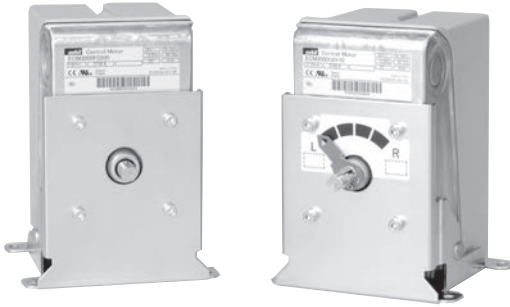


# ECM3000 Control Motor User's Manual



Thank you for purchasing an Azbil Corporation product.

This manual contains information for ensuring the correct use of this product. It also provides necessary information for installation, maintenance, and troubleshooting.

This manual should be read by those who design and maintain equipment that uses this product. Be sure to keep this manual nearby for handy reference.

Please, read 'Terms and Conditions' from following URL before the order and use.

<http://www.azbil.com/products/factory/order.html>

## NOTICE

Be sure that the user receives this manual before the product is used.

Copying or duplicating this user's manual in part or in whole is forbidden. The information and specifications in this manual are subject to change without notice.

Considerable effort has been made to ensure that this manual is free from inaccuracies and omissions. If you should find an error or omission, please contact the azbil Group.

In no event is Azbil Corporation liable to anyone for any indirect, special or consequential damages as a result of using this product.

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## SAFETY PRECAUTIONS

Safety precautions are for ensuring safe and correct use of this product, and for preventing injury to the operator and other people or damage to property. You must observe these safety precautions. Also, be sure to read and understand the contents of this user's manual.

• Key to symbols

### **WARNING**

Warnings are indicated when mishandling this product might result in death or serious injury to the user.

### **CAUTION**

Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to this product.

### **WARNING**

Before doing other wiring work, connect the frame ground terminal to ground. The ground connection should have a resistance of 100 Ω or less. Afterwards connect the other circuits.

### **WARNING**

Before removing, mounting, or wiring this device, be sure to turn off the power to the device and all connected devices. Failure to do so may cause electric shock.

Do not touch electrically charged parts such as the power terminals. There is a risk of electric shock.

### **CAUTION**

In order to use this product correctly, be sure to follow this manual, the manuals for any associated devices and equipment.

Installation, wiring, inspection, adjustment, maintenance, etc., should be carried out only by trained and experienced technicians who have knowledge and technical skills related to this device and associated equipment.

Be sure to use this device correctly, within the ranges specified in this user's manual. Otherwise device failure or malfunction could result.

Avoid installing the device where it will be subject to conditions such as the following. Otherwise device failure could result.

- Certain chemicals, corrosive gases, or salt
- High temperatures
- Prolonged vibration
- Direct sunlight

Do not stand on this device or use it as a step. Doing so could damage the device, and if you lose your footing you may be injured.

Wire this device properly according to indoor wiring standards, technical standards, etc., using the types of wire and wiring methods specified in the user's manual. Otherwise, device failure or malfunction could result.

The motor part of this device can reach a high temperature during operation. There is a risk of burns if the cover is opened and the motor is touched immediately after the power has been turned off.

While power is being supplied and during operation, do not touch any movable part. Doing so may cause injury.

If equipment safety may be endangered by the failure of this device, consider having a fail-safe design for the system as a whole, with circuit breakers, duplexed controllers, and limiter; or use a redundant design.

When discarding this device, dispose of it properly as industrial waste, following local regulations.

## WARNING SYMBOLS USED FOR THE PRODUCT

To reduce the risk of an electric shock, etc. resulting in personal injury, and to ensure safe operation of devices, follow all safety notices in this document.

This symbol warns the user when there is a danger of electric shock from accidental contact.

## OVERVIEW

ECM3000 control motors are designed to control various types of industrial equipment.

There are two types of strokes: a 90° stroke for burner control and a 160° stroke for valve control using hot and cold water, steam, etc. There are three types of control signal inputs: relay contact, 4–20 mA DC, and potentiometer (nominal 135 Ω resistance input). 24, 100, and 200 V AC models are available. Flexible 85–264 V AC powered models are also available for 4–20 mA DC signal input models. The included bracket can be used for replacement of an older Azbil Corporation motor with this one.

## MODEL SELECTION TABLE

✓: Applicable    —: Not applicable

| Model No.       | Power         | Signal name    | Rotation angle | Rotation time |       | Output torque | Power consumption   | Notes                           | UL*1 | CE*1 |
|-----------------|---------------|----------------|----------------|---------------|-------|---------------|---|---------------------------------|------|------|
|                 |               |                |                | 50Hz          | 60Hz  |               |   |                                 |      |      |
| ECM3000D01 __   | 24 V AC       | Relay contacts | 90°            | 39 s          | 33 s  | 12.5 N·m      | 9 VA*4  | ON/OFF operation                | ✓    | ✓    |
| ECM3000D11 __   | 100 V AC      |                |                |               |       |               |   |                                 |      |      |
| ECM3000D21 __   | 200 V AC      |                |                |               |       |               |   |                                 |      |      |
| ECM3000E01 __   | 24 V AC       | Potentiometer  | 160°           | 69 s          | 58 s  | 12.5 N·m      | 9 VA*4  | Position proportional operation | ✓    | ✓    |
| ECM3000F01 __   | 24 V AC       | Relay contacts |                |               |       |               |   |                                 |      |      |
| ECM3000F11 __   | 100 V AC      |                |                |               |       |               |   |                                 |      |      |
| ECM3000F21 __   | 200 V AC      | 4 ~ 20mA DC    | 39 s           | 14 W*5        | 6 N·m | 14 VA         | High-speed motor model<br>Position proportional operation | —                               | ✓    |      |
| ECM3000G01 __*2 | 24 V AC       |                |                |               |       |               |   |                                 |      |      |
| ECM3000G91 __*2 | 85 ~ 264 V AC |                |                |               |       |               |   |                                 |      |      |
| ECM3000F03 __   | 24 V AC       | Relay contacts | 160°           | 69 s          | 58 s  | 12.5 N·m      | 9 VA*4  | ON/OFF operation                | ✓    | ✓    |
| ECM3000D02 __   | 24 V AC       |                |                |               |       |               |   |                                 |      |      |
| ECM3000E02 __   | 24 V AC       |                |                |               |       |               |   |                                 |      |      |
| ECM3000F02 __   | 24 V AC       | Potentiometer  | 72 s           | 14 W*5        | 6 N·m | 14 VA         | High-speed motor model<br>Position proportional operation | —                               | ✓    |      |
| ECM3000F12 __   | 100 V AC      | Relay contacts |                |               |       |               |   |                                 |      |      |
| ECM3000F22 __   | 200 V AC      |                |                |               |       |               |   |                                 |      |      |
| ECM3000G02 __*2 | 24 V AC       | 4 ~ 20 mA DC   | 35 s           | 29 s          | 6 N·m | 14 VA         | High-speed motor model<br>Position proportional operation | —                               | ✓    |      |
| ECM3000G92 __*2 | 85 ~ 264 V AC |                |                |               |       |               |   |                                 |      |      |
| ECM3000F04 __   | 24 V AC       |                |                |               |       |               |   |                                 |      |      |

