



Instruction Manual

Position Balancer

PB3

PB4

PB5

PB7

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.

Introduction

Thank you very much for purchasing the Position Balancer. 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.

Symbols

This Instruction Manual uses the following symbols that simply describe warning information in addition to the indications above, "WARNING" and "CAUTION".

	Indicates a PROHIBITED action that must not be performed.
	Indicates a REQUIRED action that must be performed.
	Indicates potential property damage or a danger that may inflict bodily injury.
	Indicates a danger that may result in electric shock, burn injury, or death if mishandled or if safety checks are neglected.
	Indicates a danger of burn injury from high-temperature areas on exterior or in interior.
	Indicates a danger of injury if a hand or finger is caught.

Scope of warranty and liabilities for the equipment

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, adjustment, 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 this Instruction Manual or the warning labels.
 - 8) Failure/damage caused by any reason that is not attributable to the manufacturer.
5. Warranty exclusions such as mechanical loss.

Either during or after the warranty period, mechanical loss, damage to anything other than our product(s), or other duties incurred 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 Instruction Manual (included with the product) belong to Endo Kogyo Co., Ltd.

The Instruction 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 Instruction Manual

This manual has been prepared to help all intended users involved with this product. From the point of view 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.

Operator

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.

Maintenance operator

In addition to the work of the operator described above, the maintenance operator is permitted to perform adjustment of descent speed and setting position, 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.

Management supervisor

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.

Service engineer

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 normally performed by our service technicians.

Emergency contact in case of malfunctions

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

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1. Warning Signs and Precautions for Handling

1-1 Warning labels

Warning labels are attached to the locations with potential dangers related to the operation and maintenance.

The warning labels are displayed in an appropriate size and color that can easily attract operators' attention and indicate warning information and symbols of hazard classification.

 WARNING	
	● 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 receive the same labels as replacements. Reapply them on the same locations.

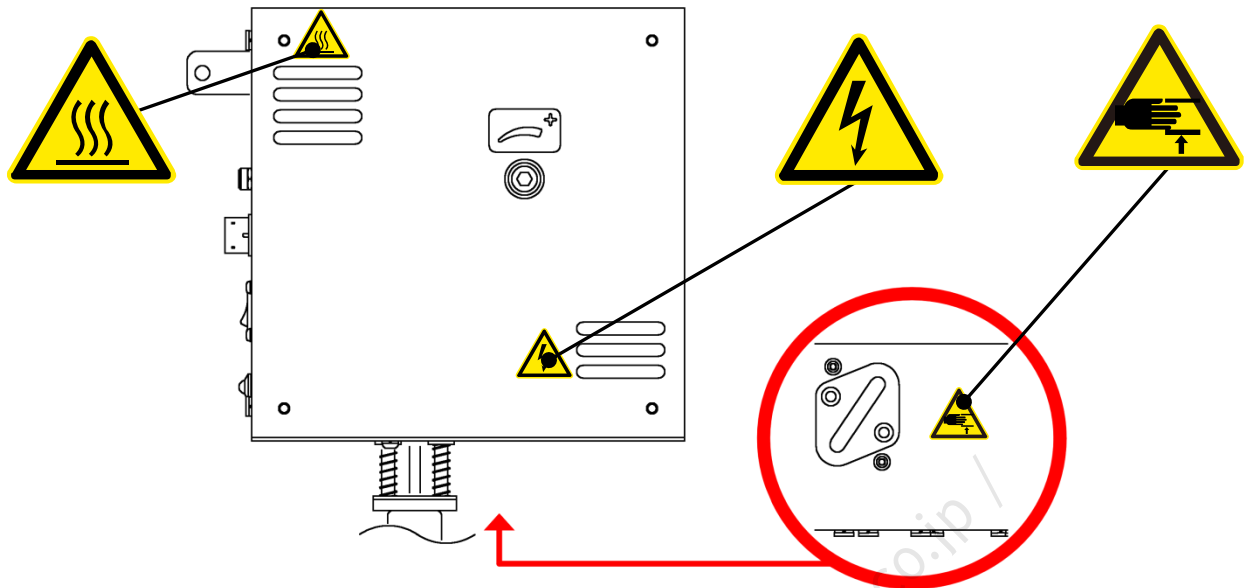
1-1-1 Types of warning labels

The following warning labels are attached to this product.

No.	Label appearance	Details
(1)		This label is attached to a surface of a cover where there is a danger of electric shock inside.
(2)		This label is attached to an area where the surface temperature could be high, so that there is a danger of burn injury from a direct contact.
(3)		This label is attached to an area where there is a danger of injury if a hand or finger is caught.

1-1-2 Warning label locations

The warning labels are attached to the following locations of this product as shown in the figure below.



1-2 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 any locations where dropped loads may cause an injury. ● Do not put your head or body under a suspended load or within the motion range of the wire rope. ● Do not apply a voltage other than the specified supply voltage. This may cause fire or damage. ● Do not use any AC adapters other than the specified options for this product. This may cause fire or damage. ● Do not use in explosive, flammable gas, or dusty atmospheres, any place where water or oil may splash, and near combustibles. This may cause fire or injury. ● Do not perform any modification of the product. ● Do not remove tools (equipment) with the wire rope pulled out.
	● Install the product correctly in accordance with the descriptions in this manual.

 CAUTION	
	● Do not pull out the wire rope further than its stroke. ● Do not pull out the wire rope in an oblique direction or a landscape direction. ● Do not trigger the limit switch manually. ● Do not operate without load.
	● Be sure to perform daily and periodic inspections. ● Be sure to use the product within the capacity range that is described in the specifications. ● Please install the position balancer in a way that the wire rope withdrawing surface is downward. ● Adjustment of operation of the position balancer · Signal input must definitely be done after suspending the tool in the correctly installed state. ● Always perform signal inputs under a balanced condition (balanced between upper and lower sides).

2. Unpacking and Installation

2-1 Packaging arrangement and transportation

The standard set of this product is packaged for delivery in a 315 mm × 265 mm × 200 mm sized cardboard box.

The total weight of the package is approximately 6.0 kg.

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

Prepare a box of a similar size for re-packaging.

<Standard product>

- | | |
|--|------------------------------|
| (1) Outer carton: 315 mm × 265 mm × 200 mm | Weight: Approximately 0.6 kg |
| (2) Inner carton: 295 mm × 240 mm × 70 mm | Weight: Approximately 0.2 kg |
| (3) Position Balancer | Weight: Approximately 4.5 kg |
| (4) Auxiliary hanger | Weight: Approximately 0.1 kg |
| (5) Pendant switch | Weight: Approximately 0.3 kg |

<Optional parts>

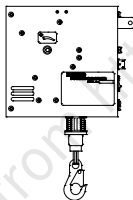
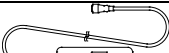
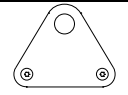
- | | |
|----------------|------------------------------|
| (1) Top hook | Weight: Approximately 0.3 kg |
| (2) AC adapter | Weight: Approximately 0.5 kg |

2-2 Checks after unpacking

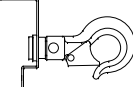
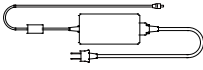
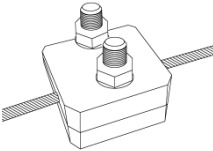
After opening the package, check that the following products are included.

Please contact us if you find anything missing or damaged.

■ Packing contents (main equipment and accessories)

Item	Appearance	Quantity
Position Balancer (Main equipment)		1
Pendant switch	 Item No. LBP001907	1
Auxiliary hanger (M5 bolts × 2)	 Item No. LBP001856	1
Instruction Manual	(This manual)	1

■ Optional parts (sold separately)

Item	Appearance	Quantity
Top hook (M5 bolts × 4)	 Item No. LBP001855	1
AC adapter	 Item No. P2B402321	1
Movement stopper	 Item No. LBP000125	1

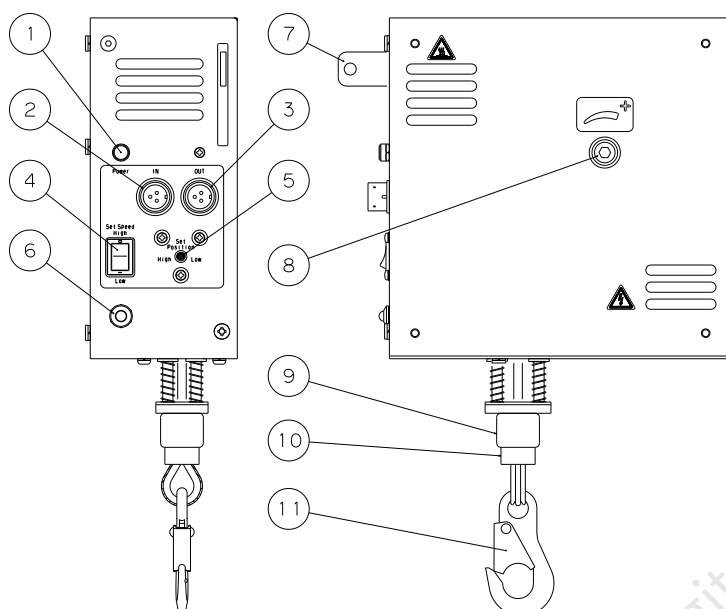
2-3 Disposal of the packing materials

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

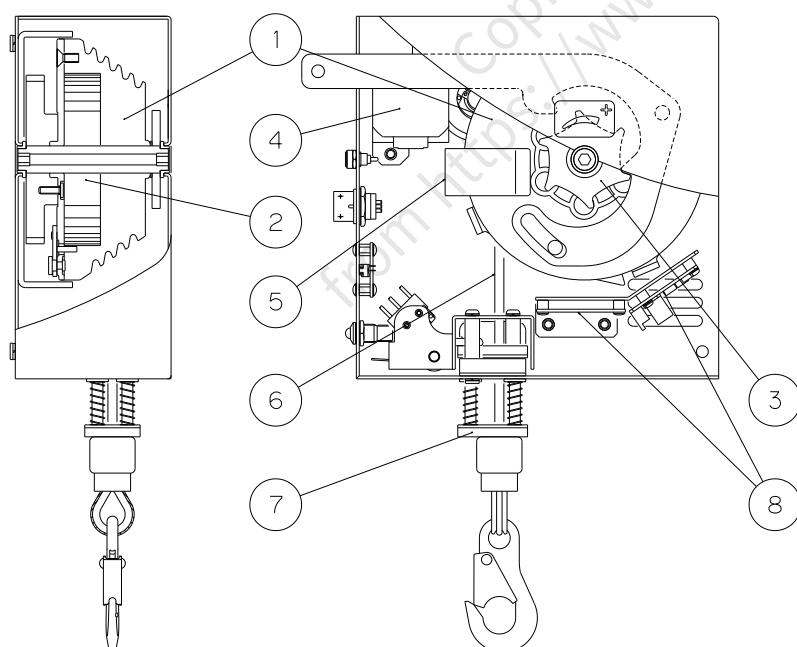
3-1 Components

3-1-1 Position Balancer main equipment (appearance)



