TA01.00TS E (17)
Issued June 1,2024

TSUBAKI

Compact Gear Motors

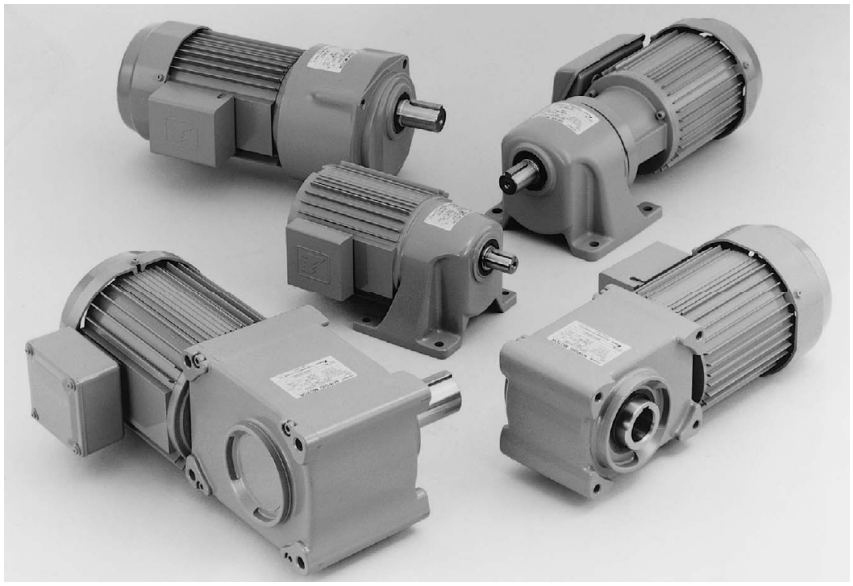
Gear Motors TA Series
Hypoid Motors TA Series
Croise Motors TA Series

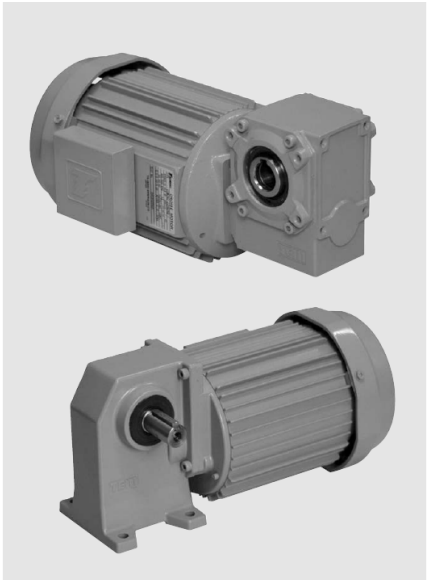
Three-phase 0.1 to 5.5 kW

Gear Motors TS Series

Single-phase 100 to 200 W

Instruction Manual





- Thank you for purchasing a Tsubaki Gear motor/Hypoid motor/Croise motor. Gear motors/Hypoid motors/Croise motors should be handled by trained individuals. Be sure to carefully read this instruction manual and fully understand the contents contained herein prior to using the product.
- Provide the instruction manual at a location that is accessible to the operator.
- Keep the instruction manual in a safe place for easy reference before using the product.

TSUBAKIMOTO CHAIN CO.

Contents

Gear Motor/Hypoid Motor/Croise Motor

Thank you for purchasing the Tsubakimoto Chain product.
The level of damage and injury that can occur if the correct operations are not followed is generally divided into "WARNING" and "CAUTIONS" in the instruction manual. The definition of each is described below.

⚠ WARNING	Incorrect operation can result in death or serious injury.
⚠ CAUTION	Incorrect operation can result in minor or moderate injury or damage.

Items denoted with "caution" can also lead to a serious result depending on the situation.
Be sure to read these, as they contain important information.

⚠ WARNING

- Do not use in an explosive atmosphere. Use an explosion-proof motor. Otherwise, explosion, ignition, fire, electric shock, injury, or equipment damage can occur.
- Have a skilled individual with expert knowledge perform transport, installation, wiring, operation, maintenance, and inspection. Otherwise, explosion, ignition, fire, electric shock, injury, or equipment damage can occur.
- Do not work on this product using live-wire operation. Be sure to turn off the power before performing any work. Otherwise, electric shock can occur.
- When using this product in a crew transport device, be sure to provide protective safety equipment on the device. Runaway operation and falls can result in personal injury or equipment damage.
- When using this product in an elevating device, be sure to provide safety equipment on the device to prevent falls. Falling of the elevating device can result in personal injury or equipment damage.
- Do not apply water or oil to the brake. Reduced brake torque can result in falls or runaway accidents.
- Overhauling of the Gear motor/Hypoid motor/Croise motor requires skill, so be sure to send the product to the specialty plant of Tsubakimoto Chain.

⚠ CAUTION

- Do not use with specifications other than those on the Gear motor/Hypoid motor/Croise motor nameplate and the manufacturing specifications. Electric shock, injury, and equipment damage can occur.
- Do not insert fingers or objects into the openings on the Gear motor/Hypoid motor/Croise motor. Electric shock, injury, fire, and equipment damage can occur.
- Do not use a damaged Gear motor/Hypoid motor/Croise motor. Injury or fire can occur.
- Do not remove the nameplate.
- Modifications made to the product by the customer are outside the warranty, and Tsubakimoto Chain Co. is not responsible.

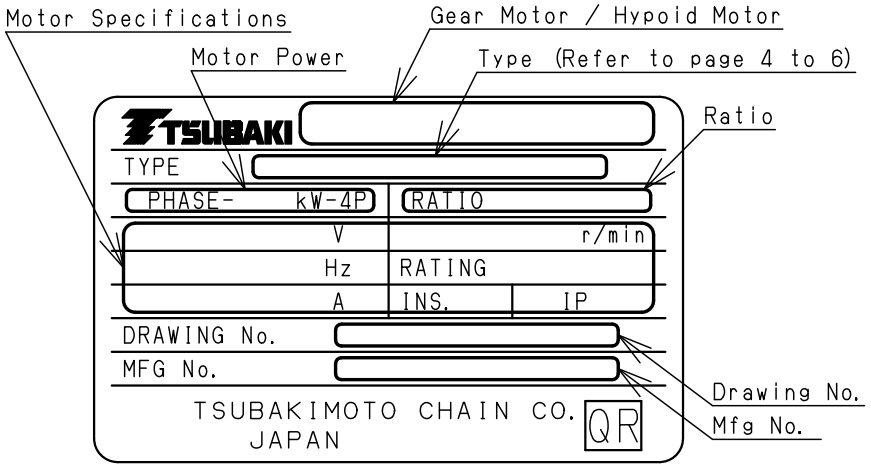
[1] Checking the Contents

1-1. Checking the contents

Check the following items upon receipt of your motor.
Contact your distributor or Tsubakimoto Chain if any defects are found.

⚠ CAUTION
● Check the contents for all ordered parts. Installing an incorrect product can result in injury or equipment damage. ● Open the packaging right side up. Otherwise, injury can occur.

(1) Verify that the specifications on the nameplate, such as the output, reduction ratio, model number, and voltage correspond to your order.
(2) Visually inspect for damage sustained during transport.
(3) Make sure there are no loose screws or bolts.
(4) For Gear motors with a clutch & brake, check that there are two protection devices (varistors) included.



1-2. Information to provide when contacting your distributor or Tsubakimoto Chain

Please provide the following information if the details on the nameplate do not match the product or when ordering parts or products:
(1) Manufacturing number (Mfg No.)
(2) Model number (Type)
(3) Motor capacity (Motor Power)
(4) Reduction ratio (Ratio) or rotating speed (Output speed)
(5) Drawing number (Drawing No.)

1-3. Lubrication

This product can be used without adding grease, as the specified amount of grease is filled before shipment.

1-4. Model number designation

(1) Gear motor model numbers

GMTA ① 010 ② – 38 ③ L ④ 1200 ⑤ □ ⑥ □□□ ⑦ □□ ⑧

① Product and series name	GMTA GMTS GRTA	With motor(Three-phase) With motor(Single-phase) With double shaft and adapter
② Motor capacity (example)	010 100	Three-phase 0.1 kW Single-phase 100 W
③ Frame number (example)	38	Frame number 38
④ Mounting type	L U F	Foot mount Face mount Flange mount
⑤ Reduction ratio (example)	1200	1/1200
⑥ Specification code	No code B CB FI BE SR	No B, CB, or BE With brake With clutch & brake With adapter With encoder Shock relay type (for 0.1 and 0.2 kW only)
⑦ Option code A	1. Z 2. W 3. J 4. V 5. L1～L8 6. V1～V9 7. N N2 PN3 HN3 WN3 8. H 9. Q 10. M 11. A1 12. A2 13. G1	With variable frequency motor Outdoor type (with brake 0.2 to 0.75 kW: WC) Waterproof (IP65) 400 V class (400/400/440 V, 50/60/60Hz) 200 V class Different voltage(Table 1-4.) 400 V class Different voltage(Table 1-4.) CE certified UL listed (0.1 to 0.75 kW only) CCC compliant (with plastic terminal box: 0.1 to 0.75 kW only) CCC compliant (with hard terminal box: 0.1 to 0.75 kW only) CCC compliant (outdoor type: 0.1 to 0.75 kW only) With hard terminal box (0.1 to 0.75 kW only) With single-action manual release With manual shaft Heat resistant Cold resistant No. 1 grease specification
⑧ Option code B	1. P1 P2 P3 2. D1 D2 D3 E1 E2 E3 3. C0 C1 C2 C3	Terminal box position: 90° swing (1.5kW to 5.5kW only) Terminal box position: 180° swing Terminal box position: 270° swing (1.5kW to 5.5kW only) Terminal box outlet direction: 90° swing (0.1kW to 0.75kW: Outdoor type, Hard terminal box) Terminal box outlet direction: 180° swing (0.1kW to 0.75kW: Outdoor type, Hard terminal box) Terminal box outlet direction: 270° swing (0.1kW to 0.75kW: Outdoor type, Hard terminal box) Terminal box outlet direction: 90° swing (1.5kW to 5.5kW: Standard type, Outdoor terminal box) Terminal box outlet direction: 180° swing (1.5kW to 5.5kW: Standard type, Outdoor terminal box) Terminal box outlet direction: 270° swing (1.5kW to 5.5kW: Standard type, Outdoor terminal box) Paint color: Light gray (Munsell N7.5) Paint color: Light silver metallic Paint color: Ivory white Paint color: Dark silver metallic

Table 1-4. Different voltage

200 V class		400 V class	
L1	220V50Hz	V1	380V50Hz
L2	230V60Hz	V2	380V60Hz
L4	210V60Hz	V3	415V50Hz
L5	230V50Hz	V4	460V60Hz
L6	240V60Hz	V5	415V60Hz
L7	210V50Hz	V6	420V50Hz
L8	240V50Hz	V7	420V60Hz
		V8	440V50Hz
		V9	460V50Hz

(2) Hypoid motor model numbers

HMTA 010 – 38 L 1200 L □ □□□ □□

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Product and series name	HMTA	With motor
	HRTA	With double shaft and adapter
② Motor capacity (example)	010	Three-phase 0.1 kW
	100	Single-phase 100 W
③ Frame number (example)	38	Frame number 38
④ Mounting type	L	Foot mount
	U	Face mount
	H	Flange mount
⑤ Reduction ratio (example)	1200	1/1200
⑥ Shaft arrangement	L	Output shaft on left when looking from motor side
	T	Output shaft on both sides
	R	Output shaft on right when looking from motor side
	S	Output shaft on one side (face side) (face mount type only)
	No code	Hollow shaft type
⑦ Specification code	No code	No B, K, BE
	B	With brake
	FI	With adapter
	BE	With encoder
	K	With POWER-LOCK (hollow shaft type only)
	SR	Shock relay type for 0.1 and 0.2 kW only
⑧ Option code A	1. Z	With variable frequency motor
	2. W	Outdoor type (with brake 0.2 to 0.75 kW: WC)
	3. J	Waterproof (IP65)
	4. V	400 V class (400/400/440 V, 50/60/60Hz)
	5. L1～L8	200 V class Different voltage(Table 1-4.)
	6. V1～V9	400 V class Different voltage(Table 1-4.)
	7. N	CE certified
	N2	UL listed (0.1 to 0.75 kW only)
	PN3	CCC compliant (with plastic terminal box: 0.1 to 0.75 kW only)
	HN3	CCC compliant (with hard terminal box: 0.1 to 0.75 kW only)
	WN3	CCC compliant (outdoor type: 0.1 to 0.75 kW only)
	8. H	With hard terminal box (0.1 to 0.75 kW only)
	9. Q	With single-action manual release
	10. M	With manual shaft
	11. A1	Heat resistant
	12. A2	Cold resistant
	13. G1	No. 1 grease specification
⑨ Option code B	1. P1	Terminal box position: 90° swing (1.5kW to 5.5kW only)
	P2	Terminal box position: 180° swing
	P3	Terminal box position: 270° swing (1.5kW to 5.5kW only)
	2. D1	Terminal box outlet direction: 90° swing (0.1kW to 0.75kW: Outdoor type, Hard terminal box)
	D2	Terminal box outlet direction: 180° swing (0.1kW to 0.75kW: Outdoor type, Hard terminal box)
	D3	Terminal box outlet direction: 270° swing (0.1kW to 0.75kW: Outdoor type, Hard terminal box)
	E1	Terminal box outlet direction: 90° swing (1.5kW to 5.5kW: Standard type, Outdoor terminal box)
	E2	Terminal box outlet direction: 180° swing (1.5kW to 5.5kW: Standard type, Outdoor terminal box)
	E3	Terminal box outlet direction: 270° swing (1.5kW to 5.5kW: Standard type, Outdoor terminal box)
	3. C0	Paint color: Light gray (Munsell N7.5)
	C1	Paint color: Light silver metallic
	C2	Paint color: Ivory white
	C3	Paint color: Dark silver metallic
	4. S1	Hollow shaft hole diameter: ϕ20
	S2	Hollow shaft hole diameter: ϕ25
	S3	Hollow shaft hole diameter: ϕ30
	S4	Hollow shaft hole diameter: ϕ35
	S5	Hollow shaft hole diameter: ϕ40
	S6	Hollow shaft hole diameter: ϕ45
	S7	Hollow shaft hole diameter: ϕ50

(3) Model numbers for Croise motor CSMA/HCMA series

CSMA 010 – 13 0 L 20 T B □□□ □□

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① Product and series name	CSMA HCMA	Single reduction type with motor Double reduction type with motor
② Motor capacity (example)	010 150	Three-phase 0.1 kW Three-phase 1.5 kW
③ Frame number (example)	13	Frame number 13
④ Installation code	0 to 6	Refer to the installation codes and mounting direction guide on page 9
⑤ Mounting type	L U H	Foot mount Face mount Flange mount
⑥ Reduction ratio (example)	20	1/20
⑦ Shaft arrangement	L T R No code	Output shaft on left when looking from motor side Output shaft on both sides Output shaft on right when looking from motor side Hollow shaft type
⑧ Specification code	No code B	Without brake With brake
⑨ Option code A	1. G 2. Z 3. W 4. J 5. V 6. L1～L8 7. V1～V9 8. H 9. Q 10. M 11. N N2 PN3 HN3 WN3	With mechanical overload protection device With variable frequency motor (excludes 0.55 kW models) Outdoor type Waterproof (IP65) 400 V class (400/400/440 V, 50/60/60Hz) 200 V class Different voltage(Table 1-4.) 400 V class Different voltage(Table 1-4.) With hard terminal box (0.75 kW or less) With single-action manual release With manual shaft CE certified UL listed (0.75 kW or less, excludes 0.55 kW models) CCC compliant (with plastic terminal box: 0.75 kW or less, excludes 0.55 kW models) CCC compliant (with hard terminal box: 0.75 kW or less, excludes 0.55 kW models) CCC compliant (outdoor type: 0.75 kW or less, excludes 0.55 kW models)
⑩ Option code B	1. P1 P2 P3 2. D1 D2 D3 E1 E2 E3 3. C0 C1 C2 C3	Terminal box position: 90° swing Terminal box position: 180° swing Terminal box position: 270° swing Terminal box outlet direction: 90° swing (0.1kW to 0.75kW: Outdoor type, Hard terminal box) Terminal box outlet direction: 180° swing (0.1kW to 0.75kW: Outdoor type, Hard terminal box) Terminal box outlet direction: 270° swing (0.1kW to 0.75kW: Outdoor type, Hard terminal box) Terminal box outlet direction: 90° swing (1.5kW to 5.5kW: Standard type, Outdoor terminal box) Terminal box outlet direction: 180° swing (1.5kW to 5.5kW: Standard type, Outdoor terminal box) Terminal box outlet direction: 270° swing (1.5kW to 5.5kW: Standard type, Outdoor terminal box) Paint color: Light gray (Munsell N7.5) Paint color: Light silver metallic Paint color: Ivory white Paint color: Dark silver metallic

[2] Transport

⚠ WARNING

- Never stand underneath the product while it is being lifted for transport. Falls can result in personal injury.

⚠ CAUTION

- Be careful when transporting so as not to drop or overturn the product. When using a Gear motor/Hypoid motor/Croise motor that has lifting hardware, ensure that there is no slack in the lifting cables before using the lifting hardware. Avoid lifting the entire machine by the lifting hardware after installing the machine. Breaking of the lifting hardware, falls, or overturning can result in injury or equipment damage.
- Before lifting the Gear motor/Hypoid motor/Croise motor, check the weight on the packaging, external drawing, or catalog. Do not lift a Gear motor/Hypoid motor/Croise motor that exceeds the rated load of the lifting equipment. The lifting equipment breaking or the product falling or overturning can result in injury or equipment damage. Also, do not touch the terminal box when lifting the product. Doing so may cause the terminal box to fall free of the product.
- If the product is packaged in a wooden box, using a forklift from under the box is unstable, so be sure to use belts to secure the box to the forklift.

[3] Mounting

Mounting quality will affect Gear motor/Hypoid motor/Croise motor life, so it is important to pay particular attention to the points below.
Grease-lubricated models do not have any restrictions on mounting direction.

⚠ WARNING
● Do not use in an explosive atmosphere. Use an explosion-proof motor. Otherwise, explosion, ignition, electric shock, injury, fire, or equipment damage can occur. ● When using an explosion-proof motor, ensure that it is suitable for use in dangerous locations (locations where there is a risk of the existence of an explosive atmosphere consisting of gas or vapors). Otherwise, explosion, ignition, electric shock, injury, fire, or equipment damage can occur. ● When running a pressure-resistant explosion-proof motor using a variable frequency drive, always ensure that all products, including the inverter, are officially certified. Inverters themselves do not have an explosion-proof construction, so be sure to install them in a location where there are no explosive gases. Otherwise, explosion, ignition, fire, injury, or equipment damage can occur. ● Increased-safety-type explosion-proof motors cannot be run using a variable frequency drive.

⚠ CAUTION
● Never place combustible items around the Gear motor/Hypoid motor/Croise motor. Doing so can result in fire. ● Do not place obstacles that can block ventilation around the Gear motor/Hypoid motor/Croise motor. This can prevent cooling and cause overheating, resulting in burns or fire. ● Never place objects on or hang objects from the Gear motor/Hypoid motor/Croise motor. Otherwise, injury can occur. ● Do not touch the keyways, such as the shaft end or inside diameter of the Gear motor/Hypoid motor/Croise motor, with a bare hand. Injury can occur. ● When using the Gear motor/Hypoid motor/Croise motor with food processing machines, especially equipment that is affected by oil vapor, install an oil pan or other protective device in case of oil leaks in the event of a malfunction or the end of operating life. Oil leaks can result in product faults.

3-1. Installation location

Ambient temperature: -20 to 40°C (Gear motors/Hypoid motors)
5 to 40°C (Croise motors)
Ambient humidity: Up to 85%
Altitude: Up to 1,000 m
Ambient atmosphere: No corrosive gases, explosive gases, vapors, or the like.
Install in a well-ventilated location without dust.

● Indoor type
Install indoors in an area that is well-ventilated, low in humidity, and has little or no dust.
(The protective construction for Gear motors/Hypoid motors/Croise motors is as follows: three-phase models without brake: IP44, three-phase models with brake: IP20, models with clutch & brake: IP12, single-phase models without brake: IP22, single-phase models with brake: IP20.)

● Outdoor type
Install outdoors in an area that has little or no dust.
(When used horizontally in the axial direction without a brake, the protective construction for the Gear motor/Hypoid motor/Croise motor is IP55. When used with a brake, the protective construction is as follows:
When used at continuous time rating at 0.75 kW or less: IP65. When used at continuous time rating at 1.5 kW or more: JPW44. When used at short time rating at 0.75 kW or less: IP65. For other axial directions, contact us for details.)

● Increased-safety-type explosion-proof motors
Increased-safety-type explosion-proof motors can be used in ambient temperatures of -20 to 40°C in Zone 2 areas where there are no corrosive gases.
(Motor: Conforms to JIS C 0934)

● Pressure-resistant explosion-proof motors
Pressure-resistant explosion-proof motors can be used in the atmospheres below specified in the Recommended Practices for Explosion-protected Electrical Installations in General Industries (Gas Vapor Explosion-Proofing).
(Motor: Conforms to JIS C 0931)
Zone 1 or Zone 2 category hazardous areas that have explosive gas from ignition group G1 to G4 with atmospheres of explosion class 1 or 2, or non-hazardous areas.

● Waterproof motors
Waterproof motors can be used indoors in IP65 atmospheres (protection against dust and water jets). (When used horizontally in the axial direction without a three-phase brake, the protective construction for the Gear motor/Hypoid motor/Croise motor is IP65. For other axial directions, contact us for details.)

3-2. Mounting

● Foot mount types
Select a solid and flat installation platform which is not greatly affected by operational vibration and secure the motor firmly using four bolts after removing dust and other foreign material from the installation surface.
If using a non-direct drive setup or in a situation where the equipment will be frequently started and stopped, it is recommended to install stoppers on the feet.

● Face mount types/hollow shaft types (Hypoid motors)
When mounting a face mount type or hollow shaft type, pay particular attention to the points below.

① Mounting
A short length of engagement between the mounting bolt and the female screw on the main unit or an excessive tightening torque can damage the female screw. Be careful, as an insufficient tightening torque may lead to the main body becoming loosened due to shock when the machine is started or stopped.

② Mounting bolts

i. Bolt types

When mounting using tap (screw) holes	When mounting using through holes
Hex bolt (JIS B1051 strength class 4.6)	Hex bolt (JIS B1051 strength class 8.8)
Hex cap bolt (JIS B1051 strength class 10.9)	Hex cap bolt (JIS B1051 strength class 10.9)

ii. Bolt lengths
When mounting using tap holes, determine bolt length by adding the mounting flange thickness to the screw engagement length in the table below.
* If using a Hypoid motor with M8 x 28-mm tap-hole threads, add a further 10 mm to the figure obtained using the formula above.

• Gear motors - Face mount types

When mounting using tap (screw) holes	
Screw holes on case	Length of bolt engaging with screw
M8 x 26 mm	18 mm or longer
M10 x 32 mm	22mm or longer
M12 x 38 mm	26mm or longer
M16 x 34 mm	24mm or longer

• Hypoid motors - Face mount types & hollow shaft types

When mounting using tap (screw) holes		When mounting using through holes	
Screw holes on case	Length of bolt engaging with screw	Through-hole size	Bolt length
M8 x 28 mm*	25mm or longer	M6	95mm or longer
M10 x 34 mm	31mm or longer	M8	120mm or longer
M12 x 46 mm	43mm or longer	M10	150mm or longer
M16 x 44 mm	41mm or longer	M12	170mm or longer
M20 x 52 mm	50mm or longer	M16	200mm or longer

③ Tightening torque
Use the tightening torques listed below:

Screw size	Hex bolt		Hex cap bolt	
	N·m	[Ref. kgf·m]	N·m	[Ref. kgf·m]
M6	4.1 - 4.3	[0.40 - 0.42]	4.1 - 8.2	[0.40 - 0.80]
M8	9.8 - 10.3	[1.0 - 1.05]	9.8 - 19.6	[1.0 - 2.0]
M10	19.6 - 20.6	[2.0 - 2.1]	19.6 - 39.2	[2.0 - 4.0]
M12	34.3 - 36.3	[3.5 - 3.7]	34.3 - 68.6	[3.5 - 7.0]
M16	84.3 - 88.2	[8.6 - 9.0]	84.3 - 168.6	[8.6 - 17.2]
M20	132.3 - 139.2	[13.5 - 14.2]	132.3 - 264.6	[13.5 - 27.0]

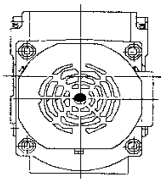
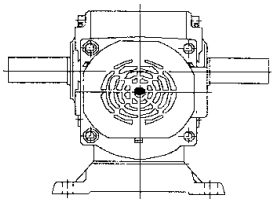
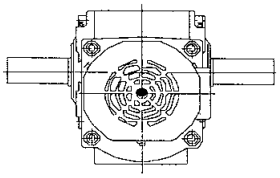
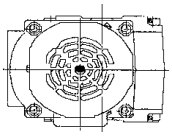
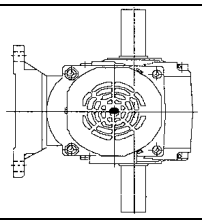
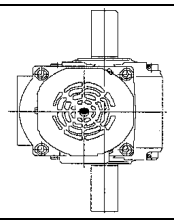
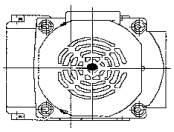
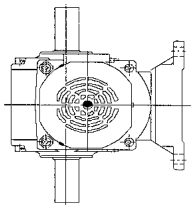
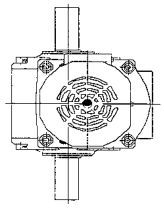
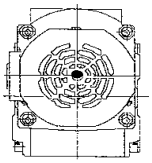
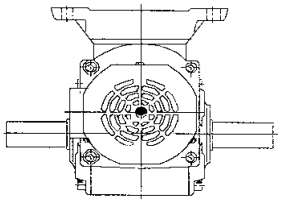
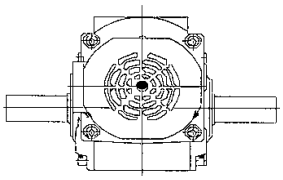
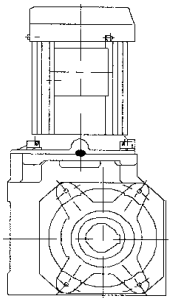
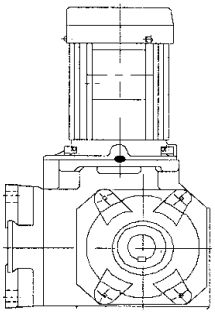
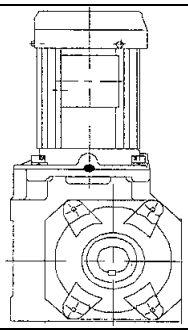
Note: When mounting an optional flange for the Gear motor face mount type (U), be sure to use the supplied bolts and disk spring washers.