(Example) ECM3000D01

└─ 0 (zero): not GB-compliant, C: GB-compliant

└─ 0 (zero): No options\*3

3: 4 built-in auxiliary switches (for standard model. Contact current: 100 mA to 5 A [resistive load], 100 mA to 3 A [inductive load])\*7 \*8

4: 2 built-in auxiliary switches (for standard model. Contact current: 100 mA to 5 A [resistive load], 100 mA to 3 A [inductive load]) with forced open/close function\*6 \*8

5: 4 built-in auxiliary switches (for low-current model. Contact current: 1 to 100 mA [inductive load, including inrush current])\*7 \*8

6: 2 built-in auxiliary switches (for low-current model. Contact current: 1 to 100 mA [inductive load, including inrush current]) with forced open/close function\*6 \*8

\*1. GB-compliant models are not compliant with UL or CE standards.

\*2. Direct/reverse operation can be switched and zero point, span, and deadband can be adjusted. The device is adjusted at the factory with the direct operation setting. Readjustment is essential if the type of operation is switched.

\*3. An extension unit can be mounted.

\*4. Power consumption of the following models is 11 VA. ECM3000G014\_, ECM3000G016\_, ECM3000G024\_, ECM3000G026\_

\*5. Power consumption of the following models is 15 W. ECM3000G914\_, ECM3000G916\_, ECM3000G924\_, ECM3000G926\_

\*6. Selectable only for ECM3000G01\_, ECM3000G91\_, ECM3000G02\_, ECM3000G92\_.

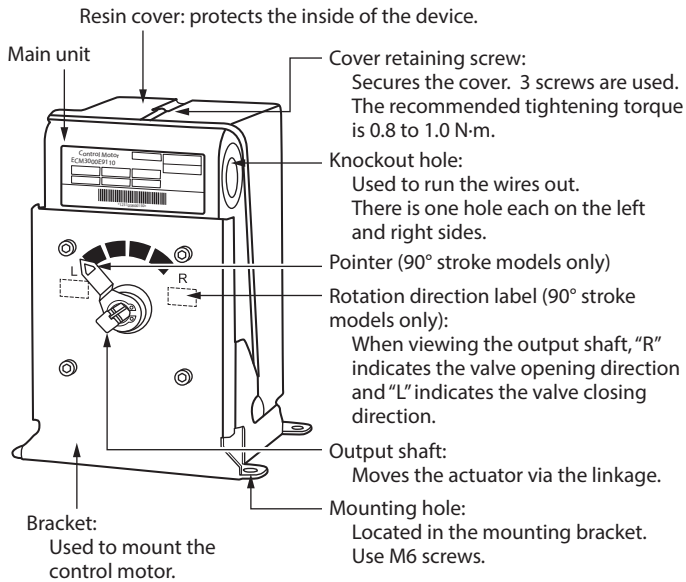
\*7. Selectable only for 90° stroke models.

\*8. If UL or CE compliance is required, the voltage applied to the auxiliary switches must be no more than 30 Vrms or 42.4 V peak AC.

### ! Handling Precautions

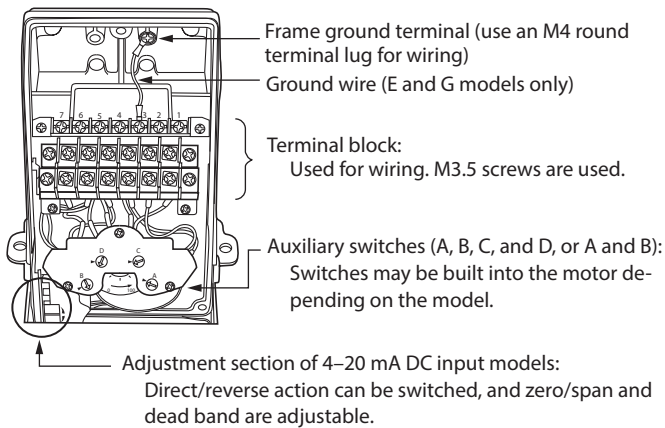
- Use high-speed motor models at a duty ratio (operating ratio) of 40 % or less.
- Do not connect the ECM3000F to a mechanical balancing relay such as the R9107A or R927C. Doing so may apply excessive voltage to the potentiometer, resulting in device failure.
- Be sure to connect non-voltage contacts to terminals S, CONT, CW, and CCW of an ECM3000 model with forced open/close function. In the case of the M744 and M7284, 24 V AC may be applied to the S, CONT, CW, and CCW terminals.  
If the ECM3000 is replaced with a forced open/close function model, do not apply 24 V AC to any terminal. Doing so will damage the circuit.
- For the ECM3000F and ECM3000D, leakage current from the snubber circuit protecting the motor drive element (relay or SSR) must be within the following.
  - 100 V AC: 0.8 mA (RMS) max.
  - 200 V AC: 0.4 mA (RMS) max.

