

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 the 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** item may result in serious damage.

DANGER

General	<ul style="list-style-type: none">• Avoid any unauthorized personnel to transport, install, or inspect the product.• Turn off the main power at grounding, transportation, wiring and inspection. (Risk of electric shock.)
Installation	<ul style="list-style-type: none">• Earth the ground terminal without fail. (Risk of electric shock or fire.)
Wiring	<ul style="list-style-type: none">• Do not pull or pinch the motor lead wire or power cable.• Wire as per the wiring diagram and insulate the connection part to avoid any active part to expose.• Thermal protector is only installed to UL and CE versions. Make sure to install an over-current protector, thermal protector and current leakage breaker.

DANGER

Operati	<ul style="list-style-type: none"> Do not touch the rotating part such as the shaft. Turn off the main power when the power breaks down, or when the thermal protector is activated.
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CAUTION

General	<ul style="list-style-type: none"> Use the motor as per the specification described in the name plate, operation manual or catalogue. Do not insert any objects or finger through any space of the 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 impact during transportation.
Installation/Adjustment	<ul style="list-style-type: none"> Do not place combustible material nearby the motor. Do not place any objects around the motor, which may hinder ventilation. Install a cover so that the rotating part will not get touched.
Operation	<ul style="list-style-type: none"> Do not touch the motor during stall or right after the motor stops.
Maintenance	<ul style="list-style-type: none"> Do not touch any terminals while measuring the insulation resistance. Check the installation, loosen screws or power supply carefully before operation or after any abnormal incidents such as earthquakes or fires.
Scrap	<ul style="list-style-type: none"> Treat as an industrial waste material when the motor is scrapped.

2 . Upon receipt of goods

Check the following:

The motor is not damaged during transportation.

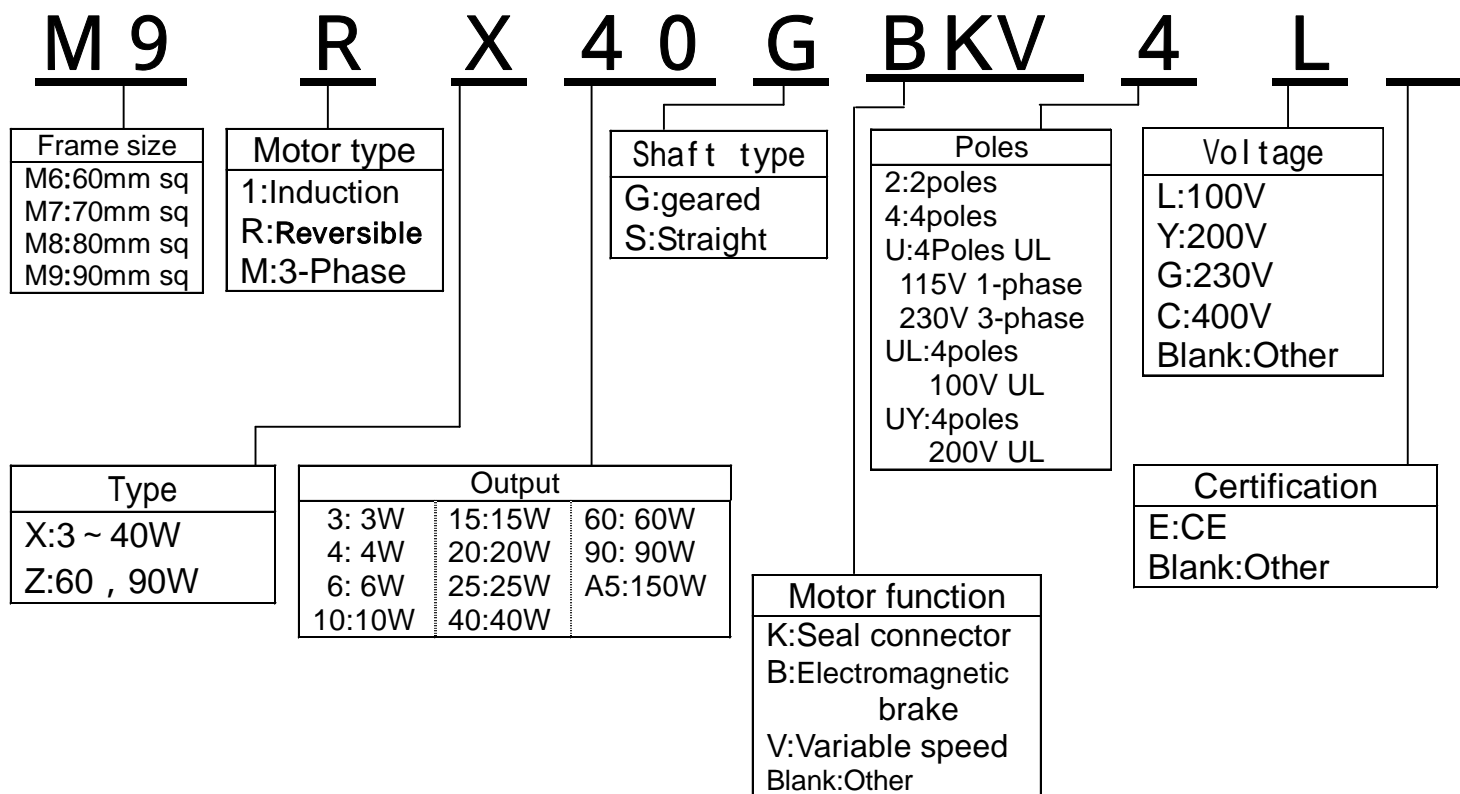
The motor is correct which has been ordered.

