

Panasonic

Small Compact Geared Motor Operation Manual





- Thank you for buying and using Panasonic Small Induction Geared Motor. This operation manual describes the product, its handling and caution for safety. Read and follow the instruction in this operation manual carefully before installation of the product.
- Keep this manual in a convenient place for further reference.


1. Safety precautions

Please follow this instruction manual to prevent any injury to the operator or any damage to any property concerned.

- Safety precautions are classified as follows, depending upon each degree of risk.

 DANGER	Risk of serious injury or death, unless installed or handled properly.
 CAUTION	Risk of injury or damage to the property, unless installed or handled properly.

Note  **CAUTION** means that it may result in serious damage.

 DANGER	
General	<ul style="list-style-type: none"> ▪ Do not let any unauthorized personnel transport, install, or inspect the product. ▪ Turn off the main power at grounding, transportation, wiring and inspection for electric shock.
Install	Earth the ground terminal without fail for electric shock or fire.
Wiring	<ul style="list-style-type: none"> ▪ Do not pull or pinch the motor lead wire or power cable. ▪ Wire per the wiring diagram and insulate the connection part so that active part may not be exposed. ▪ Thermal protector is not installed to any other than UL or CE rated models. Install overcurrent protector, thermal protector and leakage current breaker for electric shock or fire. ▪ Thermal protector is installed to UL or CE rated models. It is recommended to install overcurrent protector, thermal protector and leakage current breaker for electric shock or fire.

DANGER

Operation	<ul style="list-style-type: none">Do not touch the rotating part such as the shaft.Turn off the main power at power failure or while the thermal protector is activated for sudden restarting.
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CAUTION

General	<ul style="list-style-type: none">Use the motor within the specification described in the name plate, operation manual or catalogue for electric shock.Do not insert any object or finger into opening space of motor.Do not modify, dismantle or repair the motor.
Transportation	<ul style="list-style-type: none">Make sure that the motor is not dropped with shock during transportation.
Installation/Adjustment	<ul style="list-style-type: none">Do not put combustible material by the motor.Do not put any object around the motor, which may affect ventilation for fire caused by overheating.Install a cover so that the rotating part can not be touched.
Operation	<ul style="list-style-type: none">Do not touch the motor during motor running or right after the motor stops.
Maintenance	<ul style="list-style-type: none">Do not touch terminals while measuring the insulation resistance for electric shock.Check the installation, loosen screws or power supply carefully before operation or after any accident such as earthquake or fire. <p>For electric shock, injury, fire or damage to machine.</p>
Scrap	<ul style="list-style-type: none">Trash it as industrial waste material when the motor is scrapped.

