

**AC Motor Troubleshooting:
The motor rotates in the opposite
direction to the one specified**

- (1) In order to ensure a safe use of the system, please refer to the operating manuals and operating instructions for each device such as "Safety Precautions" and "Safety Essentials". Please check the contents before use.
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- (3) The information contained in this document is as of December 2020.
The information in this document is subject to change without notice.
- (4) This document describes the malfunction of the equipment and does not cover the individual operation, installation or wiring methods. For further information, other than the malfunction of the equipment, please refer to the operating manual of the product or contact the manufacturer for more information.

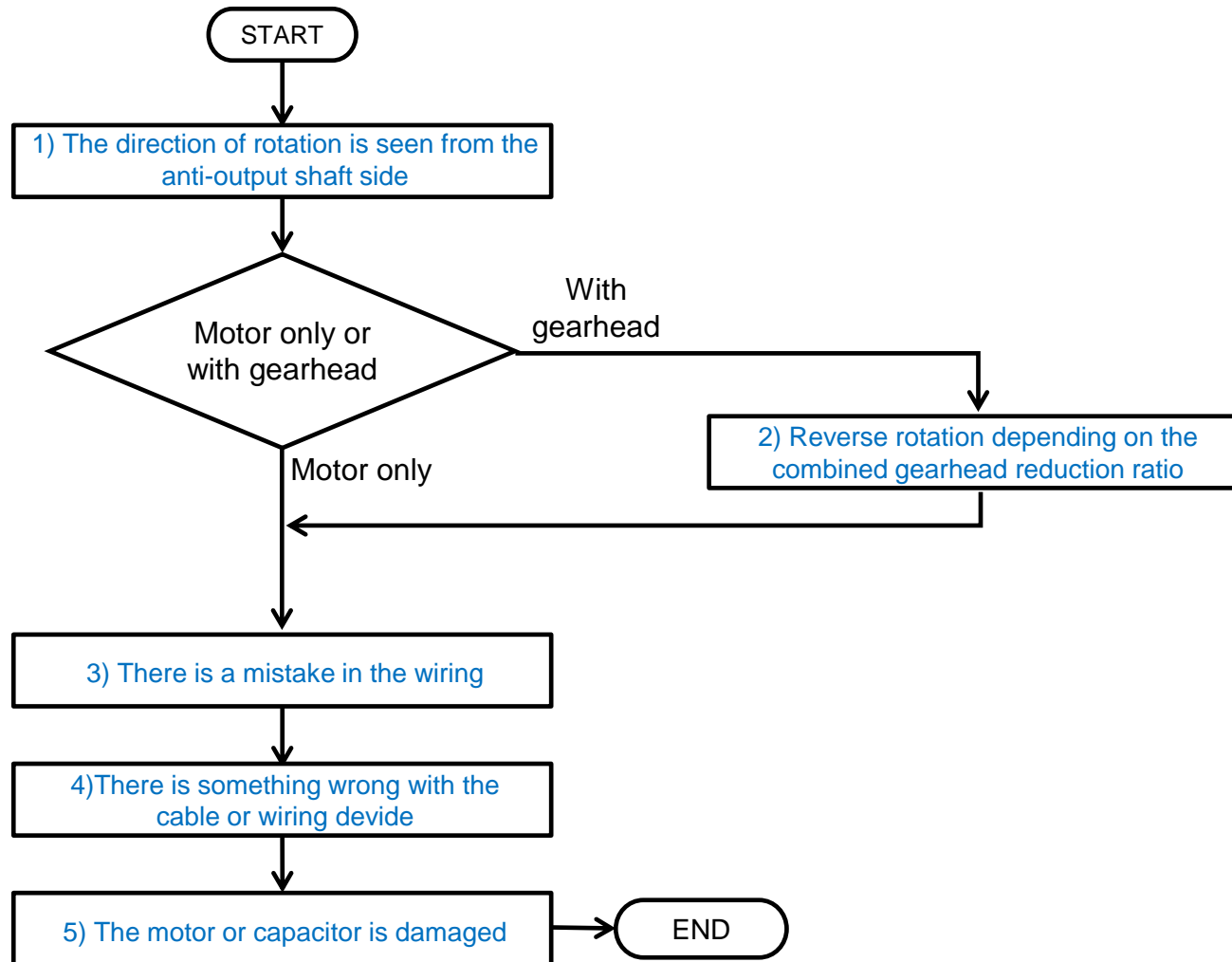
Problem: Motor rotates in the opposite direction