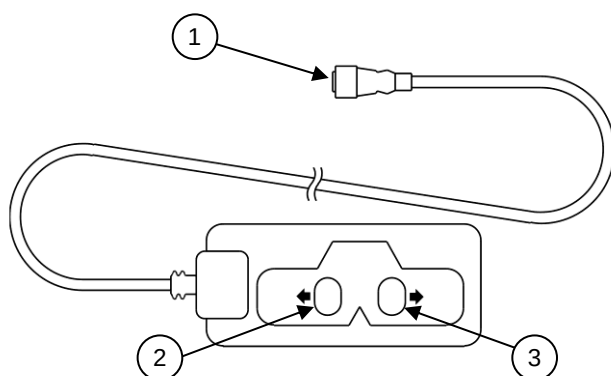
Code	Name
(1)	DC jack
(2)	Receptacle A (input connector)
(3)	Receptacle B (output connector)
(4)	Rocker switch (descent speed changeover switch)
(5)	Volume (descent position setting volume)
(6)	Indication lamp (origin lamp)
(7)	Ratchet
(8)	Spindle
(9)	Buffer
(10)	Collar
(11)	Bottom hook

3-1-2 Position Balancer main equipment (inside)



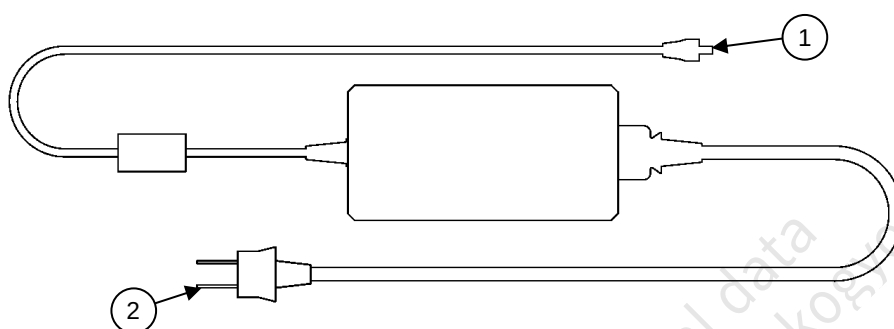
Code	Name
(1)	Drum
(2)	Spring
(3)	Ratchet wheel
(4)	Stepping motor
(5)	Guard
(6)	Wire rope
(7)	Limit switch
(8)	Circuit board (for controller and driver)

3-1-3 Pendant switch



Code	Name
(1)	Input plug
(2)	Origin button
(3)	Setting position button

3-1-4 AC adapter (optional)



Code	Name
(1)	DC plug
(2)	Insertion plug

3-2 Product specifications

Model	PB3	PB4	PB5	PB7
Capacity	1.5 - 3.0 kg	2.5 - 4.0 kg	3.5 - 5.0 kg	5.0 - 7.0 kg
Stroke	1.2 m	1.2 m	1.2 m	1.2 m
Main equipment mass	4.2 kg	4.3 kg	4.4 kg	4.5 kg
Descent setting position	0.3 - 0.9 m			
Descent speed	Low speed: 0.2 - 0.3 m/s, High speed: 0.3 - 0.5 m/s			
Ascent speed	0.2 - 0.3 m/s			
Power supply	24 V DC			
Maximum power consumption	56 W			
Duty factor	50%ED or less			

Note: Factory setting is for the maximum load.

3-2-1 Main features

■ Fall prevention device

A mechanism to prevent the suspended tool / device from falling to the maximum cable travel in case of spring breakage.

This mechanism can not prevent the tool / device from falling at all when the spring breaks.

3-3 External signals

In addition to the operation with the pendant switch supplied, you can also remotely operate this product by inputting signals from a PC or PLC.

According to the specification below, input external signals to the Position Balancer or monitor the condition of the Position Balancer by processing the external signal output.

3-3-1 External input

■ Connector

	Model	Manufacturer
Compatible plugs (you need to prepare the plugs)	PRC03-12A10-3AM10.5 (three cores, plug)	Tajimi Electronics Co., Ltd.
Input connector	PRC03-23A10-3AF (three cores, receptacle)	

■ Pin assignment

Pin No.	Signal
A	Origin
B	Setting position
C	COM

■ Signal specification

No-voltage contact input: Use contacts suitable for 5 V DC and 0.17 mA (maximum).

Use of no-voltage contacts for large currents may cause contact failures.

Signal	Action
Origin	Ascend to the origin position when one-shot ON is triggered between the origin and COM.
Setting position	Descend to the setting position when one-shot ON is triggered between the setting position and COM with the hook at the origin position.

3-3-2 External output

■ Connector

	Model	Manufacturer
Compatible plugs (you need to prepare the plugs)	PRC03-12A10-4F10.5 (four cores, plug)	Tajimi Electronics Co., Ltd.
Output connector	PRC03-23A10-4M (four cores, receptacle)	

■ Pin assignment

Pin No.	Signal
A	COM1
B	Origin position signal
C	COM2
D	Positioning completed signal

■ Signal specification

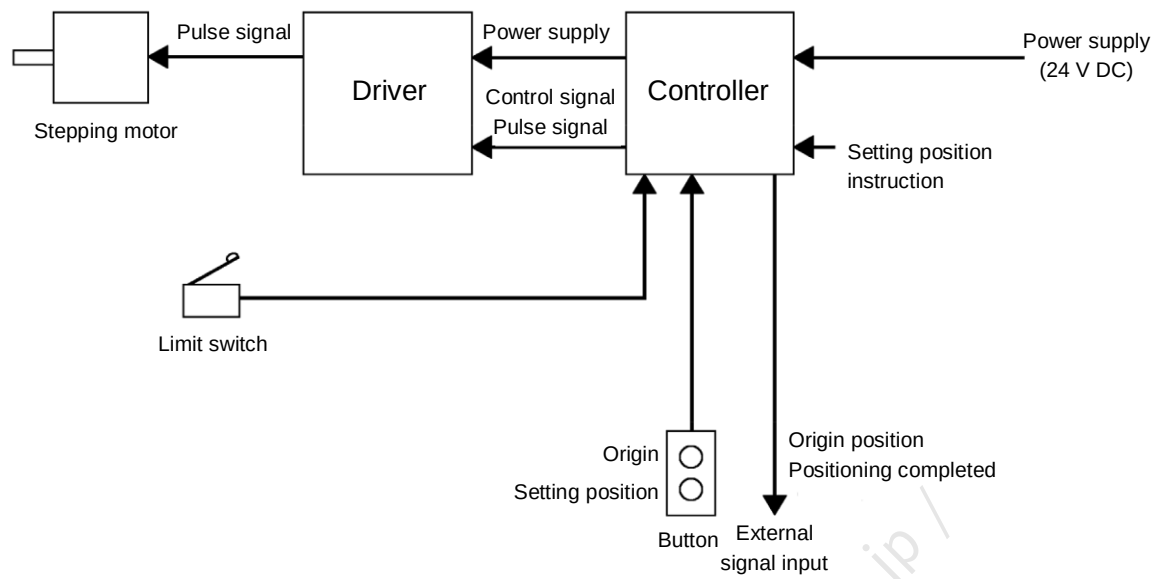
No-voltage contact output: A resistance load of 30 V or less and 1 A or less can be driven.

Signal	Action
Origin position signal	The contact between the origin position signal and COM1 closes when the hook is at the origin position or when an alarm has been generated at the driver.
Positioning completed signal	The contact between the positioning completed signal and COM2 closes when the positioning has been completed by the setting position instruction or when an alarm has been generated at the driver.

Notes:

1. A delay of approximately 1 s at maximum occurs in the origin position signal until the contact between the origin position signal and COM1 closes after the hook has reached the origin position.
2. The contacts of both the origin position and positioning completed signals close when an alarm has been generated at the driver.

3-4 System diagram



3-5 Operating environment

Installation location:	General indoor
Ambient temperature:	0°C to +50°C (no freezing)
Humidity:	85% or less (no condensation)
Altitude:	1,000 m or lower above sea level
Atmosphere:	Non-explosive, free of flammable or corrosive gas, or dust, water/oil should not splash directly and no combustibles nearby.

3-6 Disposal of the product

When disposing of the product, follow the local regulations of the area where the product is used, and properly treat it as industrial waste.

3-7 Applicable standards

■ EMC Directive 2004/108/EC

EN IEC 61000-6-2: Electromagnetic compatibility (EMC). Generic standards. Immunity for industrial environments
 EN IEC 61000-6-4: Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments

■ Machinery Directive 2006/42/EC

EN ISO 12100: Safety of machinery. General principles for design. Risk assessment and risk reduction
 EN IEC 60204-1:2006+A1:2009: Safety of machinery. Electrical equipment of machines. General requirements

Note: Only the standard specification of this product complies with the standards. If the product is used in combination with non-standard parts or modified by the customer, the standards are no longer complied with. Please note this in advance.

3-8 Operating noise

The normal operating noise of this product never exceeds 70 dB. Therefore, no hearing protection equipment is required.

