

- Motor should be handled, installed, and maintained by trained technicians. Carefully read the maintenance manual before use.
- A copy of this maintenance manual should be sent to the actual user.
- This maintenance manual should be maintained by the user.

This maintenance manual is common for motor products and motor units of a gearmotor (except ASTERO).
See the maintenance manual of each model for handling the drive.

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CAUTION

- Unpack the unit after verifying that it is positioned right side up; otherwise, it may result in injury.
- Verify that the unit received is in fact the one you ordered. Installing the wrong unit may result in personal injury or equipment damage.
- Do not remove the nameplate.

Verify the items listed below upon receiving the product. If a nonconformity or problem is found, please contact with your nearest agent, distributor, or sales office.

- [1] Does the information on the nameplate conform to what you ordered?
- [2] Was any part broken during transport?
- [3] Are all bolts and nuts tightened firmly?

This is the manual only for the motor unit.
See the maintenance manual of each model for handling the reducer part.

1-1 Reading the Nameplates

Representative examples of a nameplate are shown below. Please observe them by type.
When contacting the company, please provide [1]. Gearmotor or reducer nomenclature, [2]. Reduction ratio, and [3]. Serial number.

(1) Nameplate of a motor

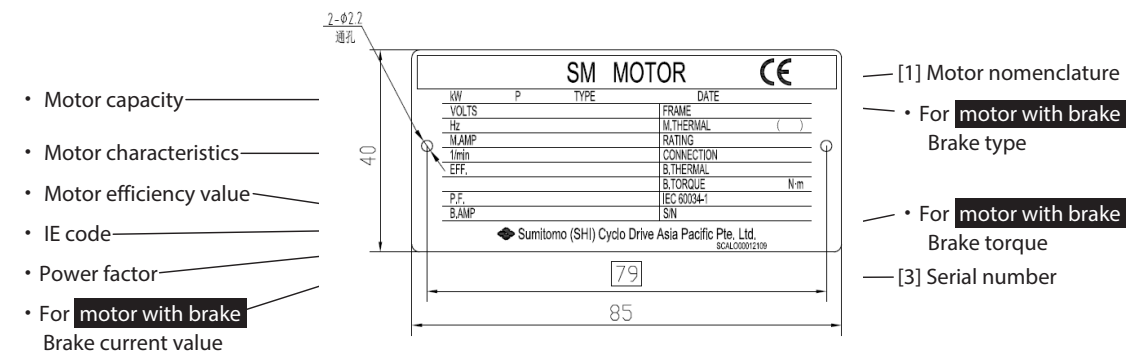


Figure 1-1 SMmotor nameplate

2. Nomenclature

1-2 Motor Nomenclature

Symbol meanings are shown below. Please confirm that the nomenclature matches the order.

Motor Power					
Symbol	Power	Symbol	Power	Symbol	Power
01	0.1kW	55	5.5kW	G1	110kW
02	0.18kW	75	7.5kW	G2	110kW (S)
03	0.25kW	A1	11kW (S)	G3	132kW
04	0.37kW	A2	11kW	G6	160kW
05	0.55kW	A5	15kW	H0	200kW
07	0.75kW	A8	18.5kW	H2	220kW
11	1.1kW	B2	22kW	H5	250kW
15	1.5kW	C0	30kW	H8	280kW
2X	2.2kW (S)	C7	37kW	J1	315kW
22	2.2kW	D5	45kW	J5	355kW
30	3.0kW	EX	55kW (S)	K0	400kW
37	3.7kW	E5	55kW	K5	450kW
4X	4.0kW (S)	F7	75kW (S)		
40	4.0kW	F8	75kW		
5X	5.5kW (S)	F9	90kW		

Supply					
3-Phase			1-Phase		
Symbol	Supply	Symbol	Supply	Symbol	Supply
0	380-420V, 50Hz*	A	220/380V, 50Hz	S	220V, 50Hz
	440-460V, 60Hz*	B	230/400V, 50Hz	T	230V, 50Hz
1	380V, 50Hz	C	230/415V, 50Hz	U	240V, 50Hz
2	400V, 50Hz	D	240/415V, 50Hz	V	120/220V, 50Hz
3	415V, 50Hz	E	220/440V, 60Hz	W	220V, 60Hz
4	380V, 60Hz	F	220V, 60Hz		
5	440V, 60Hz	G	220V, 50Hz		
6	460V, 60Hz	H	230V, 50Hz		
7	480V, 60Hz	J	240V, 50Hz		

