INSTRUCTIONS FOR

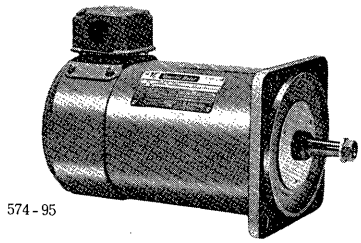
MINERTIA MOTORS

STANDARD SERIES

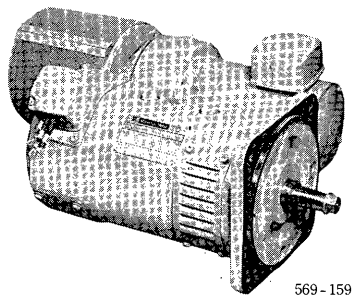
Instructions
TOE-C245-1
October 1976

TYPE UGMM □□

When properly installed, operated and maintained, this equipment will provide a lifetime of optimum operation. Before starting read thoroughly these instructions, and keep them for future reference.



Totally-enclosed Type UGMMER



Externally-ventilated Type UGMMKR

IMPORTANT

Overload Protection

Minertia Motor should be provided with an overload protective relay matched to thermal characteristics. Otherwise, motor burnout may occur. Yaskawa Type RH-35 thermal relay is recommended for use.

Disassembly and Machining

Minertia Motor should not be disassembled or machined unnecessarily.

RECEIVING

The unit has been put through severe tests at factory before shipped. After unpacking, however, check and see the following:

- Its nameplate rating meets your specifications.
- It has sustained no damage while in transit.
- Bolts and screws are not loose.
- The shaft should be clear of any obstructions for rotating.

If any part of the motor is damaged or lost, immediately notify us giving full details and nameplate data.

CONTENTS

YASKAWA Electric Mfg. Co., Ltd./Japan

GENERAL

Allowable Temperature Rise and Maximum Allowable Temperature

Minertia Motor employs class H insulation in its armature winding and class F insulation in its field winding. Since the temperature rise of class H insulation is 140°C (284°F) and that of class F insulation 115°C (239°F), the total temperature should not exceed 180°C (356°F) in armature winding and 155°C (311°F) in field winding. (NEMA MG-12, 16)

Rated Current and Rated Torque

Rated current and torque of Minertia Motor in **Table 1** are based on the continuous operation by the power supply of smooth current waveform.

As the waveform of DC power converted from AC with rectifiers and control rectifiers (thyristors, thyratrons, etc.) contains pulsating components when DC reactor for smoothing is not used, the RMS value is not equal to the mean value of current flowing through Minertia Motor. Output torque of Minertia Motor is proportional to the mean value of the current and heat loss depends on the RMS value.

Therefore, if required load torque is equal to the rated torque of Minertia Motor and pulsating components are contained in current, Minertia Motor will be overheated. Depending on waveform of power voltage, therefore, the output torque of Minertia Motor may become lower than the rated torque indicated in Table 1. It is necessary to multiply the rated torque shown in Table 1 by derating factor which depends mainly on power voltage waveform, etc., so that the RMS value of

Table 1 Ratings & Specifications

Type			UGMMEM-06AA1	UGMMEM-13AA1	UGMMEM-25AA1	UGMMEM-50AA1	UGMMEM-1AAA1	UGMMKR-2AAA1
Enclosure & Cooling Method			Totally-enclosed	Totally-enclosed	Totally-enclosed	Totally-enclosed	Totally-enclosed	Externally ventilated
Rated Output*		W/HP	185/1/4	401/1/2	771/1	1540/2	3080/4	6170/8
Rated Torque*		kg·cm	6.00	13.0	25.0	50	100	200
		lb·in	5.21	11.3	21.8	43.6	87.1	174
Rated Speed*		rpm	3000	3000	3000	3000	3000	3000
Rated Armature Voltage*		V	40.5	68.5	70.9	146	139	128
Rated Armature Current		A	6.2	7.4	13.1	12.1	24.9	54.1
Power Rate*		kW/sec	6.10	11.5	21.2	26.7	38.1	73.1
Torque/Inertia*		rad/sec^2	1.04×10^4	0.904×10^4	0.867×10^4	0.545×10^4	0.389×10^4	0.374×10^4
Maximum Torque (1 sec)		kg·cm	60	130	250	500	800	2000
Maximum Armature Current (1 sec)*		lb·in	52	113	218	436	697	1742
		A	62	74	131	117	194	541
Maximum Safe Speed		rpm	5000	5000	5000	5000	5000	5000
Armature Inertia	J	g·cm·sec^2	0.579	1.44	2.89	9.17	25.7	53.6
		lb·in·sec^2	0.504×10^{-3}	1.25×10^{-3}	2.52×10^{-3}	7.99×10^{-3}	22.4×10^{-3}	46.7×10^{-3}
	$GD^2/4$	kg·cm^2	0.567	1.41	2.83	9.00	25.2	52.5
		lb·in^2	0.194	0.482	0.968	3.08	8.62	17.96
Armature Resistance at 20°C		Ω	0.84	1.03	0.47	0.71	0.28	0.089
Armature Inductance		mH	0.92	1.55	0.63	2.63	1.70	0.30
Voltage Constant		V sec/rad	0.101	0.179	0.193	0.420	0.408	0.377
		mV/rpm	10.6	18.7	20.2	44.0	42.7	39.5
Torque Constant		kg·cm/A	1.03	1.82	1.97	4.28	4.15	3.84
		lb·in/A	0.90	1.59	1.72	3.73	3.61	3.34
Friction Torque		kg·cm	0.163	0.309	0.472	0.90	1.66	3.69
		lb·in	0.142	0.269	0.411	0.784	1.45	3.21
Viscous Damping Coefficient		g·cm/rpm	0.0864	0.0605	0.177	0.360	0.913	1.96
		lb·in/rpm	0.000075	0.000053	0.000154	0.00031	0.00080	0.00171
Inertial Time Constant		msec	4.7	4.6	3.6	3.6	4.2	3.3
Inductive Time Constant		msec	1.1	1.5	1.3	3.7	6.3	3.4
Field Current		A	Parmanent Magnet					4.0
Field Resistance at 20°C		Ω	—	—	—	—	—	26.2
Cooling Required		CMM mm·H_2O	TENV	TENV	TENV	TENV	TENV	4.2
		CFM in·H_2O	—	—	—	—	—	147.0
Cooling Wind Pressure		mmAq	—	—	—	—	—	35
Weight		kg	8	14	25	49	73	90
		lb	18	31	55	108	162	199

*The values of these ratings are when armature temperature is 150°C, and the others, 20°C.