● Flange mount motors (Gear motors)
Securely tighten the motor to the flange mounting plate.

3-3. Mounting direction (Croise motor only)

Refer to the mounting direction guide below when mounting the motor.
Table of mounting direction numbers indicated on the nameplate

CSMA Series		HCMA Series			
Frame No. 13 to 28		Frame No. 16 to 28		Frame No. 32 to 50	
Mounting No.	Mounting direction	Mounting No.	Mounting direction	Mounting No.	Mounting direction
0	No restrictions on mounting direction	0	Standard Left side up Right side up Upside down	1	Standard
				2	Left side up
				3	Right side up
				4	Upside down
		5	Input up	5	Input up
		6	Other	6	Other

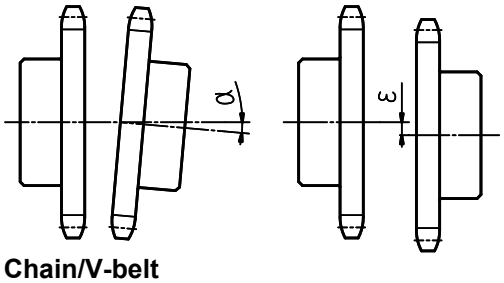
Mounting direction	Mounting direction		
	Hollow shaft type	Foot mount type	Face mount
Down ← →Up Standard			
Down ← →Up Left side up			
Down ← →Up Right side up			
Down ← →Up Upside down			
Down ← →Up Input up			
Down ← →Up Other	Mounting direction specified when ordering		

[4] Connecting to another machine

⚠ CAUTION
● When connecting the Gear motor/Hypoid motor/Croise motor to the load, be careful of the alignment, belt tension, and parallelism of the pulley. When direct coupling, be careful of the direct coupling accuracy. When setting a belt, adjust the belt tension correctly. Before operation, securely tighten the pulley and coupling tightening bolts. Otherwise, launching of parts can cause injury or equipment damage. ● Provide a cover so that rotating parts cannot be touched. Otherwise, injury can occur.

During connection, hitting the sprocket or gear forcefully can damage the output shaft bearing. The output shaft diameter is made with a tolerance of h6, so fit sprockets and gears, etc., are connected with an interference fit, and should be shrink fit at approximately 100°C. If the phases must be matched,Tsubakimoto Chain recommends using a POWER-LOCK. Align the belt and chain accurately and make sure that an overhang load exceeding the specified value is not applied.

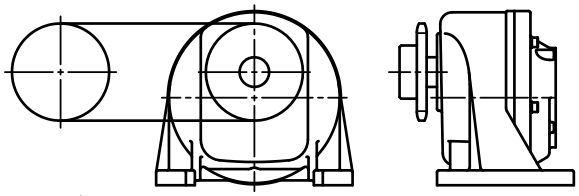
4-1. Direct coupling



Ensure that displacement α and ε is kept to a minimum.
Values for α and ε differ according to the type of coupling, so ensure that they are within the allowable values indicated by the manufacturer.
(Reference: For Tsubaki Roller Chain Couplings, α = 1° or less and ε = 2% of chain pitch or less.)

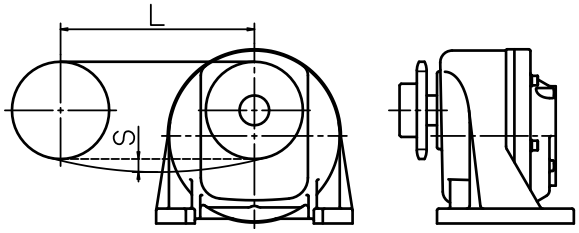
4-2. Chain/V-belt

Correct usage



- Chain/belt tension is correct.
- Sprocket/pulley position is also correct.

Incorrect usage

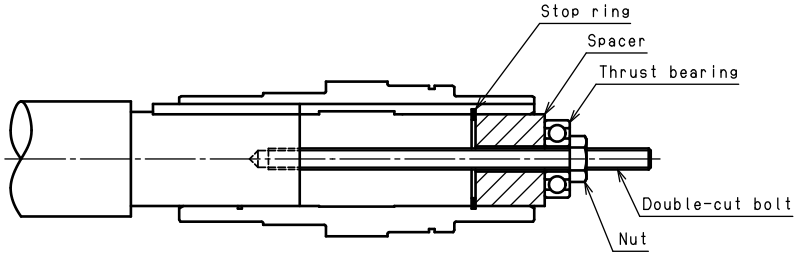


- Sprocket is back-to-front so it is near the end of the shaft.
- Chain is too loose.
  General guideline when using roller chain is that amount of slack (S) should be approximately 4% of the length of the span (L).

4-3. Mounting/removing a hollow shaft

(1) Mounting to a driven shaft

- The internal diameter of the hollow shaft is manufactured to JIS H8 tolerance. For normal applications, the finish of the driven shaft should be h7. For applications involving large shock or radial load, use a little tighter fit of js6 or k6.
- When mounting the hollow shaft to the driven shaft, apply molybdenum disulfide grease to the surface of the driven shaft and the internal diameter of the hollow shaft before inserting.
- For the key, use a parallel key (JIS B1301-1976). Using a (headed) tapered key may lead to a shorter life or malfunction due to output shaft eccentricity or other cause.
- A mounting jig as shown below helps you to insert the shaft smoothly:

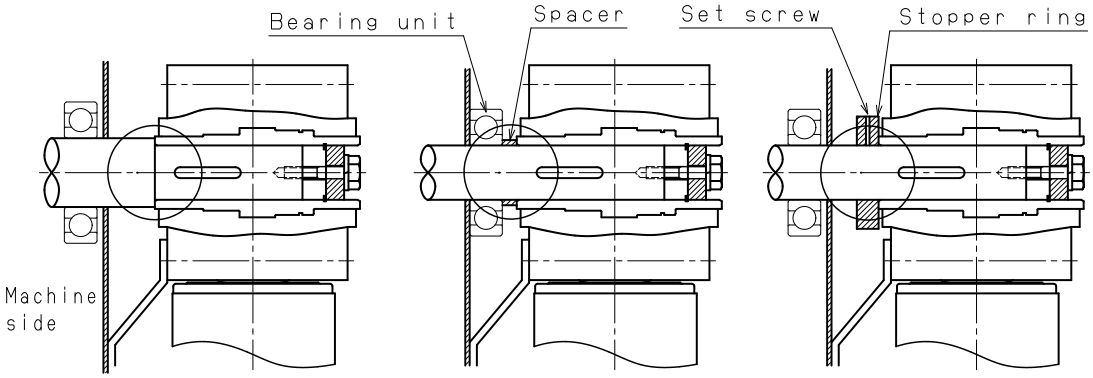


Mounting jig

(2) Fixing to the driven shaft

● Be sure to secure the Hypoid motor/Croise motor to the driven shaft.

• Fixing methods that prevent the Hypoid motor/Croise motor from moving to the machine side

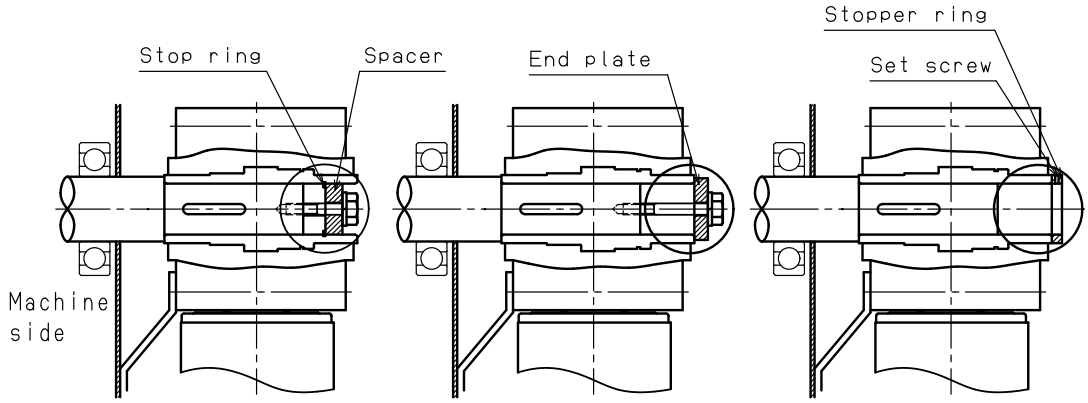


Fixing with a stepped shaft

Fixing with a spacer (driven shaft not stepped)

Fixing with set screw and stopper ring (driven shaft not stepped)

• Fixing methods that prevent the Hypoid motor from moving to the non-machine side



Fixing with spacer and stop ring

Fixing with an end plate

Fixing with set screw and stopper ring

Figure 1

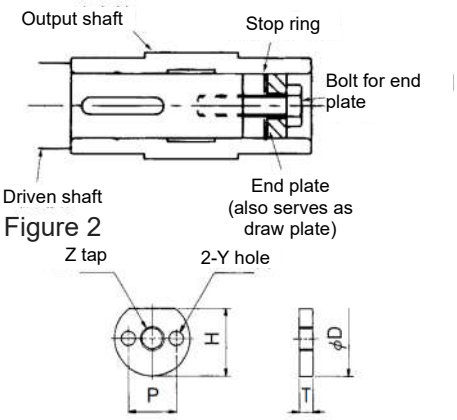


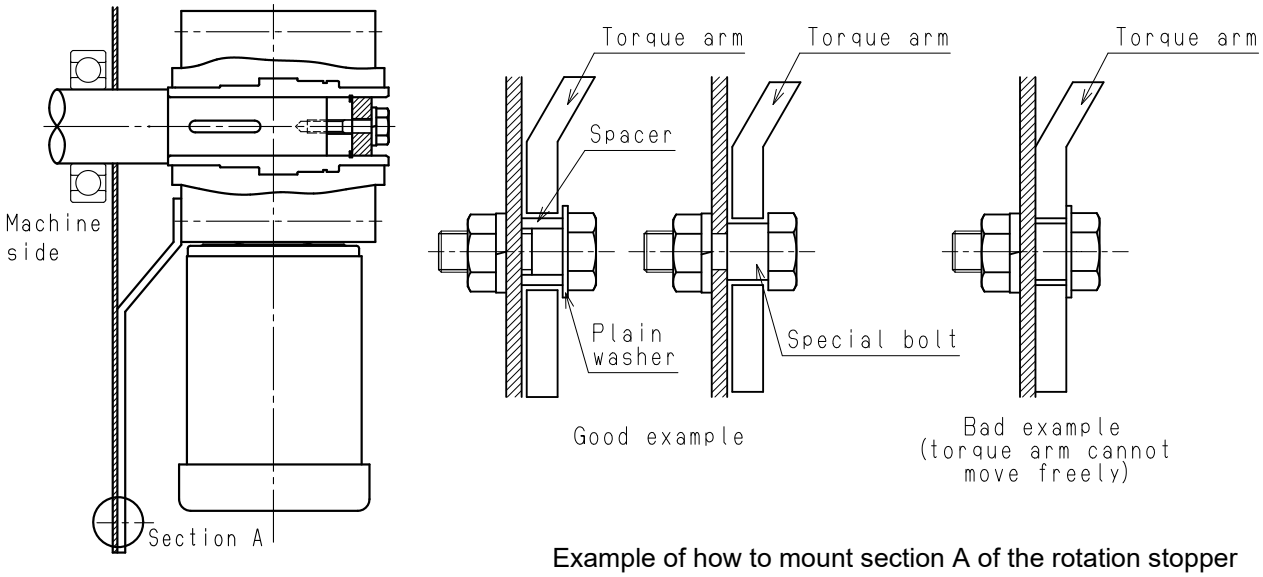
Figure 2

Table 1. Recommended dimensions for end plates(Croise motor):See Figure 1.2.

Hollow output shaft bore diameter	Plate						Bolt for plate (with spring washer)	Stop ring size
	ϕD	T	H	Z	2-Y hole	P		
ϕ20	19.6	6	16	M8	-	-	1-M6 x 24	C20
ϕ25	24.6	9	20	M10	-	-	1-M8 x 35	C25
ϕ30	29.6	9	25	M12	-	-	1-M10 x 40	C30
ϕ40	39.6	12	34	M12	6.6	24	2-M6 x 40	C40
ϕ50	49.6	12	44	M16	9	30	2-M8 x 45	C50
ϕ55	54.6	14	48	M16	11	32	2-M10 x 55	C55
ϕ70	69.5	14	62	M24	14	44	2-M12 × 60	C70

(3) Preventing the torque arm from rotating

● Mount the torque arm on the of the driven-machine side of the Hypoid motor housing/Croise motor. Mount using a hex bolt. Provide sufficient room for the rotation stopper of the torque arm so that the torque arm is free to move without excessive force being applied between the Hypoid motor and driven shaft. Be sure not to fix the torque arm with a rotation preventing bolt. When the motor is started and stopped frequently or when it is repeatedly run forward and then reversed, install a rubber bush between the torque arm and the mounting bolt (or the spacer) to reduce shock.



Example of how to mount section A of the rotation stopper

(4) Mounting to machine (Croise motor)

- Use spigot facing for flange mount type.
- The end plate is not required when mounting a reducer by its flange to a fixed driven shaft. Take measures to prevent the key from falling out.
  Note) If the end plate is used to fix the hollow output shaft, the bearing may be damaged due to the stress on the bearing on the hollow output shaft.
- When fixing the driven shaft to the reducer by its flange, mount the reducer so that the driven shaft is free in the thrust direction before fixing the thrust direction of the driven shaft.
- When mounting the motor to the machine by its base, use the recommended bolts in Table 2.

Table 2. Recommended Mounting Bolts (Equivalent to JIS strength 4.8 hex bolts)

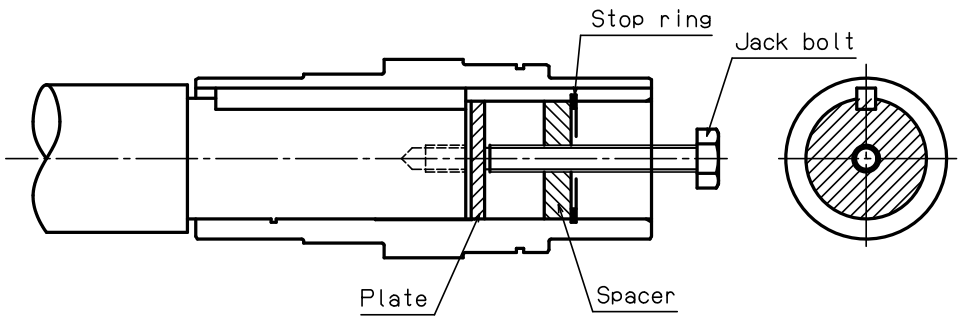
Reducer frame No.	Bolt size	Reducer frame No.	Bolt size
13	M6 x 20	32	M12 x 40
16	M8 x 25	40	M14 x 45
22	M10 x 35	50	M16 x 50
28	M12 x 40		

Note: Recommended bolts are the same for all Croise motors with the same reducer frame number, regardless of motor power or reduction ratio.

5) Removing the driven shaft

● Remove the driven shaft from the hollow shaft while making sure that excessive force is not applied between the housing and hollow shaft.

● A jig as shown below helps you to remove the shaft smoothly:



Removing jig

[5] Direction of rotation

⚠ CAUTION
● Check the direction of rotation before connecting to another machine. A difference in direction can result in injury or equipment damage.

5-1. Direction of rotation of Gear motor

The direction of rotation of the output shaft is as shown in the table below when the motor is wired as shown in Fig. 5-1.

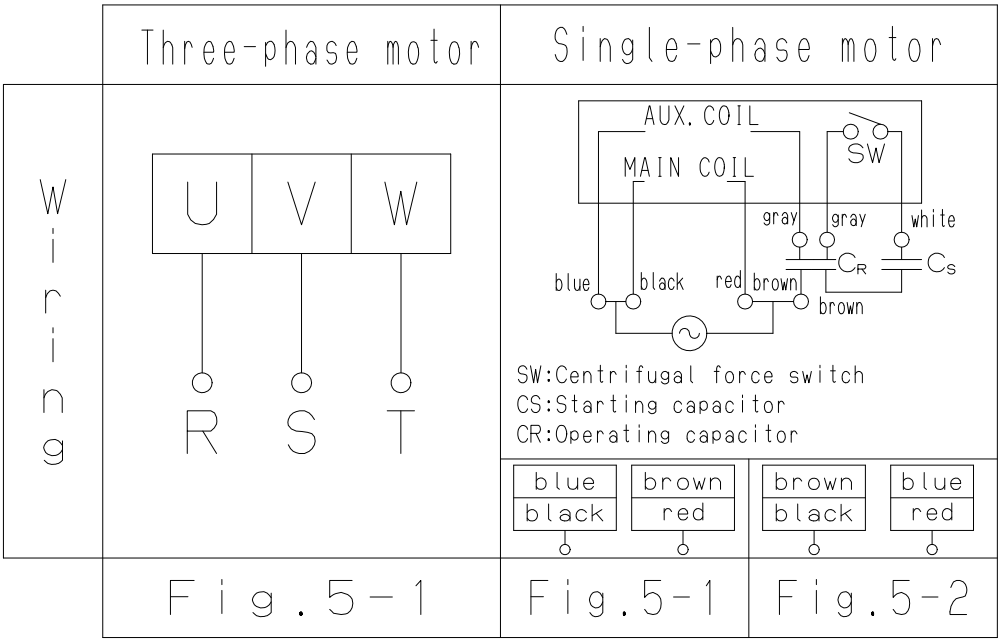
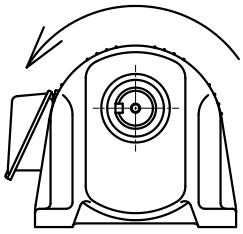
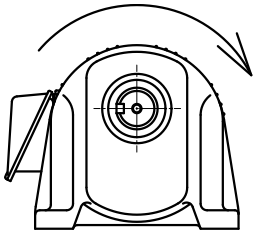


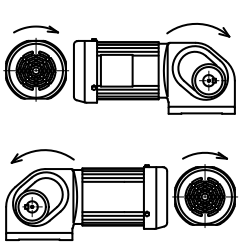
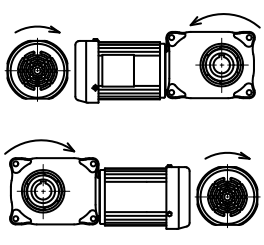
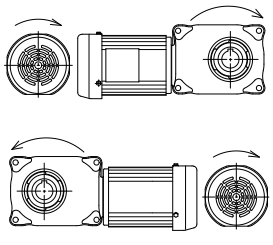
Table 5-1. Direction of rotation of output shaft when motor is wired as shown in Fig. 5-1

Direction of rotation when viewed from output shaft side			
Motor capacity	Reduction ratio (2-stage)	Reduction ratio (4-stage)	Reduction ratio (3-stage)
0.1 kW 100 W	5 to 50	300 to 1200	60 to 200
0.2 kW 200 W	5 to 40	300 to 1200	50 to 200
0.4 kW	5 to 30	300 to 1200	40 to 200
0.75 kW	5 to 30	300 to 450	40 to 200
1.5 kW	5 to 30	-	40 to 200
2.2 kW	5 to 30	-	40 to 200
3.7 kW	5 to 30	-	40 50
5.5 kW	5 to 30	-	-

The direction of rotation of a **three-phase motor** can be changed by switching any two of U, V, and W.
The direction of rotation of a **single-phase motor** can be changed by using the wiring configuration shown in Fig. 5-2.

5-2. Direction of rotation of Hypoid motor

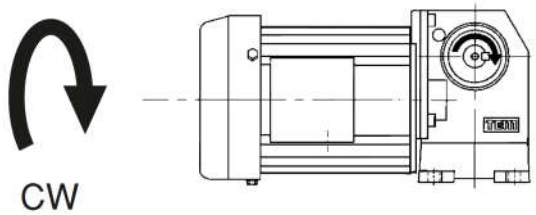
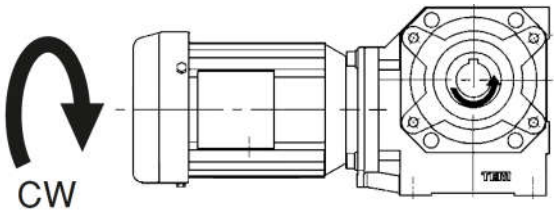
Table 5-2. Direction of rotation of output shaft when motor is wired as shown in Fig. 5-1

Direction of rotation when viewed from output shaft side					
Motor capacity	Frame No.	Mounting	Reduction ratio (2-stage)	Reduction ratio (4-stage)	Reduction ratio (3-stage)
0.1 kW	22	L	-	-	60 to 120
		U	5 to 50		
	20	H			
0.1 kW 100 W	19, 24, 28, 38	L	5 to 60	300 to 1200	80 to 200
	24, 28, 38	U			
	30, 35	H			
0.2 kW	22	L	-	-	60
		U	5 to 25		30 to 60
	20	H			
0.2 kW 200 W	19, 28, 38, 42	L	5 to 60	300 to 1200	80 to 200
	28, 38, 42	U			
	30, 35, 45	H			
0.4 kW	24, 38, 42, 50	L	5 to 50	300 to 1200	60 to 200
	28, 38, 42, 50	U	5 to 30		40 to 200
	30, 35, 45, 55	H			
0.75 kW	30, 42, 50	L	5 to 50	300 to 480	60 to 200
	38, 42, 50	U	5 to 30		40 to 200
	35, 45, 55	H			
1.5 kW	42, 50	L/U	5 to 30	-	40 to 200
	45, 55	H			
2.2 kW	42, 50	L/U	5 to 20	-	25 to 120
	45, 55	H			
3.7 kW	50	L/U	5 to 20	-	25 to 60
	55	H			
5.5 kW	50	L/U	5 to 20	-	25 to 40
	55	H			

The direction of rotation of a **three-phase motor** can be changed by switching any two of U, V, and W. The direction of rotation of a **single-phase motor** can be changed by using the wiring configuration shown in Fig. 5-2.

5-3. Direction of rotation of Croise motor

Table 5-3. Direction of rotation of output shaft when motor is wired as shown in Fig. 5-1

CSMA Series Direction of rotation	HCMA Series Direction of rotation
 (Clockwise when viewed from opposite side to motor load)	 (Clockwise when viewed from opposite side to motor load)

[6] Wiring

⚠ WARNING

- Connect the power supply cable according to the wiring diagram in the terminal box and the instruction manual. Otherwise, electric shock or fire can occur. (If the terminal box does not have a wiring diagram, insulate the connectors properly.)
- Do not forcibly bend, pull, or pinch the power supply cable or motor lead wires. Otherwise, electric shock can occur.
- Ground the earth terminal properly. Otherwise, electric shock can occur.
- Be sure to ground the product and install a special ground fault interrupter for each product. Otherwise, electric shock can occur.
- Install a motor protection device for each product. Problems can result in a risk of fire.
- Be sure to use the AC source listed on the nameplate. Otherwise, motor burnout or fire can occur.

⚠ CAUTION

- When measuring insulation resistance, do not touch the terminals. Otherwise, electric shock can occur.
- Perform the wiring according to electrical equipment technical standards and indoor wiring regulations. Otherwise, burnout, electric shock, fire, or injury can occur.
- The motor does not include a protection device. Electrical equipment technical standards require the installation of an overload protection device. It is recommended that other protection devices (such as a ground fault interrupter) are also installed in addition to overload protection devices. Otherwise, damage, electric shock, fire, or injury can occur.
- When rotating the Gear motor/Hypoid motor/Croise motor separately, remove the key temporarily attached to the output shaft.
- Check the direction of rotation before connecting to another machine. A difference in direction can result in injury or equipment damage.
- Do not confuse the startup capacitor with the operation capacitor. Using the startup capacitor for operation will damage the capacitor.
- Do not damage the plastic covering of the startup capacitor. Otherwise, electric shock can occur.
- Ensure that the wiring voltage drop is no more than 2%. A long wiring distance will cause a larger voltage drop, which may cause the Gear motor/Hypoid motor/Croise motor to fail to start.
- When reversing operation, be sure to bring the reducer to a full stop before starting reverse operation. Plucking can cause the forward-reverse operation to damage the equipment.
- When using a motor with a brake, do not continuously supply power to the brake coil when the motor is stopped. Otherwise, coil burnout or fire can occur.
- When using a Gear motor/Hypoid motor/Croise motor with a brake for elevating, employ DC external wiring. Falling accidents can occur.
- The DC module contains a diode. The DC module will become unusable if it is shorted due to incorrect wiring, etc. Take special care when wiring.

