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# Foreword

Thank you for purchasing our BESTEM-D01Np machine.

This machine performs continuous operation from die bonding on islands of supplied lead frames until magazine storage operation.

Please read this manual thoroughly before operating the machine and to fully understand the operational aspects and safety features of this machine so that it may be used in a safe manner and that it may last longer.

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## Before Using

This manual is prepared for operators who had undergone a special training on this machine. Please keep this manual at a place where it can be easily retrieved.

Please take extra note on the following before operating this machine.

- Please do not modify the machine. Any modifications made shall nullify any warranty given.
- Please take note that the company shall not be responsible for any unexpected accidents arising from the use of this machine for purposes other than its intended purpose or using operating methods other than as specified in the manual.
- The terms and conditions of warrantee as stated in the Sales and Purchase Agreement is the only liability undertaken by the company and manual or other documents enclosed with the machine forms part of the terms and conditions. Existing understanding, promissory or implication may not be revised or amended.
- This manual may not be reprinted or duplicated as a whole or as partial without prior written approval.
- In the event that this machine is to be exported overseas, proper export procedure and applications must be acquired according to law requirements of the exporting and importing country. The company shall not bear any responsibility on machines exported out from the country without undergoing proper procedure.
- Due to machine's improvement etc., the contents of this manual may be changed without prior notice given

Should there be any paging irregularity or missing pages, please contact us for a proper manual. Our contact information is given in "Section 5 Contact Information".

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# Manual Usage

Operators who will be operating this machine should read this manual thoroughly before using the machine in a safe manner.

Please keep this manual close by to the machine for easier reference at any time.

Please contact our sales office if you have lost this manual.

## 1 Structure of Manual

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This manual has been prepared with its intended readers being the actual machine operators and actual machine maintenance technicians.

For effective understanding, this manual has been prepared according to the following structures that are further categorized according to user's work function, manual referencing and application.

With the work of maintenance technician in mind, periodical inspection for performance maintenance and replacement of consumable parts are also explained.

- ◆ Daily Maintenance
- ◆ Parts Basic Adjustment

## 2 Definition of Danger, Warning and Caution

In this manual, risk level of operations to human body is categorized to 3 levels that are “Danger”, “Warning” and “Caution”. Please understand thoroughly all the cautionary remarks and warning symbols displayed at each location before using the machine.



If this symbol is ignored and mis-operation occurred, risk of imminent human fatality or major injury may occur.  
Mastering of prevention method described here is required rather than the operations and maintenance procedures of the machine.



If this symbol is ignored and mis-operation occurred, risk of human fatality or major injury may be expected.



If this symbol is ignored and misoperation occurred, risk of human injury or property damage may be possible.  
Please operate the machine in the correct operating and maintenance procedures.

## 3 Definition of Additional Symbols

Other cautionary symbols, important points and other useful information that are written in this manual are explained in the following.



This symbol shows action that should not be done as it will jeopardize safety.  
If the prohibited action is done, human injury and machine damage may be possible.



This symbol shows action that should be done for safety purposes.  
If this instruction is not followed, human injury or machine damage may be possible.



This explains important information and information to be emphasized on operating and maintenance of the machine.



This explains important information on operating and maintenance as well as information to be emphasized in regards to mis-operation.



Refer



Provide guidance to reference information.

# 4 Reading this Manual

This is the explanation on the page layout, header, symbols or pictorial words used in this manual.

**Title of chapter**  
Used when explaining procedures or steps.

**Title of section**

**Procedure symbol**  
Used when explaining procedures or steps.

**Reference symbol**  
Used when providing references.

**Memo symbol**  
Used when writing in memos.

**Caution symbol**  
Used when writing in cautionary remarks.

**Header**  
Shows the title of corresponding chapter.

**Index**  
Shows the title of corresponding chapter.

**Summary**  
Explains operating purpose and contents

**Illustration**  
Shows the illustration for corresponding procedures

**5** リングエンジンや部の調整

5. リングエンジン部の調整

5.1 ウェハターブルθ軸の原点調整

リングエンジン部調整のしかたについて説明します。  
これらの操作は、品種変更及び、モータ交換など行う上で必要となる基本調整項目です。  
以下の手順に従い調整します。

1 原点復帰を行います。  
2 参照⇔詳しくは「応用操作編 原点復帰方法」を参照してください。

3 テーブル手前の、原点近傍センサ(MS6312)がON(点灯)していることを確認します。

4 軸用モータ下部の原点センサ(PHS6311)がONするよう、ダイヤルカム固定ネジをゆるめ、ダイヤルカムを回して調整し、固定します。  
ウエハターブルのθ軸の原点復帰を実行し、2の状態でになっている事を確認してください。

注意

- モータ交換等を行うときは、次の点に注意してください。
- ピニオンギヤを組み付けるときには、必ずねじってからウエハターブルにかき合わせ取付けてください。

2 各軸の基本調整

2-11

NM0000

## 5 Contact Information

Please contact our office should you require any of the following:

- Request for repair
- Request for service technician support on periodical inspection
- Request for overhaul inspection
- Purchase ordering of additional manual due to loss of manual copy
- Purchase ordering of repair parts
- Purchase ordering of periodical replacement parts
- Purchase ordering of warning label due to loss or damage of label
- Prior notification on machine disposal or dismantling

CANON MACHINERY INCORPORATION (HEAD OFFICE, SALES HEAD OFFICE, SALES OFFICE) TEL (077) 566-1822 FAX (077) 565-0755
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## 6 Warranty and Indemnification of Liability

Contents of warranty for the purchased machine are as described in the following.

### 6.1 Warranty period

Warranty of delivered machine that is operated 8 hours daily is one year.

Our company shall provide repair without cost for machine breakdowns that is due to our company fault.

In the event that the cause of fault is not clear, a separate agreement of understanding is required.

### 6.2 Warranty scope

The warranty shall not cover the following incidents even if it is within the valid warranty period.

However, advice and support in regards to repairing work will be provided.

- Faults that are clearly out of our company scope
- Damage caused by natural disaster or incidental occurrences
- Damage caused by modifications done on the machine without prior agreement from our company
- Natural wear and tear of consumable parts
  - Bearing
  - Gear
  - Rotation shaft
  - V-belt
  - Impeller blade
  - Bolts
  - Nuts
  - Electronic parts
  - Grease
- Damage caused by insufficient inspection and checking during maintenance work, installation, replacement and adjustment work carried out by your company

# Safety Precautions



## WARNING

Operators handling this machine must read all the cautionary information as given below before operating the machine.

**DO NOT** switch **ON** the machine until the contents of each of the cautionary item are fully understood. Please thoroughly follow the instructions on accident prevention given to avoid any untoward incident.

## 1 Cautions when using the Machine

- This machine is for the purpose of die bonding used in semiconductor manufacturing. Do not use this machine for other than this purpose. Using this machine for non-intended purposes may cause unexpected machine damage or injury accident. Our company shall not be held liable for the damage and injury suffered in view of this.
- This machine has been designed and manufactured with safety considerations incorporated. As it is almost impossible to predict all risk and miss-operations in actual situation, not all of the potential risk might have been addressed. In order to avoid these risks, this manual must be read thoroughly and to operate the machine in a correct manner while exercising safety consciousness.
- Safety requirements of operators handling this machine must comply with relevant laws and regulations.
- Our company shall not be held liable for damages caused by dismantling, modification and others done by the user in which our company did not participate.

## 2 Cautions on Machine Operation

- Do not switch **ON** the machine until this manual has been thoroughly understood.
- Wear suitable cloth during work. Remove accessories such as necklaces before starting work as this may cause entanglement into moving parts, which may lead to major injury accident.
- Immediately inform the machine's person in charge if you notice any machine's abnormality during its operation and to follow the instruction given by the person in charge.
- Do not open the safety cover during machine operation. Opening the cover during machine operation may cause to machine to stop operation as well as exposing surrounding workers to the unsafe machine.
- Do not leave tools around the machine's moving part.

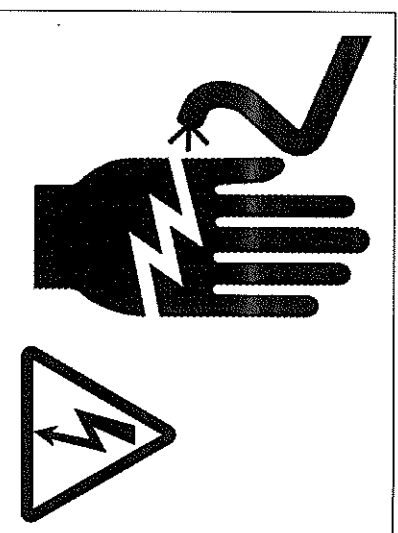
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- During machine operation, be careful not to drop any die, lead frame or tools into the machine internal. If anything should drop inside the machine, do not put in your hands to remove it out. Immediately inform the machine's person in charge and follow the instruction given. If hands are entered into moving machine, it may cause the body to be entangled to the machine, which may lead to major injury accident.
  - Do not operate, repair or adjust the machine when you are unwell.



### 3 Cautions on Electrical Parts

#### 3.1 Power supply

- There are high voltage circuits within the machine. Touching this high voltage circuits may cause major injury including fatality. Should there be possibility of coming into contact with high voltage circuit during maintenance work, switch off the primary power source of the machine and that the work to be performed by a trained person.



- There are condensers in the electronic circuit within the machine and due to this, there may be residual voltage even after the power supply has been switched off. Before starting work, check for residual voltage with a tester.

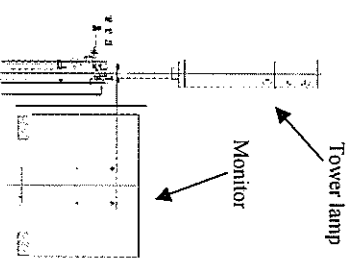
- Do not use wet hands to work when operating, repairing or adjusting the machine. Touching with wet hands may cause major injury accident including fatality.

#### 3.2 Current leakage

- The main power breaker of this machine uses current leakage breaker. When the current leakage breaker is tripped off, ensure that the maintenance technician had taken countermeasure on the cause of the trip-off before switching back the machine. Switching the machine on without checking the problem may cause major injury accident.

### 4 Errors Response

- When an error occurs, check the meaning of the error either from the tower lamp or the error message displayed on the monitor. Follow the instructions given in the Operation Manual to remove the error. If correct response to this error is not taken, major injury accident may happen.



### 5 Maintenance Work

- Trained technicians must carry out maintenance work. Do not let normal machine operator, especially, to perform the maintenance work as it may lead to major injury accident.

## 6 Cautions on Hot Parts

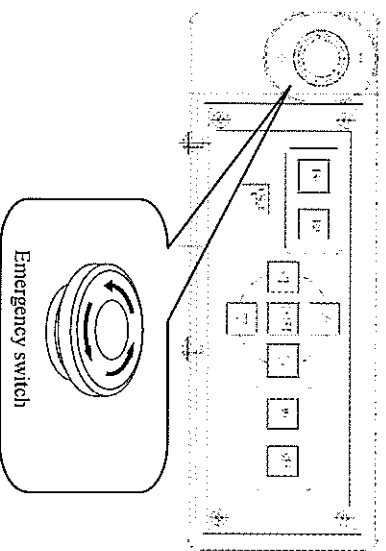
- Be careful not to touch heaters or light sources as it may cause burns. Even after the machine has been switched off, heat source within the machine may still yet to cool down. Should there be any possibility of touching these during maintenance work, ensure that the temperatures of hot parts are sufficiently down before starting work.

## 7 Cautions on Static Electric

- Amongst electronic circuits that make the machine, there are some parts used that is weak to static electric.  
During the maintenance of this part, please remove bodily static electricity before starting work. If this is not done, unexpected miss-operation and machine damage may occur.

## 8 Emergency Switch

- Press the emergency switch (on the control panel) when there is a need to stop the machine immediately and safely. However, please be reminded that there are still potential dangers in the high voltage and hot parts.



- Before operating or adjusting the machine, please check the location of the emergency switch.



Refer → Please refer to "Basic Operation Manual, Chapter 4, Section 2 Emergency Switch" for the location of emergency switch.

## 9 Warning Label

Warning labels fixed on the machine are pasted on areas expected to pose danger with the purpose to ensure safe machine operation.

The following are the warning labels that are used on this machine.

Check and understand the warning labels pasted on the work location and to sufficiently be aware of the dangers in the surrounding area and proceed to work safely.



⇨ Please refer to “Application Manual” for the locations of warning labels pasted on the delivered machine.



Do not remove warning labels. Please order new warning labels if the old ones have been removed, torn or had become illegible.

### ◆ Moving part warning

This warning is placed where there is risk of getting hands crushed by moving part.

Do not bring hands near the moving part. During maintenance, switch off the power supply for moving part before starting work.



### ◆ High voltage warning

There are dangerous high voltage parts within the machine. Switch off the machine's and switchboard breaker before starting maintenance work to avoid shock caused by accidental contact with high voltage parts.



### ◆ Hot part warning

This warning is placed on areas where there is hot part and there is risk of burn injury.

Do not place hands on hot parts. During maintenance work, check the hot part temperature with sensor etc. and that it should be below 50°C.



### ◆ Flammable chemical warning

Depending on machine, flammable chemical such as hydrogen are sometimes used that may cause fire and burn. Do not bring fire igniting sources near the machine.




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## 10 Safety Interlocks

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Various interlocks have been installed in the machine for safety purposes as well as for the protection from machine damage. Only trained persons can remove these interlocks. Major injury accident may occur should the machine be operated with its interlocks removed.


 Refer ⇨ Please refer to “Application Manual” for the machine’s interlock functions.

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## 11 Machine Utilities Supply

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Before installing and using the machine, please check that the utilities such as power supply and air supply etc are according to specification.  
Unexpected miss-operations and machine damage may occur when correct specifications are not supplied.

 Refer ⇨ Please refer to “Application Manual” for specifications of supply utility.

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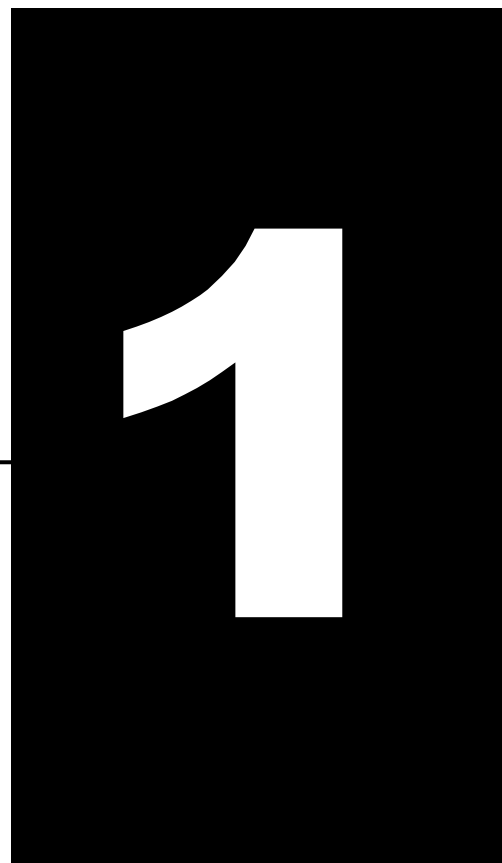
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# Chapter 1 Daily Maintenance

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Maintenance and greasing methods for the purpose of machine maintenance are explained in this chapter.

Please perform periodical maintenance to maintain the performance of machine





## 1

# Periodical Maintenance List

Please carry out periodical maintenance according to the schedule below.

Checking frequency varies depending on the type of parts to be inspected.