 CAUTION	
	● While abnormal loud noise occurs if a load is applied during operation, for instance, with the wire rope pulled, the noise does not indicate any failure (see “Exceptions” below). However, do not continue the operation if such a situation continues for a long time or occurs frequently.

[Measurement method] The noise level was measured at a distance of 1 m from the main body of the equipment while automatic lifting was performed with a heavy load of 7 kg attached.

[Measurement result] The noise level during the lifting was 60 dB or less.

[Exceptions] The maximum noise level could range up to nearly 74 dB if the wire rope has reached the upper lift limit switch.

Note: Such noise is intentionally designed as a warning.

4. Installation

CAUTION



- The installation should be performed by a maintenance operator who has developed sufficient knowledge and operating skill for the Position Balancer.

4-1 Preparation and check before installation

4-1-1 Tools for installation

For installation, attachment of auxiliary hangers: a hexagonal rod spanner (3 mm across flats)
For tension adjustment: a hexagonal rod spanner (6 mm across flats)

4-1-2 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 Ensure that sufficient space for performing maintenance, including the adjustment of the spring tension, is available on a side of the main equipment.
- 3 Ensure that adequate space for operating connectors, switches, ratchets, and other items is available on the front side of the main equipment.
- 4 Check that the installation location has the installation environment described in “3-5 Operating environment” (page 15).

4-2 Installation procedures

You can use either tapped mounting holes or a top hook (optional) to attach the main equipment to your facility.

Note: When you use the top hook (optional), continue the installation from “4-2-5 Installation with the top hook (optional)” (page 21).

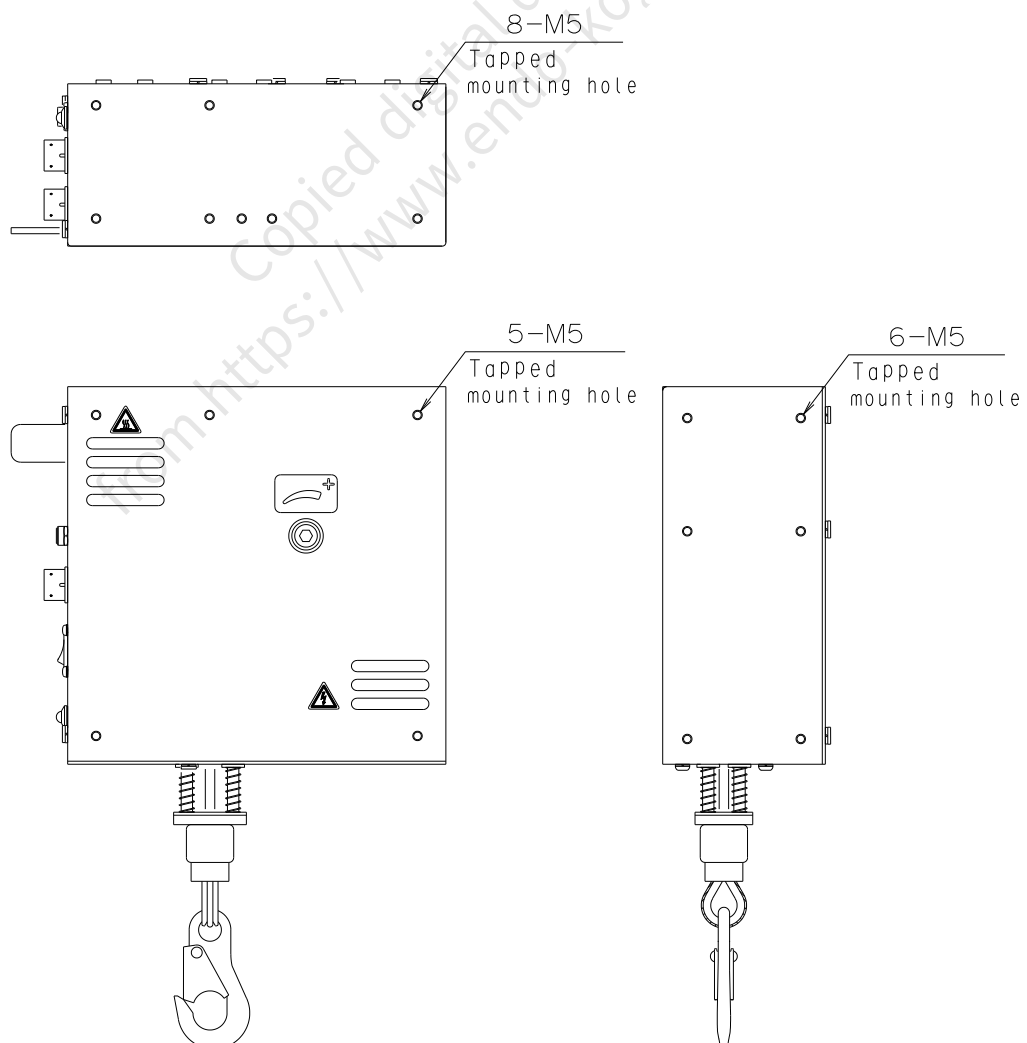
! CAUTION



- Prepare support members (metal hangers) that have a strength of 1 kN or more.
- Attach the support members such that the Position Balancer does not collide with its surroundings.
- Please install the position balancer in a way that the wire rope withdrawal surface faces downwards.

4-2-1 Standard installation (with the tapped mounting holes)

Attach to the installation surface utilizing the tapped mounting holes (either on the side, top, or back of the product) by four M5 bolts.



4-2-2 Attaching the auxiliary hanger in the standard installation

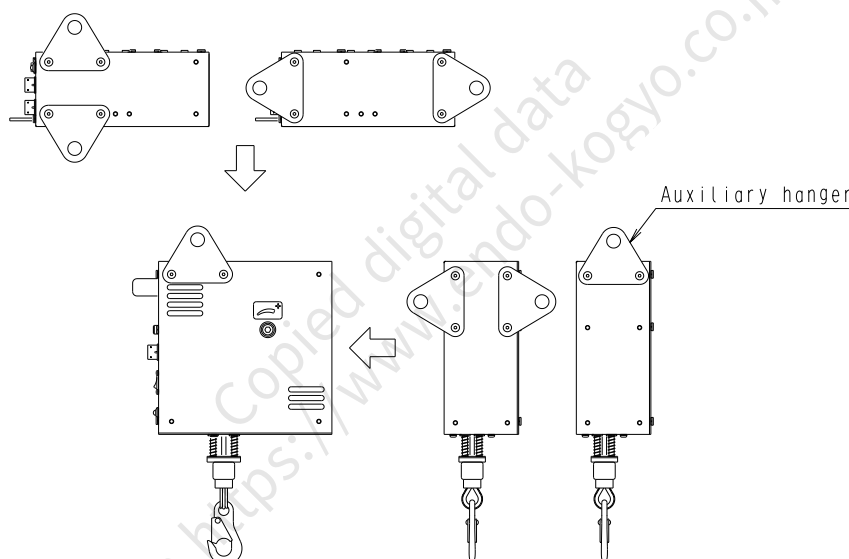
! CAUTION



- Be sure to attach an auxiliary wire rope or chain to the Position Balancer. The auxiliary wire rope or chain is necessary to protect workers from falling objects if the top hook or support members (metal hangers) for the Position Balancer are damaged and fall.
- Prepare an auxiliary wire rope or chain that has a strength of 1 kN or more.
- The length of the auxiliary wire rope or chain must be such that the Position Balancer stops within 100 mm if the top hook or support members for the balancer are damaged and fall.
- When attaching the auxiliary hanger, be sure to observe the tightening torque provided.

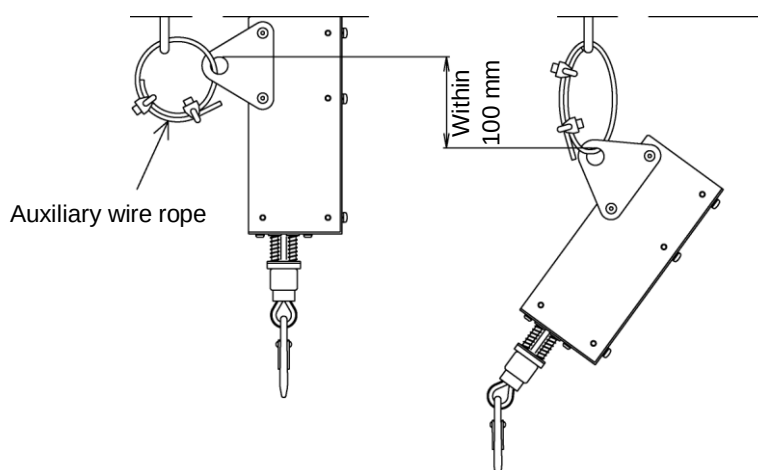
1 Attach the auxiliary hanger to the main equipment by two M5 bolts (tightening torque: 3 N·m).

[Example of the attachment of the auxiliary hanger]



2 Attach an end of the auxiliary wire rope or chain to the auxiliary hanger. Attach the other end to a support member to which the balancer is not attached.

[Example of the attachment of the auxiliary wire rope]



4-2-3 Connecting a power supply to the DC jack

WARNING



- Do not use any AC adapter other than the specified optional parts for this product. This may cause fire or damage.
- Never apply a voltage or current other than the specified values.

CAUTION

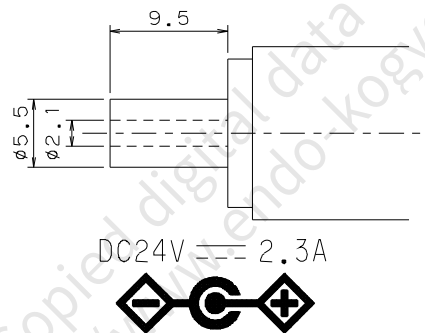


- When connecting a power supply directly from an in-factory control board, the wiring work should be properly performed by a qualified electrician.
- This product does not have a built-in rated breaker. Make sure to install a rated breaker on the control board side.