1. Rated torque and rated armature current in Table 1 are based on operation by DC power supply, such as a battery, at ambient temperature not exceeding 40°C (104°F).
   The performance differs from this normal rating when the motor is operated by rectified AC power supply having a pulsation or ripple in its output voltage.

2. Power rate can be calculated as follows:

$$\text{Power Rate (kW/sec.)} = 0.384\times\frac{\text{Rated Torque (kg·cm)}^2}{\text{Inertia (kg·cm}^2)}$$

$$\text{or} \quad = 0.1125\times\frac{\text{Rated Torque (lb·in)}^2}{\text{Inertia (lb·in·sec}^2)}$$

the armature current will become lower than the value of rated current.

For instance, when single phase full-wave thyristor Leonard system is used without DC reactor for smoothing, the output torque of Minertia Motor will be approximately 50% of the rated torque shown in Table 1.

Time Rating of Overcurrent

Inrush current flows in Minertia Motor when accelerating or decelerating.

The larger the inrush current becomes, the greater accelerating or decelerating torque Minertia Motor produces. This enables the motor to accelerate or decelerate in shorter time. The amount of inrush current of a motor is usually limited thermally or by its commutating ability. **Fig. 1** shows time rating of overcurrent of Minertia Motor, i.e., allowable duration of overcurrent flow in Minertia Motor.

When overcurrent flows in Minertia Motor throughout the rated time of overcurrent shown in Fig. 1, the motor must be rested for a required period. The operation cycle, therefore, must be so determined that the RMS value of current in one cycle of operation of Minertia Motor does not exceed the rated current. Where load inertia is not high, Minertia Motor accelerates or decelerates quickly, and overcurrent flows throughout the period permitted, and Minertia Motor can withstand repetition of acceleration and deceleration.

When testing frequency-response characteristics of Minertia Motor, extremely large current will flow continuously. It is important that Minertia Motor be provided with thermal relay prior to test. The test should be conducted at lower test voltage and completed as quickly as possible.

Overload Protection

Minertia Motor is far more sensitive to overloading and overcurrent than other DC motors, so proper care must be taken in selection of thermal relay (Fig. 1).

For overload protection of Minertia Motor, type RH-35 thermal relay is recommended for use. Refer to Figs. 1 and **2**, and **Table 2**. Against the overload more than 600% of the rated current of Minertia Motor, however, complete protection cannot always be provided by use of type RH-35 thermal relay. It is advisable to use, in conjunction with type RH-35 thermal relay, a quick acting fuse (capacity: 150% of rated current of Minertia Motor) which protects thyristor.

Connect thermo-elements of thermal relay directly into armature DC circuit of Minertia Motor (refer to **Fig. 3**) and avoid connecting them to AC side of servo-amplifier or rectifier.

Type RH-35 thermal relay is of a bimetallic type with indirect heaters. It consists of a mounting base and relay unit embodying thermo elements and trip contact. The relay unit is of the plug-in type for quick, easy removal and mounting. Type RH-35 thermal relay has the function of an automatic compensation for ambient temperature variation. This relay can be reset manually or automatically by use of reset button, Fig. 2. However, manual reset is recommended as resetting must be made after removing the cause of trip.

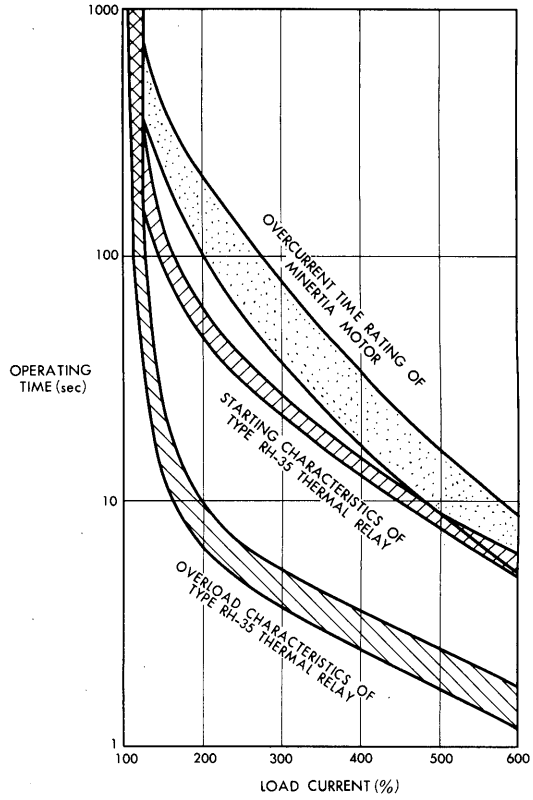


Fig. 1 Over current Time Rating of Minertia Motor and Operating Characteristics of Thermal Relay Type RH-35

Table 2 Selection of Thermal Relay Type RH-35

Motor Type	Thermal Relay Type RH-35	
	Normal Operating Current	Type
UGMMEM-06AA1	6.2 A	RH-35/6.2HV
UGMMEM-13AA1	6.9 A	RH-35/6.9HV
UGMMEM-25AA1	12.5 A	RH-35/12.5HV
UGMMEM-50AA1	12.5 A	RH-35/12.5HV
UGMMEM-1AAA1	24.5 A	RH-35/24.5HV
UGMMKR-2AAA1	53 A	RH-35/53HVW