## ◆ Maintenance List

Checking frequency	Checking items	Detail contents
Anytime	Is mount process normal?	
Anytime	Recognition condition checking	It is important that the die binary image is set in optimum for a correct performance of recognition. When recognition accuracy is not good, adjust the light position, light volume (voltage) and the binary level.
Anytime	Is there dirt present on the Ag paste?	This causes problem with paste adhesion and product reject. Please wipe off with alcohol when dispensing outside of island.
More than 2 times daily	Collet tip cleaning	Collet tip greatly affects mount accuracy. Check for any contaminants or dirt on collet tip.
More than 2 times daily	Collet tip checking	Check if collet is damaged such as cracked etc. Replace collet if it is not in good condition.
More than 2 times daily	Ejector pin checking	Check if ejector pin is damaged such as broken etc. Replace if not in good condition.
Once a day	Is there foreign objects, such as screws, tools or chips that has fallen into the machine or the electrical boards?	When a foreign object falls into the machine, it can cause problems with the mechanism or with the electrical control system. Please check regularly and promptly remove foreign objects when found.
Once a day	Is the filter for the PC cooling fan dirty?	The cooling effect decreases when the filter is dirty and this causes the internal temperature of the PC to increase. Please clean the filter regularly. Replace filter if cleaning is not effective. Standard change time is 3-6 months.
1~12 months	Greasing and grease periodical change	As the heart of the machine, mount head driving system will have its functions deteriorated if there are any suspended fine contaminants in its environment. Please change grease on ball screw and LM guide, which is the driving mechanism of mount head.
2 years	Mount head overhaul	As the heart of the machine, mount head driving system, will have its functions deteriorated if there are any suspended fine contaminants in its environment. Please carry out grease change on ball screw and LM guide, which is the driving mechanism of mount head.

# 2

## Greasing

Please carry out periodical greasing for the maintenance of machine's performance. When greasing is neglected, life span of parts will be affected and this may cause machine trouble.



- If a non-specified grease had been applied, use rags or non-dust emitting tissue paper to thoroughly clean off that grease before applying the required grease. This is to prevent grease cross-contamination.
- Some of the ball screws and LM guides may have been applied with the required grease at the manufacturer's premise. During in-house grease application work, confirm the the type of grease that was pre-applied and carry out greasing work accordingly.

### 2.1 Greasing Locations and Changing Interval

The quality of grease and oil applied on the driving parts of the machine greatly affects accuracy for each of the machine's high precision part. Please change the grease and oil used according to the changing interval of grease as specified below.



Please apply grease on parts that are repaired or replaced regardless to the changing interval listed.

#### ◆ Greasing List

Units	Parts		Grease to use	Interval
Loader	Vacuum head up/down transfer	Ball screw	AV2 or its equivalent	6 months
XY θ Table	Table XYθ transfer	Ball screw	AV2 or its equivalent	1 month
		LM guide	AV2 or its equivalent	
Mount	Mount head XYZ transfer	Ball screw	AV2 or its equivalent	1 month
		LM guide	AV2 or its equivalent	
Vacuum Table	Plunge up stage up/down	LM guide	AV2 or its equivalent	3 months
Unloader	Unloader up/down Transfer	Ball screw	AV2 or its equivalent	6 months
Dispenser, stamping	Dispense XYZ and stamping XYZ movement	Ball screw	AV2 or its equivalent	3 months

## 2.2 Ball Screw and LM Guide Greasing Procedure

The quality of grease and oil applied on ball screw and LM guide greatly affects accuracy for each of the machine's high precision part. Explanation on basic grease application is given in the following.

### Procedure

- 1** Switch OFF machine's power supply.
- 2** Remove any cover that protects the intended part to work on.



Do not dismantle the parts.

Ball screw and LM guide has very intricate assembly requirements. Its intended function may not be recovered if the parts are dismantled more than necessary.

- 3** Move by hands the nut of ball screw and LM block of LM guide along its permissible movement range.
- 4** Use a non-dust emitting tissue paper and remove the old grease.
  - For ball screw, remove the grease while rotating the screw.
  - For LM guide, remove carefully grease at rail side too.
- 5** Move the nut of ball screw and LM block of LM guide to the other end. Similarly, remove the grease. Carry out this procedure for 3 times to diligently remove all the grease.
- 6** Use a new non-dust emitting tissue paper and dip it into the new specified grease. Using the same method used in the above grease removing procedure, apply grease evenly and lightly on the parts.



- Do not apply too much grease on Y and Z guide shaft of mount head. Too much grease may cause heat generation, deterioration and leakage etc.
- Insufficient greasing may cause the part to be heated and burnt.

- 7** Return nut and LM block to its original position.
- 8** Fix the cover to its original position.

## 2.3 Grease Nipple Greasing Procedure

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This is the explanation on greasing using NSK hand grease pump to supply grease into grease nipples.

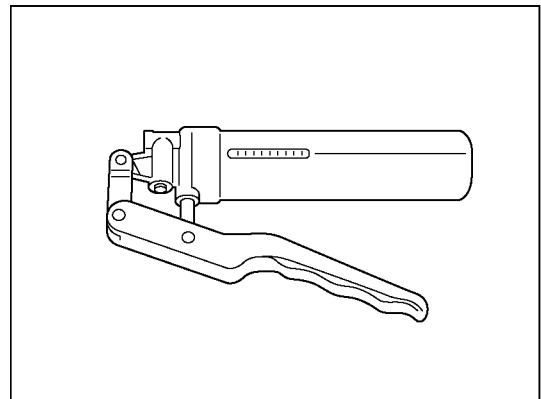
Grease quality greatly affects accuracy for each of the machine's high precision part. Please carry out periodical greasing.

### 2.3.1 Items to prepare

- 1** NSK grease AV2 [NSK GRS AV2]

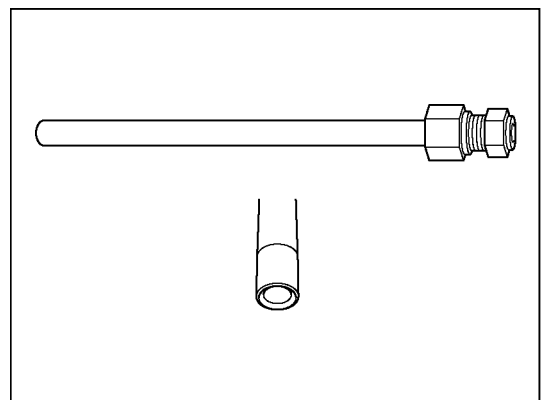


- 2** NSK hand grease pump



- 3** IKO nipple nozzle [IKO A-8120V]

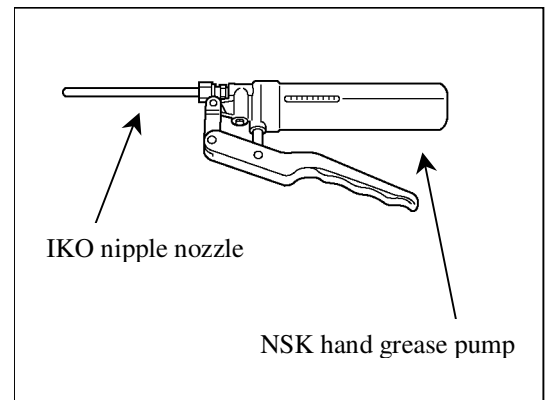
- 4** Rags or kim wipe tissue paper.



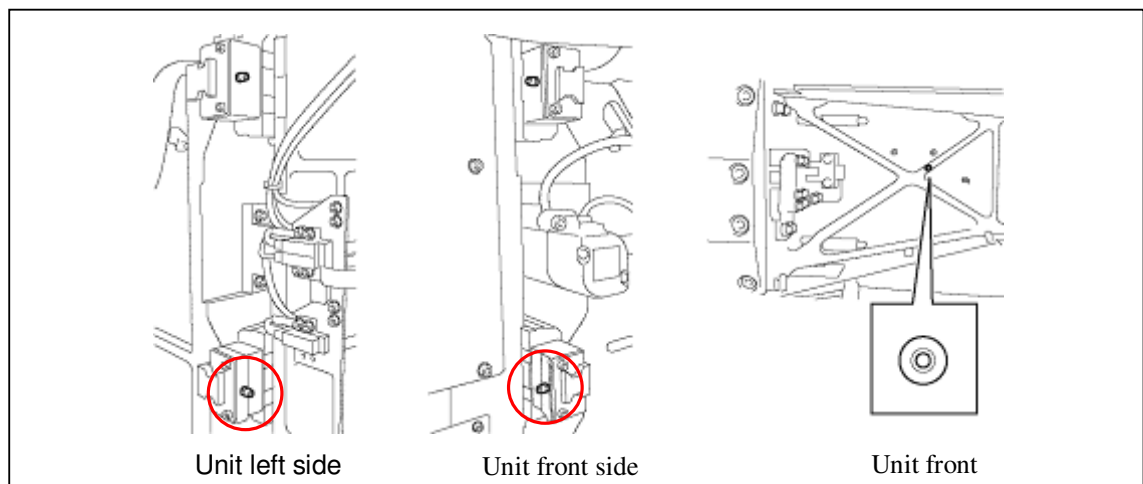
2.3.2 Preparation for greasing work

## ◆ Assembly of NSK hand grease pump

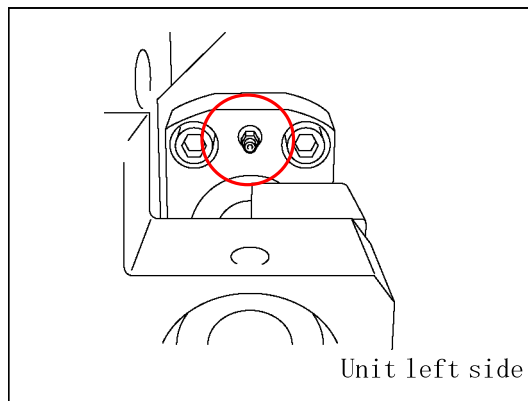
- 1** Set in the IKO nipple nozzle into NSK hand grease pump.

2.3.3 Linear guide and ball screw greasing locations and greasing volume
**Procedure**


- 1** Switch OFF machine's power supply.
- 2** Remove protective cover of intended part to work on, if any.
- 3** With NSK hand grease pump, push 2 pumps of grease into the grease nipples of the 3 pcs X-axis linear guides.



- 4** With NSK hand grease pump, push 1 pump of grease into the grease nipple on X-axis ball screw.

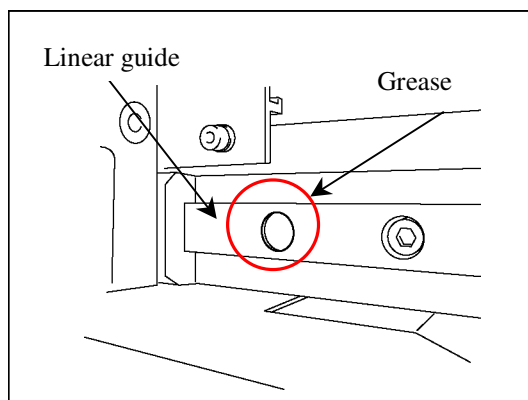


- 5** With NSK hand grease pump, supply grease into the grease nipples of the 2 pcs Y-axis linear guide.

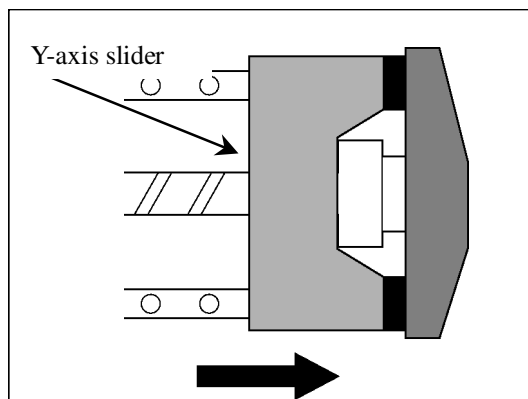


- Please follow the following procedure for grease application of Y-axis linear guide.

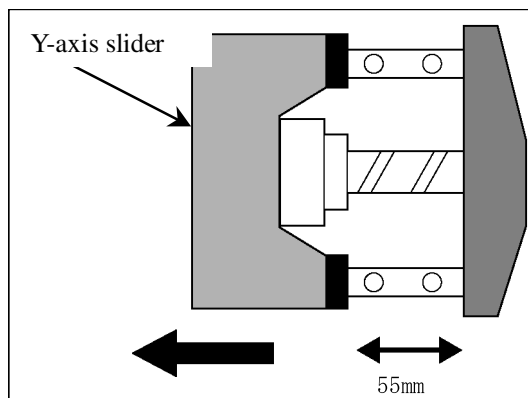
- ① Supply grease until the grease appears on top surface of linear guide.



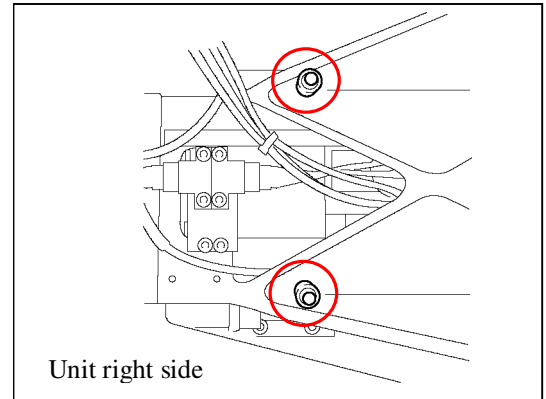
- ② Move Y-axis slider until the front rubber stopper and supply 1 pump of grease.



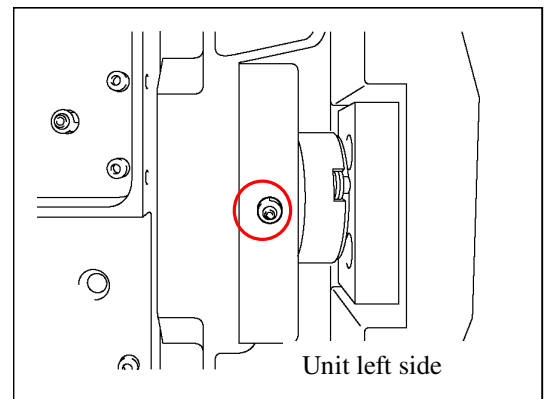
- ③ Slide Y-axis slider 55mm to the back and supply 1 pump of grease.




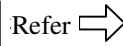
- 6** Supply grease into the grease nipples of the 2 pcs Y-axis linear guide.

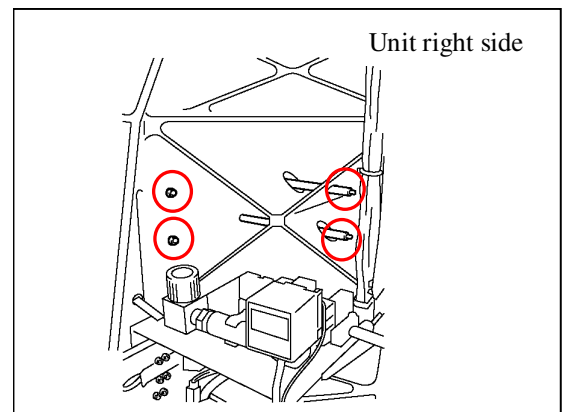


- 7** With NSK hand grease pump, supply 1 pump of grease into Y-axis ball screw.

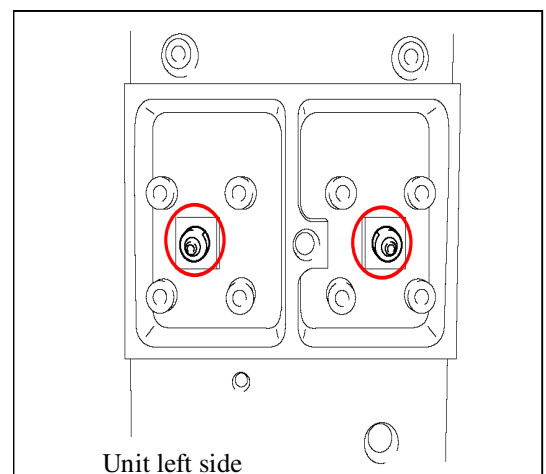


- 8** With NSK hand grease pump, supply grease into the grease nipples of 2 pcs linear guide for Z-axis driving slider.