## NAMES OF PARTS



### ! Handling Precautions

- The default setting for the output shaft is 0° opening.
- L: counterclockwise (CCW) rotation  
R: clockwise (CW) rotation  
CW: Clockwise    CCW: CounterClockwise



### ● Terminal block

- For 4 built-in auxiliary switches

|   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|

For the power supply and inputs

|    |    |    |    |    |    |
|----|----|----|----|----|----|
| D3 | D2 | D1 | C3 | C2 | C1 |
| B3 | B2 | B1 | A3 | A2 | A1 |

For auxiliary switches A to D

- 2 built-in auxiliary switches with forced open/close function

|   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|

For the power supply and inputs

|    |      |    |     |          |          |
|----|------|----|-----|----------|----------|
| S  | CONT | CW | CCW | Not used | Not used |
| B3 | B2   | B1 | A3  | A2       | A1       |

Forced open/close function  
Auxiliary switches A and B

## MOUNTING

### ■ Installation location

Do not install the device in locations prohibited in the SAFETY PRECAUTIONS section. For outdoor use, use a protective cover or the like.

### ! Handling Precautions

- Prevent foreign matter or moisture from entering the device from the output shaft.
- When the motor is used with a control valve in an application such as fluid control, if the control valve is located higher than the motor, water drops may enter the motor by running along the valve.

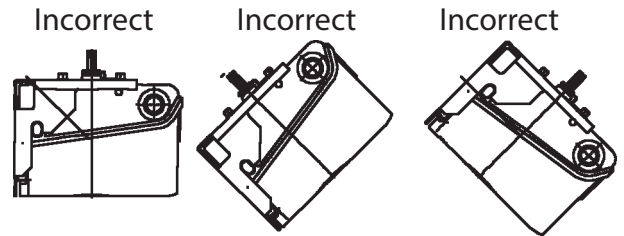
### ■ Mounting orientation

#### ● 90° stroke model

This model can be mounted with any desired orientation. However, mount it so that water and foreign matter do not enter at the output shaft.

#### ● 160° stroke model

This device can be mounted with the output shaft horizontal or facing downwards. To prevent water drops from entering the device, do not mount with the output shaft facing upward.



#### ● To ensure splash-proofing

Close the cover securely so that the packing and cable are not pinched. Make the knockout hole watertight after wiring.

- Use a waterproof connector for the cables running from the motor. Recommended waterproof connector: model No. 83104346-003
- If a conduit is used, use a waterproof precut tube or the like to ensure waterproofing.

## WIRING

### ! CAUTION

- **Make sure that the frame ground terminal is properly grounded (100 Ω max.) using at least 2 mm<sup>2</sup> wire and M4 crimp terminals with insulating sleeves.**

During wiring, open a knockout hole (22 mm dia.) on either side, and pull out the cables from the hole. For wiring to the terminals, follow the terminal label indicated on the terminal block, and be sure to use M3.5 crimp terminals with insulating sleeves.

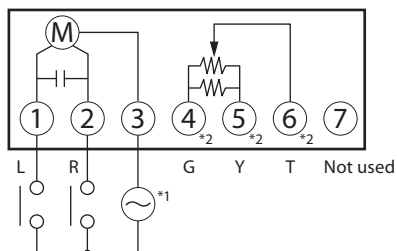
### ! Handling Precautions

- To open a knockout hole, using a flat-head screwdriver, set its tip on the outer edge of the knockout plug, and lightly tap the screwdriver all the way around this edge until the knockout is removed.
  - Do not allow any fragments to enter the actuator when the knockout hole is opened.
  - Do not use unused terminals on the device as relay terminals.
  - Be sure to attach the cover after wiring is complete.
  - Do not run the signal wires in the same conduit as power lines.
  - Keep power cables at least 50 cm away from signal cables.
  - If the power and signal cables must run together in the same conduit, use JCS4364-compliant instrument cable for signals.
  - Use the appropriate supply voltage according to the model No.
  - Be sure to install a circuit breaker for the power source.
  - During motor operation, in order to stop hunting (which causes the controller's internal relay to turn ON and OFF excessively), change the parameters of the controller. For example, set the derivative time (D) to 0 seconds, set a wider dead band, etc.
- If the internal relay operates excessively, the life of the motor or the host controller relay will be shortened.

● **Cables**

Use JIS C3307 600V vinyl insulated wire or equivalent for power.  
Use JCS4364-compliant instrument cable or equivalent for signals.

● **Relay contact input (ECM3000D and ECM3000F)**



L: counterclockwise (CCW) rotation  
R: clockwise (CW) rotation  
CW: Clockwise CCW: Counterclockwise

\*1. The supply voltage varies depending on the model.

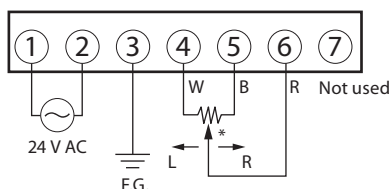
☞ MODEL SELECTION TABLE (page 2)

\*2. Terminals 4–6 of the ECM3000D are not used.

! **Handling Precautions**

- The default setting for the output shaft is 0 % opening.

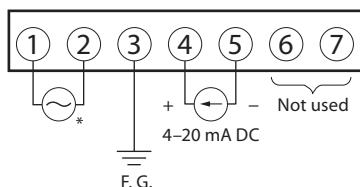
● **Potentiometer input (135 Ω) (ECM3000E)**



L: counterclockwise (CCW) rotation  
R: clockwise (CW) rotation

\* For details on TY9000, etc., contact the azbil Group.

● **4–20 mA input (ECM3000G)**



\* The supply voltage varies depending on the model.

☞ MODEL SELECTION TABLE (page 2)

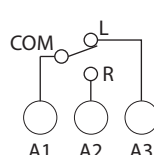
📖 **Note**

- The 4–20 mA input circuit is isolated from the power circuit inside the device.