6-1. Wiring the AC source

Be sure to use the AC source listed on the nameplate.
Connect wiring for three-phase Gear motors/Hypoid motors as shown below.

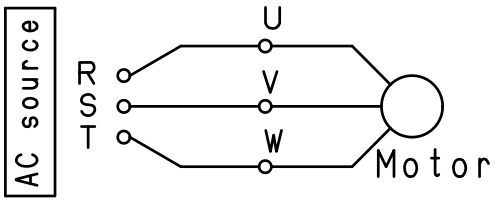
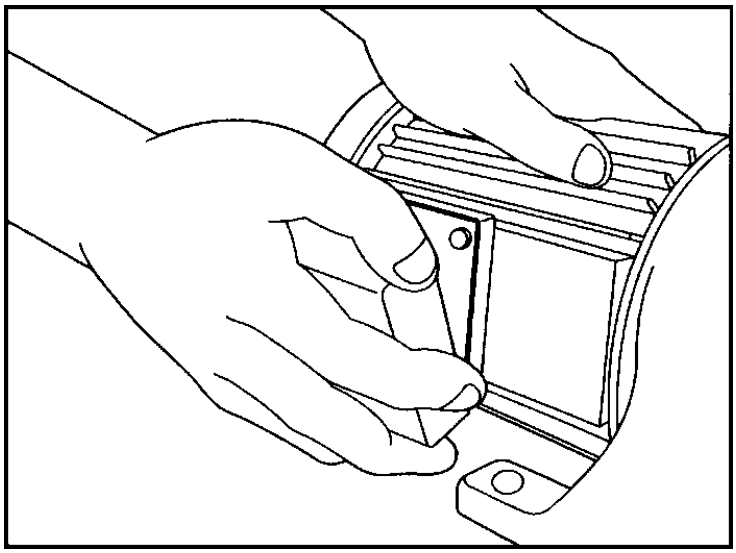


Table 6-1. Lead colors

	0.1 to 0.75 kW	1.5 to 5.5 kW
U	Red	Red
V	White	Yellow
W	Black	Blue

6-2. Attaching and removing the terminal box cover (0.1 to 0.75 kW three-phase motor)

(1) Removing
The cover can be removed by holding the side of the terminal box and pulling the cover towards you as shown in the figure below.



(2) Attaching
Press the terminal box cover down onto the terminal box housing until it clicks into place.

6-3. Wiring a motor with a brake

Unless otherwise specified, the brake is wired AC internal wiring before shipment, and generally, it can be used as is.
If the wiring must be changed to suit an application, such as when connecting a frequency inverter or reducing the stop time, do so while referring to the diagram for wiring a 3-phase motor with a brake (pages 18, 19 and pages 28 , 29). Also, be sure to use the protection device and other electronic components listed in the notes. Be careful of incorrect wiring, as this can damage the DC module and cause other problems.

Table 6-2. Wiring a motor with a brake

Wiring	Application
AC internal wiring	General application
AC external wiring	When reducing the stop time or installing a phase advancing capacitor
AC external operation	When installing a frequency inverter or performing separate brake control. However, braking with a VFD should be at 60 Hz or less. Avoid braking at high speed ranges above 60 Hz, as this can cause abnormal abrasion wear on the brake linings, abnormal heating, and other problems.
DC external wiring	When using in an elevating device (minus load) or when stopping accuracy is required

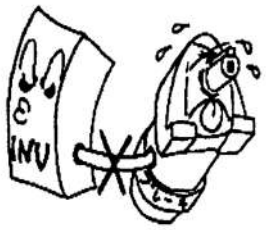
● Braking delay reference

Time from when the switch is turned off to when braking begins (s)
(Different from braking time.)

	0.1 kW	0.2 kW	0.4 kW
AC internal wiring	0.18 to 0.25	0.15 to 0.21	0.14 to 0.17
AC external wiring	0.11 to 0.18	0.09 to 0.12	0.06 to 0.09
AC external operation	0.11 to 0.18	0.09 to 0.12	0.06 to 0.09
DC external wiring	0.05 to 0.07	0.04 to 0.06	0.03 to 0.05

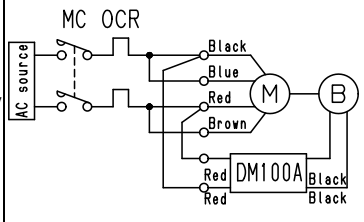
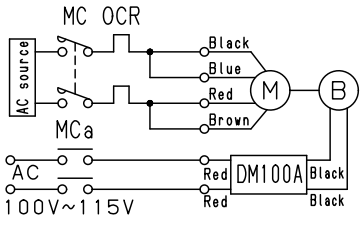
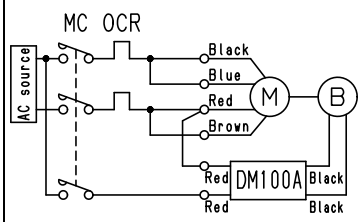
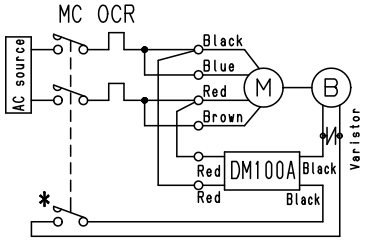
	0.55 kW	0.75 kW	1.5 kW
AC internal wiring	0.14 to 0.17	0.20 to 0.24	0.30 to 0.50
AC external wiring	0.06 to 0.09	0.10 to 0.13	0.10 to 0.20
AC external operation	0.06 to 0.09	0.10 to 0.13	0.10 to 0.20
DC external wiring	0.03 to 0.05	0.04 to 0.06	0.01 to 0.02

	2.2 kW	3.7 kW	5.5 kW
AC internal wiring	0.30 to 0.45	0.50 to 0.70	0.20 to 0.30
AC external wiring	0.10 to 0.20	0.20 to 0.40	0.03 to 0.05
AC external operation	0.10 to 0.20	0.20 to 0.40	0.03 to 0.05
DC external wiring	0.01 to 0.02	0.02 to 0.04	



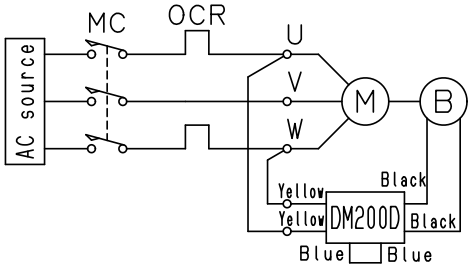
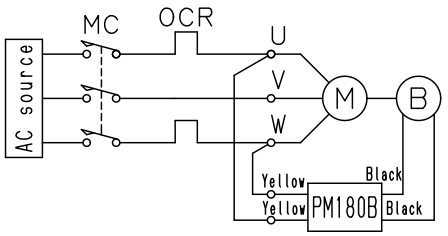
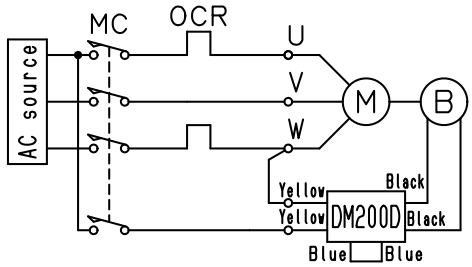
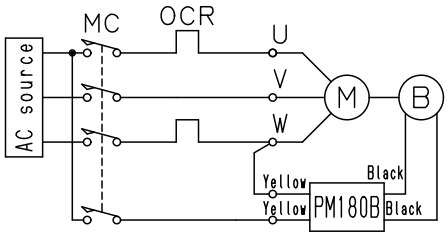
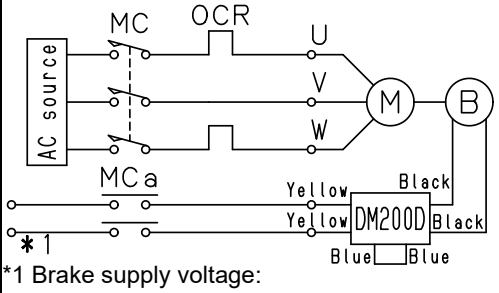
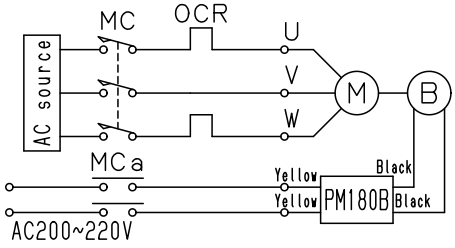
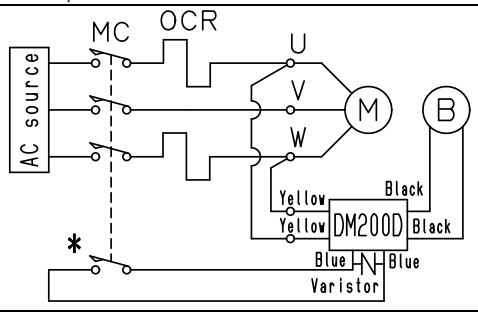
Inverter connection needs a AC external operation

● Wiring a single-phase motor with brake (100W/200W)

	Application	Single-phase 100 W/200 W 100 V		Application	Single-phase 100 W/200 W 100 V
AC internal wiring	• For general use • Standard factory wiring		AC separate control	• For variable frequency control • Use to control the brake separately Note: The contact on the auxiliary relay (MCa) should be rated for 200 VAC, 7 A or more (load resistance).	
AC external wiring	• For shorter stopping time		DC injection braking	• When using in an elevating device or when stopping accuracy is required Note: The auxiliary contact of MC, (or an auxiliary relay) used at * should be rated for 200 VAC, 10 A or more (load resistance).	

M: motor, B: brake, MC: motor starter, MCa: auxiliary relay, OCR: overcurrent relay, DM100A: DC module
Note 1: When wiring DC external wiring, connect a varistor while referring to Note 2 on page 18.

● Wiring a 3-phase motor with brake (0.1 kW to 5.5 kW, 200 V class)

	Application	0.1 to 3.7 kW	5.5 kW
AC internal wiring	• For general use • Standard factory wiring		
AC external wiring	• For shorter stopping time • Use when installing a phase advancing capacitor.		
AC external operation	• Use to control the brake separately Note: The contact on the auxiliary relay (MCa) should be rated for 200 VAC, 7 A or more (load resistance).	 *1 Brake supply voltage: 0.1 kW, 0.2 kW: 200 to 254 VAC 0.4 kW, 0.75 kW: 200 to 220 VAC 1.5 kW, 3.7 kW: 200 to 230 VAC	
DC external wiring	• When using in an elevating device or when stopping accuracy is required Note: The auxiliary contact of MC, (or an auxiliary relay) used at * should be rated for 200 VAC, 10 A or more (load resistance).		

M: motor, B: brake, MC: motor starter, MCa: auxiliary relay, OCR: overcurrent relay,
DM200D, PM180B: DC module, -N-: Protection device (Varistor)

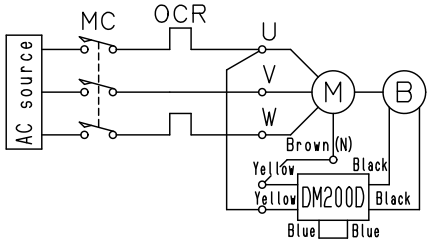
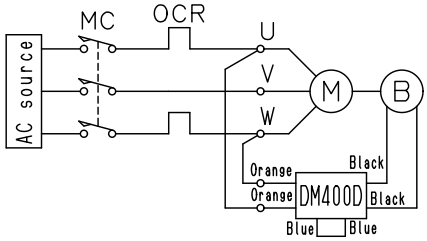
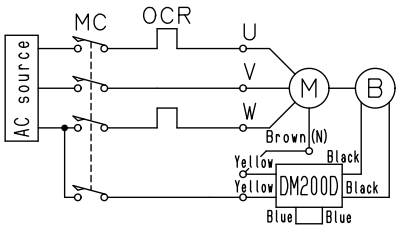
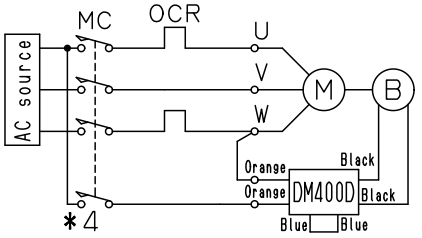
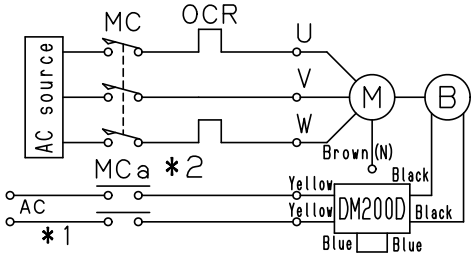
Note 1: Brake voltage is 90 VDC. (When supplying 200 VAC to the DC module)

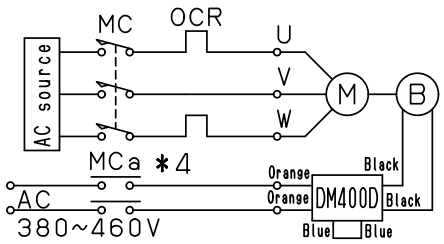
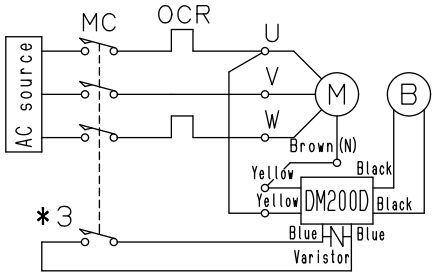
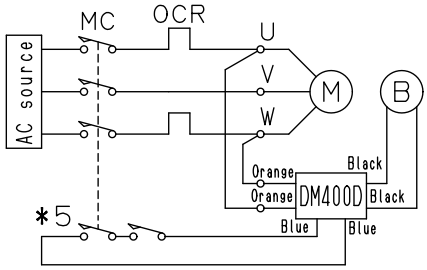
Note 2: When using DC external wiring, various conditions (wiring length, method, type of relay, etc.) may cause damage to the brake's power module. To prevent such damage, wire a varistor across the terminals used for DC injection braking.
For maximum protection, connect the varistor to the blue lead wires as close as possible to the brake's power module. Varistors with the following model numbers may be used. For DM200D, use a varistor rated for 470 V.
(DM400D has a built-in varistor, so there is no need to mount a varistor externally.)

Product name	Manufacturer	Model No.
		When using DM100A/DM200D
Surge absorber	Panasonic	ERZV14D471
Zetwrap	Fuji Electric Device Technology	ENE471D-14A
Ceramic varistor	Nippon Chemi-Con	TND14V-471KB00AA0

Note 3: The DC module for the 5.5 kW motor is PM180B. This module has a built-in relay and must not be used with DC external wiring.

●Wiring a 3-phase motor with brake (0.1 kW to 3.7 kW, 400 V class)

<table>
<tr><th></th><th>Purpose</th><th>0.1 to 0.75 kW</th><th>1.5 to 3.7 kW</th></tr>
<tr><td>AC internal wiring</td><td>• For general use
• Standard factory wiring</td><td> 
</td><td> 
</td></tr>
<tr><td>AC external wiring</td><td>• For shorter stopping time
• Use when installing a phase advancing capacitor.</td><td> 
</td><td> 
</td></tr>
<tr><td>AC external operation</td><td>• Use to control the brake separately</td><td> 

Note: The brown lead (N) wired into the wiring nut must be disconnected from the terminal block and isolated.
If supplying power to a DC module via a transformer, size it as shown below:
0.1 to 0.4 kW : 60 VA
0.75 kW : 100 VA
*1 Brake supply voltage:
200 to 254 VAC</td><td> 
</td></tr>
<tr><td>DC external wiring</td><td>• When using in an elevating device or when stopping accuracy is required</td><td> 
</td><td> 
</td></tr>
</table>

M: motor, B: brake, MC: motor starter, MCa: auxiliary relay, OCR: overcurrent relay, DM200D, DM400D: DC module, -N-: Protection device (Varistor)

Note 1: For 0.4/0.75 kW, when the brake supply voltage for *1 is AC200V, the gap limit in the heated condition is 0.4 mm.

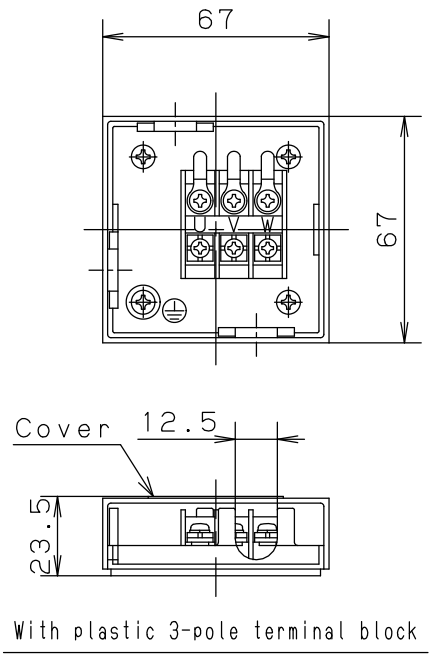
Note 2: *2 The contact on the auxiliary relay (MCa) used at *2 should be rated for 200 VAC, 7 A or more (load resistance).
*3 The auxiliary contact of MC, (or an auxiliary relay) used at *3 should be rated for 200 VAC, 10 A or more (load resistance).
*4 The contact on the auxiliary relay (MCa) used at *4 should be rated for 400 to 440 VAC inductive loads of 1 A or more.
*5 The contacts on the auxiliary relay (MCa) used at *5 should be rated for 400 to 440 VAC inductive loads of 1 A or more and wired in series of two or three contacts.

Note 3: When wiring DC external wiring, connect a varistor while referring to Note 2 on page 18.

6-4. Dimensions of terminal box unit

(1) 0.1 to 0.75 kW

● Standard terminal box specifications

<table>
<tr><th>Output</th><th colspan="2">Category</th><th>Dimensions</th></tr>
<tr>
<td>0.1 to 0.75 kW</td>
<td>Without brake</td>
<td>Indoor type</td>
<td>


With plastic 3-pole terminal block

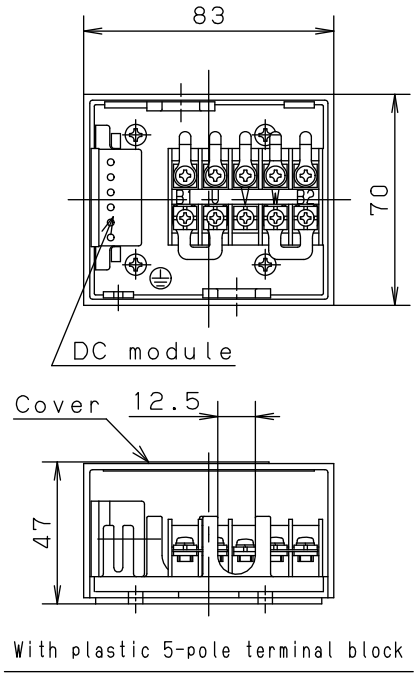
1. Material: Plastic

2. Terminal screw size: M3.5
Tightening torque: 0.8 N·m
{Ref. 0.08 kgf·m}

3. Compatible crimp-on terminal
Naked round type (R type)
1.25 to 3.5 2 to 3.5
1.25 to 4 2 to 4
Round type with insulating coating
1.25 to 3.5 2 to 3.5
1.25 to 4 2 to 4

4. Terminal box can be rotated at a pitch of 90°.

5. Wires can be inserted from 3 directions depending on the direction the cover is installed.

6. Ground terminal screw size: M4
Tightening torque: 1.2 N·m
{Ref. 0.12 kgf·m}
</td>
</tr>
<tr>
<td>0.1 to 0.75 kW</td>
<td>With brake</td>
<td>Indoor type</td>
<td>


With plastic 5-pole terminal block

1. Material: Plastic

2. Terminal screw size: M3.5
Tightening torque: 0.8 N·m
{Ref. 0.08 kgf·m}

3. Compatible crimp-on terminal
Naked round type (R type)
1.25 to 3.5 2 to 3.5
1.25 to 4 2 to 4
Round type with insulating coating
1.25 to 3.5 2 to 3.5
1.25 to 4 2 to 4

4. Terminal box can be rotated at a pitch of 90°.

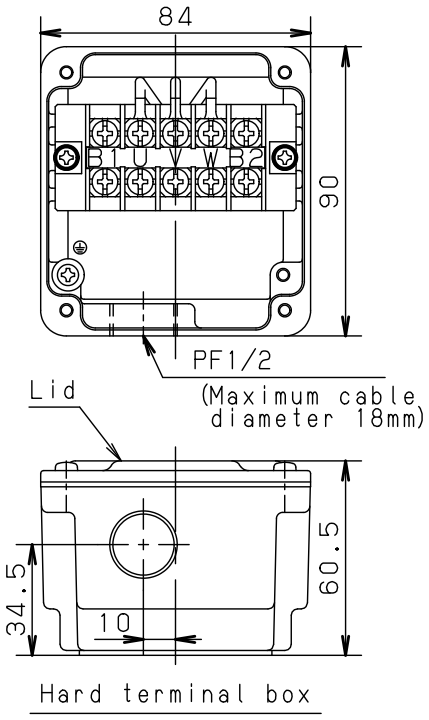
5. Wires can be inserted from 2 directions (above or below) depending on the direction the cover is installed.

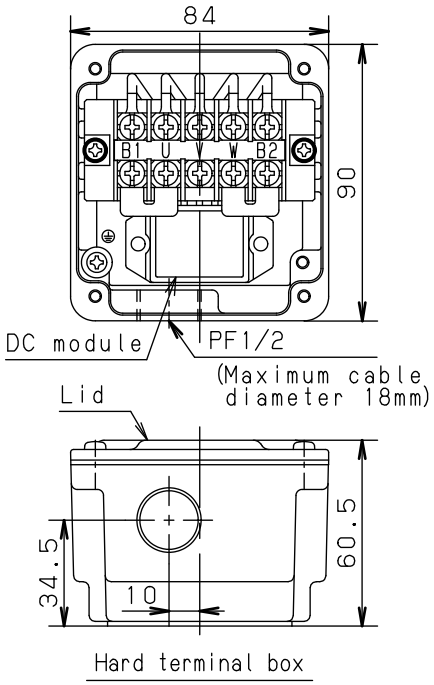
6. The brake DC power source device DM200D is housed in the terminal box with AC internal wiring. See pages 18, 19 for wiring details.