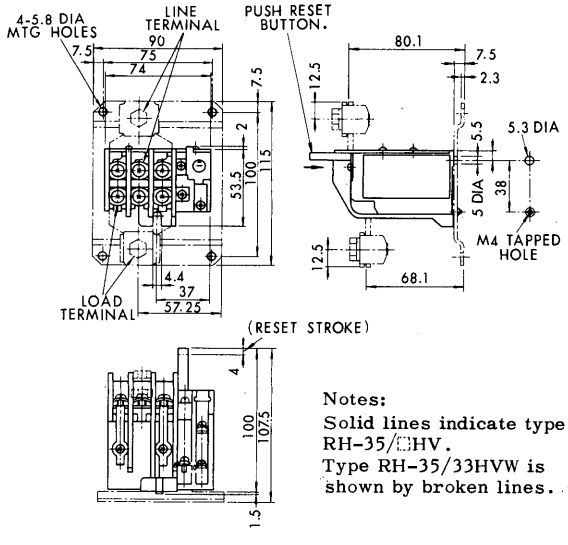
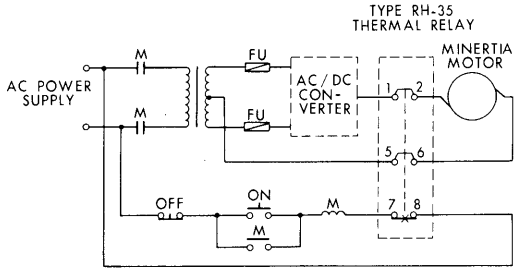
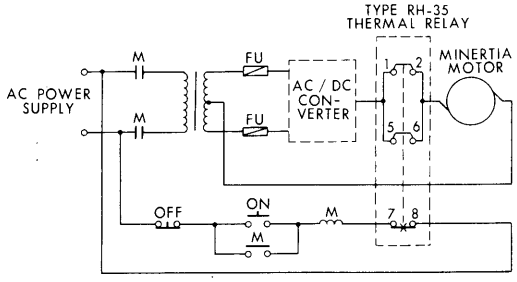


Fig. 2 Dimension Diagram of Thermal Relay Type RH-35 (mm)

GENERAL (Cont'd)



(a) Type RH-35 / ☐HV



(b) Type RH-35 / 53 HVW

Fig.3 Connection Diagram of Thermal Relay Type RH-35

Approximate Temperature Rise

Approximate armature temperature rise of Minertia Motor can be estimated by the measurement of the commutator surface temperature with a thermocouple immediately after Minertia Motor has stopped. The temperature of the commutator surface is approximately 25°C (77°F) lower than that of the armature winding, slightly depending upon the motor type.

Time Constant

Where the armature resistance of DC motor is R_a (Ω), armature inductance, L (H), inertia moment, J_M (g·cm·sec^2 or lb·in·sec^2), induced voltage constant, K_E (V·sec/rad) and torque constant, K_T (g.cm/A or lb·in/A), time constant is calculated as follows:

· Mechanical time constant $= \dfrac{J_M \cdot R_a}{K_E \cdot K_T}$ (sec)

· Electrical time constant $= \dfrac{L}{R_a}$ (sec)

The flywheel effect GD^2 (or WK^2) is expressed as follows:

GD^2 (or WK^2) = 4gJ

Where J: moment of inertia
g: acceleration of gravity

In calculating response time of a servo system employing Minertia Motor, the mechanical time constant and electrical time constant should be calculated and corrected, considering the effects of the load inertia and impedance of power supply circuit.

For converting the inertia of load with respect to Minertia Motor shaft, calculation should be made as follows:

1. Where the speed of Minertia Motor is n rpm, and the speed of load is N rpm:

   GD^2 (kg·cm^2) or WK^2 (lb·in^2)

   reflected in Minertia = $\left(\dfrac{N}{n}\right)^2 \times$
   Motor shaft
   load GD^2 (kg·cm^2) or WK^2 (lb·in^2)

2. Where the load weighing W (kg or lb) is put into linear movement at speed V (m/sec or ft/sec) when the Minertia Motor is at n rpm:

   GD^2 (kg·cm^2) or WK^2 (lb·in^2)

   reflected in Minertia = $365^2 \times \left(\dfrac{N}{n}\right)^2 \cdot W$
   Motor shaft

Coupling to Load

Tachometer generator or couplings to be mounted on Minertia Motor shaft should have the lowest inertia. They should be rigid in construction as build-up of output torque in Minertia Motor is extremely rapid.

End play of the coupling assembly must be small at the coupled part. The sleeve type solid couplings are more suitable than the flexible couplings.

AS FOR TRANSMISSION MECHANISM, A GEAR TRAIN WITH LITTLE BACKLASH IS RECOMMENDED. The gears located close to Minertia Motor shaft must have a low inertia construction. On the other hand, the backlash of gears nearer to the load must be as small as possible. The most suitable reduction ratio of transmission mechanism can be obtained when inertia of load reflected in Minertia Motor shaft is almost equal to that of Minertia Motor itself.

Minertia Motor has double shaft extension but the shaft extension at the opposite drive end is only for mounting a tachometer generator.

Be sure to avoid driving load on this shaft end.

As build-up of output torque of Minertia Motor is extremely rapid, a 1/10 tapered shaft end is adopted as standard. When the shaft end is connected to the load, be sure to drive a pin into nut, or use adequate adhesive agent for preventing nut from getting loose. Recommended adhesive is "NUTLOCK®" from Locktite Corp. (Hartford, Conn., U.S.A.).

The basic dimensions of Minertia Motor conform to the Standard of Japan Machine Tool Industry Association.

The shaft end configuration of Minertia Motors sold in the United States is different from the above tapered type. A straight shaft end with a double key configuration is adopted for these motors. For details, refer to the Catalog.