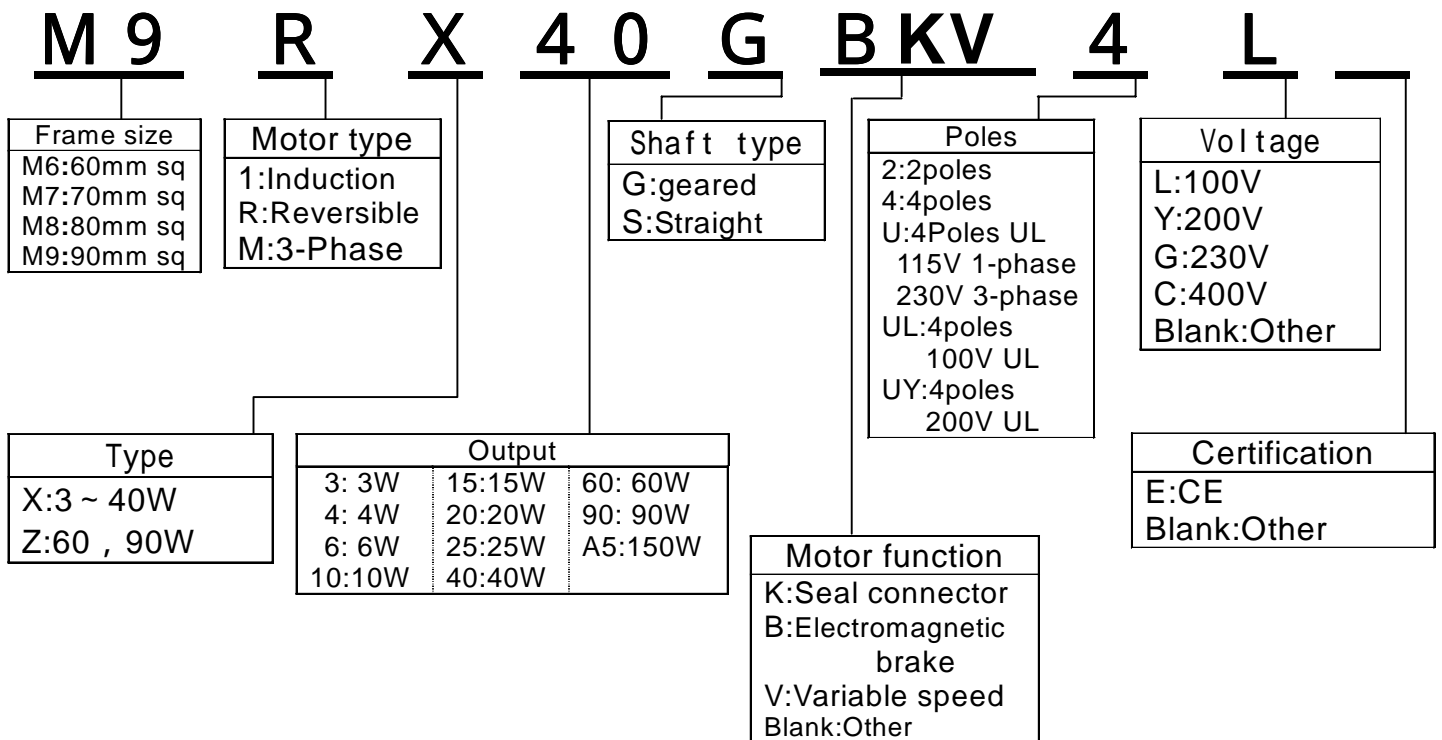
2. After open the package

■ Confirm the followings:

- The motor is not damaged during transportation.
- The motor is correct as you ordered.
- The capacitor is also supplied together when it is a single phase induction motor. Check the capacitance on name plate.
- Gear heads is supplied separately from motor.
- If any failure found, call the distributor first.

