Sumitomo Drive Technologies

ASTERO® Socket-type Speed Control Motor (CAH-type) Maintenance Manual

■The gear head and motor should be handled, installed and maintained by trained technicians. Carefully read this manual and all accompanying documents before use.
■A copy of this manual should be sent to the actual user of the gear unit.
■This manual should be maintained by the user.

1. Safety and other precautions

⚠CAUTION

General
- The gear head and motor should be operated only within its name plate and catalogue ; otherwise, electric shock, injury or damage to a system may occur.
- Keep hands and all foreign objects from the internal moving part of the gear unit and motor; otherwise, electric shock, injury, fire or damage to a system may occur.
- Damaged units should be taken off-line; otherwise, injury or fire may occur.
- Do not remove the nameplate.
- Any modifications or alterations of any kind, to the unit, will void the warranty and all subsequent claims.

Transport
- Exercise ample care not to drop the unit and fall during transport.

Installation
- Do not place any inflammables around the gear head and motor; otherwise, fire may result.
- Do not place any objects that will hinder ventilation around motor; otherwise, cooling effect is reduced, and may lead to a possible fire hazard and a burn due to excessive heat built-up.
- Do not touch the key way at the shaft end or on the inside of the dear unit and motor; otherwise, injury may result.
- When the unit is used in food processing applications vulnerable to oil contamination, install an oil pan or other such device to cope with rare oil leaking. Otherwise, oil leakage may damage products.

Coupling with other machines
- Install appropriate guard devices around rotation parts ; otherwise, injury may result.
- Confirm the direction of rotation before coupling the unit with its driven machine. Difference in the direction of rotation may cause injury or damage to the system.

Wiring
- Do not touch lead wire when measuring the insulation resistance. Electric shock may result.

⚠ DANGER

Wiring
- Connect a power cable to the motor according to the connection diagram or maintenance manual; otherwise, electric shock or fire may result.(Without terminal box, exercise insulation in the connecting part.)
- Do not forcibly curve, pull or clamp the power cable and lead wires; otherwise, electric shock may result.
- Correctly ground the grounding bolt; otherwise, electric shock may result.
- Use power source stated in the nameplate; otherwise, motor's burning or fire may result.

Operation
- Never approach or touch any rotating parts (shaft, etc.) during operation; otherwise, loose clothing caught in these rotation parts may result in severe injury.
- When the power supply is interrupted, be sure to turn off the power switch. Unexpected resumption of power may cause injury or damage to the equipment.

Daily inspection and maintenance
- Never approach or touch any rotating parts (shaft, etc.) during maintenance ; otherwise, loose clothing caught in these rotating parts may result in severe injury.

Inspection upon delivery
- Verify that the unit received is in fact the one ordered. When a different product is installed, injury or damage to the system may result.

2. Inspection upon delivery

- Confirm the contents of nameplates for motor type and capacitor.
- Gearhead and motor which have same model No.s and same heat treatment symbols can be combined.

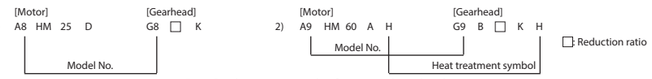


Fig.1 Combination example of motor and gearhead

Table 1. Combination table of motor type and capacitor

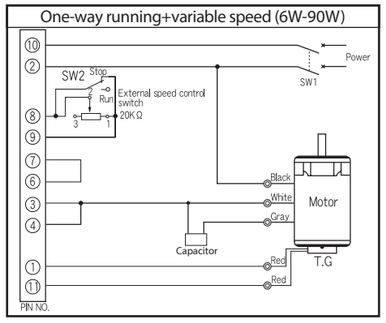
Capacitor		DMF-25255	DMF-25305	DMF-25505	DMF-25605	DMF-251006	DMF-251506	DMF-252006	DMF-252406	DMF-45704	DMF-45804
Speed Control	Induction	A6HM06A	-	A7HM15A	A8HM25A	A9HM40A	-	A9HM60AH	A9HM90AH	A6HM06C	-
										Reversible	
	Reversible	-	A6HR06A	-	A7HR15A	A8HR25A	A9HR40A	-	-	A6HR06D	A6HR06C
	W/Brake	-	A6HR06AB	-	A7HR15AB	A8HR25AB	A9HR40AB	-	-	A6HR06DB	A6HR06CB

