

**TSUBAKI**

# **LINIPOWER JACK**

**< Worm Series >**

## **Instruction Manual**

### **ATTENTION**

Make sure that this instruction manual is delivered to the final user who uses this product.

### **NOTICE**

In the case of special specification, it might be partially different from this instruction manual.

Refer to the attached final drawing for “★” sections.

※The final drawing of standard specification is not attached, so please check the catalog or website as necessary.



- Thank you for purchasing Tsubaki LINIPOWER JACK. This product should be handled by experienced engineers only. Before using the LINIPOWER JACK, you must read and understand the entire contents of this instruction manual.
- Units described herein are SI {Gravitational}. Figure in { } is for reference.

**TSUBAKIMOTO CHAIN CO.**


# TSUBAKI LINIPOWER JACK Worm series

## Safety Precaution

- You must read this instruction manual and other attached documents prior to use (installation, operation, maintenance, inspection, etc). Understand the equipment and read all instructions thoroughly before installing or operating.
- Keep this manual visible to all users
- Safety precautions in this manual are classified into two categories, “WARNING” and “CAUTION”. These are defined as follows:

	<b>WARNING</b>	Death or serious injury may result from misusing the product without following the instructions.
	<b>CAUTION</b>	Minor or moderate injury, as well as damage to the product may result from misusing the product without following the instructions.

Notice that under “CAUTION” lead to serious results depending on the surrounding situation. Therefore, this section is just as significant as the other, and requires much attention.

 <b>WARNING</b>
<ul style="list-style-type: none"> <li>• Do not release the brake while the jack is supporting a load. Doing so could cause an elevated object to fall or cause unstable parts to move suddenly.</li> <li>• Do not use the jack with a motor or electrical accessories in a combustible atmosphere. This may result in an explosion or fire.</li> <li>• When using the jack with equipment for transporting personnel or lifting equipment, protective devices should be installed to prevent accidents if the jack should break or fall.</li> <li>• When using the jack for lifting equipment, provide safety devices on the equipment to prevent it from falling.</li> <li>• Immediately turn off the power switch in the event of a power failure. Sudden power restoration may result in equipment damage or injury to jack operators.</li> <li>• Do not use the jack beyond the scope of the specifications described on its nameplate or manufacturing specifications.</li> <li>• Be sure to use the power supply indicated on the nameplate of the motor. Improper power supply may cause a fire or motor burnout.</li> <li>• Never approach or touch the rotary parts (input shaft, etc.) or the screw during operation. This may result in injury if a part of your body or clothing becomes caught in the moving parts.</li> <li>• Completely discontinue use of a damaged jack to avoid injury, fire or other accidents.</li> </ul>



## CAUTION

- Do not remove the nameplate from the jack.
- As the jack ages and parts begin to wear, its performance may decline. Use the instructions in this manual for effective inspection and maintenance. Have it repaired or replaced through the distributor that you purchased it from if necessary.
- Product warranty is applicable as long as the unit is operated within the specifications and service conditions described in this manual or specifications that have been approved by Tsubaki. It is user's responsibility to prevent any destructive external conditions that may typically include severe shock loading, vibratory loads, mechanical or thermal overloads, or side loads.
- Any trouble caused by modifications to the product by the customer is not covered by warranty and Tsubaki can not be considered liable for such damage.

Thank you for purchasing TSUBAKI LINIPOWER JACK. To make best use of it, proper installation, operation, and maintenance is required. This manual contains such information and should be carefully read in order to maintain the performance of your Tsubaki LINIPOWER JACK.

If you have any questions, consult the distributor you purchased the jack from or the Tsubaki sales office nearest to you (See the last page of this manual).

The jack's type, test number, and drawing number shown on the nameplate attached to the main body of the jack will be required when you contact your distributor or our sales office.

This instruction manual is subject to change for product improvement without notice.

# —Contents—

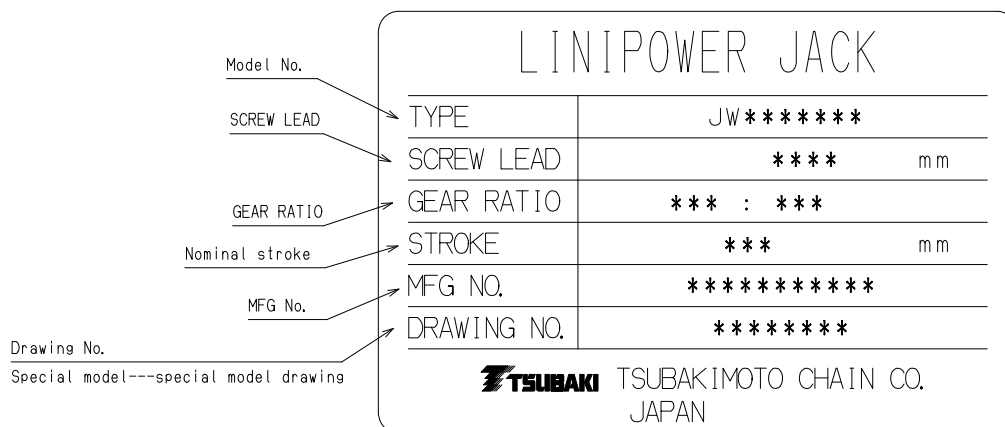
1. Inspection upon receipt
2. Transportation
3. Installation
4. Operation
5. Maintenance and inspection
6. Trouble shooting
7. Basic drawing
8. Option
  - (1) Counter LS unit
  - (2) Position detect unit
  - (3) Specification of each position detector
  - (4) Motor
  - (5) Gear motor
9. Warranty

# 1. Inspection upon receipt

1. Be sure the package is right side up to avoid injury when unpacking the product.
2. As soon as you receive the LINIPOWER JACK, check the followings:
  - (1) Make sure that the "type" stated on the nameplate conforms to that of your order specifications.  
Also, confirm that the accessories enclosed are the same as those you ordered.
  - (2) Check that the nuts and bolts on the unit have not loosened.

Consult the distributor you purchased the product from if you encounter a problem.

In case you find product defects, please contact your distributor or our sales office with the description of following body nameplate.



※ Please check "TYPE", 'MFG No.' and 'DRAWING No.' of the nameplate when inquiring so that we can support smoothly.

※ Even if you return the product, please contact distributor you purchased and let them know "TYPE", "MFG No" and "DRAWING No."

## 2. Transportation

1. Jacks that range under the standard capacity of 49.0kN (5tf) are provided with screw covers made of hard vinyl chloride pipe. Never suspend or carry a jack by its cover.
2. If the Jack has a hanger, use the hanger to lift it. Before lifting, check the packaging, outline drawing or catalog to confirm the weight of the jack. After the jack has been installed, avoid using the hanger to lift it and the equipment that is connected to. This may damage the bolts, causing injury or equipment damage if the equipment drops or the jack turns over.
3. The packaged product has uneven distribution of weight in the longitudinal direction. Be careful when you carry the product.

## ★3. Installation

### 1. Location of installation and atmosphere

Location	Indoor (No rain/water exposure)
Atmosphere	※Dust level should be that of a normal factory
Operating Temperature Range	-15°C to 80°C
Relative Humidity	85% max.

※ Operating temperature range refers to the surface temperature of the jack during operation. To check, measure the surface temperature of the input shaft unit or travel nut (if used). Be sure all the rotating parts have completely stopped before proceeding to measure.

※In case of special specification, please confirm the final drawing because use conditions such a use environment or ambient temperature might be different.

2. Do not place any obstacles that might prevent ventilation around the Jack. They can hinder cooling resulting in a fire caused by abnormal overheating.
3. Never step or hang on the Jack. This may result in injury.
4. A stopper is not provided on the screw shaft of JWM. If the stroke capacity is exceeded, the shaft may disengage from the unit or fail to function.  
Screw shafts of JWB (Ball Screw Type) and JWH (High Lead Ball Screw Type) rotate and drop by its own weight. The same is true for the traveling nut of JWB and JWH Travel nut type. Provide anti-rotation measure to prevent the screw shaft and traveling nut from rotating at the time of installation.
5. For JWB (Ball Screw Type) and JWH, (High Lead Ball Screw Type), do not operate input shaft manually while loaded. Load pressure will rotate the shaft.
6. When using equipment that must avoid all contact with oil or grease such as food processing equipment, make sure a protective device such as an oil receiver is attached to prevent damage from oil leakage resulting from equipment damage or overuse.
7. When installing a motor and reducer unit in addition to the jack body, prepare a robust counter making allowance for a safety factor to prevent alignment accuracy at installation from being reduced even if the maximum load is applied. Make sure that the transmission shaft connected to the input shaft is aligned accurately (Fig.1).

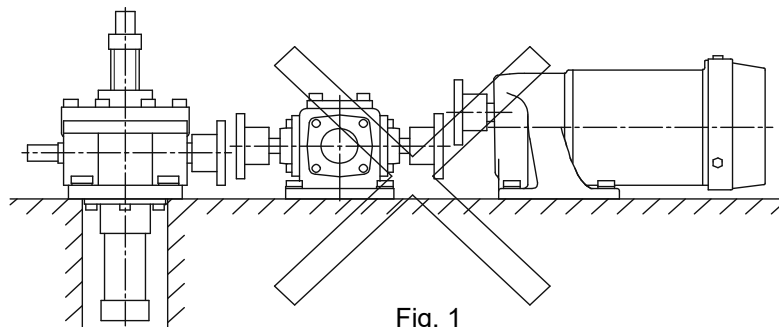


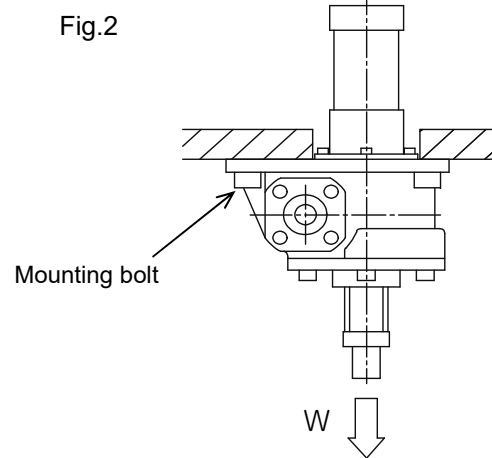
Fig. 1

8. Using a floating shaft may result in malfunction due to vibration depending on rotation speed, therefore, sufficiently consider rigidity of the shaft and backlash of the coupling.

9. To install a screw shaft or cover to the base, avoid drilling large holes so as not to reduce the surface area of contact between the jack and the base.
10. See table 1 for bolt sizes to fasten the jack. Strength class 8.8 or above bolts are usually used for mounting. Use 10.9 or above when load applies directly to the mounting bolts as in Fig.2.

Table 1. Bolt Sizes

Frame No.	Mounting hole	Bolt Size
002	4-φ7	M6
005	4-φ7	M6
010	4-φ9	M8
025	4-φ11	M10
050	4-φ18	M16
100	4-φ22	M20
150	4-φ22	M20
200	4-φ26	M24
300	4-φ33	M30
500	4-φ42	M39



11. Attach shaft end by applying an adhesive agent to its set screw. it is possible for the shaft end to become detached by the rotational torque applied to the shaft. To avoid this, use one of the following adhesives:

Provide a locking mechanism to the shaft end when an end fitting is attached . The screw shaft receives a rotational torque and cause the end fitting to drop. Follow the instructions below to avoid drop of the end fitting.

- 1) Apply an adhesive agent. Use the following brands or their equivalent. Read instructions and safety precautions provided with each product before applying.

Table 2. Tightening Agent

Maker	Brand
Nihon Lock Tight	#262, 271
Three Bond	#1307N

- 2) After tightening the end fitting, fix with the attached set screw (cone point or cut point) as a locking device. For set screw sizes, refer to the end fitting configuration (dimensional drawing).
- 3) In atmospheres with a lot of vibration or temperatures higher than the operating temperature range use dowel pins instead of set screws.

12. The jack's thrusting force may cause the screw shaft (nut in the case of travel nut type) to rotate, in which case a rotation prevention is required. When operating with the shaft end unconnected or pulling the rope, use the rotation prevention type.

13. Do not use mechanical stops. This will cause major internal damage.

14. Apply load in the same direction as that of the screw shaft.

Load from inappropriate angles can bend the shaft (Fig.3).

For side load, make sure to use guides so the load or bending momentum do not apply directly to the jack.

15. Be certain that the jack rating exceed the maximum possible stroke.

If the stroke capacity is exceeded, the shaft may disengage from the unit or fail to function.

16. Consider maximum possible inertia before setting the limit switch.

This means calculating the maximum coasting distance affected

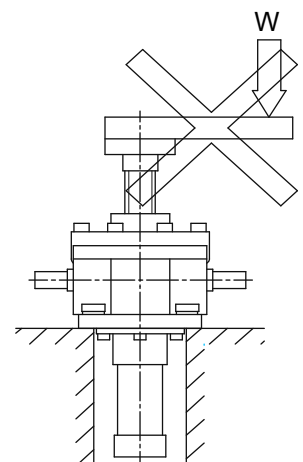


Fig.3

by specific load and installation conditions. Also, install a mechanical stopper within the stroke range in case of emergency.

## 4. Operation

1. Be sure that the dynamic or static load carried or sustained by jack does not exceed its capacity.
2. Make sure that the surface temperature of the housing does not exceed temperature of -15°C to 80°C during operation. If using a traveling nut type unit, measure the traveling nut surface temperature.
3. The maximum input speed is 1800 rpm as long as the input power dose not exceed the unit's maximum allowable input power.
4. Do not operate continuously. Maximum allowable input power ratings are based on a 20% duty cycle per 30 minutes for the JWM (Machine Screw Type) and 30% for the JWB (Ball Screw Type) and JWH (High Lead Ball Screw Type). Duty cycle (%) per 30 min. can be calculated using the following formula: (30min. - off time per cycle) / 30 X 100. For operation longer than that mentioned above or for any continuous operation, the jacks temperature must be monitored and should not exceed 80°C max. in order to determine its duty cycle.
5. Be sure that starting torque is 200% or more of required running torque.
6. Be sure that ample driving power is available to drive the jack when using in temperatures below 0°C. Low temperatures decrease the jack's efficiency due to the increased grease viscosity inside the gear box.
7. Although JWM has self-locking feature, vibration and shock may affect its efficiency, in which case a brake unit is required. JWB and JWH must have brake units that over power their holding torque because of their extremely high efficiencies.
8. Never approach or touch the rotary parts (input shaft, etc.) or the screw during operation.

## 5. Maintenance and inspection

- ★ 1. The jack is shipped prepacked with grease. Recommended grease brands are shown in Table 3. Under normal operation, lubrication is required every 6 months, however, this interval may vary as frequency of use and conditions change. Severe operating conditions will require a self-lubricating system. See Table 4 for the lubrication cycle.  
 ※In case of the made-to order type, confirm with the final drawing, used grease might not be same as standard.
2. When lubricating the screw, use a brush to spread the grease on the screw after the old grease has been removed. See Table 5 for the amount of grease to be applied.