 Refer  Please refer to Step **5** for grease application of Z-axis driving slider.

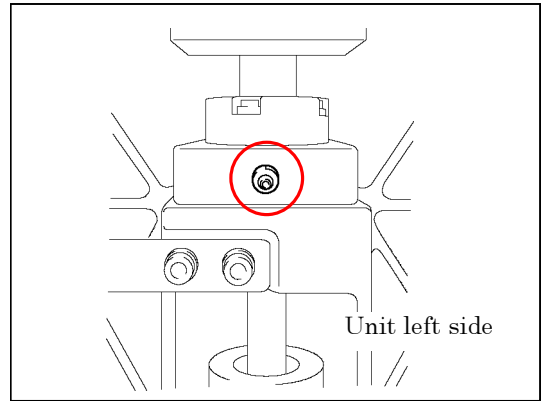


- 9** With NSK hand grease pump, supply 1 pump of grease into grease nipples of the 2 pcs linear guide for Z-axis driven slider.

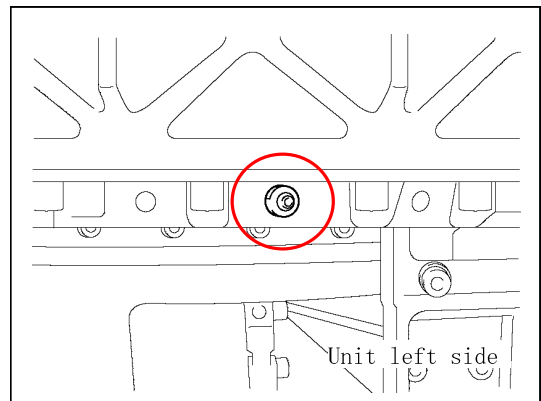




- 10** With NSK hand grease pump, supply 1 pump of grease into grease nipple of Z-axis ball screw.



- 11** With NSK hand grease pump, supply 1 pump of grease into grease nipple of YZ linear guide.



- 12** Remove excess grease on grease nipple and its surrounding area with rags or kim wipe tissue.
- 13** Fix the protective cover of the intended part back to its original position.
- 14** Switch ON machine's power supply.

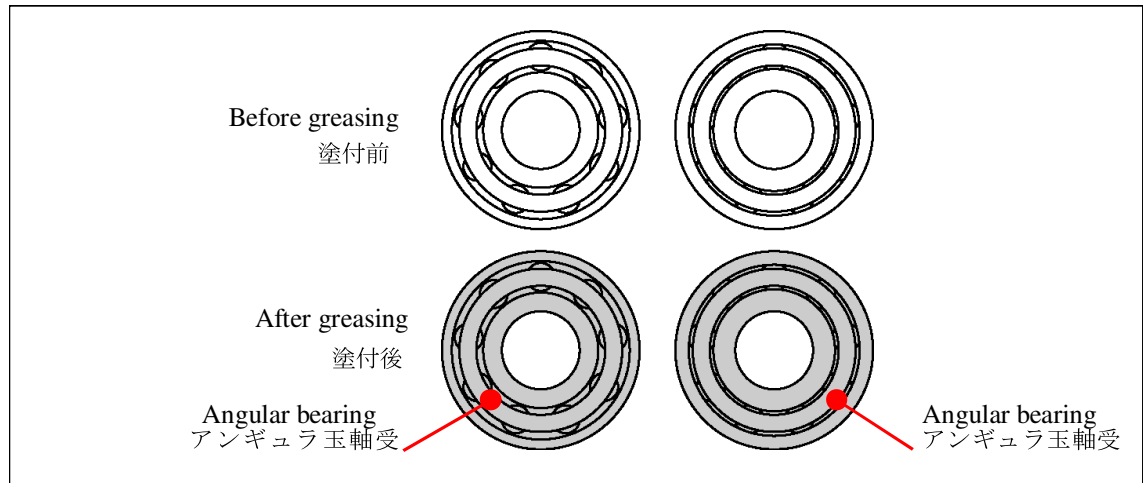
### 2.3.4 Angular contact bearing grease application method

#### ■ Procedure ■

- 1** Pump out 1 pump of grease from the NSK hand grease pump onto finger and rub in the grease onto both sides of angular contact bearing. Repeat this for 2 times.



Apply grease into the angular contact bearing until the groove on the angular contact bearing is filled with grease.



## 2.4 Grease Properties

This is the explanation on properties of grease used and its applicable greasing locations.

■ NSK grease AV2 (NSK)

Properties	Purified mineral oil is used as base oil. A versatile heavy duty grease that uses lithium based thickener and special additive, which is excellent in abrasion resistance with extreme pressure durability. Excellent in load resistant performance and has good oxidation stability. Maintain good lubrication performance over long period of use to demonstrate long lubricating life. Excellent in water retentivity. Suppresses water outflow when it becomes softened due to high water moisture content in its environment.
Application	The standard grease commonly used in NSK linear guide and ball screw. (Its base oil viscosity is high and excellent in load resistant performance. As it has good oxidation stability, it is widely use for various conventional applications).

## Chapter 2 Parts Basic Adjustment

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# 2

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Basic adjustments for machine maintenance are explained in this chapter.

Origin adjustment and basic adjustments when motor is changed etc. are included in this chapter.

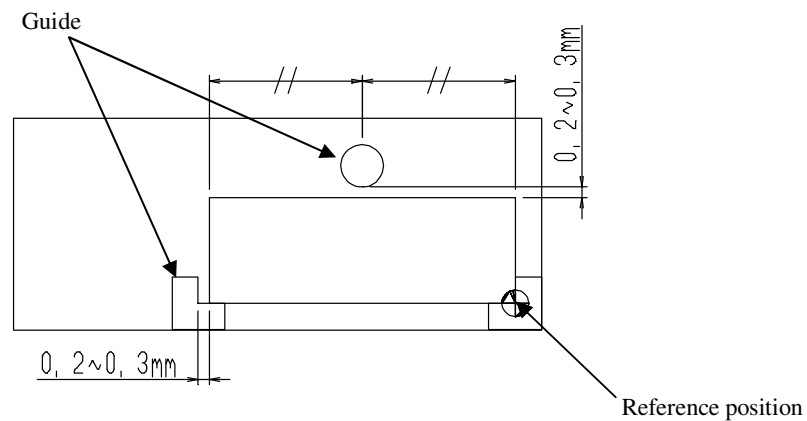
# 1 PP Loader Adjustment

This is the explanation on adjustment of PP Loader.

The operations here are the basic adjustments required during product conversion and part replacement. Carry out the adjustments as the following procedures.

## 1.1 Lead Frame Magazine Adjustment

Adjust the lead frame magazine guide according to the size of the work supplied.

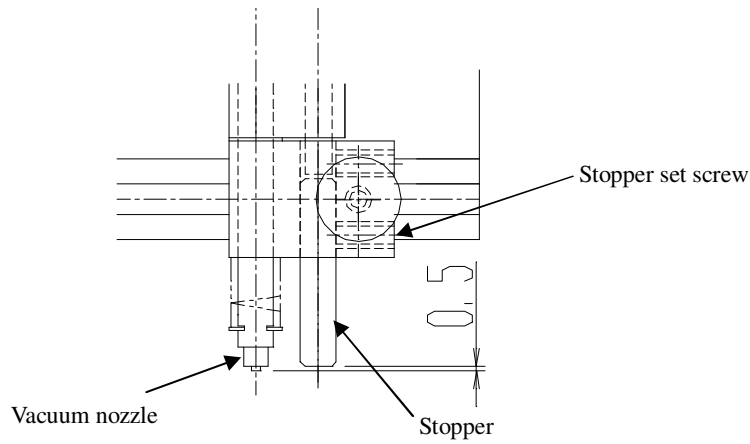


### Procedure

- 1** Loosen up the set screw on the guide at reverse surface of lead frame magazine and set frame on magazine.
- 2** With the frame placed on the reference position, adjust the guide so that the clearance from guide to frame is 0.2 ~ 0.3mm. Here, adjust the guide at frame lengthwise direction to be at center of frame.

## 1.2 Vacuum Nozzle and Stopper Adjustment

Adjustment of vacuum nozzle and stopper is explained in the following.

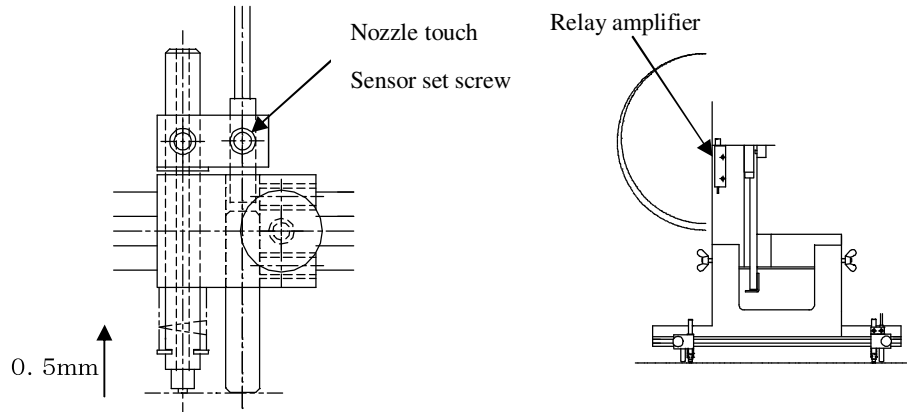


### ■ Procedure ■

- 1** Remove rubber pad on vacuum nozzle so that it is detached from being in contact with the work.
- 2** Loosen up stopper set screw and adjust the vacuum nozzle and tip of stopper to be 0.5mm from each other and then tighten. (Please carry out the same at all 4 locations).

## 1.3 Vacuum Nozzle Touch Sensor Position Adjustment

Adjustment of nozzle touch sensor position is explained in the following.



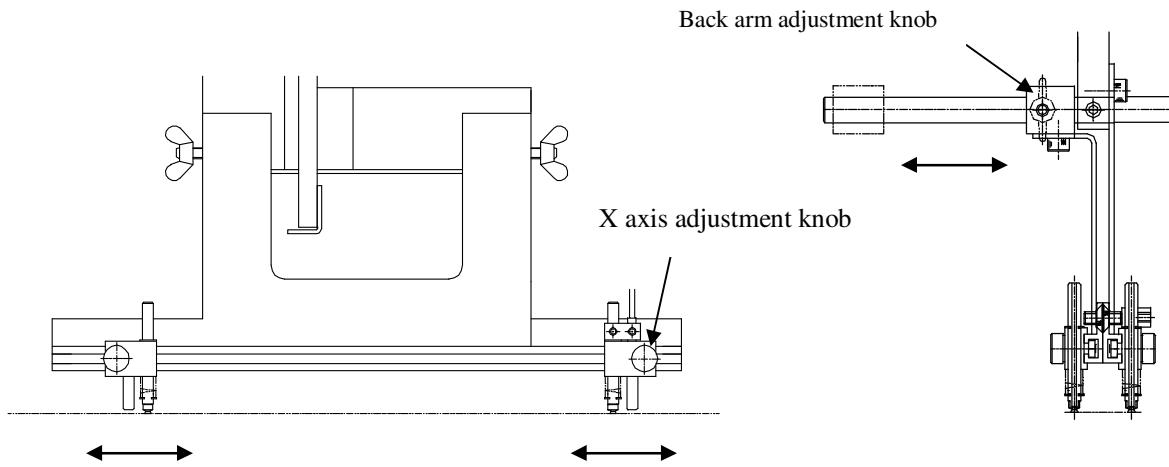
### Procedure

- 1** Loosen up the set screw of vacuum nozzle touch sensor and tighten it moderately at 0.1 ~ 0.2mm above its touching position with the sensor stopper.
- 2** With the vacuum nozzle slightly loosen, the relay amplifier LED light will be ON. With the vacuum nozzle pushed 0.5mm up (same height as stopper height), adjust the height of sensor head until the LED light is turned OFF.  
Here, ensure that the sensor is not touching the stopper.



## 1.4 Vacuum Nozzle Position Adjustment

Adjust the vacuum nozzle position according to the lead frame supplied.

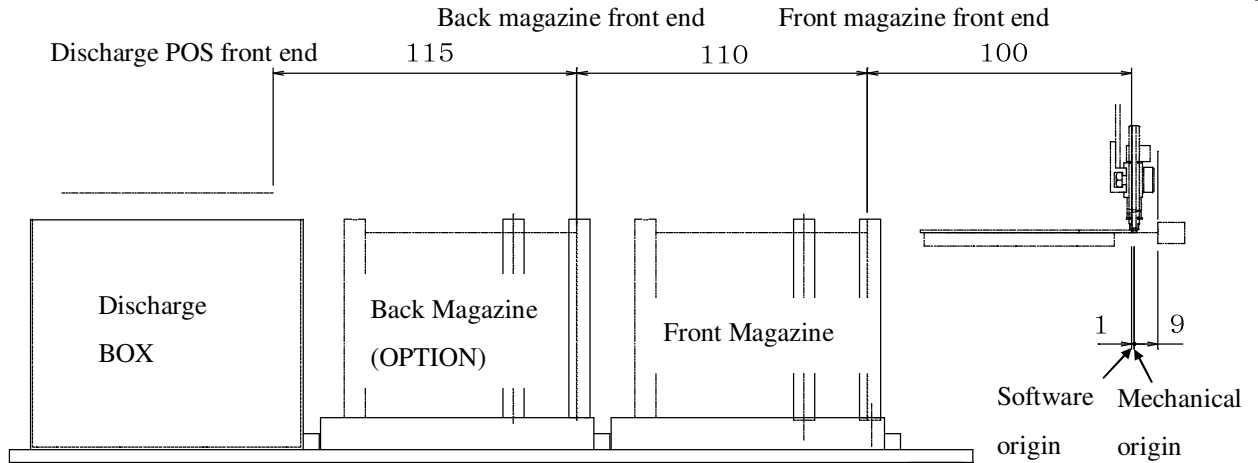


### Procedure

- 1** Loosen up each of the X-axis adjustment knob on vacuum pad and adjust it in a way that it does not touch the cut off area of lead frame. (Please carry out the same at all 4 locations).
- 2** Loosen up the back arm adjustment knob and align it to the width of lead frame and tighten it.
- 3** Check that there is no interference between vacuum pad and lead frame magazine guide.