Cheek whether the capacitor is supplied for these single phase induction types.

Gear heads are available sold separately.

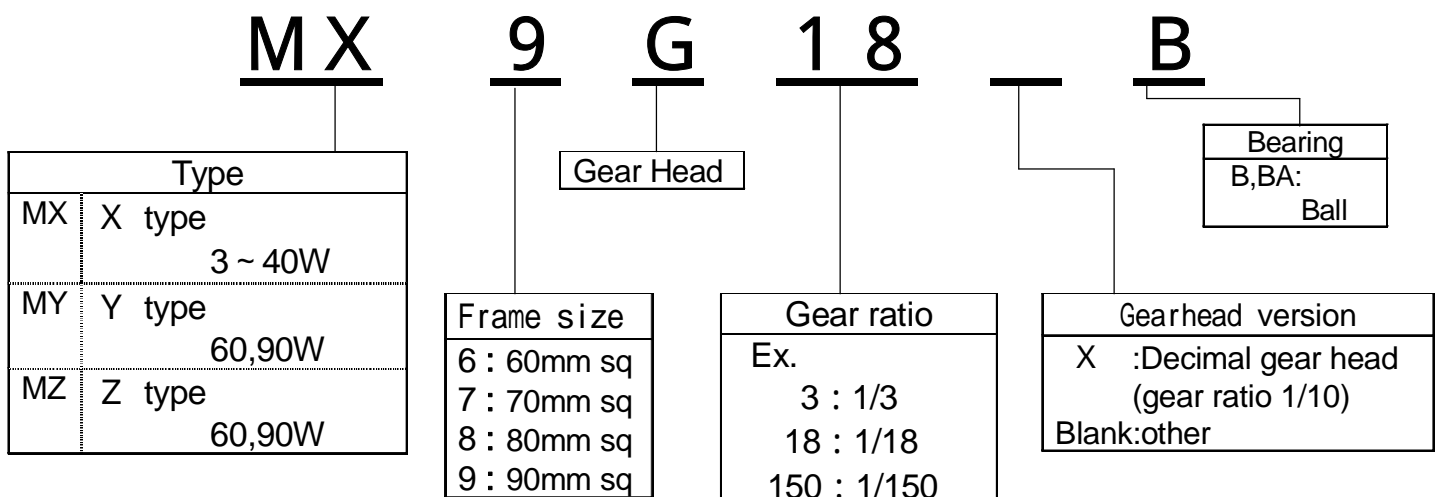
Model suffix code

Motor

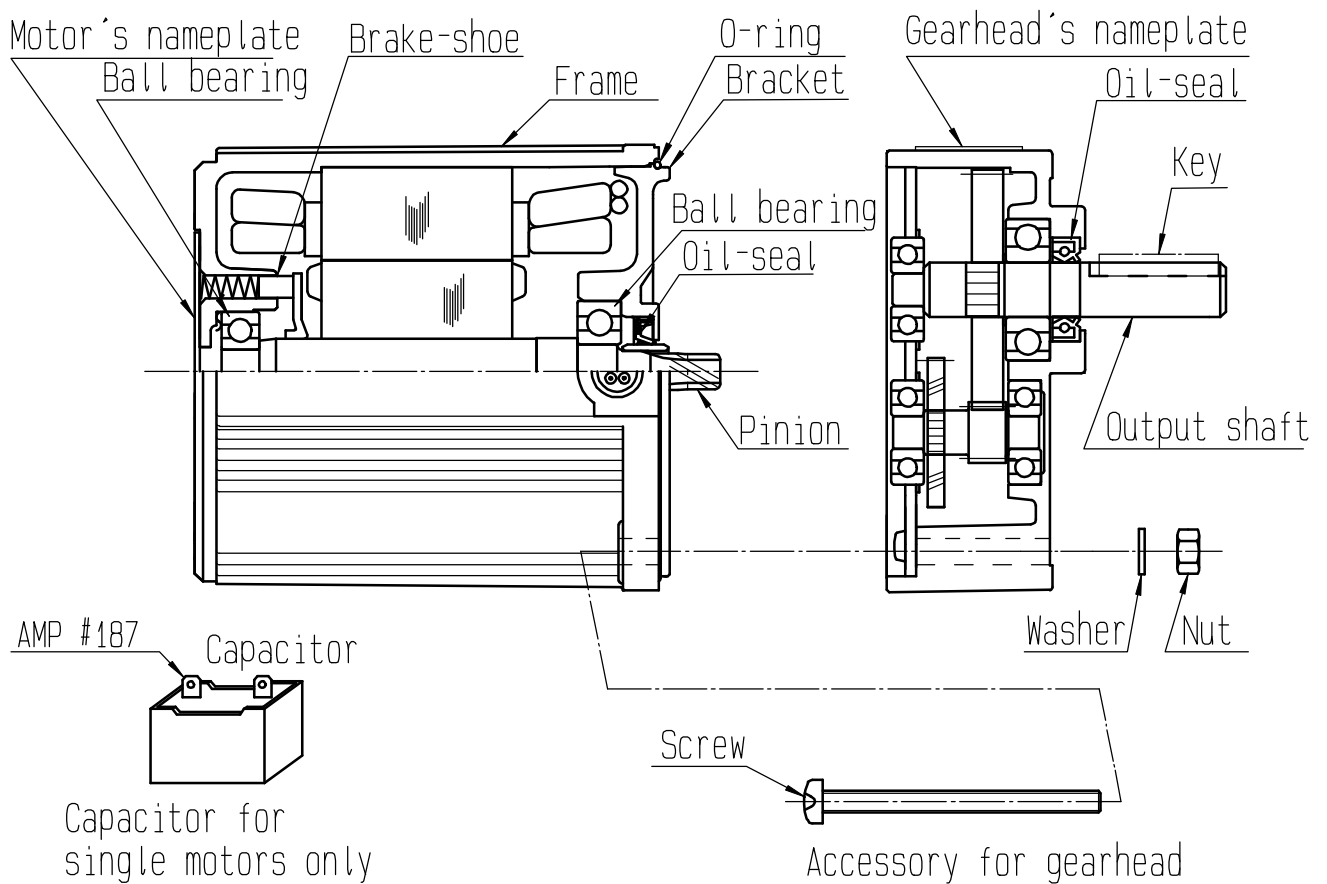


Applicable gear head

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



3 . Description



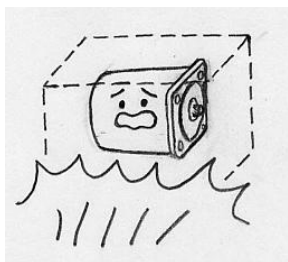
- Note**
- 1) The Above cross section represents reversible motors.
 - 2) The Capacitor is supplied together with single phase motors.
(No capacitor is supplied for three phase motors.)
 - 3) Keys are supplied with the gear head.
(No key is required for 60mm gear head, since the output shaft has a D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

4 . Transportation

Make sure to prevent any injury or damage due to any mishandling 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



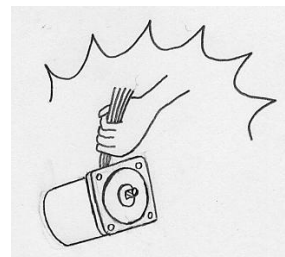
(Risk of damage to machine)

No dropping



(Risk of injury or damage to machine)

Do not hold the motor by leads or shafts.



(Risk of injury or damage to machine)

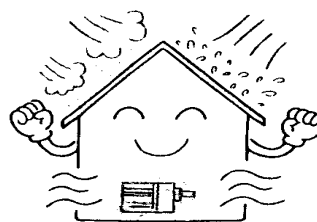