Mounting of Detector

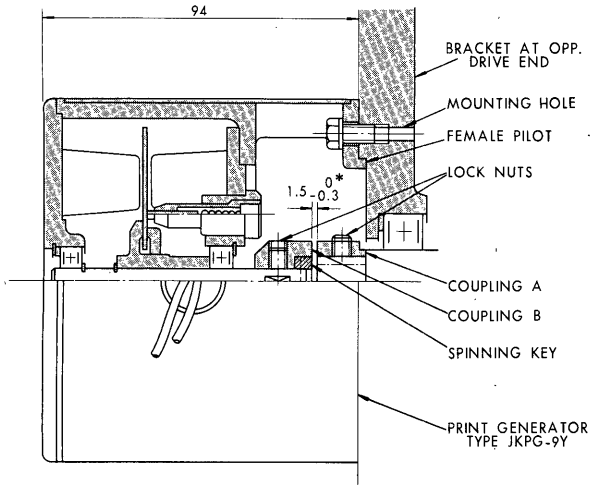
In case a tachometer generator or other detector like a resolver is installed on opposite drive end, use the female pilot and tapped mounting holes.

When the shaft end cover at opposite drive end is removed, the female pilot will appear. As two

mounting bearings are provided on opposite drive end, utilize them for mounting the coupling. WHEN INSTALLING A DETECTOR AT OPPOSITE DRIVE END, ATTENTION MUST BE PAID TO THE FOLLOWING: DUE TO THE DIFFERENCE IN MATERIALS OF STATOR AND ROTOR AS WELL AS DIFFERENCE IN WORKING TEMPERATURE, THE SHAFT EXPANDS AND SLIDES OUTWARD APPROXIMATELY 1MM (0.04IN) AT MAXIMUM; THEREFORE, PROVIDE A CLEARANCE FOR THE ESCAPE. If not, a big thrust force will be imposed on the detector, resulting in serious accidents.

Be sure to apply adhesive agent on setscrews of the coupling to prevent the screws from loosening.

For tachometer generator, Yaskawa Type JKPG-9Y PRINT GENERATOR (output voltage 6.5V/1000rpm) is recommended. With additional coupling it can be installed very easily on Minertia Motor shaft (Refer to **Fig. 4** for details.).



Notes: 1. Apply LOCKTIGHT (retaining compound) to the inside diameter of coupling and setscrews, using a LOCK-QUICK PRIMER together. Cure time is 6 hours.
2. Apply grease to the engaging part of the coupling.
3. The gap of the asterisked value should be kept.

Fig.4 Installation of Print Generator (dimensions mm)

Installation of Oil Seal

In order to protect Minertia Motor against penetration of oil from gear box, oil seal is necessary. However, when oil seal is installed, the minimum starting current will be increased, resulting in lowering the performance of a servomotor. Therefore, Yaskawa has developed an oil seal designed specially for Minertia Motor.

It is desirable to replace the seal every 5000 operating hours, while the life of oil seal differs with operating conditions.

Even if oil seal is fitted, be sure not to allow the oil level in a bath to come up near the center of the shaft.

When Minertia Motor with oil seal is operated just for testing, be sure to operate the motor, oiling the oil seal part.

Cooling Fan and Cooling Air Volume

Minertia Motors type UGMMKR-2AAA1 are of an externally ventilated type and provided with a cooling fan assembly. As cooling fan motor, a three-phase induction motor is used. **Table 3** shows the cooling air volume and air pressure obtained by the fan. Be sure to put an interlock so that Minertia Motor will stop when the fan motor stops.

In case other cooling methods are adopted, the minimum cooling air volume must be higher than the value shown in Table 3. And, provide an air filter to prevent entry of moisture, dirt and dust into the motor.

Table 3 Specifications of Cooling Fan

Type of Minertia Motor			UGMMKR-2AAA1
Fan	Air volume m^3/min (CFM)	50Hz	3.5 (124)
		60Hz	4.2 (148)
	Air pressure mm Aq (in)		35 (1.4)
Fan Motor	Output		100W
	Voltage, frequency		200V 50/60Hz
	Speed		3000/3600rpm

Cautions for Machining Minertia Motor

When machining Minertia Motor, special care must be taken. Avoid unnecessary machining. The frame yoke of Minertia Motor is part of the magnetic circuit. If the frame is cut carelessly, magnetic characteristics may be disturbed. The shaft is made of stainless steel and when machined, it may be bent. Even a small bending of shaft will result in commutator eccentricity and poor commutation. Furthermore, bending causes the fatigue of the shaft during repeated operation. Entry of machining chips into Minertia Motor may damage the rotor.

Protection Against Oil Drops

Minertia Motor must be protected from oil drops. If oil drops stick to the rotor surface together with brush particles, rotor burnout may occur. Oil sticking to the commutator surface will cause the roughening of commutator and poor commutation.

When the eyebolt is removed, stop up the hole by screwing a bolt, to prevent entry of oil.
When Minertia Motor is installed at a place where it will be exposed to splashes of oil, provide the motor with a cover so that oil will not drip directly on the motor.

INSTALLATION AND TEST RUN

Minertia Motor Standard Series are flange-mounted construction.

Installation and Wiring

Minertia Motors should be installed in a clean, dry place not exceeding 40°C (104°F) which has easy accessibility for inspection and maintenance. The motors should be mounted on rigid and solid foundations free from vibration. After final alignment, eccentricity of the drive and driven shafts should be less than 0.05mm (0.002in).

Wiring should be performed according to the connection diagram provided, using wires of adequate size, with terminal connections secured tightly.

When using externally-ventilated Minertia Motor under most adverse atmospheric conditions and operating it from rectified source, put a transformer in the line and insulate secondary side of transformer.

Inspection after Installation

Before test run, see that:

. Bolts and nuts are tight.
. Commutator surface is not damaged and maintains intimate contact with brushes.
. Brush rocker is correctly mounted (indicated by blue I-mark).
. Motor shaft rotates smoothly.
. Insulation resistance of armature winding is maintained at proper value (not less than 1 MΩ per 100V).
. Direction of rotation of ventilation fan is correct. To check, remove a cap mounted at opposite drive end.

Test Run

At test run, check commutation, vibration of Minertia Motor, and vibration which comes from the unbalanced driven machine or from misalignment with the driven machine. Should vibration from the driven machine be large, it will lead to poor commutation and may burn the motor.