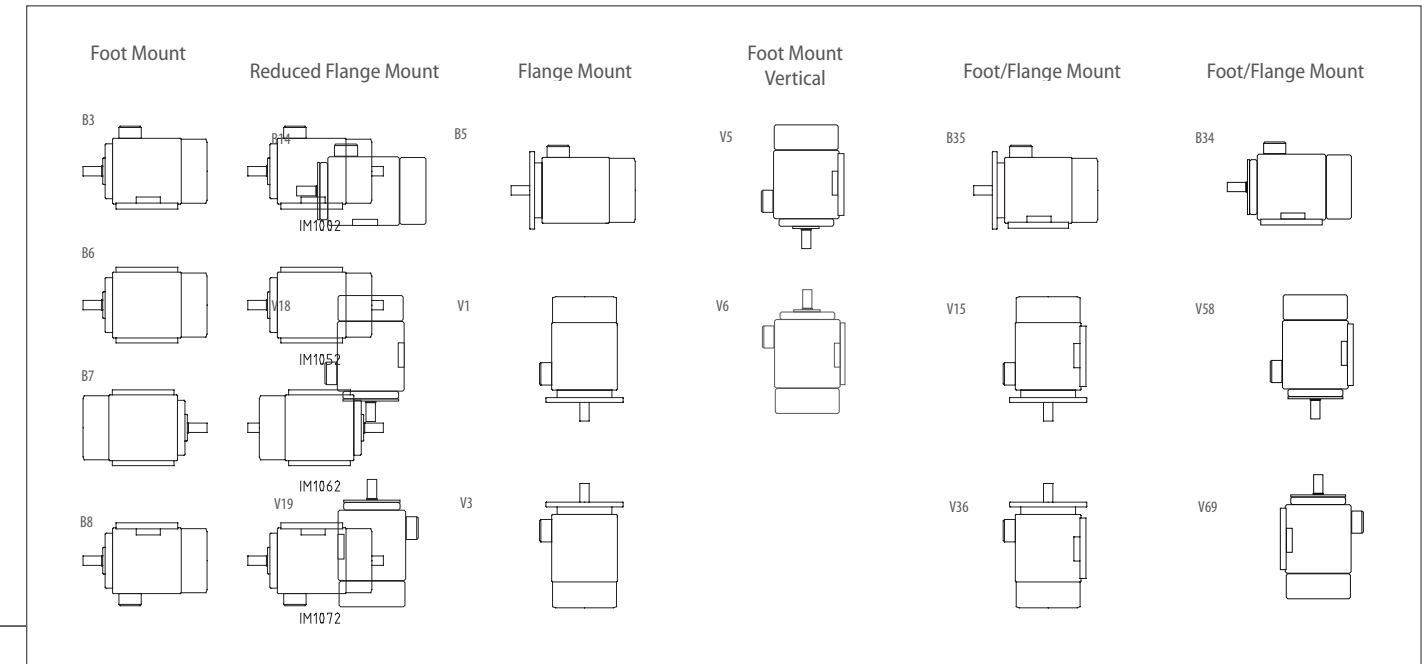
*Voltage range only applicable for IE2-IE4 motor. IE1 motor must follow specific voltage during order placement.

Ingress Protection Code			
Class F		Class H	
Symbol	Mounting	Symbol	Mounting
1	IP54	A	IP54
2	IP56	B	IP56
3	IP65	C	IP65
4	IP44	D	IP44
5	IP55*	E	IP55
6	IP66	F	IP66

Mounting					
Symbol	Mounting	Symbol	Mounting	Symbol	Mounting
1	V1	A	B6	G	V15
3	B3	B	B7	H	V36
4	B14	C	B8	J	V18
5	B5	D	V5	K	V19
7	B34	E	V6	L	V58
8	B35	F	V3	M	V69

Paint	
Symbol	Description
X*	Standard Sumitomo Blue 90micron
U	Australia Orange 90micron
A	C2
B	C3
C	C4
D	C5
E	Special Color - To be specified

MOUNTING ARRANGEMENTS (IEC60034-7)



Efficiency Class	
Symbol	Class
IE1	1
IE2	2
IE3	3
IE4	4
IE5	5

Poles			
Symbol	Poles	Symbol	Poles
2	2P	A	2/4P
4	4P	B	4/6P
6	6P	C	4/8P
8	8P	D	6/8P