7. Ground terminal screw size: M4
Tightening torque: 1.2 N·m
{Ref. 0.12 kgf·m}
</td>
</tr>
</table>

● Hard terminal box (optional) and outdoor type standard terminal box

<table>
<tr><th>Output</th><th colspan="2">Category</th><th>Dimensions</th></tr>
<tr><td>0.1 to 0.75 kW</td><td>Without brake</td><td>Indoor type

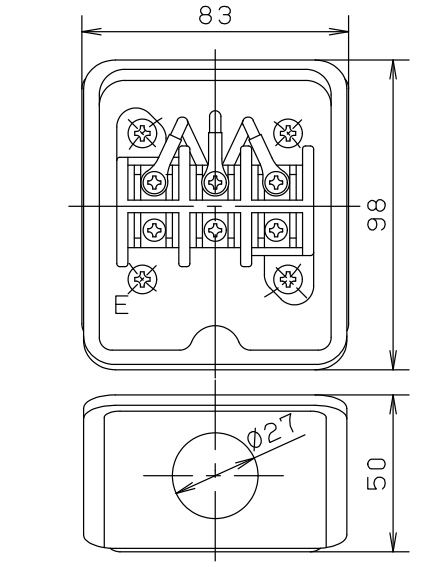
Outdoor type</td><td> 

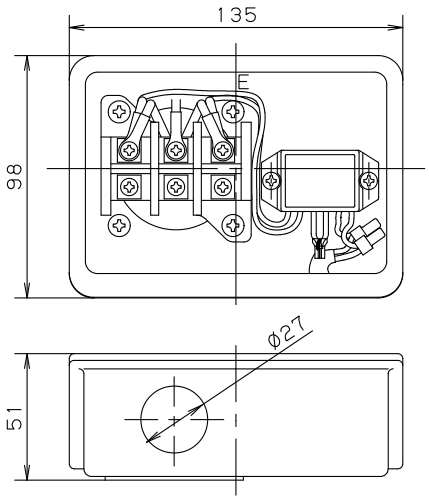
1. Material: aluminum die-cast
2. Terminal screw size: M4
Tightening torque: 1.8 N·m
{Ref. 0.18 kgf·m}
3. Compatible crimp-on terminal
Naked round type (R type)
1.25 to 4 2 to 4
Round type with insulating coating
1.25 to 4 2 to 4
4. Terminal box can be rotated at a pitch of 90°.
5. When the motor is shipped, the mouth of the terminal box is facing the opposite side of the load.
6. When using outdoors, tighten the cable gland to the prescribed tightening torque.
7. Ground terminal screw size: M4
Tightening torque: 1.2 N·m
{Ref. 0.12 kgf·m}</td></tr>
<tr><td>0.1 to 0.75 kW</td><td>With brake</td><td>Indoor type</td><td> 

1. Material: aluminum die-cast
2. Terminal screw size: M4
Tightening torque: 1.8 N·m
{Ref. 0.18 kgf·m}
3. Compatible crimp-on terminal
Naked round type (R type)
1.25 to 4 2 to 4
Round type with insulating coating
1.25 to 4 2 to 4
4. Terminal box can be rotated at a pitch of 90°.
5. When the motor is shipped, the mouth of the terminal box is facing the opposite side of the load.
6. The brake DC power source device DM200D is housed in the terminal box with AC internal wiring. See pages 18 and 19 for wiring details.
7. Ground terminal screw size: M4
Tightening torque: 1.2 N·m
{Ref. 0.12 kgf·m}</td></tr>
</table>

(2) 1.5 to 3.7 kW

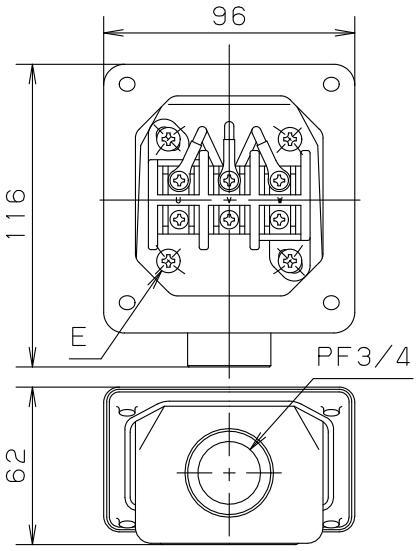
● Standard terminal box specifications

<table>
<tr><th>Output</th><th colspan="2">Category</th><th>Dimensions</th></tr>
<tr><td>1.5 to 3.7 kW</td><td>Without brake</td><td>Indoor type</td><td> 

With steel 3-pole terminal block
1. Material: SPCC
2. Terminal screw size: M4
Tightening torque: 1.2 N·m
{Ref. 0.12 kgf·m}
3. Compatible crimp-on terminal
Naked round type (R type)
2 to 4 3.5 to 4
Round type with insulating coating
2 to 4 3.5 to 4
4. Terminal box can be rotated at a pitch of 90°.
5. Ground terminal screw size: M5
Tightening torque: 2.0 N·m
{Ref. 0.20 kgf·m}</td></tr>
<tr><td>1.5 to 3.7 kW</td><td>With brake</td><td>Indoor type</td><td> 

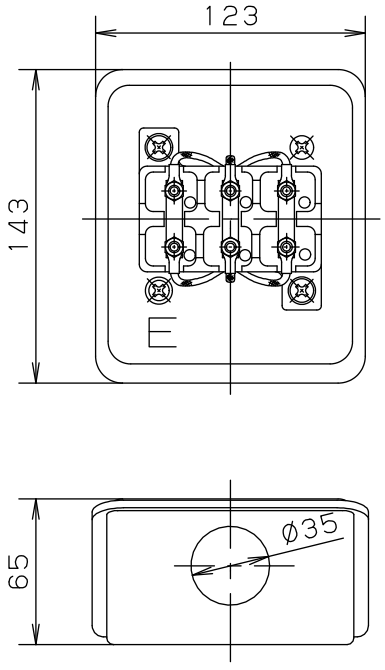
With steel 3-pole terminal block
1. Material: SPCC
2. Terminal screw size: M4
Tightening torque: 1.2 N·m
{Ref. 0.12 kgf·m}
3. Compatible crimp-on terminal
Naked round type (R type)
2 to 4 3.5 to 4
Round type with insulating coating
2 to 4 3.5 to 4
4. Terminal box can be rotated at a pitch of 90°.
5. The size of the DC module varies for the 400 V class.
6. Ground terminal screw size: M5
Tightening torque: 2.0 N·m
{Ref. 0.20 kgf·m}</td></tr>
</table>

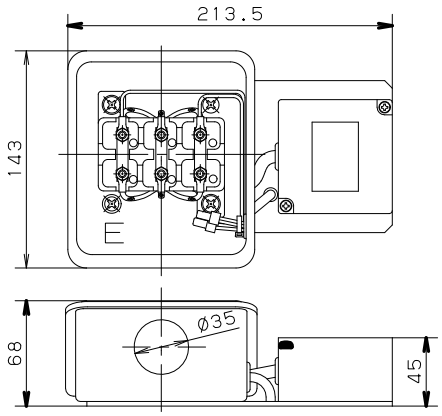
● Outdoor type standard terminal box

Output	Category		Dimensions
1.5 to 3.7 kW	Without brake	Outdoor type	 1. Material: SPCC 2. Terminal screw size: M4 Tightening torque: 1.2 N·m {Ref. 0.12 kgf·m} 3. Compatible crimp-on terminal Naked round type (R type) 2 to 4 3.5 to 4 Round type with insulating coating 2 to 4 3.5 to 4 4. Terminal box can be rotated at a pitch of 90°. 5. Ground terminal screw size: M5 Tightening torque: 2.0 N·m {Ref. 0.20 kgf·m}

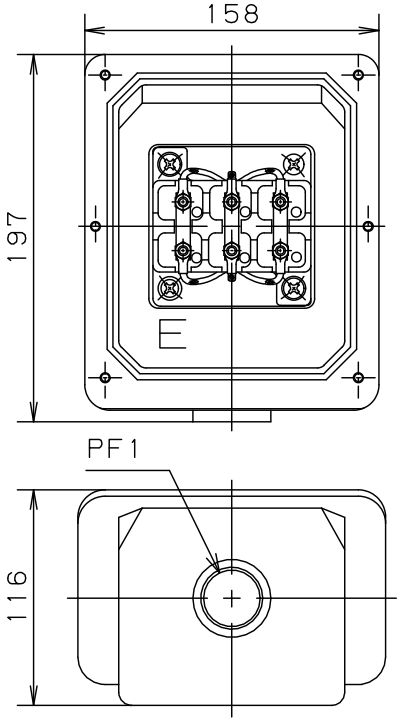
(3) 5.5 kW

● Standard terminal box specifications

Output	Category		Dimensions
5.5 kW	Without brake	Indoor type	 1. Material: SPCC 2. Terminal screw size: M5 Tightening torque: 2.0 N·m {Ref. 0.20 kgf·m} 3. Compatible crimp-on terminal (for Y-Δ starting) Naked round type (R type) 5.5 to 5 Round type with insulating coating 5.5 to 5 (for full-voltage starting) Naked round type (R type) 14 to 5 Round type with insulating coating 14 to 5 4. Terminal box can be rotated at a pitch of 90°. 5. Ground terminal screw size: M6 Tightening torque: 2.5 N·m {Ref. 0.26 kgf·m}

Output	Category		Dimensions
5.5 kW	With brake	Indoor type	 1. Material: SPCC 2. Terminal screw size: M5 Tightening torque: 2.0 N·m {Ref. 0.20 kgf·m} 3. Compatible crimp-on terminal (for Y-Δ starting) Naked round type (R type) 5.5 to 5 Round type with insulating coating 5.5 to 5 (for full-voltage starting) Naked round type (R type) 14 to 5 Round type with insulating coating 14 to 5 4. Terminal box can be rotated at a pitch of 90°. 5. Ground terminal screw size: M6 Tightening torque: 2.5 N·m {Ref. 0.26 kgf·m}

● Outdoor type standard terminal box

Output	Category		Dimensions
5.5 kW	Without brake	Outdoor type	 1. Material: SPCC 2. Terminal screw size: M5 Tightening torque: 2.0 N·m {Ref. 0.20 kgf·m} 3. Compatible crimp-on terminal (for Y-Δ starting) Naked round type (R type) 5.5 to 5 Round type with insulating coating 5.5 to 5 (for full-voltage starting) Naked round type (R type) 14 to 5 Round type with insulating coating 14 to 5 4. Terminal box can be rotated at a pitch of 90°. 5. Ground terminal screw size: M6 Tightening torque: 2.5 N·m {Ref. 0.26 kgf·m}

[7] Operation

7-1. Operation

⚠ WARNING
● Do not operate the product with the terminal box cover removed. After performing work, install the terminal box cover to its original position. Otherwise, electric shock can occur. Always install the cover securely. ● Never approach the shaft or other rotating parts during operation. Catching and injury can occur. ● Be sure to turn off the power switch if a power failure occurs. Unexpected resumption of power can result in injury or equipment damage.

⚠ CAUTION
●The Gear motor/Hypoid motor/Croise motor becomes very hot during operation. Be careful not to touch it with your hands or body. Burns can occur. ● If a problem occurs, immediately stop operation. Otherwise, electric shock, injury, or fire can occur. ● Do not use at above the rated load. Injury or equipment damage can occur. Do not touch electrified parts of the startup capacitor of a single-phase motor until they have discharged completely. Otherwise, electric shock can occur. ● When reversing the motor, be sure to bring it to a full stop before starting reverse operation. There is a risk that the direction of rotation may not change resulting in runaway operation.

(1) Pre-start inspection

After completing installation and wiring, inspect the following items before turning on the switch:

- an appropriately sized earth leakage breaker and overcurrent relay is wired into the motor circuitry.
- all wiring is correct.
- the motor is properly ground.

Make sure the equipment incorporates failsafe measures to prevent accidents from occurring during operation of the Gear motor/Hypoid motor/Croise motor, or in the event the Gear motor/Hypoid motor/Croise motor stops working properly.

(2) Voltage or frequency fluctuation

If the voltage or frequency applied to the motor is not the specified value, be careful as the characteristics will change. The motor voltage can fluctuate within 10% above or below of the rated voltage.

(3) Load

Loading the motor and gears above their rated capacity can affect their life and damage the Gear motor/Gypoid motor/Croise motor. Be sure that the rated amperage listed on the nameplate of the Gear motor/Hypoid motor/Croise motor is not exceeded.

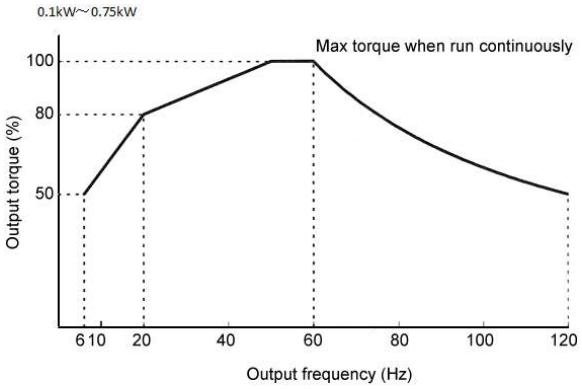
(4) Verification after operation starts

Verify the following after starting operation:

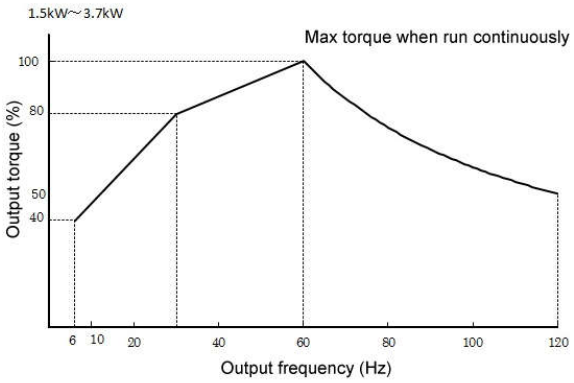
a. the direction of rotation is correct.
b. the maximum current is within the value listed on the nameplate.
c. there is no abnormal vibration or noise.
d. the start frequency is not high.
e. there is no shock.

7-2. Variable frequency operation

(1) Using a continuous variable frequency drive (VFD) (V/F control) for a standard motor



Output torque (%) is 100% when motor runs at 60 Hz rating
(Set base frequency to 60 Hz)



Output torque (%) is 100% when motor runs at 60 Hz rating
(Set base frequency to 60 Hz)

Notes

When operating at low frequencies or above 60 Hz, reduce the torque as shown in the graph above.

① When using a VFD with a 400 V class motor, high voltage spikes (micro surges) occur as the VFD switches, which can result in insulation failure. Because the motor must be protected against micro surges,Tsubakimoto Chain provides protection against micro surges for all standard 400 V class motors, even if not instructed to do so.
However, if the level exceeds 1250 V, install suppression filters and reactors on the inverter side.

② Temperature rise, noise, and vibration levels will be higher than when using mains service power.

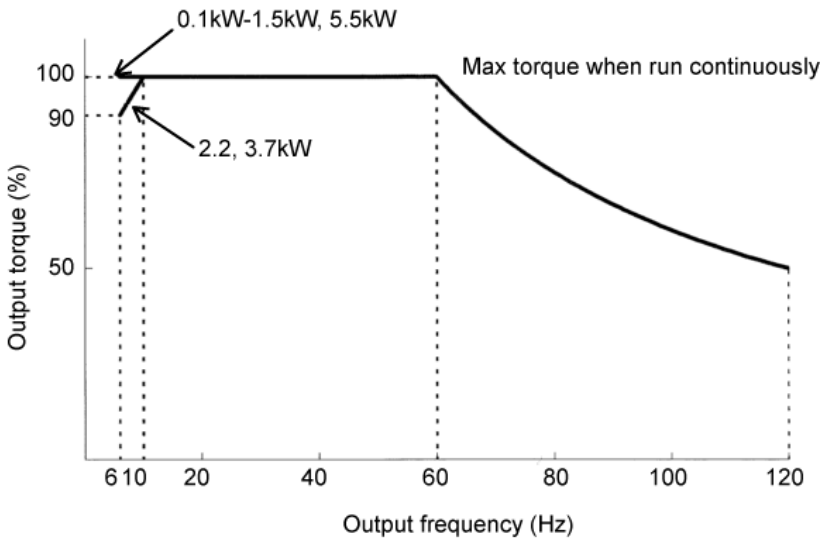
③ To protect the motor from overheating, set the VFD's electronic thermal protector for general-purpose motor characteristics, or install a thermal relay between the VFD and motor.

④ When using a motor with a brake, see the wiring diagram (page 28 and 29). Applying the brake at high speeds (above 60 Hz) may cause mechanical damage or abnormal abrasion wear on the brake linings. Always apply at 60 Hz or less.

⑤ When using the motor at the base frequency of 50 Hz, set the output torque to 0.8x the value in the table above.

⑥ Torque characteristics shown here are only for the motor itself. The efficiency of the worm gear must be taken into consideration, particularly when using a Croise motor.

(2) Using a continuous variable frequency drive (VFD) (V/F control) for a VFD motor
(0.55 kW motors do not support VFD motors)



Output torque(%) is 100% when motor runs at 60 Hz rating
(Set base frequency to 60Hz)

These motors deliver constant torque from 6 to 60 Hz, with the continuous operating torque at 60 Hz.
(On 2.2 kW and 3.7 kW motors, the torque is at 90% at 6Hz. If 100% torque is required, use automatic torque boost or vector control VFD.)

① From 60 to 120 Hz, VFD motors enter their rated horsepower range as do standard motors. The output torque is limited in this range so be careful of the load torque.

② The input voltage from the motor to the VFD should be set by adjusting the base frequency and base voltage settings in the VFD. Make sure the VFD's output voltage falls within the voltage and frequency specifications on the motor nameplate. (When using a VFD motor, the base frequency must be set to 60 Hz.) VFD motors should not be connected directly to source without going through the inverter. Otherwise, voltage fluctuations can cause frequent amperage increases. (This is not a problem for brief operation such as for test running and emergency use.) This effect is particularly noticeable at 50 Hz.

③ Always set the base frequency of the VFD to 60 Hz.

④ If 100% torque is required at slow frequency ranges, apply the torque boost feature in the VFD. Excessive torque boost over prolonged continuous operation can cause overheating and should be avoided.

⑤ The motor may resonate depending on the rotating speed and frequency. When running the motor continuously, avoid the resonance frequency by changing the VFD's carrier frequency.

⑥ When test running, etc., under light loads, the motor may draw a large current at low frequencies. This is a characteristic of the motor and is not abnormal. The current can be lowered by changing the settings in the VFD (lowering the torque boost and/or the V/F ratio, and using torque vector control).

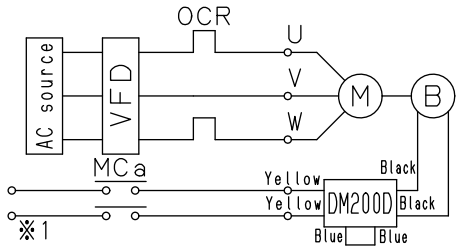
⑦ To protect the motor from overheating, set the VFD's electronic thermal protector for VFD motor characteristics, or install a thermal relay between the VFD and motor.

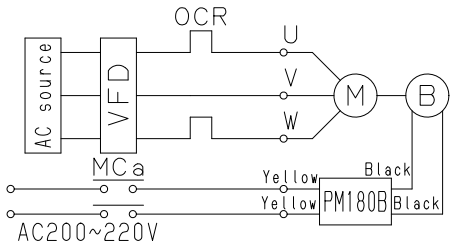
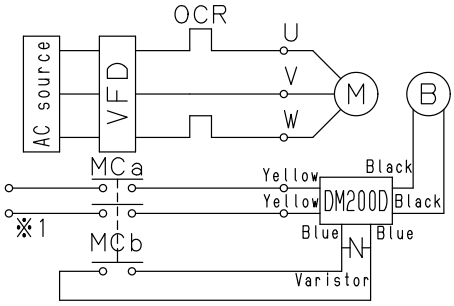
⑧ When using a motor with a brake, see the wiring diagram (page 28 and 29). Applying the brake at high speeds (above 60 Hz) may cause mechanical damage or abnormal abrasion wear on the brake linings. Always apply at 60 Hz or less.

⑨ Torque characteristics shown here are only for the motor itself. The efficiency of the worm gear must be taken into consideration, particularly when using a Croise motor.

7-3. Wiring a 3-phase motor with brake during variable frequency operation

(1) 200 V class motors

<table>
<tr><th></th><th>Application</th><th>0.1 to 3.7 kW</th><th>5.5 kW</th></tr>
<tr><td>AC internal wiring</td><td>• General variable frequency drive
Note: The contact on the auxiliary relay (MCa) should be rated for 200 VAC, 7 A or more (load resistance).</td><td> 

*1 Brake supply voltage
0.1 kW, 0.2 kW: 200 to 254 VAC
0.4 kW, 0.75 kW: 200 to 220 VAC
1.5 kW, 2.2 kW: 200 to 230 VAC</td><td> 
</td></tr>
<tr><td>DC external wiring + AC external operation</td><td>• When using in an elevating device or when stopping accuracy is required
Note: The contact should be rated as follows:
MCa: 200 VAC, 7 A or more
(load resistance)
MCb: 200 VAC, 10 A or more
(load resistance)</td><td> 

*1 Brake supply voltage
0.1 kW, 0.2 kW: 200 to 254 VAC
0.4 kW, 0.75 kW: 200 to 220 VAC
1.5 kW, 3.7 kW: 200 to 230 VAC</td><td></td></tr>
</table>

M: motor, B: brake, MC: motor starter, MCa/MCb: auxiliary relay, OCR: overcurrent relay, DM200D, PM180B: DC module, -N-: Protection device (Varistor)

Note 1: Brake voltage is 90 VDC. (When supplying 200 VAC to the DC module)

Note 2: When wiring DC external wiring, connect a varistor while referring to Note 2 on page 18.

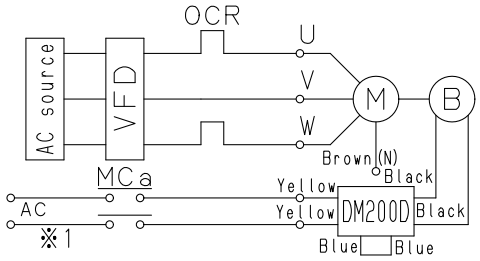
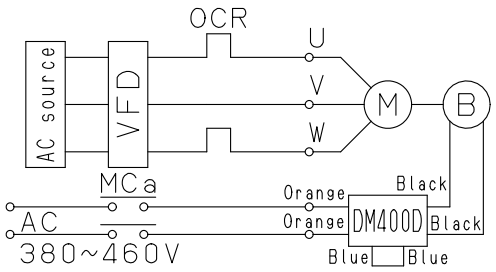
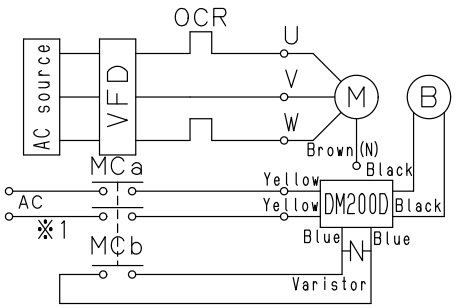
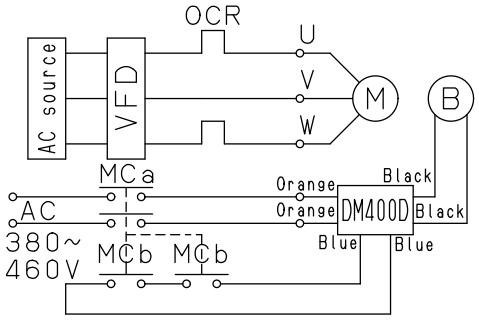
Note 3: When using separate controlled braking with different voltage specifications for 0.1 to 0.75 kW, the brake supply voltage varies. Contact us for details.

Note 4: Be sure to take the brake AC source from the primary AC source of the VFD and sync the brake operation with the On/Off setting of the motor.

Note 5: The input and release of the MCa requires the interlock with the VFD, so refer to the instruction manual of the VFD.

Note 6: The DC module for the 5.5 kW motor is PM180B. This module has a built-in relay and must not be used with DC external wiring.

(2) 400V class motors

	Application	0.1 to 0.75 kW	1.5 to 3.7 kW
AC separate control	• General variable frequency drive	 Note: On the standard motor, cut and isolate the brown lead (N) wired with a wiring nut. (There is no brown lead (N) on a VFD motor.) If supplying power to a DC module via a transformer, size it as shown below: 0.1 to 0.4 kW: 60 VA 0.75 kW: 100 VA • The brake supply voltage for *1 should be as follows: 0.1 kW, 0.2 kW: 200 to 254 VAC 0.4 kW, 0.75 kW: 200 to 254 VAC (standard motor) 200 to 220 VAC (VFD motor) • The contact on the auxiliary relay (MCa) should be rated for 200 VAC, 7 A or more (load resistance).	 The contact on the auxiliary relay (MCa) should be rated for 400 to 440 VAC inductive loads of 1 A or more.
DC external wiring + AC external operation	• When using in an elevating device or when stopping accuracy is required	 Note: On the standard motor, cut and isolate the brown lead (N) wired with a wiring nut. (There is no brown lead (N) on a VFD motor.) If supplying power to a DC module via a transformer, size it as shown below: 0.1 to 0.4 kW: 60 VA 0.75 kW: 100 VA • The brake supply voltage for *1 should be as follows: 0.1 kW, 0.2 kW: 200 to 254 VAC 0.4 kW, 0.75 kW: 200 to 254 VAC (standard motor) 200 to 220 VAC (VFD motor) • The contact on the auxiliary relay should be rated as follows: MCa: 200 VAC, 7 A or more (load resistance) MCb: 200 VAC, 10 A or more (load resistance)	 The contacts on the auxiliary relay (MCa or MCb) should be rated for 400 to 440 VAC inductive loads of 1 A or more and wired in series of two or three contacts.

M: motor, B: brake, MC: motor starter, MCa/MCb: auxiliary relay, OCR: overcurrent relay, DM200D, DM400D: DC module, -N-: Protection device (Varistor)

Note 1: For a standard 0.4/0.75 kW motor, when the brake supply voltage for *1 is AC200V, the gap limit in the heated condition is 0.4 mm.

Note 2: When DC external wiring, connect a varistor while referring to Note 2 on page 18.

Note 3: Be sure to take the brake AC source from the primary AC source of the VFD and sync the brake operation with the On/Off setting of the motor.

Note 4: The input and release of the MCa requires the interlock with the VFD, so refer to the instruction manual of the VFD.

7-4. Specifications and structure of SLB brake (for 0.1 - 2.2 kW motor with brake) and gap adjustment

(1) SLB brake specifications and performance

Values in curly brackets are for reference purposes only. Values in parentheses indicated 400 V class.