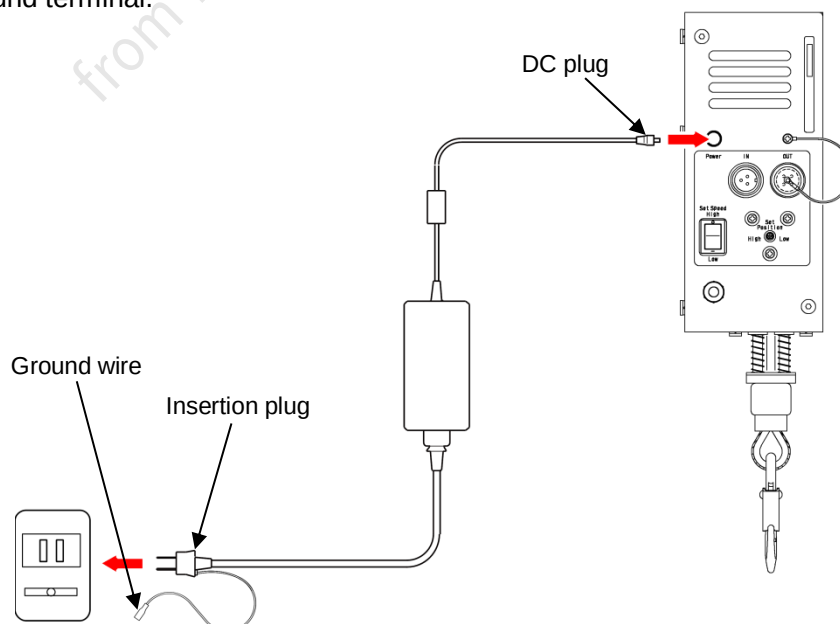
- 1 When connecting a power supply from an in-factory control board to this product, prepare a DC plug of the dimensions described in the figure below.

Note: Continue to the procedure 2, when connecting an AC adapter (optional part).

ø5.5×2.1 DC PLUG



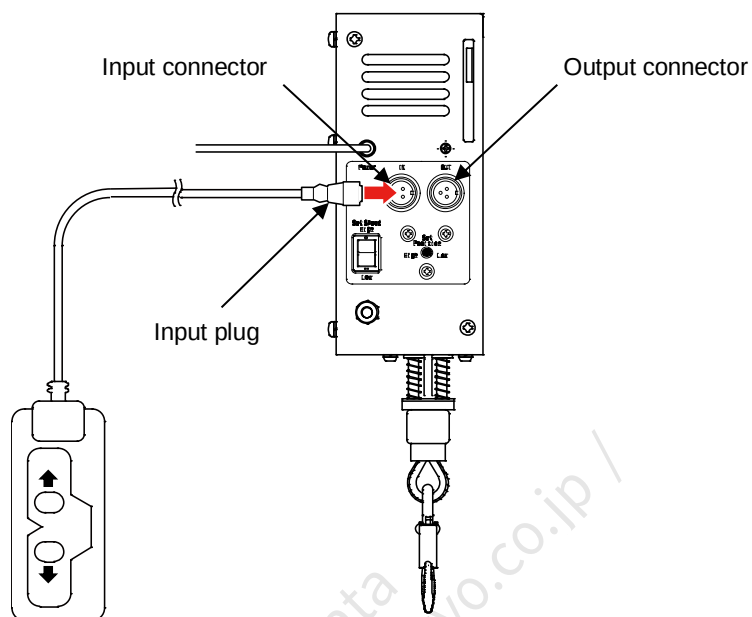
- 2 Connect the DC plug of the AC adapter to the DC jack of the main equipment.
- 3 Connect the insertion plug of the AC adapter to a 100 V single-phase AC power outlet.
- 4 To prevent electric shock accidents, connect the ground wire on the side of the plug to a ground terminal.



4-2-4 Connecting the pendant switch

Connect the input plug of the pendant switch to the input connector of the main equipment.

Note: For the external signal input, connect the input plug of your facility to the input connector of the main equipment.



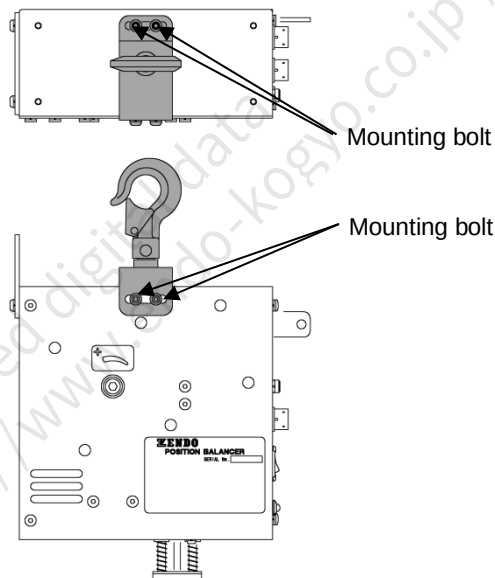
4-2-5 Installation with the top hook (optional)

⚠ CAUTION

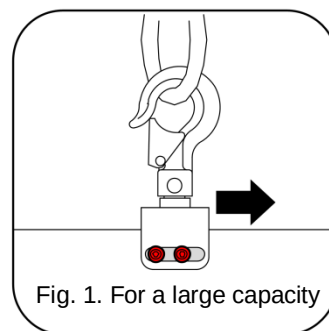
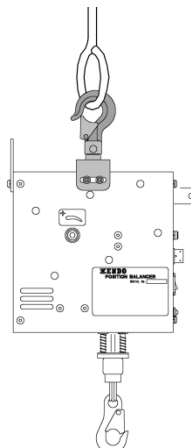
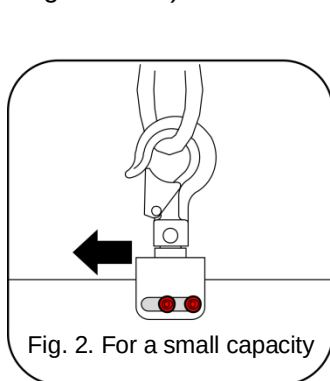


- Attach the top hook of the Position Balancer directly to the support member, and make sure that the hook latch is closed.
- Use support members with no opening so that the Position Balancer does not come off while in motion.
- Ensure that the Position Balancer moves freely.
- Do not fix the top hook.
- When installing multiple Position Balancers, place the balancers at different heights so that they do not collide with each other.
- When attaching the top hook, be sure to observe the tightening torque provided.

- 1 Attach the top hook to the main equipment by four M5 bolts (tightening torque: 3 N·m).



- 2 When performing mounting, adjust the hook position according to the masses of the workpieces.
 - For a large capacity, move the top hook to the side of the operation surface (see Fig. 1 below).
 - For a small capacity, move the top hook to the opposite side of the operation surface (see Fig. 2 below).



4-2-6 Attaching the auxiliary hanger in the installation with the top hook (optional)

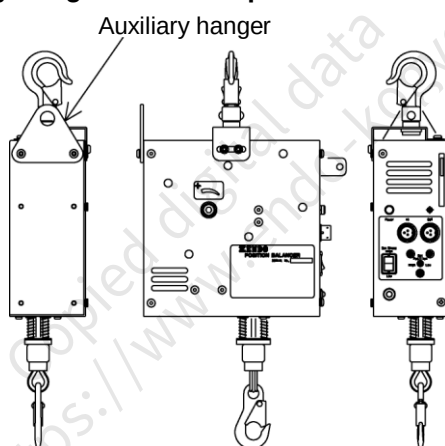
CAUTION



- Be sure to attach an auxiliary wire rope or chain to the Position Balancer. The auxiliary wire rope or chain is necessary to protect workers from falling objects if the top hook or support members (metal hangers) for the Position Balancer are damaged and fall.
- Prepare an auxiliary wire rope or chain that has a strength of 1 kN or more.
- Create slack in the auxiliary wire rope or chain to allow the Position Balancer to move freely.
- The “slack” must be such that the Position Balancer stops within 100 mm if the top hook or support members for the balancer are damaged and fall.
- When attaching the auxiliary hanger, be sure to observe the tightening torque provided.

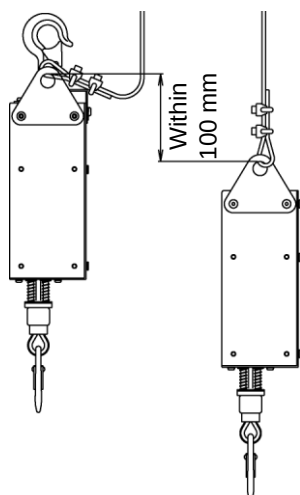
- 1 Attach the auxiliary hanger to the main equipment by two M5 bolts (tightening torque: 3 N·m).

[Attaching the auxiliary hanger with the top hook installed]



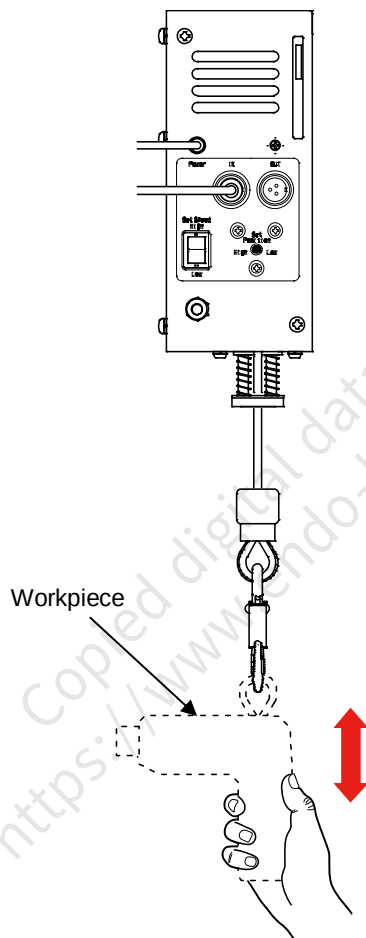
- 2 Attach an end of the auxiliary wire rope or chain to the auxiliary hanger. Attach the other end to a support member to which the balancer is not attached.