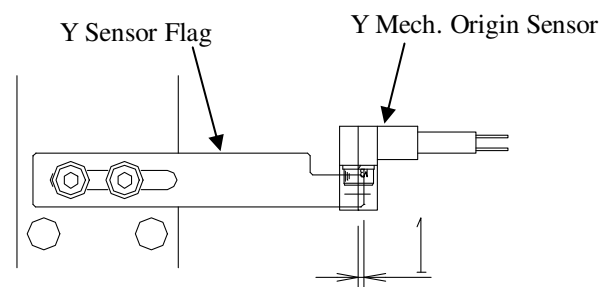
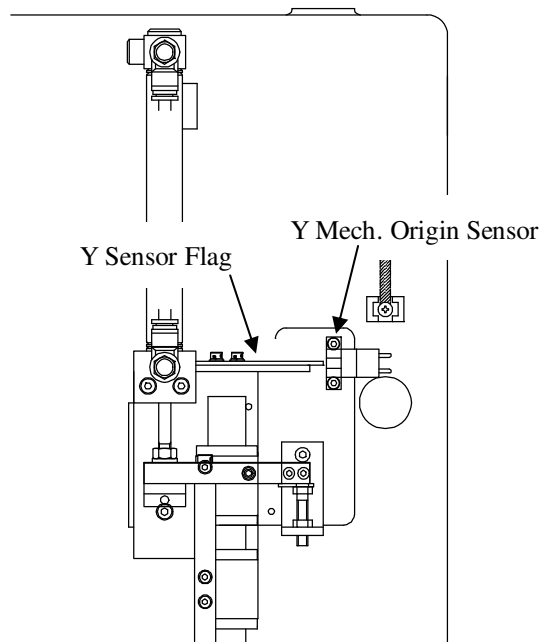
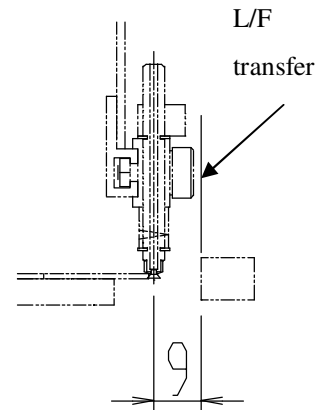
## 1.5 Vacuum Arm Y Mechanical Origin Adjustment

Adjustment for Y mechanical origin of vacuum arm is explained in the following.  
Y reference position of PP loader is shown below.



### Procedure

- 1 With the pulse motor switched OFF, move vacuum nozzle at the vacuum arm front to be 9mm from the front end of lead frame transfer.



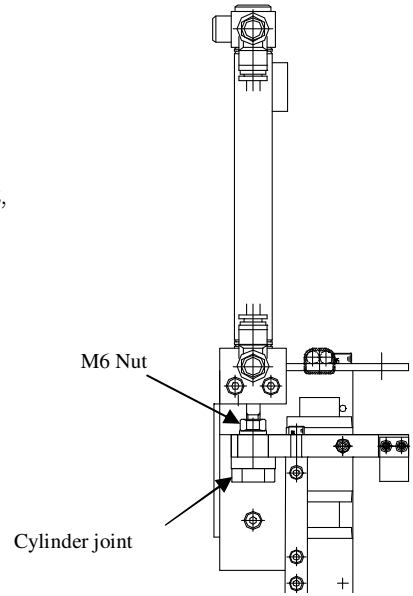
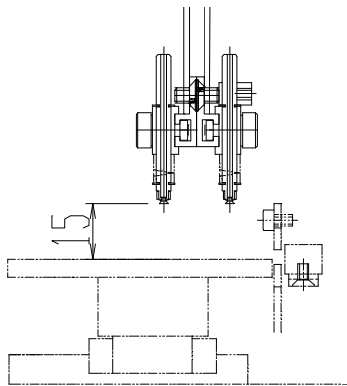
- 2 Adjust Y sensor flag to be 1mm inside the photomicrosensor optical axis.

## 1.6 Vacuum Arm Height Adjustment

Adjust the height of vacuum arm.

### Procedure

- 1** In Manual Mode, with the lead frame align plate in front, move the vacuum arm until the return position of double work detection.
- 2** Loosen up the M6 nut at tip of piston rod in the cylinder and rotate the cylinder joint until the clearance between frame align plate and vacuum nozzle is 15mm. Then, tighten the M6 nut.



- 3** Lower the arm down in Manual Mode.
- 4** Adjust the height of stopper bolt at the position where the vacuum nozzle touch sensor is activated. (Stopper bolt should enter the hole).

# 2

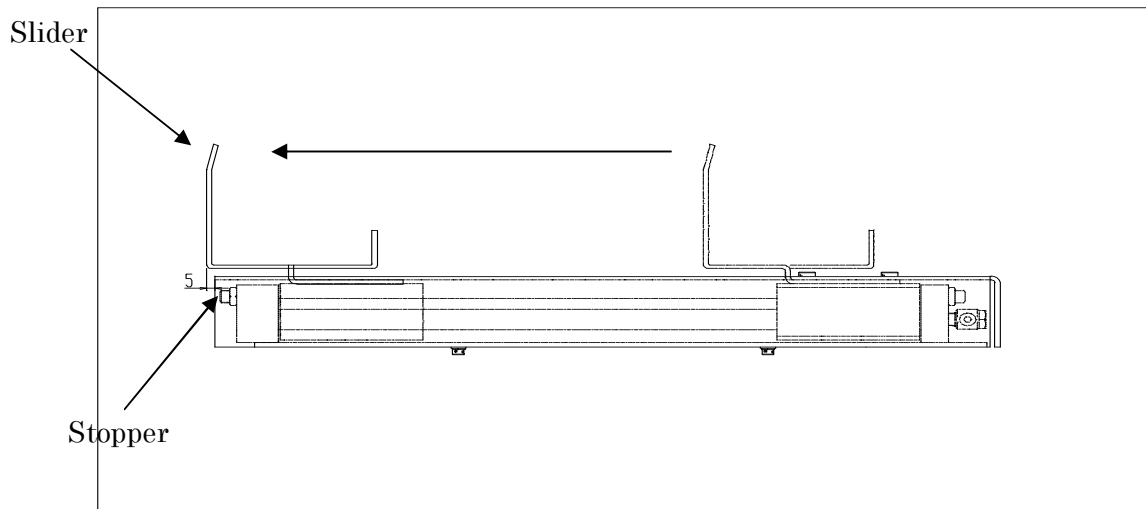
## Magazine Stacker Loader Adjustment

This is the explanation on adjustment of magazine stacker loader.

The operations here are the basic adjustments required during product conversion and parts replacement.

### 2.1 Adjustment of Slider Forward End

Adjust the forward end position of magazine supply slider.

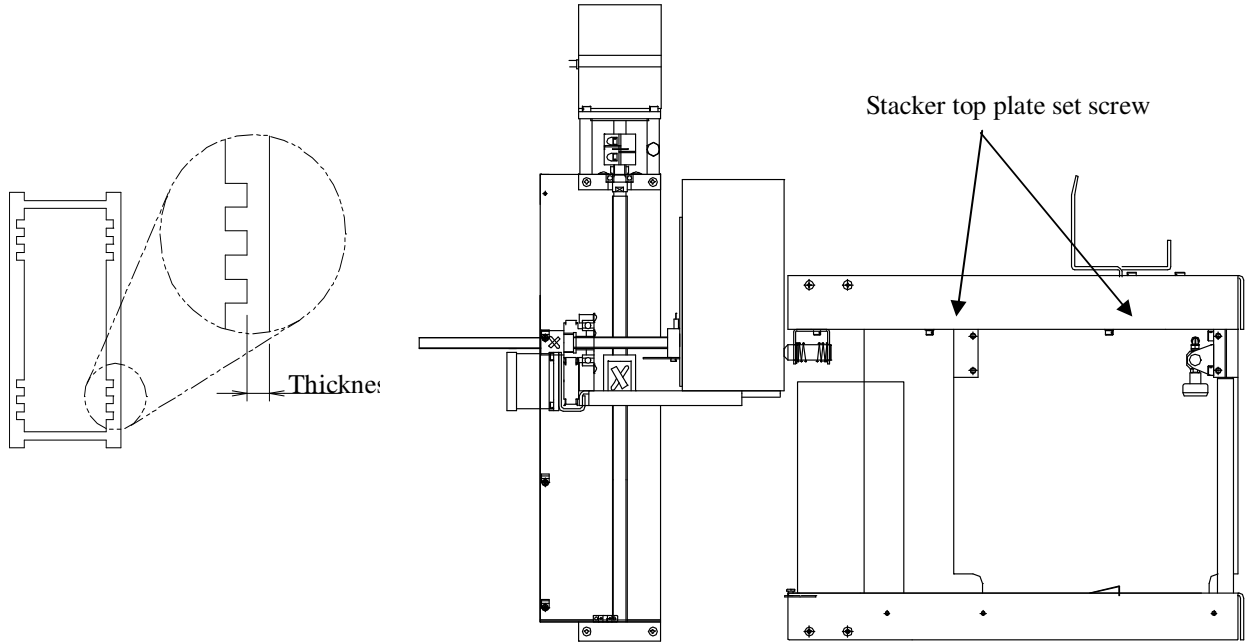


#### Procedure

- 1** With the air source OFF, move the slider to elevator side.
- 2** Adjust the rodless cylinder stopper (shock absorber) until the slider is protruding 5mm from the end of the stocker top plate.

## 2.2 Push Rod Position Adjustment

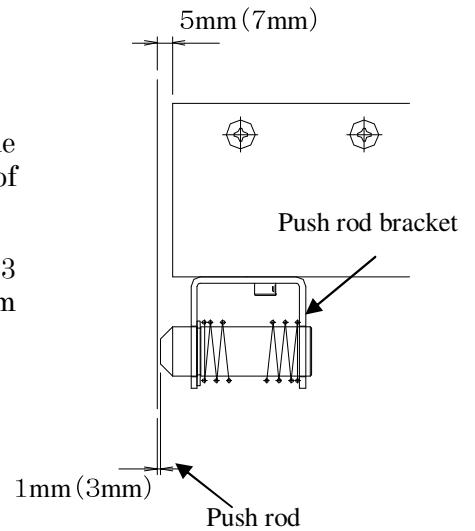
Push rod position may sometimes need to be adjusted due to the difference of plate thickness at lead frame magazine side.



### 2.2.1 When magazine thickness $t$ is less than 4mm

**Procedure**

- 1** Loosen 4 pcs stacker top plate set screw and adjust the edge of stacker top plate to be 5mm from the edge of front lead frame transfer and tighten.
- 2** Loosen push rod bracket set screw and adjust all the 3 pcs push rods together with its brackets to be 1mm from the edge of front lead frame transfer and tighten.



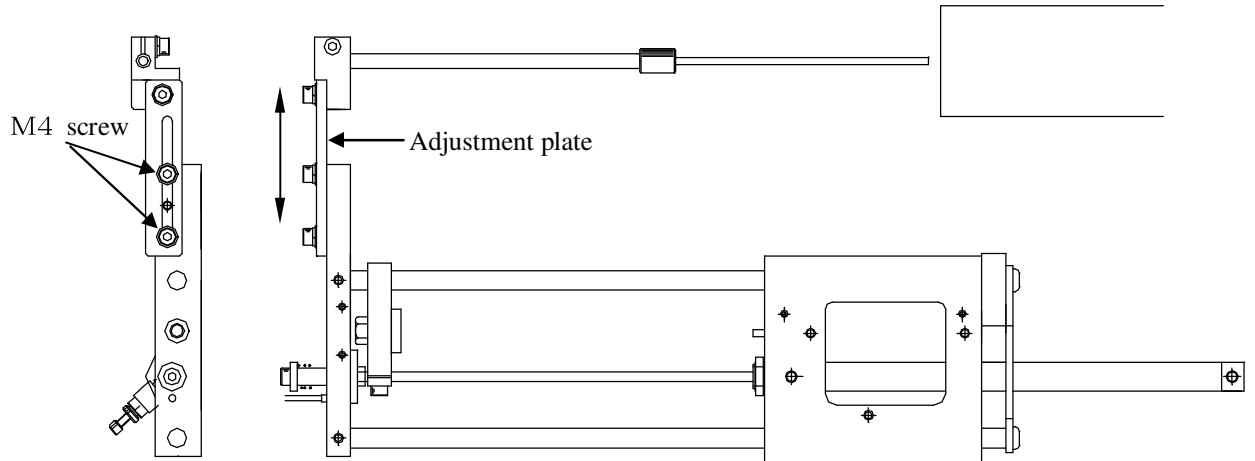
### 2.2.2 When magazine thickness $t$ is 4 ~ 6mm

**Procedure**

- 1** Loosen 4 pcs stacker top plate set screw and adjust the edge of stacker top plate to be 7mm from the edge of front lead frame transfer and tighten.
- 2** Loosen push rod bracket set screw and adjust all the 3 pcs push rods together with its brackets to be 3mm from the edge of front lead frame transfer and tighten.

## 2.3 Pusher Y Direction Position Adjustment

Adjust the pusher Y direction position from the lead frame magazine.

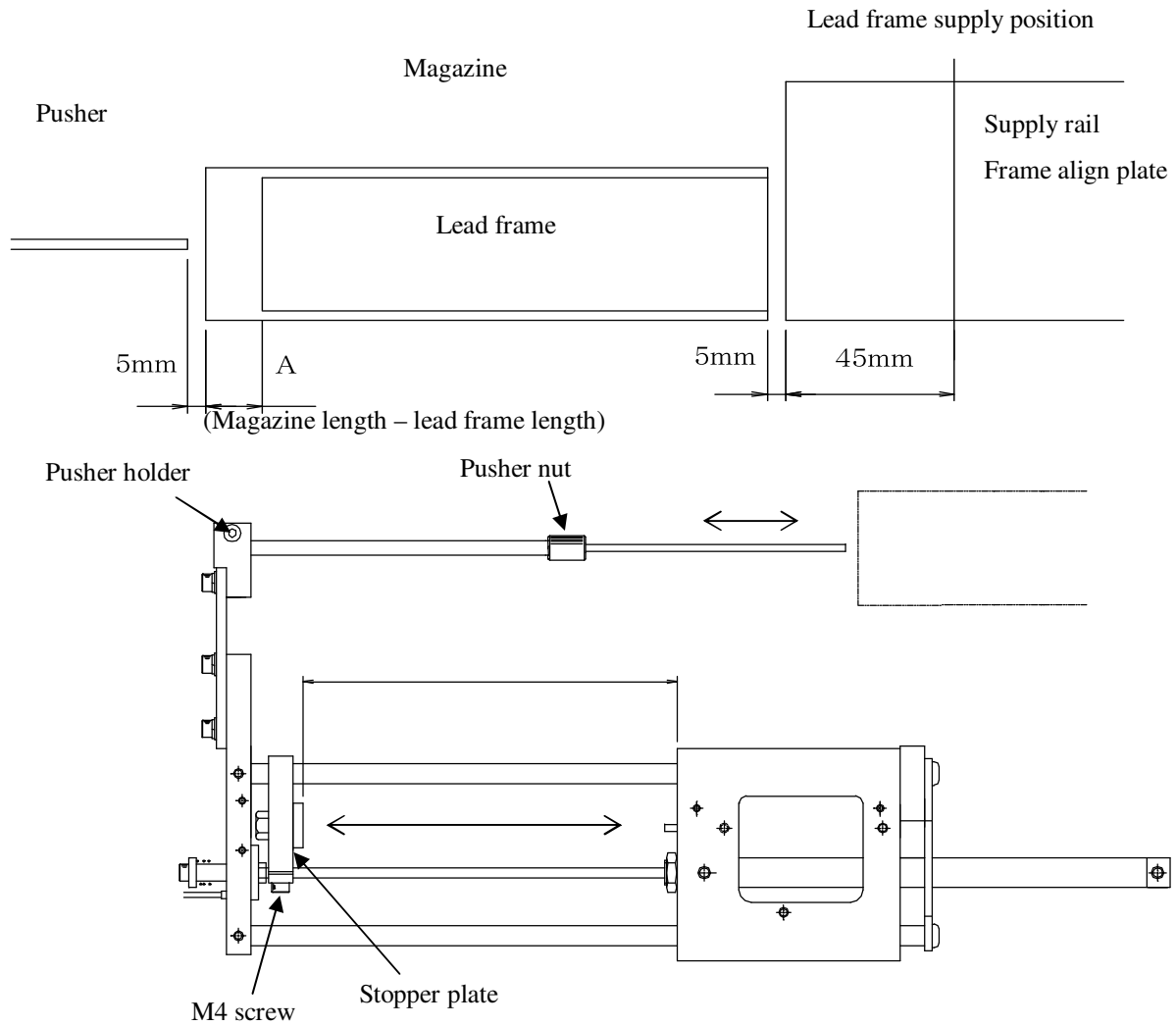


### Procedure

- 1** Loosen the 2 pcs M4 adjustment plate screw and slide the tip to and fro from the adjustment plate.
- 2** Please make the center of lead frame as the reference for pusher position.