Table 3. Recommended Grease

Part	Maker	Grease
Shaft	Tsubakimoto Chain	JWGS
	Idemitsu Kosan	※ Daphne Eponex Grease SR No.1
Reducer Unit	Nippon Grease	Niglube EP-1K
	Exson Mobile	Mobilux EP No.1
	Cosmo Lubricants	Cosmo Grease Dynamax EP No.1
	Showa Shell	Shell Alvania EP Grease 1

Note: JWGS100G is available in 100g tube.

※ Daphne Eponex is prepacked.

Table 4. Lubrication Intervals

Jack operating cycle	Lubricating Cycle		
	Machine screw	Ball screw	Gear housing
50 to 100 times / day	1 month	3 months	3 months
10 to 50 times / day	3 month	3 to 6 months	3 to 6 months
1 to 10 times / day	6 mo.s to 1 yr.	6 mo.s to 1 yr.	6 mo.s to 1 yr.

Table 5. Amount of Grease

Frame No.	Amount of grease	Initial enclosed quantity
	screw shaft (amount per 100mm stroke)	Reducer unit
002	5 g	35 g
005	5 g	35 g
010	5 g	80 g
025	10 – 15 g	170 g
050	10 – 15 g	370 g
100	20 – 30 g	470 g
150	20 – 30 g	700 g
200	40 – 50 g	830 g
300	40 – 50 g	2600 g
500	50 – 100 g	5500 g

- 3 Reducer units JWM025/JWB025/JWH025 and above are provided with grease nipples and hex socket plugs. Remove the plugs and pour grease through the nipples until it seeps from the openings. Then firmly seal the openings with tape.
- ★ 4 Grease upper bearings for JWB (Ball Screw Type) and JWH (High Lead Ball Screw Type) using the grease nipple set attached to their housings, at 6-month intervals. Not necessary for jacks JWB010/JWH010 and below.

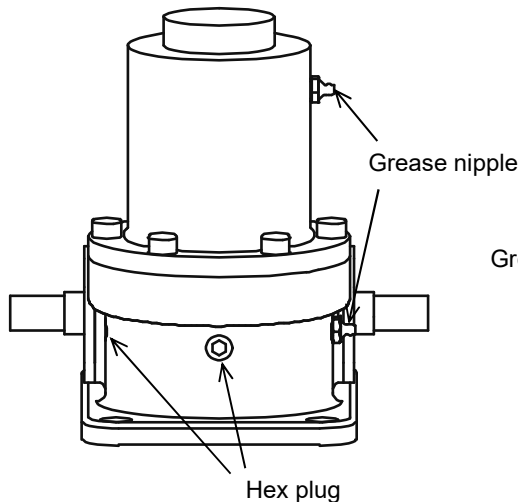


Fig. 4. Grease nipple

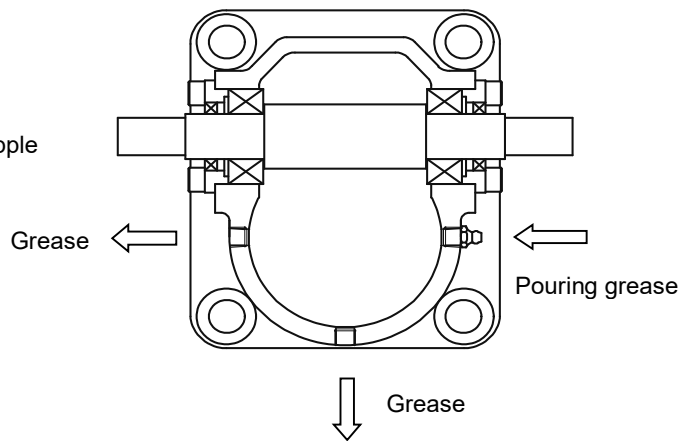


Fig. 5. Greasing method

※In case of the made-to order type, confirm with the final drawing, grease nipple might not be same as above.

- 4 Inspect regularly for general backlash and screw unit condition. Jack life and replacement timing are determined by the following:
- JWM --- Backlash in the direction of screw shaft and nut hits 1/4 of the screw pitch.
  - JWB/JWH --- Visible particles due to wear and tear of the screw unit
  - ALL types --- Check for backlash between the worm and worm gear. Backlash excess of 30° for H speed and 60° for L speed indicates the need to replace the worm and worm gear. (Angle C in Fig.6)

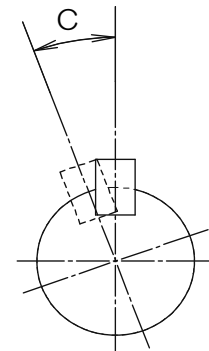


Fig. 6. Input backlash

Generally, continuous use without lubrication at recommended intervals may cause inefficiency of shaft and failure of travel nut.

## 6. Trouble shooting

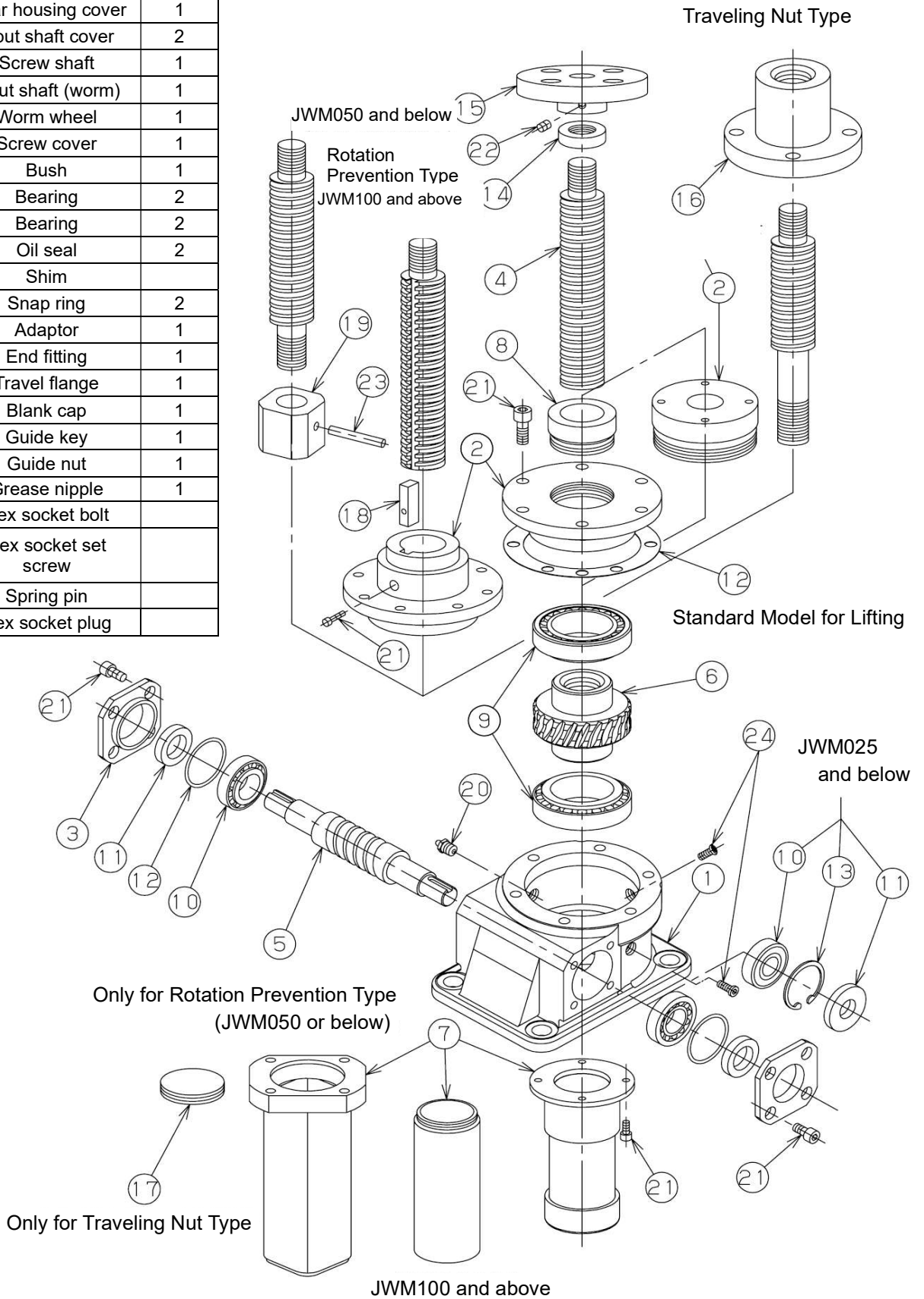
Most of jack troubles arise from improper lubrication, inappropriate selection, and misalignment. Please use the following trouble shooting table when investigating problems.

Table 6. Trouble shooting

Trouble	Cause	Action
Gear Housing Failure	<ol style="list-style-type: none"> <li>1. Over load</li> <li>2. Improper support</li> <li>3. Shock</li> </ol>	<ul style="list-style-type: none"> <li>• Reduce the load or replace with a unit of sufficient capacity.</li> <li>• Install the jack to a robust base and align properly.</li> <li>• Provide a shock absorbing device.</li> </ul>
Input Shaft Failure	<ol style="list-style-type: none"> <li>1. Improper centering</li> <li>2. Excessive overhung load</li> <li>3. Overload</li> <li>4. Impact load</li> <li>5. Excessive input</li> </ol>	<ul style="list-style-type: none"> <li>• Tube coupling may cause shaft failure. Please use flexible coupling.</li> <li>• Re-align as mentioned in installation page.</li> <li>• Check the catalog for allowable loads and adjust.</li> <li>• See Gear Housing Failure #1.</li> <li>• Provide a safety device to avoid possible impact loads.</li> <li>• Set the input power to be less than the allowable input torque in the catalog or replace it with a larger unit.</li> <li>• When several jacks are connected in series, there is a limitation on the input shaft of the first jack due to the axial strength. If the current value exceeds the catalog value, reduce the load or change the jack to one with a larger capacity</li> </ul>
Bearing Failure	<ol style="list-style-type: none"> <li>1. Overload</li> <li>2. Excessive overhung load</li> <li>3. Coupling misalignment</li> <li>4. Coupling axial adjustment</li> <li>5. Abnormal force to worm wheel bearings</li> <li>6. Improper lubrication</li> <li>7. Impact load</li> </ol>	<ul style="list-style-type: none"> <li>• See Gear Case Housing #1.</li> <li>• See Input Shaft Failure #2.</li> <li>• See Input Shaft Failure #1.</li> <li>• Although the specified pressure has been applied to the bearing, the input shaft can be rotated freely when no load is connected. If the rotation is heavy, some force may be applied to the input shaft in the axial direction. Remove the force.</li> <li>• See #5 (Maintenance and inspection) of this manual.</li> <li>• See Input Shaft Failure #4.</li> </ul>
Abnormal wear of travel nut/ worm wheel	<ol style="list-style-type: none"> <li>1. overload</li> <li>2. Improper lubrication</li> <li>3. Improper adjustment/installation</li> </ol>	<ul style="list-style-type: none"> <li>• See Gear Housing Failure #1.</li> <li>• See Bearing Failure #6.</li> <li>• Set the load so that it will be applied onto the same axis as the screw shaft.</li> </ul>
Ball nut damage, abnormal wear	<ol style="list-style-type: none"> <li>1. Overload</li> <li>2. Improper adjustment/installation</li> <li>3. Improper lubrication</li> <li>4. Inappropriate sizing</li> </ol>	<ul style="list-style-type: none"> <li>• See Gear Housing Failure #1.</li> <li>• Set the load so that it will be applied onto the same axis as the screw shaft.</li> <li>• See Bearing Failure #6.</li> <li>• Check the catalog for relationship between life and load.</li> </ul>
Shaft failure, Abnormal abrasion, abnormal noise	<ol style="list-style-type: none"> <li>1. Overload</li> <li>2. Improper adjustment/installation</li> <li>3. Side load</li> <li>4. Improper lubrication</li> </ol>	<ul style="list-style-type: none"> <li>• See Gear Housing Failure #1.</li> <li>• See Ball Nut Failure #2.</li> <li>• Provide a guide to avoid side loads</li> <li>• See Bearing Failure #6.</li> </ul>
Gear Housing overheat (over 80°C)	<ol style="list-style-type: none"> <li>1. Overload</li> <li>2. Improper lubrication</li> <li>3. Improper centering</li> </ol>	<ul style="list-style-type: none"> <li>• See Gear Housing Failure #1.</li> <li>• See Bearing Failure #6.</li> <li>• See Input Shaft Failure #1.</li> <li>• See Shaft Failure #3.</li> </ul>

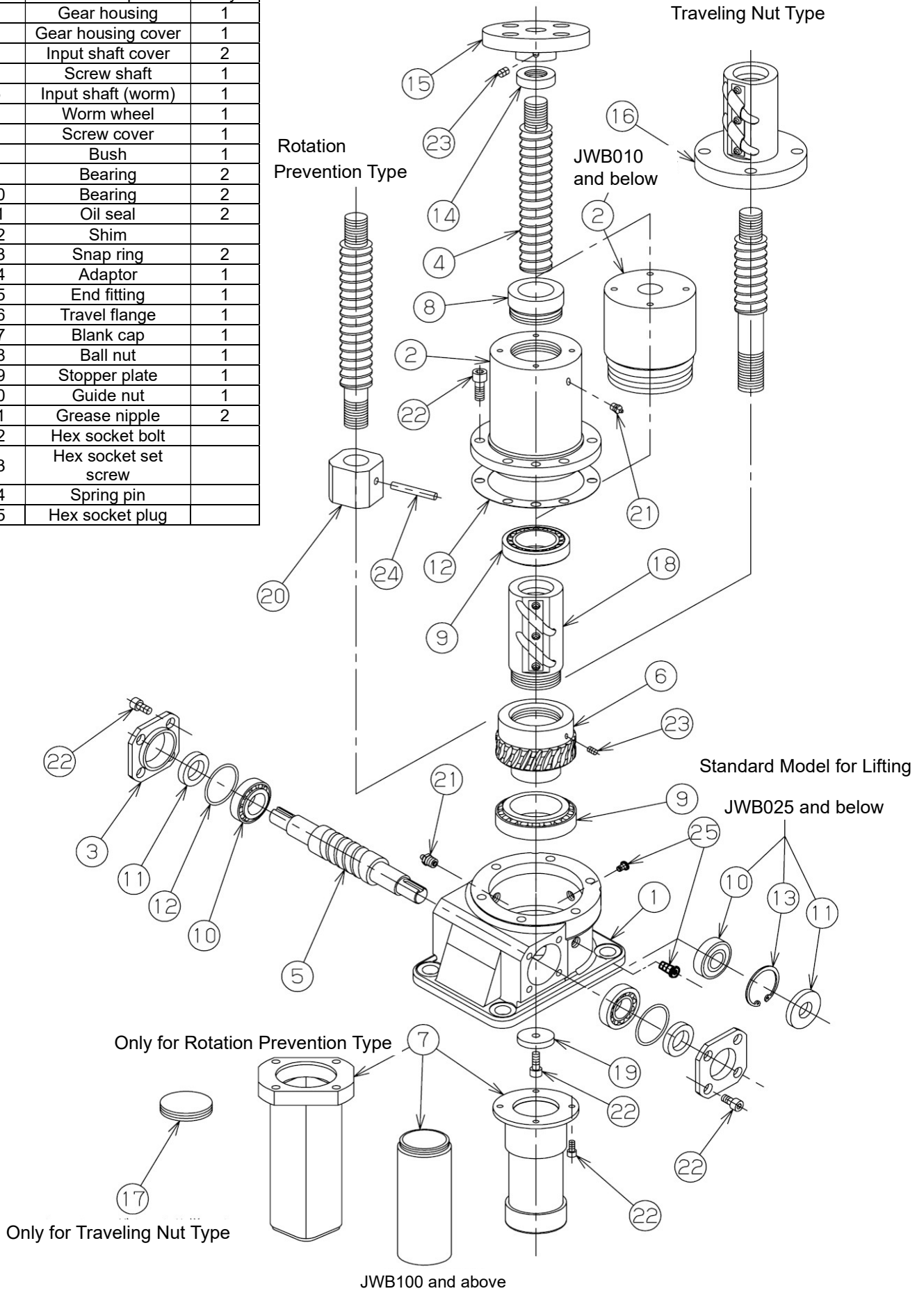
## 7. Basic Structure <Machine Screw Type>