Minertia Motor may be overloaded at test run since the driven machine is not run in yet and the motor may be subject to large friction torque. When the thermal relay trips, investigate the cause.

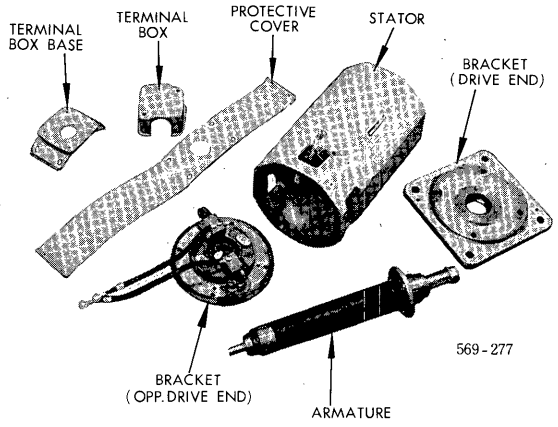
MAINTENANCE

Minertia Motor requires less maintenance, compared with other DC motors, but it is advisable to conduct a periodical inspection once every 500 to 700 operating hours according to the inspection sechdule, **Table 4**. During the initial installation, more frequent inspection is recommended. Inspection schedule is given in Table 4. **Fig. 5** shows construction of Minertia Motor.

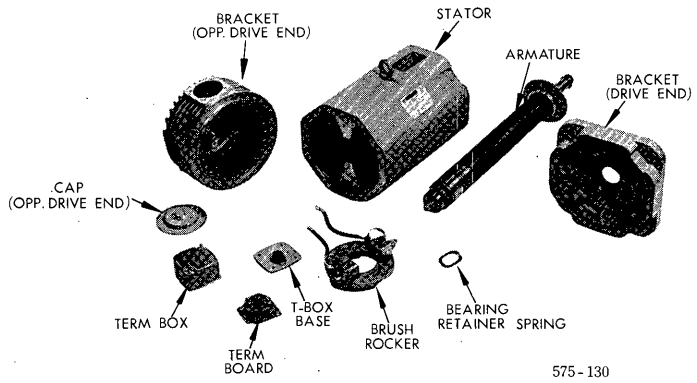
To inspect, remove the protective cover only. Do not disassemble the whole motor if not necessary. During inspection, protect the motor against entry of dirt.

Table 4 Inspection Schedule

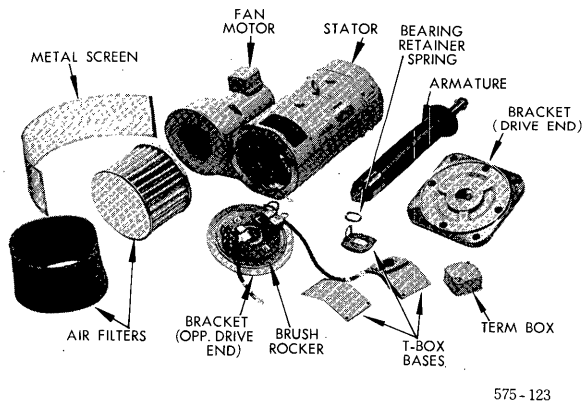
	What to check
With motor at rest	· Any loose bolt · Injury to any part of the motor · Injured or loose transmission · Contamination of any part with dust or oil · Any loose terminal or connection · Neutral position of brush rocker · Degree of brush wear · Any injury to brush · Roughened, soiled, discolored, or deformed commutator surface · High mica · Insulation resistance
With motor running	· Sparking at brushes · Brush chattering, vibration of brush holders · Peak voltage and peak current · Measurement of RMS value of armature current with AC ammeter · Vibration or thrust load from driven machine · Abnormal noise · Decreased air volume due to clogging of air filter with dust



(a) Type UGMMEM-06AA1, -13AA1



(b) Type UGMMEM-25AA1 thru -1AAA1



(c) Type UGMMKR-2AAA1

Fig. 5 Construction of Minertia Motor

Maintenance of Commutator

If operated in favorable environment, Minertia Motor will have few commutation troubles since its commutating ability is far better, compared with other DC motors.

However, under adverse atmospheric conditions —excessive humidity, presence of gases such as ammonia, chlorine gas or sulfurous gas, the motor will have appreciable sparking. Vibration due to misalignment of the motor will also affect commutation.

Where the motor is subject to extremely adverse atmospheres or great vibration, as in application for an edge-a-liner in a steel mill, it is advisable to check commutation every two weeks.

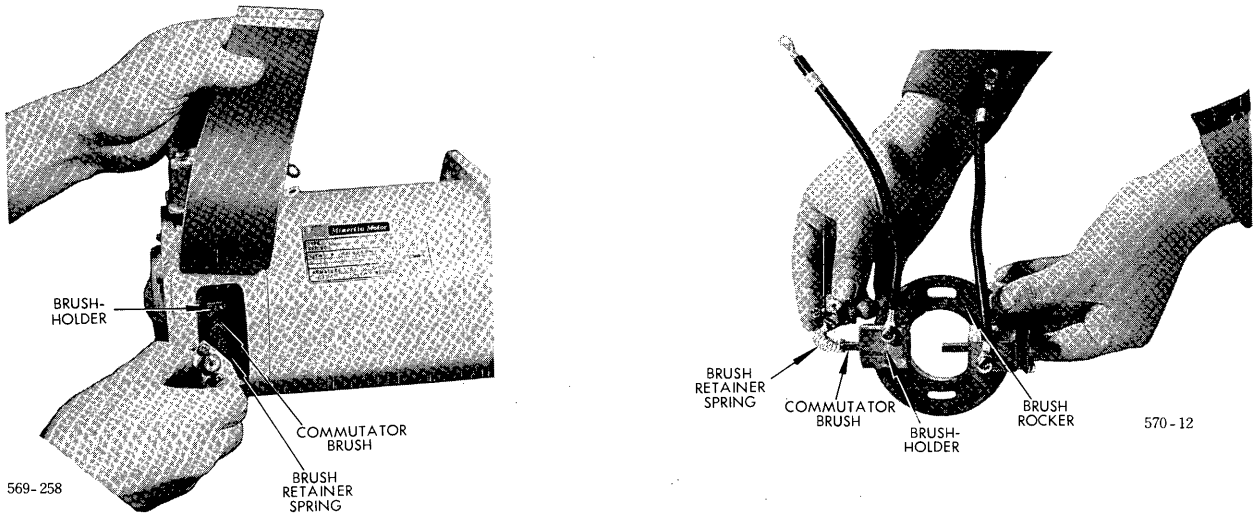
Poor commutation may cause excessive sparking or blackening of the commutator surface. Before it becomes blackened over a half of its surface, the commutator should be ground with a bedding stone as follows: remove the coupling connecting Minertia Motor to the driven machine, and grind, through the inspection window, with a bedding stone (BS 24 from Morganite Carbon) the whole surface of the commutator. Wipe the commutator surface with a dry cloth, then blow compressed air against the surface to remove brush particles and dust. See additional figure on last page.

