

IS-94BZC

Operation Manual



Notice to users

The unauthorized reproduction or replication in whole or in part of this operation manual is prohibited. The product's performance, specifications, and appearance may be modified for improvements without advance notice. Thank you for your understanding.

MABUCHI MOTOR CO., LTD.



FOR YOUR SAFTY

Read the safety warnings for proper use of this product.

Mabuchi Motor Co., Ltd. has no liability to indemnify damages, including any malfunction of the motor resulting from failure to follow this operation manual. Thank you for your understanding.

Safety Precautions



Warning: May result in death or serious injury.



Prohibition: Prohibited actions.



Caution: May result in injury or damage.



Instruction: Required actions.



Warning



Prohibition

- Do not plug the lead wire or motor terminal into home electrical outlets. This will cause electrical shock, injury, and equipment damage.
- Do not touch conductive parts such as powered terminals when the power is on. This may result in electrical shock.
- Do not touch rotating parts, including attachments, with the hands or fingers while the power is on. This may result in injury.
- Do not lock the shaft while the motor is powered on. This will cause equipment damage.
- The motor operating conditions (installation condition, load, environmental temperature) may cause significant heat buildup in the motor, with the risk of burns.
- Do not disassemble the motor. This may cause equipment damage, injury, and electrical shock.
- Do not use in the presence of corrosive or flammable gas, or near combustibles. This may cause fire, injury, and equipment damage.

**Caution****Prohibition****Instruction**

- This product is a brushless motor. It cannot be used directly connected to an AC or battery power source. Connect a dedicated brushless motor drive circuit compatible with this product between the power source and the motor.
- This is a general purpose product. It cannot be used with special equipment for medical, military, aerospace, or vehicle mounted applications.
- Do not detach connectors while the motor is in operation under any circumstances. Always shut off power before inserting them. This will cause equipment damage.
- When inserting or detaching cable connectors, support the plug with your fingers while releasing the detachment prevention mechanism, and insert or detach it in the direction of the connector pin, making sure that the connector is not subject to excessive force.
- Using it with an excessive load on the output shaft will reduce service life. Handle the shaft carefully so that there is no impact load in the direction of thrust.
- When using lead wires, switches, relays, or controllers, etc., give careful consideration to their electrical capacity and heat tolerance. If they do not meet the appropriate standards, this will cause equipment damage due to fire, etc.
- Confirm set installation matching and service life, and perform quality assurance.

Example Checklist for Set Installation:

Laws and standards applicable to the mounting product.

Service life, electrical characteristics, mechanical characteristics, mechanical/electrical noise, storage environment, atmosphere gases, etc.

- The internal resistance and capacity of the motor drive power source (including the circuit) may affect starting performance and rotational stability. Confirm the actual operating conditions at high and low temperatures as well as room temperature.

When using transmission systems which apply lateral pressure to the motor, such as a belt drive on the output shaft, the lateral pressure on the shaft bearing may reduce service life.

- Significant radial loads from eccentric cams, etc., during motor operation or outside vibrations may affect motor service life. Verify the actual usage conditions.
- Do not subject the motor output shaft to excessive impacts. This will cause equipment damage.