If the motor rotates in the opposite direction to that specified, the cause could be

- 1) The **direction of rotation is viewed from the anti-output shaft side (rear of the motor)***.
- 2) **Reverse rotation according to the combined gearhead reduction ratio***.
- 3) There is a **mistake in the wiring***.
- 4) There is **something wrong with the cable or wiring device**.
- 5) The **motor or capacitor is damaged**.

* Occurs most often at start-up or when changes are made, such as motor replacement.

What to do if the motor rotates in the opposite direction



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1) The direction of rotation is viewed from the anti-output shaft side (rear of the motor)

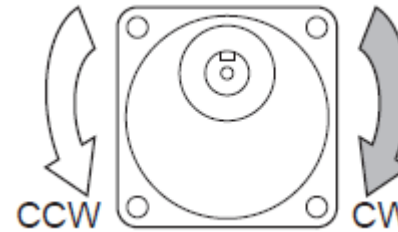
The direction of rotation represents the direction of rotation as seen from the output shaft side of the motor and gearhead.

Please make sure you are looking in the right direction.

<Please check>

Check the direction of rotation from the front of the output shaft.

CW and CCW in the connection diagrams indicate the rotation direction. CW is standing for clockwise, CCW for counter-clockwise.



Rotation direction viewed from the output shaft side

If you are looking at the motor from the anti-output shaft side (the back of the motor), the direction of rotation is the opposite of what you want.

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2) Reverse rotation according to the combined gearhead reduction ratio

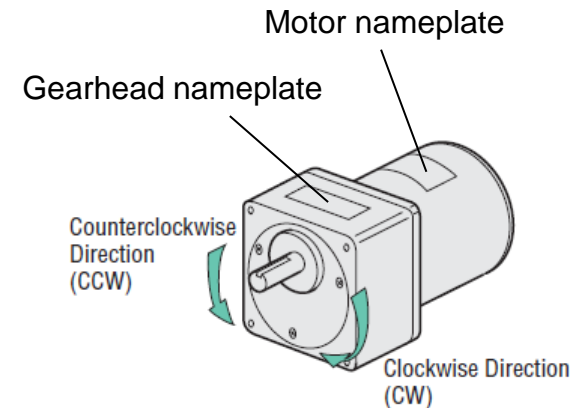
Depending on the reduction ratio of the combined gearhead, the gearhead output shaft may rotate in the opposite direction to that of the motor output shaft (due to the difference in the number of internal reduction stages, the number of shafts comprising the reduction ratio).

The direction of rotation of the gearhead output shaft can be checked from the name of the combined gearhead. The name of the gearhead can be found on the gearhead nameplate.

<Please check>

Check the reduction ratio of the combined gearhead.

Rotation Direction: This refers to the rotation direction viewed from the output shaft. A colored background () indicates gear shaft rotation in the same direction as the motor shaft, while the others rotate in the opposite direction. The direction of gearhead shaft rotation may differ from motor shaft rotation depending on the gear ratio of the gearhead. The gear ratio and rotation direction of each gearhead is shown in the table below.



◇ Gear Ratio and Rotation Direction of Gearhead

Product Name	Gear Ratio	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180	250	300	360	
		<div style="display: flex; justify-content: space-between; font-size: small;">Same direction as the motor shaftOpposite direction as the motor shaft </div>																					
2GV□B, 3GV□B, 4GV□B																							
5GV□B(S), 5GVH□B(S)																							
5GVR□B(S)																							

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3) There is a mistake in the wiring