Capacitor		DMF-45904	DMF-45125	DMF-45155	DMF-45205	DMF-45255	DMF-45305	DMF-45355	DMF-45405	DMF-45505	DMF-45705
Speed Control	Induction	A7HM15D	A7HM15C	A8HM25C	A9HM40D	A9HM40C	-	A9HM60DH	-	A9HM06CH	A9HM90CH
				A8HM25D						A9HM90DH	
	Reversible	-	A7HR15D	A7HR15C	A8HR25D	A8HR25C	A9HR40D	-	A9HR40C	-	-
	W/Brake	-	A7HR15DB	A7HR15CB	A8HR25DB	A8HR25CB	A9HR40DB	-	A9HR40CB	-	-

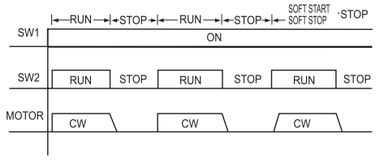
3. Wiring diagram

[1] Induction motor

One-way running+variable speed (6W-90W)

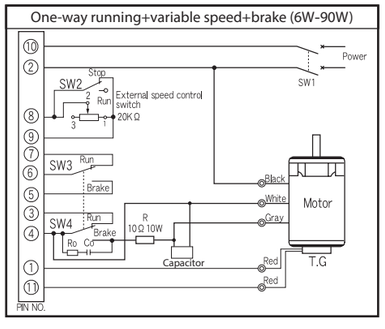


• Example of running operation

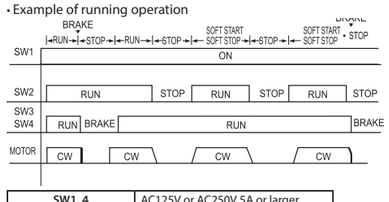


SW1	AC125V or AC250V 5A or larger
SW2	DC20V 10mA

One-way running+variable speed+brake (6W-90W)



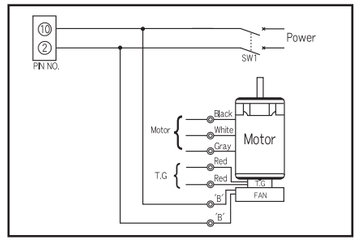
• Example of running operation



SW1, 4	AC125V or AC250V 5A or larger
SW2, 3	DC20V 10mA
CR circuit Ro, Co	Ro=10-200Ω (1/4W or larger) Co=0.1-0.2 μF (for AC125V or AC250V)
R:for brake outer resistance	10Ω, 10W or larger

Note: CR circuit is for the surge voltage protection.

■**Wiring for motors with fans (60W, 90W)**

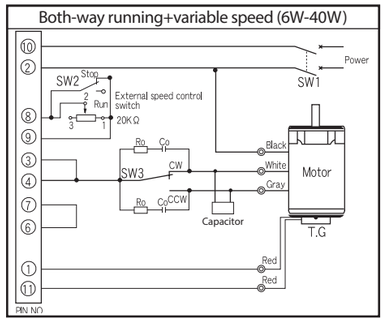


• Caution
For the connections of components other than the fan, see the relevant wiring diagrams.

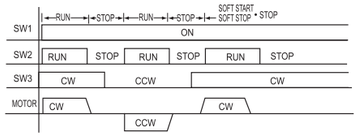
Voltage	Color of lead wire 'B'
Single-phase 100-110 VAC	Brown
Single-phase 100-240 VAC	Yellow

[2] Reversible motor

Both-way running+variable speed (6W-40W)



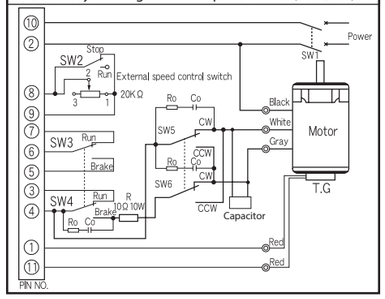
• Example of running operation



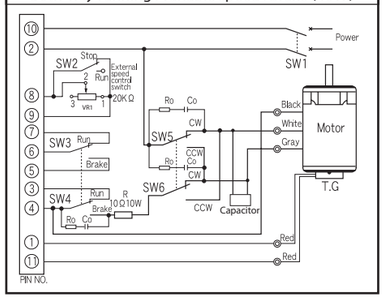
SW1, 4	AC125V or AC250V 5A or larger
SW2, 3	DC20V 10mA
CR circuit Ro, Co	Ro=10-200Ω (1/4W or larger) Co=0.1-0.2 μF (for AC125V or AC250V)

Note: CR circuit is for the surge voltage protection.