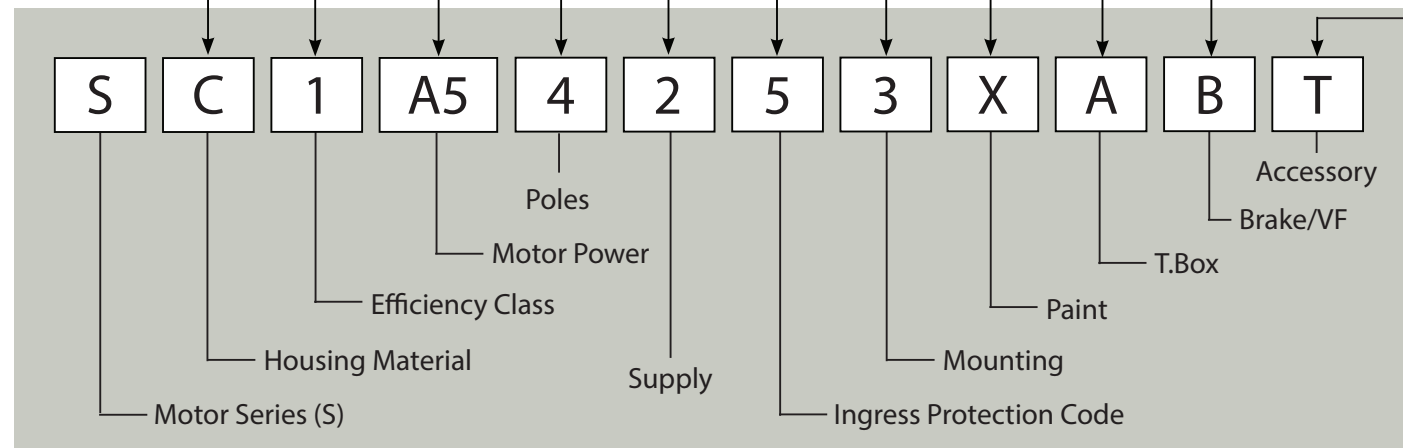
Housing Material	
Symbol	Material
C	Cast Iron
A	Aluminium

T.Box	
Symbol	Description
A	Left
B	Back
C	Front
D	Right*

Brake/VF	
Symbol	Description
X	N.A.
B	Brake (400V)
C	Brake (400V) + Inverter Duty
V	Inverter Duty
E	Brake (400V) + Manual Release
F	Brake (400V) + Manual Release + Inverter Duty
G	Brake (200V)
H	Brake (200V) + Inverter Duty

Accessory	
Symbol	Description
X	None**
T	Thermistor
S	Space Heater
U	Space Heater + Thermistor
E	Encoder
P	Backstop

Lead wire direction	Terminal box mounting position (as viewed from output shaft with motor being horizontal)	
	Top	
A		
B		
C		
D*		



* Default **11kW and above comes with thermistor by default

2. Nomenclature

3. Storage

If this product is not for immediate use, note the following points when storing it.

2-1 Storage Location

Store the product indoors in a clean and dry location.

Do not store the product outdoors. Store in a location that is free of moisture, dust, extreme temperature changes, corrosive gases, etc.

2-2 Storage Period

- The storage period of the product should not be more than one year.
 - Before the product is shipped from the factory, it is coated with rust preventive oil. Check the rust conditions to see if any rust is forming on the machined surface every six months after shipment. Reapply the rust prevention oil or any other rust prevention process if necessary.
- If it is necessary to use rust preventive oil that conforms to special specifications because the product is to be exported or stored for at least 1 year etc., please contact us.

2-3 Using after Storage

- Oil seals are affected by temperature, ultraviolet light and other ambient conditions and can easily degrade. After long storage periods, inspect before operation, and replace any degraded seals with new seals.
- Measure the insulation resistance of the motor (see P11) and check it.
- At startup, check that there are no unusual noises, vibrations, temperature rises, or other symptoms. For motor with brakes, check that brakes work properly. If any abnormalities are found, immediately contact the nearest authorized maintenance shop.

4. Transport

DANGER

- Do not step under a unit suspended by a crane or other lifting mechanism for transport; otherwise, injury or death may result.

CAUTION

- Be careful not to drop the unit.
When hanging bolts or holes are provided, be sure to use them. After attaching hanging tools to a unit, do not hoist the entire machine using the hanging bolts or holes; otherwise, personal injury or damage to the equipment and/ or lifting device may result due to falling of the machine or failure of hanging metal fitting.
- Before hoisting, refer to the nameplate, crate, outline drawing, catalog, etc. for the weight of the unit. Never hoist a unit that exceeds the rating of the crane or other mechanism being used to lift it; otherwise, personal injury or damage to the equipment and/or lifting device may result. There is a risk of the product dropping or toppling over, or of the hoisting attachment becoming damaged, resulting in possible injury or damage to the product.
- Use a suitable hoisting attachment, check that the eye bolts and nuts are not loose, and then hoist the product.