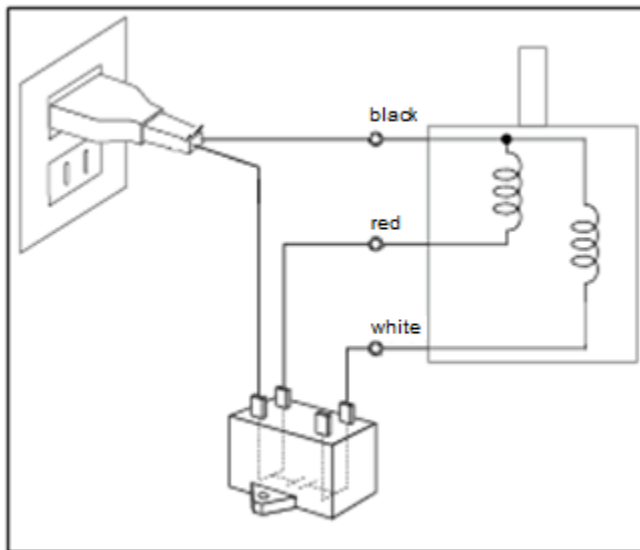
If the motor does not run at start-up, there may be a wiring error.

Read the operating manual carefully and compare the wiring with the actual wiring to ensure that there is no mistake.

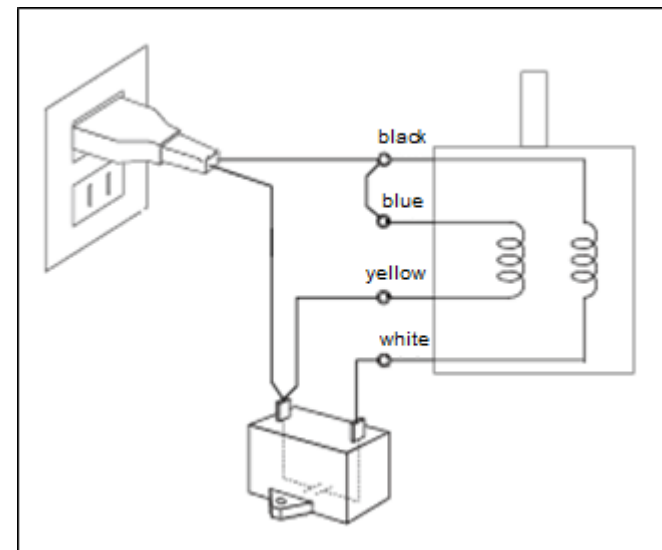
Especially if your motor is a single-phase motor.

Please check carefully, as in many cases the capacitor is miswired and does not work.

Connection example for single-phase induction motors and reversible motors (CW direction)



Induction/reversible motor (3 leads), example of CW directional rotation

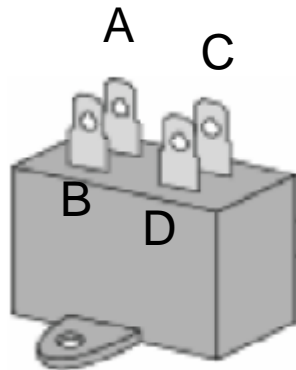


Induction motor (4 leads), example of CW directional rotation

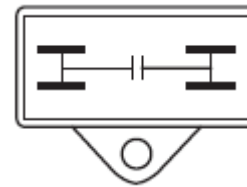
The colour of the wires may vary depending on the series. Please read the supplied operating manual carefully and check the connection points.

3) There is a mistake in the wiring

The capacitor supplied with the motor can be either 2 or 4 terminals. In the case of a 4-terminal capacitor, terminals A and B, and terminals C and D are connected internally, and electrically, it has two terminals.



4-terminal capacitor
Internal wiring diagram



In the connection diagram in the operating manual, a CR circuit for absorbing surge voltage has been added to protect the contacts (switches), but if the motor does not run properly, please check the operation with all CR circuits and contacts removed.

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- 4) There is **something wrong with the cable or wiring device.**
- 5) The motor or capacitor is damaged.

* Occurs most often at start-up or when changes are made, such as motor replacement.

4) There is something wrong with the cable or wiring equipment

The motor may not rotate if there is a faulty connection due to a broken cable or a faulty wiring device.

Check that there is nothing wrong with the connections or wiring equipment.

<Please check>

1. Check with a tester that voltage is applied between the motor and the capacitor terminals.
2. Check for cable breakage and abnormalities in connection points such as terminal blocks and crimp terminals.
3. Check for malfunctions in relays and other wiring devices.

1. Check the voltage between motor and capacitor terminals with a tester.

Use a tester to measure the voltage applied between the motor and capacitor terminals. If the voltage is unusually low or cannot be checked, there may be a broken cable or a problem with the connection.