NO	Name of part	Qty
1	Gear housing	1
2	Gear housing cover	1
3	Input shaft cover	2
4	Screw shaft	1
5	Input shaft (worm)	1
6	Worm wheel	1
7	Screw cover	1
8	Bush	1
9	Bearing	2
10	Bearing	2
11	Oil seal	2
12	Shim	
13	Snap ring	2
14	Adaptor	1
15	End fitting	1
16	Travel flange	1
17	Blank cap	1
18	Guide key	1
19	Guide nut	1
20	Grease nipple	1
21	Hex socket bolt	
22	Hex socket set screw	
23	Spring pin	
24	Hex socket plug	



< Basic Structure (High Lead) Type >

NO	Name of part	Qty
1	Gear housing	1
2	Gear housing cover	1
3	Input shaft cover	2
4	Screw shaft	1
5	Input shaft (worm)	1
6	Worm wheel	1
7	Screw cover	1
8	Bush	1
9	Bearing	2
10	Bearing	2
11	Oil seal	2
12	Shim	
13	Snap ring	2
14	Adaptor	1
15	End fitting	1
16	Travel flange	1
17	Blank cap	1
18	Ball nut	1
19	Stopper plate	1
20	Guide nut	1
21	Grease nipple	2
22	Hex socket bolt	
23	Hex socket set screw	
24	Spring pin	
25	Hex socket plug	



## 8. Options

### ★ (1) Counter LS Unit

The counter LS unit is a stroke adjustment and detection unit, which has two internal microswitches. The strikers and microswitches detect the jack stroke through the gear and cam mechanism. The display number of the counter LS unit is changed by one with each rotation of the input shaft.

Microswitch specifications in Counter LS Unit

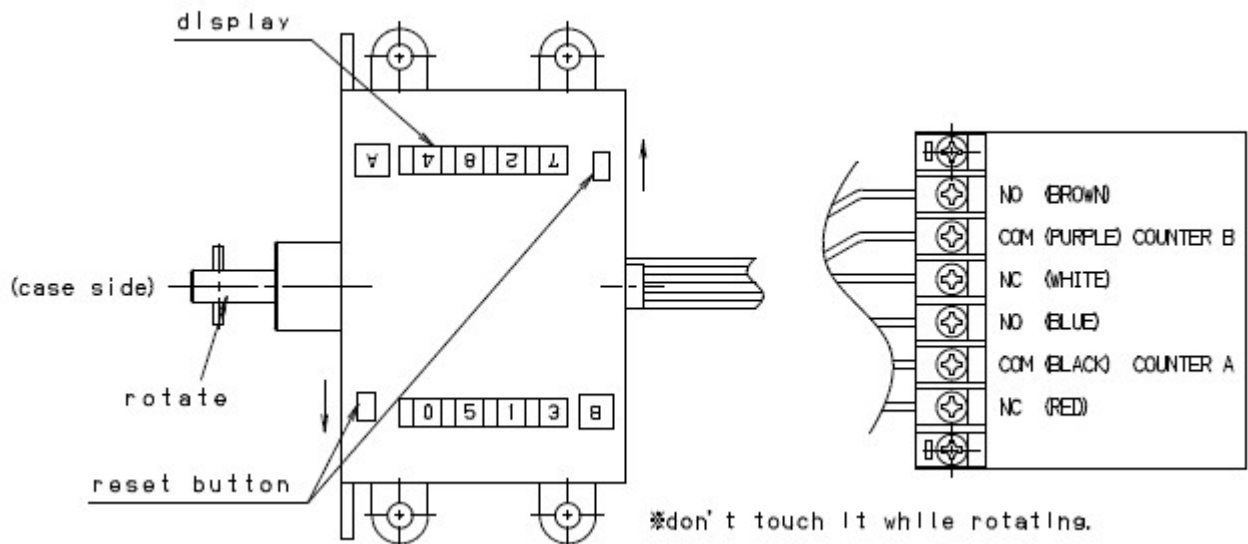
Part Number	AVT3254 (Panasonic) or equivalent
Rating	AC250V 3A (cosφ=0.4)
Contacts	1 C

### ■ General Precautions

1. The installed counter LS unit has been checked on delivery test, but it is not adjusted the stroke position. You must adjust and set the stroke when the Jack is installed. Consider the coasting stroke of the jack when setting the stroke. If the travel screw is rotated while the input shaft is fixed, the adjusted position will be changed. Therefore, do not allow the travel screw to be rotated (for traveling nut-types, do not allow the nut to be rotated).
2. The counter LS unit contains precision parts. So it should not be subjected severe shock or vibration.

### ■ Connection

1. Note: As the wiring cable is longer, the signal power is decreased.
2. Make sure to take the ground for the main unit and the shielded wiring for the signal wires.
3. Keep proper distance between signal conductor and power cable. If any noise generators are installed on surroundings, necessary countermeasures is required such as noise filter, shielding signal wires.
4. Use same OD of the cable ( $\phi 12.5 \sim \phi 14.5 \text{mm}$ ) as the connector of the counter LS unit. If using smaller cable or discreet wires, it will lose the waterproof.
5. If wiring in an area where the counter LS unit may get wet from rain or other sources, make sure that no water gets inside. It may cause malfunction.



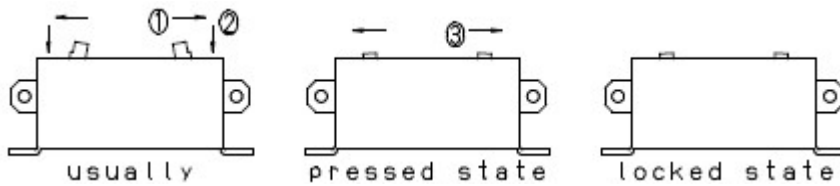
## ■Setting the counter LS unit

The counter LS unit micro switches works from NC contact to NO contact when the display shows from 9999 to 0000, and from NO contact to NC contact when showing between 1999 to 2000.

For the longer stroke, it can be used in the entire stroke range by setting the display count between 9999 to 2000 in lowering counting.

### I : Preparation before setting

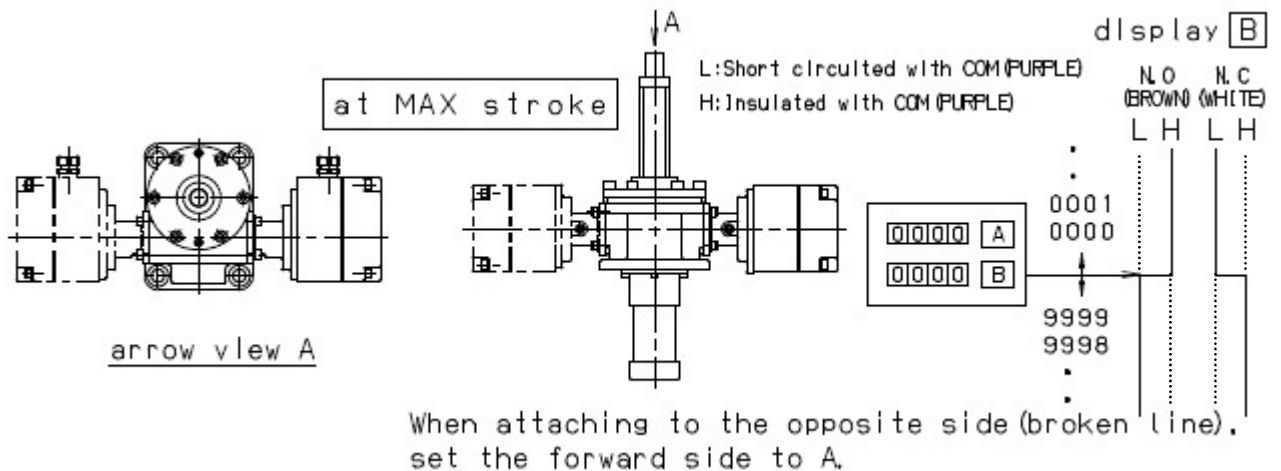
1. Open the cover. There is a display on the side inside the counter LS unit.  
Check the reset buttons A and B stickers.
2. Connect the wire to the operating circuit.
3. Press in the reset switch A and B following ① to③ to be locked state. The locked state means that the reset button is pressed in and fixed in low position, and the display shows 0000.



### II : Setting for lift up

1. Set the forward switch.

Move the screw forward to the target position. When you reach the target position, stop the screw and unlock the reset button on the display B.

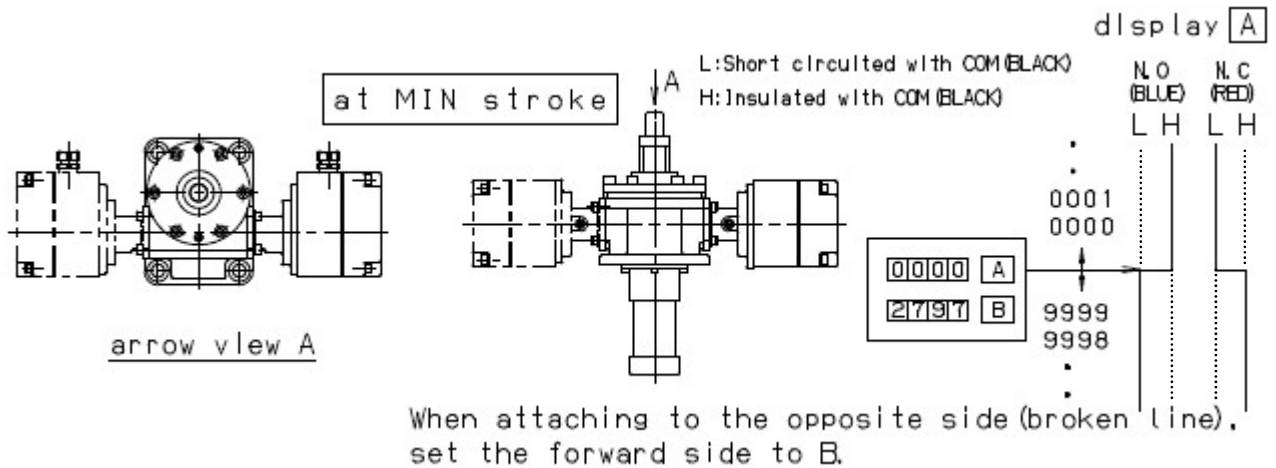


2. Check the operation of the forward switch.

Reverse the screw a little and move back the set position again to check the micro switch outputs a signal.

3. Set the backward switch.

Retract the screw and move it to the target position. When you reach the target position, stop the screw and unlock the reset button on the display A.



4. Check the operation of the backward switch.

Reverse the screw a little and move back the set position again to check the micro switch outputs a signal.

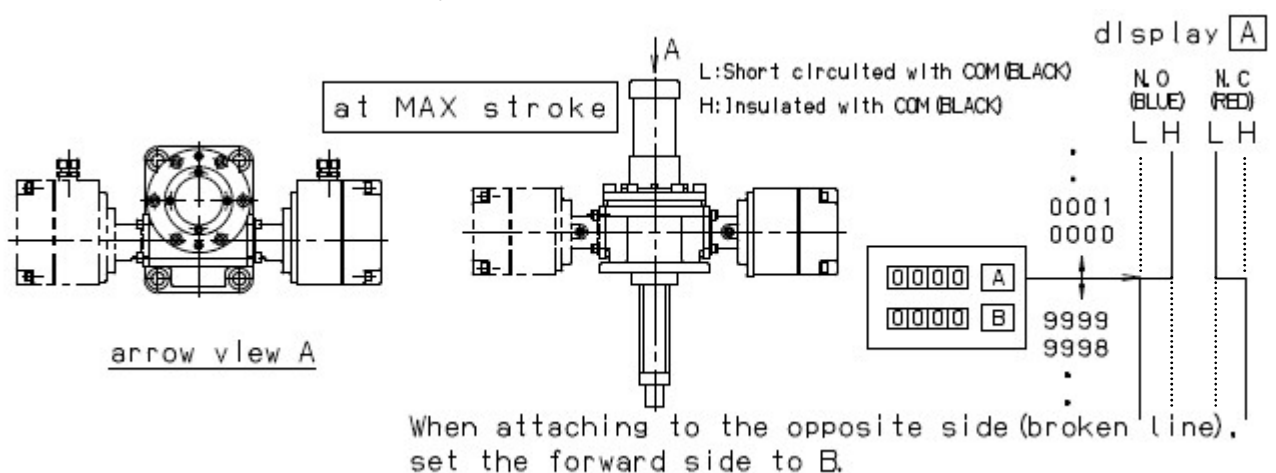
5. After completing the settings for the forward position and the backward position, check that the device stops at both positions of A and B to be sure.

All the setting is done after completing the functional confirmation.

### III : Suspending Type

1. Set the forward switch.

Move the screw forward to the target position. When you reach the target position, stop the screw and unlock the reset button on the display A.