5. Installation

⚠ DANGER

- Do not use a standard unit in an explosive atmosphere. Under such conditions, an explosion proof motor should be used; otherwise, explosion, ignition, electric shock, or damage to the equipment may result.
- In the case of **explosion proof motor**, use a motor that has specifications that are appropriate for a dangerous location (a location where gas or volatile vapor is present); otherwise, explosion, ignition, electric shock, or damage to the equipment may result.
- Since the inverter itself is not explosion-proof, in the case of an When **a flameproof motor is driven by an inverter** install an inverter in a place free from explosive gas; otherwise, explosion, ignition, electric shock, or damage to the equipment may result.

⚠ CAUTION

- Do not use the products for purposes other than those shown on the nameplate or in the manufacturing specifications; otherwise, electric shock, personal injury, or damage to the equipment may result.
- Do not place flammable objects around the products; otherwise, fire may result.
- Do not place any object around the products that may hinder ventilation. Insufficient ventilation can cause excessive heat that may result in burns or fire.
- Do not step on or hang from the products; otherwise, personal injury, or damage to the equipment may result.
- Do not touch the shaft end of the products, inside keyways, or the edge of the cooling fan with bare hands; otherwise, injury may result.

4-1 Installation Location

Ambient temperature: -20°C to $+40^{\circ}\text{C}$

Ambient humidity: 85%RH or less with no condensation

Altitude: Maximum 1,000 m

Atmosphere: No corrosive or volatile gases, no steam
Dust-free, well-ventilated area.

Installation location: Indoor type: Indoors (area with minimal dust, no contact with water)

Outdoor type: Indoors or outdoors (areas where are got wet with common rainwater but not direct heavy wind and rain)

Waterproof type (Protection class IP65/Dust-tight, water jets protection type):

A structure that is not adversely affected by water jets from any direction.

It cannot be used in water or in environments where strong water jets are splashed (high-pressure cleaning) or cleaned with chemicals.

Waterproof type (Protection class IP67/Dust-tight, immersion protection type):

A structure that is submerged in water at the specified water depth and time and is not adversely affected even if water enters.

It cannot be used in an environment where a strong water jets are splashed (high-pressure cleaning) or cleaned with chemicals.

Vibration: Maximum 1G

- Mounting in conditions other than the above requires adherence to optional specifications. Please consult with us.
- Drives built to specifications, such as dust proof, can be used in the specified mounting environments. However, concerning the connector to the machine used, implement measures based on the mounting environment.
- Mount in a location that enables smooth operation, such as inspection and maintenance.
- Mount on a sufficiently rigid base.

4-2 Mounting Angle

There is no limit on a mounting angle.

However, do not use **Outdoor** and For **a motor with ESB brake** in a direction other than the ordered mounting direction.

For the gearmotor, the mounting angle differs depending on the specification of a drive, therefore, see the maintenance manual for each model.

Do not remove the motor's eye-bolt. When it is removed, insert a bolt or other appropriate material into the screw hole to prevent water or other substances from entering the motor through the screw hole.

6. Coupling with Other Machines

⚠ CAUTION

- Confirm the rotation direction before coupling the unit with the driven machine. Incorrect rotation direction may cause personal injury or damage to the equipment.
- When operating the product alone (uncoupled), remove the key that is temporarily attached to the output shaft; otherwise the key could fly off, and injury may result.
- Install a cover or other appropriate protection items over the rotating parts to prevent human contact; otherwise, injury may result.
- When coupling the product with another machine, check that the centering, the belt tension and parallelism of the pulleys are within the specified limits. When the unit is directly coupled with another machine, check that the direct coupling accuracy is within the specified limits. When a belt is used for coupling the unit with another machine, check the belt tension.
Correctly tighten bolts on the pulley and coupling before operation; otherwise there is a risk of injury due to scattering the broken pieces or of damage to the products.

5-1 Checking Rotational Direction

- If the wiring is carried out as indicated in P15 to 45, the motor shaft will rotate clockwise as seen from the anti-load side.
- To cause reverse rotation of a 3-phase power source motor, reverse R and T in the connection diagram on P15, P16, and P22-27.
- To cause reverse rotation of a single phase power source motor, see the connection diagram on P19-21 and P40-43.
- For a gearmotor, the rotation direction of a gearmotor output shaft may differ from that of a motor shaft, and see the maintenance manual of each model.

5-2 Mounting Connected Equipment

- When mounting Connector, do not apply impact or excessive axial load to the shaft. The bearing could be damaged, or the collar could come off.
- Shrinkage fit is recommend.

(1) When using a coupling

The alignment accuracy (A, B, X) in figure 5-1 should be no greater than that shown in Table 5-1.