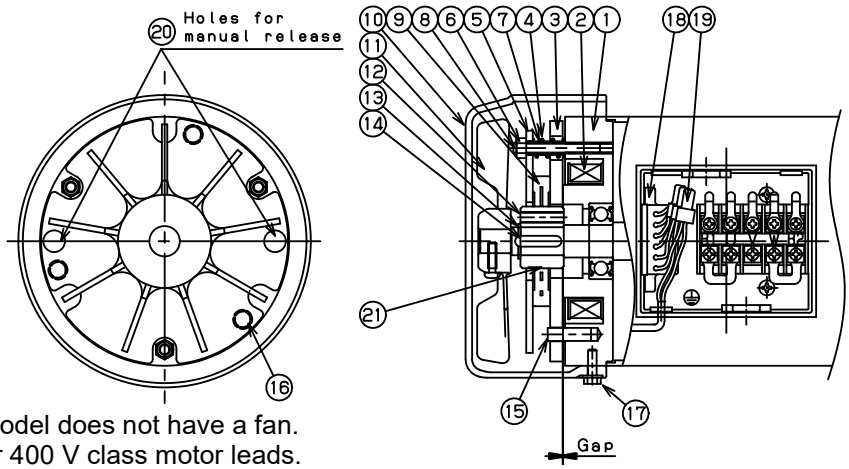
Motor capacity		0.1kW 100W	0.2kW 200W	0.4kW	0.55kW	0.75kW	1.5kW	2.2kW
Brake model number		SLB01	SLB02	SLB04 (SLB04V)	SLB04 (SLB04V)	SLB07 (SLB07V)	SLB15 (SLB15 180V)	SLB22 (SLB22 180V)
Brake model		Engaged when de-energized, DC electromagnetic brake						
DC module		DM200D※1					DM200D (DM400D)	
Rated static friction torque	N·m {kgf·m}	0.98 {0.1}	1.96 {0.2}	3.92 {0.4}	3.92 {0.4}	7.35 {0.75}	15.0 {1.50}	22.0 {2.20}
Rated dynamic friction torque	N·m {kgf·m}	0.78 {0.08}	1.57 {0.16}	3.14 {0.32}	3.14 {0.32}	5.88 {0.60}	11.8 {1.20}	17.2 {1.76}
DC module voltage		90 VDC					90 VDC (180 VDC)	
Amperage	A at 20°C	0.178	0.178	0.232	0.232	0.273	0.289 (0.145)	0.289 (0.145)
Capacity	W at 20°C	16.0	16.0	20.9	20.9	24.6	26.0 (26.1)	26.0 (26.1)
Total brake duty	x 10^7J (x 10^7kgf·m)	13.1 {1.34}	18.5 {1.89}	18.5 {1.89}	18.5 {1.89}	36.6 {3.73}	108 {11.0}	108 {11.0}

※ 1: 100W, 200W is DM 100 A

(2) Brake structure

[Three-phase 0.1 to 0.75 kW]

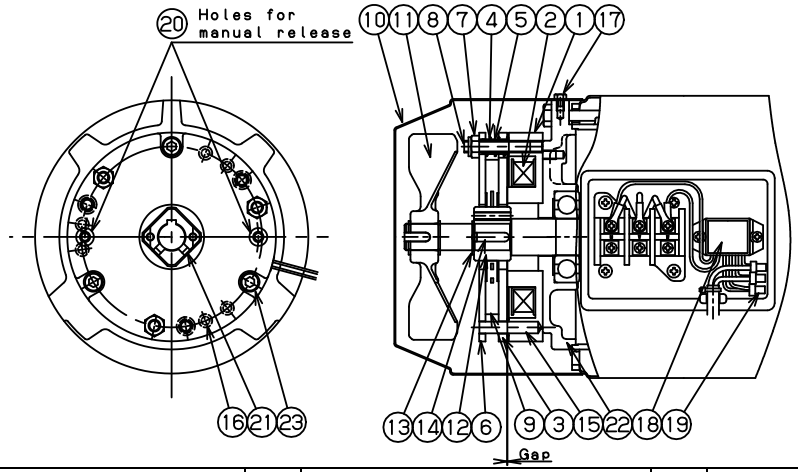
[Single-phase100W・200W]



Note 1: The 0.1 kW model does not have a fan.

Note 2: There are four 400 V class motor leads.

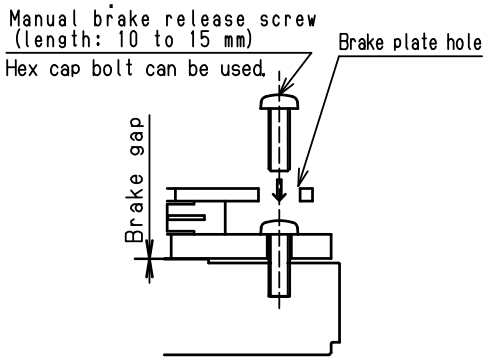
[Three-phase 1.5 to 2.2 kW]



1	Bracket for opposite side of load with yoke	8	Guide bolt	15	Spring pin
2	Coil	9	Lining	16	Braking spring
3	Armature	10	Fan cover	17	Fan cover set screw
4	Retainer spring	11	Fan	18	DC module
5	Collar	12	Square hub	19	Closed-end splice
6	Brake plate	13	Retaining ring	20	Holes for manual release
7	U nut	14	Key	21	Flat spring

(3) Manual release procedure

Remove the fan cover ⑩, insert the screw or hex cap bolt (effective depth of 10 to 15 mm) from the 2 holes for manual release ⑳, and screw them in. Once it becomes difficult to rotate the screw, at approximately 1/3 or 1/2 turn, the brake cap becomes almost 0 and is released. Models with a 0.2 to 2.2 kW motor have a fan ⑪, and if the holes for manual release are hidden on the fan, screw in 1 screw, gently turn the fan by hand with the brake slightly released, move the position of the fan, and screw in the other screw. After servicing, make sure to loosen the screws, remove them from the brake unit, and replace the fan cover before operating the motor. Operating with the brake released can cause accidents. Never loosen the U nut ⑦ and manually release the brake.



Manual brake release screw size

Brake model number	Manual release screw size
SLB01/SLB02/SLB04/SLB07	M5 screw or M5 hex cap bolt
SLB15/SLB22	M6 screw or M6 hex cap bolt

(4) Gap adjustment

When a gap reaches the limit, the brake cannot be released, so inspect and adjust the gap when it approaches the limit value. Depending on usage conditions, the limit value may be reached earlier.

● Brake gap value and lining dimensions　Values in parentheses indicate outer gap values

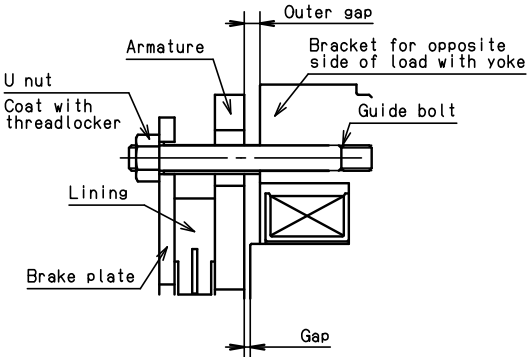
Motor capacity	Brake model number	Gap value (mm)		Lining thickness (mm)	
		Initial value	Limit value	Initial thickness	Limit thickness
0.1 kW･100W	SLB01	0.15 to 0.2 (1.35 to 1.40)	0.5 (1.7)	8	7
0.2 kW･200W	SLB02				
0.4 kW	SLB04	0.15 to 0.2 (1.05 to 1.10)	0.5 (1.4)		
0.75 kW	SLB07				
1.5 kW	SLB15	0.15 to 0.2 (1.05 to 1.10)	0.5 (1.4)	9	8
2.2 kW	SLB22				

● Adjustment method (See the brake structure.)

a. Remove the fan cover ⑩.

b. Tighten the 3 U nuts uniformly to the right and make adjustments so that the 3 U nuts along the circumference are at the initial gap. Next, coat with a threadlocker. (Be careful, as repeated loosening and tightening of the U nuts can cause them to break or reduce the threadlock effect.)

c. Confirm that AC power is supplied to the brake motor, and that the motor is rotating properly without coming into contact with the armature and brake plate. If there is contact, adjust the gap so that it is a little bit larger.

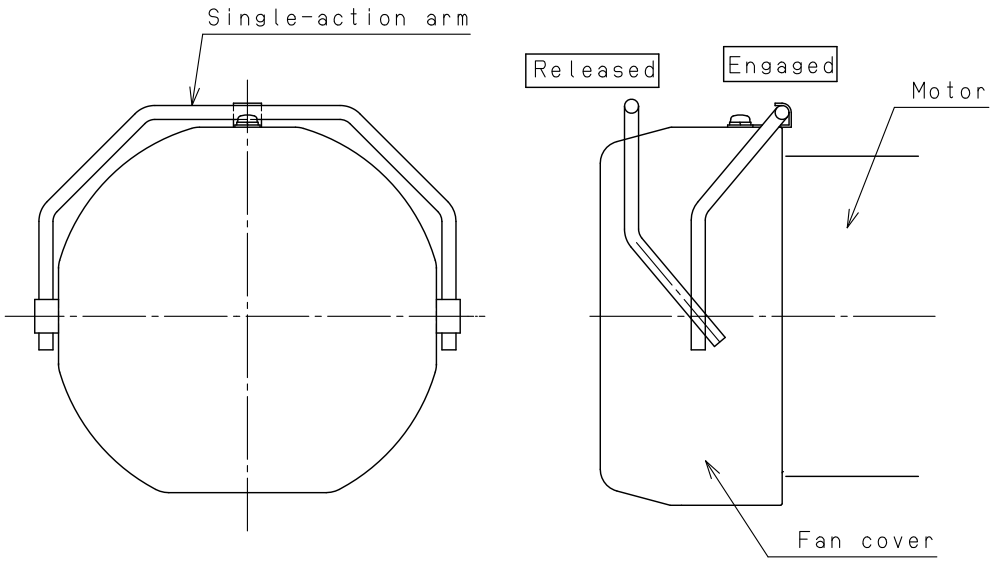


Caution: When rotating the U nut, insert a hex bolt wrench into the hex socket hole of the guide bolt and secure it so that it does not rotate before rotating the U nut. Rotating both together can cause the guide bolt to loosen.

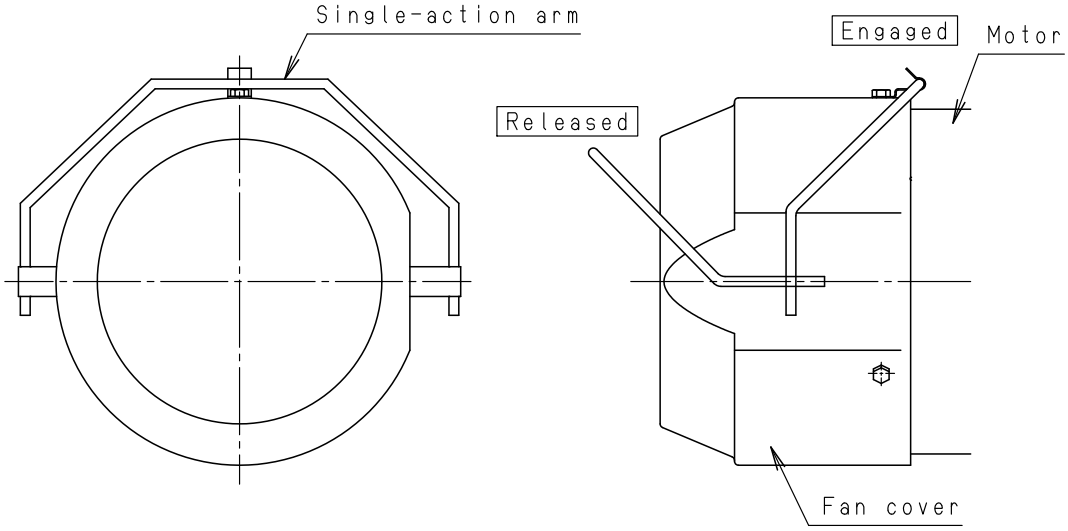
If the U nut has been removed or repeatedly loosened and tightened, replace it with a new U nut. (For SLB01 to SLB07, use size M5 x P0.8, and for SLB15/SLB22, use M8 x P1.25.) At this time, thoroughly degrease the U nut and coat it with a threadlocker. Do not disassemble the brake parts, as this can cause abnormal operation of the brake parts if they cannot be re-assembled or if assembled incorrectly.

(5) Structure of single-action manual release (optional)
[Three-phase 0.1 to 0.75 kW]

[Single-phase100W・200W]



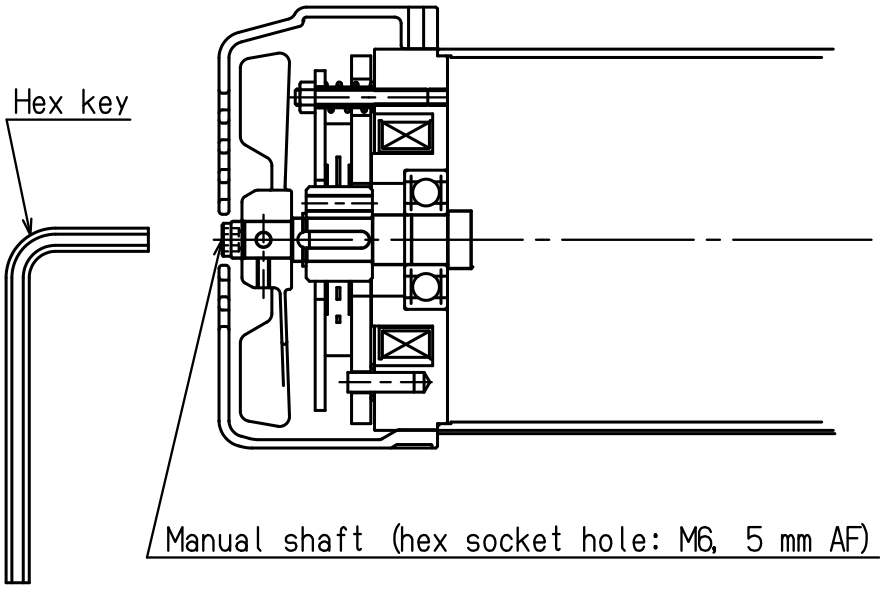
[Three-phase 1.5 to 2.2 kW]



During normal operation, the single-action arm is in the engaged position indicated in the drawing above. Moving the arm to the released position releases the brake. After completing work, always return the arm to the engaged position.

Notes • Ensure that there is no load on the output shaft before moving the arm.
• Take care when moving the single-action arm as over-rotation can result in damage.

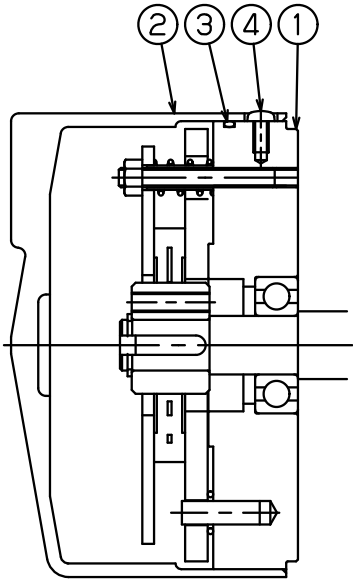
(6) Construction of motor with manual shaft (optional) [Three-phase 0.1 to 0.75 kW]



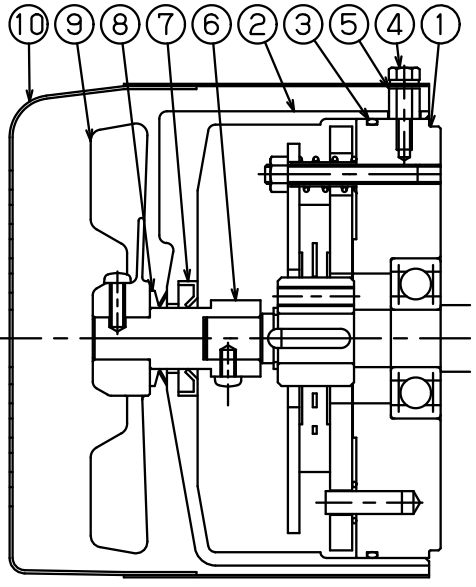
Turn the hex socket hole (M6, 5 mm AF) in the center of the motor fan cover using a commercially available hex key.
Before performing work, ensure that the brake has been manually released. Never turn the socket hole during operation.
Notes: • Ensure that there is no load on the output shaft before performing work.

(7) Structure of motor with outdoor brake [Three-phase 0.1 to 0.75 kW]

Totally enclosed



Totally enclosed fan-cooled



1	SLB brake for outdoor use
2	Brake cover
3	O-ring
4	Screw
5	Spacer
6	Coupling
7	Oil seal
8	V-ring
9	Fan
10	Fan cover

Notes: Totally enclosed
0.1 kW: continuous rating
0.2 kW: 30-min rating
0.4 kW: 25-min rating
0.75 kW: 20-min rating
Totally enclosed fan-cooled
0.2 to 0.75 kW: continuous rating

By removing the brake cover on totally enclosed models, and the fan cover, fan, and brake cover on totally enclosed fan-cooled models, it is possible to perform gap adjustment and manual release using the same method as for standard models.
When reattaching the brake cover, check that the O-ring is not scratched or dirty. If the O-ring is scratched or dirty, it may lose its seal and water and other fluids may get inside the brake. The O-ring may also lose its seal if it hardens, so replace it as necessary.
In the same way, the V-ring and the oil seal, which are wear parts, may also lose their seal due to wear. This may result in water and other fluids getting inside the brake, and these parts should therefore be replaced as necessary.

7-5. Specifications and structure of VNB brake (for 3.7 kW/5.5 kW motor with brake) and gap adjustment

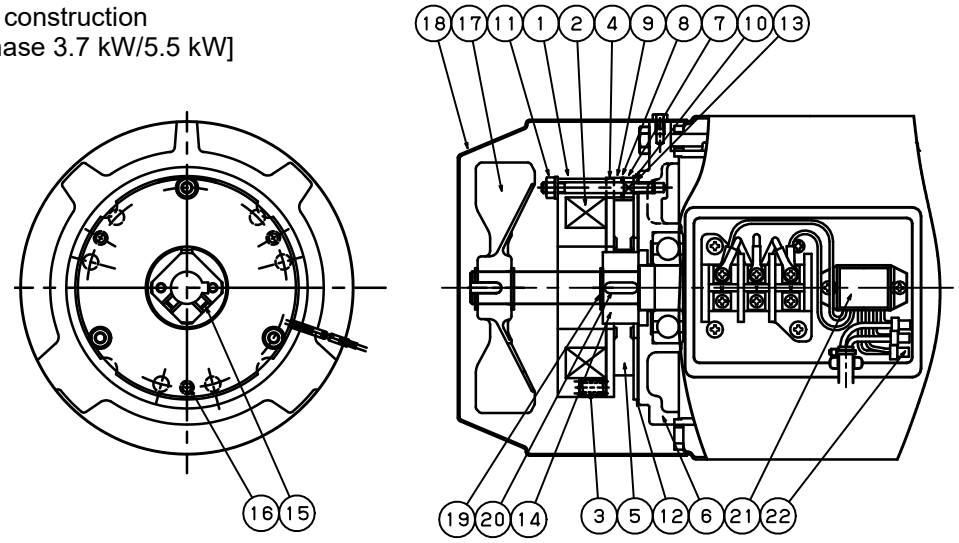
(1) VNB brake specifications and performance

Values in curly brackets are for reference purposes only. Values in parentheses indicated doubled voltage.

Motor capacity		3.7	5.5
Brake model number		VNB371K	VNB55
Brake model		Engaged when de-energized, DC electromagnetic brake	
DC module		DM200D (DM400D)	PM180B (-)
Rated static friction torque	N·m {kgf·m}	36 {3.70}	54 {5.50}
Rated dynamic friction torque	N·m {kgf·m}	29.0 {2.96}	43.1 {4.40}
DC module voltage		90 VDC (180 VDC)	54 VDC (-)
Amperage		0.261	0.268
Capacity		26.1	16.7
Total brake duty	x 10^7J {x 10^7 kgf·m}	135 {13.8}	247 {25.2}

(2) Brake construction

[Three-phase 3.7 kW/5.5 kW]



1	Yoke	10	Protective liner	19	Retaining ring
2	Coil	11	Hex nut	20	Key
3	Braking spring	12	Brake plate	21	DC module
4	Armature	13	Sheet packing	22	Closed-End splice
5	Lining	14	Center hub		
6	Bracket for opposite side of load	15	Noise absorption metal		
7	Stud bolt	16	O-ring		
8	Liner	17	Fan		
9	Distance collar	18	Fan cover		

(3) Gap adjustment

When a gap reaches the limit, the brake cannot be released, so inspect and adjust the gap when it approaches the limit value. Depending on usage conditions, the limit value may be reached earlier.

● Brake gap value and lining dimensions

Motor capacity	Brake model number	Gap value (mm)		Lining thickness (mm)	
		Initial value	Limit value	Initial value	Limit value
3.7kW	VNB371K	0.3	0.7	12	9
5.5kW	VNB55	0.35	1.2	13 (1 each)	11.5 (1 each)

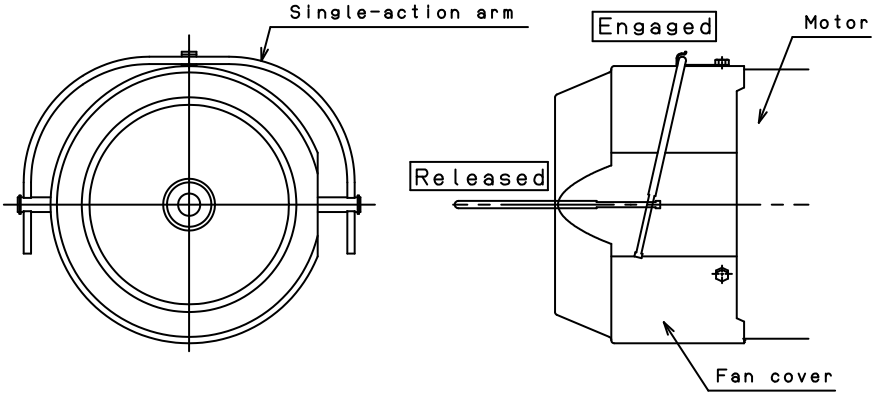
● Adjustment method (See the brake construction.)

a. Remove the hex nut ⑪.

b. At each location between the stud bolt ⑦ and distance collar ⑨, 5 to 7 liners ⑧ are installed, so remove the liners evenly from each stud bolt and adjust to the specified gap.

c. After making adjustments, tighten the hex nut securely.

(4) Structure of single-action manual release (optional)



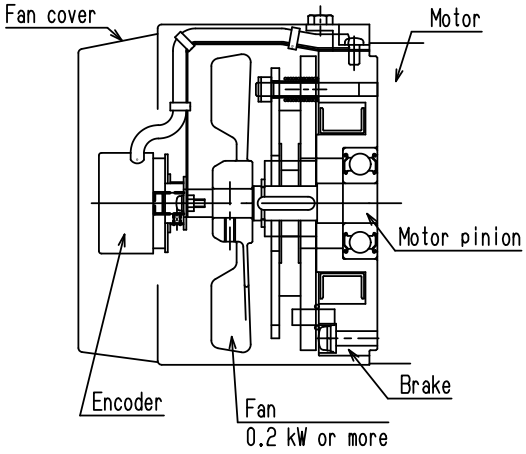
* Engaged and released positions are reversed on 5.5 kW models.

During normal operation, the single-action arm is in the engaged position indicated in the drawing above. Moving the arm to the released position releases* the brake. After completing work, always return the arm to the engaged position.

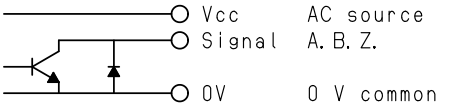
Notes:

- Ensure that there is no load on the output shaft before moving the arm.
- Take care when moving the single-action arm as over-rotation can result in damage.

7-6. Structure of motor with encoder (optional)



■ Encoder unit specifications

Supply voltage	4.5 to 30 VDC
No. of pulses	100
Output	Open collector (NPN)
Output circuit	
Power consumption	30 mW or less
Output voltage	0.5 V or less (at maximum incoming)
Maximum incoming current	40 mA MAX.
Signal startup and fall time	1 μs or less
Maximum response frequency	240 kHz
Output circuit withstand voltage	50 V max.
Cable length	0.5 m

■ Wiring diagram

Color	Wiring
Red	AC source
Black	0 V common
Blue	Signal A
White	Signal B
Yellow	Signal Z
Black	NC

■ Environmental conditions

Ambient temperature	-10 to 40°C
Ambient humidity	Up to 85%, no condensation
Installation angle	No restrictions on mounting angle - horizontal, vertical, or inclined installation permitted
Vibration	4.9 m/s^2 0.5 G} or less (20 to 50 Hz)

Since the encoder lead wire has a connector (DF 3 - 6 S - 2 C made by Hirose Denki), the counterpart connector (made by Hirose Electric DF3 - 6EP - 2C) and pin contact.

· A glass disk is mounted inside the encoder, so please do not give shocks or vibrations more than specified.

· Provide a margin for the supply current value to the encoder. If the supply power is insufficient, the normal waveform will not be output.

· Please use shielded wire for encoder connection cable. Please wire the middle cable so as not to bind with the AC line.Also please extend the extension cable within about 10 m.

· Since the encoder uses parts of optical system, please use it in the atmosphere free from dust, oil, water etc. as much as possible.

[8] Inspection and adjustment

⚠ WARNING

- Never touch the shaft or other rotating parts when maintaining or inspecting the Gear motor/Hypoid motor/Croise motor during operation. Catching and personal injury can occur.
- When inspecting the gear tooth surfaces while stopped, properly prevent the drive and driven equipment from rotating. Catching on the gear meshing parts and personal injury can occur.
- Loading the motor and gears above their rated capacity can affect their life and damage the Gear motor/Hypoid motor/Croise motor.
  (Inspection and maintenance of brake parts)
- Do not operate the product with the brake released using the manual release bolt or manual release lever. Falls or runaway accidents can occur.
- Before operating the product, turn the power on and off and check the brake operation. Falls or runaway accidents can occur.
- After gap inspection and adjustment, do not operate the motor with the fan cover removed. Catching and injury can occur.
- When using this product for elevating, do not release the brake while lifting a load. Falling accidents can occur.

⚠ CAUTION

- When measuring insulation resistance, do not touch the terminals. Otherwise, electric shock can occur.
- Follow the instruction manual for replacing the lubrication. Be sure to use the oil or grease recommended by Tsubakimoto Chain. Failure to do so may damage the Gear motor/Hypoid motor/Croise motor.
- The surface of the Gear motor/Hypoid motor/Croise motor can get very hot, so do not touch it with a bare hand. Burns can occur.
- Do not replace the lubrication oil during operation or immediately after stopping operation. Burns can occur.
- When measuring insulation resistance for an explosion-proof motor, check that there is no explosive atmosphere consisting of gas or vapors nearby. Otherwise, explosion or ignition can occur.
- If a problem occurs, diagnose the problem according to the instruction manual. Never operate the reducer until the source of the problem is determined and corrective measures have been taken.
- Repairs, disassembly work, and assembly work other than brake gap adjustment must be performed at the specialty Surely plant .
  (Inspection and maintenance of brake parts)
- When using a Gear motor/Hypoid motor/Croise motor with a brake for elevating, employ DC external wiring. Falling accidents can occur.