! **Handling Precautions**

- During motor operation, in order to stop hunting (which causes the controller's internal relay to turn ON and OFF excessively), change the parameters of the controller. For example, set the derivative time (D) to 0 seconds, set a wider dead band, etc.  
If the internal relay operates excessively, the life of the motor or the host controller relay will be shortened.  
If frequent operation cannot be avoided, install an auxiliary relay between the motor and controller.
- The feedback potentiometer of the ECM3000F is a combination resistor consisting of two different resistors connected in parallel.  
Accordingly, the angle of rotation of the ECM3000F is proportional not to the resistance of the feedback potentiometer but to the voltage ratio between the potentiometer terminals (T–G voltage or Y–G voltage).  
The resistance of the feedback potentiometer cannot be used to measure the angle of the motor rotation.

● **Auxiliary switch (up to 4)**

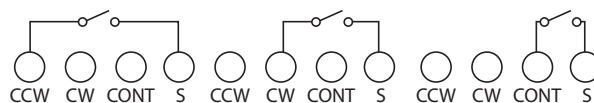


L: counterclockwise (CCW) rotation  
R: clockwise (CW) rotation

Note: The internal connections of switches B, C, and D are the same as those of switch A. Models with forced open/close function have only auxiliary switches A and B.

● **Forced open/close input**

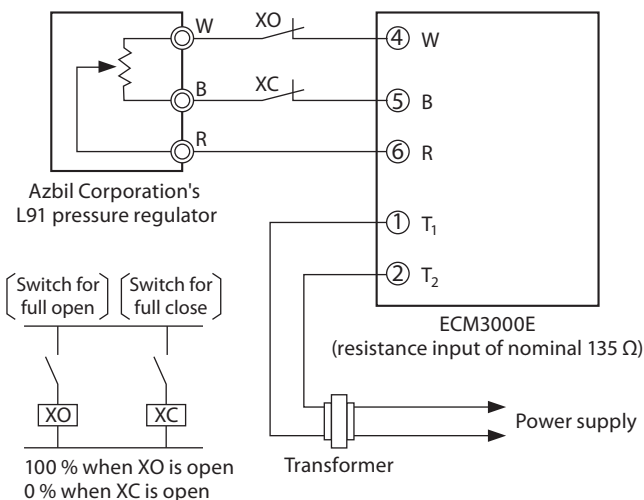
(a) Forced fully closed (b) Forced fully open (c) Automatic operation



! **Handling Precautions**

- Before shipment, terminals CONT and S are connected. Disconnect these terminals if operation with the valve forced fully open (or closed) is desired.
- Only one of terminals CCW, CW, and CONT can be connected to terminal S. Multiple terminals cannot be connected to terminal S.
- Be sure to connect non-voltage contacts to terminal S, CONT, CW, or CCW of an ECM3000 model with a forced open/close function. If 24 V AC is applied, the circuits will fail.
- If the same signal is input to multiple control motors that are connected in parallel, faulty operation may result. The same contact signal cannot synchronize multiple ECM3000 motors.

● **If the ECM3000E is used to fully open/close the valve**



Note: Recommended contact rating for XO and XC  
Material: Gold plating  
Rated voltage: 15 V DC min.  
Rated current: 100 mA

## INSPECTION AND MAINTENANCE

### ■ Inspection Method

| Item              | Frequency | Inspection method  |
|-------------------|-----------|--|
| Visual inspection | 6 months  | <ul style="list-style-type: none"> <li>• Check for loose screws.</li> <li>• Check for damage to the motor.</li> </ul>  |
| Operation state   | 6 months  | <ul style="list-style-type: none"> <li>• Check for unusual noise or vibration.</li> <li>• Check that the motor operation is normal.</li> </ul>                           |
| Daily inspection  | As needed | <ul style="list-style-type: none"> <li>• Check for unusual noise or vibration.</li> <li>• Check that the motor operation is normal.</li> <li>• Check hunting.</li> </ul> |

### ■ Maintenance method

Check the motor operation visually every six months. If a problem is found, take corrective actions.

| Problem   | Check item  | Corrective action  |
|---|---|--|
| <ul style="list-style-type: none"> <li>• The motor does not work.</li> </ul>  | <ul style="list-style-type: none"> <li>• Wiring status and disconnection.</li> <li>• Supply power voltage.</li> </ul>   | <ul style="list-style-type: none"> <li>• Check the wiring.</li> <li>• Check the supply power voltage.</li> </ul>                                     |
| <ul style="list-style-type: none"> <li>• The motor rotation stops halfway.</li> </ul>                                 | <ul style="list-style-type: none"> <li>• Check for loose terminal screws.</li> </ul>  | <ul style="list-style-type: none"> <li>• Tighten terminal screws.</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Auxiliary switches do not work.*1</li> </ul>                                 | <ul style="list-style-type: none"> <li>• Check the auxiliary switch cam.</li> <li>• Wiring status and disconnection.</li> </ul>                                   | <ul style="list-style-type: none"> <li>• Set it up again.</li> <li>• Check the wiring.</li> </ul>  |
| <ul style="list-style-type: none"> <li>• The feedback potentiometer does not work.*2</li> </ul>                       | <ul style="list-style-type: none"> <li>• Check the resistance.</li> <li>• Wiring status and disconnection.</li> <li>• Check for loose terminal screws.</li> </ul> | <ul style="list-style-type: none"> <li>• Set it up again.</li> <li>• Check the wiring.</li> <li>• Tighten terminal screws.</li> </ul>                |
| <ul style="list-style-type: none"> <li>• Decreased control sensitivity.</li> <li>• Decreased motor torque.</li> </ul> | <ul style="list-style-type: none"> <li>• Wiring status and disconnection.</li> <li>• Check for loose terminal screws.</li> <li>• Supply power voltage.</li> </ul> | <ul style="list-style-type: none"> <li>• Check the wiring.</li> <li>• Tighten terminal screws.</li> <li>• Check the supply power voltage.</li> </ul> |

\*1. For models with auxiliary switch

\*2. For models with feedback potentiometer

## AUXILIARY SWITCH (OPTIONAL)

### ■ Adjustment

#### ● Operating point

An auxiliary switch can turn on if the arrow on the setting dial (A, B, C, or D) is aligned with the ► mark.