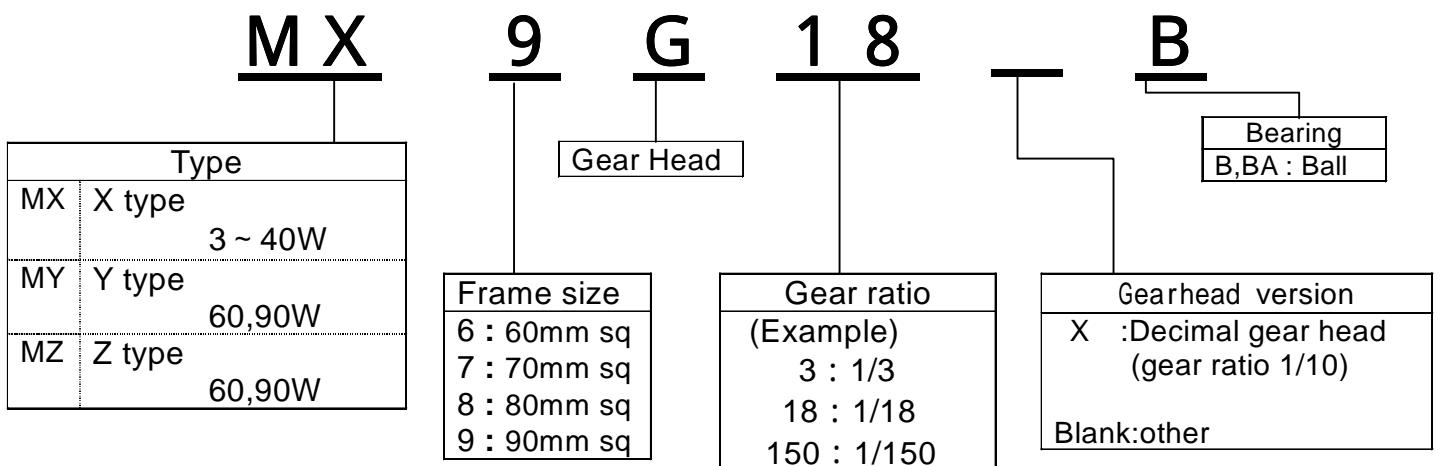
■ Model number

- Motor

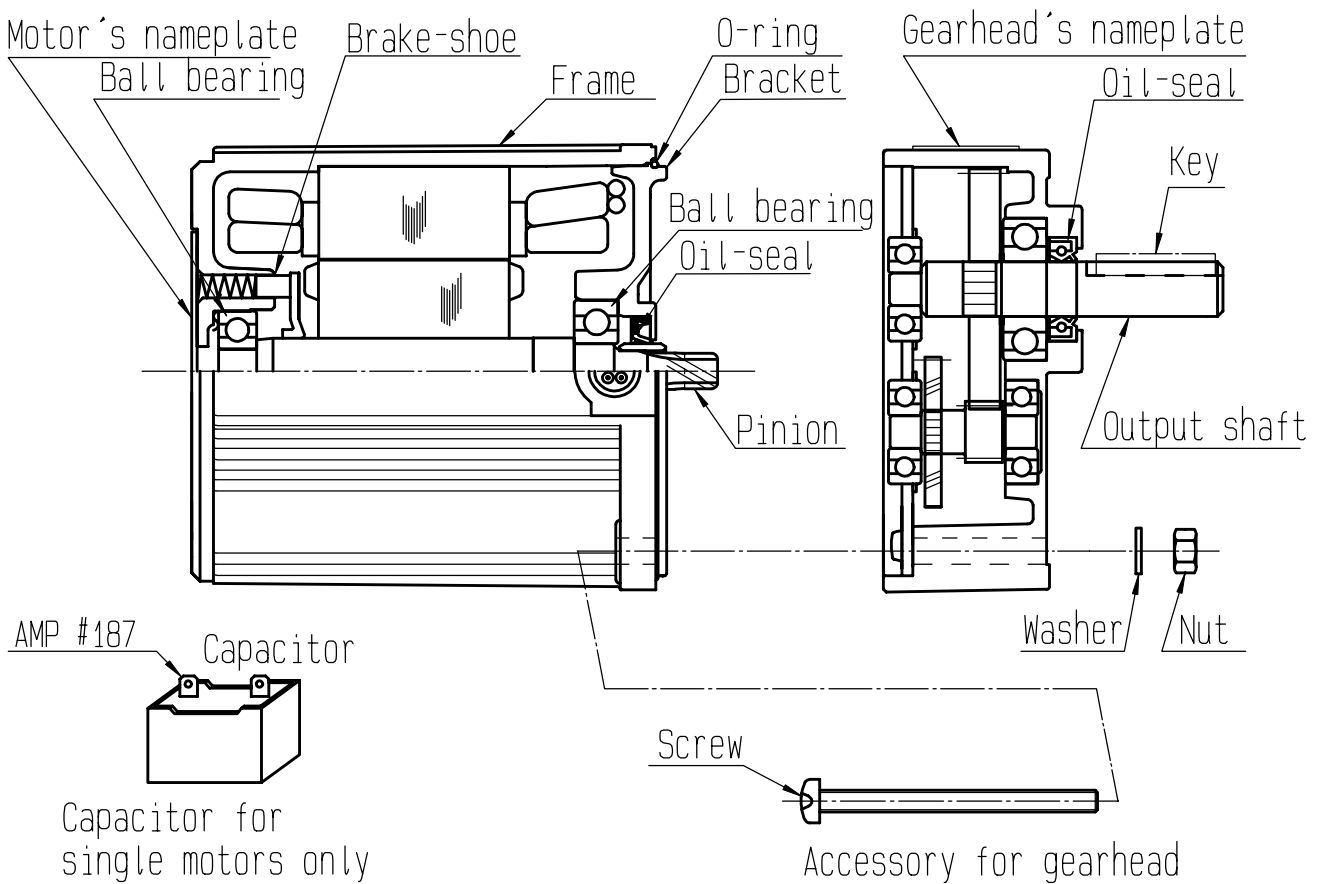


- Applicable gear head

Motor with straight shaft can't be assembled with Gear head.



3. Motor structure



- Note
1. The Above cross section represents reversible motors.
 2. The Capacitor is supplied together with single phase motors.
(No capacitor is supplied for three phase motors.)
 3. Keys are supplied with gear head.
(No key is required for 60mm gear head, since the output shaft has a D-shape cut.)

4. Transportation

Make sure to prevent any injury or damage from happening due to wrong handling of the motor.


- Make sure that the motor is not subject to crucial vibration, which may lead to the damage of motor bearings.

No vibration, nor shock




(Risk of damage to machine)

No drop or fall down



(Risk of injury or damage to machine)

Do not hold the motor by wires or shaft.




(Risk of injury or damage to machine)

5. Storage

Keep to the followings. Otherwise it may affect life time of motor.

Remark : Store the gear head with the output shaft facing up to prevent grease from leaking.

Indo

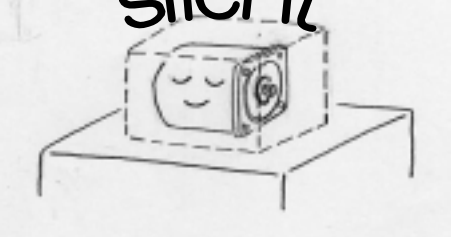


indo

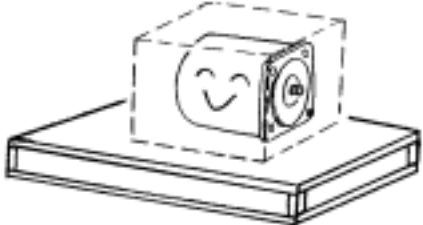
Free from water, splashes or dust.



No vibration
silent



Fit securely

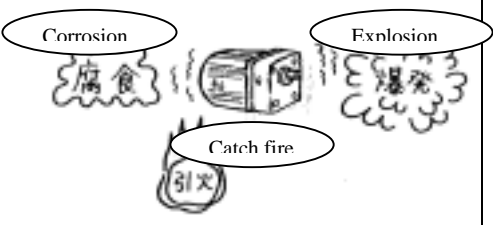


6. Installation

Install properly, otherwise it may affect life time of motor.


■ Installation

Free from explosive, Inflammable or corrosive gas




(Risk of explosion, fire or corrosion.)

Small vibration, dry and no dust and free from water/oil.




(Risk of property damage or shorter life.)

No enclosure with good ventilation



(Risk of burn, fire or property damage due to overheating.)


No vibration



(Risk of property damage or shorter life.)