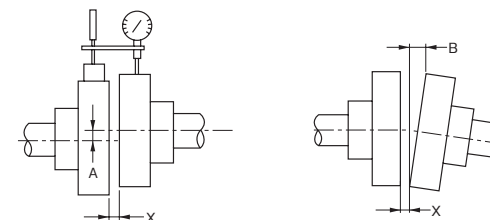


Figure 5-1

Table 5-1 Alignment Precision for Flexible Coupling

Allowable Dimensional Error for A	0.05mm or manufacturer-specified value
Allowable Dimensional Error for B	0.04mm or manufacturer-specified value
Dimension for X	manufacturer-specified value

Note) See the maintenance manual for each gearmotor for the alignment accuracy.

(2) When using chains, sprockets, or gears

- When using a chain, attach so that the chain tension angle is perpendicular to the shaft.
- Refer to the chain catalog or other reference for chain tension.
- The pitch circle of the sprocket and gear shall be more than three times of the shaft diameter.
- The working load point of the sprocket or gear should go from the center of the shaft to the motor. (See Figure 5-2)

(3) When using a V belt

- Over-tightening the V-belt will damage the shaft and bearing. Refer to the V-belt catalog or other reference for V belt tension.
- The parallelism, eccentricity β of the two pulleys should be within $20'$. (See Figure 5-3)
- When using multiple V-belts, use the same V-belts having the same circumferential length.

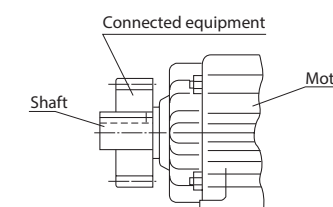


Figure 5-2

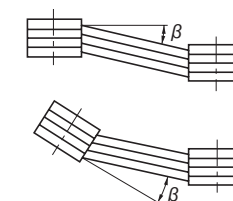


Figure 5-3

7. Operation

⚠ DANGER

- Do not approach or touch rotating parts (output shaft, etc.) during operation; otherwise loose clothing may become caught in these rotating parts and injury may result.
- When the power supply is interrupted, be sure to turn off the power switch. Unexpected resumption of power may cause electric shock, personal injury, or damage to the equipment.
- Do not operate the unit with the terminal box cover removed. Return the terminal box cover to the original position after maintenance, otherwise, electric shock may result.
- Do not operate the machine while the brake is released by the manual brake release bolt; otherwise, falling, going out of control, or damage to the equipment may result.
- Do not use a single phase power source motor for applications which provide more load than maximum torque of the motor. otherwise, reverse overdrive may result.
- To reverse a single phase power source motor other than a reversible motor, be sure to stop the motor then reverse it; otherwise, overdrive may result with the rotation direction unchanged.

⚠ CAUTION

- Do not put fingers or foreign objects into the opening of the motor or reducer; otherwise, electric shock, injury, fire, or damage to the equipment may result.
- The motor or reducer becomes very hot during operation. Be careful not to touch with hands or body. otherwise, burns may result.
- If any abnormality occurs during operation, stop operation immediately; otherwise, electric shock, personal injury, or fire may result.
- Do not operate the unit in excess of the load rating; otherwise, personal injury, or damage to the equipment may result.
- Do not touch the current-carrying part of a capacitor for starting a single phase motor until it is fully discharged; otherwise, electric shock may result.

7-1 Items to Check Before Operation

After installation and wiring are completed, check the following items before operating.

- Is the wiring correct?
- Is the unit properly coupled with the driven machine?
- Are mounting bolts tightened firmly?
- Is the direction of rotation as required?

After confirming these items, operate without a load and gradually apply a load. Check the items shown in Table 7-1.

7-2 Items to Check During Operation

Table 7-1 Items to Check During Operation

Does abnormal sound or vibration generated?	<ul style="list-style-type: none"> - Is the housing deformed because the installation surface is not flat? - Is insufficient rigidity of the installation base generating resonance? - Is the shaft center aligned with the driven machine? - Is the vibration of the driven machine transmitted to the gearmotor or reducer?
Is the surface temperature abnormally high?	<ul style="list-style-type: none"> - Does the voltage rise or drop substantial? - Is the ambient temperature too high? - Does the current flowing to the gearmotor exceed the rated current shown on the nameplate?

If any abnormalities are found, immediately stop operation and contact the nearest authorized maintenance shop.

8. Troubleshooting

If any abnormal condition occurs, refer to Table 9-1, 9-2 and promptly take appropriate measures.

If these actions do not remedy the issue, immediately contact the nearest authorized service station.