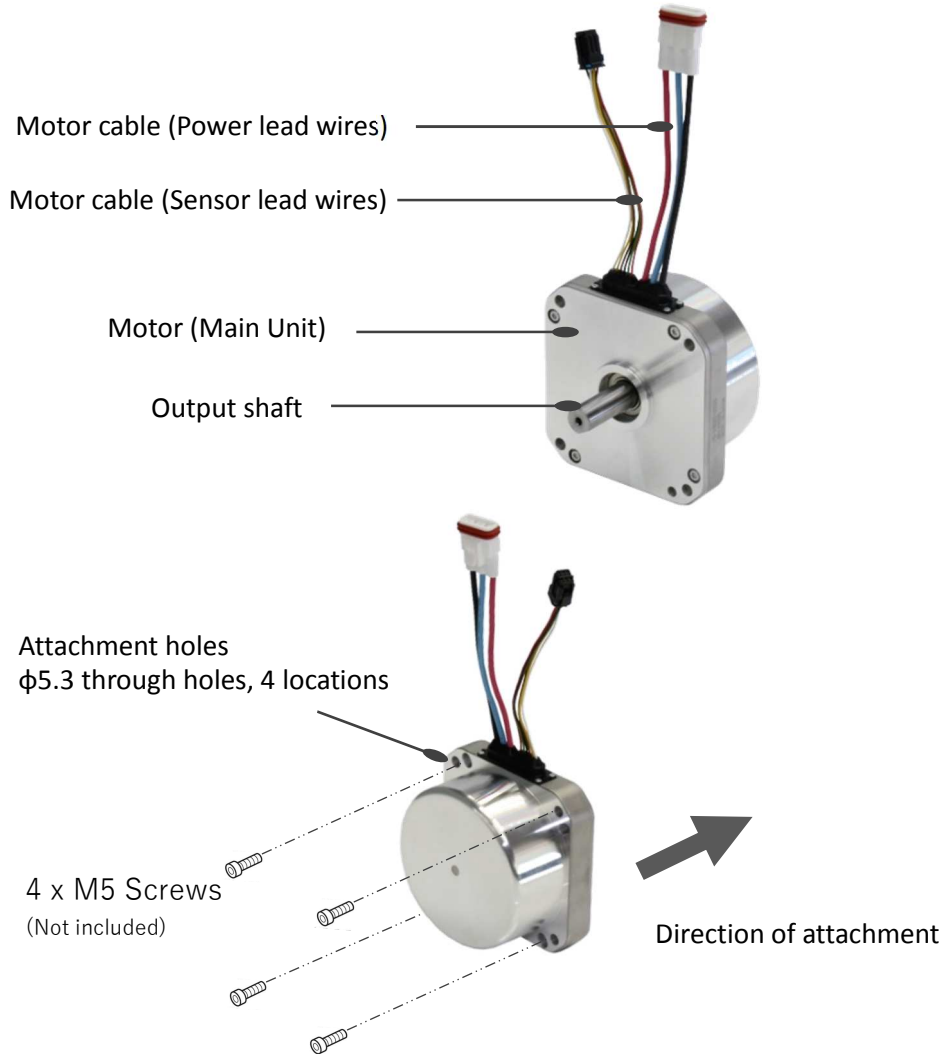
- When securing the motor, do not apply forces that would cause deformation of the motor. When securing with screws, avoid uneven tightening. This may negatively affect the flatness and other characteristics of the motor installation plate.
- Always use the designated components for extension cable connectors.
- If abnormalities occur, shut down power immediately.
- The temperature of the motor rises during operation and after immediately after shut down, so exercise caution.
- Do not apply excessive force to cables or connectors.
Do not pull cables to reposition or transport the motor.
- Dispose of this product in accordance with local laws and government instructions.

● **Operating and Storage Environment**

- Avoid storing the motor in high temperature or humidity areas, or in contact with corrosive gases.
The recommended environment: +10~+30°C temperature, 30~95% relative humidity
- Chemicals used for fumigation may contaminate metal components of the motor.
When fumigating packaging (pallets, etc.) for the motor itself or products into which the motor is integrated, make sure that the motor is not exposed to the fumigating material or gases.
- High ambient temperature while the motor is in use (motor temperature) will affect performance and service life. Exercise special caution in cases of high temperature and humidity.

Motor Parts and Features

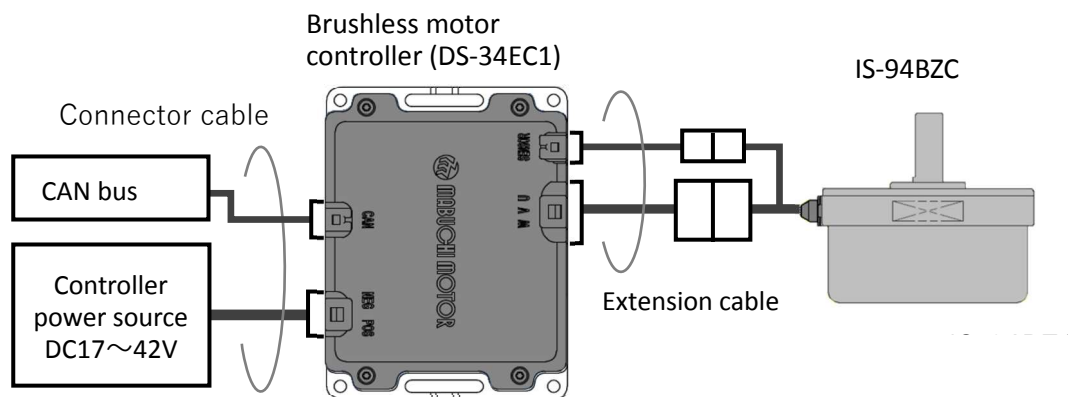
• Motor parts



 **Caution**  **Prohibition**  **Instruction**

- Make sure there is no gap with the attachment plate.
- Do not disassemble the motor.
- Connect the motor cable so that it is not under tension.