5 . Storage

Follow the proper storage method and condition which may effect the motor life.

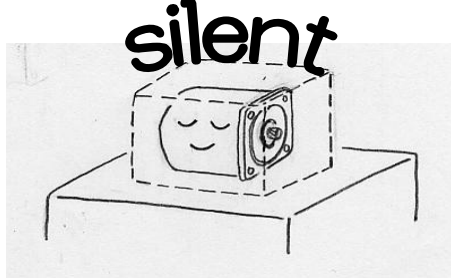
Indoors, dry and ventilated.



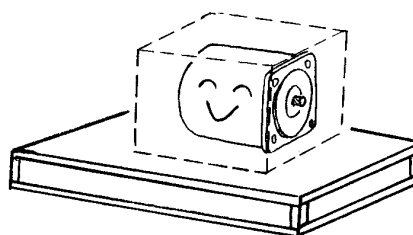
Free from water, splashes or dust.



No vibration



Fit securely



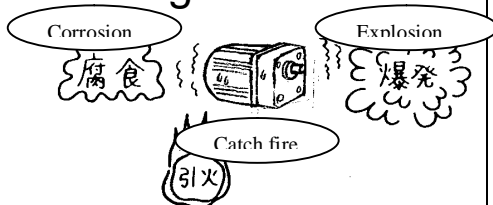
Remark : Store the gear head with the output shaft facing downwards to avoid grease leakage.

6 . Installation

Follow the proper installation method which may effect the motor life.

Installation

Free from explosive,
Inflammable and
corrosive gas



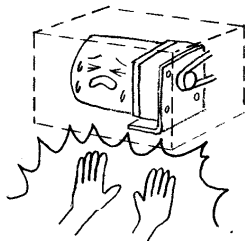
(Risk of explosion, fire or corrosion.)

Small vibration,
dry minimal dust and
free from water/oil.



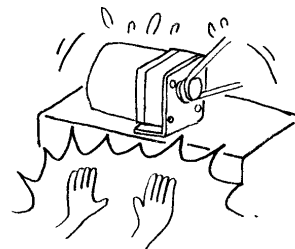
(Risk of property damage or shorter life.)

Enclosure free with
good ventilation



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

Minimal vibration



(Risk of property damage or shorter life.)

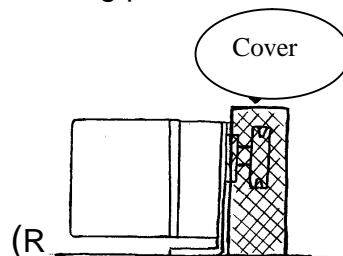
Caution during installation

Do not place combustible
materials near the motor
Such as Volatile solvent.