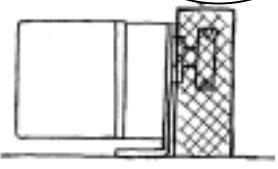
■ Caution during installation

Do not place combustible material by the motor
Such as Volatile solvent.



(Risk of fire)

Install a cover over any rotating parts



(Risk of injury.)

Do not stand or hang on the motor.



(Risk of injury or property damage.)

7. Load/Running condition

Life of the geared motor is subject to the load/running condition.
Limit the load under permissible torque, overhang load, thrust load and moment of inertia.

■ Permissible torque of the gear head

- The rated life time is 10,000 hours at a Service Factor(Sf) of 1.0.
(Except oil seal.)
- Service Factor(Sf) is subject to the load impact and running condition.
Table7-1 Shows the Service Factor under different load conditions.

Table7-1 Service Factor(Sf) under different load condition

Type of load	Example of load	Service Factor (Sf)		
		5hours/day	8hours/day	24hours/day
Constant	One-way run like conveyor	0.8	1.0	1.5
Light impact	Start, Stop, Cam impact	1.2	1.5	2.0
Middle impact	Instant reverse, Instant stop	1.5	2.0	2.5
Heavy impact	Frequent repetition of above	2.0~2.5	2.5~3.0	3.0~3.5

- necessary permissible torque T_A can be obtained in the following formula,

$$T_A = T_1 \times Sf$$
 where T_A = Necessary permissible torque (Nm)
 T_1 = Actual load torque (Nm)
 Sf = Service Factor

Run the motor so that the calculated permissible torque T_A gets under the torque in the table 2 and 3.

Table7-2 :When gear head is directly connected to the load(Unit in Nm)

Speed(r/min)		500	300	200	180	150	120	100	90	75	60	50	30	20	15	10	9	7.5	
Ratio	50Hz	3	5	7.5		10	12.5	15		20	25	-	30	-	50	75	100	150	200
	60Hz	3.6	6	9	10		15	18	20		-	30	-	36	60	90	120	180	200
Case size	Output																		
60mm sq	3W	0.048	0.079	0.12	0.13	0.16	0.20	0.24	0.25	0.31	0.38	0.46	0.76	1.08	1.47	2.16			
	4W	0.059	0.108	0.16	0.18	0.23	0.27	0.32	0.35	0.44	0.53	0.64	0.98	1.47	2.06	2.45			
	6W	0.098	0.16	0.25	0.26	0.33	0.40	0.49	0.53	0.66	0.79	0.95	1.57	2.25	2.45	2.45			
70mm sq	10W	0.16	0.25	0.38	0.44	0.51	0.64	0.10	0.85	0.88	1.08	1.47	2.55	3.63	4.80	4.90			
	15W	0.24	0.39	0.59	0.66	0.80	0.98	1.18	1.27	1.57	1.86	2.25	3.82	4.90	4.90	4.90			
80mm sq	15W	0.24	0.39	0.59	0.66	0.80	0.98	1.18	1.27	1.57	1.86	2.25	3.82	5.49	7.35	7.84			
	20W	0.34	0.57	0.85	0.95	1.18	1.37	1.67	1.86	2.25	2.74	3.33	5.49	7.84	7.84	7.84			
	25W	0.39	0.66	0.98	1.08	1.27	1.57	1.96	2.06	2.55	3.14	3.82	6.37	7.84	7.84	7.84			
90mm sq	40W	0.66	1.08	1.57	1.76	2.25	2.74	3.23	3.53	4.41	5.29	6.37	9.80	9.80	9.80	9.80			
	60W	0.98	1.57	2.35	2.65	3.14	3.92	4.70	5.29	6.27	7.55	9.11	15.2	19.6	19.6	19.6	19.6	19.6	19.6
	90W	1.37	2.25	3.43	3.72	4.51	5.68	6.76	7.55	9.02	10.9	13.0	19.6	19.6	19.6	19.6	19.6	19.6	19.6

Note: ■ shows that rotating direction of gear head shaft is same as that of the motor.

Table7-3: When decimal gear head is used (Unit inNm)

Speed(r/min)		9	7.5	6	5	3	2	1.5	1	0.9	0.75	
Reduction ratio	50Hz	—	200	250	300	500	750	1000	1500	—	2000	
	60Hz	200	—	300	360	600	900	1200	1800	2000	—	
Case size	Output											
60mm sq	3W					2.45						
	4W					2.45						
	6W					2.45						
70 mm sq	10W					4.90						
	15W					4.90						
80mm sq	15W					7.84						
	20W					7.84						
	25W					7.84						
90mm sq	40W					9.80						
	60W	per Table 2						19.6				
	90W							19.6				

Note: ■ shows that rotating direction of gear head shaft is same as that of the motor.