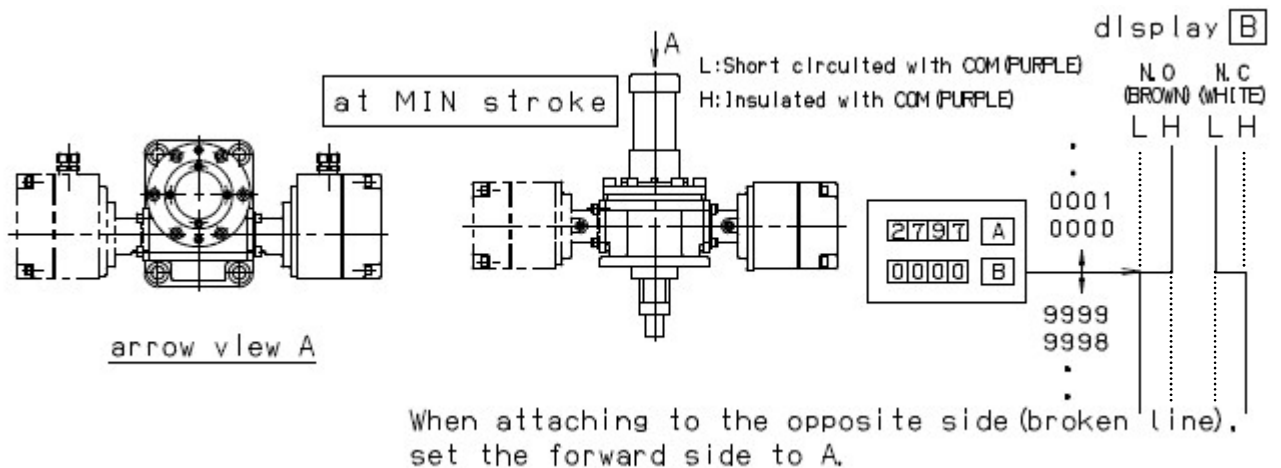


2. Check the operation of the forward switch.

Reverse the screw a little and move back the set position again to check the micro switch outputs a signal.

3. Set the backward switch.

Retract the screw and move it to the target position. When you reach the target position, stop the screw and unlock the reset button on the display B.



4. Check the operation of the backward switch.

Reverse the screw a little and move back the set position again to check the micro switch outputs a signal.

5. After completing the settings for the forward position and the backward position, check that the device stops at both positions of A and B to be sure.

All the setting is done after completing the functional confirmation.

(Precautions)

- The display characters 9 to 7 of the uppermost digit (thousands place) are not shown because of the groove of the micro switch actuator.

## (2) Position detection unit (option)

Three types of position detection units can be built in at most.

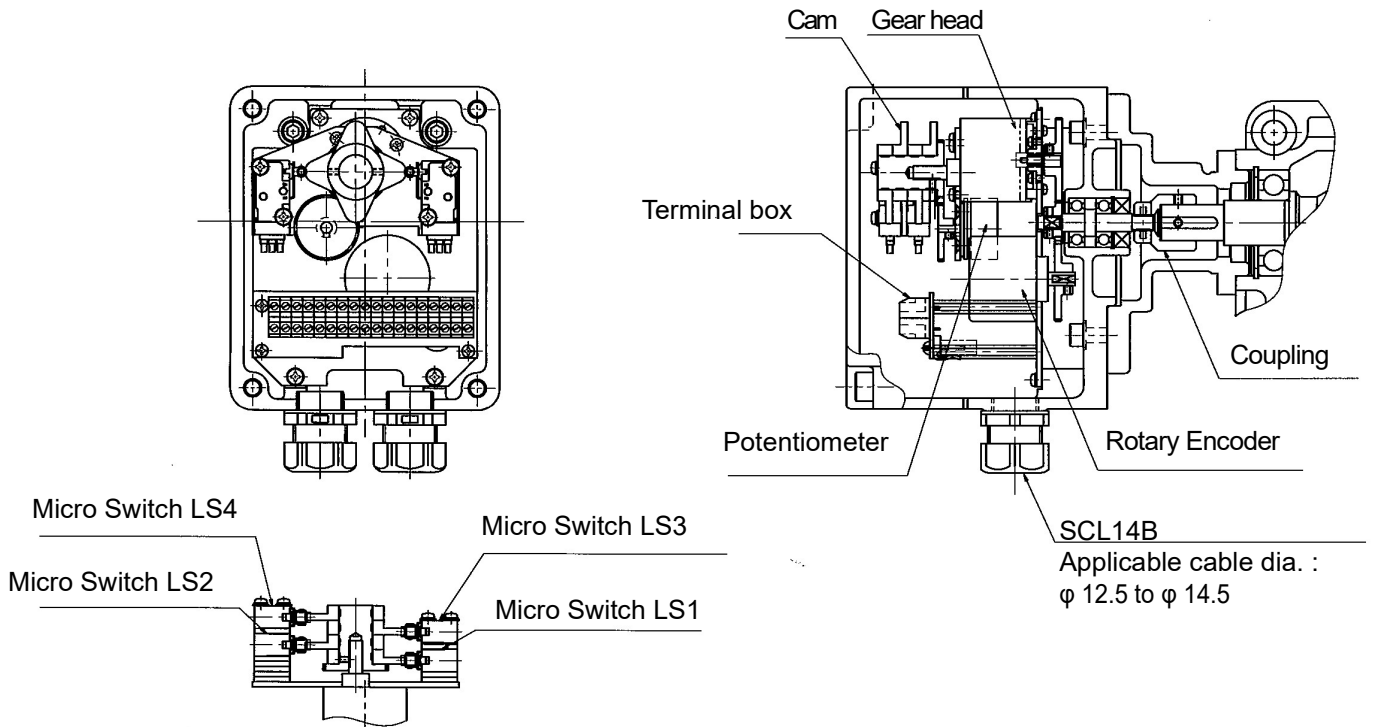
Micro switch: 4 pieces.

Potentiometer: 1 pc.

Rotary encoder: 1 pc.

### Structure

Following shows the unit diagram consisting of micro switch, potentiometer and rotary encoder.



### I Note

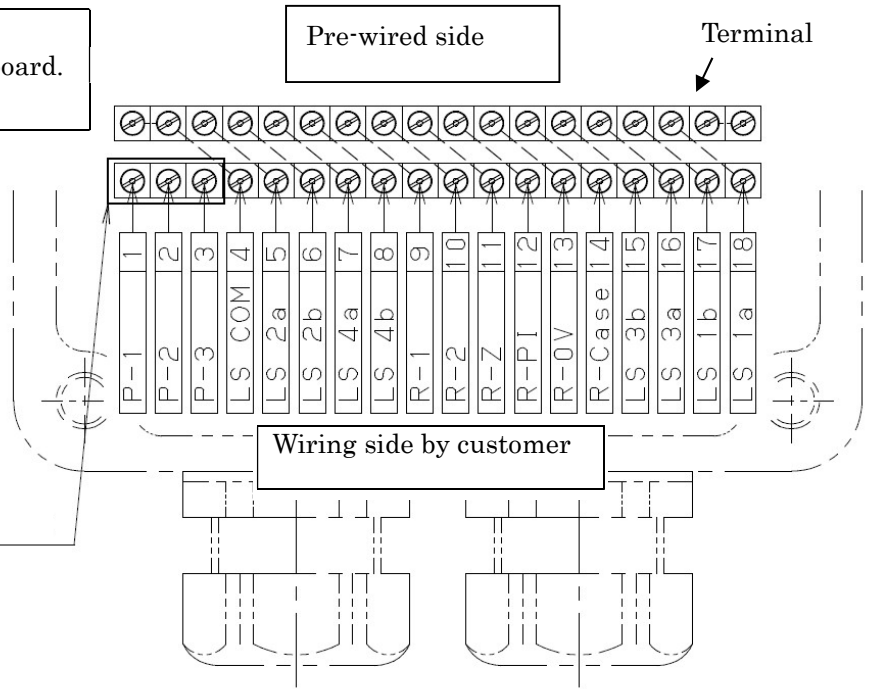
1. Newly delivered micro switches have already been tested, but have not been adjusted for stroke. Therefore, you must carry out stroke adjustment after the unit is installed. Be sure to take into consideration the inertia of the jack when performing the stroke adjustment. If the travel screw is turned while the input shaft fixed after adjustment, the adjusted settings will change. Therefore, do not allow the travel screw to be turned (for traveling nut-types, do not allow the nut to be turned).
2. Position detection unit consists of precision parts. Never apply shock or vibration.
3. Never rotate LS cam strongly after fixing it by the set of screws. Otherwise, built in reducer can brake.

### I Connection

1. Use the terminal block in the unit for the connection to each detector. Connection of each detector to terminal block is previously completed.
2. In case of long distance wiring, signal loss can get worse.
3. Make sure to ground the shield wire of the detector unit and signal.
4. Locate the signal and power line separately. Put noise filter, shield the signal line, in case there is a source of noise. Use shield wire for wiring rotary encoder.
5. Use suitable diameter of cable, which corresponds to the connector of position detection unit. In case of smaller diameter cable or bulk cable, waterproof is poor.  
Applicable cable diameter: SCL14B (12.5 to 14.5 mm dia.)
6. In case of wiring in rain or other wet environment, avoid water from entering the position detection unit. It will damage the product.

**Caution !**  
The back of terminal has printed board.  
It is wired as broken line.

**Pre-wired by Tsubaki**  
Potentiometer is connected by  
connector from the backside



### (3) Specification of each position detector

#### ★ ■ Micro switch (Option code: K2 or K4)

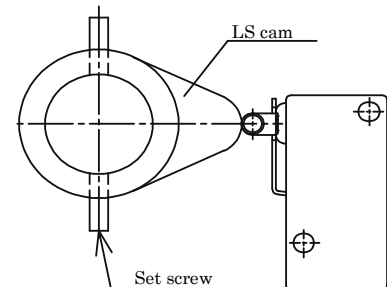
Specification of micro switch	
Type	D2VW-5L2A-1M or equivalent
Maker	OMRON
Contact configuration	
Capacity	AC250V4A (COSφ = 0.7)

※ In case of the special specification, confirm the final drawing because model number, specification or the number might be different.

#### Setting the internal LS (Option code: K2 or K4)

The position detection unit may contain either two or four microswitches for the internal LSs. The jack stroke runs the output from the rotation of the input axis through the reducer, and changes the cam rotation angle. When the cam reaches a specified position, it will activate the microswitch and stop the jack. Then adjustment of the cam positions should be carried out.

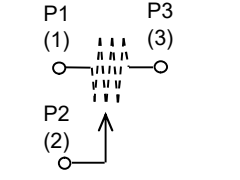
1. Ensure that all connections have been properly made when adjusting the stroke.
2. At approximately the center of the stroke, ensure that (1) the cam is stopped by the operation of the forward limit microswitch by screw extension and nut progression, and that (2) the cam is stopped by the reverse limit microswitch by screw contraction and nut reversal.
3. Be aware that the momentum of the jack will prevent it from stopping immediately when the microswitch is activated and that there will be a slight amount of overrunning. Take this into consideration and adjust the microswitch activation position to point slightly in front of where you actually want the jack to stop.
4. The rotary cam is affixed by two hexagonal bolts to the shaft directly connected to the reducer. Turn and adjust the cam after loosening these two bolts. Trying to turn the cam without loosening these bolts may damage the internal reduction gears. (Note: Use a hexagonal wrench [2size] for loosening the bolts).
5. Adjust the cams beginning with the one farthest away (if you start with the nearest cams you may not be able to move the farthest ones). After adjustment, be sure to tighten the bolts.



★ **I Potentiometer (Option code: P)**

1. Potentiometer is set at half of the resistance (500 ohm) at the middle of the stroke, unless otherwise specified.
2. Never rotate the screw or nut during transportation or installation, otherwise the relation between the stroke and resistance can get out of control. When the resistance is incorrect, reset 500 ohm at the middle of stroke.

Potentiometer output the stroke of the Linipower Jack as the change of the value of resistance.  
 ※ In case of the special specification, confirm the final drawing because model number or specification might be different.

Potentiometer Specification		Terminal #
Type	CP-30	 <p>( ) indicates terminal No.</p>
Maker	Sakae	
Total resistance	1.0kΩ	
Power rating	0.75W	
Insulation rating	AC1000V (1min)	
Effective electrical angle	355°	
Effective angle of rotation	360°(infinite)	

★ **■ Rotary encoder (Option code: R)**

Encoder Specification		
Type	TS5305N251	
Maker	Tamagawa Seiki Co., Ltd	
Output pulse	600C / T	
Output form	Open collector	
Output wave	90° phase difference, 2 phase square wave, — home position signal	
Output voltage	H	—
	L	1V or less
Power supply	DC5V to 24V 100mA or less	

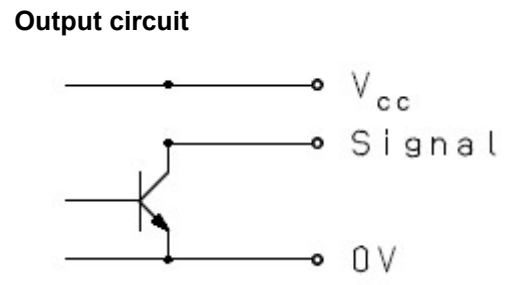
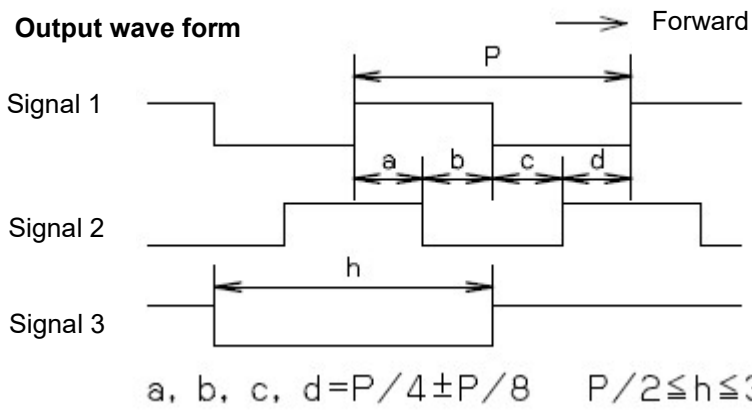
- ※ Rotary encoder is set to output 300 pulses per rotation of input shaft of Linipower Jack.  
 ※ In case of the special specification, confirm the final drawing because model number or specification might be different.

Output connection

Signal 1	Signal 2	Signal Z	+5 to +24V	0V	Case
(9)	(10)	(11)	(12)	(13)	(14)

( ) represents the terminal number.

- ※ Use with an equipment like sequencer or program controller, which controls the stroke as a digital signal.
1. Standard type has built-in incremental type encoder
  2. It is possible to set an accurate home position of the machine in combination with a limit switch because home position output is read out every 600 pulses.
  3. Because the output is open collector type, output signal can be obtained when connected to a pull up resistor.  
 Output voltage for signal 1 and 2: “H” is “(supply voltage - 1)V or more”  
 “L” is “1V or less”.  
 Reference for pull up resistance: DC 5V: 220Ω / DC12V: 470Ω / DC24V:1kΩ
  4. Rotary encoder is a precision instrument. Never apply vibration or shock.
  5. Use shield wire for wiring of rotary encoder.