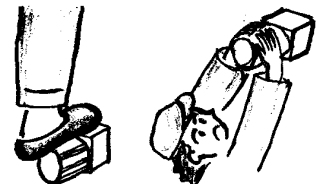
(Risk of fire)

Install a cover over any
rotating parts



(R

Do not stand or hang
from 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 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,

$$T_A = T_1 \times Sf \quad \text{where} \quad T_A = \text{Necessary permissible torque (N} \cdot \text{m)}$$

$$T_1 = \text{Actual load torque (N} \cdot \text{m)}$$

$$Sf = \text{Service Factor}$$

Run the motor so that the calculated permissible torque, T_A falls below the torque in the table 2 and 3.

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

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	Table 3			
	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		
	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		

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 inN•m)

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										
60/70 mm sq	3W	2.45									
	4W	2.45									
	6W	2.45									
	10W	4.90									
	15W	4.90									
80mm sq	15W	7.84									
	20W	7.84									
	25W	7.84									
90mm sq	40W	9.80									
	60W	19.6									
	90W	19.6									

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

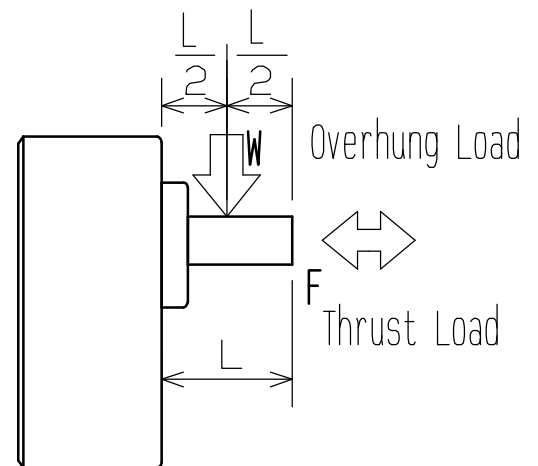
Permissible Overhang and Thrust load

Overhang and Thrust load affect the bearing life and shaft strength.

Limit the running load not 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 motors.

Once higher inertia is applied to the motor, the motor life may be shorten.

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 when it is used with the load described in the table 5.

Table7-6: Life of the motor depending on the brake method

Condition	Life
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 for 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.

Prevention against mal-operation due to broken gear teeth or brake damage, such as lifter applications.

Prevent oil leakage when the oil seal worms out by installing oil pan for food and textile related application.

Install control sensors where free from grease nor oil.

When control sensors are used, install them where oil or grease from the motor may not splash.

8 . Assembly

Prior to assembly

Make sure that the O-ring is inserted and placed firmly, otherwise grease leakage may occur.

Clean the grease if any appears on the edge or surface of gear head.

During assembly

Place the motor with the shaft upwards, and match the leads direction according to the machine.

Do not hit the motor pinion teeth with the gear head.

Assembly the gear head to the motor smoothly by turning slightly.

Use the attached mounting screws to mount the geared motor to the machine.

Tighten until there is no gap between the motor flange and the top head of the faucet edge with no pinch of keeping the O-ring in tight pitch.

Refer to Table8-1 for the tightening torque of the mounting screws.