Table 9-1 Troubleshooting

Problem		Cause	Correction		
The motor will not operate under no load		Power failure	Contact the electric power company.		
		Defective electric circuit	Check the circuit.		
		Blown fuse	Replace the fuse.		
		Protective device is engaged	Fix the problem and recover.		
		Load locking	Check the load and safety device.		
		Poor switch contact	Adjust the contact unit.		
		Motor stator coil disconnect	Consult with authorized maintenance shop.		
		Bearing damage	Consult with authorized maintenance shop.		
		Defective governor switch (0.1 - 0.4kW single phase motor)	Consult with authorized maintenance shop.		
		Damaged capacitor (single phase motor)	Consult with authorized maintenance shop.		
		3-phase is functioning as single-phase	Check the power supply with a voltmeter. Check the motor, transformer coil, contactor, fuse, etc. and repair or replace them.		
		Friction surface of brake is corroded	Request brake cleaning from an authorized.		
	Incorrect brake gap adjustment	Re-adjust brake gap.			
The slow speed shaft turns with no load	When a load is applied	The switch overheats	Insufficient switch capacity Overload	Replace with a specified fuse. Decrease the load to the specified value.	
		Fuse tripping	Insufficient fuse capacity Overload	Replace with specified fuse. Decrease the load to the specified value.	
	The speed will not increase and the motor is overheating.		Voltage drop	Contact the electric power company.	
			Overload	Decrease the load to the specified value.	
			Lowered capacitor capacity range (single phase motor)	Consult with authorized maintenance shop.	
	It stops.		Short-circuited motor stator coil	Consult with authorized maintenance shop.	
			The key is not inserted	Insert key.	
			Bearing burnout	Consult with authorized maintenance shop.	
	The motor runs in the reverse direction.		Poor adjustment of protection device	Adjust the protection device.	
		Fuse tripping		Wiring error	Change the connection.
				The lead wire is short circuited.	Consult with authorized maintenance shop.
	Excessive temperature rise		Poor contact between motor and starter	Make good connection.	
		Overload	Decrease the load to the specified value.		
		Voltage drop or rise	Contact the electric power company.		
		The ambient temperature is high	Improve the ventilation method.		
		Damaged bearing	Consult with authorized maintenance shop.		

