



Instruction Manual

ZENMAI MOTOR

ZM60-02

ZM60-05

ZM60-08

ZM80-02

ZM80-05

ZM80-08

ZM80-16

For safe and correct operation of the product, please be sure to read this manual and fully understand its content before use.
After reading, keep the manual safe so that you can find and use it readily.
In case of resale or transfer of this product, make sure to transfer the manual to the new owner.

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Introduction



Thank you very much for purchasing the Zenmai Motor. To prevent any trouble and obtain the best performance, please be sure to read this Instruction Manual and fully understand its content.

Notation in this Instruction Manual

Hazard levels

This product is designed with ultimate priority on the safety of operators. However, due to the nature of the system, there are risks that cannot be removed.

In this manual, the level of significance and risk is defined and indicated in two stages, "WARNING" and "CAUTION". Thoroughly read and fully understand the indicated items before operating the product and performing maintenance procedures. The indications for "WARNING" and "CAUTION" are described below in order of risk significance (WARNING > CAUTION).

 WARNING	A situation that, if mishandled, may cause death or serious disability.
 CAUTION	A situation that, if mishandled, may cause minor or moderate injury, or property damage.

The extent of the problem described above (disability, injury, and property damage) is defined as follows.

Serious disability: Loss of eyesight, wound, burn (high-temperature or low-temperature), electric shock, bone fracture, poisoning, and other injuries that leave aftereffects and that require hospitalization or long-term outpatient treatment.

Moderate injury: Burn, electric shock, bone fracture, and other injuries that do not require hospitalization or long-term outpatient treatment.

Minor injury: Scratch, bruise, laceration, and other injuries that have a minor impact on health.

Property damage: Extended damage to buildings, household articles, and injury to domestic animals or pets.


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1. Signs and Precautions for Handling

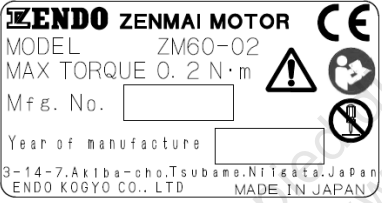

1-1 Labels

Symbols for hazard classifications are indicated on the nameplate of the product.

 WARNING	
<ul style="list-style-type: none"> ● The operators must check the positions of all danger warning labels attached to the product, and thoroughly read and fully understand the information on the labels before performing any procedure. ● If the warning labels are peeling off or deteriorated and become illegible, contact us to replace them. 	

1-1-1 Types of label and nameplate

The following labels are attached to this product.

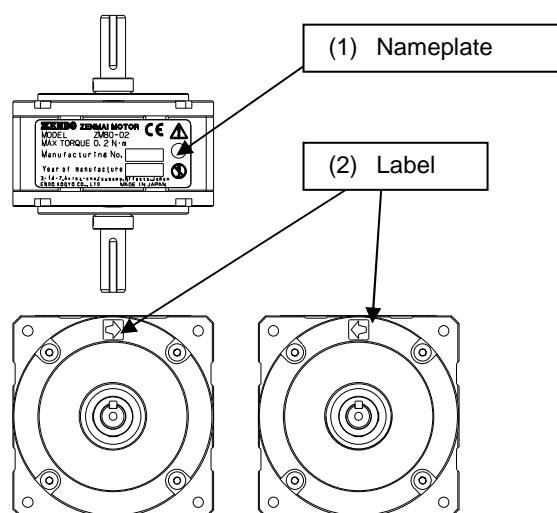
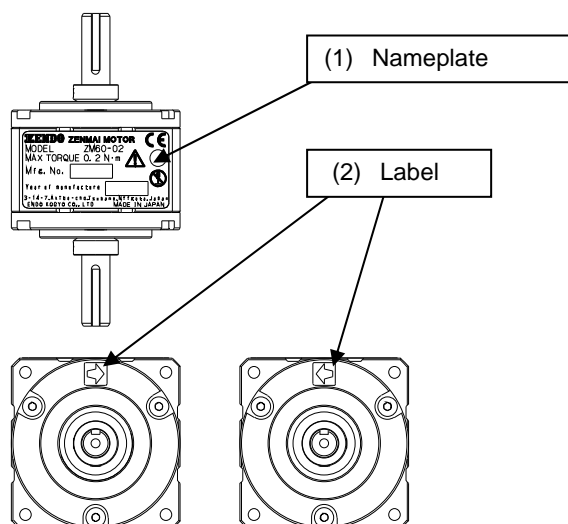
No.	Label appearance	Details
(1)		This is the nameplate of the product. The model name and the maximum torque of the product is indicated.
(2)		This label shows the rotation direction. Rotating the shaft toward the direction of the arrow generates torque.