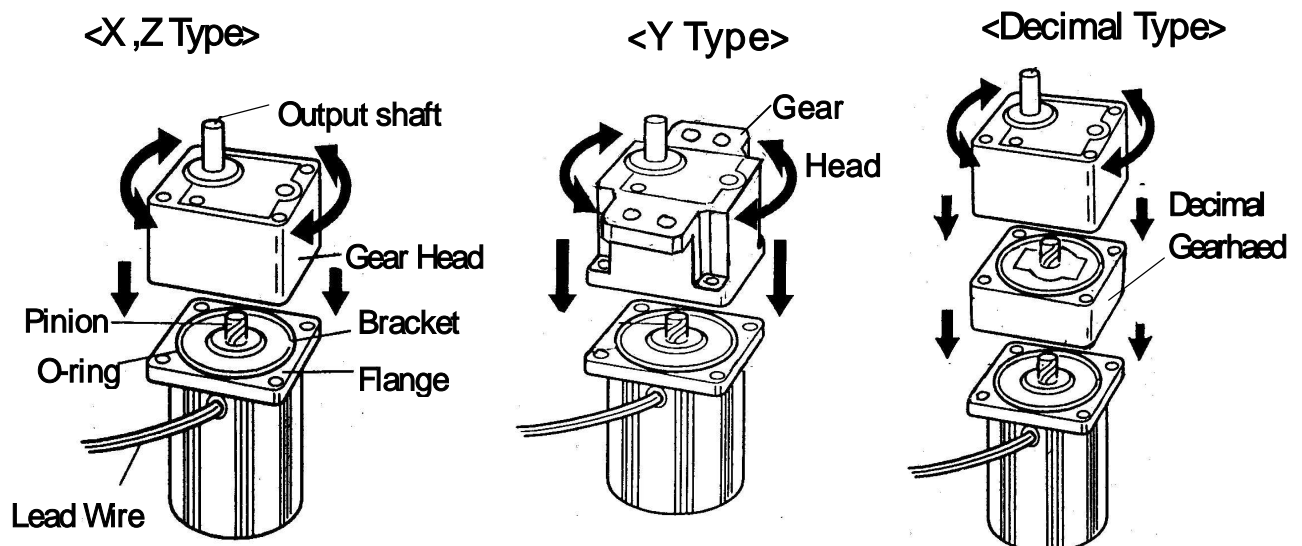
Table8-1: Tightening torque of Mounting screws per frame size

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	M 4	2.0N·m	70mm	
70sq	X	M 5	2.5N·m	82mm	
80sq	X	M 5	2.5N·m	94mm	
90sq	X,Z,Y	M 6	2.9N·m	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 separate options.

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



9 . Wiring

Earthing

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 Table9-1 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