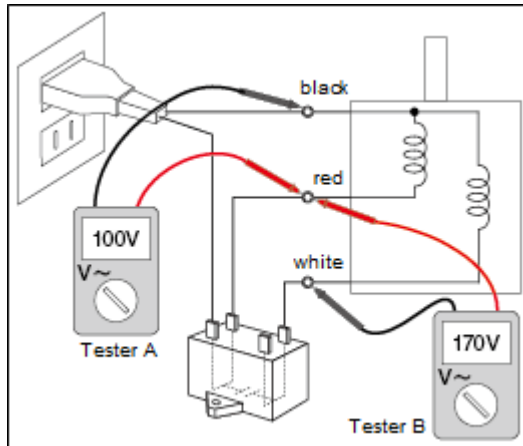
Please note:

Be sure to check the actual wiring, not just the wiring diagram.

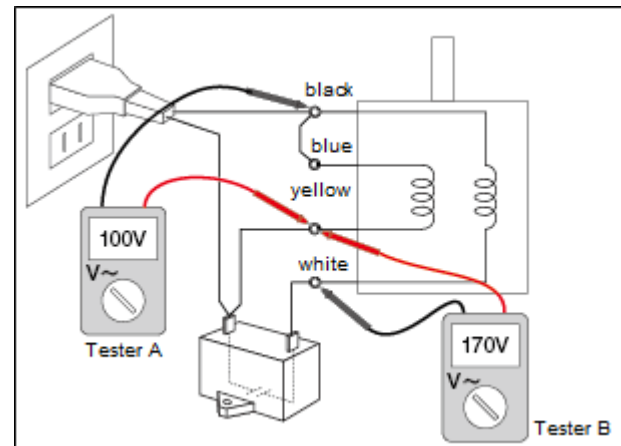
(Make sure you know where the motor cables are routed).

When measuring the voltage, try to measure it as close to the motor as possible.

4) There is something wrong with the cable or wiring equipment



Induction/reversible motor (3 leads), example of CW directional rotation

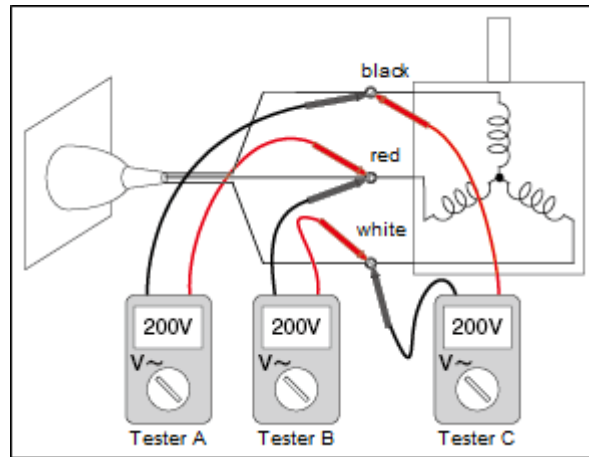


Induction motor (4 leads), example of CW directional rotation

(approx. 1.7 times the supply voltage at no load and approx. 1.4 times the supply voltage at rated load)

Voltage measurement method for single-phase induction motors and reversible motors

4) There is something wrong with the cable or wiring equipment



For three-phase induction motors

4) There is something wrong with the cable or wiring equipment

If there is no voltage problem, please check the other solutions.

If there is a voltage problem:

Check that there are no cable breaks or problems with terminal blocks, crimp terminals or other connection points (see No. 2).