1-1-2 Locations of label and nameplate

The label and nameplate are attached to the following locations of the product as shown below.

■ ZM60-02, ZM60-05, ZM60-08

■ ZM80-02, ZM80-05, ZM80-08, ZM80-16



1-2 Precautions for handling

Incorrect handling of this product may cause damage to the product itself as well as an injury. Thoroughly read the following precautions and be sure to heed the instructions when handling the machinery.



WARNING

- Do not perform any modification or disassembly of the product.
- Do not use the product overhead or in any locations where an injury may result.



CAUTION

- Install the product correctly in accordance with the descriptions in this manual.
- Do not hold the keyway.
The edge of the keyway may cause an injury.
- Install the main equipment of the Zenmai Motor before rotating the shaft or the parts that are installed on the shaft.
If you rotate the shaft or the main equipment before installation, the shaft or the main equipment may rotate when released and cause an injury.
- If you install and operate the Zenmai Motor on another device, install a safety cover on the rotating part or attach a warning label to the device.
- If the spring ruptures, there will be no torque or less torque generated.
If a loss of torque will create a safety risk, suitable precautions must be taken by the customer.
- Rotating the shaft or the parts that are installed on the shaft in the direction of the arrow generates torque.
When you release the rotated shaft or parts, they may quickly rotate in the reverse direction and cause an injury.
- A sudden release of the spring may damage the spring.
Do not release the spring when there is no load on it.
- If you wind the spring more than the maximum number of turns, a mechanism to prevent excess winding works and makes clicking sounds.
Do not operate the device in such a way that the mechanism to prevent excess winding is constantly activated.
- Be sure to perform daily inspections.
- Check that no torque is being applied to the shaft before removing the Zenmai Motor from the device.

2. Unpacking and Installation

2-1 Packaging arrangement and transportation

This product is packaged for delivery in a cardboard box.

When transporting the package, do not drop or apply excessive impact to it.

Standard product

Zenmai Motor ZM60-02、ZM60-05、ZM60-08

Weight: Approximately 0.5 kg

ZM80-02、ZM80-05、ZM80-08、ZM80-16

Weight: Approximately 0.8 kg

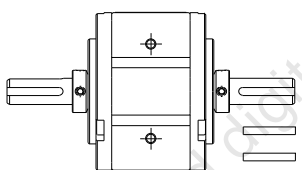
2-2 Checks after unpacking

After opening the package, check that the following products are included.

Please contact us if you find anything missing or damaged.

■ **Packing contents**

(main equipment only)

Item	Appearance
Zenmai Motor (key × 2)	
Instruction Manual	(This manual)

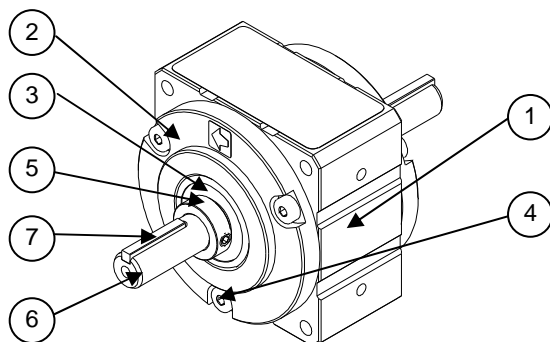
2-3 Disposal of packing materials

After opening the package, dispose of any packing and cushioning materials in accordance with the local regulations of the area where the product is used.

3. Product Description

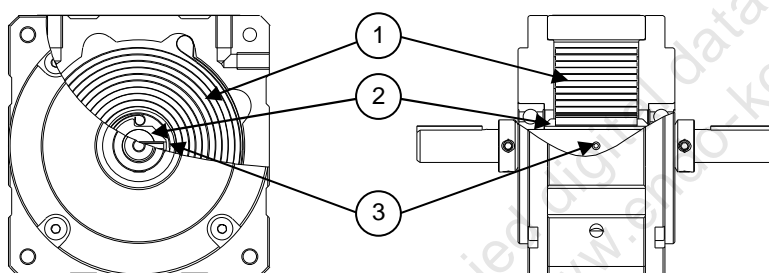
3-1 Components

3-1-1 Main equipment of Zenmai Motor (external view)



Ref. No.	Part name
(1)	Casing
(2)	Cover
(3)	Deep groove ball bearing
(4)	Hexagon socket head cap screw
(5)	Collar
(6)	Shaft
(7)	Key

3-1-2 Main equipment of Zenmai Motor (internal view)



Ref. No.	Part name
(1)	Spring
(2)	Bushing
(3)	Spring pin

3-2 Product specifications

Model	ZM60-02	ZM60-05	ZM60-08	ZM80-02	ZM80-05	ZM80-08	ZM80-16
Maximum torque	0.2 N·m	0.5 N·m	0.8 N·m	0.2 N·m	0.5 N·m	0.8 N·m	1.6 N·m
Maximum number of turns	10	7	4.5	22	17	12	9
Main equipment mass	0.5 kg	0.5 kg	0.5 kg	0.8 kg	0.8 kg	0.8 kg	0.8 kg

Note: See "5. Torque Adjustment" (page 8) for the details of torque and the number of turns.