8. Troubleshooting

Table 9-2 Troubleshooting

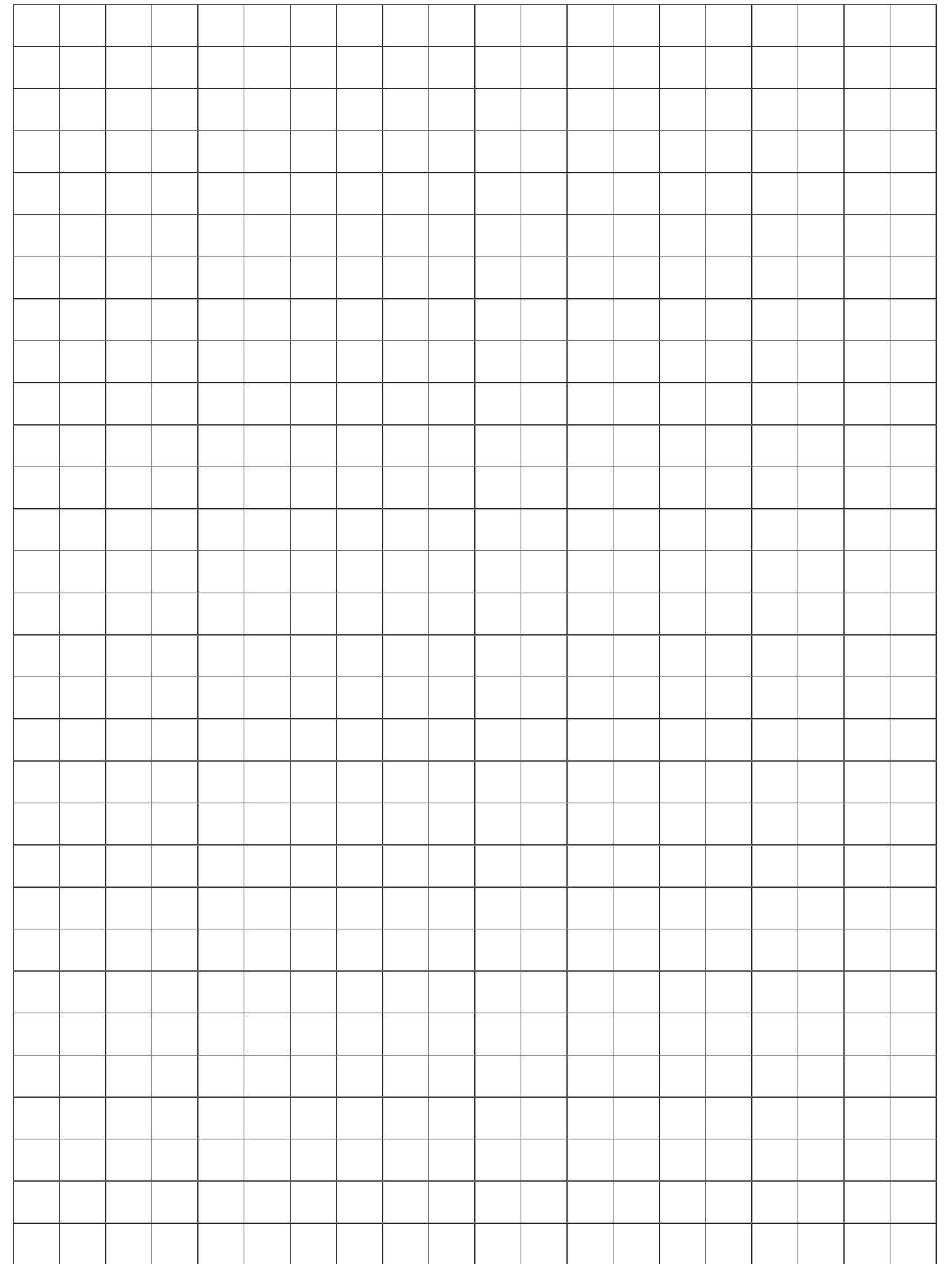
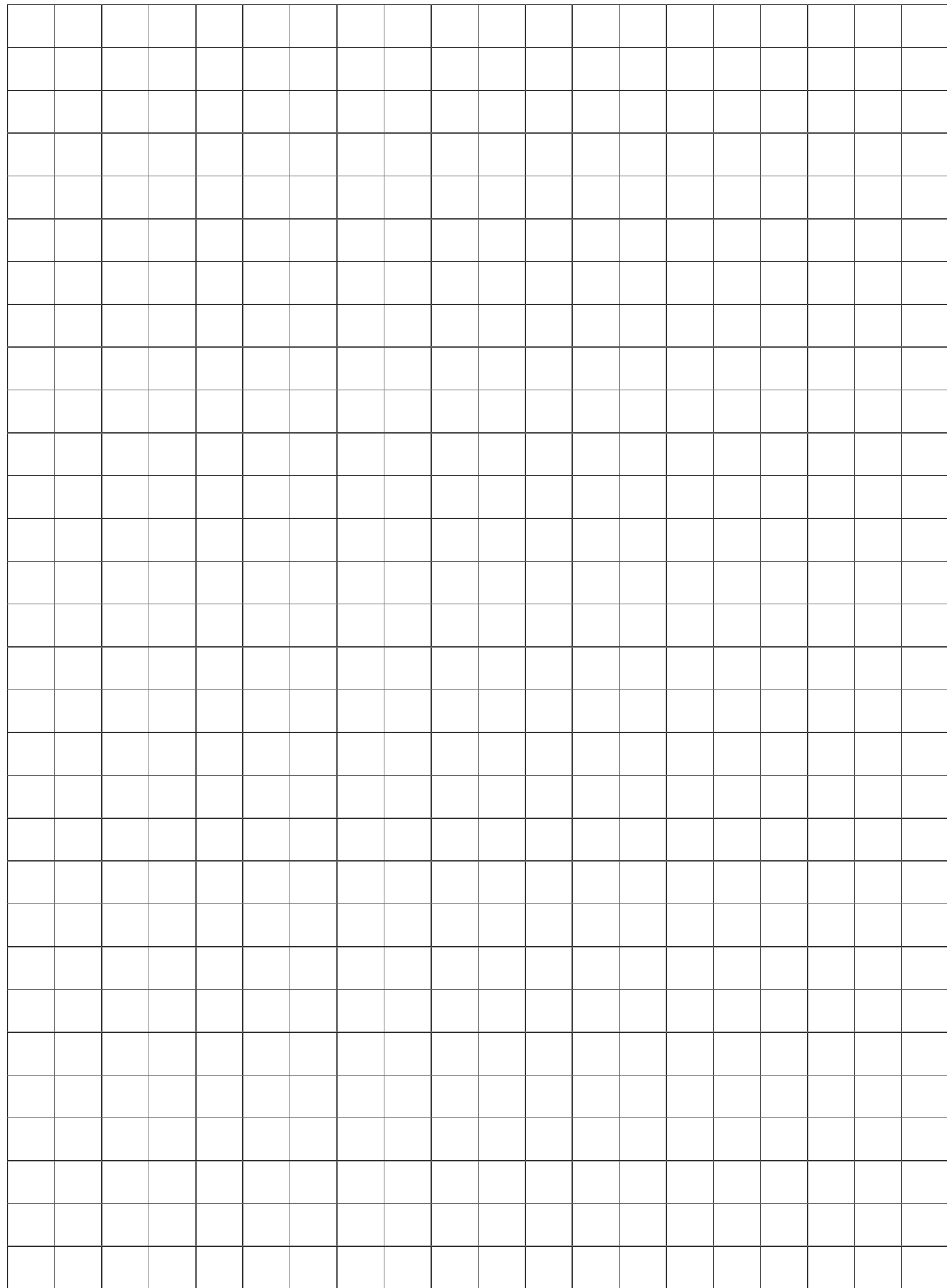
Problem		Cause	Correction	
Abnormal sound Excessive vibration		Dust and foreign matter in bearings, or damaged bearings	Consult with authorized maintenance shop.	
		Warping of cover or frame because the installation surface is not flat	Make the installation base flat or make adjustment by using liners, etc	
		Resonance due to insufficient rigidity of the installation base	Reinforce the installation base to increase rigidity.	
		Nonalignment of the center of axle with driven machine	Align the center of axle.	
		Transmission of vibration from the driven machine	Individually operate the product to check the source of the sound.	
Abnormal motor sounds		Foreign objects have entered	Consult with authorized maintenance shop.	
		Bearing damage	Consult with authorized maintenance shop.	
		Improper brake gap adjustment	Adjust the brake gap. (See P54 – 87)	
		Brake lining wear	Request brake lining replacement from an authorized maintenance shop.	
		Brake unit electromagnetic coil burnout	Consult with authorized maintenance shop.	
		Rectifier damage	Consult with authorized maintenance shop.	
		A leaf spring in the brake boss unit has come off or is damaged.	Consult with authorized maintenance shop.	
Brake is ineffective	Does not activate	Forgot to restore the brake release bolt to its original position	Restore the release bolt.	
		Improper adjustment after disassembly	Request authorized maintenance shop to re-adjust.	
	Slips (Braking takes a long time)	Not using the quick braking circuit	Change to quick braking circuit. (See P22 – 45)	
		Foreign objects in brake lining unit, oil adhesion	Request cleaning from authorized maintenance shop.	
		Brake lining wear	Adjust the brake gap. Request brake lining replacement from an authorized maintenance shop.	
		Brake gap not uniform	Adjust the brake gap.	
		Overload	Decrease the load to the specified value.	
		Brake release bolt not sufficiently restored	Restore the release bolt.	
	Tripping after	Overcurrent shut-off	Sudden speed changes	Increase the time for speed changes.
			Extreme load fluctuation	Decrease load fluctuation.
Overcurrent due to ground fault		Ground fault on output side	Take measures to prevent ground fault.	
Direct current overcurrent		Short on output side	Take measures to prevent short. Inspect wiring.	
Regenerative overvoltage shut-off		Sudden speed reduction	Increase the time for speed reduction. Decrease brake frequency.	
Thermal operation	Overload	Decrease the load to the specified value.		