## (4) Motor

### ★ ■ General precautions

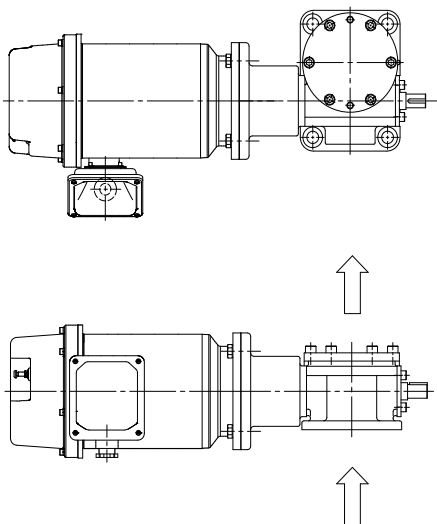
1. Perform the wiring work according to the electric equipment technical standard and the regulations of the electric power company. Take care that the voltage drop is not large, since the longer the wiring distance becomes, the more the voltage drop will increase. Generally, you should use electric wire that has proper thickness and length that will not cause the voltage to drop 2% or more. Voltage drop may prevent brake release. Use a power supply which is described on the nameplate.
2. Refer to the Table 2 below for the applicable cable diameter. Using cables with smaller diameter will render the waterproof feature ineffective.
3. After wiring is completed, check the mounting set screws and connector whether they are not loose.
4. Grounding  
After installation of the Linipower Jack, ground the motor (Earth work in class 3 or higher).

Table 2. (Motor terminal box)

Motor capacity	Connector configuration	Applicable cable diameter	Connector mounting part	Size of ground terminal
0.2 to 0.4 kW	SK-14L	φ11 to φ13	G1 / 2	M4
0.75 to 1.5 kW	A20c	φ14 to φ15	G3 / 4	M4
2.2 to 2.3 kW	A25c	φ19 to φ20	G1	M4

※ Connector connection will be required depending on lead-out part size of the terminal box or when servo motor is used. Please refer to the drawing when using a special type motor.

### ★ I Motor connection

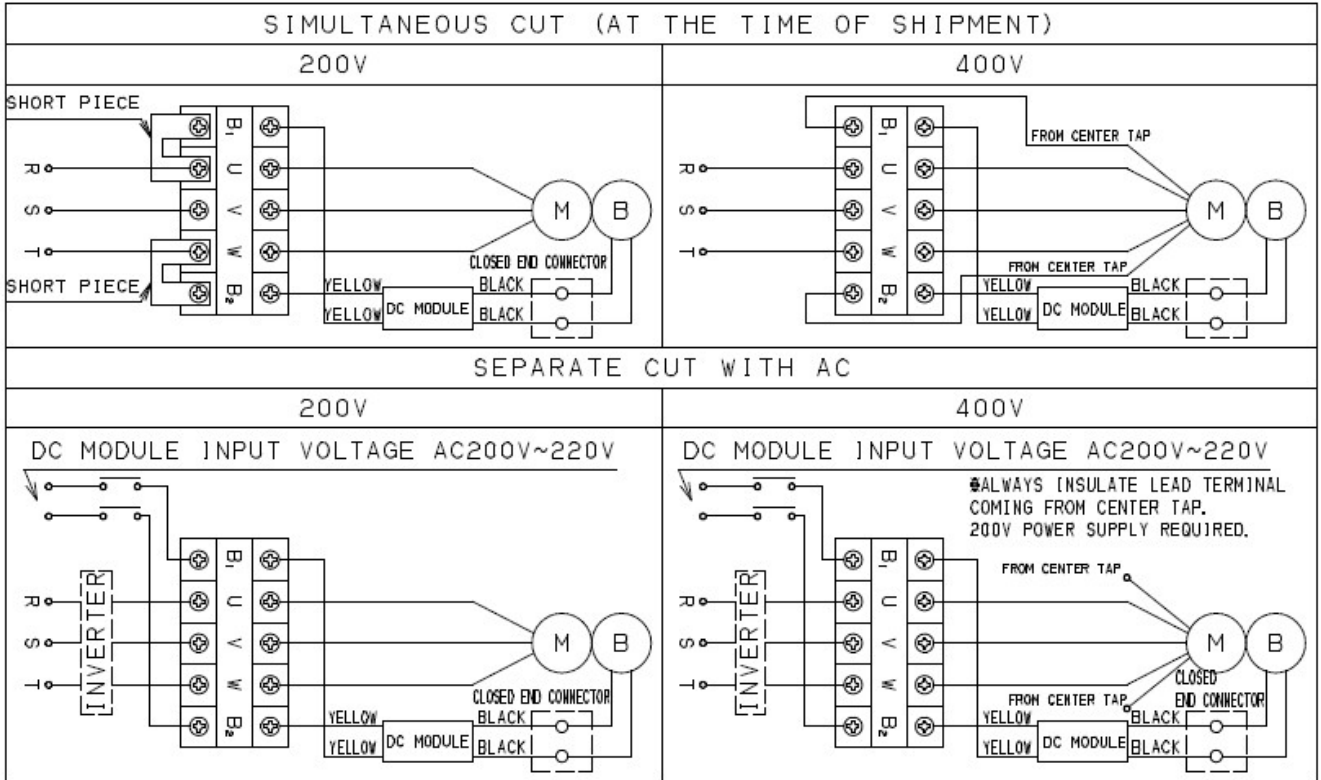


The screw shaft of the standard type and rotation prevention type move in the direction of the arrows shown in the picture on the left with normal wiring. The traveling nut moves in the same direction as the travel screw.

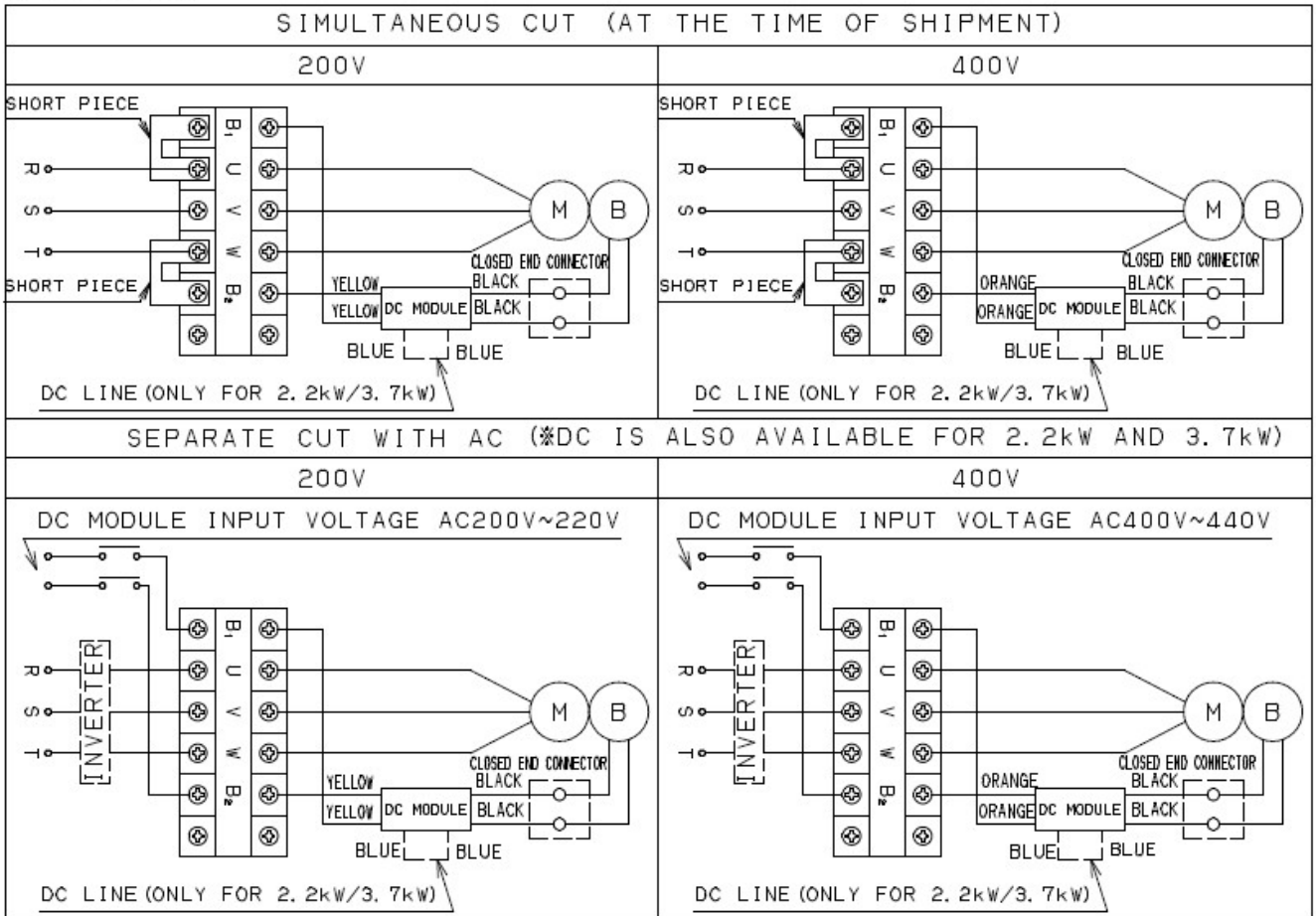
Note: Add necessary protective devices to each contact site.

Note: Please comply with the regulations of electric companies for switches and fuse.

0.2~0.4kW



0.75~3.7kW



### ★ 3-4. Wiring method when inverter is used

- When the inverter drives the motor it is necessary to use a separate power supply for the brake. When using a separate power supply for the brake, first remove the short piece, and then apply the normal power source to the brake. Do not output power from the inverter.
- For motors up to 0.4kW/ 400V class, remove the wire from the mid-tap and insulate it, and apply 200 to 220V to the DC Module for the brake. In case a power source of 200 to 220V is not available, use a transformer to step-down the voltage to the necessary 200 to 220V. The capacity of the transformer should be 90VA and bigger, with no voltage drop.
- Use a rated load of AC250V, 7A and larger for the electro-magnetic switch of the 200V class brake. Use a contact voltage of AC400 --- 440V, with an inductive load of 1A and larger (ex. magnetic contactor for 2.2kW motor) for the 400V class brake.

The DC Module has a surge absorption protective device. Add necessary protective devices to each contact site.

- If separate DC wiring is required, please contact us.
- ※ Special Type may require a different wiring. Please refer to the drawing.

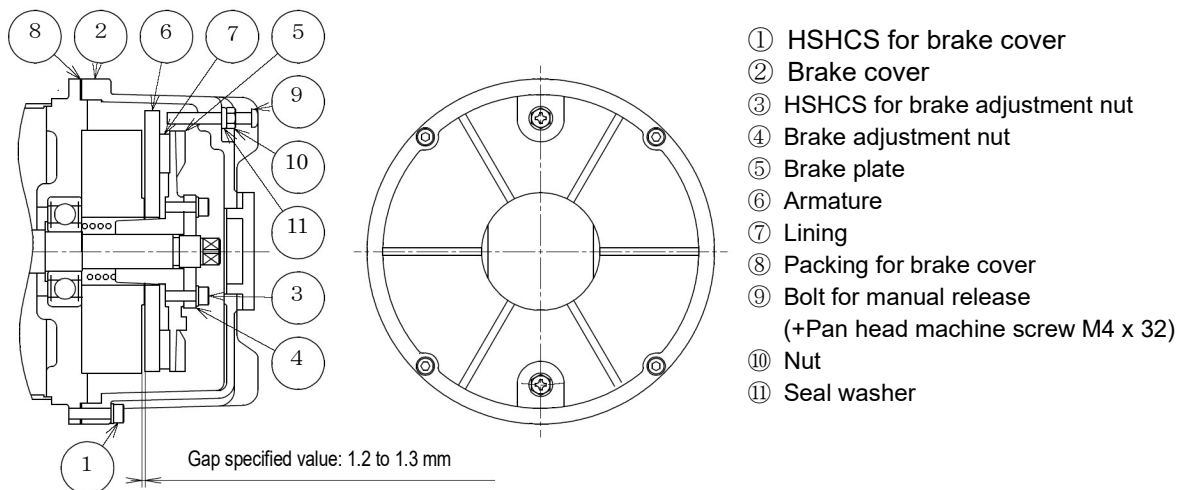
## ★ I Brake

### ■ 0.2 to 0.4 kW

It is usually sufficient to monitor the operational status of the brake on your own, but please be aware of the following:

- The brake lining becomes worn because of the force of friction between the brake plate and the lining. It is necessary to change brake motor after 2 times of 'Gap adjustments'.
- It is necessary to clean up the brake twice a year because it accumulates a lot of dust and particles due to the continuous wearing of the brake lining.

#### (1) Brake structure



1. Unfasten 4 HSHCS'①, then remove the brake cover②.
2. Unfasten 2 HSHCS'③.
3. Adjust the gap within the regulated 1.2 to 1.3 mm by adjusting the nut④. Use a thickness gauge for adjustment. (Limitation of gap is 1.5 mm)
- ※ In case of the special specification, (Ambient temperature 70°C)Limitation of gap is 1.4 mm.
4. Apply anti-loosening liquid to 2 HSHCS'③, then affix the brake plate⑤ at a tightening torque of 294 to 392 N·cm {30 to 40 kgf·cm}.

5. Turn on the power source, and make sure the brake works normally. If the gap is small, the armature⑥ will make contact with the lining⑦ when it's turning. Re-adjust the gap in this case.
6. Affix the brake cover packing⑧ to the matching surface of the brake cover, then fasten to the motor with 4 HSHCS' ①.

(Note) In case the brake cover packing develops a crack or is cut, change to new packing or apply sealing agent to maintain sealing performance.

When the grooves in the brake lining wear out, it is no longer effective.

## (2) Manual release operation

Conduct the following in the case the brake is released manually without turning on the brake power.  
Never apply any load to the screw shaft when manually releasing it.

1. Loosen the (2) nuts ⑩ until they come in contact with the head of the bolt.
2. By screwing the (2) bolts ⑨ in evenly, the tip of the bolt will make contact with the armature ⑥, causing it to suddenly become heavy and thus releasing the brake.

**Note: Forcefully screwing in the bolts may deform the armature or damage the bolts and/or the tap holes at brake cover.**

3. With the above-mentioned operation, when the brake lining ⑦ separates from the armature ⑥, the braking force ablates.
4. When resetting to the original brake operation state, loosen the brake cover bolts ⑨ and return to their original position. Move the nut ⑩ to its original position and tighten. Once finished, conduct a test run to ensure the brake is running as normal.