3-3 Operating environment

Installation location: General indoor
 Ambient temperature: -10°C to +50°C (no freezing)

3-4 Disposal of product

WARNING

- Do not disassemble the Zenmai Motor.
 If you disassemble the main equipment without sufficient care, there is a danger that the spring may spring out.

When disposing of the product, the customer should not disassemble the product. Please contact an appropriate collection service that deals with recycling materials.

4. Installation

! CAUTION

- Install the product correctly in accordance with the descriptions in this manual. Incorrect installation may cause an injury, property damage, or damage to the Zenmai Motor.

4-1 Check of installation location

Before installing the product, check that the installation location does not have any of the following problems.

- 1 Check that the support member can withstand a force of 1 kN or more.
- 2 Check that the installation location has the installation environment described in “3-3 Operating environment” (page 6).

4-2 Key installation

! CAUTION

- Do not hold the keyway. The edge of the keyway may cause an injury.

Use the accessory key if installing gear or coupling to the shaft.

4-3 Installation procedures

! CAUTION

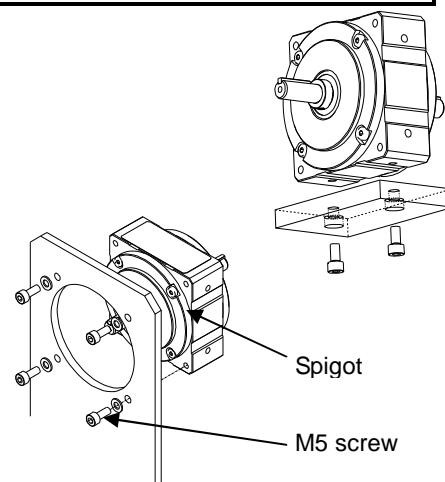
- Prepare support members that have a strength of 1 kN or more.
- You can use the side spigot or the front through holes of the main equipment for the installation.

4-3-1 Example of installation using the side spigot of the main equipment.

Fix the main equipment to the plate or bracket with screws.
See “8. Outline Drawings” (page 12) for detailed dimensions.

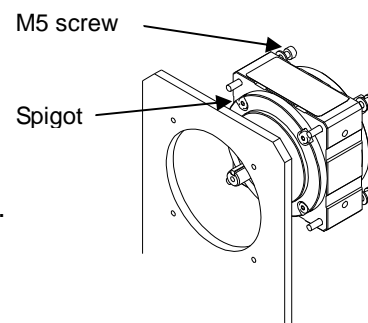
4-3-2 Example of installation using the front spigot of the main equipment.

You can use the spigot and M5 tapped holes of the main equipment for the installation.
See “8. Outline Drawings” (page 10) for the detailed dimensions.



4-3-3 Example of installation using the front through holes of the main equipment.

You can use the spigot and $\varnothing 4.2$ through holes of the main equipment for the installation.
See "8. Outline Drawings" (page 10) for the detailed dimensions.