[Usage example of the auxiliary hanger with the top hook installed]



4-3 Post-installation checks

- 1 Check that the masses of workpieces are within the capacity range of the balancer.
Adjust the spring tension if it is not properly balanced with a workpiece hanging.
See “6-3 Adjustment of the spring tension” (page 30).
- 2 Move a workpiece up and down, and make sure that the workpiece is always balanced within the working range and the stroke of the wire rope is sufficiently secured.



Abnormal loud noise occurs accompanied with some resistance when you pull out the hook from the upper lift limit during energization; however, this does not indicate any failure.

5. Operation Method

5-1 Pre-operation inspections and checks

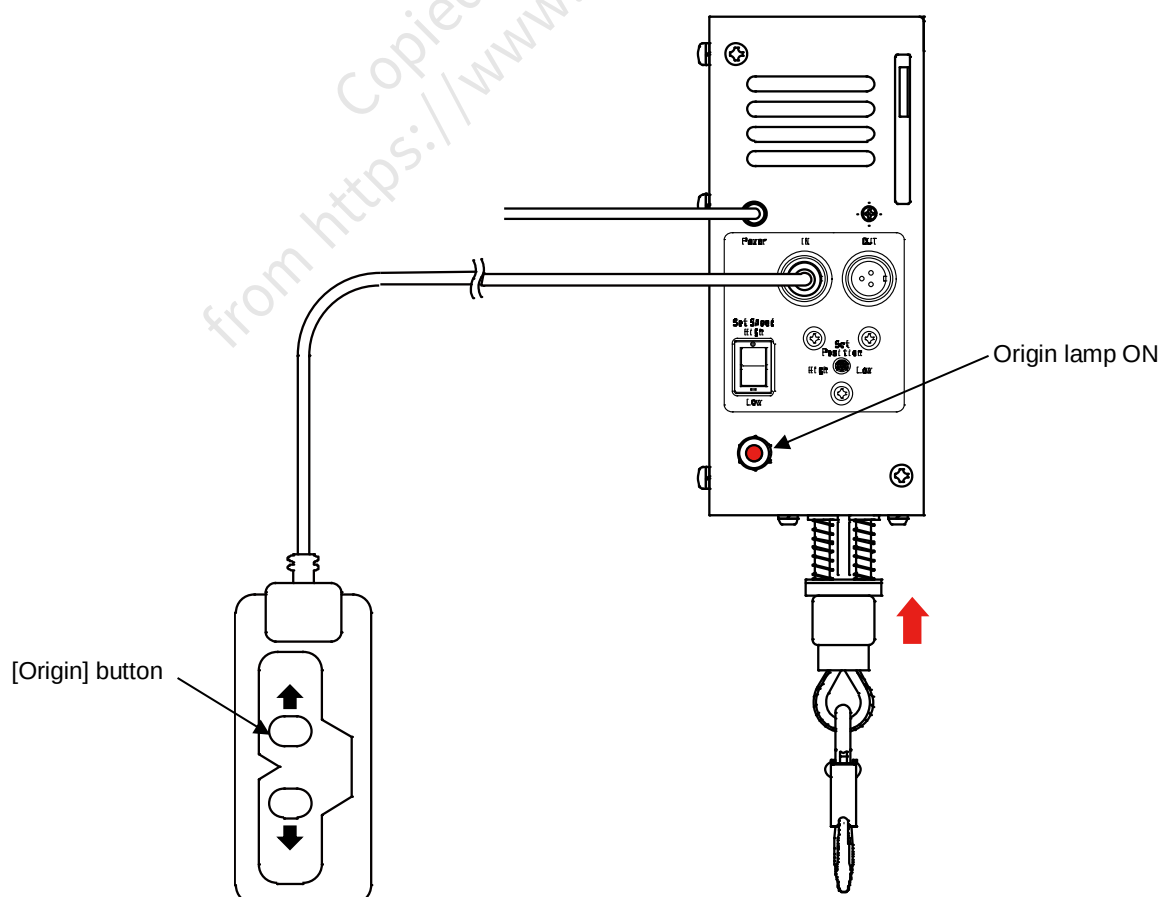
Inspect and check the following items before starting the operation:

- 1 Check that the power cables connected to the Position Balancer and the wiring for input/output signals are not loosened or deteriorated.
- 2 Ensure that there is no trash or unnecessary equipment around the Position Balancer or in the work space.
- 3 Press the [Origin] button or input the origin signal from the external input.
Once the wire rope has moved and stopped at the upper lift limit, check that the origin lamp is ON.

⚠ 注意



- When lowering the wire rope to the setting position by signal input, please prevent the bottom hook from coming in contact with any object before reaching the setting position.
- When lowering the wire rope to the setting position by signal input, make sure there are no obstacles in the descending range of the wire rope.

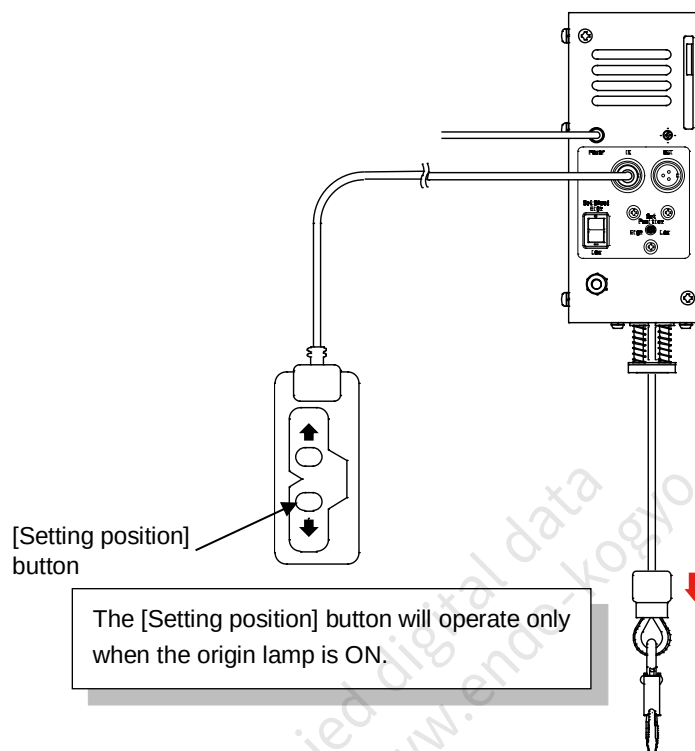


5-2 Operation method

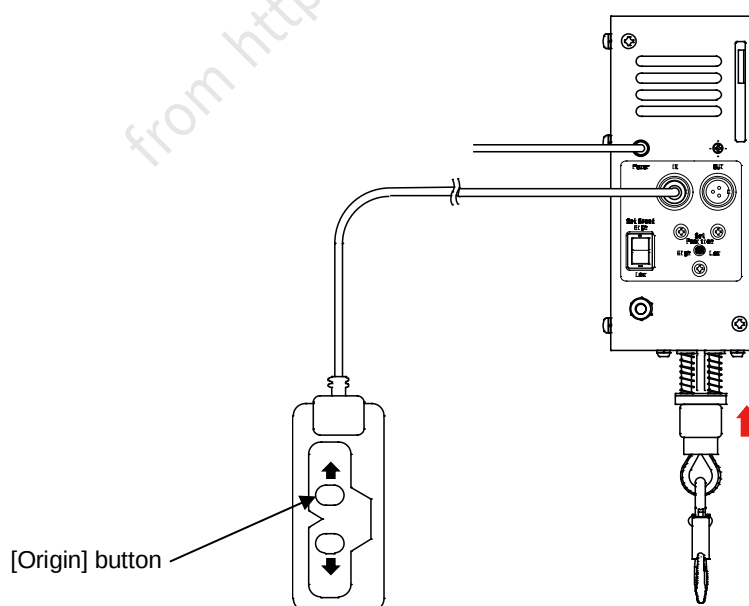
5-2-1 Operation with the pendant switch

- 1 Press the [Setting position] button of the pendant switch, and the equipment will descend to the setting position.

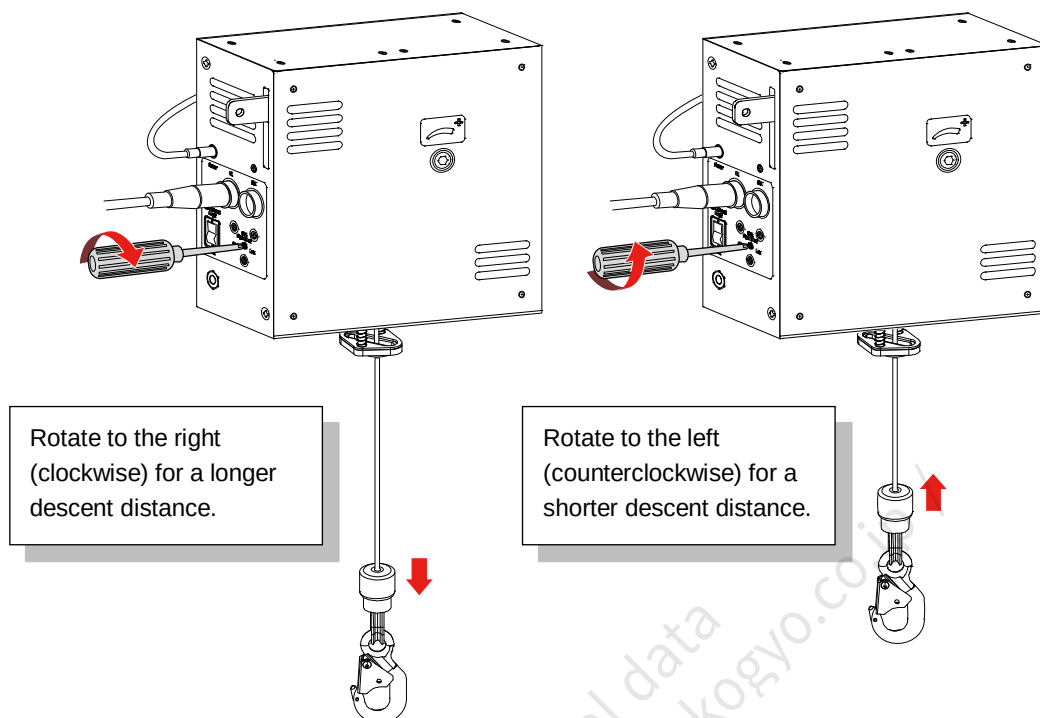
It will stop at the setting position, then stay balanced.



