



# Repair Manual

## Retractor

**ERM-2**

**ERM-4/ERM-4S**

**ERM-6/ERM-6S**

**ERM-8/ERM-8S**



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 ownership of this product, make sure to transfer the manual to the new owner.

# Introduction

Thank you very much for purchasing the Spring Balancer. To prevent any trouble and obtain the best performance, please be sure to read this Repair Manual and the separate Users Manual, and fully understand their content.



## Notation in this 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 three stages:

“WARNING”, “CAUTION”, and “NOTICE”. Thoroughly read and fully understand the indicated items before operating the product and performing maintenance procedures. The indications for “WARNING”, “CAUTION”, and “NOTICE” are in order of risk significance (WARNING > CAUTION > NOTICE). Their details are described below.

 <b>WARNING</b>	A situation that, if mishandled, may cause death or serious disability.
 <b>CAUTION</b>	A situation that, if mishandled, may cause minor or moderate injury.
<b>NOTICE</b>	A situation that, if mishandled, may cause 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.





Other than WARNING, CAUTION, and NOTICE described above, matters important to workers are indicated using the following format.

### REMINDER

Describes important details to be remembered for the operation.

## Symbols

This Users Manual uses the following symbols to simply provide information in addition to the indications above.

	Indicates a PROHIBITED action that must not be performed.		Indicates potential property damage or a danger that may inflict bodily injury.
	Indicates a REQUIRED action that must be performed.		Indicates that it is necessary to thoroughly read the manual and the relevant documents.

## Illustrations

This manual covers multiple models of the Spring Balancer. If their functions and details of operations are identical and can be correctly described in the same way, illustrations are provided taking a specific model as an example. Therefore, please note that the illustrations may be different from the actual equipment.

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## Scope of warranty and liabilities for the equipment

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### Warranty and liabilities for the equipment

1. We will repair or replace the product free of charge if a failure due to manufacturing defects occurs under proper usage during the warranty period. For details, contact us or your dealer.
2. The warranty will be void in the following cases:
  - 1) Change in ownership.
  - 2) Repair or modification performed by a party other than the manufacturer, agents, or dealers.
3. The warranty period is one (1) year from the date of purchase.
4. Repairs applicable to any of the following shall be charged even during the warranty period:
  - 1) Failure/damage caused by incorrect use.
  - 2) Failure/damage caused by use of non-genuine parts.
  - 3) Failure/damage caused by fire, earthquake, natural disaster, or other unexpected incident.
  - 4) Incident caused by fall, shock, negligence, or by inadequate storage.
  - 5) Failure/damage caused by use of parts or other equipment that are not included in this product.
  - 6) Replacement of consumables.
  - 7) Usage in violation of dangers or cautions stipulated in the User's Manual and this manual.
  - 8) Failure/damage caused by any reason that is not attributable to the manufacturer.
5. Warranty exclusions such as opportunity loss.

Either during or after the warranty period, opportunity loss, damage to anything other than our product(s), or other duties imposed on you/your customer as a result of the failure of our product(s) are outside the scope of the warranty.

### Copyright and liabilities

The copyright for this manual belongs to Endo Kogyo Co., Ltd.

The manual is provided for the limited purpose of supporting the safe and proper use of the product. It cannot be used for other purposes.

The customer may not use or make copies of this manual, in whole or in part, outside of this purpose without receiving prior consent from Endo Kogyo Co., Ltd.

The customer is also prohibited from translating or modifying the content of the manual, in whole or in part.

The content described in the manual is subject to change without advance notice. Please note this in advance.

## Definition of intended users for this manual

This manual has been prepared to help all intended users involved with this product. From the standpoint of safety, we have defined intended users according to their ability and experience and provided detailed descriptions for each group.

This manual defines four user levels.

<b>Operator</b>	The operator is a user who engages in general operations. Maintenance and other operations that require special skills are excluded from the general operations. The operator is therefore not permitted to disassemble the main equipment. The operator should read the manual thoroughly and carry out their work with complete understanding of the operating procedures.
<b>Maintenance operator</b>	In addition to the work of the operator described above, the maintenance operator is permitted to perform installation, simple troubleshooting, and periodic inspections. The maintenance operator is required to develop sufficient knowledge and operating skill for this product. The maintenance operator should read the manual thoroughly and carry out their work with complete understanding of the equipment's characteristics and all work contents.
<b>Management supervisor</b>	The management supervisor is required to have sufficient knowledge of the product and advanced operating skill for this product. The management supervisor should manage not only the product itself but on-site operations that handle the product, comprehensively.
<b>Service engineer</b>	The service engineer is a worker with special knowledge and skills for installing the product, investigating the causes of a failure or damage, and performing repairs and overhauls. Service engineering (the work by the service engineer) is performed by our service technicians or other authorized service personnel.

## Emergency contact in case of malfunctions

If any problem with the product arises, contact us or your dealer.

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# 1. Precautions for handling

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

## **WARNING**



- Do not use in explosive, flammable gas, or dusty atmospheres, any place where water or oil may splash, or near combustibles. This may cause fire and injury.
- Do not perform any modifications to the product.



The maintenance should be performed by a maintenance operator who has developed sufficient knowledge and operating skill for the balancer.