When the commutator surface is grooved and has high mica, take out the rotor by following the procedure described in DISASSEMBLY and resurface the commutator. Then undercut mica between commutator segments about 1-1.5mm (about 0.05 in) with a hacksaw blade, and chamfer the edges of the segments. When reassembled, clean up the commutator section thoroughly.

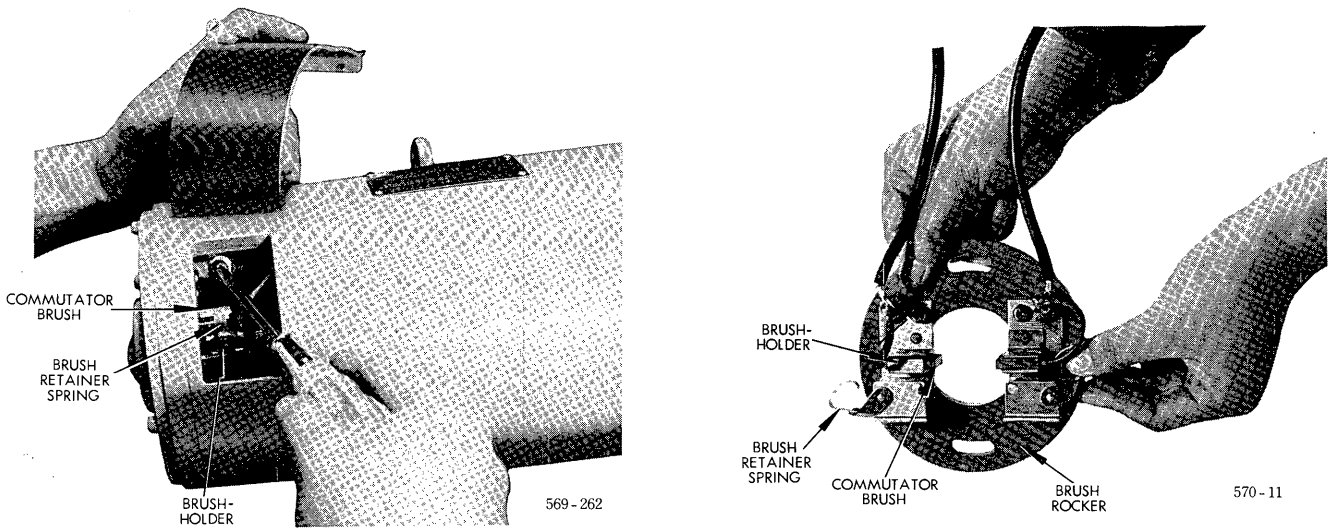
Inspection of Brushes

The commutator brushes wear 1-2mm (0.04-0.08 in) per 1000 operating hours, but under unfavorable conditions, the rate of wear is two to three times the normal rate. The brush should be replaced with a new one when its length has decreased to 13mm (1/2 in). Spare brushes should be kept in stock ready for use.

As shown in **Fig. 6** , brushes can easily be taken out without removing the brush rocker. Clean up the brushholders after removing the brushes. As the spring tension does not change until brushes wear to 13mm (1/2 in), no adjustment is necessary. For replacement, brush grade given in **Table 5** is recommended.



(a) Type UGMMEM-06AA1, -13AA1



(b) Type UGMMEM-25AA1 thru UGMMKR-2AAA1

Fig.6 How to take out Brushes

Table 5 Commutator Brushes for Minertia Motor

Motor Type	Brush			
	Drawing No.	Size mm	Material	Q'ty
UGMMEM-06AA1	DP6404699-1	4 × 12.5 × 22	MH-372	2
UGMMEM-13AA1	DP6404699-1	4 × 12.5 × 22		
UGMMEM-25AA1	DP6404714-1	5 × 25 × 25		
UGMMEM-50AA1	DP6404714-4	6 × 20 × 25	MG9RB-O	
UGMMEM-1AAA1	DP6404714-3	10 × 20 × 25		
UGMMKR-2AAA1	DP6402438-9	16 × 20 × 25	TD-550	4

After Replacement of Brushes

As the sliding surface of spare brushes is already rounded according to the commutator surface before shipped, bedding is unnecessary. After replacing a brush, grind the entire commutator surface evenly with a bedding stone. Wipe the commutator surface with a dry cloth and blow off brush dust and other dirt with dry compressed air.

Cleaning of Air Filter

Everlight Scott Filter

Clean Everlight Scott Filter once every two weeks.

The filter can be taken out by removing the pin fixing the outer metal screen **Figs.7** and **8**. To clean, dip and wash the filter in a solution of detergent, and rinse in clean water and dry it.

Vinyl Sponge Filter

Clean Vinyl Sponge Filter once a month.

The filter can be taken out easily by removing the mounting bolts on fan casing, **Figs. 9** and **10**. To clean, dip the filter in a solution of detergent for a while and wash out dirt, then rinse it in clean water. The filter will be deformed at temperature 80°C (216°F) or more, so care should be taken in heat drying. Both Everlight Scott Filter and Vinyl Sponge Filter are not affected by detergents.