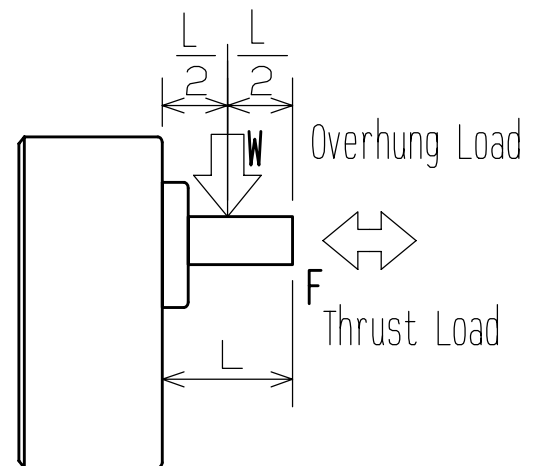
■ Permissible Overhang and Thrust load

- Overhang and Thrust load affect life time of bearings and the shaft.

Limit the running load from exceeding the permissible overhang load and thrust load of the table 7-4.

Table7-4: Permissible overhang load and thrust load

Frame Size	Model	Permissible overhang load W (N)	Permissible thrust load F (N)
60mm sq	MX6G□ B	90	29
70mm sq	MX7G□ B	198	39
80mm sq	MX8G□ B	294	49
90mm sq	MX9G□ B	392	98
	MY9G□ B	588	147
	MZ9G□ B	588	147



■ Permissible moment of the load inertia.

- Pay attention to the inertia in addition to the loading torque for Electro-magnetic brake motor and when DC brake is used.
(DC brake = Optional brake device or the brake function of the speed controller.)

- Table7-5 shows the permissible moment of the inertia for each motor.
Once higher inertia is applied to the motor, the motor life time may be shortened.
Table7-5: Permissible moment of inertia of the load, and that of the motor

Frame Size	Out-put	Permissible moment of inertia of load(kg.cm ²)		Motor moment of inertia (kg.cm ²)(reference)		
		DC brake	E-M Brake motor	Induction	Reversible	E-M Brake
60mm sq	3W	0.125	-	0.103	-	-
	4W	0.125	-	-	0.113	-
	6W	0.125	0.080	0.163	0.173	0.201
70mm sq	10W	0.125	-	0.221	0.235	-
	15W	0.125	0.158	0.322	0.336	0.329
80mm sq	15W	0.138	-	0.438	-	-
	20W	0.138	-	-	0.460	-
	25W	0.138	0.178	0.578	0.600	0.603
90mm sq	40W	0.400	0.735	1.287	1.341	1.361
	60W	0.650	0.875	1.787	1.841	1.862
	90W	0.650	1.000	2.211	2.265	2.353

- Table7-6 shows the motor life time when it is used with the load described in the table 5.

Table7-6: Life time of the motor depending on the braking method

Condition	Life time
DC brake	Brake times:2mil.
Electro-Magnetic Brake motor	Brake times:1mil.

■ Remarks

- Variable speed motors should be operated with speed controllers.
Please refer to the operation manuals for controllers for details.
- Life time of the brake-shoe(of reversible motors) is 5000 hours.
- The life of the gear head will reach the end by gear teeth damage, oil leakage or brake damage(for brake type motors).
The following countermeasures are recommended to prevent damage to the property concerned.
 - ① Prevention against accident such as broken gear teeth or brake damage losing and dropping the lift suddenly.
 - ② Prevent oil leakage by installing oil pan for food and textile related application when the oil seal wears out.
 - ③ When control sensors are used, install them where oil or grease from the motor may not splash.

8. Assembly

■ Before assembly

- ① Make sure that the O-ring is inserted and placed firmly, otherwise grease leakage may occur.
- ② Wipe off grease if it is on the edge or surface of gear head.

■ Assembly

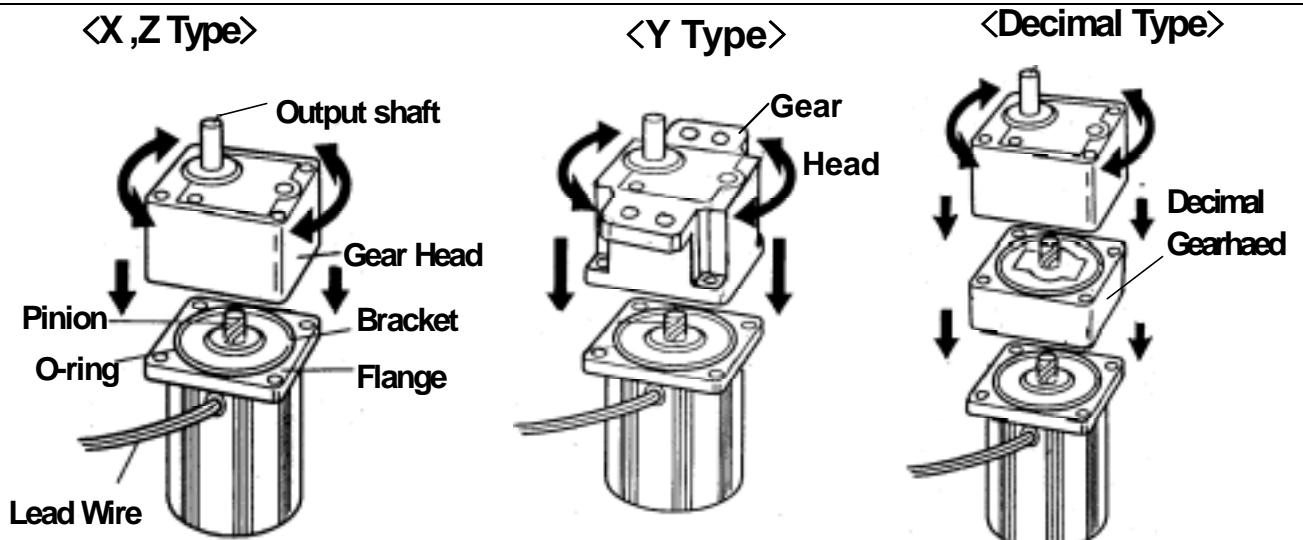
- ① Place the motor with the shaft facing up and match the lead wires direction according to the machine.
- ② Do not hit the motor pinion teeth on to the gear head.
Assemble the gear head to the motor smoothly by turning it slightly.
- ③ Use the attached mounting screws to install the geared motor to the machine.
Tighten until there is no gap between the motor flange and the gear head faucet edge with no pinch O-ring.
- ④ Refer to Table8-1 for the tightening torque of the mounting screws.