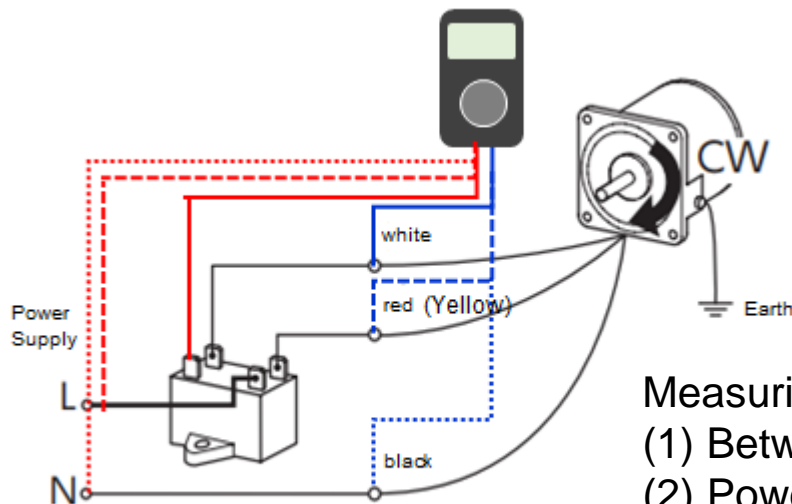
Also check that there are no operating faults in relays and other wiring devices (see No. 3).

4) There is something wrong with the cable or wiring equipment

2. Check for cable breaks, terminal blocks, crimp terminals and other connection points. Check the resistance at the source of the input and just before the motor with a tester, etc., to make sure there is no problem with the cable breakage or connection (between blue and red below).

If the measurement does not show an open condition, there is no wire break.

Induction motor (clockwise direction)



Measuring points

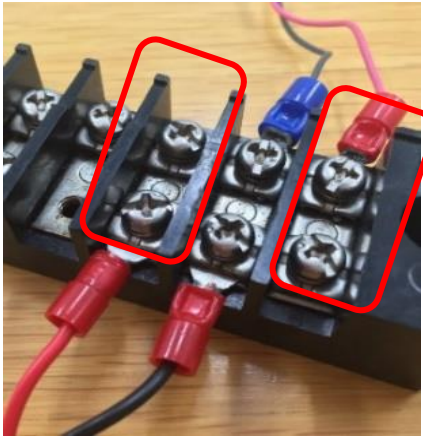
- (1) Between capacitor and motor (white) (solid line)
- (2) Power supply (L) - motor (red/yellow) (dashed line)
- (3) Power supply (N) - Motor (black) (dotted line)

When measuring resistance, be sure to turn off the power supply for safety.

4) There is something wrong with the cable or wiring equipment

If the resistance is open, check the terminal block for wrong connections or missing terminals.

Wrong connection



Terminal disconnection



4) There is something wrong with the cable or wiring equipment

3. Check malfunctions in relays and other wiring devices.

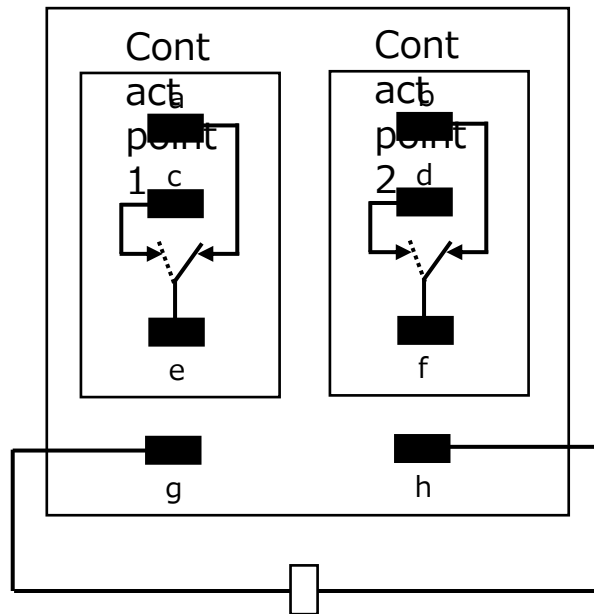
Relays can be damaged by surge voltages, for example by welding.

A tester is used to check that the contact switches are switched in accordance with the control commands (continuity check).

Visually check the condition of the relay contacts (no blackening or welding).

Also check with a tester that the continuity destination is switched by switching the control unit.