8-1. Maintenance

For daily maintenance it is sufficient to use the five senses and simple measuring equipment to pay attention to motor operation.

Noise - Is the noise louder than usual? Are there any unusual periodic noises?
Vibration - Is there any unusual vibration?
Temperature - Is the motor hotter than usual?

8-2. Lubrication

(1) Lubricant

● Gear motors/Hypoid motors

Gear motors/Hypoid motors are grease-lubricated and are filled with the specified amount of grease before shipment. They can be used without adding grease. In most cases, it is not necessary to replace the grease, but the Gear motor/Hypoid motor can be used for a longer time if grease is replaced about every 20,000 hours.

Use grease for high-grade gears equivalent to consistency number 000 or 00. Gear motors/Hypoid motors are filled with Nigtight LMS No. 000 made by Nippon Grease.

● Croise Motors

Croise motors are filled with high-grade lubrication oil (Daphne Alpha Oil TE260) before shipment. They can be used without adding oil.

Always install the included pressure vent after checking the installation position for motors with reducer frame numbers 32 to 50. After installing the pressure vent, check the oil level in the oil gauge. If the mounting number will be anything other than 1, please indicate when ordering.

- Replacing lubrication oil

  As motors with reducer frame numbers 13 to 28 employ an enclosed structure, in most case it is not necessary to replace or replenish lubrication oil. However, in cases where lubrication oil deteriorates rapidly due to usage conditions, extended life can be expected if lubrication oil is replaced about every 2,500 hours. Maintain motors with reducer frame numbers 32 to 50 following the guidelines below.

  ① Replace lubrication oil for the first time 1,000 hours after commencing operation.

  ② Although exact timing will differ according to operating conditions, from the second time onward replace lubrication oil about every 5,000 hours.

- Precautions when replacing lubrication oil

  Take care when draining lubrication oil as it is extremely dangerous to do so immediately after operation because the oil is likely to be hot. For this reason, check that the temperature of the housing has cooled to around 40 to 50°C before draining the oil.

  Use only recommended lubrication oil. Do not mix the oil with other brands. When changing to a different brand of oil, clean out the interior of the housing with kerosene or wash it thoroughly with the new brand of lubrication oil, before filling with the prescribed volume of lubrication oil. Fill with the standard oil volume indicated in 5-1 or check the oil gauge.

- Operating temperature

  The motor may generate heat during the first two or three days of operation. This is expected and is not a problem. However, if the surface of the Croise motor's reducer unit housing reaches or exceeds 93°C, this may be due to insufficient Croise motor capacity or an excess/lack of lubrication oil, so stop the machine/equipment immediately. To prevent burn injuries, do not touch the Croise motor directly with your hands.

(2) Amount of grease for Gear motors

Motor capacity	Reduction ratio	Amount (kg)
0.1 kW	5	0.3
	10 to 50	0.14
	60 to 200	0.3
	300 to 450	0.5 + (0.35)
	600 to 1200	1.1 + (0.35)
0.2 kW	5	0.3
	10 to 25	0.14
	30 to 75	0.3
	100 to 200	0.5
	300 to 450	1.1 + (0.4)
	600 to 1200	1.3 + (0.4)
0.4 kW	5 to 25	0.3
	30 to 75	0.5
	100 to 200	1.1
	300 to 450	1.4 + (0.8)
	600 to 1200	2.8 + (0.8)

Motor capacity	Reduction ratio	Amount (kg)
0.75 kW	5 - 25	0.5
	30 to 75	1.1
	100 to 200	1.3
	300 to 450	2.8 + (1.0)
1.5 kW	5 to 30	1.3
	40 to 75	1.4
	100 to 200	2.8
2.2 kW	5 to 30	1.3
	40 to 75	2.8
	100 to 200	4.2
3.7 kW	5 to 30	2.8
	40 to 50	2.8
5.5 kW	5 to 30	3.3

Note: Figures in parentheses indicate amount for first stage of reducer unit.

(3) Amount of grease for Hypoid motors

● Hollow shaft types (H)/Face mount types (U)

Motor capacity	Frame No.		Reduction ratio	Amount (kg)
	H	U		
0.1 kW	20	22	5 to 50	0.27
			60 to 120	0.23
0.1 kW 100 W	30	24	5 to 200	0.33
		28	300 to 480	0.33 + (0.15)
	35	38	600 to 1200	0.53 + (0.15)
0.2 kW	20	22	5 to 25	0.27
			30 to 60	0.23
0.2 kW 200 W	30	28	5 to 200	0.33
	35	38	300 to 480	0.53 + (0.15)
	45	42	600 to 1200	1.15 + (0.2)
0.4 kW	30	28	5 to 50	0.33
	35	38	60 to 200	0.53
	45	42	300 to 480	1.15 + (0.4)
	55	50	600 to 1200	3.8 + (0.4)
0.75 kW	35	38	5 to 30	0.67
			40 to 50	0.53
	45	42	60 to 200	1.15
	55	50	300 to 480	3.7 + (0.7)
1.5 kW	45	42	5 to 30	1.4
			40 to 80	1.15
	55	50	100 to 200	3.8
2.2 kW	45	42	5 to 20	1.4
			25 to 60	1.15
	55	50	80 to 120	3.8
3.7 kW	55	50	5 to 20	3.7
			25 to 60	3.4
5.5 kW	55	50	5 to 20	3.7
			25 to 40	3.4

Note: Figures in parentheses indicate amount for first stage of reducer unit.

● Foot mount types

Motor capacity	Frame No.	Reduction ratio	Amount (kg)
0.1 kW	22	60 to 120	0.23
0.1 kW 100 W	19	5 to 50	0.17
	24	60	0.40
		80 to 200	0.33
	28	300 to 480	0.33 + (0.15)
	38	600 to 1200	0.53 + (0.15)
0.2 kW	22	60	0.23
0.2 kW 200 W	19	5 to 50	0.17
	28	60	0.40
		80 to 200	0.33
	38	300 to 480	0.53 + (0.2)
	42	600 to 1200	1.15 + (0.2)
0.4 kW	24	5 to 50	0.28
	38	60 to 200	0.53
	42	300 to 480	1.15 + (0.4)
	50	600 to 1200	3.8 + (0.4)
0.75 kW	30	5 to 50	0.47
	42	60 to 200	1.15
	50	300 to 480	3.7 + (0.7)
1.5 kW	42	5 to 30	1.4
		40 to 80	1.15
	50	100 to 200	3.8
2.2 kW	42	5 to 20	1.4
		25 to 60	1.15
	50	80 to 120	3.8
3.7 kW	50	5 to 20	3.7
		25 to 60	3.4
5.5 kW	50	5 to 20	3.7
		25 to 40	3.4

(4) Approximate oil volume for Croise motors (ℓ)

Reducer frame No.	CSMA Series			HCMA Series		
	Foot mount type	Face mount type	Hollow shaft type	Foot mount type	Face mount type	Hollow shaft type
13	0.13	0.05	0.05	—	—	—
16	0.20	0.10	0.10	0.37	0.37	0.29
22	0.36	0.30	0.30	0.7	0.7	0.6
28	0.55	0.55	0.55	1.4	1.4	1.2
32	1.0	1.0	1.0	1.8	1.8	1.4
40	1.2	1.2	1.2	2.8	2.8	2.5
50	3.3	3.3	3.3	5.3	5.3	4.7

Note 1: The above oil volumes are for motors mounted in the standard direction (mounting number 0 or 1). Oil volume is the same for all Croise motors with the same reducer frame number, regardless of motor power or reduction ratio.

Note 2: The oil volume for HCMA Series motors mounted in accordance with mounting number 5 is 60% more than each value indicated above.
(Approximate oil volume (up to check plug or oil gauge position))

(5) Recommended grease (Gear motors/Hypoid motors)

Nippon Grease	: Nigtight LMS No. 000 (factory filled)
Showa Shell	: Alvania EP Grease R000
JXTG Nippon Oil & Energy	: Pyronoc Universal 000

In the case of No. 1 grease specification,

Nippon Grease	: Nigtite LYS No. 1, Niglove EP-1 K
Showa Shell	: Albania EP Grease No. 1

(6) Recommended lubrication oil (Croise motor): Grade 2 of industrial gear lubricant (worm gear) ISO VG320

Exxon Mobil	: Mobil 600W Cylinder Oil
Esso	: Spartan EP 320
Showa Shell	: Omala S2 G
Idemitsu	: Daphne CE Compound 320S

Notes

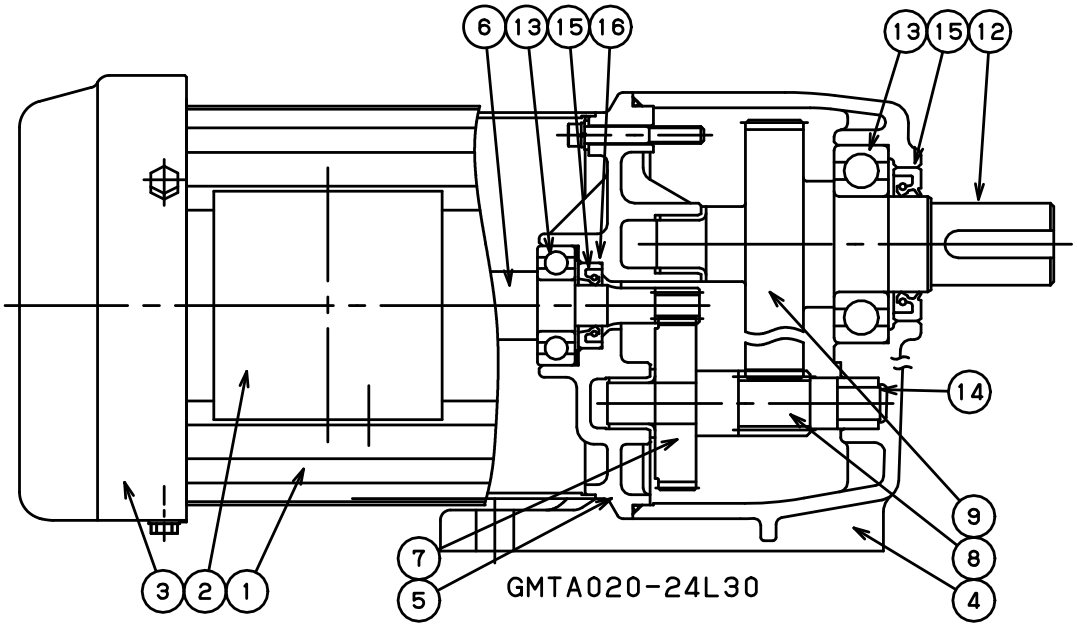
- Follow these guidelines to determine when to replace the above recommended lubrication oil (for Croise motors):
  ① Replace lubrication oil for the first time 500 hours after commencing operation.
  ② Although exact timing will differ according to operating conditions, from the second time onward replace lubrication oil about every 2,500 hours.

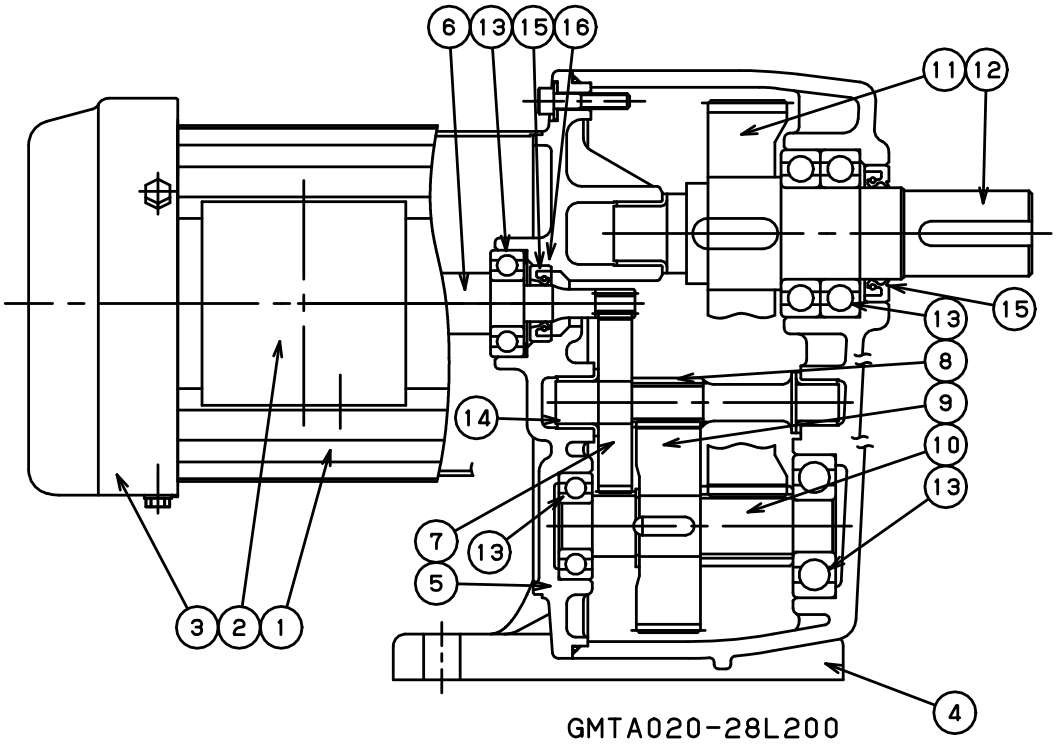
(7) Oil seals

- Oil seal life differs depending on usage conditions, so it may become necessary to replace seals within 10,000 hours in some cases. When using the Gear motor/Hypoid motor/Croise motor with food processing machines, especially equipment that is affected by oil vapor, install an oil pan or other protective device in case of oil leaks in the event of a malfunction or the end of operating life.
- Occasionally, during the first few hours of operation, grease filled during the assembly process may seep out of the oil seal lip. This is normal and does not affect the performance of the reducer.

[9] Structure of Gear Motor/Hypoid Motor/Croise Motor

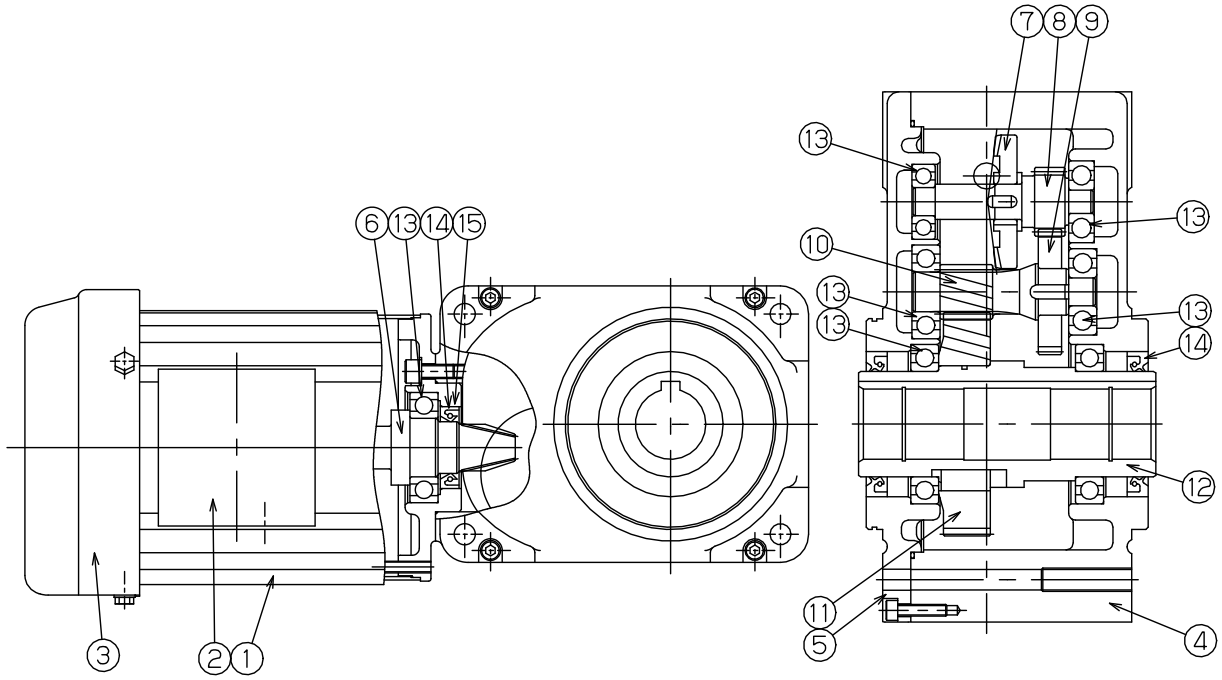
(1) Gear motor structure



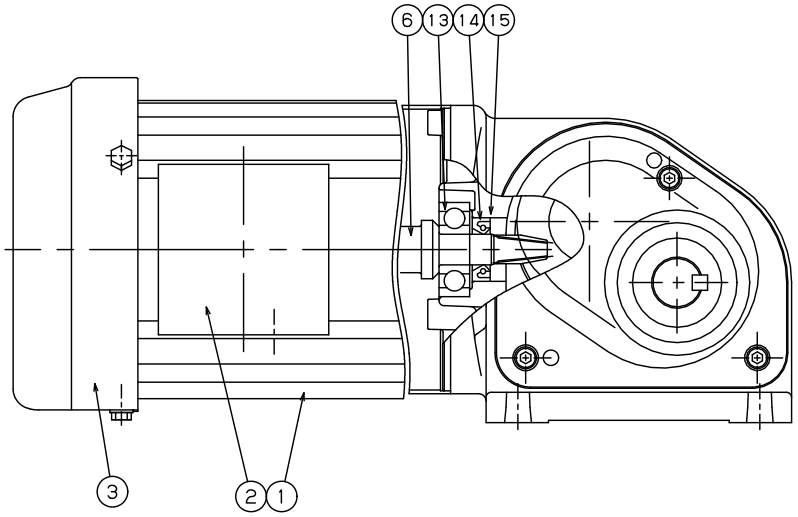


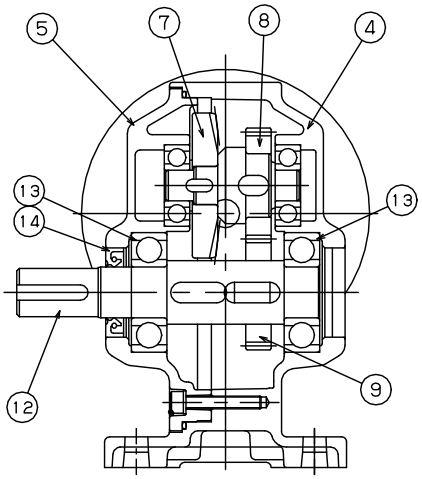
1	Motor	7	1st-stage wheel	13	Bearing
2	Terminal box	8	2nd-stage pinion	14	Metal
3	Fan cover	9	2nd-stage wheel	15	Oil seal
4	Housing	10	3rd-stage pinion	16	Filter
5	M-bracket	11	3rd-stage wheel		
6	Motor pinion	12	Output shaft		

(2) Hypoid motor structure



HMTA020-30H200

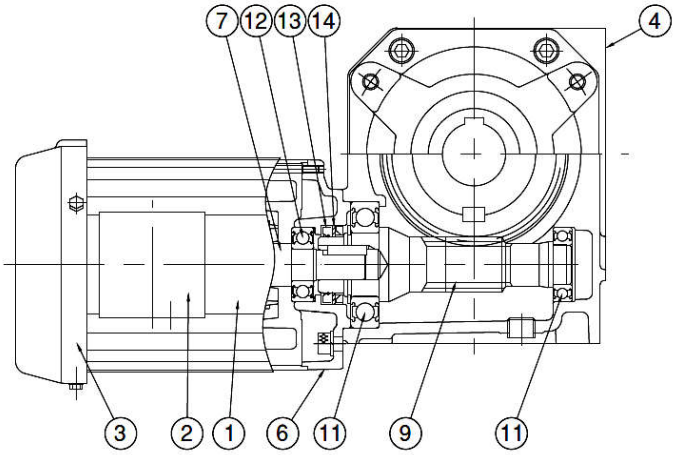


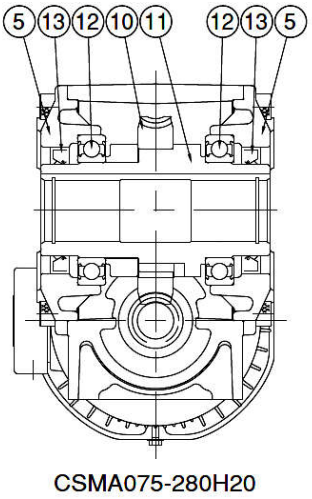


HMTA020-19L10

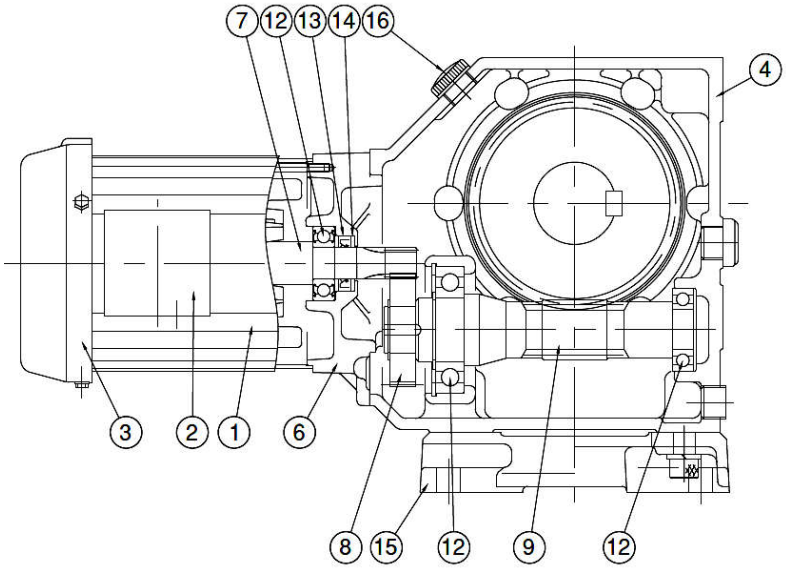
1	Motor	7	1st-stage wheel	13	Bearing
2	Terminal box	8	2nd-stage pinion	14	Oil seal
3	Fan cover	9	2nd-stage wheel	15	Filter
4	Housing	10	3rd-stage pinion		
5	Lid	11	3rd-stage wheel		
6	Motor pinion	12	Output shaft		

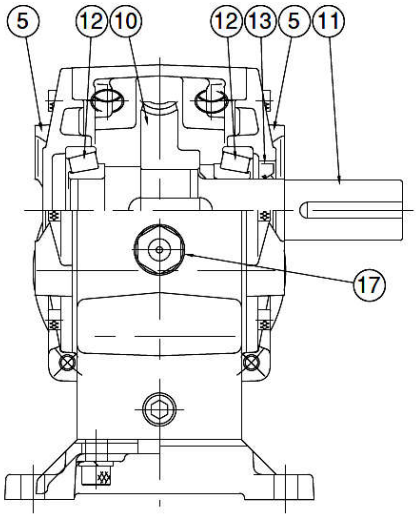
(3) Croise motor construction





CSMA075-280H20





HCMA075-321L120L

1	Motor	7	Motor pinion	13	Oil seal
2	Terminal box	8	1st-stage wheel	14	Filter
3	Fan cover	9	WG worm	15	Base
4	Housing	10	WG wheel	16	Pressure vent
5	Output bearing support	11	Output shaft	17	Oil gauge
6	Motor Flange	12	Bearing		

[10] Motors with clutch & brake

10-1. Clutch & brake wiring

(1) Clutch & brake specifications

Motor capacity (kW)	Model number	Category	Static friction torque [N·m] {Ref. kgf·m}	Power consumption (W)	Gap (mm)	Excitation voltage
0.1	NC/NB-0.15/0.1-AG	Clutch	1.47 (0.15)	4	0.25 to 0.5	24 VDC
		Brake	0.98 (0.1)	3		
0.2	NC/NB-0.15/0.2-AG	Clutch	2.94 (0.3)	5		
		Brake	1.96 (0.2)	4		
0.4	NC-0.6AG-033	Clutch	5.88 (0.6)	8	0.2 to 0.5	
	NB-0.4AG-001	Brake	3.92 (0.4)	7		
0.75	NC-1.2AG-034	Clutch	11.8 (1.2)	11		
	NB-0.75AG-001	Brake	7.35 (0.75)	8		
1.5	NC-2.5AG-033	Clutch	24.5 (2.5)	17		
	NB-1.5AG-001	Brake	14.7 (1.5)	12		
2.2	NC-2.5AG-033	Clutch	24.5 (2.5)	17		
	NB-2.2AG-001	Brake	21.6 (2.2)	16		
3.7	NC-5AG-024	Clutch	49.0 (5)	25		
	NB-3.7AG-001	Brake	36.3 (3.7)	17		

(2) Precautions regarding control circuit

● Voltage
Clutch & brake torque changes depending on excitation voltage, so supply the prescribed voltage (24 VDC). Ensure that voltage fluctuation is kept within ±10% of the rated voltage. Long wiring can lead to a drop in clutch and brake terminal voltage due to line resistance, etc., so when powering up the motor, check the lead wire terminals.
With DMP and TMP model controllers, the voltage is 40 VDC when the clutch & brake is not connected; it becomes the prescribed 24 VDC when the clutch & brake is connected.