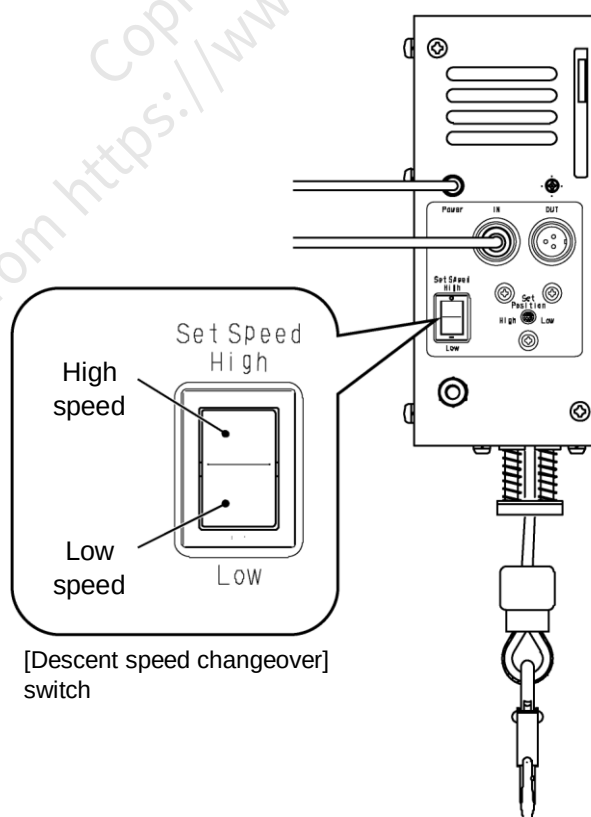
- 2 When the work has been completed, press the [Origin] button to lift up the equipment to the origin position.



- 3** Set the descent position as needed.
Set the descent position by rotating the descent position setting volume with a precision driver or other tool.



- 4** Change the descent speed as needed.
Change the descent speed with the [Descent speed changeover] switch.



6. Maintenance

! CAUTION



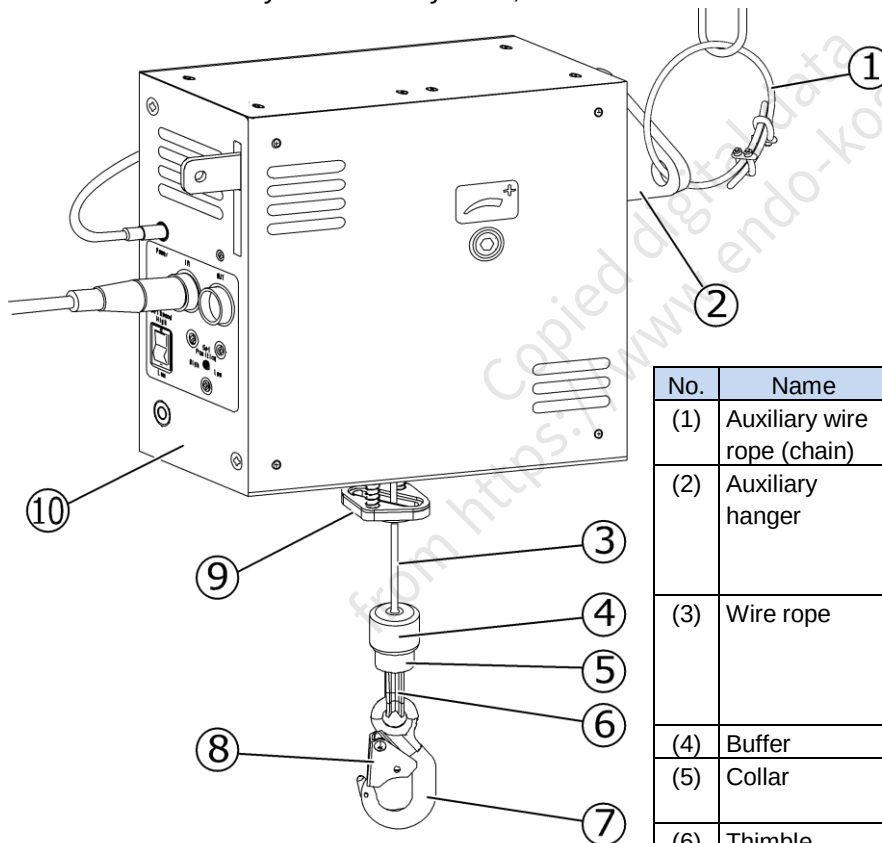
- The maintenance should be performed by a maintenance operator who has developed sufficient knowledge and operating skill for the Position Balancer.

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.

6-1 Daily inspections

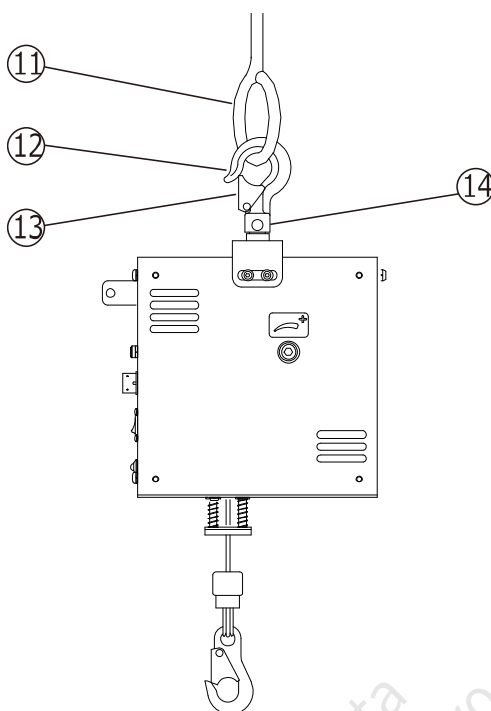
Before starting the operation, check the following items daily:

- If any loose bolts or screws are found in the inspections, retighten the bolts and screws.
- When you notice any wear, deterioration or deformation of the parts, contact us or your dealer.



No.	Name	Inspection description
(1)	Auxiliary wire rope (chain)	• Check that the auxiliary is not worn. • Check that the bolts are not loose.
(2)	Auxiliary hanger	• Check that the auxiliary hanger is not worn. • Check that the mounting bolts are not loose.
(3)	Wire rope	• Check that the wire rope is not worn (particular attention should be paid to wire breakage and the base of terminal locks). See page 28.
(4)	Buffer	• Check for wear or cracks.
(5)	Collar	• Lift up the collar when inspecting the thimble and wire rope.
(6)	Thimble	• Check that the thimble is not worn.
(7)	Bottom hook	• Check that the bottom hook is not worn.
(8)	Latch	• Check for deformation.
(9)	Wire guide	• Check for significant wear. • Check for cracks. • Check that the mounting screws are not loose.
(10)	Casing	• Check that the casing is not worn. • Check that the mounting bolts are not loose.

Check the following items if using the top hook (optional).



No.	Name	Inspection description
(11)	Metal hanger	• Check that the metal hanger is not worn.
(12)	Top hook	• Check for significant wear. • Check that the mounting screws are not loose.
(13)	Latch	• Check for deformation.
(14)	Rotating part	• Check for smooth rotation.

■ Inspection of the wire rope

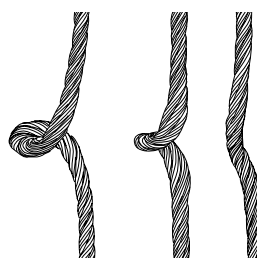
Check that there is no wire breakage, deformation, or kink in the wire rope.



Wire breakage



Deformation



Kink

The number of broken wires should not exceed 11 per pitch.



6-2 Periodical inspections

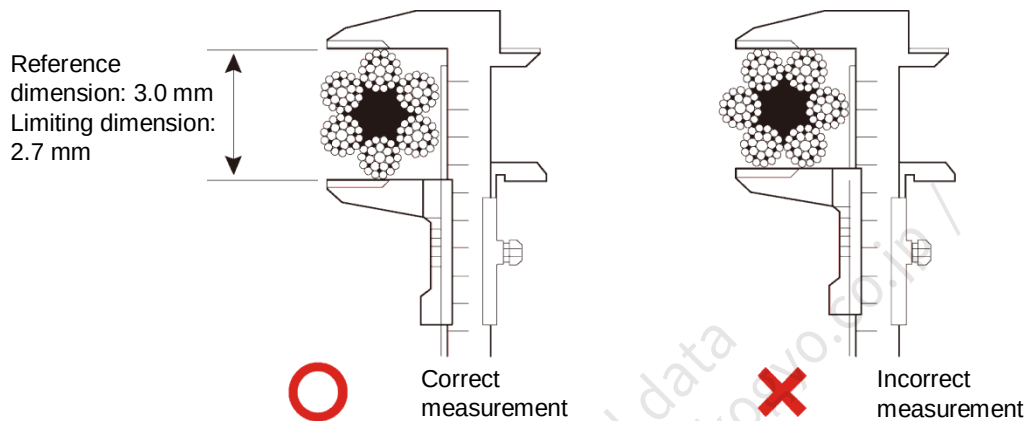
Check the following items at least once per month.

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

■ Inspection of the diameter of the wire rope

Check that the diameter of the wire rope has not been reduced to less than the limiting dimension below.