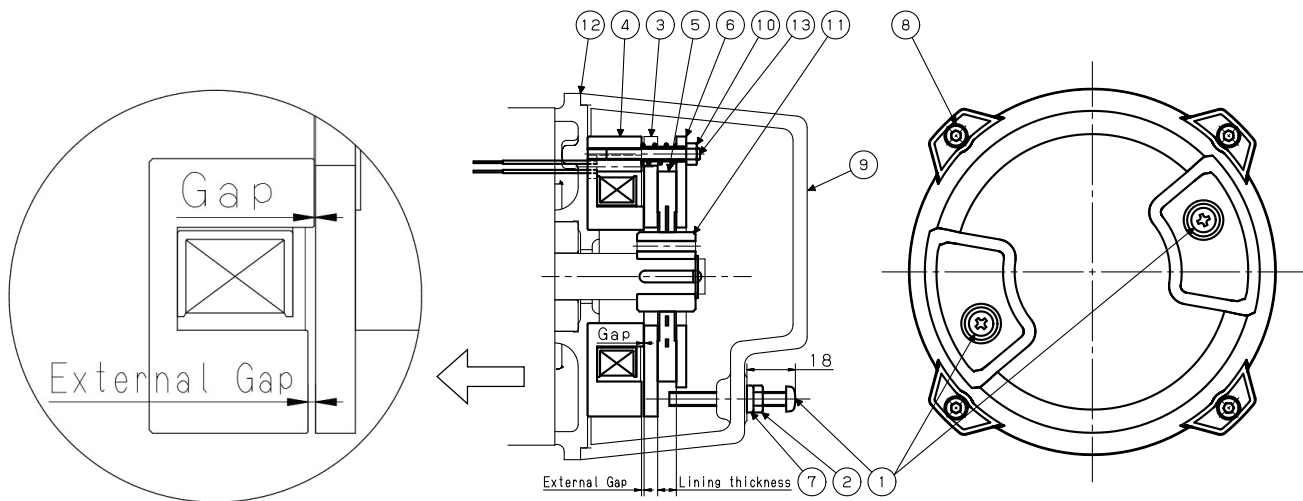
Note: Make sure the nut⑩ is tightened properly to ensure a good seal.

## ★ ■ 0.75kW / 1.5kW/ 2.2kW

It is usually sufficient to monitor the operational status of the brake, but be aware of the following while brake function is not well:

- This brake works with friction force between the brake plate⑥, the armature③ and the lining⑤, brake lining will be worn while operation. It is necessary to change brake motor after 3 times of 'Gap adjustments'.
- It is necessary to clean up the brake every 6 months because it will have wear of dust and particles due to the brake operation.

### (1) Brake structure



- |   |                         |                       |
|---|-------------------------|-----------------------|
| ① Bolts for manual release<br>(+Pan head machine screw) | ⑥ Brake plate           | ⑫ Water proof packing |
| ② Double nuts   | ⑦ Seal washer           | ⑬ Guide bolt          |
| ③ Armature  | ⑧ Bolts for brake cover |                       |
| ④ Fixed core  | ⑨ Brake cover           |                       |
| ⑤ Lining  | ⑩ Adjustable nuts       |                       |
|   | ⑪ Hub                   |                       |

### (2) Brake inspection and gap adjustment

1) Loosen the bolts⑧ for brake cover and remove the brake cover⑨.

2) Tighten Adjustable nuts⑩ (3 pcs.) clockwise, and adjust the gap to range listed below with verifying the gap dimensions with a thickness gauge.

Check the gap at several points along the circumference to be the Fixed core④ and Armature③ are parallel to each other, then apply locking agent. (Do not repeat loosening and tightening, the adjustable nuts⑩ may damage to the nuts and lose locking effect.)

#### 【Note】

- Before tightening the adjustable nuts⑩, insert the hexagon socket screw key into the hexagon socket of the guide bolt so that the guide bolt may not come loose by rotating together.
- Replace with a new adjustable nut⑩ if the adjustable nut⑩ is removed or repeatedly tightened and loosened. (Size 0.75kW:M5×P0.8, 1.5,2,2kW:M8×P1.25) Remove grease from the guide bolt⑬ and the adjustable nut⑩, and apply anti-loosening liquid in this case. Do not take down the brake because it may make reassembly impossible and incorrect reassembly may lead to a brake malfunction.

3) After adjusting the gap, make sure the brake operates normally by connecting to power source.

Observe the gap is appropriate to prevent the armature③, brake plate⑥ and lining⑤ from contacting during rotation. If they do come in contact, readjust the gap.

4) Attach the brake cover⑨ with bolts⑧.

Motor kW		0.75kW	1.5kW	2.2kW
Brake Type	200V	SLB07LP	SLB15LP	SLB22LP
	400V	SLB07LPV	SLB15LPV	SLB22LPV
Initial lining (mm)		8	9	
Lining limit (mm)		7	8	
Gap standard (mm)		0.15~0.20 (1.05~1.10)	0.2~0.25 (1.10~1.15)	
Gap limit (mm)		0.5 (1.4)	0.5 (1.4)	

( ) External gap value

### (3) Manual release operation

Carry out the following steps to release the brake manually, or without connecting to power source. Make sure to release manually when no load is applied to the screw shaft and nut.

- 1) Loosen the double nuts② by the bolts① placed for manual release (2 pcs.).
- 2) Tighten the bolts① for manual release (2 pcs.) gradually by hand or with a Phillips driver until they hit the armature③. After they hit the armature③, completely tighten the bolts① with a Phillips driver (Complete rotation is approx. 45°).

**【Note】 Do not tighten the bolts forcefully. Otherwise, the armature may deform and bolts or female screws at cover may be damaged, which will lead to brake failure.**

- 3) In the above operation, the lining⑤ is released from the armature③ and brake plate⑥, allowing the braking force to be removed. However, the braking force is not removed depending on the individuality. In that case, tighten the bolts① again to 45° with a Phillips driver.
- 4) When setting back to regular braking condition, loosen the bolts① (3 rotations) until they reach the bolt projection lengths (see (1) Brake structure) or the further and tighten the double nuts② to the extent that the rubber of the seal washer⑦ deforms (Reference tightening torque: 4.9Nm).  
When these steps are completed, make sure the brake works normally with motor.

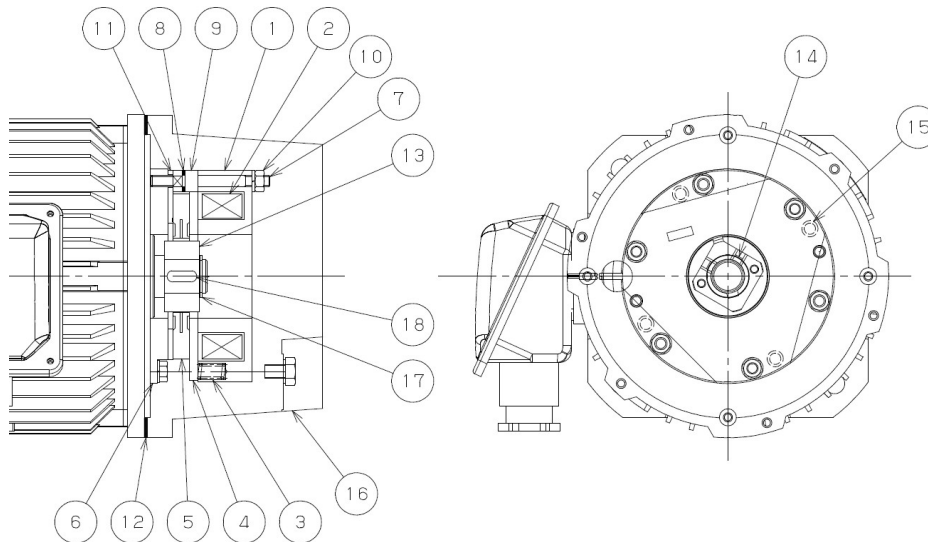
**【Note】 Securely tighten the double nuts②. Otherwise, the sealing for brake cover may not perform efficiently.**

★ ■ 9-2. 3.7kW

It is usually sufficient to monitor the operational status of the brake, but be aware of the following while brake function is not well:

- The brake lining becomes worn and brake torque will be lower, due to the force of friction between the brake plate⑪, the armature④ and the lining⑤. It is necessary to change the brake motor in case the thickness will become below limit.
- It is necessary to clean up every 6 months the brake lining wear.

(1) Brake structure



- |            |                       |                    |
|------------|-----------------------|--------------------|
| ⑦ Yoke     | ⑦ Stud bolts          | ⑬ Hub              |
| ② Coil     | ⑧ Liner               | ⑭ Silencer fitting |
| ③ Spring   | ⑨ Distance collar     | ⑮ O-ring           |
| ④ Armature | ⑩ Hexagon nut         | ⑯ Brake cover      |
| ⑤ Lining   | ⑪ Brake plate         | ⑰ Clip             |
| ⑥ Bracket  | ⑫ Water proof packing | ⑱ Key              |

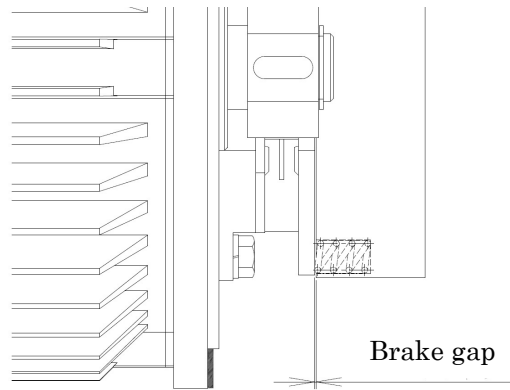
(2) Brake inspection and gap adjustment

It is necessary to adjust the gap when the thickness of lining and gap reach limit, otherwise brake will be not able to function well. Depending on usage condition, the lining and gap may reach to limit, Lining limit as following.

- Brake gap and lining limit

Motor kw	3.7kW (200V)	3.7kW (400V)
Brake type	VNB371K (NB-31186)	VNB371K (NB-31187)
Initial lining (mm)		12.0
Lining limit (mm)		9.6
Gap standard (mm)		0.3
Gap limit (mm)		0.6

- Brake gap measurement



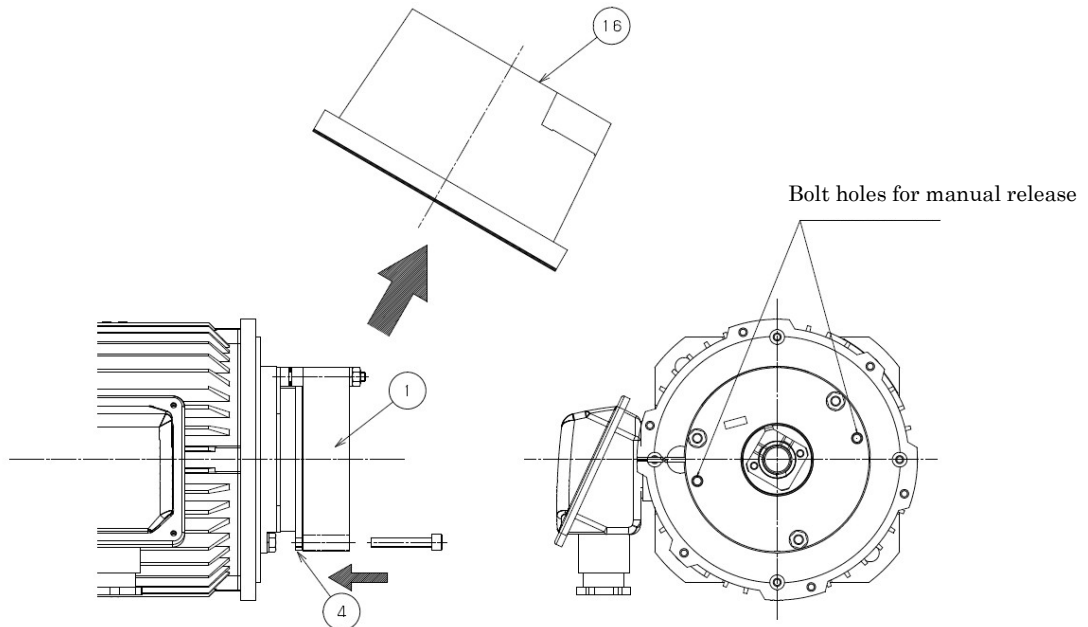
- Gap adjustment procedure

1) Remove the brake cover<sup>16</sup>.

Insert the hexagon bolts (Please prepare M8X50) into holes (2 pcs.) for manual release on Yoke<sup>1</sup>. Tighten the bolts to fix the yoke<sup>1</sup> and the armature<sup>4</sup>.

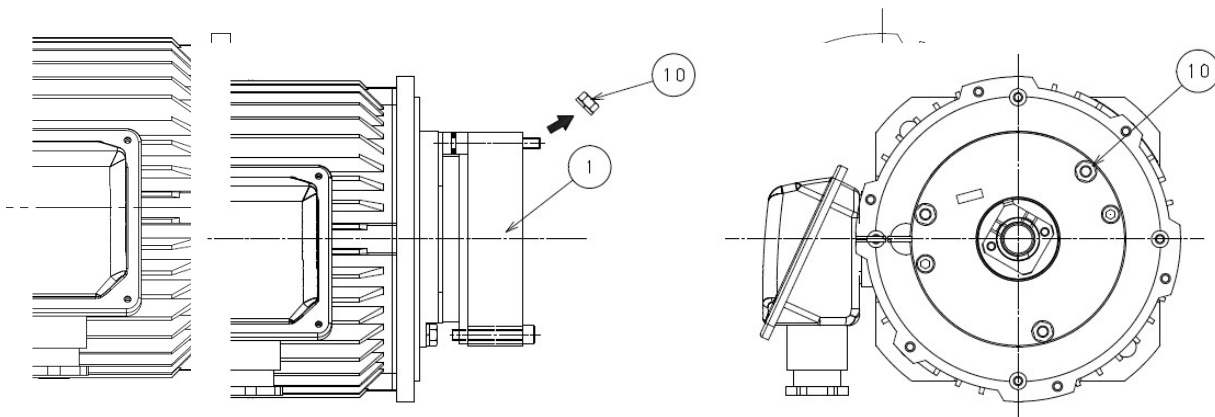
【Note】 In case of separate the yoke<sup>1</sup> and the armature<sup>4</sup>, the brake spring and O-ring will comes out. It is difficult to reassemble.

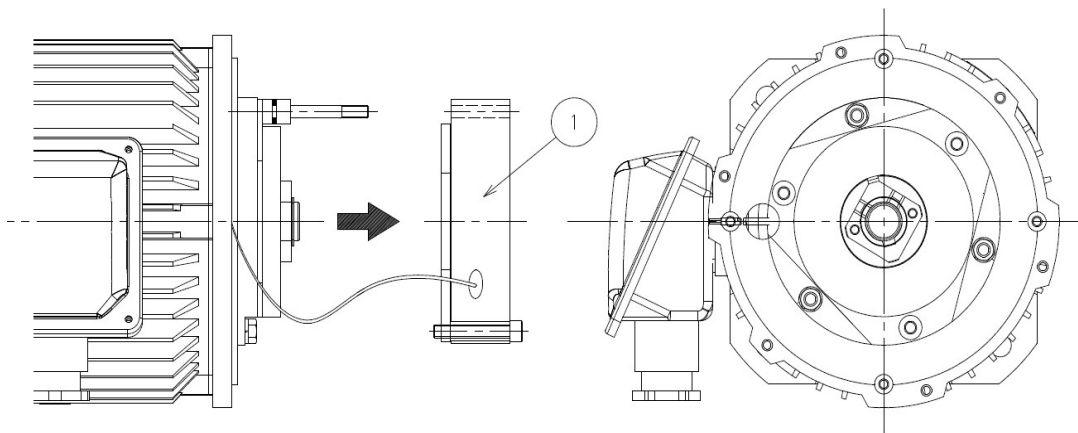
【Note】 Attached brake release screw (M8X70L) is not available to fix Yoke<sup>1</sup> and Armature<sup>4</sup>



2) Remove the hexagon nut<sup>10</sup> and pull the yoke<sup>1</sup>.