Table8-1: Tightening torque of mounting screws per frame size

Frame size mm	Gear head type	Screw size	Tightening torque	Mounting pitch	Mount the Y-type (90mm sq with hinge) with the attached screws to the motor as same as Z-type. Prepare additional bolt, nut and washers for mounting to the machine (M8, mounting pitch of 36 X 110mm, tightening torque of 10 Nm)
60sq	X	M4	2.0N·m	φ 70mm	
70sq	X	M5	2.5N·m	φ 82mm	
80sq	X	M5	2.5N·m	φ 94mm	
90sq	X,Z,Y	M6	2.9N·m	φ 104mm	

- Mount the decimal gear head to the motor as per gear head assembly.
Take note that screws for decimal gear heads are only available by buying it separately.

Note)1. Forced assembly of motor and gear head, or flaw on pinion or gear head may cause erroneous noise or shorten the life time of the product.



9. Wiring

■ Grounding

Ground earth according to the safety standard.

■ Treatment of power cable and motor leads

Do not bend, pull or pinch the power cable or the motor leads.

■ Connection between the motor and power cable or capacitor

- Connect securely with soldered connectors or fasten terminals.
Insulate to avoid no active portion is exposed.
- Refer to Table 9-1 and 9-2 for motor and power cable connections.
Rotation direction is viewed from the side of the motor shaft.
Refer to Table 7-2 for the directions of the gear head shaft.