- Incorrect usage of the product may cause injury. Use the product correctly in accordance with the descriptions in this manual.
- Particularly, “WARNING”, “CAUTION”, and “NOTICE” described in this manual must be fully understood and always observed.
- Install the product correctly in accordance with the descriptions in this manual.

## **CAUTION**



- Be sure to perform daily and periodic inspections.

## 2. Maintenance

### **WARNING**



The maintenance should be performed by a maintenance operator who has developed sufficient knowledge and operating skill for the balancer.

### **CAUTION**



Replace any parts using genuine parts only.

Daily and periodic 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.

### 2-1 Daily inspections

Before starting the operation, refer to “6-1 Pre-operation inspections and checks” of the separate User’s Manual and perform the inspections and checks daily.

### 2-2 Periodical inspections

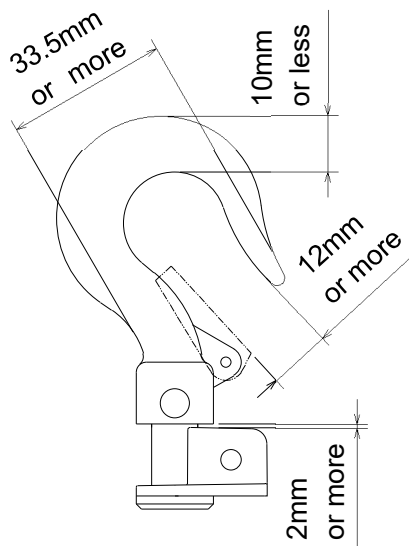
Perform an inspection at least once per month.

If the product is used in an unfavorable environment or used frequently, reduce the interval between the inspections.

#### 2-2-1 Inspection of the hook

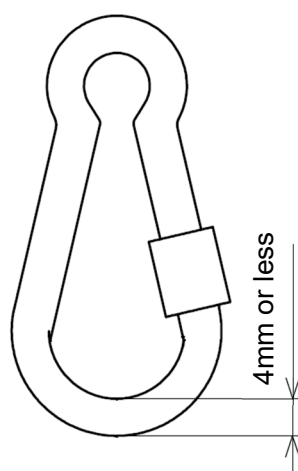
See the figure below and measure the dimensions of the hook. The hook must be replaced when any dimensions have reached the limiting dimensions. Stop using the balancer, and contact us or your dealer.

##### ■ Operating limit of the top hook





## ■ Operating limit of the bottom hook



## 2-2-2 Inspection of the wire rope

See the figure below and measure the dimension of the wire rope. The wire rope must be replaced when the dimension has reached the limiting dimension or the limiting number of broken wires within one pitch. Stop using the balancer and change the wire rope (see "2-3 Replacement of the wire rope"), or contact us or your dealer.

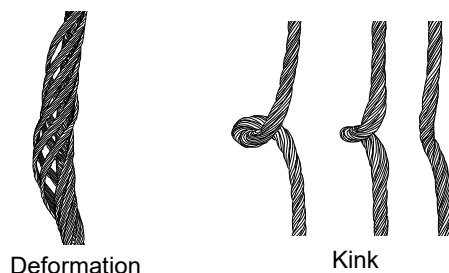
## ■ Operating limit of the wire rope



Reference dimension	Limiting dimension	Limiting number of broken wires within one pitch
2.5mm	2.3mm	13

## ■ Check of the state of the wire rope

Check that there is no deformation or kink in the wire rope.

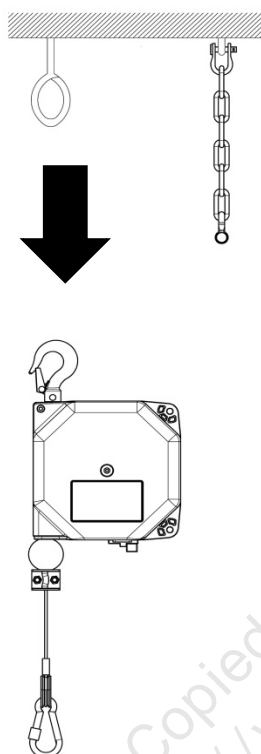


Note: Kink is the state in which the wire rope is partially deformed due to torsion or looseness.