【Note】 The yoke<sup>1</sup> has wire connection with motor, please handle carefully not to damage the wire

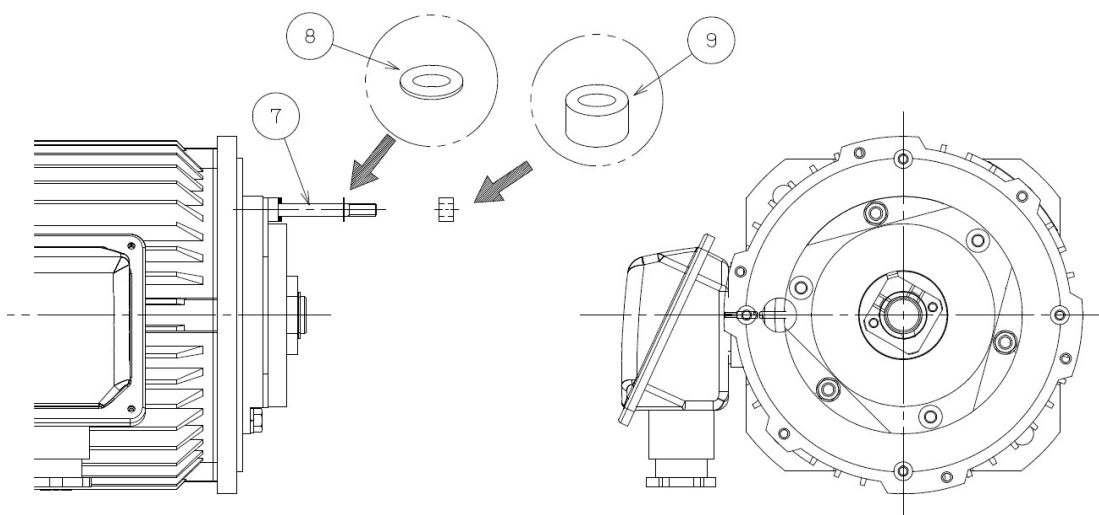




- 3) 5 to 7 pieces of Liners are at each stud bolt⑦ with a distance collar⑨.

Remove the liner⑧ evenly from the each stud bolt according with measured gap. Adjust the thickness to reach the specified gap.

**【Note】** Keep the removed liners⑧



- 4) Return the yoke① back to the original position. Securely tighten the hexagon bolts⑩ After tightening the hexagon bolts⑩, remove the hexagon bolts (M8X50).

- 5) Check the gap at several points along the circumference and all in range of specified value. The yoke ① and the armature③ should be installed parallel position. After adjusting the gap, apply power and make sure the brake function correctly. When the gap is too small between Armature④, Brake plate⑪ and Lining⑤, each parts contact and make noise during rotation.

- 6) Fix the brake cover⑫.

**【Note】** Be aware of wire, packing is installed correctly, no twist on wire or packing. If not set correctly while fixing brake cover⑫, it may not keep proper water protection.

**(3) Manual release operation**

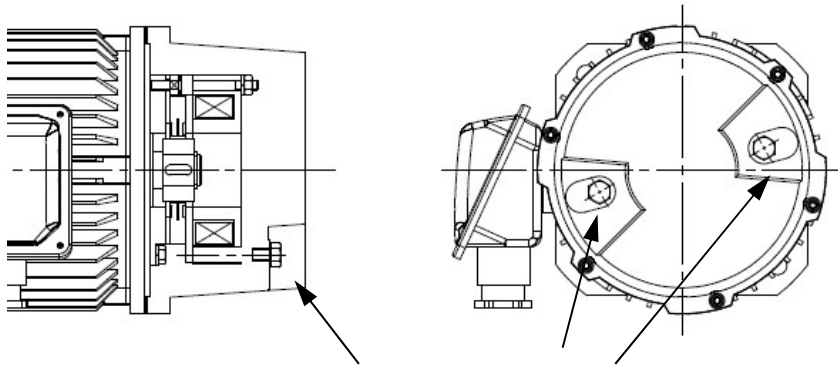
Conduct the following when the brake is released manually. Do not turn on the brake power and Never apply any load to the rod when releasing the brake manually.

- 1) Remove the sealing bolts (2pcs) with M10 seal washer. (Figure1)
- 2) Inset the bolts for manual release (M8X70L) attached with motor in two positions and tighten it into the screw hole in the cover. (Figure2)
- 3) The head surface of release screw hits the end. Keep tighten the bolts another 90° after it becomes heavy, brake will be released.

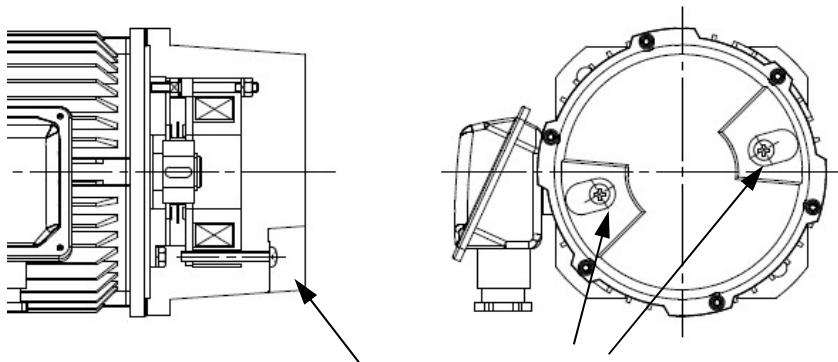
**[Note]** Do not tighten the bolts too much. Otherwise, the armature may deform and bolts or female screws at cover may be damaged, which will lead to break failure.

- 4) When setting back to regular braking condition, remove the bolts for manual release (M8X70L).  
When these steps are completed, make sure works normally with motor.

**[Note]** Securely tighten the sealing bolts. Otherwise, the sealing for brake cover may not perform efficiently, water may enter the brake.



(Figure1) Sealing bolt (Hexagon nut)  
M10 (with seal washer)



(Figure2) Bolts for manual release (Phillips-round head screw attached motor) M8 X 70

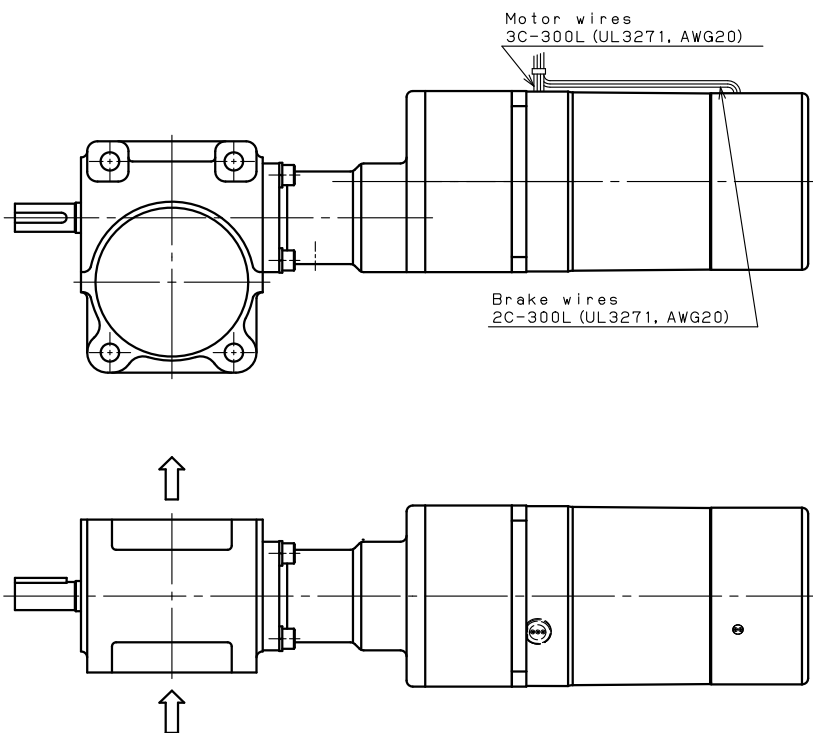
## (5) Gear motor

### ■ General precautions

1. Be sure to use the power supply that is specified on the specification plate affixed on the unit.
2. Before doing a test run, be sure to check once again that all wiring has been done correctly. Improper wiring may cause a reversal of the jack stroke motions, thus damaging the unit.
3. Turn the unit off in the event of a power outage.

### ★ ■ Gear Motor Wiring

#### (1) Jack with 25W and 40W Gear Motor



The travel screw of the standard jack and keyed machine screw jack moves in the direction of the arrow shown in the picture to the left picture and wired as shown below. The traveling nut moves in the same direction as the travel screw. If two of the wires among white, gray and black are changed, the travel screw will move in the reverse direction.

Use a conductance and a resistance in between contacts of a Magnetic Contact to protect it.

For 25 Watt Gear Motor,

Resistance=10 to 200Ω(1/4Watt and larger)

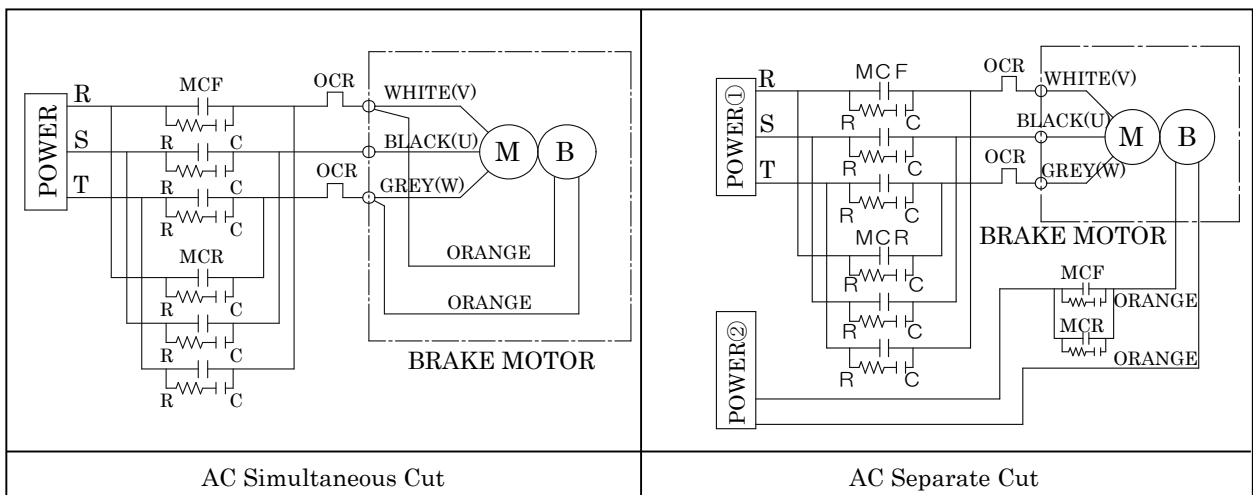
Conductance=0.1 to 0.33μF

(AC125WV and larger)

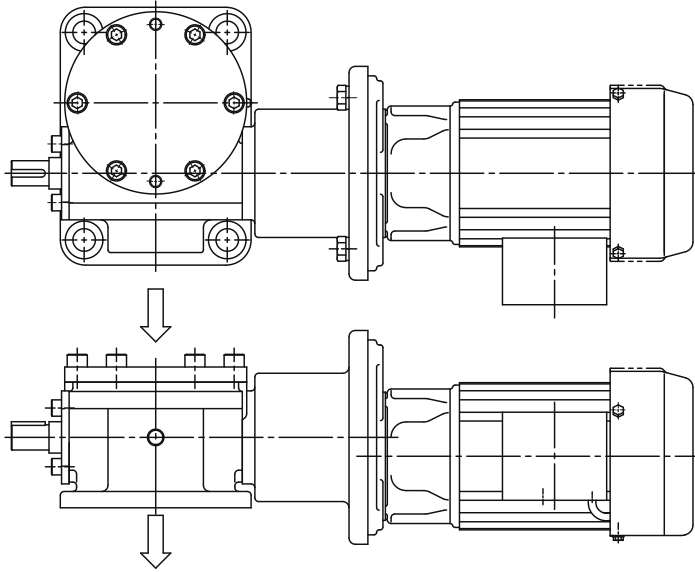
For 40 Watt Gear Motor,

Resistance=10 to 200Ω(1/4Watt and larger)

Conductance=0.1 to 0.33μF (AC250WV and larger)



( 2 ) Jack with 0.1kW to 1.5kW Gear Motor

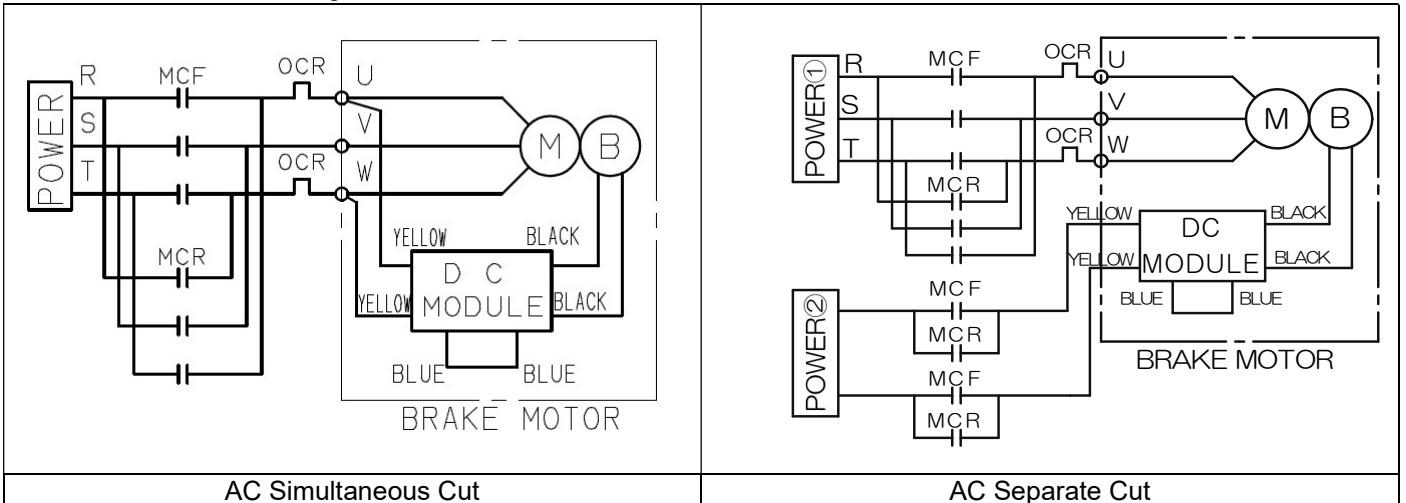


The travel screw of the standard jack and keyed machine screw jack moves in the direction of the arrow shown in the picture to the left picture and wired as shown below. The traveling nut moves in the same direction as the travel screw.