Table 9-1 Motor wiring

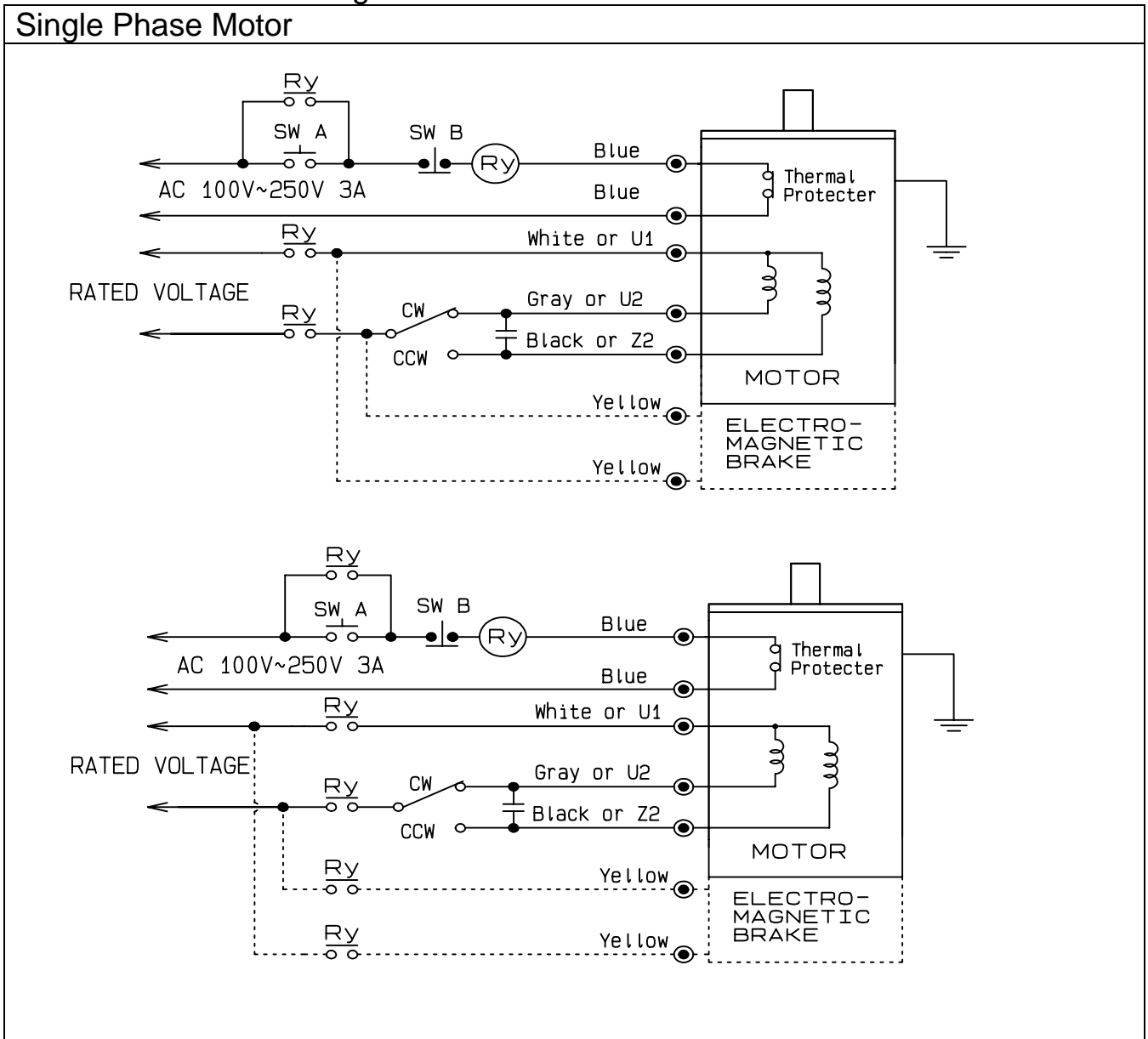
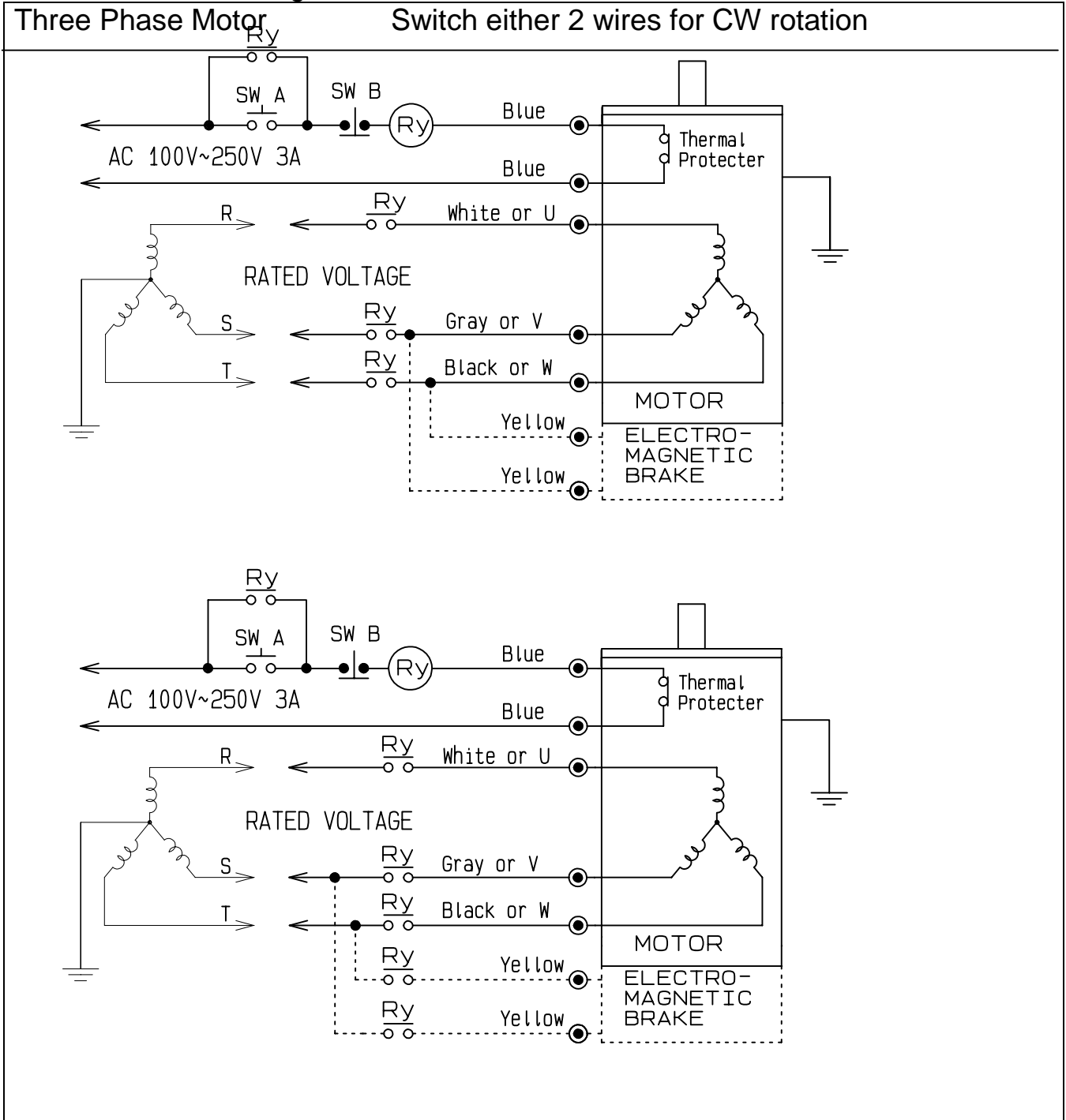