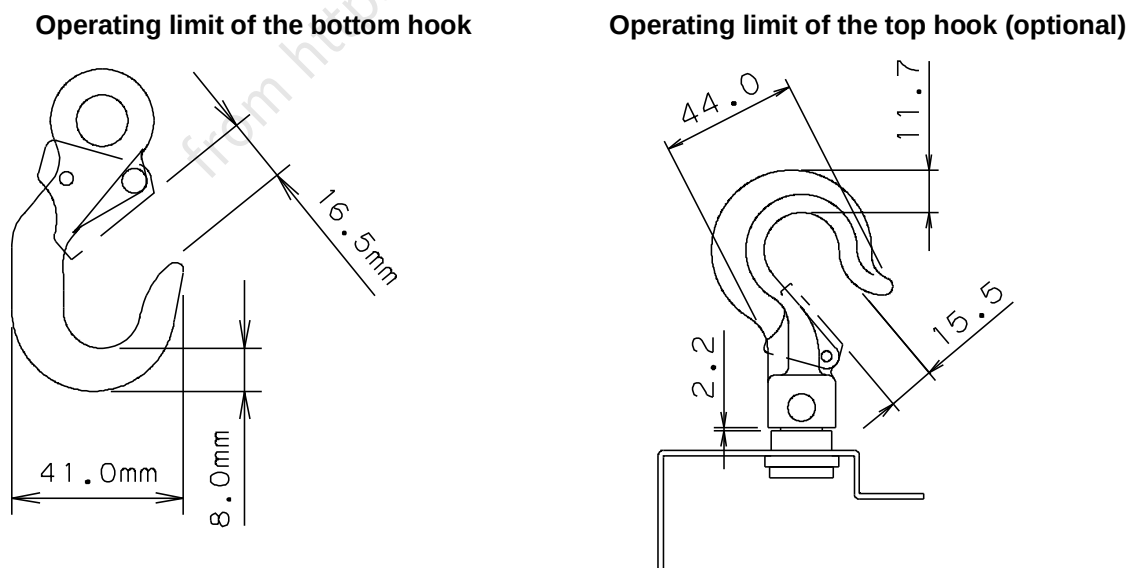
Note: Correctly measure the diameter by referring to the figure below.



The hook must be replaced when the diameter has been reduced to less than the limiting dimension. Stop using the Position Balancer, and contact us for the replacement.

■ Inspection of the hook

See the figure below, measure the relevant dimensions of the hook, and check the measured dimensions against the operating limits.



The hook must be replaced when any dimensions have been reduced to less than the limiting dimensions. Stop using the Position Balancer, and contact us for the replacement.

6-3 Adjustment of the spring tension

⚠ CAUTION



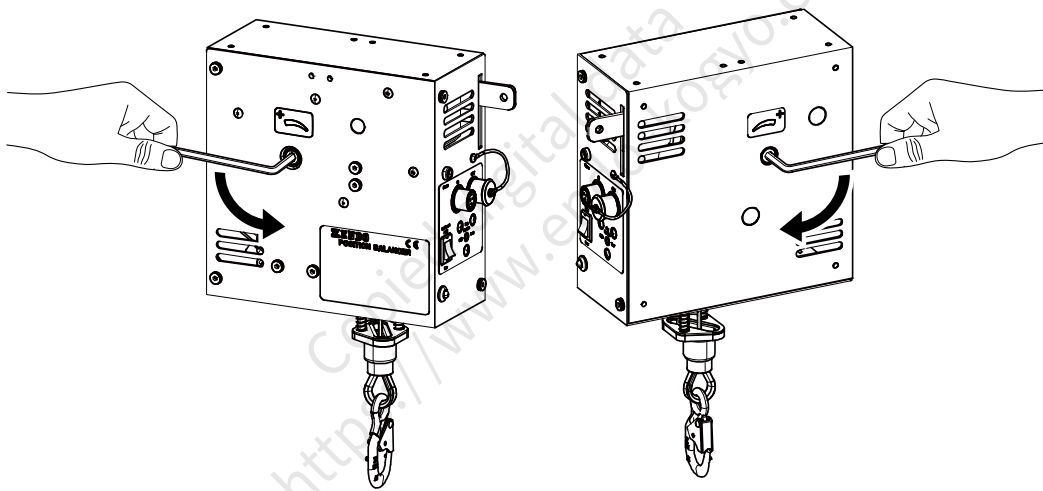
- When adjusting the spring tension, prevent the hexagonal rod spanner (or other adjustment tool) from being swung by the spring tension as much as possible.
- The spring will be damaged if the spindle is turned in the opposite direction of the “+” sign.
- Over-tightening the spring by more than the initial number of turns makes it unable to pull out the wire rope to the specified stroke length.

[Tools required]

Hexagonal rod spanner (6 mm across flats)

[Adjustment procedure]

- 1 To increase the tension, turn the spindle in the “+” direction with a hexagonal rod spanner. (The tension adjustment can be performed on the front or back surfaces.)

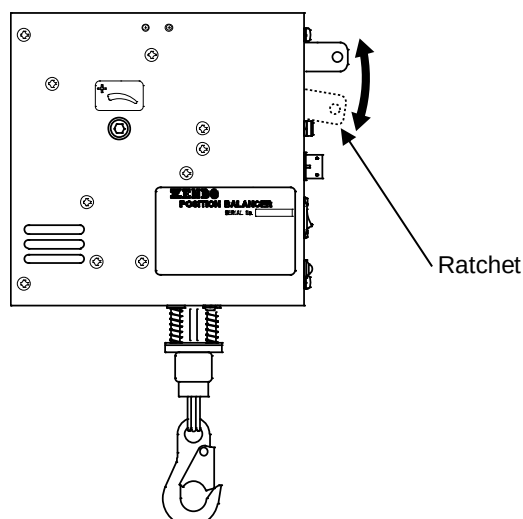


Tension will increase if you turn the spindle counterclockwise.



Tension will increase if you turn the spindle clockwise.

- 2 To decrease the tension, move the ratchet up and down.



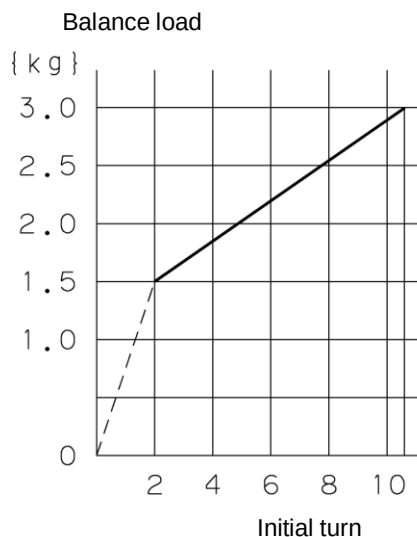
[Notes]

The factory setting is for the intermediate load.

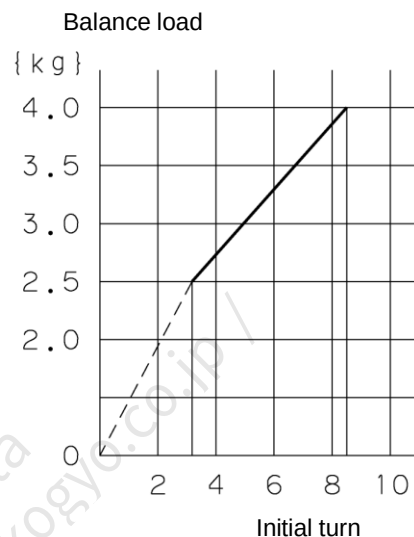
Please refer to the following figures for the adjustment of the balance load.

(The tension disappears when the wire rope is completely wound up. This condition corresponds to the zero load.)

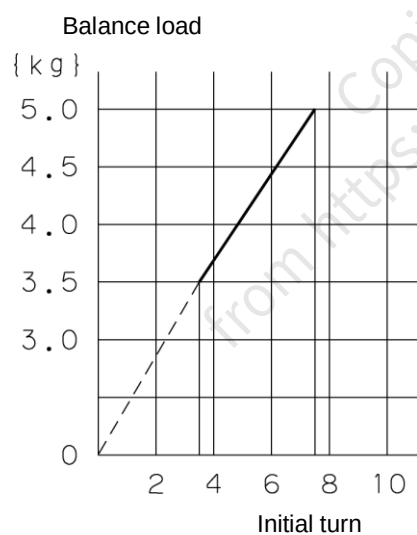
Model: PB3



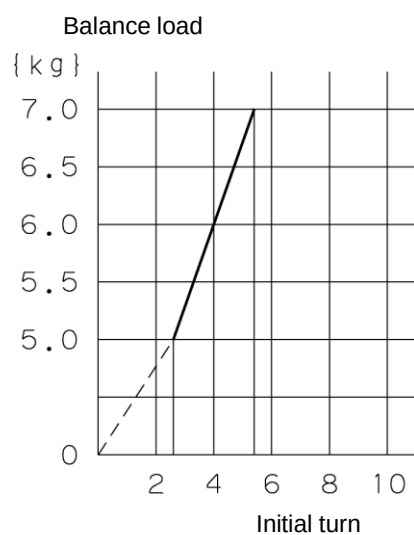
Model: PB4



Model: PB5



Model: PB7



The "initial turn" is the number of the spindle rotations from the state where the wire rope is completely wound up.

The solid lines represent the preferred ranges of the specified capacities for the Position Balancers.

7. Troubleshooting

7-1 Countermeasures

CAUTION



- If you notice anything unusual, stop the operation immediately. After checking the items listed in the table below, appropriate measures should be taken by a maintenance operator who has developed sufficient knowledge and operating skill for the Position Balancer.
- If the situation does not relate to any of the listed items in the table below, contact us or your dealer.