The operating point can be set in a range of 5–95 % opening.

The repeatability is within  $\pm 3\%$ .

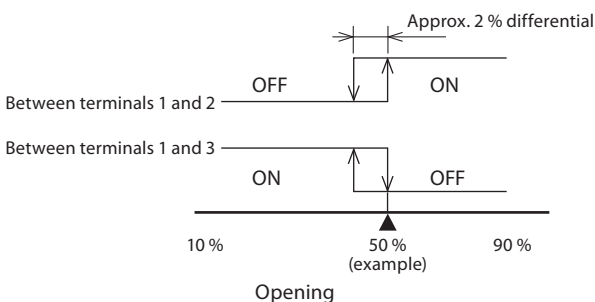
The differential is approximately 2 %.

After the settings are changed, make sure that the switch operates before the motor reaches the fully-open and fully-closed positions.

#### ● Operation type

If the actual opening is greater than the set opening, connection between terminals 1 and 2 (Common–NO) will be electrically continuous, but connection between terminals 1 and 3 (Common–NC) will not be.

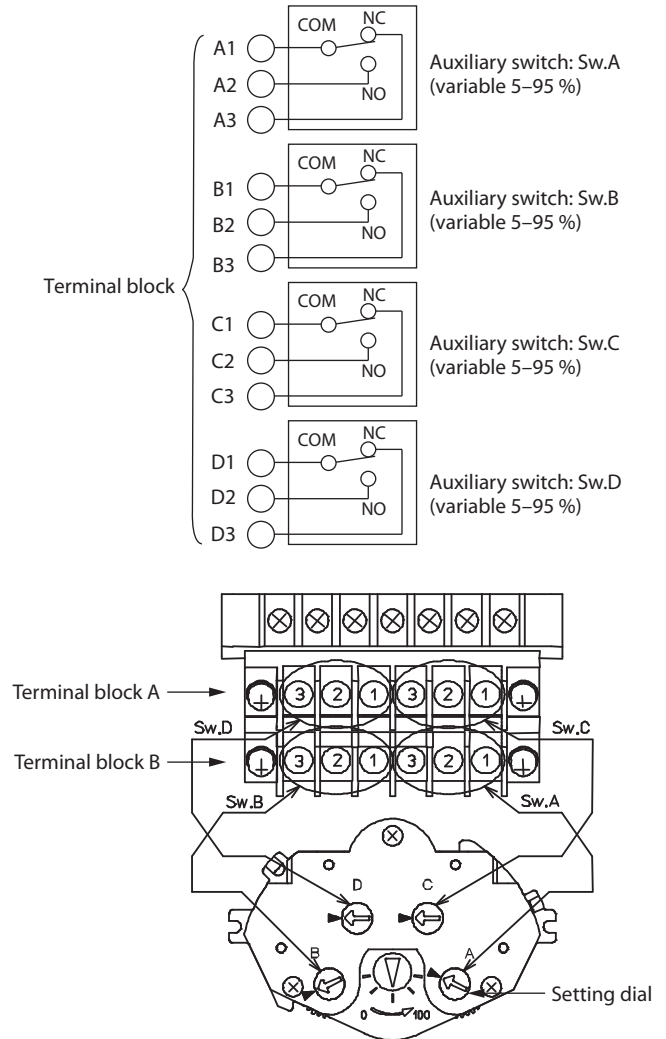
The figure below shows an example in which, at 50 % opening, connection between terminals 1 and 2 is ON while connection between terminals 1 and 3 is OFF.



#### ● How to set the operating point

- (1) Operate the motor electrically until the output shaft travels to the desired angle that turns on the switch. Then, align the arrow on the setting dial with the ► mark using a flat-head screwdriver.
- (2) Operate the motor electrically to rotate the output shaft near the set travel position, and check that the switch works normally.

The figure below shows an example of setting at 50 % opening.



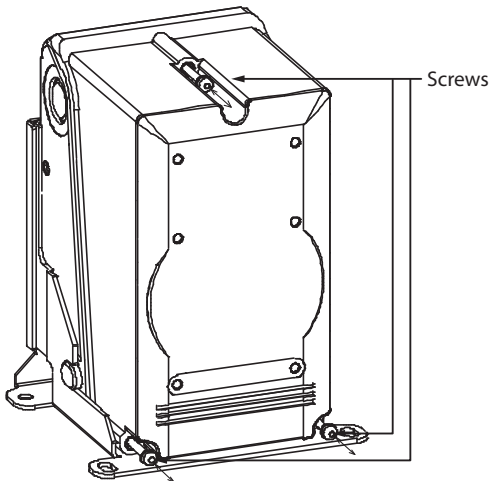
#### 📖 Note

- Use a 6 mm flat-head screwdriver for the slotted-head screws (JIS B 4609).