## 2.4 Pusher Forward Position Adjustment

Adjustment of forward position of lead frame pusher is explained as in the following.



### Procedure

- 1** Loosen up pusher nut (or pusher holder) and adjust the pusher tip to be 5mm from the magazine.
- 2** Loosen stopper plate M4 screw and adjust the pusher stroke. Here, calculate the pusher stroke as:

$$\text{Pusher stroke} = 5\text{mm} + A\text{mm} + 5\text{mm} + 45\text{mm}$$

(A: Magazine length - lead frame length)



- When using parts with A dimension (magazine length-lead frame length) of only 15mm or less, set the cylinder stroke as 70mm and to adjust only the pusher. This will make the product conversion easier.
- Here, the clearance from pusher tip and magazine will be  $5\text{mm} + (15\text{mm} - A)$ .

# 3 Feeder Adjustment

This is the explanation on adjustment of Feeder.

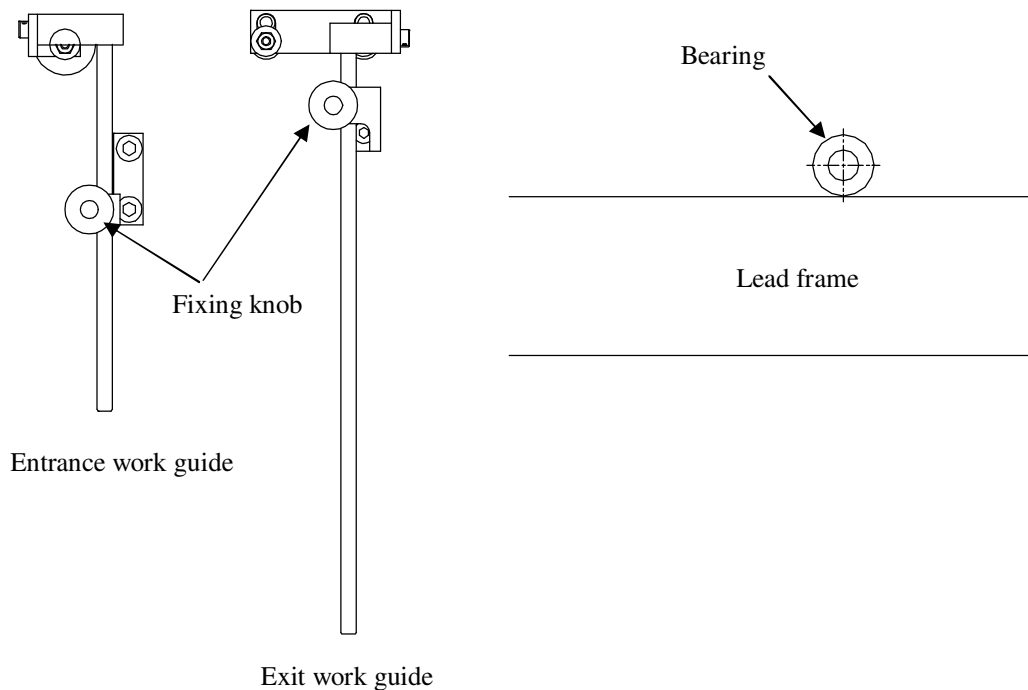
The operations here are the basic adjustments required during product conversion and part replacement.

Carry out the adjustments as the following procedures.

## 3.1 Entrance and Exit Work Guide Width Adjustment

Adjustment of width of entrance and exit work guide is explained in the following.

### Procedure

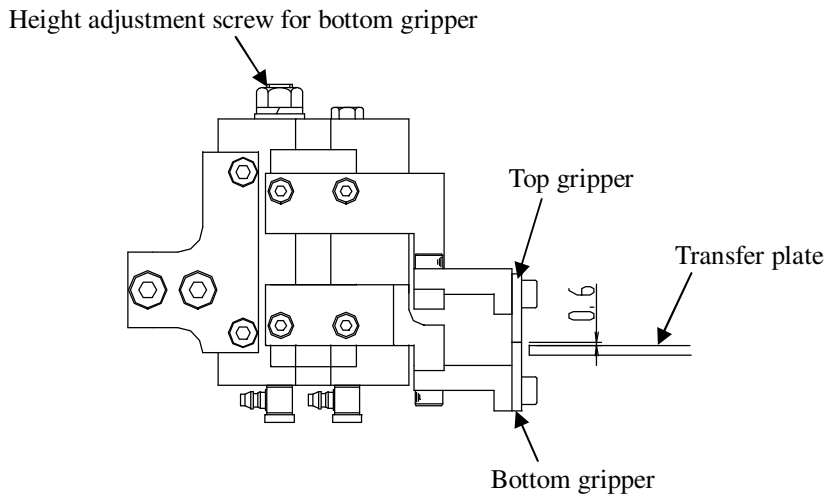


- 1** Loosen up set knob of work guide and push in the shaft to spread the work guide until the back.
- 2** Supply 1 pc of frame. Narrow down the width until the bearing is slightly touching the edge of lead frame, and then tighten. Here, clearance between bearing and frame should be less than 0.1mm.
- 3** Adjust the entrance and exit work guide in the same manner.



### 3.2 Exit Gripper Height Adjustment

Adjustment of exit gripper height is explained in the following.



#### Procedure

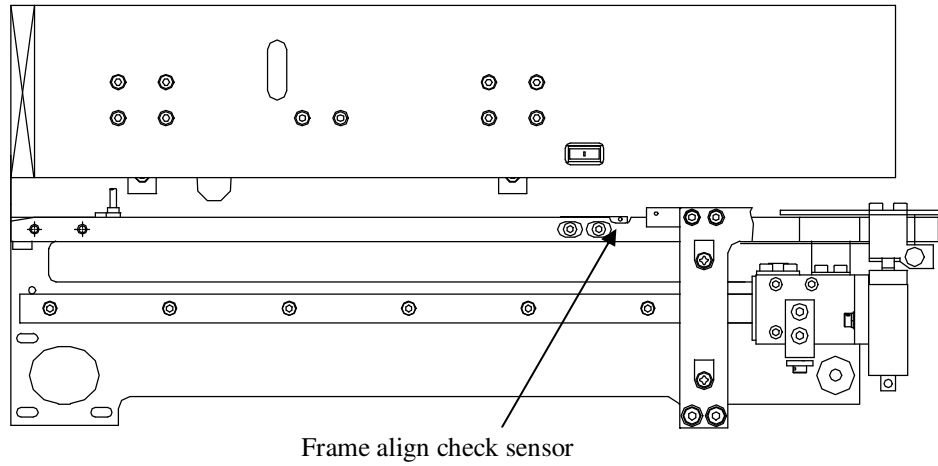
- 1** Loosen up the set screw on bottom gripper and adjust the bottom gripper to be in parallel with transfer plate.
- 2** Close gripper and with the air hand adjustment screw, adjust the height of bottom gripper to be 0.6mm higher than transfer plate.
- 3** Adjust the top gripper to follow the bottom gripper.
- 4** Adjust the position of air hand auto switch so that the sensor is ON at end of both top and bottom stroke.



Both top and bottom gripper should be adjusted to be aligned to transfer plate.

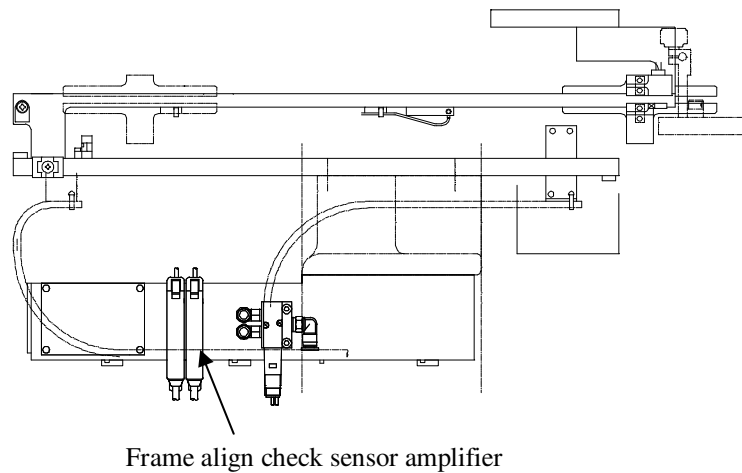
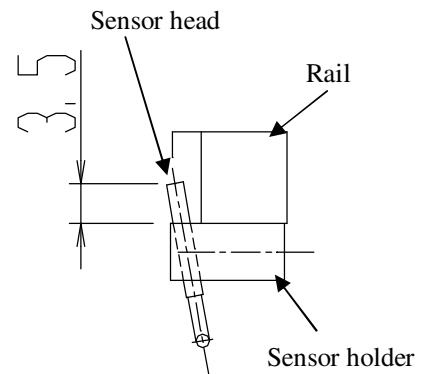
### 3.3 Frame Align Check Sensor Adjustment

Adjustment of frame align check sensor is explained in the following.

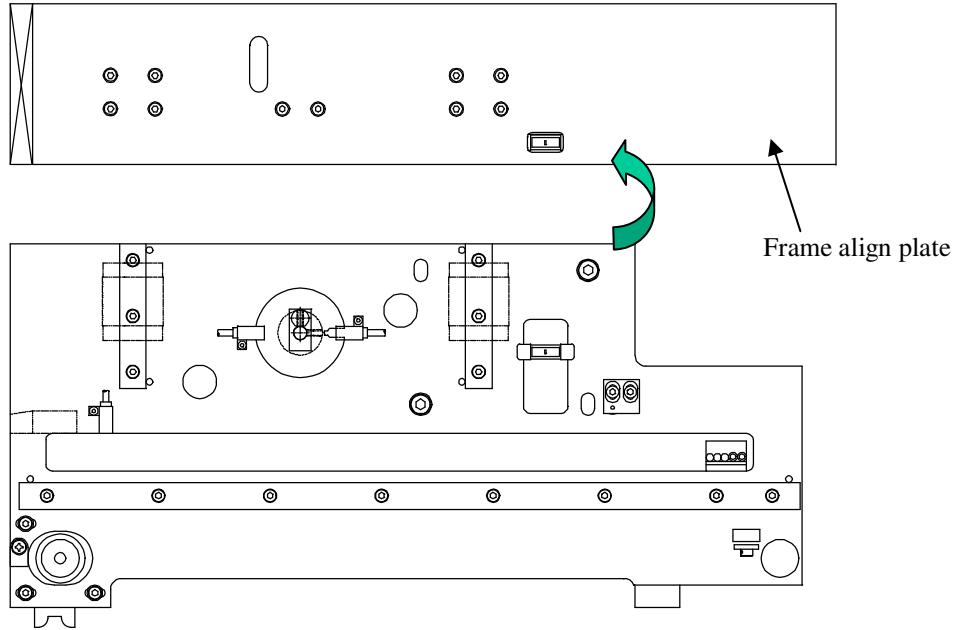


#### Procedure

- 1** Adjust the sensor head of frame align check sensor to protrude out from sensor holder by 3.5mm.
- 2** Supply 1 pc of lead frame and align the frame. At this position, adjust the sensitivity so that the sensor amplifier is turned ON (LED is lighted).

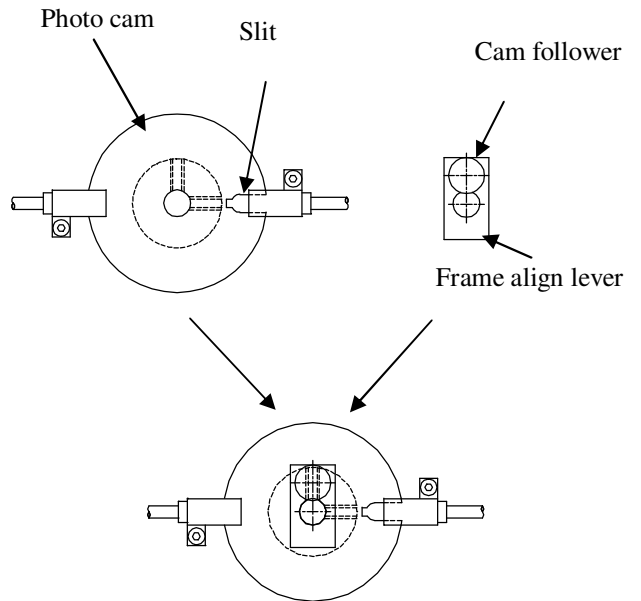


### 3.4 Frame Align Activating Sensor Flag and Lever Adjustment

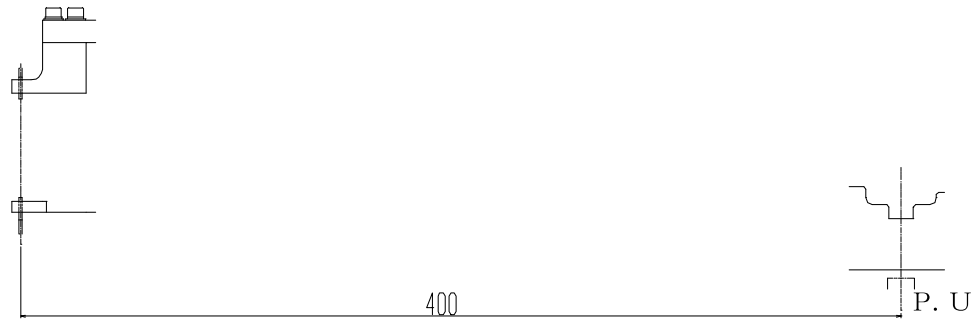


**Procedure**

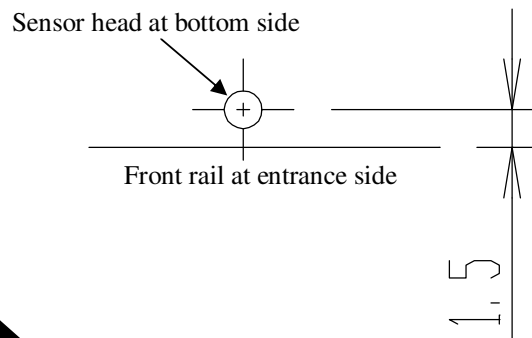
- 1** Remove lead frame align plate.
- 2** Set the slit of photo cam to be at right side and the cam follower attached on the frame align lever to be at the back.
- 3** Fix lead frame align plate.



## 3.5 Lead Frame Edge Detection Sensor Adjustment

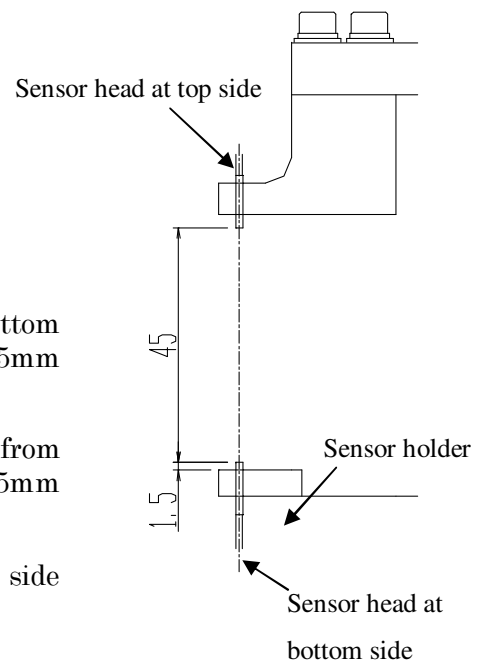


Edge detection sensor position



### Procedure

- 1** Adjust the position of edge detection sensor at bottom side to be 400mm from X: Pickup position and 1.5mm from Y: Front rail edge.
- 2** Adjust the sensor head at bottom side to be 1.5mm from sensor holder and sensor head at top side to be 45mm from sensor head at bottom side.
- 3** Adjust the optical axis with the adjustment of top side sensor adjustment.