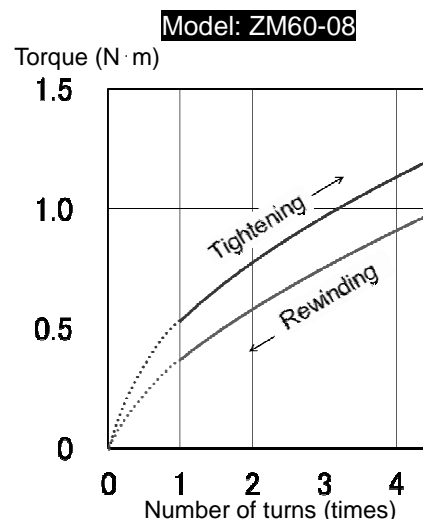
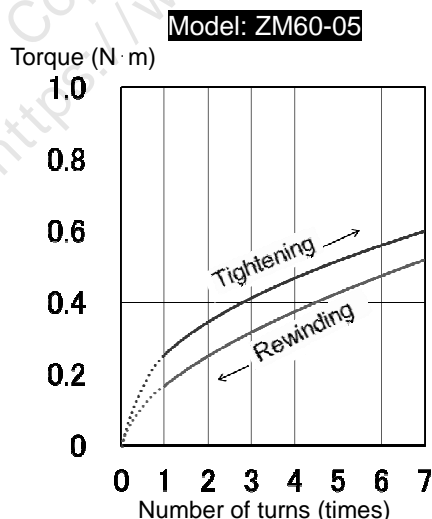
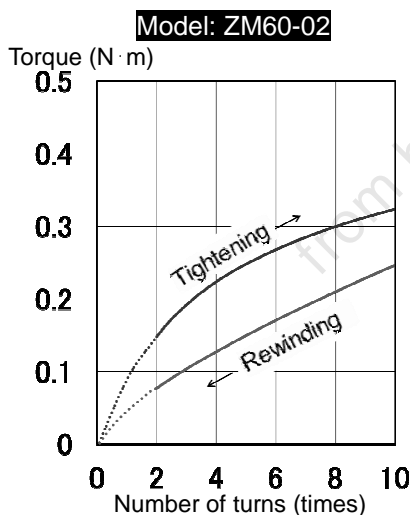
5. Torque Adjustment

! CAUTION

- Rotating the shaft or the parts that are installed on the shaft in the direction of the arrow generates torque.
When you release the rotated shaft or parts, they may quickly rotate in the reverse direction and cause an injury.
- A sudden release of the spring may damage the spring.
Do not release the spring when there is no load on it.
- If you wind the spring more than the maximum number of turns, a mechanism to prevent excess winding works and makes clicking sounds.
Do not operate the device in such a way that the mechanism to prevent excess winding is constantly activated.

Perform the initial turn and other settings as indicated in the graphs below.

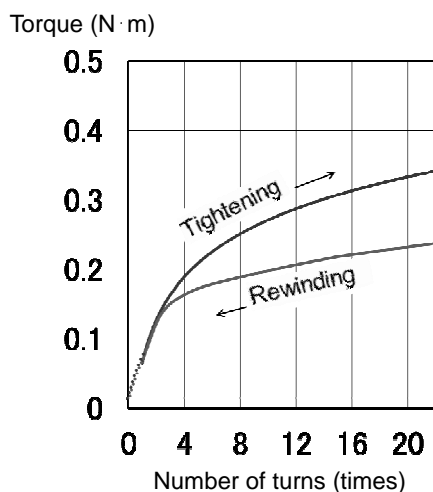
[Torque and number of turns]



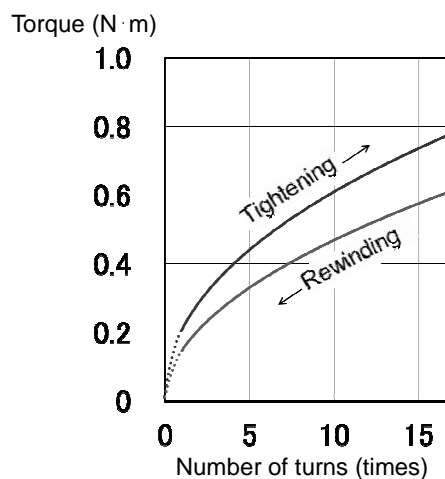
Due to the characteristics of the product, the spring may not fully return, even without any torque. This makes the product inoperable within the ranges that are indicated by the broken lines in the graphs.

Allow a little leeway for the maximum turns.

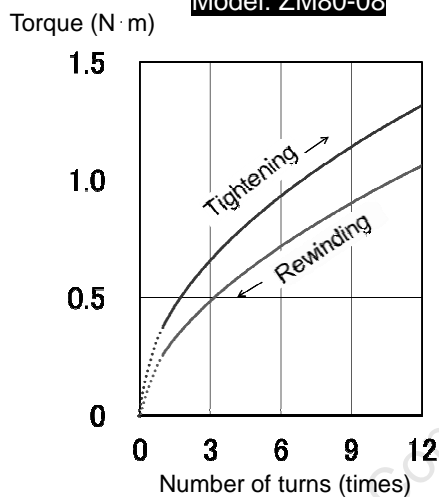
Model: ZM80-02



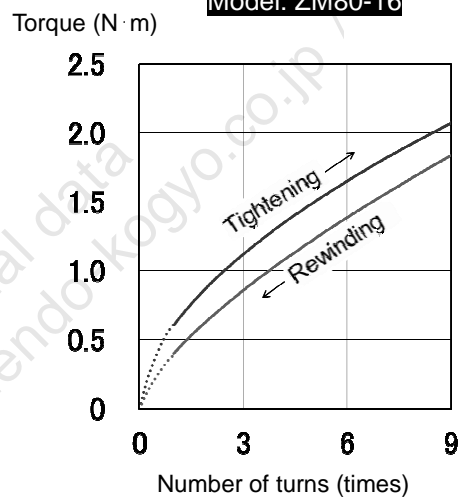
Model: ZM80-05



Model: ZM80-08



Model: ZM80-16



6. Maintenance

⚠ CAUTION

- If you notice any damage or deformation, stop using the product.