Example: Relay internal circuit

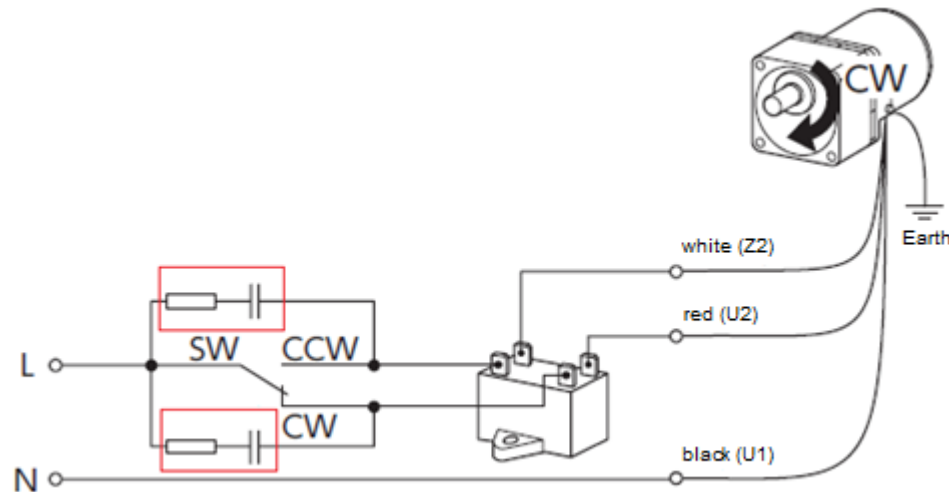


Control unit OFF (g - h open)
Contact point 1: e - a conductive
Contact 2: f - b conducts
Control unit ON (voltage applied to g - h)
Contact 1: e - c conducts
Contact 2: f - d conducts

4) There is something wrong with the cable or wiring equipment

If the cause is welding of the relay due to surge voltage, adding a surge killer circuit may improve the situation.

If you are not using a surge killer circuit, please consider installing one.

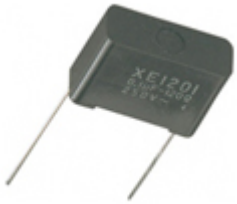


Also available from Oriental Motor as an option (sold separately). Please see next page.

4) There is something wrong with the cable or wiring equipment

Options

CR circuit for surge voltage absorption



Product name: EPCR1201-2

Specification: 250 VAC (120 Ω , 0.1 μ F)

CR circuit module



Product name: VCS02

This circuit facilitates the connection of a CR circuit for surge voltage absorption.

It is equipped with four optional EPCR1201-2.

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5) The motor or capacitor is damaged

If the contents of 1)-8) are OK and the motor does not rotate, the motor or capacitor may be damaged. You can check this in three simple ways:

<Please check>

1. Check the winding condition by measuring the resistance of the motor winding.
2. Check the deterioration of the bearings by hand turning the motor output shaft.
3. Check the capacitor capacity.

Please note:

To prevent electric shock and short-circuit accidents, always switch off the power supply when checking. If the circuit breaker is tripped when the power is turned on the motor's power line may be grounded or the motor may have suffered a breakdown. In such cases, we recommend that you do not switch on the power but replace the motor and capacitors.

About inspection:

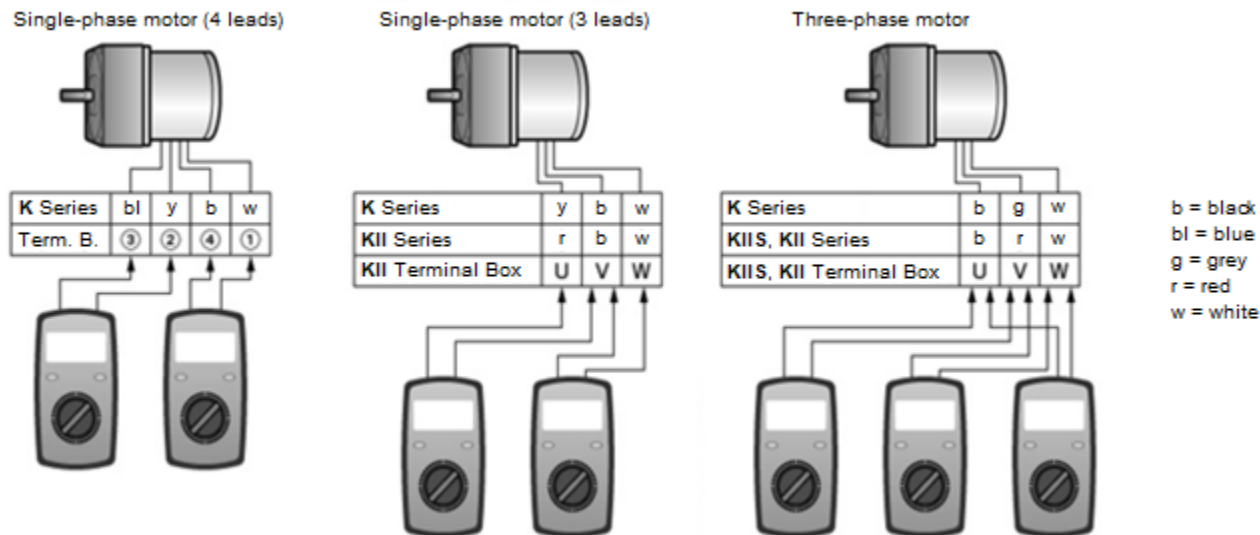
We will carry out an inspection free of charge.
If you would like to carry out an inspection, please contact your local sales office or customer service centre.