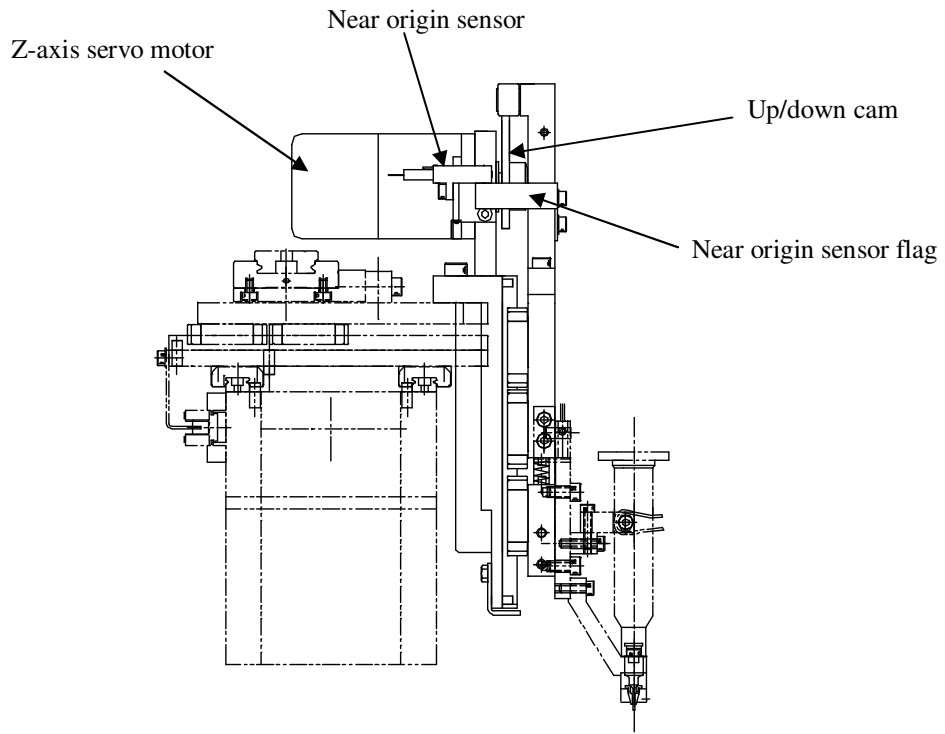


# 4

## Dispenser (XYZ) Adjustment

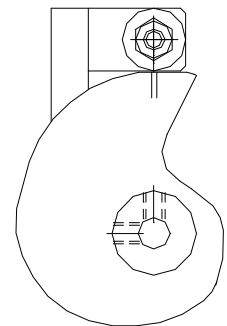
Adjustment of dispenser (XYZ) is as explained in the following.

### 4.1 Dispenser Z-axis Mechanical Origin Adjustment

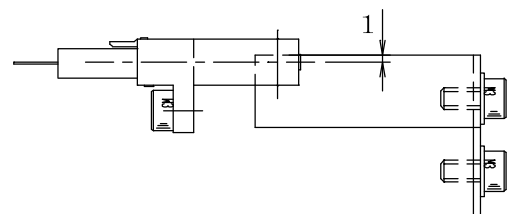


**Procedure**

- 1** Loosen up up/down cam screw. (M4 set screw at 2 locations).
- 2** Carry out origin return of Z-axis servo motor.
- 3** Adjust the cam follower marking line to be straight up (cam follower position).

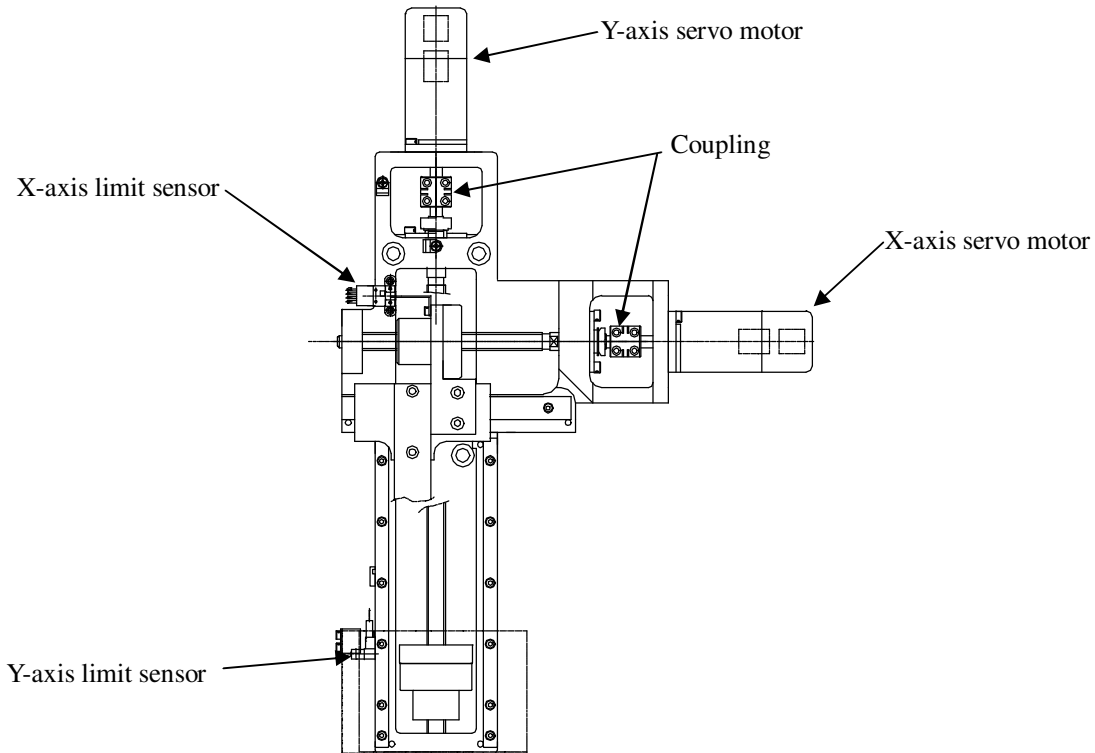


- 4** Adjust the near origin sensor flag to shield the photomicrosensor for 1mm.



## 4.2 Dispenser X, Y-axis Mechanical Origin Adjustment

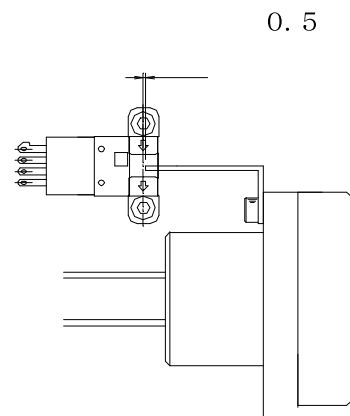
Adjustment of dispenser X, Y-axis mechanical origin is as explained in the following.



### 4.2.1 X-axis Mechanical Origin Adjustment

#### Procedure

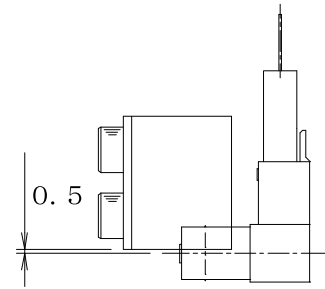
- 1** Loosen up the X-axis coupling screw.
- 2** Move X-table to the left and adjust it to be 0.5mm from the limit position by reversing it to the right.
- 3** Carry out servo-motor origin return and tighten the coupling.



### 4.2.2 Y-axis Mechanical Origin Adjustment

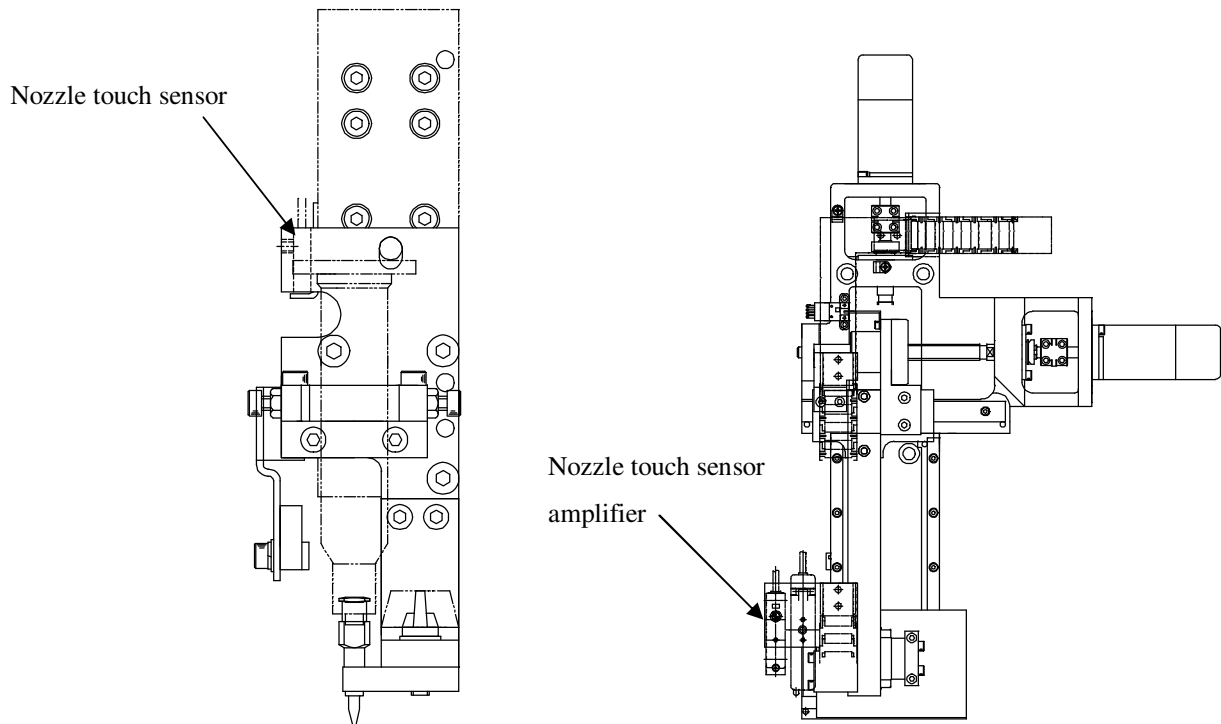
■ Procedure ■ 

- 1** Loosen up the Y-axis coupling set screw.
- 2** Move Y-table to the front and adjust it to be 0.5mm from the limit position by reversing it to the back.
- 3** Carry out servo motor origin return and tighten the coupling.



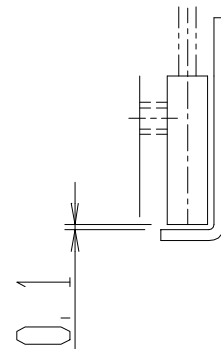
## 4.3 Nozzle Touch Sensor Adjustment

Adjustment of nozzle touch sensor is explained as in the following.



### Procedure

- 1** Treat the dispenser Z-axis as the origin position (where nozzle is not touching).
- 2** Loosen up the touch sensor sensor head set screw (M3 set screw) and adjust it to be 0.1mm clearance from the detection flag.
- 3** In Teaching Mode, lower down Z-axis. When it touches the nozzle, lower it further down by  $100\mu\text{m}$ . At this condition, adjust the sensitivity until the red light is OFF.





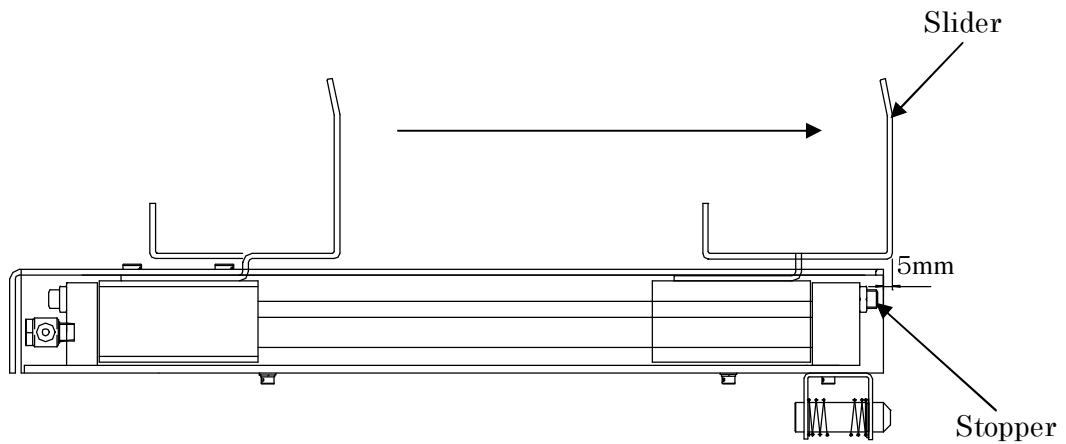
# 5

## Unloader Adjustment

Adjustment of unloader is explained in the following.  
The operations here are the basic adjustments required during product conversion and parts replacement.

### 5.1 Slider Forward End Adjustment

Adjust the forward end position of magazine supply slider.

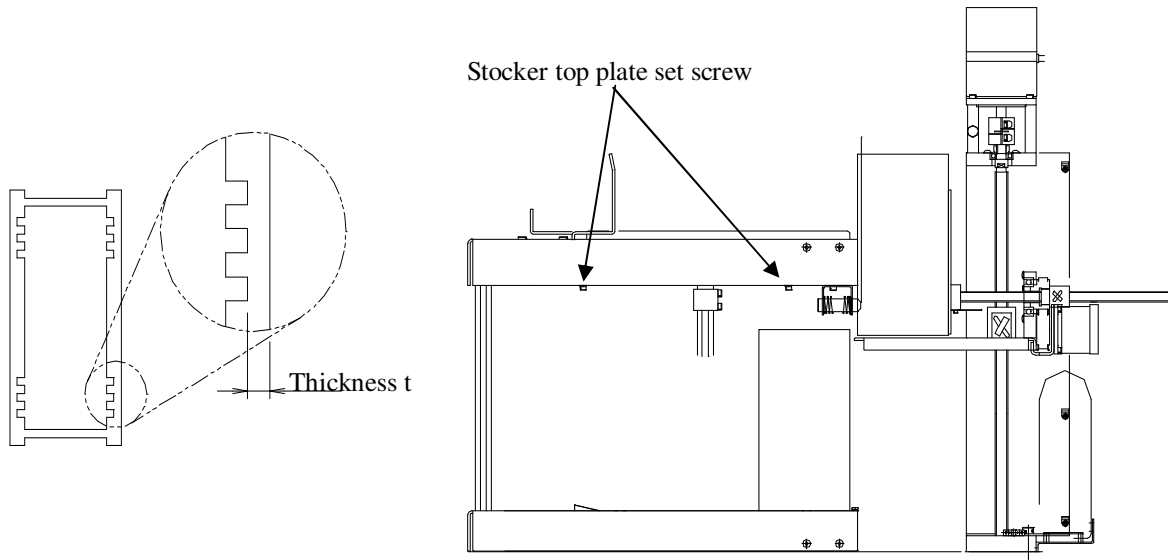


#### Procedure

- 1** With air source OFF, move slider to the elevator side.
- 2** With the slider protruding 5mm out from the stacker top plate end, adjust the rodless cylinder stopper (shock absorber).