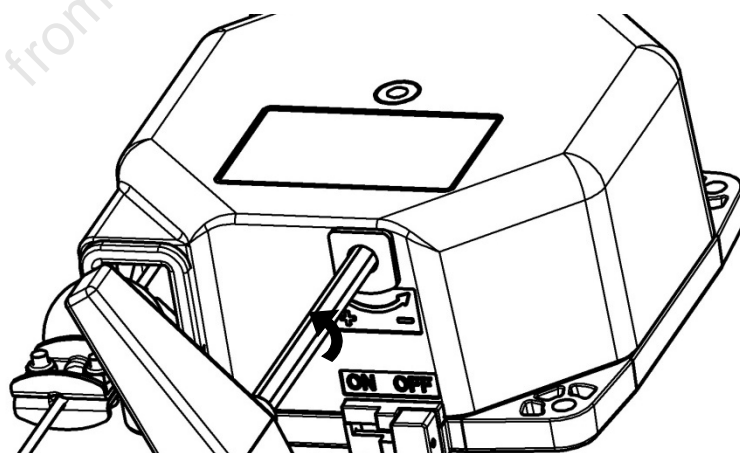
## 2-3 Replacement of the wire rope

### 2-3-1 Disassembly

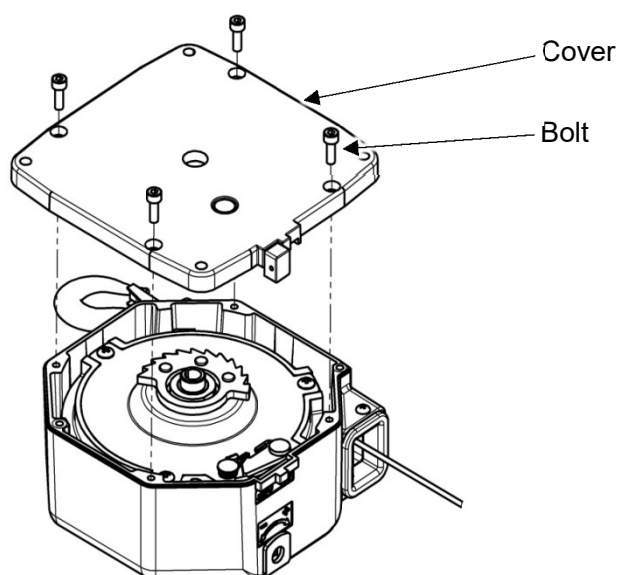
- 1 Lift the tool (equipment) and retract the wire rope completely. Remove the tool (equipment) from the bottom hook.
- 2 Disconnect the auxiliary wire rope or chain from the retractor.
- 3 Remove the retractor from the support member (metal hanger).



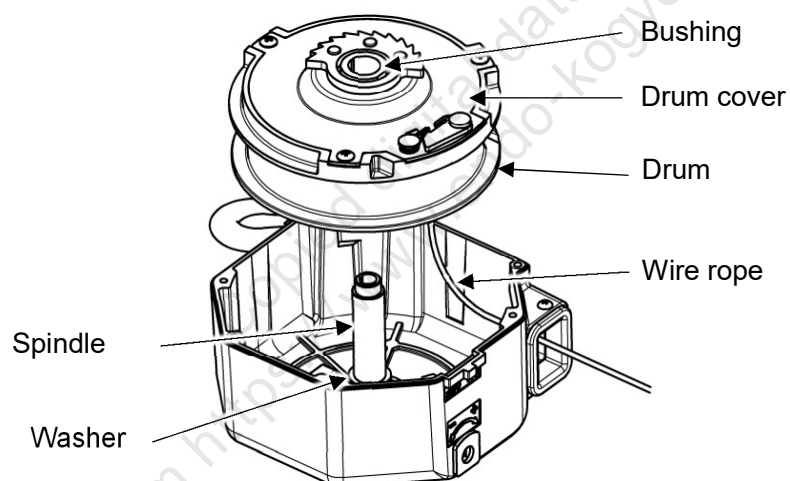
- 4 Turn the worm to the " - " direction (counterclockwise) and decrease tension to 0. Test the wire rope by pulling it to make sure the spring tension is 0.



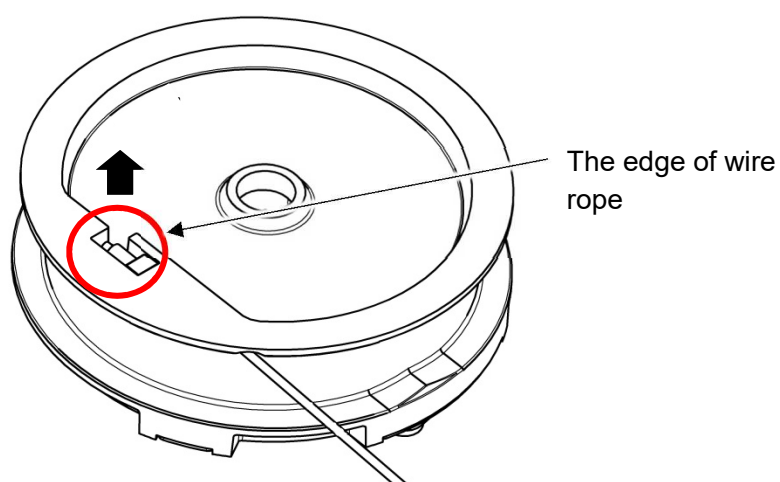
- 5** Remove the bolts and remove the cover.



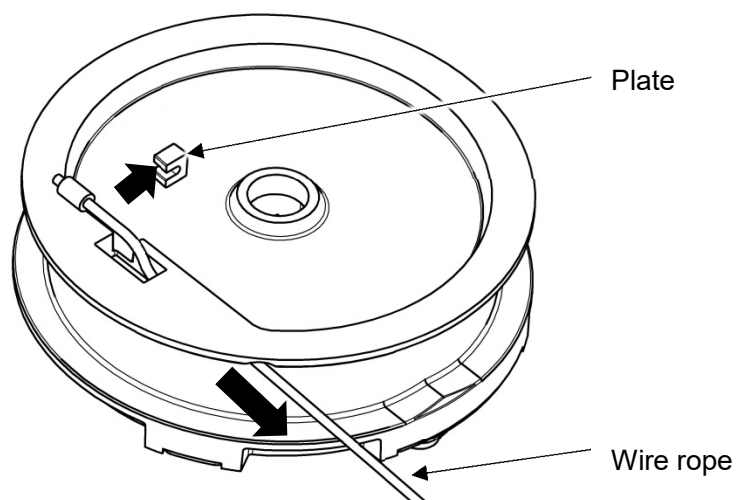
- 6** Remove the bushing, drum, drum cover and wire rope as one unit from the casing. Do not remove the washer and spindle.