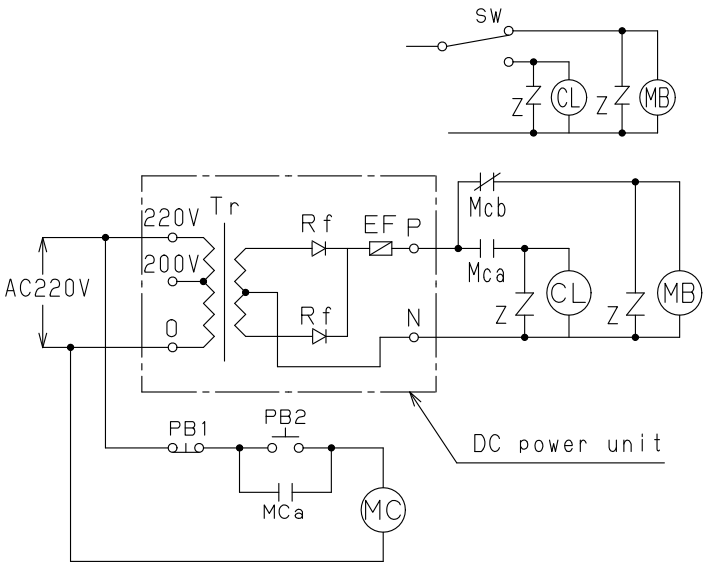
● AC source capacity
Ensure that the AC source capacity is at least 130% of clutch power consumption.

● Switching
Always perform switching on the DC side.

● Discharge circuit
As the clutch & brake is an inductive load, it stores electromagnetic energy when powered up and generates back EMF (back surge) when the switch is turned off. Therefore, if the motor is then used in such a state, the coil's insulation will deteriorate or the coil will burnout. As a result, it is necessary to connect appropriate surge protection when constructing the discharge circuit. While there are many different methods of organizing a discharge circuit, Tsubaki Gear motors with clutch and brake come with two discharge elements (varistors), so please use them. (When using a TMP controller, varistors are not required as a discharge circuit is already built in to the controller.)

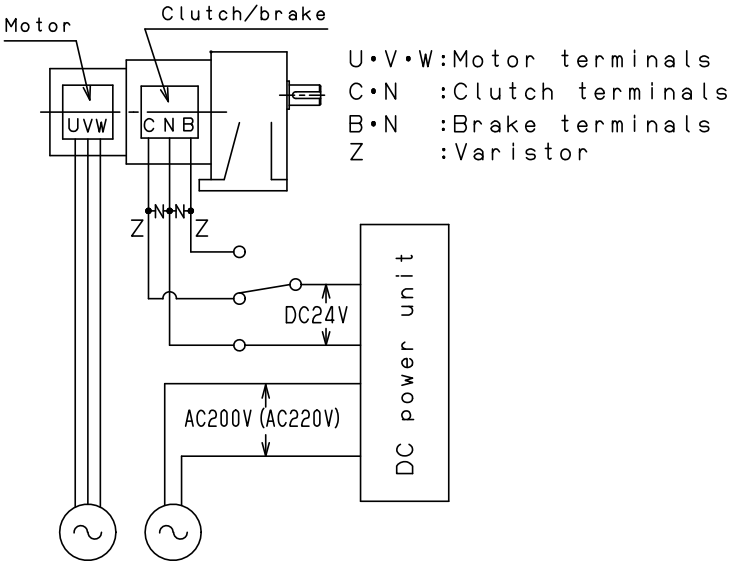
● VFD operation
When using a VFD, ensure that the motor speed is less than 1,800 r/min (60 Hz) when engaging the clutch or applying the brake.
Engaging the clutch or applying the brake at speeds higher than 1,800 r/min can cause problems such as abnormal abrasion wear on the brake linings and damage to the gears and shaft due to impact load.

Basic circuit



Tr: Transformer, Rf: Silicon rectifier, EF: Fuse, PB1/PB2: Push button switch
Z: Varistor, CL: Electromagnetic clutch, MB: Electromagnetic brake, MC: Coil
MCa/MCb: Electromagnetic contacts, SW: Switch

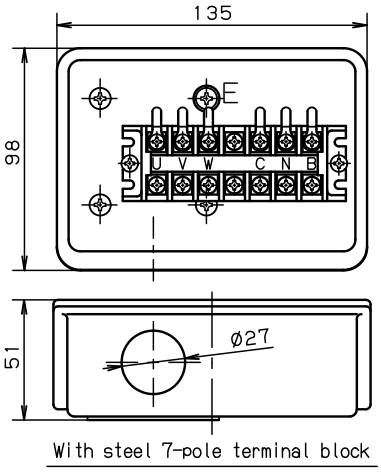
● Wiring for Gear motors with clutch & brake
The operating voltage for the clutch & brake is 24 VDC, so use the DC power unit (which converts commercial AC power supply to the prescribed 24 VDC) and connect it as shown in the (reference) diagram below.

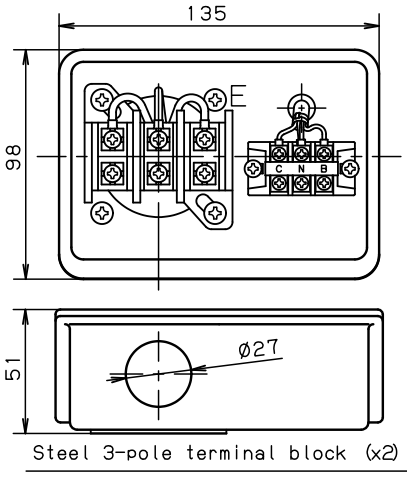


10-2. Troubleshooting Gear motors with clutch & brake

Problem	Possible cause	Action
Clutch and brake do not work	Incorrect wiring	Check wiring
	Power unit malfunction	Replace
	Broken wiring in clutch & brake coil or short	Send to specialty plant for repair
	Poor switch contact	Repair or replace
Motor does not start turning well Brake is not effective	Oil or dirt on friction surface	Disassemble and clean
	Life of lining exceeded	Repair or replace
	High load torque/inertia	Reduce load

10-3. Terminal box on motors with clutch & brake

<table>
<tr><th>Output</th><th colspan="2">Category</th><th>Dimensions</th></tr>
<tr><td>0.1 to 0.75 kW</td><td>With clutch & brake</td><td>Indoor type</td><td> 

1. Material: SPCC
2. Terminal screw size: M3.5
Tightening torque: 0.8 N·m
{Ref. 0.08 kgf·m}
3. Compatible crimp-on terminal
Naked round type (R type)
1.25 to 3.5 2 to 3.5
1.25 to 4 2 to 4
Round type with insulating coating
1.25 to 3.5 2 to 3.5
1.25 to 4 2 to 4
4. Ground terminal screw size: M4
Tightening torque: 1.2 N·m
{Ref. 0.12 kgf·m}</td></tr>
<tr><td>1.5 to 3.7 kW</td><td>With clutch & brake</td><td>Indoor type</td><td> 

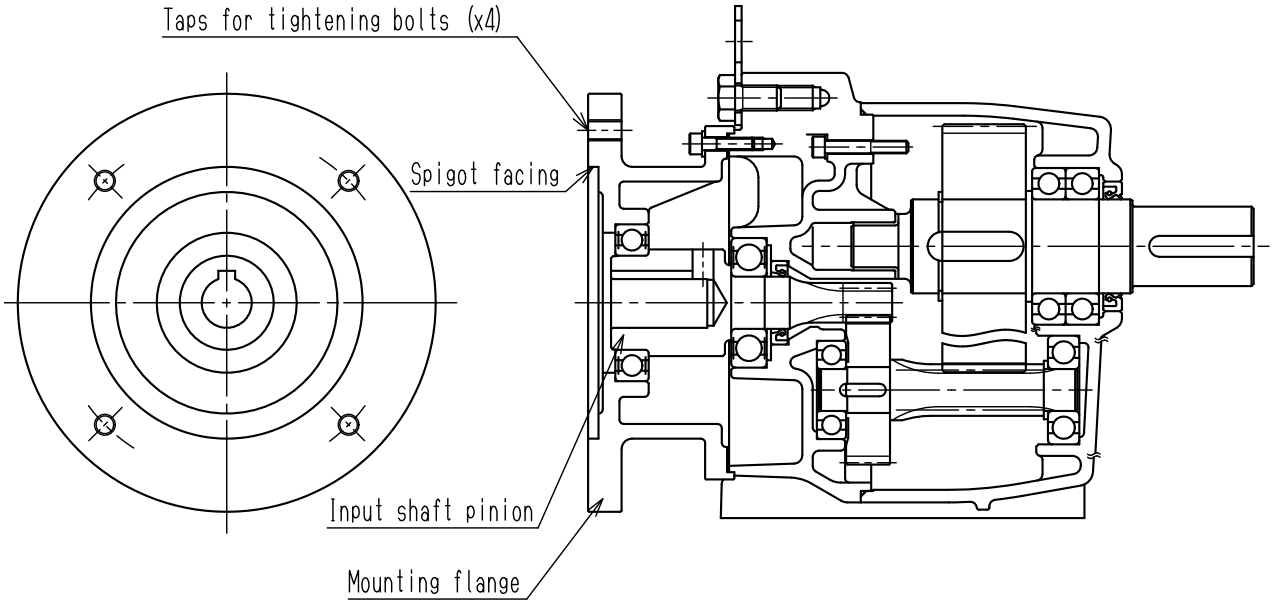
1. Material: SPCC
2. Terminal screw size
For motor: M4
Tightening torque: 1.2 N·m
{Ref. 0.12 kgf·m}
For clutch & brake: M3
Tightening torque: 0.5 N·m
{Ref. 0.05 kgf·m}
3. Crimp-on terminal
For motor
Naked round type (R type)
2 to 4 3.5 to 4
Round type with insulating coating
2 to 4 3.5 to 4
For clutch & brake
Naked round type (R type)
1.25 to 3.5 2 to 3.5
1.25 to 4 2 to 4
Round type with insulating coating
1.25 to 3.5 2 to 3.5
1.25 to 4 2 to 4
4. Ground terminal screw size: M5
Tightening torque: 2.0 N·m
{Ref. 0.20 kgf·m}</td></tr>
</table>

[11] Reducers with adapters/double shafts (Gear motors/Hypoid motors)

11-1. Attaching a motor to a reducer with an adapter

(1) Motor attachment procedures

① Check that the key is set accurately on the motor shaft. (On 0.1 kW/0.2 kW motors, the key is already attached to the input shaft pinion.)
② Apply the grease on the inside of the input shaft pinion to the motor shaft.
③ Align the keyway on the input shaft pinion with the position of the key on the motor shaft, and insert the key.
④ Check that the spigot facing on the motor is fully inserted, and tighten the four bolts.



(2) Attachment precautions

① Wipe away rust, dust, anti-rust oil, and other contaminants from the motor shaft.
② When attaching the motor, do not hit the motor unit or the reducer unit, or insert using the tightening strength of the bolts. Using excessive force when attaching the motor may cause the key to sit up on the raised section of the keyway on the motor shaft, resulting in bearing damage, unusual noises, or other problems.
③ Reducers with adapters do not come with a key on the input pinion, so use the key on the motor side. However, on 0.1 kW/0.2 kW motors, the key is already attached to the input shaft pinion.
④ When the weight of a reducer motor with an adapter increases, the load on the mounting flanges becomes excessive, leading to problems. (Use Table 11-1 as a guideline.)
Motors that exceed the values in Table 11-1 must be supported.

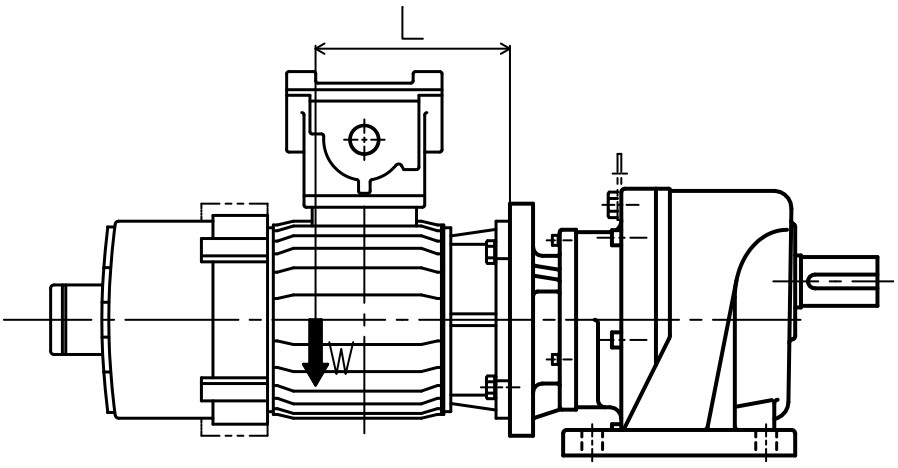


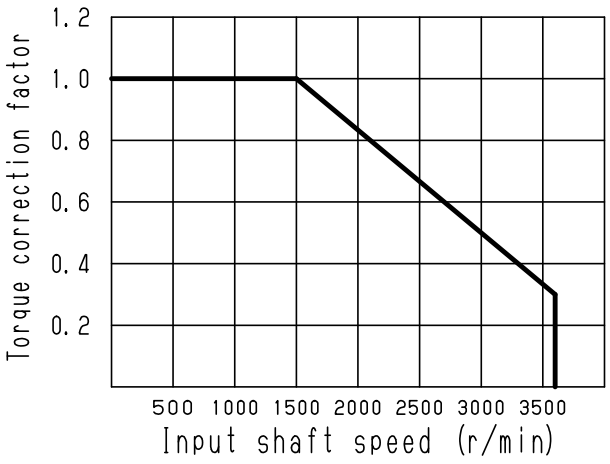
Table 11-1.

Equivalent capacity of 4-pole motor	L x W
0.1 kW / 0.2 kW	27.4 N·m {2.8 kgf·m} max.
0.4 kW	31.3 N·m {3.2 kgf·m} max.
0.75 kW	49.0 N·m {5.0 kgf·m} max.
1.5 kW	80.3 N·m {8.2 kgf·m} max.
2.2 kW	98.0 N·m {10.0 kgf·m} max.
3.7 kW	117.6 N·m {12.0 kgf·m} max.
5.5 kW	147 N·m {15.0 kgf·m} max.

11-2. Relationship between rotation speed of input shaft and allowable torque of output shaft

The allowable output shaft torque values indicated in the catalog specifications chart are for when the input shaft speed is 1,500 r/min. For use at other speeds, the allowable torque value is obtained by multiplying the allowable output shaft torque indicated in the specifications chart by the torque correction factor indicated in Figure 11-2.

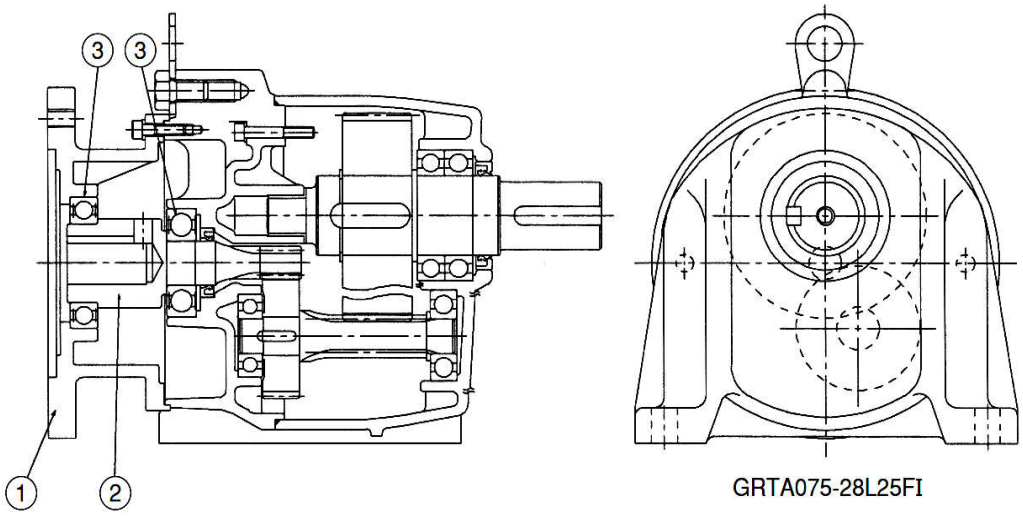
Figure 11-2. Allowable torque factor of output shaft by rotation speed of input shaft



Note 1: The allowable input/output shaft OHL is also obtained by multiplying the allowable input/output shaft OHL indicated in the specifications chart by the torque correction factor indicated in the figure above.

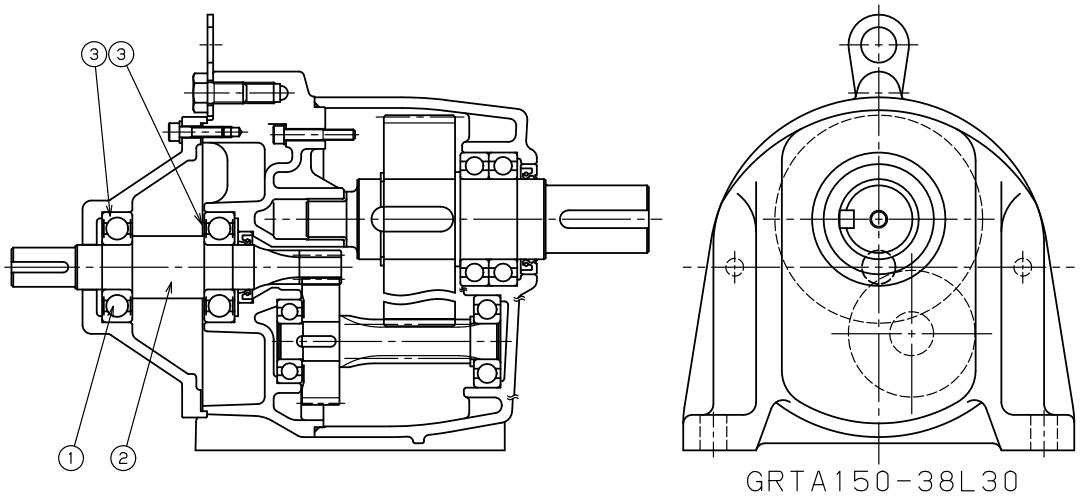
Note 2: Do not drive from the output shaft.

11-3. Structure of reducers with adapters



1	Motor flange	2	Input shaft pinion of adapter	3	Bearing

11-4. Structure of reducers with double shafts



1	R-bracket	2	Input shaft pinion	3	Bearing

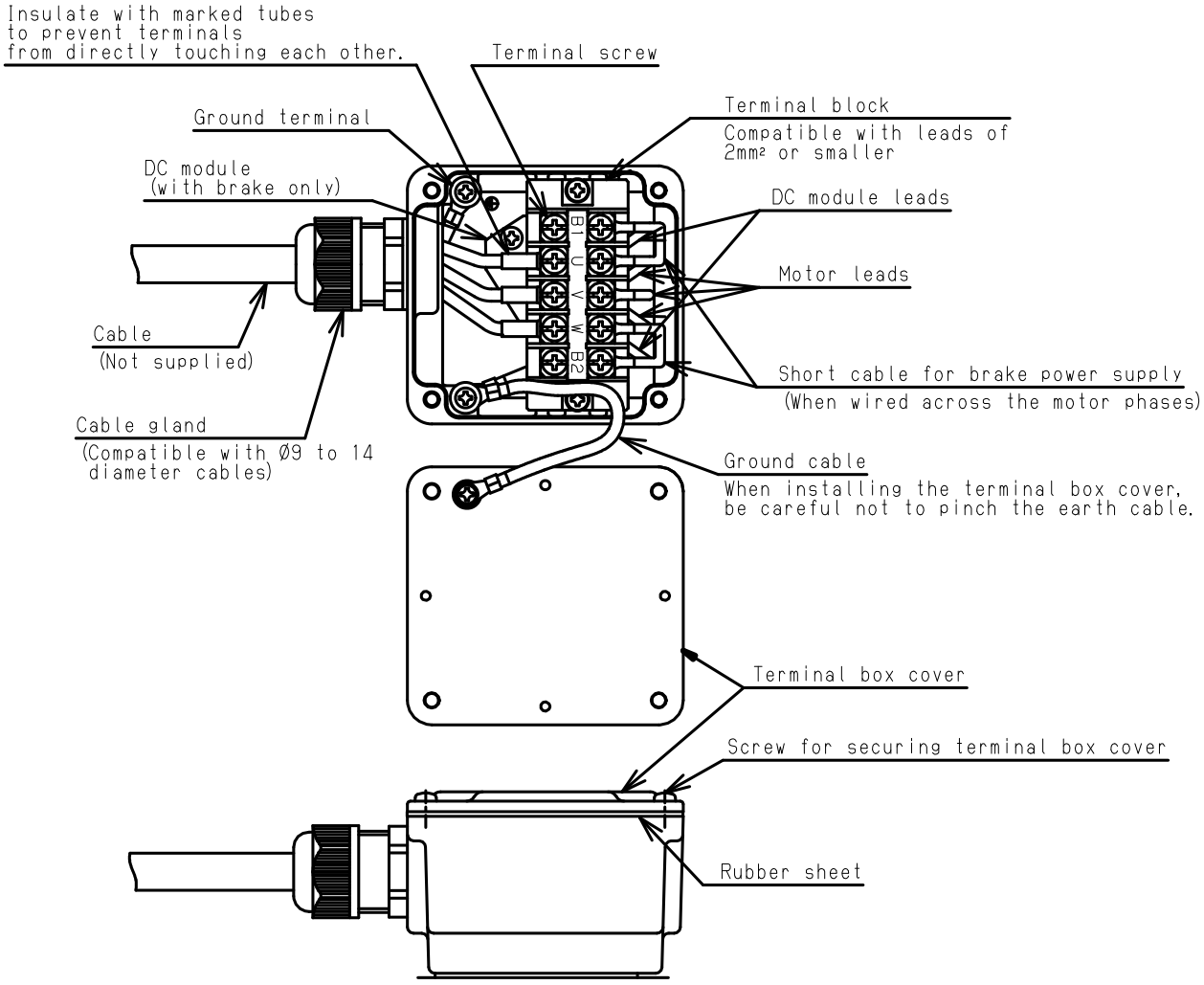
[12] CE Certified Motor (optional, 0.1 kW only)

For 0.2kW or more, please refer to the TR instruction manual (instruction manual No.TR020.00TS-*).

Please take into consideration the following items in addition to sections 1 to 12 when using the product.

Protection: IP55 (Outdoor type)
IP44 (Indoor)
IP20 (Motor with brake)
Thermal class: 130(B) type Time rating: S1(continuous)

(1) Terminal box specifications
Material: aluminum die-cast



	Tightening torque	
	N·m	kgf·m
Terminal screw	1.8	0.18
Ground terminal screw	1.2	0.12
Screw for securing terminal box cover	1.2	0.12
Cable gland	2	0.2

(2) Motor/brake wiring
See pages 13 to 19.

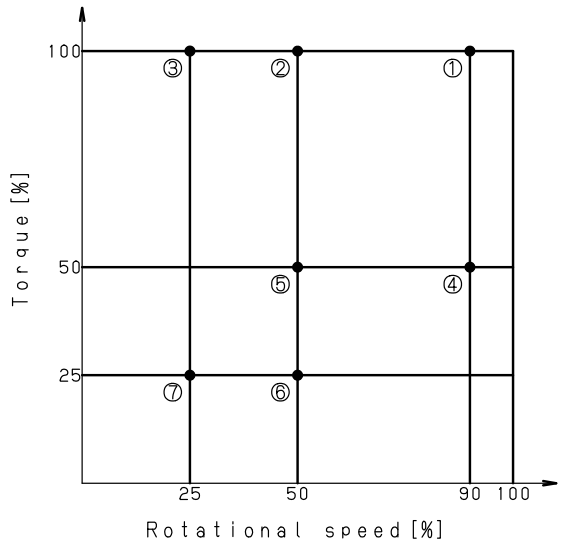
(3) Motor rotating direction
When using the wiring configurations shown in Fig. 5-1 (pages 13 and 14), the direction of rotation of the motor is clockwise when viewed from the opposite side of the load. (The rotating direction of the motor is the same as standard motors.)

(4) Overload (overheat) protection device
Protect with an EU certified thermal relay.
Use the amperage listed on the nameplate for the thermal setting.

(5) Grounding
A ground terminal is provided, so be sure to ground the product.
Please note that a ground cable is attached to the terminal box and cover. There is a risk of electric shock when a ground cable is not attached to the terminal box and cover and start the operation. Applying an excessive force may damage the cover and cable.
When putting on the cover to the box, make sure that all the wires are set inside the box and do not stick out and the cover lays flat. There is a risk of electric shock, injury, or fire when the wires are stuck out.

(6) Operating range
This product is manufactured with the specified values of Overvoltage Category III and Pollution Degree 3 as defined in IEC664.
Power is supplied to the motor via a transformer.

(7) Losses at 7 operating points, (EU) 2019/1781
Please refer to the material in below link.
https://tt-net.tsubakimoto.co.jp/tecs/pdct/gen/pdf/TA40.00TS.pdf



[13] UL Listed Motor (optional, 0.1 to 0.75 kW) *Excludes 0.55 kW

Please take into consideration the following items in addition to sections 1 to 12 when using the product.