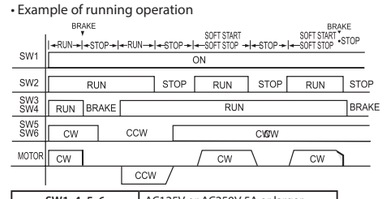
Both-way running+variable speed+brake (6W-25W)



Both-way running+variable speed+brake (40W)



• Example of running operation

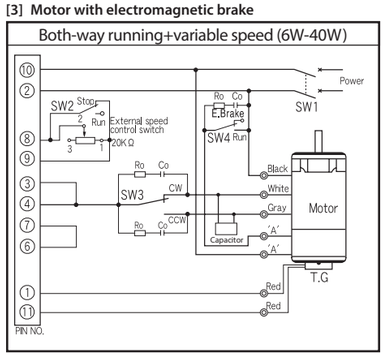


SW1, 4, 5, 6	AC125V or AC250V 5A or larger
SW2, 3	DC20V 10mA
CR circuit Ro, Co	Ro=10-200Ω (1/4W or larger) Co=0.1-0.2 μF (for AC125V or AC250V)
R:for brake outer resistance	10Ω, 10W or larger

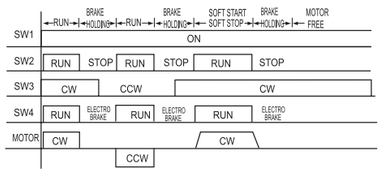
Note: CR circuit is for the surge voltage protection.

[3] Motor with electromagnetic brake

Both-way running+variable speed (6W-40W)



• Example of running operation

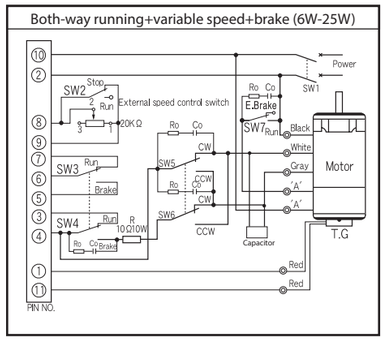


SW1, 3, 4	AC125V or AC250V 5A or larger
SW2	DC20V 10mA
CR circuit Ro, Co	Ro=10-200Ω (1/4W or larger) Co=0.1-0.2 μF (for AC125V or AC250V)

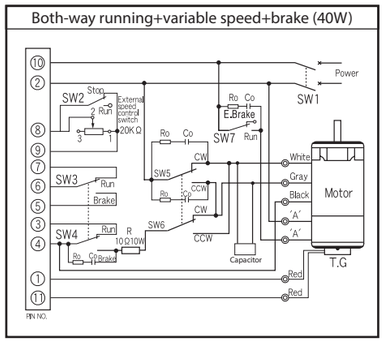
Note: CR circuit is for the surge voltage protection.

Voltage	Color of lead wire 'A'
Single-phase 100-110 VAC	Blue
Single-phase 100-240 VAC	Orange

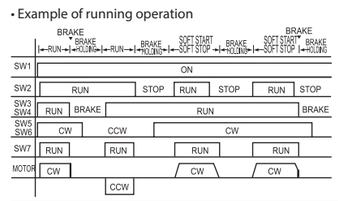
Both-way running+variable speed+brake (6W-25W)



Both-way running+variable speed+brake (40W)



• Example of running operation



SW1, 4, 5, 6, 7	AC125V or AC250V 5A or larger
SW2, 3	DC20V 10mA
CR circuit Ro, Co	Ro=10-200Ω (1/4W or larger) Co=0.1-0.2 μF (for AC125V or AC250V)
R:for brake outer resistance	10Ω, 10W or larger

Note: CR circuit is for the surge voltage protection.