- Connection diagram



- This diagram shows an example of connections for controllers (DS-34EC1) and power sources, etc., made by our company.
- The Motor Controller (DS-34EC1) connection and extension cables are available as optional items.
Read DS-34EC1 Operation Manual or IS/MS Series Product Guide for details on connection cables and extension cables.

 Caution	 Instruction
----------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------

- The controller power supply has polarity. Be sure to connect it correctly.
- Use the designated extension cables (motor power, sensor).
- Do not interconnect multiple extension cables, as it may reduce performance.
- Ensure that there is a sufficient safety margin for the current capacity of the power source and the current carrying capacity of distribution cables, etc.

- Extension cables

Extension cables are sold separately.
Please purchase these separately.

- Motor power line extension cable
Part number: 67-Q22AA
Cable length: 1m
Poles: 3
Terminals: Double ended connectors



- Motor sensor line extension cable
Part number: 67-Q23AA
Cable length: 1m
Poles: 6
Terminals: Double ended connectors

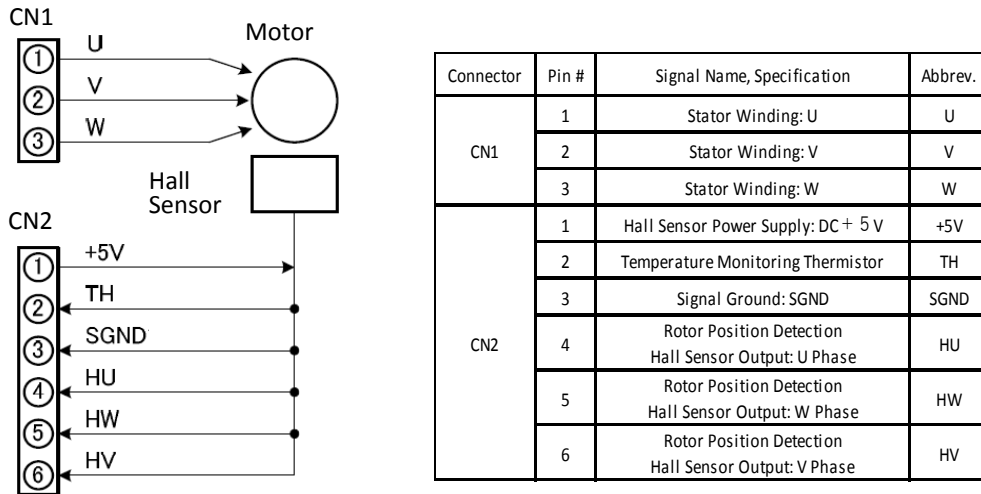


- Extension cable connector specifications

Cable name	Connector maker	Connector type name (Controller side)		Connector type name (Motor side)		Wire seal	Poles	Wire type (AWG)
		Housing (F)	Terminal (F)	Housing (M)	Terminal (M)			
Motor Power line	Sumiko tec	CL07D03A	215006-2M	CL07D03M	215005-2M	WS07MF-0D	3	AWG14
Motor Sensor line	Sumiko tec	CA01A6-06B0-01	CA01C6-010A	CA01A5-06B0-01	CA01C5-010A	01 (Light Blue)	6	AWG26

For detailed connector specifications, please consult the connector maker's website.