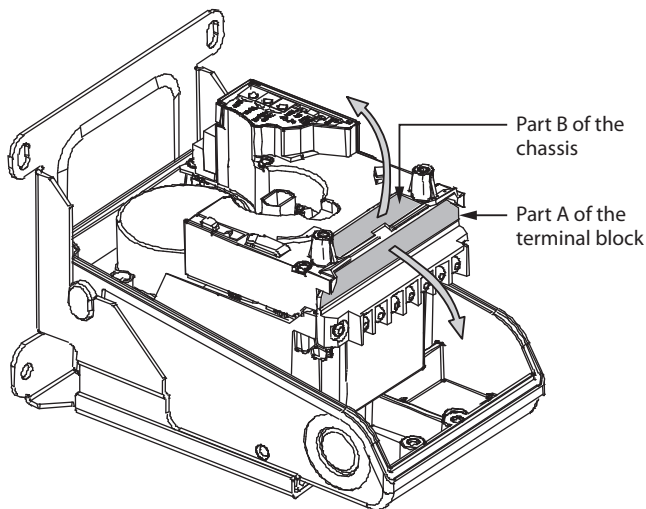
## ■ Installation and removal

### ● Installation

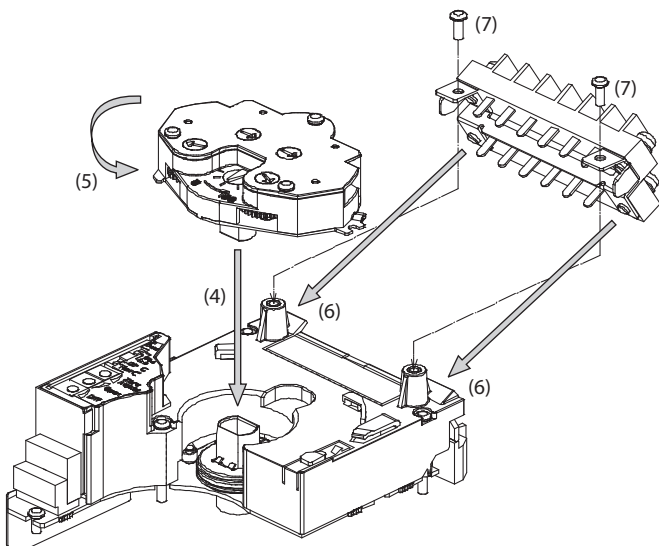
- (1) Turn OFF the power.
- (2) Loosen the 3 screws and remove the cover. Keep the removed parts in a safe place.



- (3) Rotate part B of the chassis upward and remove it. Fold part A of the terminal block outside and remove it.

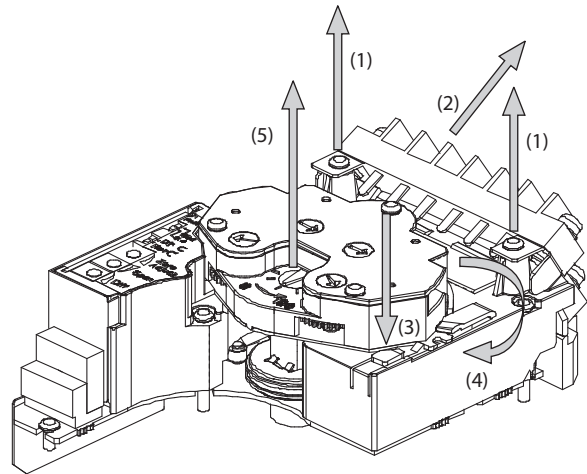


- (4) Insert the shaft of the auxiliary switch into the actuator shaft. (The triangular arrow on the 0–100 dial should be positioned within the scale.)
- (5) Turn the auxiliary switch unit counterclockwise until it clicks.
- (6) Align the holes on the terminal block bracket with the holes on the chassis.
- (7) Insert and tighten the 2 screws.



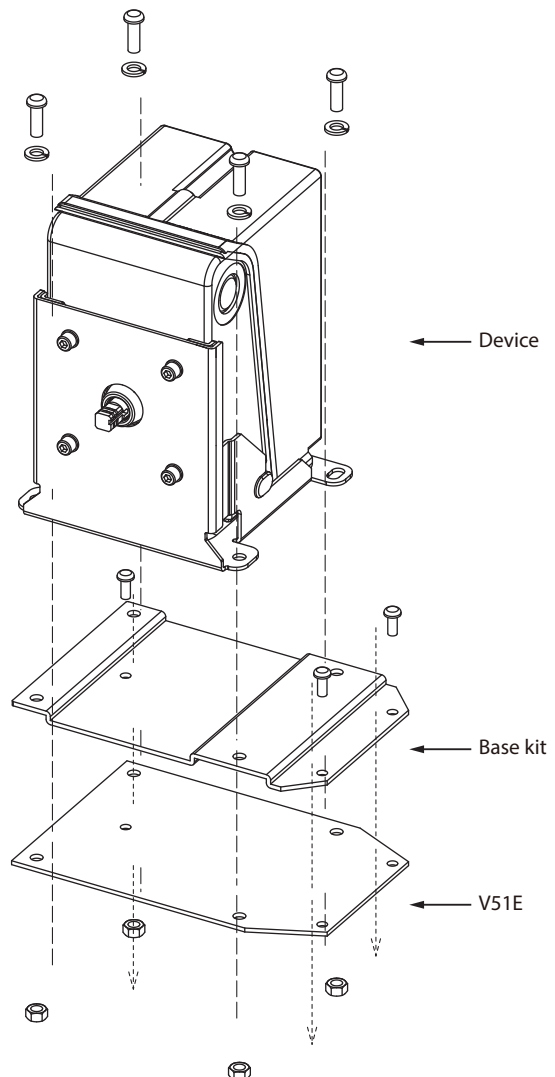
### ● Removal

- (1) Remove the 2 screws.
- (2) Remove the terminal block. The bracket is combined with the terminal block.
- (3) Press and hold the release button.
- (4) Turn the auxiliary switch unit clockwise.
- (5) Remove the unit by pulling it up.



## MOUNTING ON A BUTTERFLY VALVE (V51E)

If this device is mounted on the V51E, install the base kit (83165292-001, sold separately) between the V51E and the device.