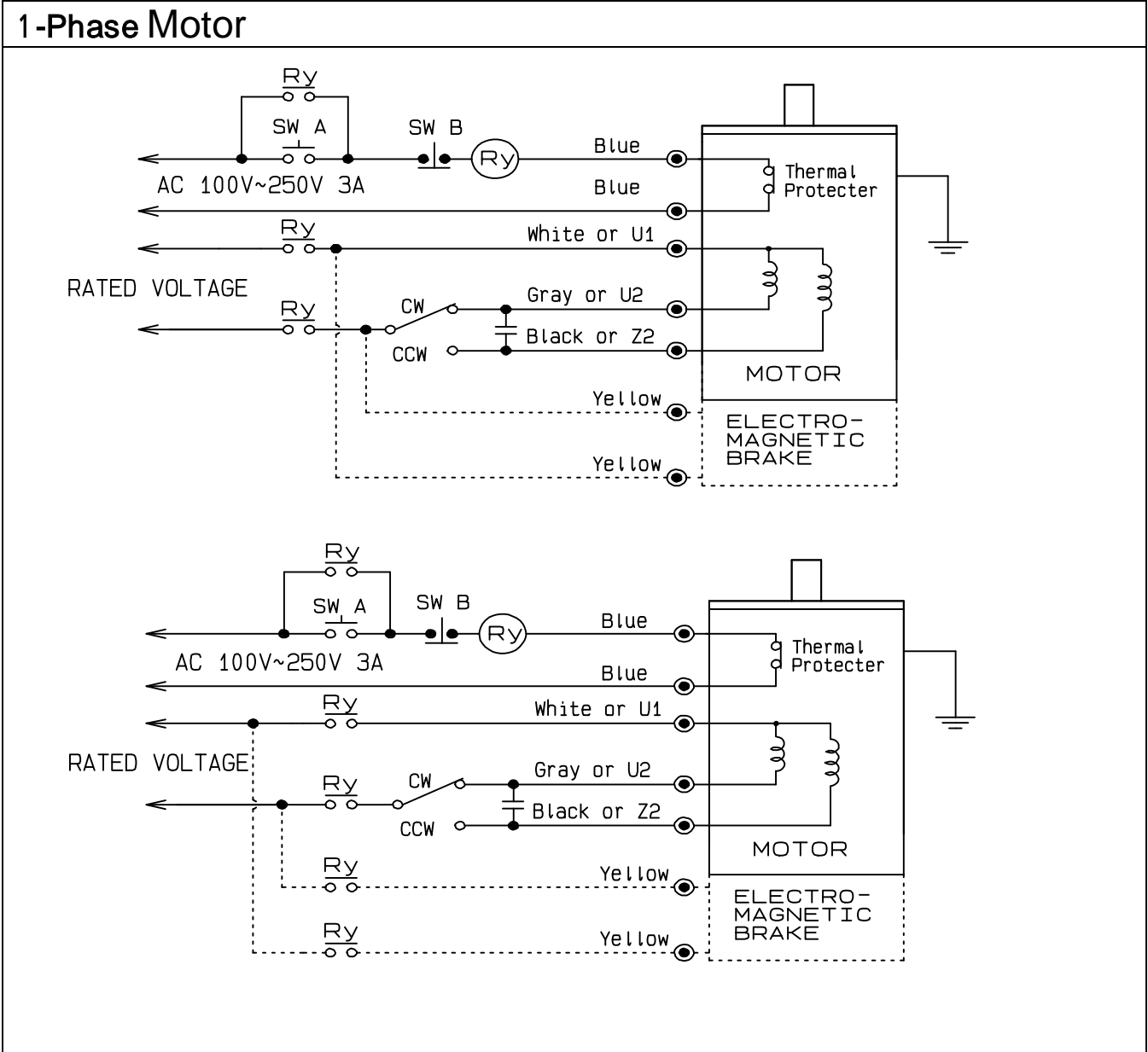