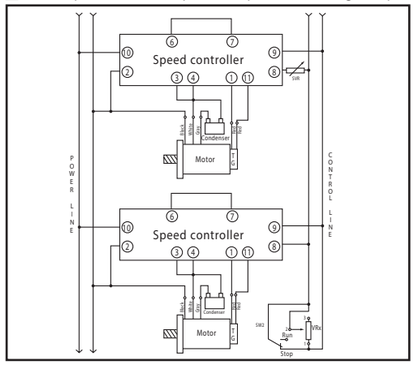
[1] - [3] How to use

- Run/stop function
When SW2 in the wiring diagram is set to the RUN position, the motor operates at the speed set by the external speed control switch. When SW2 is set to the STOP position, the motor stops naturally after losing its inertia.
- Run/brake function
When SW3 and SW4 are switched from the RUN or the BRAKE position with SW2 in the RUN position, the brake operates for about 0.5 second, stopping the motor instantly.
- Soft start/soft stop functions
  - When the controller's SOFT START or SOFT STOP dial has been set, and SW2 is set to the RUN or STOP position, the motor gradually slows or speeds up for the set amount of time, to the speed set by the speed control switch.
  - The soft stop and soft start functions change the motor speed in a straight-line manner for the set amount of time. The time can be set in a range of 0.5 to 15 seconds (1,200 r/min.)
  - The soft stop function can't be used to stop the motor faster than a natural stop.

Note: When not using the equipment for an extended period, turn SW1 off to prevent the controller from heating up.

[4] Others

■ Parallel operation: Parallel operation is possible, enabling multiple motors to be controlled to the same speed simultaneously using a single external speed control switch.



• How to use

As shown in the diagram on the left, the power unit (terminal Nos. ② , ⑩) and control unit (terminal Nos. ⑧ and ⑨ should each be wired to the same wires. Parallel operation is also possible with other motor and controller combinations if the power unit and control unit are wired in the same way,

• Caution

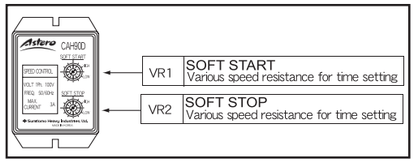
- Wire power units and control units using the same numbers for each pin.
- The capacity of the speed control variable resistor is given by the formula below.

  VRx=20/N KΩ, N/4W (N: number of motors)

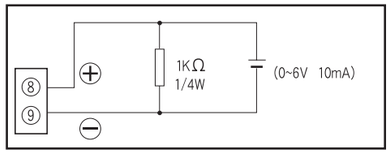
  Example: For 2 motors, the capacity is 10KΩ 1/2W.
- Each motor will operate at almost the same speed, but load differences may sometimes create slight deviations. To prevent this problem, connect a fine-turning viable resistor (SVR) to terminal No. ⑧ . Set the resistance value to between 5 and 10% of the value for the speed control variable resistor (VRx), with a capacity of 1/4W.

• For single-phase 220 to 240 VAC/50 Hz motor connections, use the brown wire instead of the gray wire in the diagram.

■ **Operation**



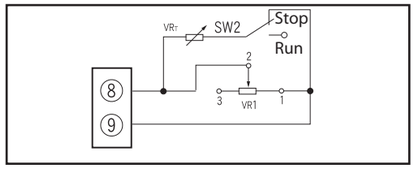
■ **Controlling the motor speed using an external DC voltage**



• Caution

To set the motor speed using an external DC voltage instead of an external speed control switch, connect the DC power supply and controller as shown below. (Be sure that the DC power supply output uses an AC input and is insulated, and the polarity doesn't change.)

■ **Decreasing the starting time**

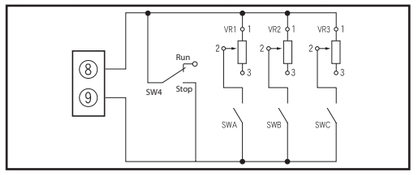


• Caution

- When the set motor speed is low, a greater amount of time elapses from when the RUN/STOP switch is set to RUN, until the motor starts operating. If the amount of time the motor takes to start during low-speed operation is a problem, connect variable resistor VRT (used to adjust the starting time) as shown below.
- To stop the motor instantly, use the RUN/BRAKE switch and the circuit's RUN/STOP switch together.
- With the RUN/STOP switch in the STOP position, adjust the VRT until just before the motor starts.