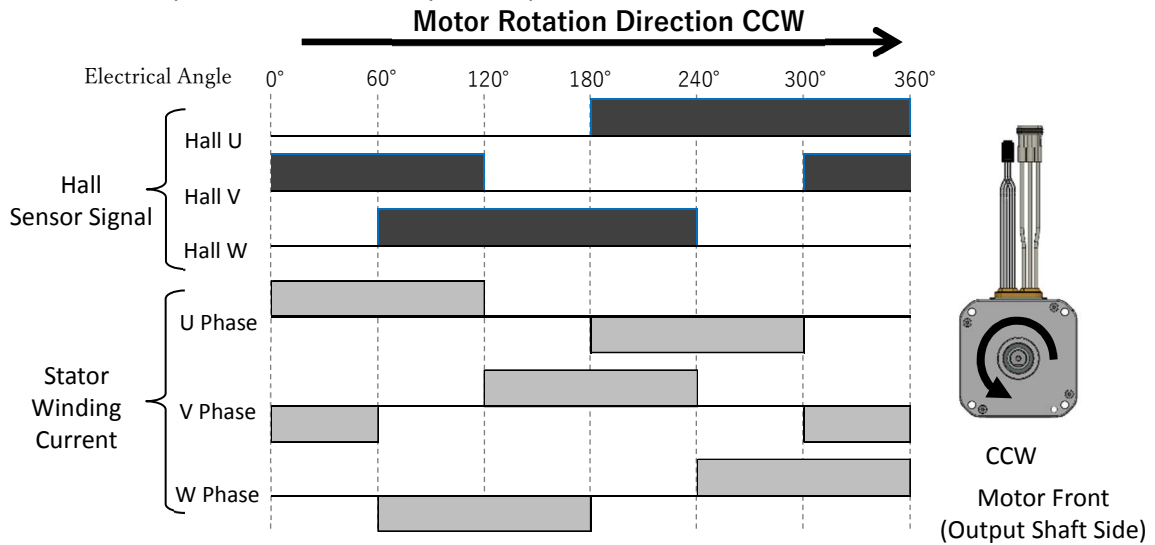
● Cable Connector Signal Explanation



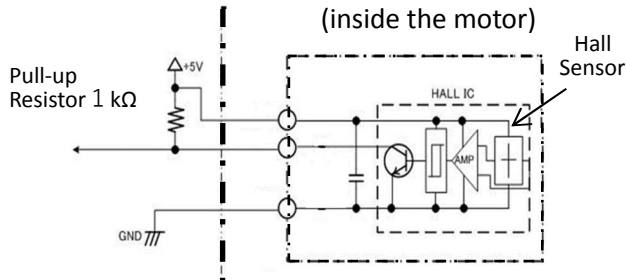
● Hall Sensor Output Signal

The relationship between the Hall sensor signal and the stator winding current is shown in the following chart.

Example: Motor driven by 120° square wave current



External Drive Circuit



- The hall sensors in this motor are equipped with pull-up resistors. Connect pull-up resistors for each phase on the drive circuit end.
- If you are using the motor controller (DS-34EC1), pull-up resistors are not necessary.

● Specifications

Item		Specifications
Mechanical Characteristics	Appearance	See outline drawing
	Mass (Reference)	830g
	Water Resistance	IPx4 (Excluding shaft hole. Use of special water proof connectors)
	Cable, Connector Tensile Strength	9.8N (min.)
Standard Usage Conditions	Rated Voltage	36V (when using DS-34EC1 controller, controller power supply voltage.)
	Operating Voltage Range (*1)	17 to 42V (when using DS-34EC1 controller, controller power supply voltage.)
	Operating Temperature Range	-10 to +50°C (*2)
	Operating Humidity Range	20 to 95% RH (no condensation)
	Direction of Rotation	CCW/CW viewed from the output shaft side.
	Temperature Range for Storage	10 to 30°C
	Humidity Range for Storage	30 to 95% RH (no condensation)
Motor Electrical Characteristics	No Load Current	1.3A (Reference, under 120° square wave current, 36V DC power)
	No Load Speed	4,300 (r/min) (Reference, under 120° square wave current, 36V DC power)
	Instantaneous Maximum Torque	2.0Nm, 10sec (max) (Reference, under 120° square wave current, 36V DC power)
	Maximum Output	680W (Reference, under 120° square wave current, 36V DC power)
	Insulation Resistance	10MΩ (min.) (DC500V) between motor winding and housing.
	Withstand Voltage	AC500V, 1 minute between motor winding and housing.
	Thermistor	For the motor winding temperature monitor (*2) 100kΩ±10%, B constant (25/50°C), 4250K±10% (reference)

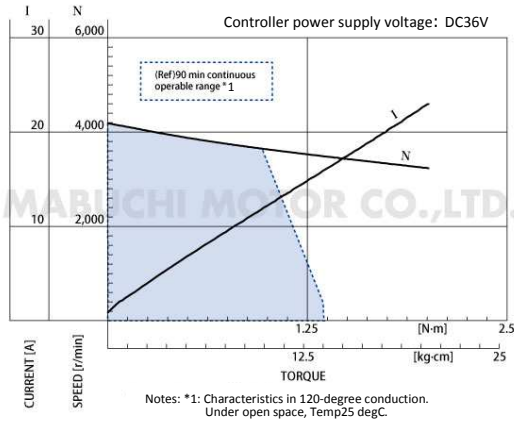
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*1: If you are supplying your own controller, be careful that the controller power voltage does not exceed the maximum limit.