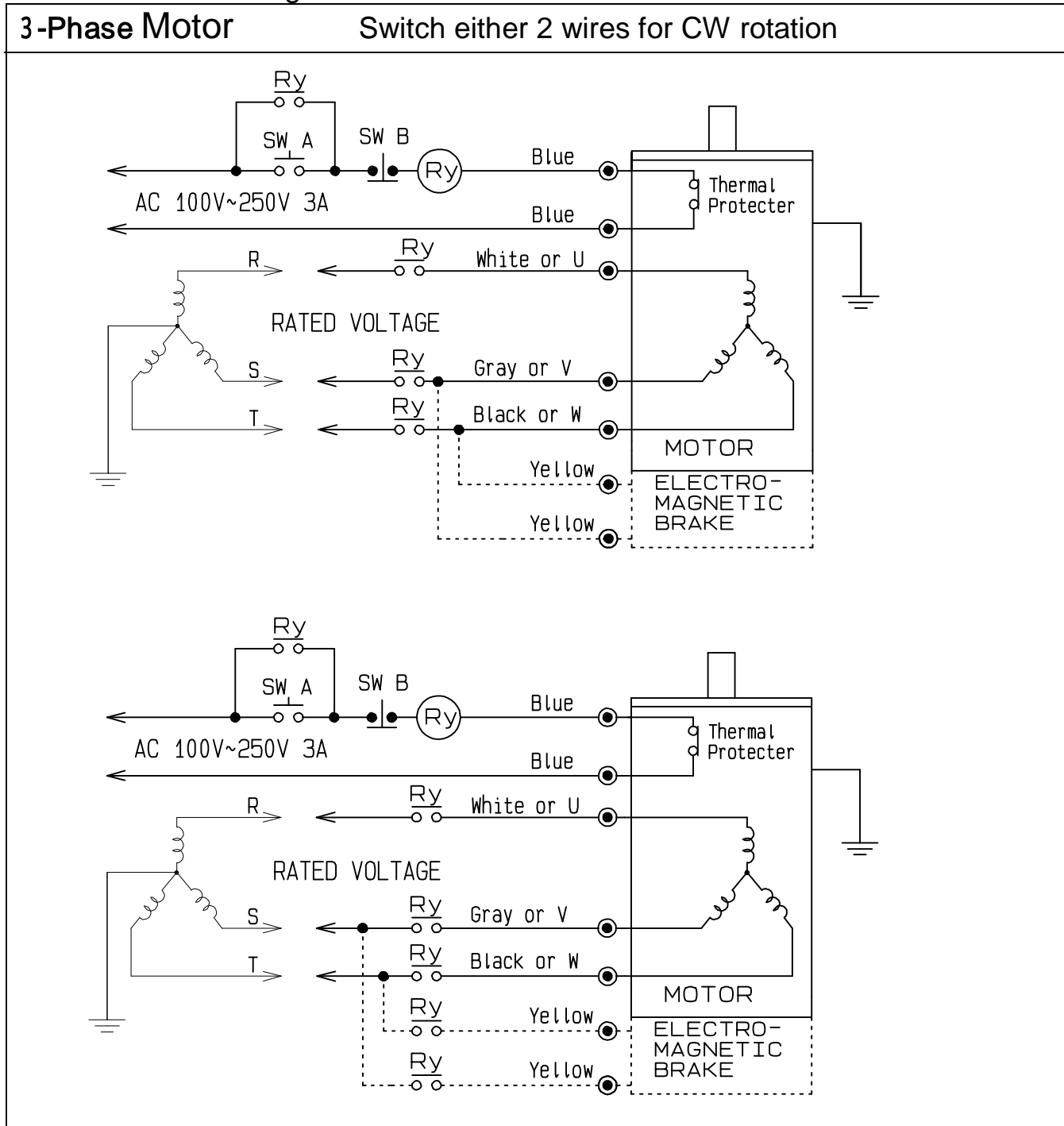