- 7** Turn the drum over and lift up the edge of wire rope using a flat head screwdriver.

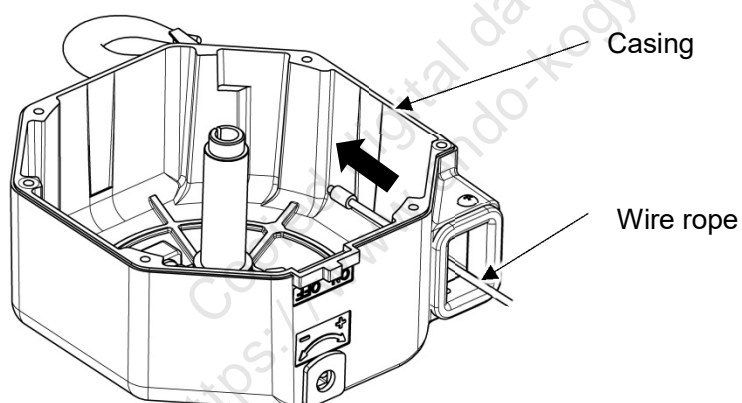


- 8 Remove the plates from the edge of wire rope.  
Pull out and completely remove the wire rope.

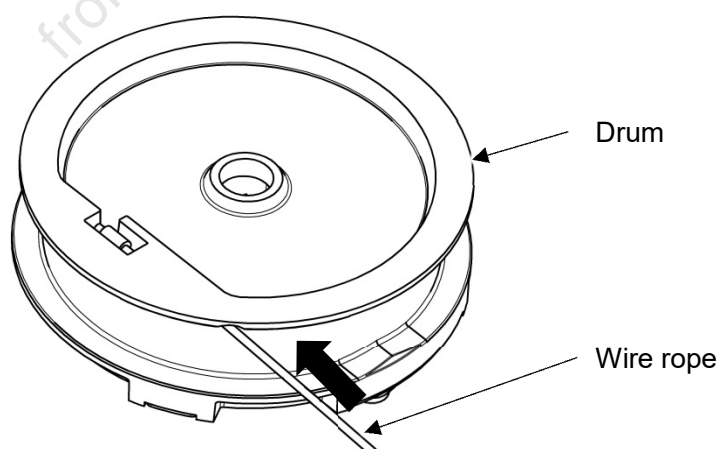


## 2-3-2 Installation of wire rope

- 1 Insert the new wire rope into casing.



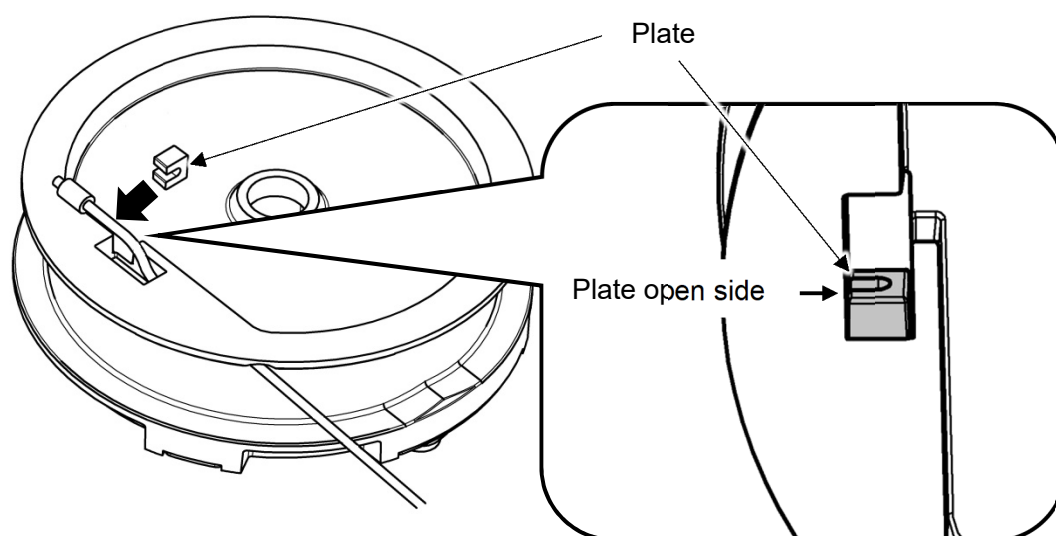
- 2 Insert the new wire rope into the drum.