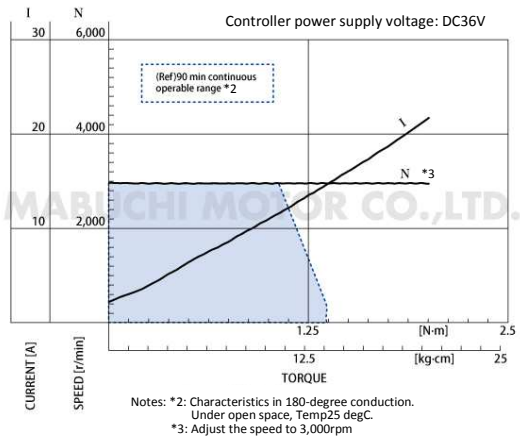
*2: The motor operating conditions (installation condition, load, environmental temperature) may cause significant heat buildup in the motor. Be careful that the detected temperature of the thermistor does not exceed 100°C. High ambient temperature while the motor is in use (motor temperature) will affect performance and service life.

● Motor Characteristics

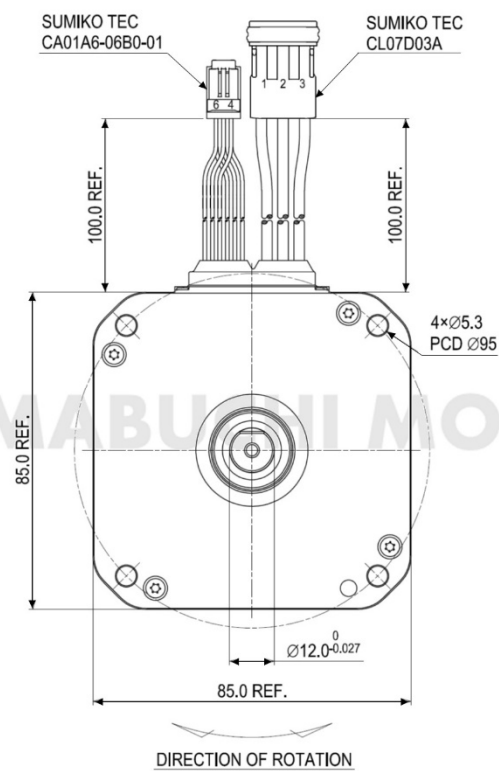
120° square wave current



DS-34EC1 connected (180° sine wave drive)

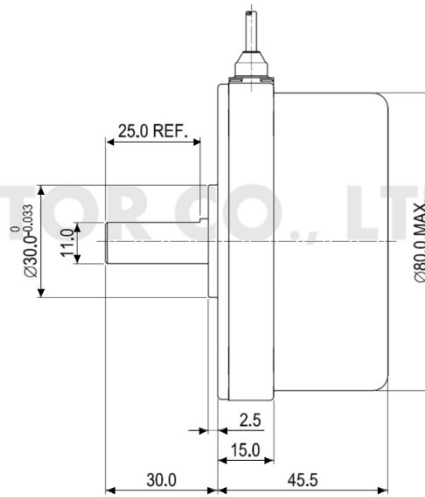


● Drawing



CIRCUIT No. AND CHARACTERISTICS			
CONNECTOR	No.	DEFINITION	COLOR
CL07D03A	1	U PHASE OF MOTOR	RED
	2	V PHASE OF MOTOR	BLUE
	3	W PHASE OF MOTOR	BLACK
CA01A6-06B0-01	1	+5V POSITIVE ELECTRODE	RED
	2	THERMISTOR	GREEN
	3	GND	BLACK
	4	U SIGNAL BY ELECTROMAGNETIC WAVE	BROWN
	5	W SIGNAL BY ELECTROMAGNETIC WAVE	YELLOW
	6	V SIGNAL BY ELECTROMAGNETIC WAVE	WHITE

LEAD WIRE AND CONNECTOR.



UNIT: MILLIMETERS



Product Warranty, Inquiries

Please contact the retailer where you purchased this product.