Bearing

Since Minertia Motor utilizes double-shielded ball bearings, long running life can be obtained without regreasing. **Table 6** shows the bearings used in Minertia Motor.

Avoid subjecting Minertia Motor to excessive thrust or radial load. Allowable thrust load is shown in **Table 7**. Values of allowable thrust load given under I in Table 7 are based on operation of Minertia Motor at rated speed and rated torque, where thrust load is generated by, and varies in proportion to, motor torque. The maximum allowable momentary load, therefore, will be ten times these values. Values of allowable thrust load given under II in Table 7 are based on operation of Minertia Motor at rated speed, where thrust load is applied statically to the motor regardless of the motor output torque.

The values under I and II are calculated inclusive of the radial load component fully developed by the motor output torque. Allowable equivalent radial/thrust load III is the value permissible at rated speed when pure radial or thrust load is only applied to motor shaft irrespective of the motor output torque.

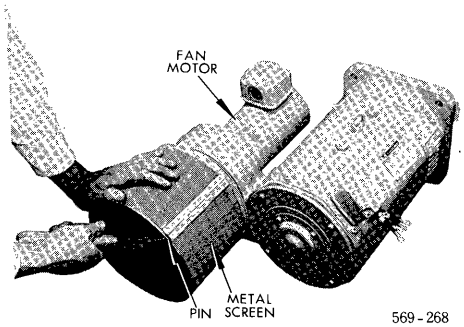


Fig. 7 Removal of Metal Screen

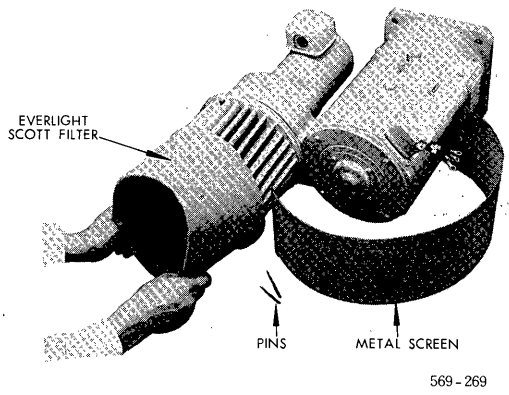


Fig. 8 Removal of Everlight Scott Filter

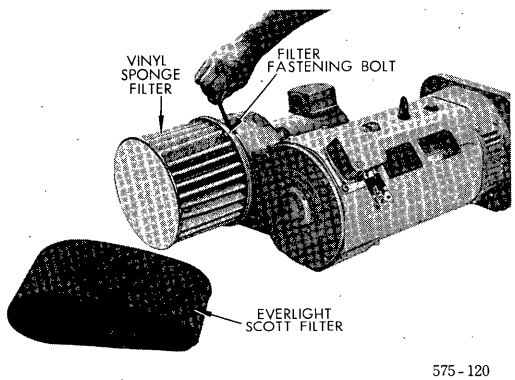


Fig. 9 Removal of Filter Fastening Bolt

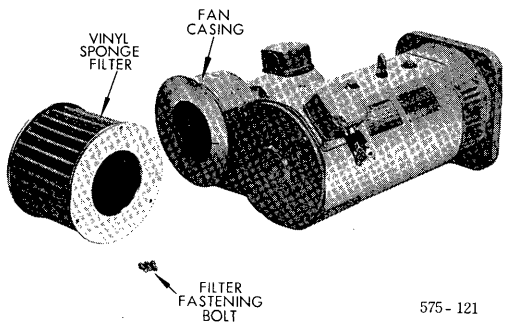


Fig. 10 Removal of Vinyl Sponge Filter

When bearings are replaced, contact the manufacturer or overseas sales office, because

1. Grease of special grade is used in Minertia Motor bearings,
2. Other additional parts (collar or flinger) should be changed together with the bearings,
3. Magnets, if permanent type, should be demagnetized before taking out the rotor.

Table6 Bearings of Minertia Mator

Motor Type	Bearing No.		I.D. of Bearing at Drive End mm (in.)
	Drive End	Opp. Drive End	
UGMMEM-06AA1	6002ZZ	6000ZZ	15 (.59)
UGMMEM-13AA1	6003ZZ	6000ZZ	17 (.67)
UGMMEM-25AA1	6004ZZ	6001ZZ	20 (.79)
UGMMEM-50AA1	6205ZZ	6203ZZ	25 (.99)
UGMMEM-1AAA1	6206ZZ	6204ZZ	30 (1.18)
UGMMKR-2AAA1	6207ZZ	6005ZZ	35 (1.38)

Table 7 Allowable Thrust Load and Radial Load

Motor Type	Speed rpm	Allowable Thrust Load kg (lb)		Allowable Equivalent Radial / Thrust Load kg (lb)
		I	II	III
UGMMEM-06AA1	3000	5 (11)	10	25 (55)
UGMMEM-13AA1	3000	5 (11)	10	25 (55)
UGMMEM-25AA1	3000	7.5 (16.5)	15	45 (100)
UGMMEM-50AA1	3000	11 (24)	22	65 (145)
UGMMEM-1AAA1	3000	14 (31)	28	90 (200)
UGMMKR-2AAA1	3000	15 (33)	30	120 (265)

DISASSEMBLY

Avoid unnecessary disassembly of Minertia Motor, especially of a permanent magnet field type (UGMMEM-06AA1 through -25AA1). When disassembling a wound-field type UGMMEM Minertia Motor (UGMMEM-50AA1 through-2AAA1), proceed as follows. Disassembly should be made in a place free from dust, especially from iron particles.

Removal of Armature

1. Release the brush springs and remove brushes from the holders.
2. Loosen four bracket screws "A".
3. Hit the shaft end C lightly with a rubber hammer or a mallet in the arrow direction.
4. Take out the armature assembly, taking care not to scratch the armature surface.
5. Be sure that bearing washer is not lost.
6. Unscrew "B", and detach the armature from the bracket "A".
7. Before removing the bracket "C" from stator frame, mark them to insure correct reassembly.
8. The disassembled armature should be handled with care and placed on a cardboard or cloth (not directly on the floor).