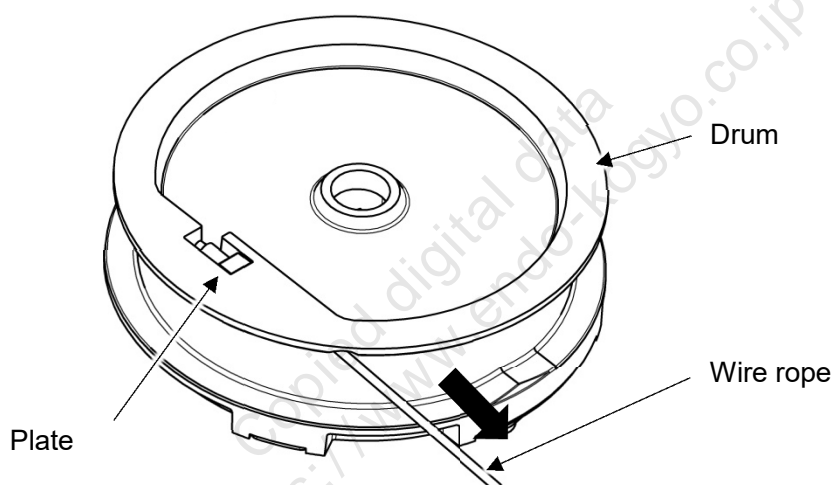
### ! Point

You can easily insert wire rope by pushing while twisting it.

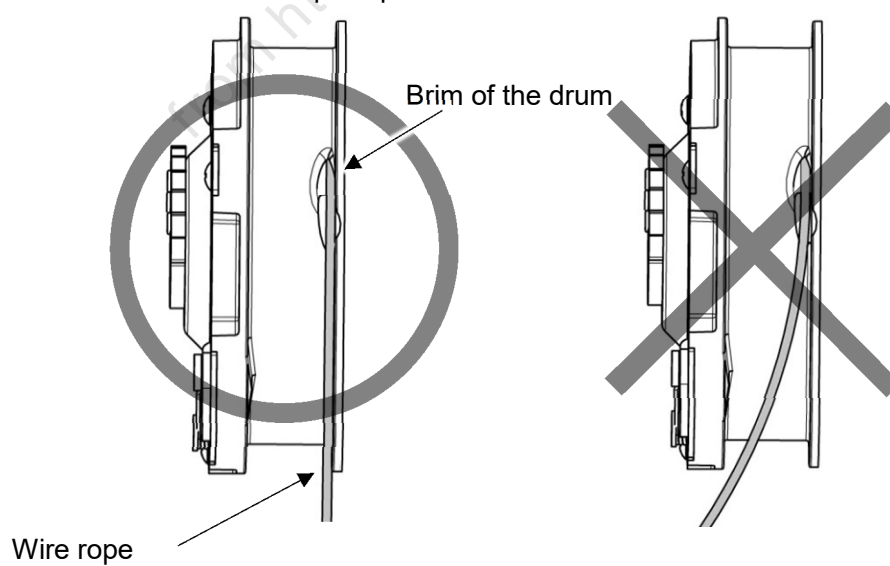
- 3** Raise up the edge of the wire rope with a flat head screwdriver and insert the plate.



- 4** Pull the wire rope and fix the wire rope and plate into the notch of drum.

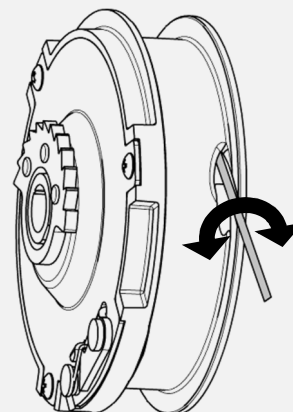


- 5** Make sure the wire rope is parallel to the side of the drum.