## SPECIFICATIONS

### ■ Specifications

| Item                                      | Specifications   |         |   |
|---|--|---------|---|
| Operation mode (fixed by the model)       | ON-OFF or position proportioning   |         |   |
| Input signal                              | Relay contact, 4–20 mA DC, potentiometer   |         |   |
| Feedback potentiometer                    | Reference resistance for selection: 135 Ω (combination resistor*1)<br>Max. applied voltage: 5 V DC   |         |   |
| Input impedance (with 4–20 mA DC input)   | 125 Ω max. (at 20 mA) (45 Ω of signal reception resistor + resistance of overcurrent protection circuit)   |         |   |
| Angle of rotation (fixed by the model)    | 90° or 160°  |         |   |
| Rotation time                             | 90° stroke model   | 39/33 s | Relay contact, 50/60 Hz without load                          |
|   |  | 39 s    | Supply power: 85–264 V AC, 50/60 Hz without load              |
|   |  | 20/16 s | Relay contact, 50/60 Hz, without load, high-speed motor model |
|   | 160° stroke model  | 69/58 s | Relay contact, 50/60 Hz without load                          |
|   |  | 72 s    | Supply power: 85–264 V AC, no load, 50/60 Hz without load     |
|   |  | 35/29 s | Relay contact, 50/60 Hz, without load, high-speed motor       |
| Output torque                             | 12.5 N·m (high-speed motor: 6 N·m)   |         |   |
| Supply power voltage (fixed by the model) | 24 V AC ±15 %, 50/60 Hz<br>100 V AC ±10 %, 50/60 Hz<br>200 V AC ±10 %, 50/60 Hz<br>85–264 V AC, 50/60 Hz   |         |   |
| Power consumption (during operation)      | 👉 MODEL SELECTION TABLE (page 2)   |         |   |
| Standard operating conditions             | 23±2 °C, 50 ±10 %RH  |         |   |
| Ambient temperature                       | –20 to +60 °C  |         |   |
| Ambient humidity                          | 5–95 %RH (without condensation)  |         |   |
| Vibration resistance                      | 4.9 m/s <sup>2</sup>   |         |   |
| Insulation resistance                     | 5 MΩ min. with a 500 V DC megger between housing and power supply, input terminals, or forced open/close input terminals   |         |   |
|   | 20 MΩ min. with a 500 V DC megger between housing and auxiliary switches   |         |   |
| Dielectric strength                       | 500 V AC for 60 s (24 V AC models), 1200 V AC for 60 s (100 V AC models), 1500 V AC for 60 s (200 V AC and 85–264 V AC models) between housing and power & input terminals                   |         |   |
|   | 1500 V AC for 60 s between housing and auxiliary switch terminals  |         |   |
|   | 500 V AC for 60 s (24 V AC models), 1200 V AC for 60 s (100 V AC models), 1500 V AC for 60 s (200 V AC and 85–264 V AC models) between housing and power & forced open/close input terminals |         |   |
| Default positions of auxiliary switches*2 | A and C: at 9° ±5°<br>B and D: at 81° ±5°  |         |   |
| Forced open/close input                   | Non-voltage contact<br>Contact rating: 15 V DC min., 100 mA min,<br>Contact resistance: 10 Ω max. (at 1 mA DC)   |         |   |
| Sealing                                   | IP54 (protection from splashing water) or the equivalent (with waterproof cable gland)   |         |   |
| Material                                  | Case: Die-cast aluminum<br>Cover: Glass-containing polycarbonate resin<br>Bracket: Steel   |         |   |
| Mass                                      | Approx. 3 kg   |         |   |
| Standards compliance*3                    | EN 55011 class A, EN 61000-6-2*4, UL 873 class 2, GB 30439.8   |         |   |

#### \*1. Feedback potentiometer output specifications

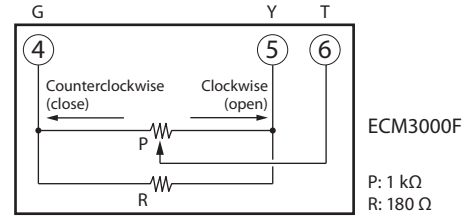
The feedback potentiometer of the ECM3000F has the following equivalent circuit. (See the diagram of parallel resistors below.)

In the controller, the resistance of the feedback potentiometer is converted to voltage, which indicates the motor opening.

In other words, the angle of rotation is not calculated directly from the resistance of the potentiometer. But if a combination resistor (1 kΩ + 180 Ω) is used, the resistance can be close to 135 Ω, which has been conventionally used in the industry.

The following are Azbil Corporation's controllers compatible with this device: SDC35/36, SDC45/46, the SDC40 series, DMC10, Network Instrumentation Modules, RN748.

For other products, please contact the azbil Group.

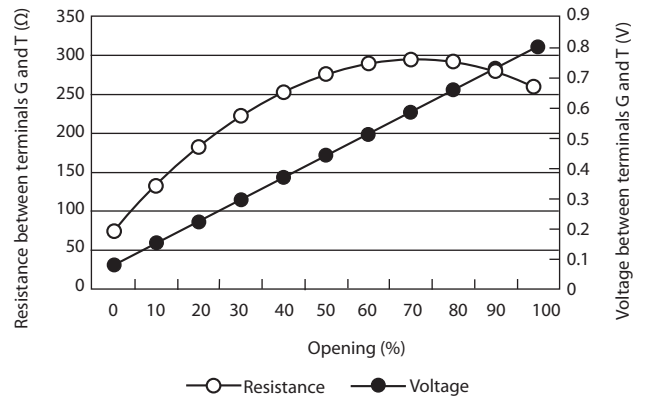


#### 📖 Note

- In old models, such as the M904, because the feedback potentiometer uses a single resistor, if the resistance of the potentiometer is measured (between terminals G and T) with a continuity tester, the motor opening can be deduced. However, the output part of the feedback potentiometer of this device consists of multiple resistors. Thus, unlike old models, its resistance is not proportional to the motor opening.

The controller calculates the motor opening from the voltage between terminals G and T.

The voltage between terminals G and T is linear to the motor opening, but if the resistance between these terminals is measured, as was possible for older models, the result will not be linear to the motor opening. Instead, the relationship can be graphed as a parabola, as shown below.



\*2. For 90° stroke models with auxiliary switches

\*3. Varies depending on the model.

