF-45355	DMF-45305	DMF-252506	DMF-252006	DMF-45605	DMF-45505	DAL-253006	DMF-252506	DMF-45705	DMF-45605

4. Overheat protection device

1) Thermally protect type

- When motor is run with overload or is stopped and overheated, in order to protect motor coil, overheat protection device, T/P (Thermally protect), is built in the coil.
 - This T/P has an automatic reset system.
- So, if temperature in the coil returns to the normal level, this motor runs automatically.

2) Impedance protect type

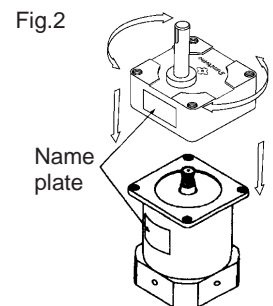
- Impedance protect motor is designed to enlarge impedance of coil winding, reduce the input current at motor restriction, and not to exceed the allowable max. temperature. Allowable temperature at class-A restriction of UL is less than 150°C. (Our UL approval motor is class-A)
 - "ZP" as impedance protect is displayed in the nameplate.
- Our □60mm motor is equivalent.

5. Rating

- Motor is designed to be suited to the usage conditions, and its usage limitation to fit to the usage conditions is called rating.
- There are some ratings, like continuous, short-time, and repetition rating. SHI's induction motor is continuous rating and reversible motor is short-time rating (30min).

6. How to install motor and gearhead

- Install motor and gearhead, putting both contact surfaces together like 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.
- When holding down transfer systems, such as chain, pulley, and sprocket, to the gearhead shaft with keyway, process keyway in the system side as well and hold them down by attached key.
- When holding transfer fittings down to gearhead shaft, giving impacts may cause damages or shortening operation life of gearhead. Please do not hit the gearhead shaft.



7. Ambient conditions

Location	Indoors (Minimal dust and humidity)
Temperature	-10°C-40°C
Humidity	Under 85%
Elevation	Under 1,000m
Atmosphere	Well ventilated location, free of corrosive gases, explosive gases, vapors and dust.

 **Sumitomo Heavy Industries, Ltd.**

POWER TRANSMISSION & CONTROLS GROUP

5-9-11, KITA-SHINAGAWA SHINAGAWA-KU, TOKYO 141-8686, JAPAN

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Gearhead Maintenance Manual

- The gear head and motor should be handled, installed and maintained by trained technicians. Carefully read this manual and all accompanying documents before use.
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Transport

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Installation

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- When the unit is used in food processing applications vulnerable to oil contamination, install an oil pan or other such device to cope with rare oil leaking. 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.

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- Use power source stated in the nameplate; otherwise, motor's burning or fire may result.

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.
- 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.

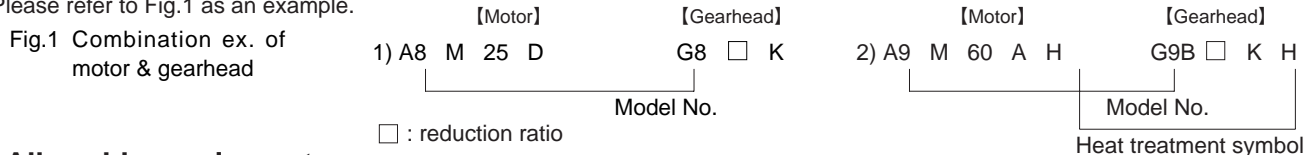
Inspection upon delivery

- Verify that the unit received is in fact the one ordered. When a different product is installed, injury or damage to the system may result.

2. Inspection upon delivery

- Gearhead and motor which have same model No.s and same heat treatment symbols can be combined.

Please refer to Fig.1 as an example.



3. Allowable maximum torque

- Allowable maximum torque is max. Torque during motor operation. It is limited by motor torque, temperature raising, and combined gearhead strength. 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	250	
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

: counter-direction

5. Operation life & service factor (S.F.) 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. Ex. of service factor & load type

Load type	Example of load	Service factor
Uniform load	Continuous running	1.0
Light duty	Frequent start/stop running	1.5
Medium duty	Frequent cw/ccw running	2.0

6. Radial load & axial load

- Radial load can be obtained by following formula.
 $Pr = P\ell \times Cf \times S.F./R$
 Where Pr : Radial load [N]
 Pℓ : Actual transmitted torque on output shaft [N·m]
 Cf : Coupling factor refer to (table 3)
 S.F. : Service factor refer to (table 2)
 R : Radius of gear or pulley [m]

Table 3. Coupling factor for operating type

Operating type	Cf
Chain, sprocket	1
Gear	1.25
Pulley	1.5

- When gearhead whose radial load exceeds the allowable value (Table 4) is used, bearing's short-term damage, bend of output shaft, and fatigue damage by repeating loads may result.
- In the case gear which generates axial load, such as helical gear, is applied, on the gearhead output shaft do not exceed both allowable values of radial and axial loads.

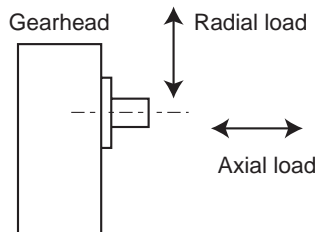


Table 4. Allowable radial & axial loads

Model	Reduction ratio	Max. allowable torque (N·m)	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.
 $J_M = J/i^2$ Ratio ≤ 50 J : Load moment of inertia [kg·m²]
 $J_M = J/50^2$ 50 < Ratio J_M : Load moment of inertia on motor shaft [kg·m²]

Table 5. Allowable load moment of inertia on motor shaft (10⁻⁴kg·m²)

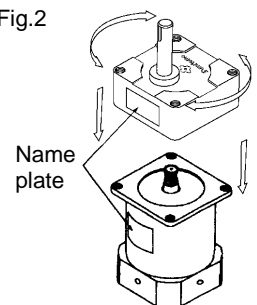
Model	Capa. (W)	1-phase	3-phase
A6□06	6	0.05	-
A7□15	15	0.15	-
A8□25	25	0.30	0.30
A9□40	40	0.75	0.75
A9□60	60	1.00	1.00
A9□90	90	1.00	1.00

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

8. How to install motor and gearhead

- Install motor and gearhead, putting both contact surfaces together like 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.
- When holding down transfer systems, such as chain, pulley, and sprocket, to the gearhead shaft with keyway, process keyway in the system side as well and hold them down by attached key.
- When holding transfer fittings down to gearhead shaft, giving impacts may cause damages or shortening operation life of gearhead. Please do not hit the gearhead shaft.

Fig.2



9. Ambient conditions

Location	Indoors (Minimal dust and humidity)
Temperature	-10°C-40°C
Humidity	Under 85%
Elevation	Under 1,000m
Atmosphere	Well ventilated location, free of corrosive gases, explosive gases, vapors and dust.

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