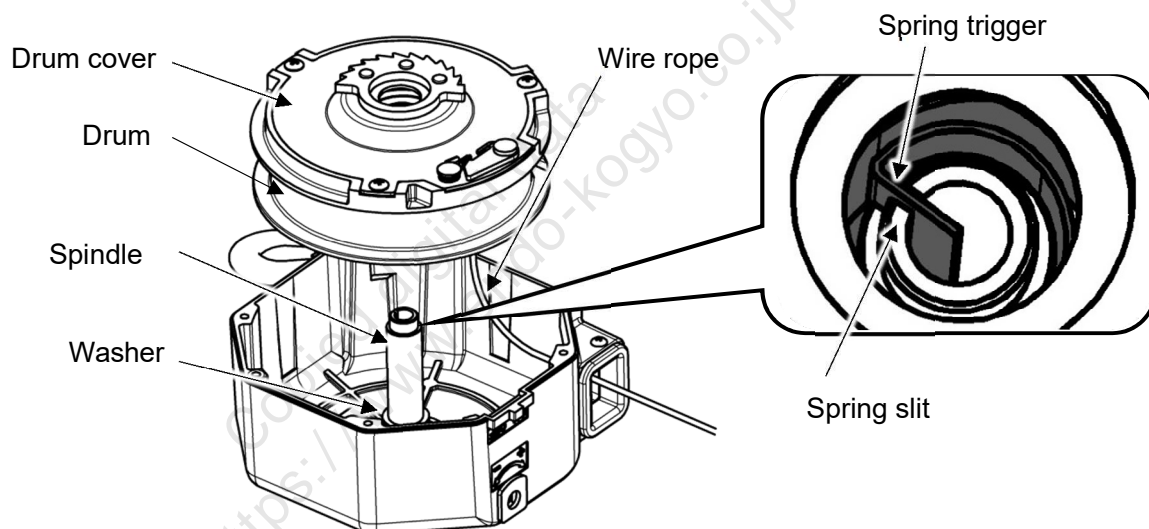


**! Point**

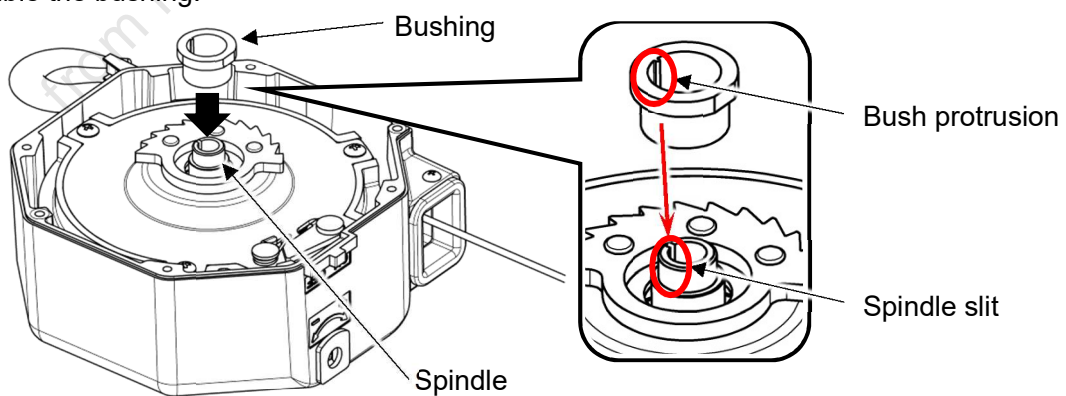
The wire rope position can be changed by rotating the drum.



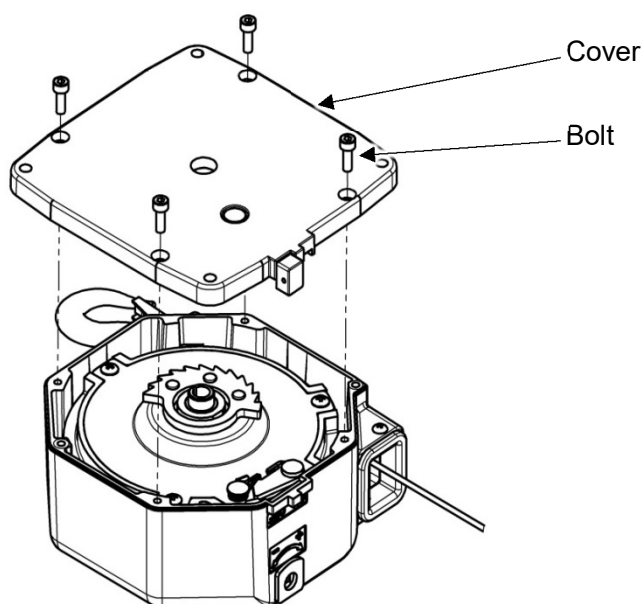
- 6** Assemble drum, drum cover and wire rope.  
Before assembling, make sure washer is inserted to the spindle.



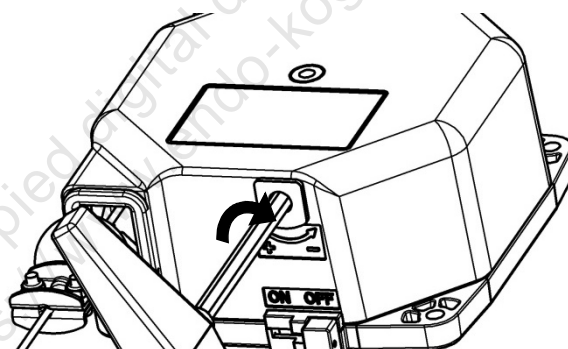
- 7** Assemble the bushing.



**8** Reassemble cover and bolts.



**9** Turn the worm in the “+” direction (clockwise) and wind the spring.



**! REMINDER**

When the worm is turned, the wire rope is wound inside the drum.

Wind while pulling the wire rope to prevent slack.

After the wire rope is completely wound inside the drum, further turn the worm by the number of times described in the table below.

Model	Number of turns from zero to factory set weight
ERM-2	Approx.98
ERM-4/ERM-4S	Approx.42
ERM-6/ERM-6S	Approx.56
ERM-8/ERM-8S	Approx.56