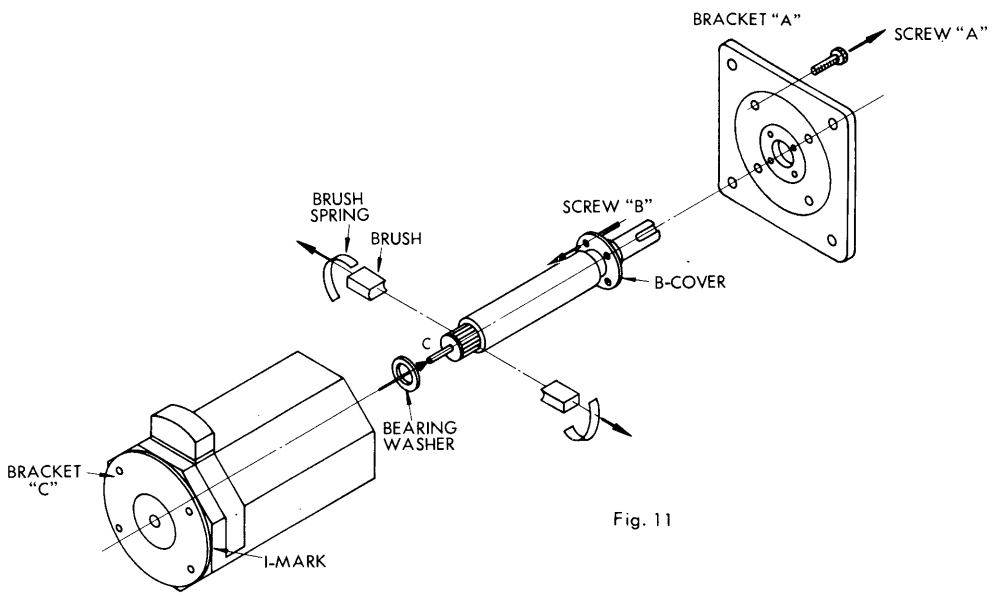


Fig. 11

Reassembly

Before reassembly, clean thoroughly the inside of the motor, and make sure that the field magnets are free from iron particles.

Reassembly of the parts is primarily a matter of reversing the disassembly procedure.

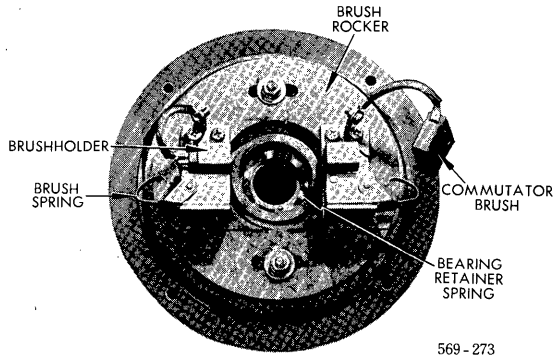


Fig. 12 OPP.-DRIVE-END BRACKET of Type UGMMKR-2AAA1

SPARE PARTS

Following spare parts are available from our stock. In ordering, address to:

Yaskawa Electric Mfg. Co., Ltd.
Overseas Division
Ohtemachi, Bldg. Chiyoda-ku, Tokyo, 100 Japan
Telex: 222-2273
Cable Address: YASKAWAMOTOR TOKYO
Telephone: Tokyo (03) 217-4111

Brushes

When ordering, give motor type, brush dwg. no., size and quantity required (See Table 5).

Thermal Relay Type RH-35

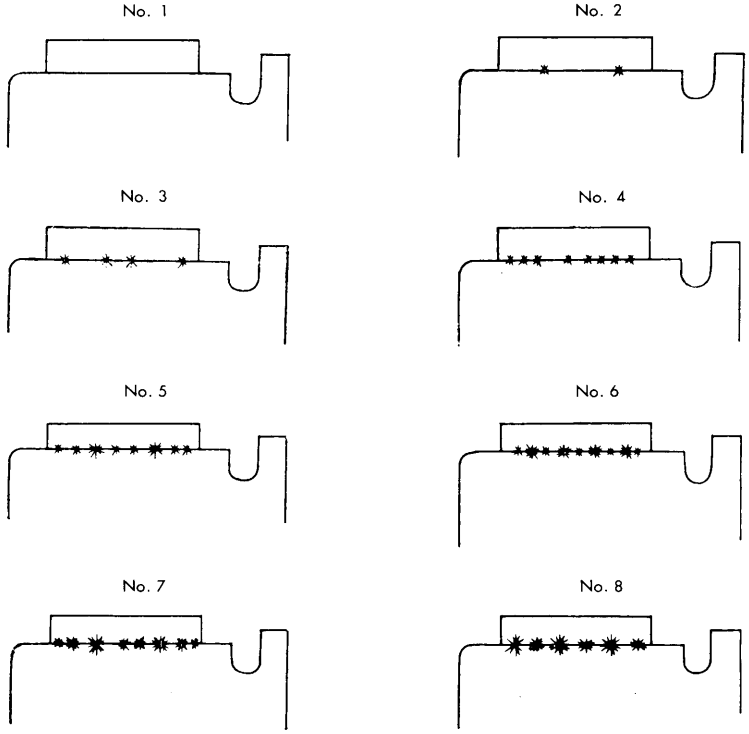
When ordering, give motor type, relay rated current, and quantity required (See Table 2).

Everlight Scott Filter/Vinyl Sponge Filter

When ordering, give motor type and quantity of everlight scott filter and/or vinyl sponge filter (See Figs. 8 and 10).

＜FOR REFERENCE＞

Sparking*



* Extent of Sparking, Specified in JEC (Japan Electrotechnical Committee Standard) 54

Notes: 1. Sparking up to No. 4 is not injurious and does not bring any practical damage.
2. This classification is based upon visual inspection.

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Printed in Japan 71-4 1K ②