5) The motor or capacitor is damaged

1. Check the winding condition by measuring the resistance of the motor winding.

Measure the resistance of the motor windings, referring to the diagram below, and check that the windings are not broken or shorted.

For safety reasons, the power must be switched off when measuring resistance.



If the measured resistance of each phase is more than a few kΩ, the wire may be disconnected.

If the resistance is less than 1 Ω, there is a short circuit in the motor.

Also check the resistance between the motor leads and the motor housing (PE terminals).

If the measured resistance is less than 1 Ω, the winding may have a ground fault.

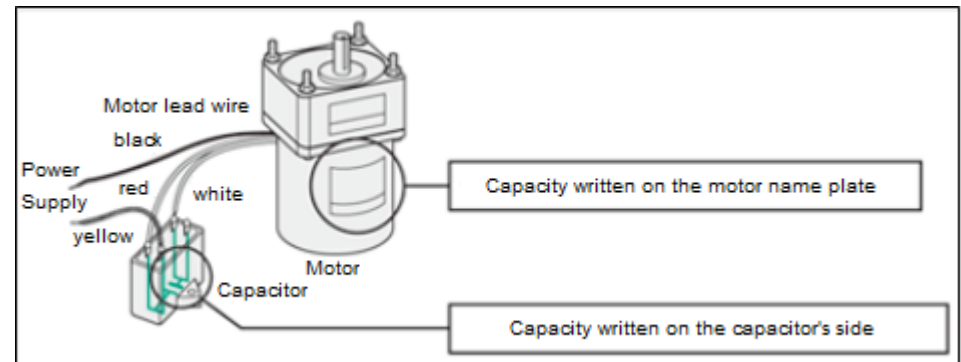
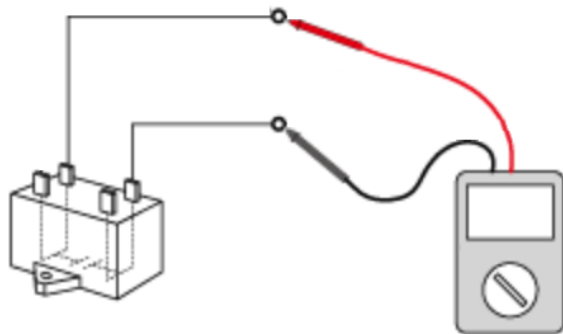
If any of the above conditions apply, please inspect and check the condition of the motor or try to replace the motor.

5) The motor or capacitor is damaged

2. Check the capacitor capacity.

After a long period of use, the capacitance of the capacitors may degrade. Check the capacitance of the capacitor with a tester. The capacitor capacitance (μF) should be checked from the side of the capacitor or from the nameplate on the motor.

When measuring the capacitance of a capacitor, please disconnect all the wires such as motor leads and power supply wires.



If the measurement shows that the capacitance is insufficient, replace the capacitor.

Contact us

Please feel free to contact us with any questions you may have about motors, how to select a product, delivery times, prices, orders, etc.

All countries except below: Tel. 00 800 22556622, info@orientalmotor.de

UK/Ireland: Tel. 01256-347090, info@oriental-motor.co.uk

France: Tel. 01 47 86 97 50, info@orientalmotor.fr

Italy: Tel. 02 9390 6346, info@orientalmotor.it