**10** Adjust the spring tension ( Refer to 5-2-2, in Users manual)



## 2-4 Replacement of the spring

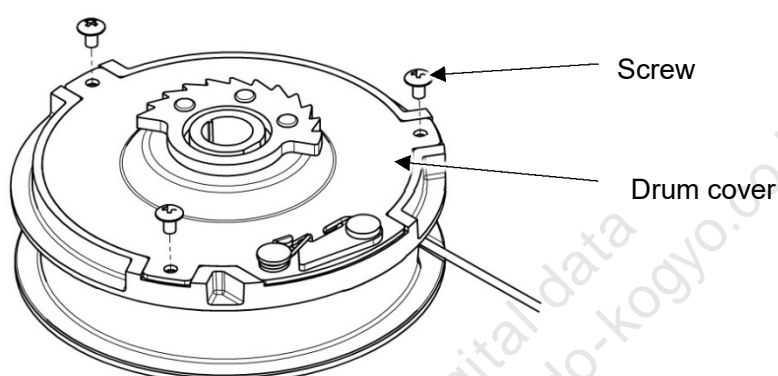
### **WARNING**



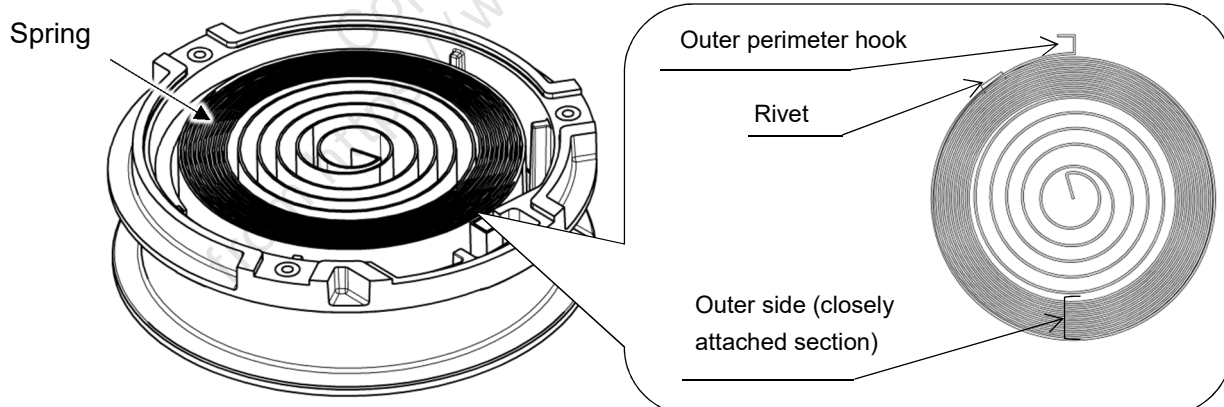
- The spring should be replaced by a maintenance operator who has developed sufficient knowledge and operating skill for the balancer.
- The spring of the product is highly dangerous if handled incorrectly. Handle the spring with great caution when replacing it.

### 2-4-1 Removal of the spring

- 1 Remove the casing from the drum according to steps 1 to 6 in “2-3-1 Disassembly”.
- 2 Remove the screw and remove the drum cover.



- 3 Check the position where the spring is ruptured and the state of the rivet.  
If the spring is ruptured in the closely attached section on the outer side, or if the rivet is damaged, install the cover again and consult with your dealer.



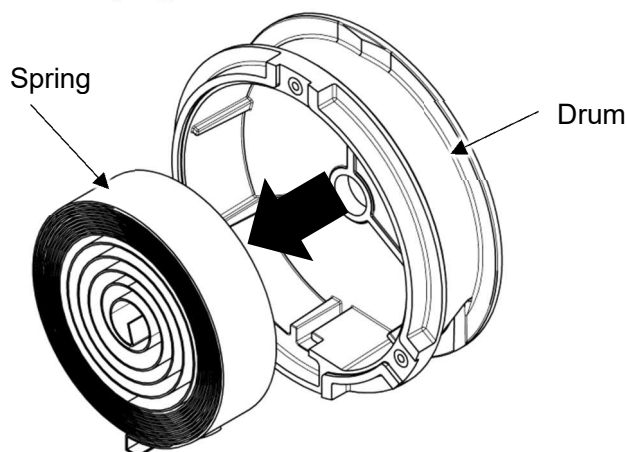
### **WARNING**



If the spring is ruptured in the closely attached section on the outer perimeter, or if the rivet on the spring is damaged, never remove the spring from the drum. If the spring is removed in such a case, the spring may rapidly extend, causing injury.



- 4 Remove the spring from the drum.