Daily inspections are required for the product to be used safely and properly. If any failure is found in the inspections, the relevant parts must be replaced. For details, contact us or your dealer.

6-1 Daily inspections

Before starting the operation, check the following items daily:

- Check for loose screws.
- Check for damage or deformation of the main equipment.

7. Troubleshooting

7-1 Countermeasures

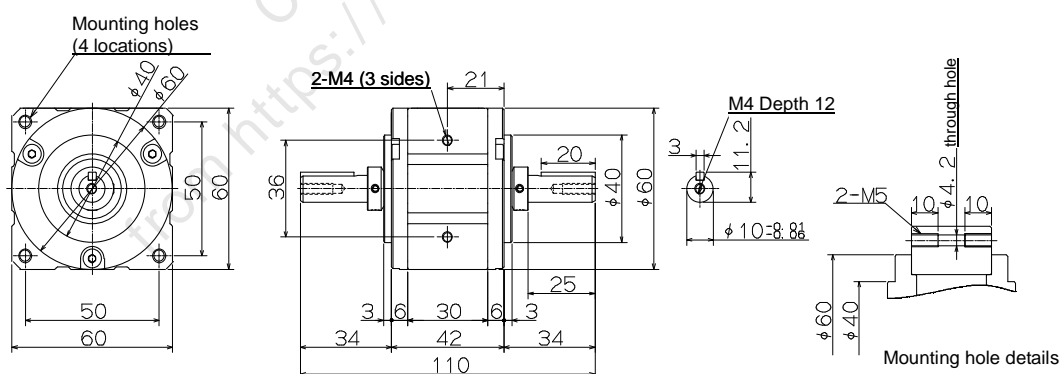
⚠ CAUTION

- If you notice anything unusual, stop the operation immediately. Take appropriate measures after checking the items listed in the table below.
- If the situation does not relate to any of the listed items in the table below, contact us or your dealer.

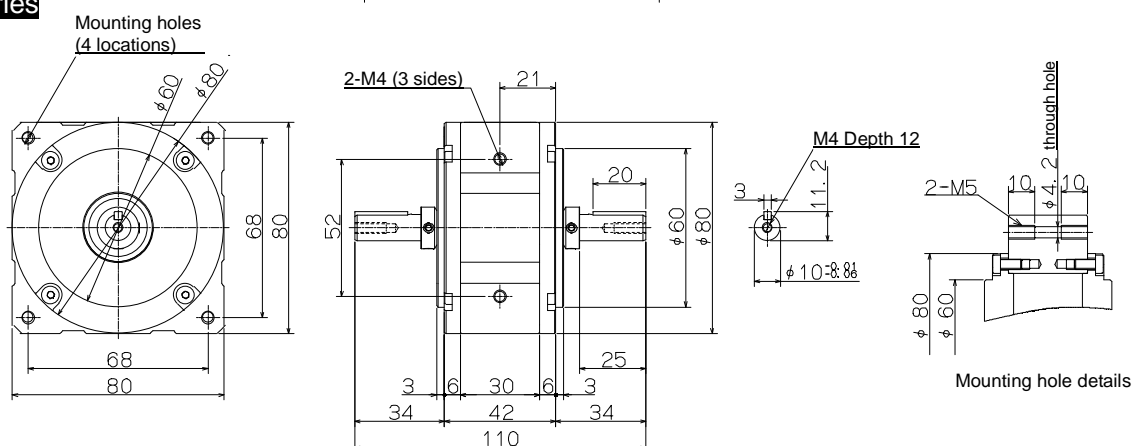
Failure	Reason	Measure
Rotating the shaft does not generate torque during installation.	The shaft rotates in the opposite direction.	Check the rotation direction.
The available number of turns is reduced.	The spring does not fully rewind.	Operate with some allowance.
An abnormal noise is audible.	The mechanism to prevent excess winding is working.	Check the number of turns.
No torque is generated during the operation.	The spring is ruptured.	Contact your dealer.
Torque is reduced during operation.	The spring is ruptured.	Contact your dealer.

8. Outline Drawings

ZM60 series



ZM80 series



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