Rated voltage: N2 230/240 V, 60/60 Hz (motors with and without brake)
: VN2 460/480 V, 60/60 Hz (motor without brake)
460 V, 60 Hz (motor with brake)
Protection: IP44 (motor without brake), IP20 (motor with brake)
Thermal class: 105(A) type Time rating: S1(continuous)

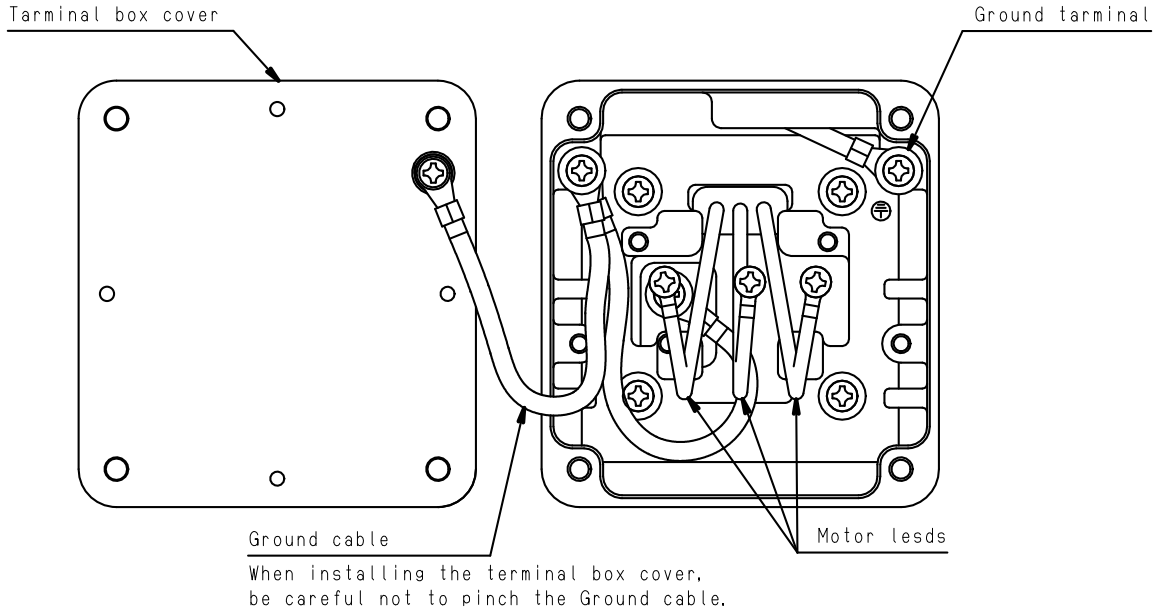
(1) Terminal box specifications
Material: aluminum die-cast
The terminal box is not always on, so wire using the supplied screws.

(2) Motor/brake wiring
See pages 13 to 19. However, for separate control of 0.4 to 0.75 kW, 200 V class, the voltage supplied to the brake must be 230 to 254 VAC.
For AC external operation of 0.1 to 0.2 kW, 400 V class, the voltage supplied to the brake must be 240 to 254 VAC.

(3) Motor rotating direction
When using the wiring configurations shown in Fig. 5-1 (pages 13 and 14), the direction of rotation of the motor is clockwise when viewed from the opposite side of the load. (The rotating direction of the motor is the same as standard motors.)

(4) Overload (overheat) protection device
Be sure to install a thermal relay to protect against motor burnout.
Use the amperage listed on the nameplate for the thermal setting.

(5) Grounding
A ground terminal is provided, so be sure to ground the product.
Please note that a ground cable is attached to the terminal box and cover. There is a risk of electric shock when a ground cable is not attached to the terminal box and cover and start the operation. Applying an excessive force may damage the cover and cable.
When putting on the cover to the box, make sure that all the wires are set inside the box and do not stick out and the cover lays flat. There is a risk of electric shock, injury, or fire when the wires are stuck out.



[14] CCC Compliant Motor (optional, 0.1 kW only)

For 0.2kW or more, please refer to the TR instruction manual (instruction manual No.TR020.00TS-*)

Please take into consideration the following items in addition to sections 1 to 12 when using the product.

Rated voltage	: PN3 HN3 WN3	200/220/200/220 V 50/50/60/60 Hz
	: PVN3 HVN3 WVN3	380 V 50 Hz
Protection	: WN3 WVN3	IP55 (Outdoor type)
	: PN3 HN3 PVN3 HVN3	IP44 (Indoor type)
	: BPN3 BPVN3	IP20 (With brake and plastic terminal box)
	: BHN3 BHVN3	IP23 (With brake and hard terminal box)
Thermal class	: 120(E) type	Time rating: S1(continuous)

(1) Terminal box specifications

PN3 : Same as specifications for standard terminal box on page 20.

HN3 WN3 : Specifications for when connector is attached to hard terminal box and standard terminal box for outdoor type on page 21.
See page 49 for details about connector.

Note: Insulate wiring with marked tubes to prevent terminals from directly touching each other.

(2) Motor/brake wiring

See pages 13 to 19 .

(3) Direction of rotation of motor

When using the wiring configurations shown in Fig. 5-1 (pages 13 and 14), the direction of rotation of the motor is clockwise when viewed from the opposite side of the load. (The direction of rotation of the motor is the same as standard motors.)

(4) Overload (overheat) protection device

Be sure to install a thermal relay to protect against motor burnout.
Use the amperage listed on the nameplate for the thermal setting.

(5) Grounding

An ground terminal is provided, so be sure to ground the product.

[15] China RoHS Instruction

本资料是中国R0HS的必备资料 (China RoHS requisite document)
GMTA、HMTA

零部件名称 (Part Name)	有害有毒物质或者元素 (Hazardous Substances or Elements)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
电动机 (Motor)	×	○	○	○	○	○
铝制减速机箱体 (AluminumReducer Case)	×	○	○	○	○	○

本表格依据SJ/T 11364 的规定编制
(This document is prepared in conformity with SJ/T11364.)

○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下
(Shows that the concentration of the hazardous substance does not exceed the concentration limits specified in GB/T26572.)
×:表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求
(Shows that the concentration of the hazardous substance exceeds the concentration limits specified in GB/T26572.)

本资料是中国R0HS的必备资料 (China RoHS requisite document)
CSMA、HCMA

零部件名称 (Part Name)	有害有毒物质或者元素 (Hazardous Substances or Elements)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
电动机 (Motor)	×	○	○	○	○	○
铝制减速机箱体 (Aluminum Reducer Case)	×	○	○	○	○	○
蜗轮 (Worm Wheel)	×	○	○	○	○	○

本表格依据SJ/T 11364 的规定编制。
(This document is prepared in conformity with SJ/T11364.)

○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下
(Shows that the concentration of the hazardous substance does not exceed the concentration limits specified in GB/T26572.)
×:表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求
(Shows that the concentration of the hazardous substance exceeds the concentration limits specified in GB/T26572.)

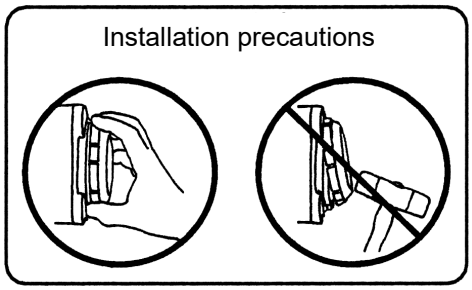
[16] Shaft-end cover (option for Hypoid hollow shaft motors)

Installation method

(1) Shaft-end cover HM70CAP/HM90CAP

Hold the shaft-end cover against the installation face and push it straight in by hand.
Do not attempt to install the cover at an angle or hit it in using a hammer.
Doing so may damage the shaft-end cover.

Example of (1)



(2) Shaft-end cover HM140CAP/HM90CAP-PL

Hold the shaft-end cover against the installation face and push it straight in.
If the cover is difficult to push in, tap it lightly with a hammer or similar tool.
Installing the cover by forcibly pushing it in at an angle or hitting it hard using a hammer may damage it.

[17] Structure and operation of mechanical overload protection device (optional)

17-1. **Features of mechanical overload protection device**

This type of motor is equipped with a mechanical safety device developed especially for hollow output shaft models. The device operates when an unexpected overload occurs to protect the machine. It is extremely compact and easy to handle.

(1) Single-position type
The array of ball-and-pocket-type torque transmission elements is a unique configuration that only engages in a single location.

(2) Automatic recovery
Once the cause of the overload has been removed, the overload protection device can be automatically re-engaged with the motor simply by turning the drive side.

(3) Simple torque adjustment
Trip torque can be freely adjusted simply by turning the adjustment nut.

(4) Standard-type overload detection sensor
A combination of non-contact TG sensors can detect overload and stop the motor or generate an alarm.

Construction/operating principle
[When engaged]
Torque is transmitted in the sequence below:

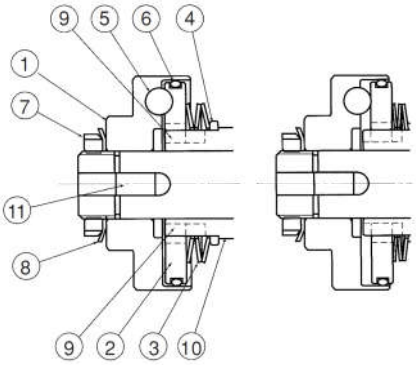
Output shaft ⇒ Center plate ⇒ Steel ball ⇒ Driven flange ⇒ Driven shaft

[When tripped]

- When an overload occurs, force greater than the disk spring load acts in the direction of thrust.
- This disengages the center plate and the steel ball, and the center plate starts idling.

17-2. Determining trip torque

- A Croise motor with an overload protection device is a Gear motor with a function that protects the machine by activating when an unexpected overload occurs. It is therefore necessary to determine a limit value beyond which torque must not be applied based on the strength, load, and other conditions of the machine/equipment, and set this value as the trip torque.
- If the limit value is not clear, set it to around 1.5 times the allowable output shaft torque of the Croise motor.



【When engaged】 【Trip】

1: Driven flange
2: Center plate
3: Disk spring
4: Stop collar
5: Steel ball
6: O-ring
7: Shaft nut
8: Shaft washer
9: Parallel key
10: Hollow shaft
11: Parallel key (to be provided by customer)

17-3.Handling instructions and precautions

(1) Mounting to a driven shaft

- The overload protection device is fixed to the output shaft side (right or left depending on the arrangement of the shaft) of the Croise motor by a steel plate using the taps in the housing. Insert it directly into the driven shaft. Insertion method and precautions are the same guidelines as for hollow shaft models. (Refer to pages 11 and 12.)
- After inserting the overload protection device into the driven shaft, remove the steel plate used to attach it, install the key, and temporarily assemble it with the shaft washer and the shaft nut.
- Ensure that the thrust load does not act on the driven shaft.

(2) Procedure for setting trip torque

- The trip torque of the overload protection device is set by adjusting the tightening angle of the adjustment nut.

1. After inserting the overload protection device into the driven shaft, tighten the adjustment nut by hand and take the point where there is no longer any looseness as the 0 point.
2. Read the adjustment nut tightening angle corresponding to the set trip torque from the "Tightening Amount - Torque Correlation Diagram" (page 55), and tighten the nut accordingly. The best way is to find the appropriate tightening amount for the machine in question by tightening the adjustment nut slightly loosely (referring to the graph as a guide) and then performing a test run.
3. After setting the torque, fix the adjustment nut using the shaft washer.
4. Do not turn the adjustment nut more than the maximum value indicated in the "Tightening Amount - Torque Correlation Diagram". Doing so may result in the motor locking due to a loss of flex in the disk spring when the overload protection device is tripped.

(3) Precautions when operating the overload protection device

- While there should be no noise or vibration during normal operation, large noise and vibration may occur in the event of an unexpected overload. If this occurs, immediately stop the device.
- In such cases, it is recommended to use a TG sensor.

(4) Recovery

The overload protection device automatically recovers, so simply restarting the drive side of the motor automatically resets it.

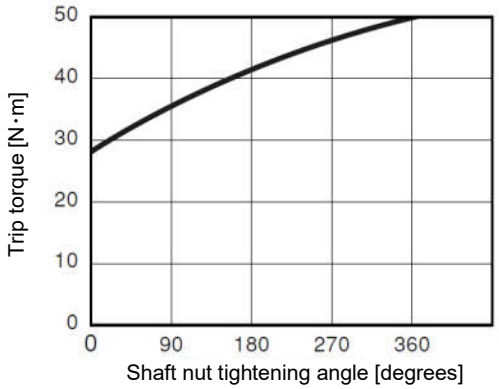
1. When the overload protection device is activated due to an overload, stop the motor and remove the cause of the overload.
2. When recovering the device, reset it (re-engage it with the motor) by setting the input speed to 50 r/min or lower, or by inching the motor.
   In the event that it is difficult to reset the device, apply a little load when inching the motor.
   Do not reset the device by manually rotating the overload protection device or shaft, etc., as it is dangerous to do so.
3. When the ball slots into the pocket, you should hear a click.

(5) Mounting precautions

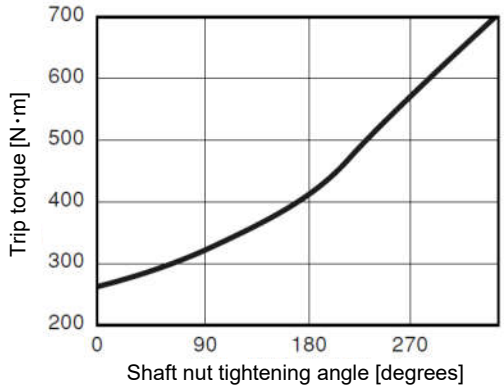
- When mounting a flange-mounted unit, take care to that undue force is not applied to the bearings. Contact Tsubakimoto Chain if you are unsure.

● Tightening Amount - Torque Correlation Diagram

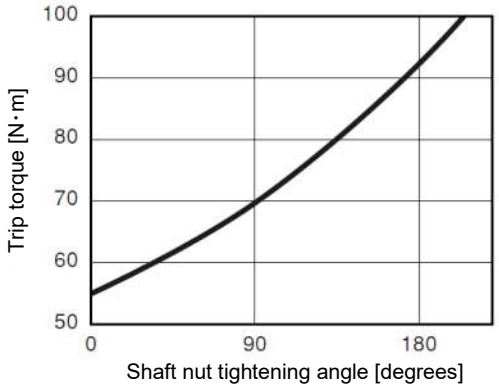
Reducer frame No. 13



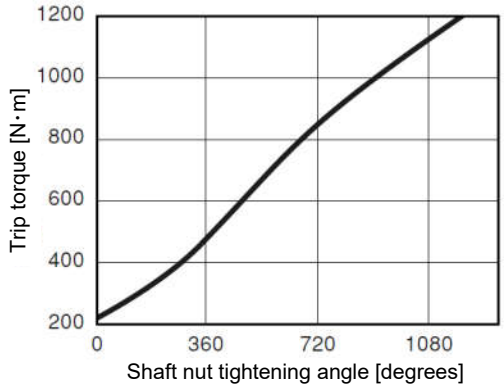
Reducer frame No. 32



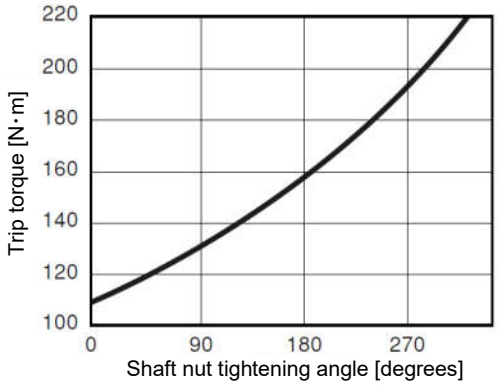
Reducer frame No. 16



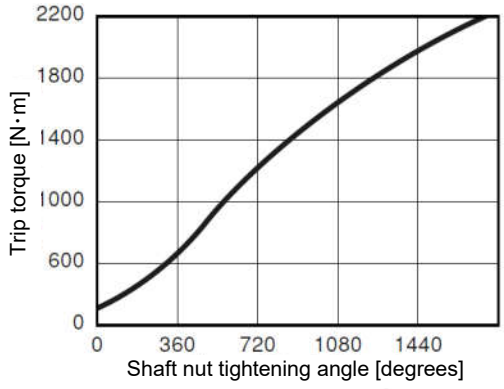
Reducer frame No. 40



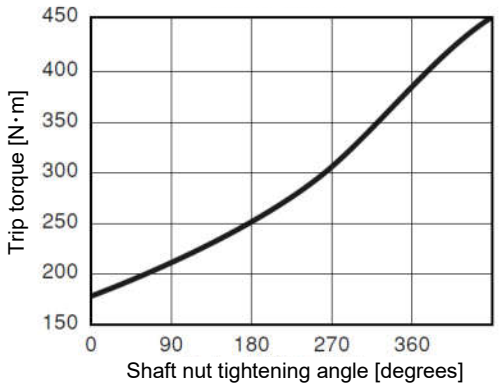
Reducer frame No. 22



Reducer frame No. 50



Reducer frame No. 28



[18] Heat-/Cold-resistant Models

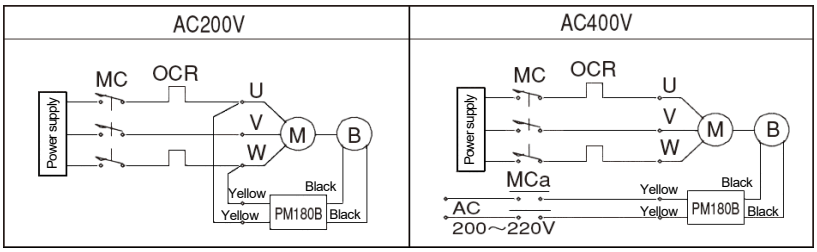
18-1. Heat-resistant models

Basic specifications

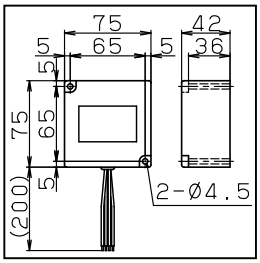
Applicable models : Gear motors/Hypoid motors
Three-phase models without brake: 0.1 to 2.2 kW, Three-phase model with brake: 0.1 to 0.75 kW

Protection : Three-phase motor without brake: IP44, Three-phase motor without brake: IP20
Ambient temperature : 0 to 60°C Altitude: Up to 1,000 m
Ambient humidity : Up to 85%
Ambient atmosphere : No corrosive gases, explosive gases, vapors, or the like. Install in a well-ventilated location without dust.
Oil seal : Heat-resistant type
Recommended grease (For grease volume, refer to "8-2. Lubrication" on pages 37, 38.)
Idemitsu : Daphne Eponex SR No. 1 (factory filled)
Nippon Grease : Nigace HT-DX No. 1
JXTG Nippon Oil & Energy : Pyronoc Universal No. 0

Note 1: Not available for VFD motors.
Note 2: Motors with brakes come with a special DC module. They should be installed in an ambient temperature of no more than 40°C and wired in accordance with the circuit diagram below.
Note 3: DC module (PM180B) has a built-in relay and must not be used with DC injection braking.



DC module dimensions



(Consult Tsubakimoto Chain regarding motors with other specifications)

18-2. Cold-resistant models

Basic specifications

Applicable models : Gear motors/Hypoid motors
Three-phase models without brake: 0.1 to 2.2 kW, Three-phase model with brake: 0.1 to 0.75 kW
Protection : IP65 (protective construction when used horizontally)
Ambient temperature : -30 to 40°C Altitude : Up to 1,000 m
Ambient humidity : Up to 85%
Ambient atmosphere : No corrosive gases, explosive gases, vapors, or the like.
Install in a well-ventilated location without dust.
Oil seal : Cold-resistant type
Oil seal used by reducer unit: Cold-resistant type
Recommended grease (For grease volume, refer to "8-2. Lubrication" on pages 37, 38.)
Nippon Grease : Nigtight LTS No. 00 (factory filled)
Idemitsu : Daphne XLA No. 0

Note 1: When restarting the motor after it has not been used for a long time, when it is only started infrequently, or in similar situations, there is a risk of high no-load loss.
Note 2: Use in a condensation-free environment.
(Consult Tsubakimoto Chain regarding motors with other specifications)

[19] Troubleshooting

(1) Troubleshooting Gear motors

Problem	Possible cause	Action
Motor does not turn in unloaded state	Power outage	Check power supply/contact power company
	Broken connection wiring	Check circuit
	Poor switch connection	Repair or replace
	Broken stator coil wiring	Send to specialty plant for repair
	Three-phase is single-phase	Check terminal voltage
	Gear/shaft/bearing damage	Send to specialty plant for repair
Motor does not turn when load is applied	Voltage drop	Check length of wiring
	Gear wear	Send to specialty plant for repair
	Overload operation	Reduce load
Abnormal heat	Overload operation	Reduce load
	Motor is started/stopped too frequently	Reduce frequency
	Bearing damage	Repair or replace
	Voltage is too high or too low	Check voltage
Noisy	Continuous noise - Bearing damage/gear wear	Send to specialty plant for repair
	Intermittent noise - Scratched gear or foreign matter in machinery	Send to specialty plant for repair
Large vibration	Gear/bearing wear	Send to specialty plant for repair
	Faulty mounting/loose bolt	Re-tighten
Grease leakage	Loose tightened parts	Re-tighten
	Damaged oil seal	Replace

(2) Troubleshooting Gear motors with brake

Problem	Possible cause	Action
Brake does not work	Incorrect wiring	Check wiring
	Switch is faulty	Replace or repair
	Oil, dirt, or other contaminant on lining	Disassemble and clean
Brake is not effective	Life of lining exceeded	Repair or replace
Braking time is long	Inertia of load is too large	Reduce inertia of load
	Brake is wired across motor phases	Change to DC injection braking
Motor does not turn	Incorrect brake wiring	Check wiring
Motor is abnormally hot	Brake gap is too large	Adjust gap
Thermal relay is activated	DC module is broken	Replace or repair
Loud brake noise	Broken wiring in brake coil or short	Send to specialty plant for repair
	Poor switch contact	Repair or replace
Abnormal heat	Break is used frequently	Reduce frequency
	High load torque/inertia	Reduce load

The above table indicates everyday malfunctions and corresponding countermeasures.
For other issues, contact your distributor, a Tsubakimoto Chain sales office, or Tsubakimoto Chain customer service center
When doing so, have the following details from the product nameplate handy (see page 3):

(1) Manufacturing number (Mfg No.)
(2) Model number (Type)
(3) Motor capacity (Motor Power)
(4) Reduction ratio (Ratio) or speed of rotation (Output speed)
(5) Drawing number (Drawing No.)

[20] Disposal

⚠ CAUTION

- Dispose of the Gear motor/Hypoid motor/Croise motor and lubricants in accordance with regulations on disposal of general waste.

[21] Storage

21-1. Storage position

The reducer is packed and shipped in its final mounting position. Store it as delivered, in the upright position. For reducers with special installation styles, if stored in the wrong position or direction, the bearing grease and lubrication may mix or even leak from the unit.

21-2. Operating the motor after storage

Non-metallic parts like oil seals, oil gauges, and oil plugs wear easily from environmental conditions such as extreme temperatures and ultraviolet rays. Make sure to inspect these parts and replace them if damaged, before operation.

[22] Warranty

Tsubakimoto chain Co.: hereinafter referred to as “Seller”
Customer: hereinafter referred to as “Buyer”
Goods sold or supplied by Seller to Buyer: hereinafter referred to as “Goods”

1. Warranty period without charge
   18 months effective the date of shipment or 12 months effective the first use of Goods, including installation of Goods to Buyer’s equipment or machine - whichever comes first.

2. Warranty coverage
   Should any damage or problem with the Goods arise within the warranty period, given that the Goods were operated and maintained according to the instructions provided in the manual, Seller will repair and replace at no charge once the Goods are returned to the Seller.
   This warranty does not include the following:
   1) Any costs related to removal of Goods from the Buyer’s equipment or machine to repair or replace parts.
   2) Cost to transport Buyer’s equipment or machines to the Buyer’s repair shop.
   3) Costs to reimburse any profit loss due to any repair or damage and consequential losses caused by the Buyer.

3. Repairs outside of warranty
   If the product malfunctions due to any of the following situations, even within the warranty period, the product will be examined and repaired at a cost to the customer.
   (1) The customer did not correctly install the product in accordance with the instruction manual.
   (2) The customer did not provide proper maintenance and did not operate the product correctly.
   (3) The product malfunctioned due to a problem with it being connected to another device.
   (4) The construction of the product was changed due to alterations by the customer.
   (5) The product was repaired by a company other than Tsubaki or by a company not specified by Tsubaki.
   (6) The product was used outside the proper operation environment as specified in the instruction manual.
   (7) The product malfunctioned due to disasters or other acts of God, or unlawful acts by a third party.
   (8) A malfunction on the customer’s equipment caused secondary damage to the product.
   (9) The product malfunctioned due to parts received and mounted by the customer, or parts specified and used by the customer.
   (10) The product malfunctioned due to faulty wiring by the customer or faulty parameter settings input by the customer.
   (11) The product has reached the end of its service life due to usage conditions.
   (12) Damage occurs due to factors outside the responsibility of Tsubaki.

4. Dispatch of Tsubaki engineers
   Customers will be charged for services such as examination, adjustment, and trial operation performed by Tsubaki engineers dispatched to the customer’s location.

【MEMO】

TSUBAKIMOTO CHAIN CO.

1-1, Kohtari-Kuresumi, Nagaokakyo
Kyoto 617- 0833
Japan
Website: http://tsubakimoto.com/

Global Associated Partners:

U.S. Tsubaki Power Transmission, LLC
http://www.ustsubaki.com/

Tsubakimoto Singapore Pte. Ltd.
http://tsubaki.sg/

Tsubakimoto Europe B.V.
http://tsubaki.eu/

Tsubaki of Canada Limited
http://tsubaki.ca/

Taiwan Tsubakimoto Co.
http://tsubakimoto.com.tw/

Tsubakimoto U.K. Ltd.
http://tsubaki.eu/

Tsubaki Australia Pty. Limited
http://tsubaki.com.au/

Tsubakimoto Chain (Shanghai) Co., Ltd.
http://tsubaki.cn/

Tsubakimoto Korea Co., Ltd.
http://tsubakimoto-tck.co.kr/