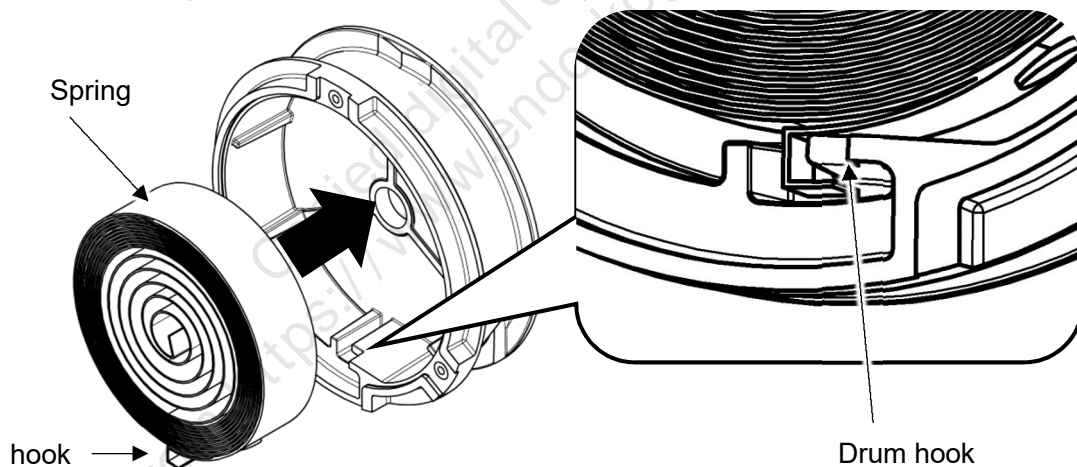
## WARNING



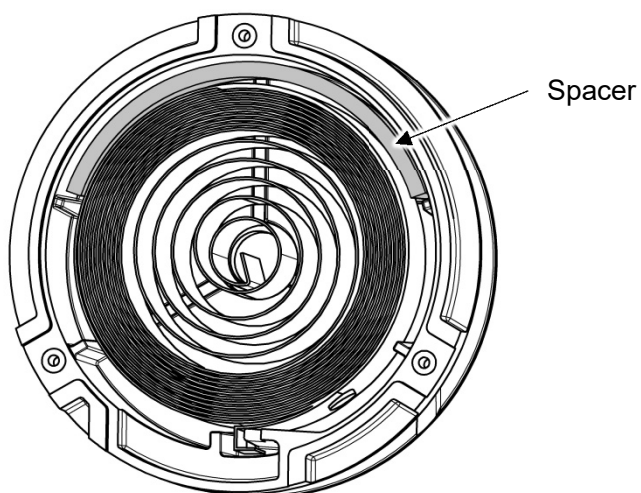
Do not pull out the spring from inner side. The spring may rapidly extend, causing injury.

### 2-4-2 Assembling the spring

- 1 Insert the spring into the drum so that the spring hook catches the drum hook.



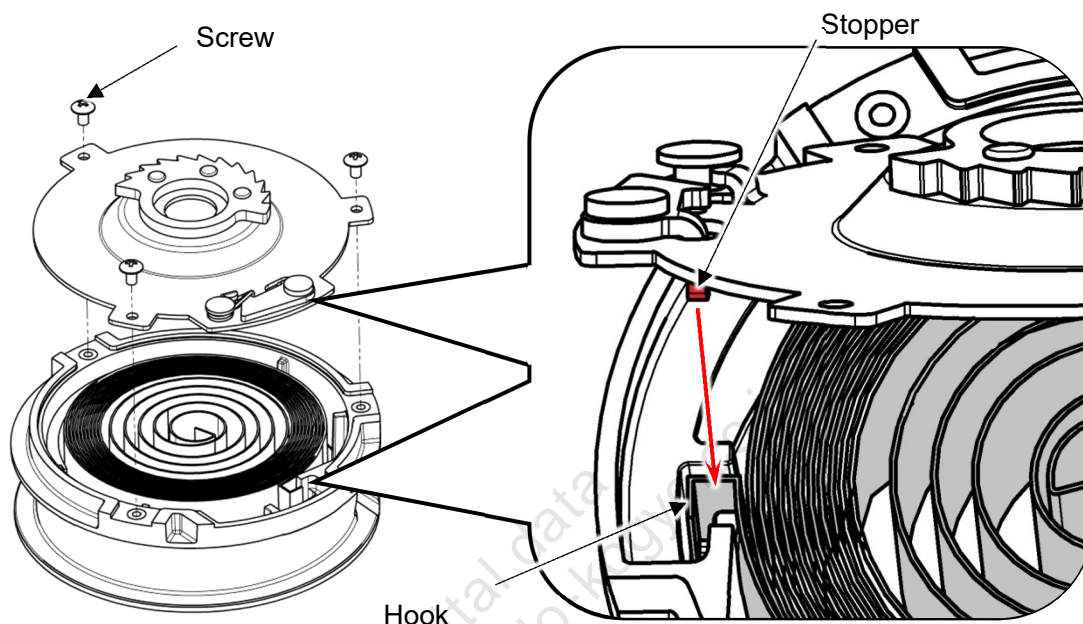
- 2 Make sure the spacers are inside the drum, except ERM-8 and ERM-8S.



- 3 Put grease to the top surface of the spring.  
The recommended grease is listed below or grease that meets the same specifications.

Brand	Grease model
Kyodo Yushi	ONE LUBER MP2

- 4 Attach the drum cover to the drum and tighten the 3 screws.



### NOTICE

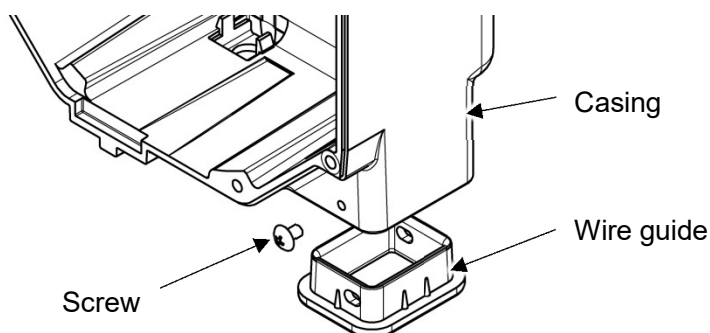


For ERM-4S, ERM-6S, ERM-8S, attach the cover to the drum so the stopper enters the spring hook.  
After assembling, check that the stopper moves smoothly.

- 5 To reassemble, refer to 6~10 in “2-3-2 disassembly of wire rope”.

## 2-5 Replacement of the wire guide

- 1 Follow 1~8 in “2-3-1 Disassembly”, remove the wire rope from the drum and casing.
- 2 Remove screw and remove the wire guide from casing.



- 3 Install new wire guide and tighten screw.
- 4 To install the wire rope refer to “2-3-2 installation of wire rope”.

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