Failure	Reason	Measure
Wire rope can not be pulled out.	Spring is fully wound UP because of over-tensioning.	Release spring. See Chapter 6-3.
	Fall prevention device is engaged because the spring tension is set under the minimum capacity.	Release fall Prevention device. See Chapter 6-3.
The origin lamp flashes.	An alarm occurred on the driver board.	Turn the power OFF and ON again.
The equipment does not ascend when the [Origin] button is pressed.	The power is OFF.	Correctly install/connect the AC adapter.
	The pendant switch is not installed.	Correctly install the pendant switch.
	The hook is at the origin.	Press the [Setting position] button to make the hook descend.
	The workpiece and the spring are unbalanced.	Adjust the tension.
	The spring is ruptured.	Contact your dealer.
	The wire rope is stuck inside the main equipment and unable to pull out.	Contact your dealer.
The equipment does not descend when the [Setting position] button is pressed.	The power is OFF.	Correctly install/connect the AC adapter.
	The pendant switch is not installed.	Correctly install the pendant switch.
	The hook is not at the origin.	Press the [Origin] button to make the hook ascend to the origin. Then, check that the origin lamp is ON.
	The descent position setting volume is not adjusted properly.	Set the descent position setting volume to make the hook descend to the desired position.
	The workpiece and the spring are unbalanced.	Adjust the tension.
	The spring is ruptured.	Contact your dealer.
	The wire rope is stuck inside the main equipment and unable to pull out.	Contact your dealer.
Control of the equipment is not possible using external signals.	The power is OFF.	Correctly install/connect the AC adapter.
	The input/output plugs are not installed.	Correctly install the input and output plugs.
	No signal is output from the PC or PLC.	Make sure that the signal is correctly output from the PC or PLC.
	The workpiece and the spring are unbalanced.	Adjust the tension.
	The spring is ruptured.	Contact your dealer.
	The wire rope is stuck inside the main equipment and unable to pull out.	Contact your dealer.
Operation of the equipment is not possible.	Other than above	Turn the power OFF and ON again. If you still cannot operate the product, contact us or your dealer.

8. Wire rope replacement



警告



- Do not disassemble the body before the spring tension is completely decreased. The drum rapidly rotates and the wire rope will be snapped back that will cause an injury accident.

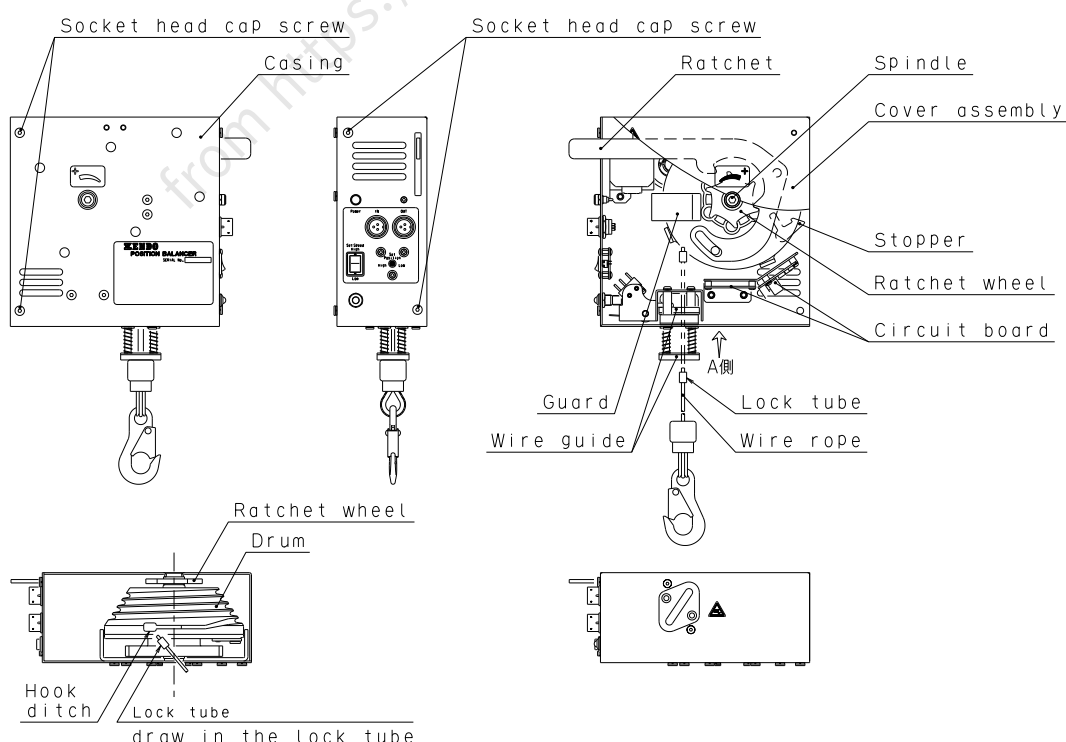


注意



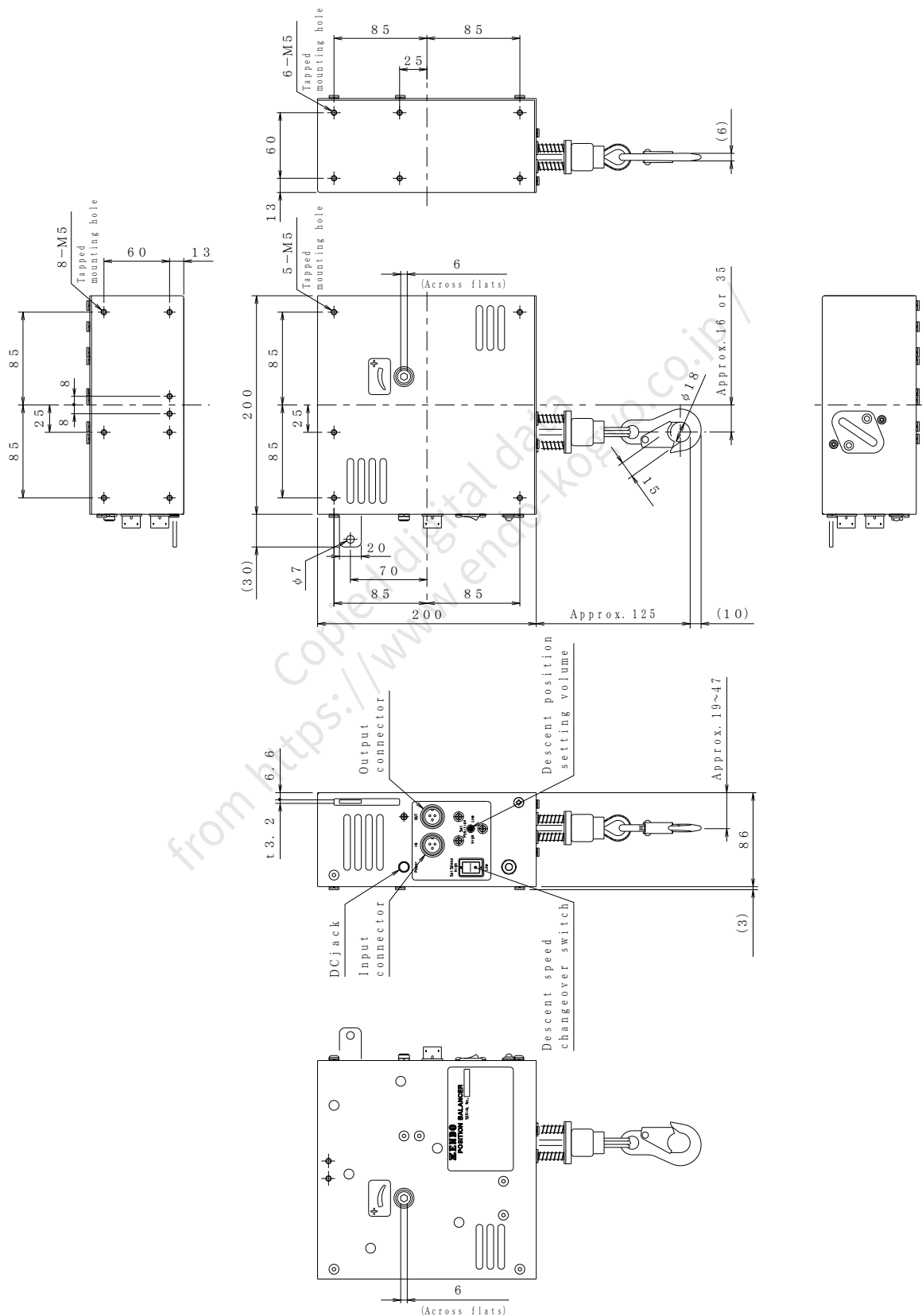
- Do not scratch the substrate, wiring during disassembly.

- 1) Decrease the spring tension by operating the ratchet back and forth.
See chapter 6-3 [Adjustment of the spring tension].
- 2) Remove 4 pcs of the socket head cap screw, put the casing on the floor then remove the cover assembly and ratchet.
Pull out the lever part of the ratchet out from the casing.
- 3) Take out the existing wire rope from the drum.
- 4) Set the lock tube of new wire rope in through the wire guide from the A side, insert the wire rope into the long hole on the drum then pull it in. (refer to below)
- 5) Assembly can be carried out in reverse order of this instruction with caution below.
The wire rope shall be installed on the drum groove properly.
No scratch or damage on the circuit board and wiring during setting the cover assembly in.

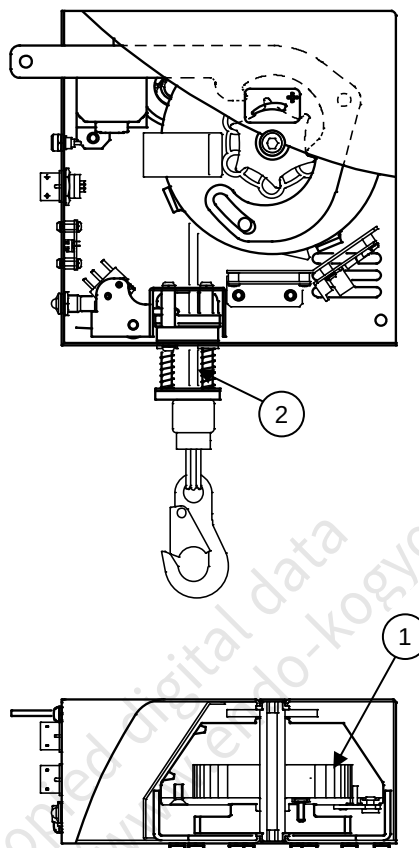


9. Outline Drawing

9-1 Main equipment



10. Consumables



Check number	Part name	Part number	Quantity			
			PB3	PB4	PB5	PB7
(1)	Spring	P2B300089	1			
		P2B301328		1		
		P2B300507			1	
		P2B300508				1
(2)	Wire rope	LBP000133	1	1	1	1

Note: Please provide us with the part names and numbers when you place your order.
For other parts, contact us or your dealer.

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