## 5.2 Push Rod Position Adjustment

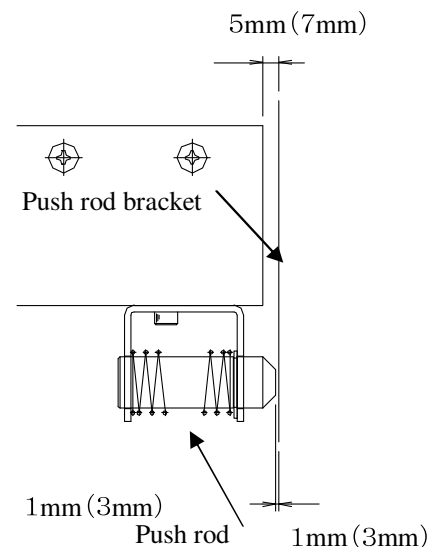
Push rod position may sometimes need to be adjusted due to the difference of plate thickness at lead frame magazine side.



### 5.2.1 Magazine thickness $t$ is less than 4mm

#### Procedure

- 1** Loosen 4 pcs stacker top plate set screw and adjust the edge of stacker top plate to be 5mm from the edge of front lead frame transfer and tighten.
- 2** Loosen push rod bracket set screw and adjust all the 3 pcs push rods together with its brackets to be 1mm from the edge of front lead frame transfer and tighten.



### 5.2.2 When magazine thickness $t$ is 4 ~ 6mm

#### Procedure

- 1** Loosen 4 pcs stacker top plate set screw and adjust the edge of stacker top plate to be 7mm from the edge of front lead frame transfer and tighten.
- 2** Loosen push rod bracket set screw and adjust all the 3 pcs push rods together with its brackets to be 3mm from the edge of front lead frame transfer and tighten.

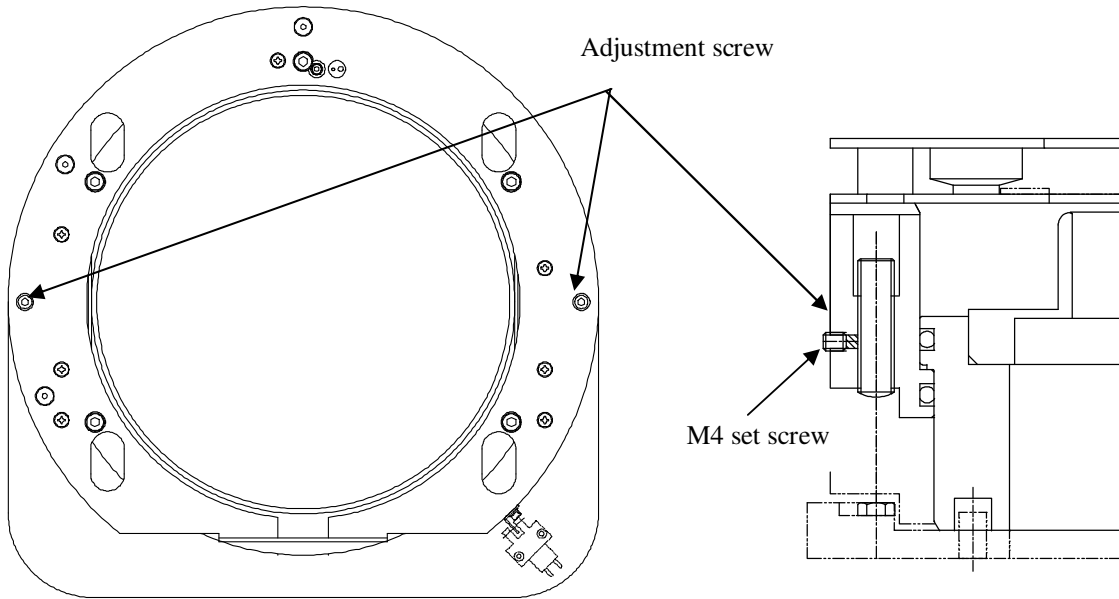
# 6

## Expander Adjustment

Adjustment of expander is explained in the following.

### 6.1 Expander Stroke Adjustment

Adjustment of expander stroke is explained in the following.



#### Procedure

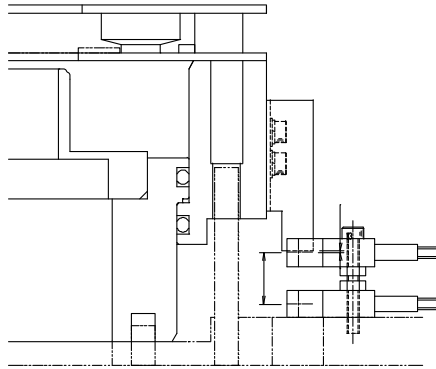
- 1** Loosen up M4 set screw (2 locations at left and right) of expander side surface.
- 2** Adjust the height from the top surface using the adjustment screw.
- 3** Expander stroke is min 14mm ~ max 23mm. Adjust it to be within this range and tighten it with the M4 set screw.



The expander must be adjusted to be in parallel.

## 6.2 Top and Bottom Limit Sensor Position Adjustment

Adjustment of expander top limit and bottom limit sensor position is explained in the following.



### ■ Procedure ■

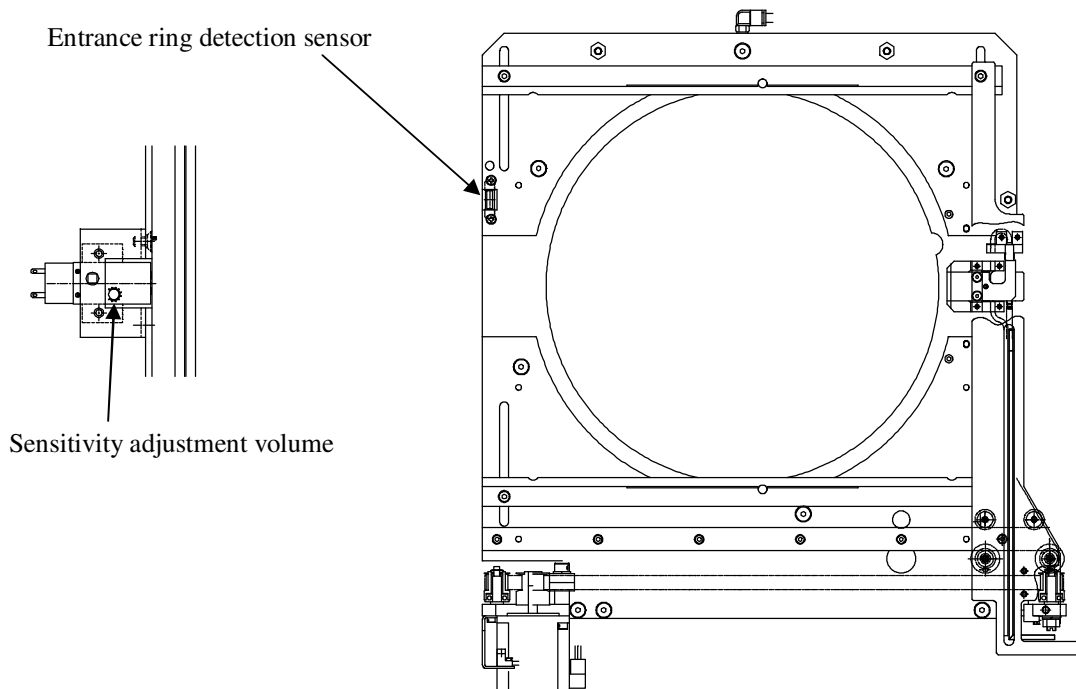
- 1** Fix the top limit and bottom limit sensor with clearance of 13mm.
- 2** Ensure that when expander is at up position, top limit and bottom limit sensor will be activated and when expander is at down position, top limit and bottom limit sensor will be off.

# 7 Ring Changer Adjustment

Adjustment of ring changer is explained in the following.

## 7.1 Entrance Ring Detection Sensor Adjustment

Adjustment of entrance ring detection sensor is explained in the following.



### Procedure

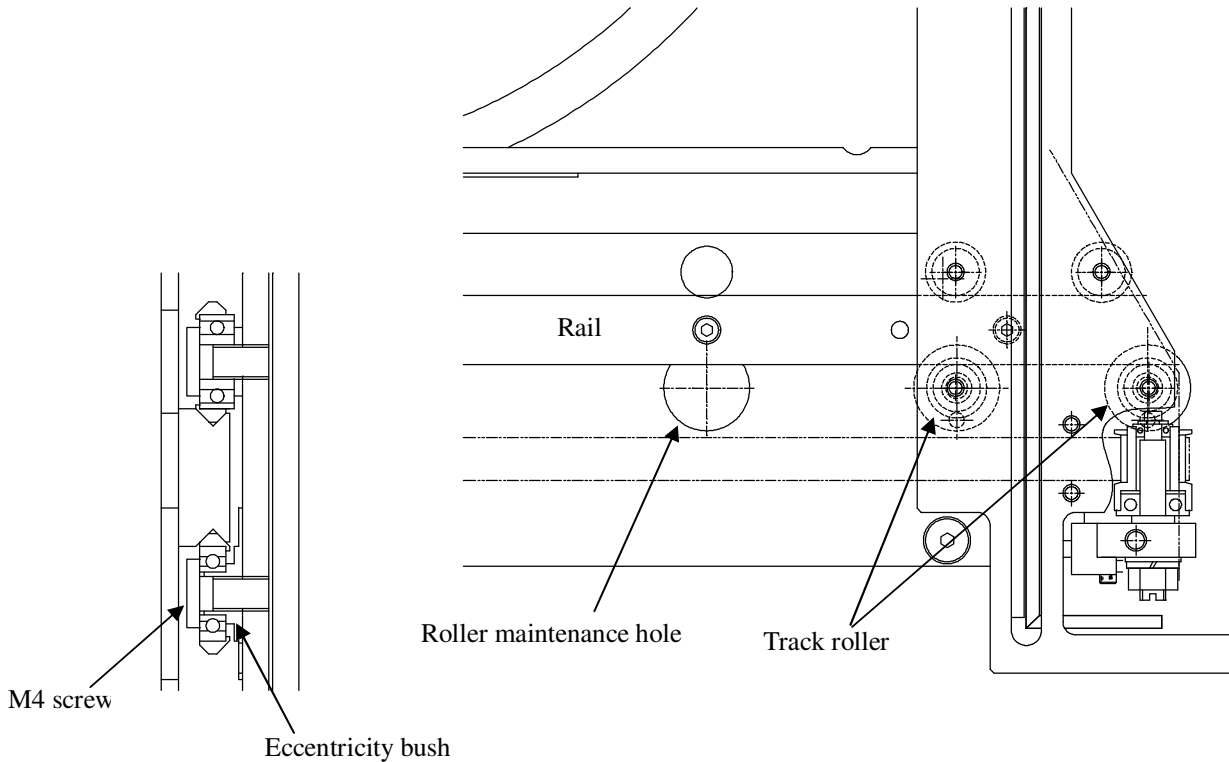
- 1** Lower down the expander and then move XY table until it goes underneath of feeder.
- 2** Turn sensitivity adjustment volume of photo electronic switch to activate under the feeder and then turn it again until it is not responding anymore.
- 3** Move XY table to ring changer position, move expander up and check if sensor is ON when one piece of wafer ring is placed on the sensor.



Adjust the ring detection sensor to respond to wafer ring and not to respond to base under the feeder.

## 7.2 Track Roller Adjustment

Adjustment of track roller is explained below.



### Procedure

- 1** Adjust the 2 pieces of guide roller at the front side.
- 2** Switch OFF pulse motor and move arm until the track roller that needs to be adjusted comes above the roller maintenance hole.
- 3** Loosen M4 screw from the reverse surface and turn eccentricity bush until track roller slightly touches the rail, then tighten the screw.
- 4** Similarly, adjust the other 1 pc roller.
- 5** After the rollers have been fixed and tightened, move arm to and fro and check that there is no rattling sound generated.

## 8

## Plunge Up Adjustment

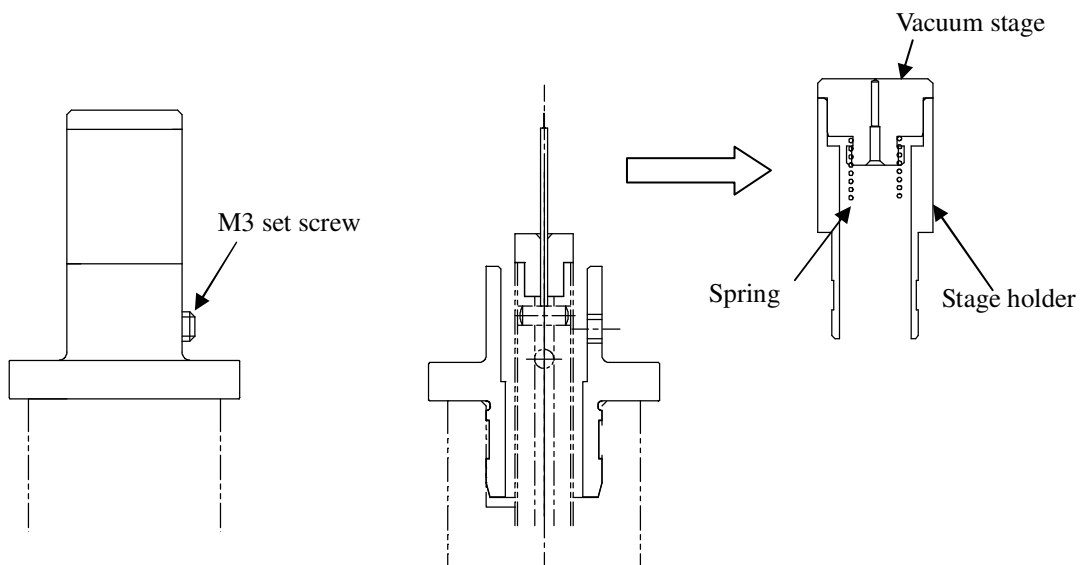
This is the explanation on adjustment of Feeder.

The operations here are the basic adjustments required during product conversion and part replacement.

Carry out the adjustments as the following procedures.

## 8.1 Vacuum Stage Replacement

Replacement of vacuum stage is explained in the following.



### Procedure

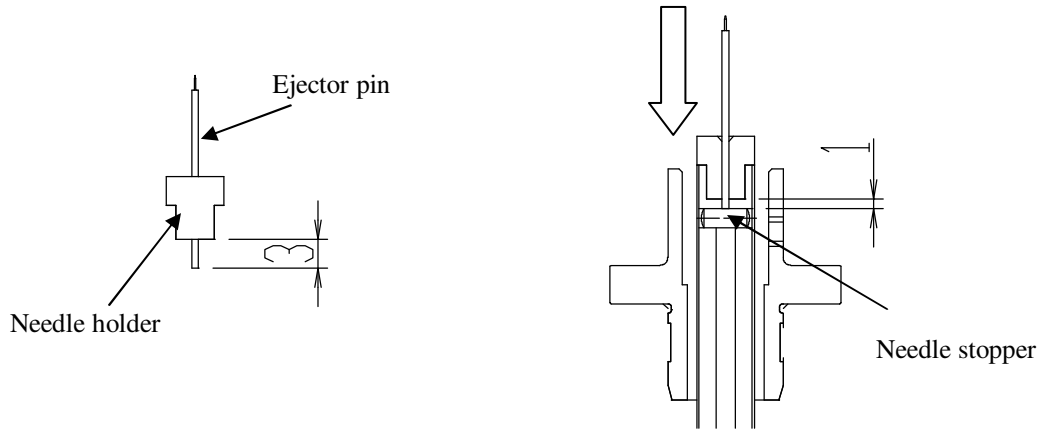
- 1** Loosen up M3 set screw, lift up stage holder with finger and pull the vacuum stage out.
- 2** Run the new vacuum stage along the plunge-up pin and fix it with the M3 set screw.