👉 MODEL SELECTION TABLE (page 2)

\*4. During EMC testing, the reading may fluctuate by ±5 %FS

## Optional parts (sold separately)

| Name                      |   | Model No.   |
|---------------------------|---|---|
| Crank arm                 |   | N-3128  |
| Damper arm                |   | J-26026G-ARM  |
| Ball joint                |   | J-27518-JOINT   |
| Valve linkage*1           |   | Q455C/D   |
| Damper linkage            |   | Q605A/D/E   |
| V51 base kit              |   | 83165292-001  |
| Waterproof connector      |   | 83104346-003  |
| 24 V AC power transformer |   | AT72-J1   |
| Extension unit*2          | 4 built-in auxiliary switches           | 83174065-002<br>(Contact current: 100 mA to 5 A [resistive load], 100 mA to 3 A [inductive load])   |
|                           |   | 83174065-102<br>(Contact current: 1 to 100 mA [inductive load, including inrush current])           |
|                           |   | 83174065-003*3<br>(Contact current: 100 mA to 5 A [resistive load], 100 mA to 3 A [inductive load]) |
|                           |   | 83174065-103*3<br>(Contact current: 1 to 100 mA [inductive load, including inrush current])         |
|                           | Auxiliary potentiometer for 90° stroke  | 83165272-001  |
|                           | Auxiliary potentiometer for 160° stroke | 83165272-002  |

\*1. Can be attached to 160° stroke models.

\*2. Only one type of extension unit can be mounted on the model without internal auxiliary switch.

\*3. For compliance with GB standards, use this model.

## Handling Precautions

- The output of the auxiliary potentiometer cannot be connected to an M904E Modutrol motor and to an ECM3000E motor. Use the potentiometer for output to an external valve-opening indicator or the like.

### Auxiliary switch

| Item                | Specifications  |
|---------------------|---|
| Auxiliary switches* | 4 (or 2)  |
| Contact rating      | Standard model.: 250 V AC, 100 mA to 5 A (resistive load), 100 mA to 3 A (inductive load)<br>Low-current model.: 250 V AC, 1 to 100 mA (inductive load, including inrush current)<br>Note: If UL or CE compliance is required, the necessary rating is 30 Vrms or 42.4 V peak AC or less. |
| Service life        | Standard model: 50,000 cycles or more.<br>Low-current model: 200,000 cycles or more.<br>Note: Service life figures assume a resistive load.   |
| Default positions   | A and C: at $9^\circ \pm 5^\circ$<br>B and D: at $81^\circ \pm 5^\circ$   |
| Setting range       | 5–95 % opening  |
| Terminals (4 or 2)  | 1 Common<br>2 NO (Normally Open)<br>3 NC (Normally Closed)  |

\* Models with forced open/close function have only auxiliary switches A and B.

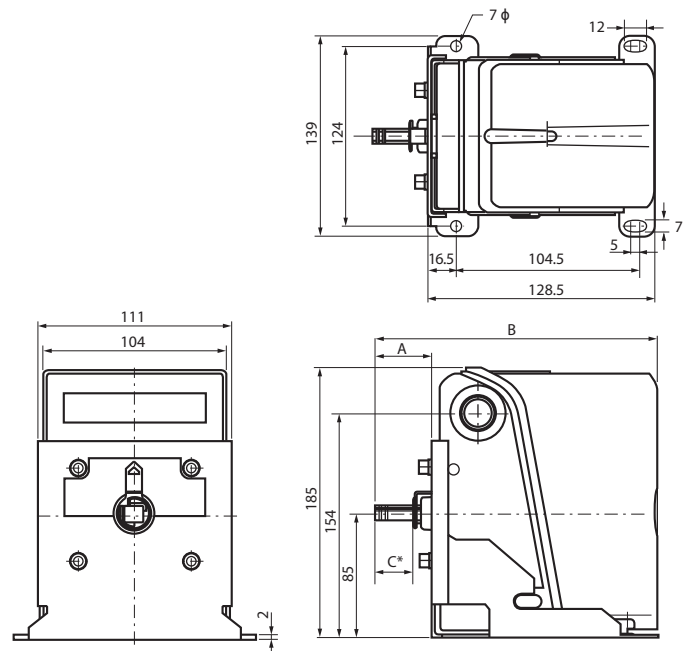
### Auxiliary potentiometer

|  |   |
|--|---|
| Total resistance   | 1 k $\Omega$ $\pm$ 10 %   |
| Accuracy   | $\pm$ 8 %FS   |
| Hysteresis   | $\pm$ 5 %FS   |
| Terminal Y voltage change in relation to the applied voltage | Continuous change between 14 $\pm$ 6 % (0 % opening) and 86 $\pm$ 6 % (100 % opening) |
| Max. applied voltage   | 5 V DC  |

## External dimensions

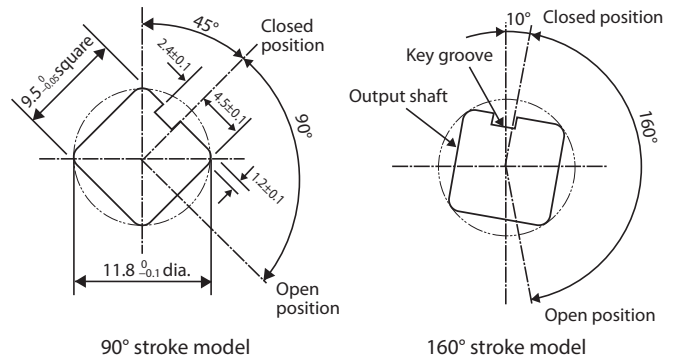
Unit: mm

| Angle of rotation | A    | B     | C  |
|-------------------|------|-------|----|
| 90° stroke model  | 32.5 | 161.6 | 22 |
| 160° stroke model | 20.5 | 149.6 | 12 |



\* C is the length of the output shaft (9.5 mm square).

- 0 % opening position of the output shaft (when viewing the output shaft)



## Handling Precautions

- The length of the output shaft varies depending on the model. Only 90° stroke models have a pointer.

基于SJ/T11364-2014 「电子电气产品有害物质限制使用标识要求」的表示式样  
产品中有害物质的名称及含量

| 部件名称  | 有害物质   |        |        |               |            |              |
|-------|--------|--------|--------|---------------|------------|--------------|
|       | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr (VI)) | 多溴联苯 (PBB) | 多溴二苯醚 (PBDE) |
| 电路板组件 | ×      | ○      | ○      | ○             | ○          | ○            |
| 本体    | ×      | ○      | ○      | ○             | ○          | ○            |

本表格依据SJ/T 11364 的规定编制。

○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。  
×：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。

**azbil**

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Specifications are subject to change without notice. (09)

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