VRT	2kΩ 1/4W B type
SW2	DC20V 10mA

■ **Switching the motor speed among multiple settings**



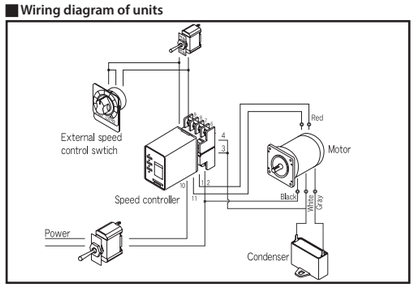
If the motor speed must be adjusted to multiple settings, you can connect VR1, VR2 and VR3 and use SWA, SWB, SWC, (etc.) to switch the speed. The switching timing of the switches should be made roughly equal to the time for opening/closing the relay contact (SW4).

• Caution

Socket-type controllers have one external control swiotch. Purchase Sumitomo's external speed control switch (EAVR20) separately if needed.

VR1, 2, 3	20kΩ 1/4W B type
SW1, 2, 3, 4	DC20V 10mA

■ **Wiring diagram of units**



• Caution

An external speed control switch can be used to adjust the motor speed continuously. When the switch is set to HIGH, the motor operates at high speed. When set to LOW, the motor operates at low speed (or stops). The heavy line in the diagram above carries the motor's operation current. The heavy unbroken lines in the diagram indicate wires with a cross-sectional area of about 0.75 mm^2. The thin line indicate wires with a cross-sectional area of about 0.5 mm^2. For single-phase 220 to 240 VAC/50 Hz motor connections, use the brown wire instead of the gray wire in the diagram.

4. Overheat protection device

1) Thermal protect type

- When motor is run with overload or is stopped and overheated, in order to protect motor coil, overheat protection device, TP (Thermal protector), is built in the coil.
- This TP has an automatic reset system.

  So, if temperature in the coil returns to the normal level, this motor runs automatically.

2) Impedance protect type

- Impedance protect motor is designed to enlarge impedance of coil winding, reduce the input current at motor restriction, and not to exceed the allowable max.temperature.
- "ZP" as impedance protect is displayed in the nameplate.

5. Rating

- Motor is designed to be suited to the usage conditions , and its usage limitation to fit to the usage conditions is called rating.
- There are some ratings, like continuous, short-time, and repetition rating. SHI's induction motor is continuous rating and reversible motor is short-time rating (30min.).
- Unit type speed control motor is induction motor.

6. How to install motor and gearhead

- Install motor and gearhead, putting both contact surfaces together like fig.1 while rotating them little by little. Forcing into motor shaft and bumping into the inside of gearhead, at assembly, may cause abnormal noise by broken gearand shorten the operating life.
- When holding down transfer systems, such as chain, pulley, and sprocket, to the gearhead shaft with keyway, process keyway in the system side as well and hold them down by attached key.
- When holding transfer fittings down to gearhead shaft, giving impacts may cause damages or shortening operation life of gearhead. Please do not hit the gearhead shaft.

Motor capacity	Gearhead size	Screw size	Tightening torque
6W	G6	M4	2N・m
15, 25W	G7, G8	M5	2.5N・m
40, 60, 90W	G9	M6	3N・m