9. Warranty

The scope of warranty of our delivered products is limited only to what we manufactured.

Warranty (period and description)

Warranty Period	The warranty period for the Products shall be earlier, 18 months after the shipment of the Products from the seller's works factory, or 12 months after starting operation, whichever is first.
Description	If the product failed within the warranty period, during which despite a proper mounting, connection and maintenance & administration are followed according to the maintenance manual, and the product is properly run based on the specification on the catalog or under conditions agreed separately, we will repair or provide an alternative product at our discretion for free of charge, except the exclusions below. However, as far as the product is connected with customers' other devices, we will not indemnify those expenses on dismounting from/mounting on the devices, etc. and other associated construction expenses, transportation expenses and opportunity loss and operation loss the customers suffered from, and other indirect damages.
Exclusion from the Warranty	The following items will be excluded from the warranty: 1. A breakdown resulting from defects in the mounting of the product and connection with other devices, etc. 2. A breakdown resulting from insufficient maintenance & administration and improper handling of the product, including a case that the product is not stored according to our defined storage manual. 3. A breakdown resulting from operation which does not fall within our specification and other operation conditions and use status we hardly can know or a failure caused by the use of lubricant which we do not recommended. 4. A breakdown resulting from defects in or special specification of devices, etc. connected by customers. 5. A breakdown resulting from disassembly, parts replacement, and modification conducted by the customer (excluding disassembly for inspection and adjustment of the brake gap, for manual release of the brake, and for other purposes guided in the maintenance manual). 6. A breakdown resulting from defects in parts supplied or specified by customers. 7. A breakdown caused by inevitable force including earthquake, fire, flood disaster, salt damage, gas damage, and lightning strike, etc. 8. Natural wear and tear, abrasion, and deterioration of such relevant consumable parts as a bearing and oil seal, etc. under normal usage. 9. A breakdown caused for reasons not attributable to each of the above item.



Regional Locations

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EMAIL sca.smph-enquiry@shi-g.com

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