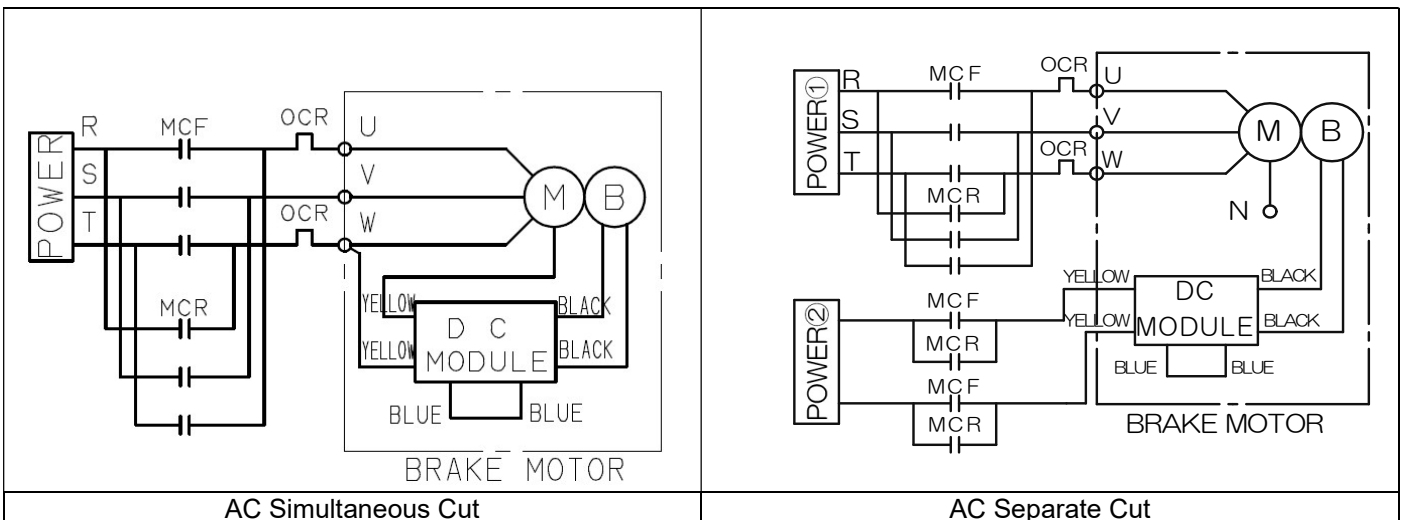
If two of the wires among white, gray and black are changed, the travel screw will move in the reverse direction.

- 1) Use a rated load of AC250V, 7A and larger for the electro-magnetic switch of the 200V class brake.
- 2) The DC Module has a surge absorption protective device.
- 3) Add necessary protective devices to each contact site.

200V class connection diagram



400V class Connection diagram

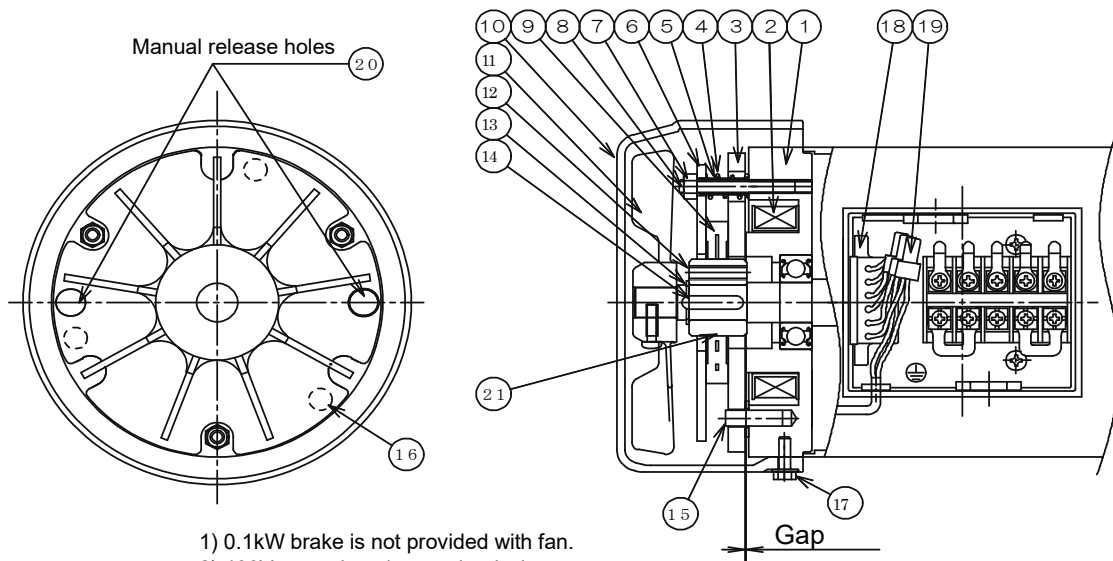


**Note:** When you use separate brake power supply operation using 400V class power source, please insulate by cutting wiring at N which is wired with closed end terminal. In this case, you have to input 200V power to the DC module.

※ In case of made-to-order product, please confirm the final drawing, the connection might not be same.

## ■ Brake Structure and Gap Adjustment

### (1) SLB brake structure [Three phase 0.1 – 2.2kW]



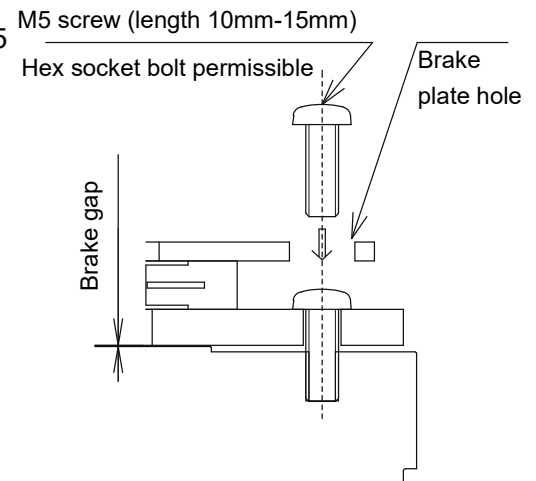
- 1) 0.1kW brake is not provided with fan.  
2) 400V motor has 4 motor lead wires.

### (2) Manual release

1	Counter-load bracket with yoke	12	Angular hub
2	Coil	13	Retaining ring
3	Armature	14	Key
4	Spring	15	Spring pin
5	Collar	16	Brake spring
6	Brake plate	17	Screw for fixing the fan cover
7	U-nut	18	DC Module
8	Guide bolt	19	Closed-end splice
9	Lining	20	Hole for manual releasing
10	Fan cover	21	Leaf spring
11	Fan		

Remove the fan cover (20). Insert an M5 screws or M5 hexagon head cap bolts (Effective length 10 - 15 mm), into the manual release holes (20) and screw them in. When the screws or bolts begin to tighten, screw a further 1/3 to 1/2 rotation. The brake gap is now roughly zero and the brake is released. A fan (11) of range 0.2kw to 0.75kW has been installed. If one of the holes (20) is hidden by the fan, insert the M5 screw and slightly release the brake. Then gently move the fan by hand and insert the other screw. After completing the work, remove the M5 screws from the brake body. Re-fix the fan cover and start operation.

If operation is begun while the brake is released accidents may occur.



### (3) Gap adjustment

When the gap reaches its limit value, the brake cannot be released. When the gap approaches its limit, inspect and adjust. Depending on the operating conditions, the gap limit value may be reached earlier.

● Brake gap and lining thickness

Motor power (kW)	Brake type	Gap ( mm )		Lining thickness ( mm )	
		Initial setting	Limit	Initial setting	Limit
0.1	SLB01	0.15 - 0.2 ( 1.05 - 1.15 )	0.5 ( 1.4 )	8	7
0.2	SLB02				
0.4	SLB04				
0.75	SLB07				

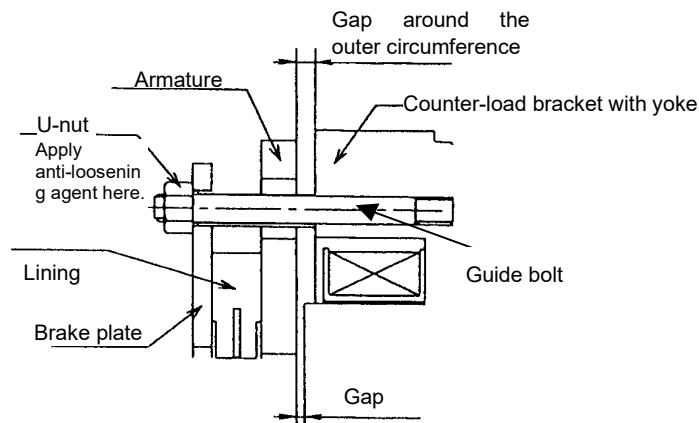
( ) is the gap value of the outer circumference.

● Brake gap adjustment ( refer to the brake structure )

a) Remove the fan cover⑩.

b) Tighten the three U-nuts evenly in a clockwise direction and adjust so that the three points around the whole circumference become the initial gap. After this, apply a anti-loosening agent. (If the U-net is repeatedly tightened and loosened, the nut may become damaged or the loosening prevention effect may deteriorate.)

c) Apply power supply to brake-motor and make sure that the motor rotates properly without the armature and braking plate coming into contact with the lining while the motor is running. If they do contact, adjust the gap by slightly enlarging it.



Note)

In case of turning U-Nut, at first put hexagonal Allen wrench into hexagon socket of guide bolt not to turn together with U-Nut, then turn U-Nut, otherwise guide bolt may loosen due to turning together with U-Nut. Replace the U-nut if it has been removed, or repeatedly loosened and tightened, when replacing (size M5 × P0.8).

When replacing, completely remove any grease from the guide bolt and the U-nut and apply a loosening prevention agent to the U-nut.

Do not dismantle the brake section, as reassembly may not be possible or incorrect reassembly may cause abnormal operation of the brake section.

It is impossible to perform gap adjustment on 25W- and 40W- gear motors with brake because of their structures.

■ Lubrication

A specified amount of grease is filled in the reducer part of the gear motor before shipment.

You can use the product without additional lubrication.

## **9. Warranty**

Tsubakimoto Chain Co.: hereinafter referred to as "Seller"

Customer: hereinafter referred to as "Buyer"

Goods sold or supplied by Seller to Buyer: hereinafter referred to as "Goods"

### **9-1. Warranty period without charge**

18 months effective the date of shipment or 12 months effective the first use of Goods, including installation of Goods to Buyer's equipment or machines - whichever comes first.

### **9-2. Warranty coverage**

Should any damage or problem with the Goods arise within the warranty period, given that the Goods were operated and maintained under instructions provided in the manual, Seller would repair and replace at no charge once the Goods are returned to Seller. The following are excluded from the warranty.

- 1) Any cost related to removal or re-installation of Goods from the Buyer's equipment or machines to repair or replace parts.
- 2) Cost to transport Buyer's equipment or machines to the Buyer's repair shop.
- 3) Costs to reimburse any profit loss due to any repair or damage and consequential losses caused by the Buyer.

### **9-3. Warranty with charge**

Seller will charge any investigation and repair of Goods caused by:

- 1) Improper installation by failing to follow the instruction manual.
- 2) Insufficient maintenance or improper operation by the Buyer.
- 3) Incorrect installation of Goods into other equipment or machines.
- 4) Structure change of the Goods by any modifications or alterations by the Buyer.
- 5) Any repair by engineers other than the Seller or those designated by the Seller.
- 6) Operation in inappropriate environment not specified in the manual.
- 7) Force Majeure or forces beyond the Seller's control such as natural disaster and injustice done by third party.
- 8) Secondary damage or problem incurred by the Buyer's equipment or machines.
- 9) Defected parts supplied, or specified by the Buyer.
- 10) Incorrect wiring or parameter setting by the Buyer.
- 11) The end of life cycle of the Goods under normal use condition.
- 12) Losses or damages not liable to the Seller

### **9-4. Dispatch the Seller's engineer**

Service to dispatch Seller's engineer for investigation, adjustment or trial testing, etc. of Seller's Goods are at Buyer's expense.

### **9-5. Others**

- In accordance with the policy of Tsubakimoto Chain Co., the contents of this instruction manual are subject to change without notice.
- We take all possible measures to ensure that there is no error in writing or defect with the contents of this instruction manual.
- We highly appreciate it, if you would let us know any error or defects found in this instruction manual.

**TSUBAKI LINIPOWER JACK**  
**China RoHS Instruction**

本资料是中国ROHS的必备资料 (China RoHS requisite document)

JWB, JWH

Part Name	Hazardous Substances or Elements									
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯 醚 (PBDE)	邻苯二甲 酸二(2- 乙基)乙 酯 (DEHP)	邻苯二甲 酸丁苄酯 (BBP)	邻苯二甲 酸二正丁 酯 (DBP)	邻苯二甲 酸二异丁 酯 (DIBP)
Worm wheel	×	○	○	○	○	○	○	○	○	○
Grease nipple	×	○	○	○	○	○	○	○	○	○
Counter LS case	×	○	○	○	○	○	○	○	○	○
Position Detecting Unit	×	○	○	○	○	○	○	○	○	○
Motor	×	○	○	○	○	○	○	○	○	○

Note 1: The symbol of ‘○’ indicates that the content of harmful substances in all homogeneous materials of the component does not exceed the requirements of the national standard for the restriction of the use of harmful substances in electrical and electronic products.  
The symbol of ‘×’ indicates that the content of harmful substances in at least one homogeneous material of the component exceeds the requirements of the national standard for the restriction of the use of harmful substances in electrical and electronic products.

Note 2: For components not listed above ‘Note 1’, the content of harmful substances does not exceed the requirements of the national standard for the restriction of the use of harmful substances in electrical and electronic products.

本资料是中国ROHS的必备资料 (China RoHS requisite document)

JWM

Part Name	Hazardous Substances or Elements									
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯 醚 (PBDE)	邻苯二甲 酸二(2- 乙基)乙 酯 (DEHP)	邻苯二甲 酸丁苄酯 (BBP)	邻苯二甲 酸二正丁 酯 (DBP)	邻苯二甲 酸二异丁 酯 (DIBP)
Worm wheel	×	○	○	○	○	○	○	○	○	○
Trapezoidal threaded nut	×	○	○	○	○	○	○	○	○	○
Grease nipple	×	○	○	○	○	○	○	○	○	○
Counter LS case	×	○	○	○	○	○	○	○	○	○
Position Detecting Unit	×	○	○	○	○	○	○	○	○	○
Motor	×	○	○	○	○	○	○	○	○	○

Note 1: The symbol of ‘○’ indicates that the content of harmful substances in all homogeneous materials of the component does not exceed the requirements of the national standard for the restriction of the use of harmful substances in electrical and electronic products.  
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