Table 9-2: Motor wiring



- 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 the 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 ± 5 , close at 77 ± 15 .)
- Install a spark killer with switches for contact protections.
Ex. DVOP008 (option: for AC-250V only)

1 0 . Operation

Before operation

Check points

- 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 run

- Check the direction of the rotation before applying the load.
- Turn on the power to make sure that the motor runs smoothly without abnormal noise from the bearing or gear.

Starting operation

Check points

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

Check the temperature rise

- Temperature rise will get saturated in 2- 3hours.
- Take note that the reversible and single phase electric magnetic brake motors are 30 minutes rating.
- Make sure that the motor frame temperature is less than 90 °C.

Power failure

- Turn off the main power to avoid accidents, otherwise the motor may heat-up due to heavy load condition.

During operation

- Do not touch the motor since it is may be hot.
- Should any malfunction occurs, stop the motor immediately .

Others

- Check the starting voltage of the motor when installed to the application, to be lower than the value shown below,

Reversible motor 70% of the rated voltage

Induction motor 80% of the rated voltage

Please certify of motor starting by the floating voltage

Break torque of reversible motor is floating.

Please certify of motor conform to machine.

1 1 . Troubleshooting

Symptom	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.

1 2 . Maintenance

Daily check

Carry out the following to prevent any unexpected malfunction.

When any error is found, return 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)
Envir.temperature	Thermometer	- 10 ~ 40
Temp. rise	Thermometer	Frame temp: 90 °C 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 check

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.

1 3 . Working condition

Working temperature	-10 ~ +40
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)

1 4 . Specifications, dimensions, and options

Contact to a dealer for specifications, dimensions and options(mounting screws for decimal gear, capacitor for UL type or capacitor cap.)

MEMO (Use this memo for your reference.)

Purchased date		Model	
Dealer			
	Tel () -		

Motion Control Device Division
Motor Company
Matsushita Electric Industrial Co., Ltd.
7-1-1 Morofuku, Daito, Osaka, 574-0044, Japan
Phone + 81-72-870-3044

IMB42E

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