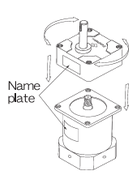


Fig. 2

7. Standard specifications

	Product		Socket type speed controller		
	Spec. item		CAH90A	CAH90C	CAH90D
	Rated voltage		Single-phase AC100V	Single-phase AC200V	Single-phase AC220Vμ240V
	Voltage range		±10%		
	Rated frequency		50/60Hz		50Hz
	Rated electric current		3.0A		
*1	Applicable motor output	Induction	6W-90W		
		Reversible	6W-40W		
		W/Brake	6W-40W		
	Speed range		90-1400r/min / 90-1700r/min		90-1400r/min
	Speed regulation		5% (Standard value)		
	Speed setting instrument		It is possible to adjust it with speed setting instrument.		
	Brake		It is possible to stop in a instant with electric brake.		
*2	Electric brake work time		0.5s (Standard value)		
	Parallel operation		Having the function		
	Soft start & Soft stop function		Having the function (0.5s-15s/1200rpm)		
	Insulation resistance		At least 100MΩ when measured with a 500V DC meager between case and pin at normal temperature and humidity after motor has reached rated torque.		
	Insulation withstand voltage		Normal function when a 1500V, 50/60Hz current is applied between case and pin for 1 minute at normal temperature and humidity after the motor has reached rated torque.		

*1: Applicable motor is SOCKET TYPE SPEED CONTROL MOTOR produced by SHI.
(Please use motor whose T.G. voltage is 24V.)

*2 : Electric brake doesn't work for a certain term but just for a instance.

[2] Motor and Gear

	Item \ Motor type	Induction motor	Reversible motor	Motor with electromagnetic brake
		Single-phase motor		
Motor	Capacity range	6W-90W 4P	6W-40W 4P	6W-40W 4P
	Protection method enclosure	6-40W : IP23 Totally enclosed non ventilated 60W, 90W : IP23 Totally enclosed fan cooled type	6-40W: IP23 Totally enclosed non ventilated	6-40W: IP23 Totally enclosed non ventilated
	Power source	100V 50/60Hz 200V 50/60Hz 220-240V 50Hz	100V 50/60Hz 200V 50/60Hz 220-240V 50Hz	100V 50/60Hz 200V 50/60Hz 220-240V 50Hz
	Insulation Class	130(B)	130(B)	130(B)
	Time rating	Continuous rating	30 minutes rating	30 minutes rating
	Starting method	Capacitor start	Capacitor start	Capacitor start
	Lead wires (with connector)	6-40W : Motor 3 wires UL Style 3266 20AWG, TG 2 wires UL Style 1007 22AWG 6-40W : Motor 3 wires UL Style 3266 20AWG, Fan 2 wires UL Style 3266 20AWG, TG 2 wires UL Style 1007 22AWG	6-40W : Motor 3 wires UL Style 3266 20AWG, TG 2 wires UL Style 1007 22AWG	6-40W : Motor 3 wires UL Style 3266 20AWG, Brake 2 wires UL Style 3266 20AWG, TG 2 wires UL Style 1007 22AWG
	Standards	CE marking (Low voltage direction), CCC standard (Safety standard depends on the motor specification)		
	Insulation resistance	At least 100MΩ when measured with a 500V DC meager between the motor coil and case at normal temperature and humidity after motor has reached rated torque.		
	Insulation withstand voltage	Normal function when a 1500V, 50/60Hz current is applied between the motor coil and case for 1 minute at normal temperature and humidity after the motor has reached rated torque.		
	Temperature rise	The temperature rise value (△T) should be no more than 60℃ (no more than 45℃for motors with fans) when measured by the prescribed method after the motor has reached rated torque.		
	Overheating protector	6W: Impedance protect (ZP), 15W-90W: Built in thermal protector (TP) (auto restore type) Release:120±5℃ Release:77±5℃		
Gear	Lubrication method	Grease lubrication. Grease is loaded at shipment.		
Paint	Color	Astero silver		
Ambient conditions	Location	Indoors (Minimal dust and humidity) • When you install the equipment under the above condition, it is regarded as the special specification. Make inquiries to us. • Install the equipment where it is easy to carry out inspection and maintenance. • Install the equipment on a mount having sufficient rigidity.		
	Temperature	-10-40℃		
	Humidity	Under 85%RH with no condensation		
	Elevation	Under 1,000m		
	Atmosphere	Well ventilated location, free of corrosive gases, explosive gases, vapors and dust.		

8. 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 applies only to new products and represents 18 months after the shipment or 12 months after the actual operation, whichever is shorter.
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 installation of the product and coupling 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. 4. A breakdown resulting from defects, special specification, etc. of device prepared and connected by customer. 5. A breakdown resulting from disassembly, parts replacement, and modification conducted by the customer. 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.

■ Specifications, dimensions, and other items are subject to change without prior notice.

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