Table 9-2 : Motor wiring



- Color of the motor lead wires and number of the terminals are described in above drawing.
- Refer to the operation manual of the speed controller for wiring connection of variable speed motors.
- 60mm square motors are impedance protected, and 70-90mm squares are equipped with thermal protectors.
(Thermal protector opens at $120 \pm 5^{\circ}\text{C}$, closes at $77 \pm 15^{\circ}\text{C}$.)
- Install a spark killer with switches for contact protections.
Example DV0P008 (option: for AC-250V only)

10. Operation

■ Before operation

Confirm the followings.

- Is the wiring correctly connected to the power?
- Is the earth correctly grounded?
- Is the fuse and breaker correct?
- Is the installation correctly made to the machine?
- Is there any grease or oil leakage?

■ Trial operation/run

- ① Check the rotating direction before applying the load.
- ② Turn on power to make sure that the motor runs smoothly without erroneous noise from the bearings or gear.

■ Starting operation

Confirm the followings.

- Check and adjust the load so that the current stays lower than the specified value.

Confirm temperature rise

- Temperature rise will get saturated in 2 to 3 hours.
Take note that the reversible and single phase electric magnetic brake motors has 30 minutes as rated time.
- Make sure that the motor frame temperature should be less than 90 degrees centigrade.

■ Power failure

Turn off main power to prevent any accident, otherwise the motor may cause overheat due to heavy load condition.

■ During operation

Do not touch the motor since it can become very hot.

Should any malfunction occur, stop the motor immediately.

■ Other cautions

Confirm the starting voltage of the motor after it is installed to the machine. It is to be lower than the value shown below,

- | | |
|--------------------|--------------------------|
| ① Reversible motor | 70% of the rated voltage |
| Induction motor | 80% of the rated voltage |

11. Trouble shooting

Trouble/Error	Where/what to check	Correction
•Motor doesn't run	•Is wiring correct ?	•Make correct wiring.
	•Is correct voltage applied ?	•Apply correct voltage.
	•Is specified capacitor installed ?	Install correct capacitor (check with name plate)
	•Is load proper ?	•Reduce load or use larger motor.
Rotational direction is reversed.	•Is wiring correct ?	•Make correct wiring.
	•Different gear ratio has different direction.	•Rewire per output shaft direction.
	•Is capacitor wired correctly per wiring diagram ?	•Wire as per wiring diagram.
	•Viewed from the correct direction ?	•Check by viewing from the motor shaft side.
•Motor gets too hot.	•Is correct voltage applied ?	•Apply correct voltage.
	•Is capacitance of capacitor correct ?	•Use specified capacitor.
	•Motor surface temperature is subject to environmental temp., load condition and frequency of start/stop. If it exceeds 90°C, it may cause motor malfunction.	•Use larger motor, or reduce the load.

12. Maintenance

■Daily confirmation

- Carry out the followings to prevent any unexpected malfunction from happening.
- When any error is found, return it to normal condition.

Where	How	What
Voltage variation	V-meter	$\pm 2 \sim 3\%$ of rating. Spec says voltage variation of $\pm 10\%$ is operable, but doesn't guarantee the motor life.
Load current	Ammeter	Within the specified value(name plate)
Environment temperature	Thermometer	-10 to 40 degrees centigrade
Temp. rise	Thermometer	Frame temp: 90 degrees centigrade or lower
Noise	Aural	Free from abnormal noise, no noise increase
Vibration	Touching	Free from abnormal vibration
Dust	Check	No dust which prevents ventilation
Oil leakage	Check	No oil/grease leakage from gear head/motor connecting, or output shaft

■ Periodical confirmation

- Dust on motor
- Deformation of the cover and corrosion
- Insulation resistance

■ Before maintenance and inspection

- Do not touch the motor during operation or just after running.
- Do not repair nor dismantle the product other wise the warranty is invalid.
Consult to the authorized dealer or contact the machine manufacturer if the motor is installed to the machine.

13. Working condition

Working temperature	-10~+40 degrees centigrade
Working humidity	85%RH or less
Altitude	1000m or lower
Vibration	4.9m/s ² or smaller
Working voltage	Rated voltage(name plate)±10%
Frequency	50/60Hz (name plate)

14. Spec. sheets, drawings, options

Make a contact to our distributor for specification sheets, drawings or any inquiry for optional products such as mounting screws for decimal gear or capacitor cap.

MEMO (Use below to keep your purchase record.)

Purchase date	Model
Distributor	
Tel()	—

Motor Company

Matsushita Electric Industrial Co., Ltd.

7-1-1 Morofuku, Daito, Osaka, 574-0044, Japan

Tel : +81-72-870-3044

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