- Replace vacuum stage, stage holder and spring as a set.

## 8.2 Plunge Up Pin Replacement

Replacement of plunge up pin is explained as in the following.



### Procedure

- 1** Remove vacuum stage.
- 2** Remove needle holder (rubber) from each ejector pin.
- 3** Replace ejector pin with a new one. Here, fix the bottom side of the ejector pin to protrude out from needle holder by 3mm.
- 4** Hold the needle holder with finger and insert it into plunge up shaft. Here, the ejector pin will hit the stopper that will lock it to its position.
- 5** Fix in the vacuum stage.

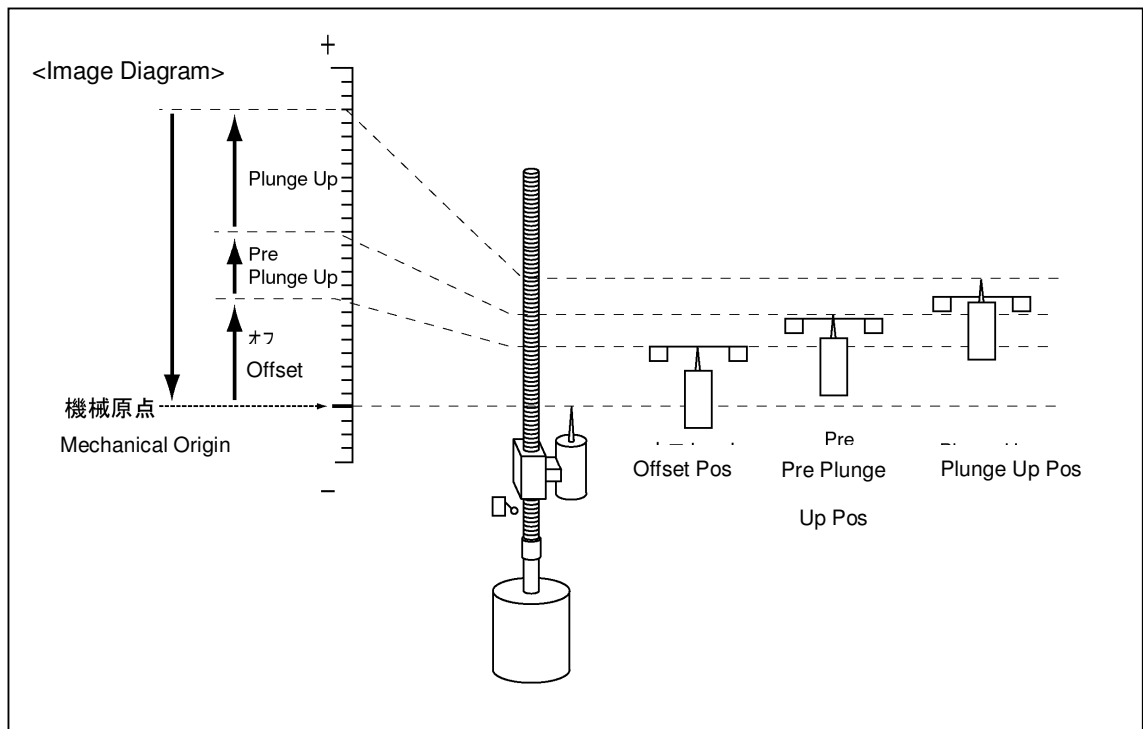


### 8.3 Offset Position

Each plunge up length that was taught in Teaching Mode etc. is controlled by addition and subtraction method.

An additional reference point used as an offset position in relations to the mechanical origin has been designed in the Chip Ejector of this machine with the purpose to further improve maintenance work.

This offset position is set as the reference point where it touches the wafer sheet in the coordinate from the mechanical origin. Movement length of [Plunge Up] and [Pre Plunge Up] as taught in Teaching Mode and Parameters are actually movement that starts from this offset position according to the addition or subtraction calculation.

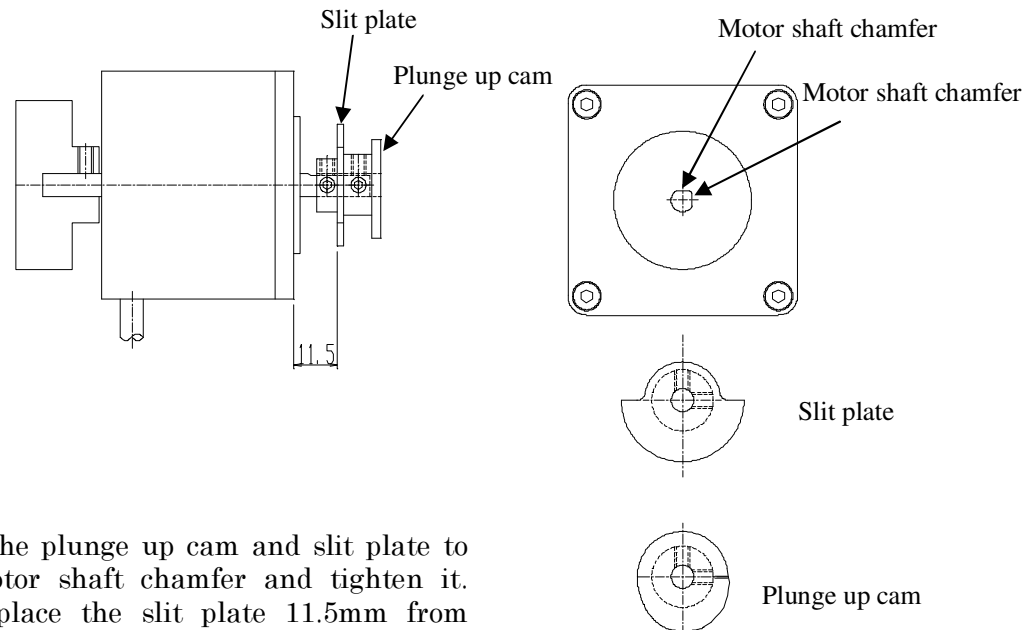


For example, after the replacement of the plunge up pin, sometimes a sudden inconsistency in the plunge up pin compared to the one that had been used in previous mounting process without any problem before may occur. This may be due to the difference in length of pin before and after the replacement. Here, instead of changing the plunge up data, re-entering correct value of offset position would suffice.

It is hoped that through the understanding of the relationship between mechanical origin, offset position and each plunge up data, maintenance work can be done more efficiently.

## 8.4 Plunge Up Cam Position Adjustment

Adjustment of plunge up cam position is explained in the following.



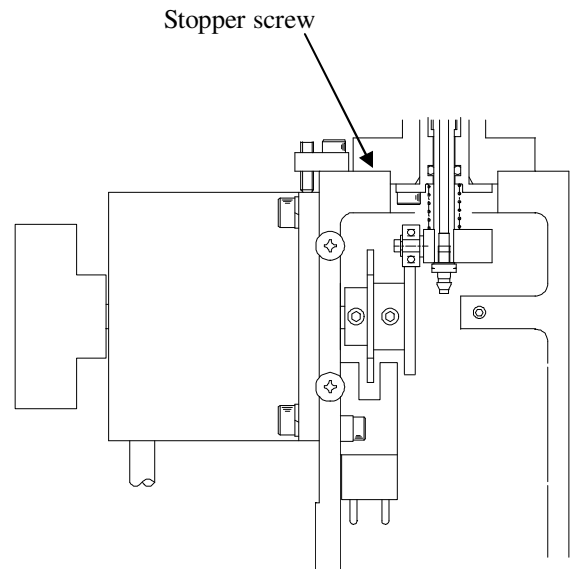
### Procedure

- 1** Align the plunge up cam and slit plate to the motor shaft chamfer and tighten it. Here, place the slit plate 11.5mm from motor and place the plunge up cam touching the slit plate.
- 2** Fix the motor.
- 3** In Teaching mode, move ejector pin 180  $\mu\text{m}$  up from the origin. In this condition, adjust the motor height using the stopper screw to allow both vacuum stage tip and ejector pin to be at the same height. (Using the edge of metal ruler etc., adjust the pin without scratching the ruler).



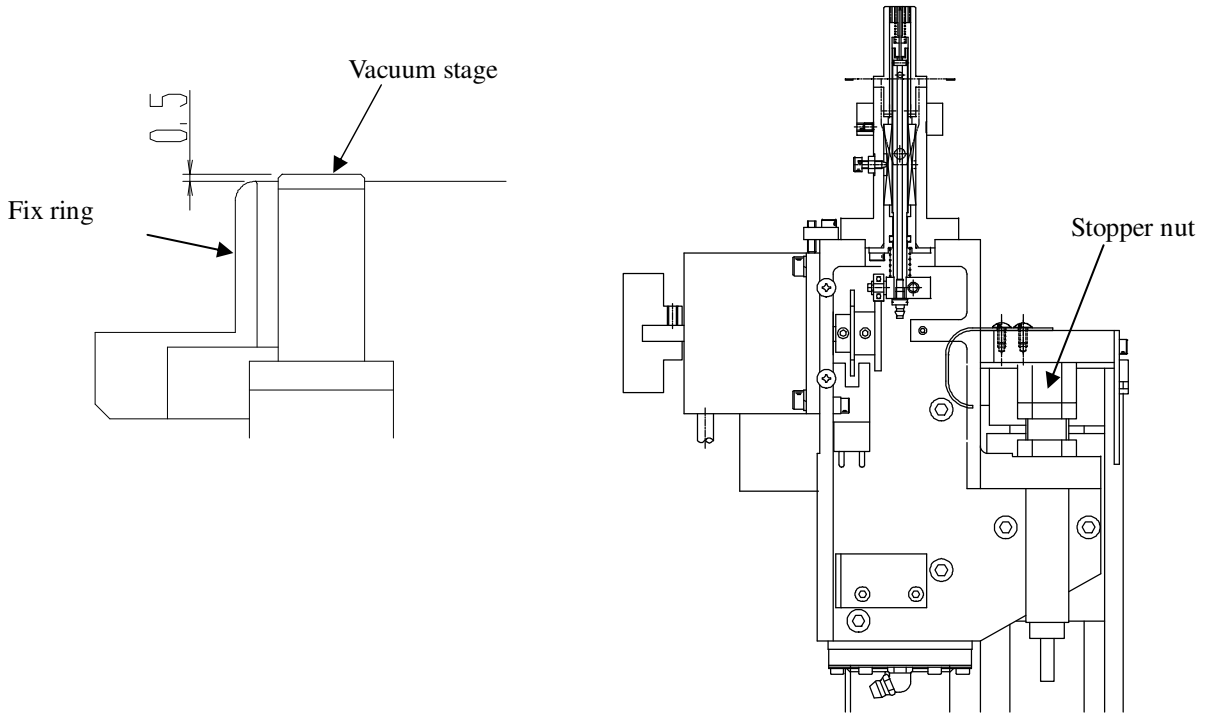
Caution

- Do not strongly push the tip of pin with ruler etc. as the tip of pin may get chipped off.
- After the adjustment is done, check that the plungeup offset length is within 150~200  $\mu\text{m}$ .



## 8.5 Vacuum Stage Top End Position Adjustment

Adjustment of vacuum stage top end position is explained in the following.

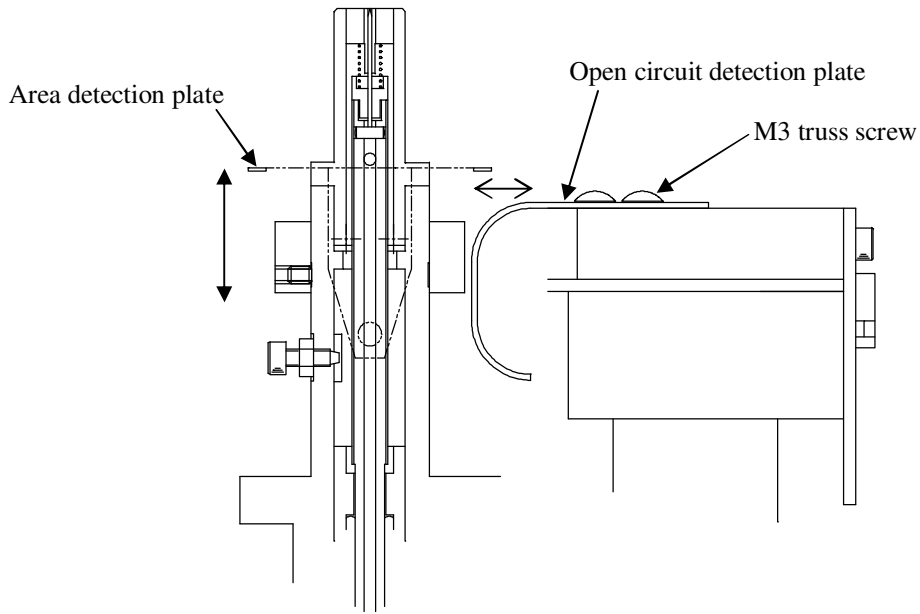


### Procedure

- 1** Move up the plunge up unit. (Move the XY table to a position where it is able to move up the plunge up unit).
- 2** With stopper nut, adjust the vacuum stage to be 0.5mm higher than the top surface of expander fix ring.
- 3** Adjust the position of rodless cylinder auto switch so that it will be activated at stroke end.

## 8.6 Area Sensor Open Circuit Detection Plate Position Adjustment

Adjustment of detection plate position for area sensor's open circuit detection is explained in the following.



### Procedure

- 1 Adjust the position of open circuit detection plate in a way that the outer circumference of area detection plate slightly grazes on the open circuit detection plate during the moving up and lowering down of the vacuum stage. (It should not be in contact at vacuum stage's top and bottom limit position).



Strictly use only M3 truss screw as the screw used to fix the open circuit detection plate.

# 9

## Chip Recognition Adjustment

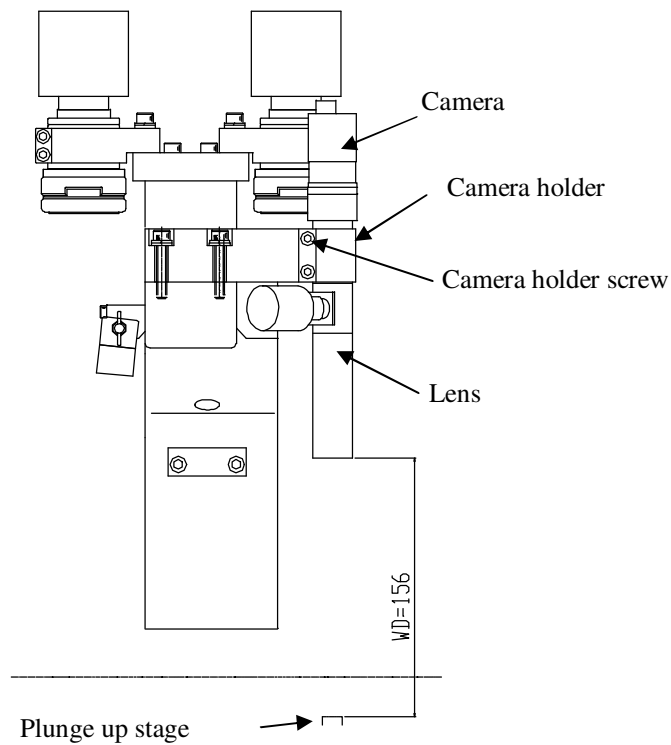
This is the explanation on adjustment of Chip Recognition.

The operations here are the basic adjustments required during product conversion and part replacement.

Carry out the adjustments as the following procedures.

### 9.1 Focus Adjustment

Adjustment of chip recognition focus adjustment is explained as in the following.

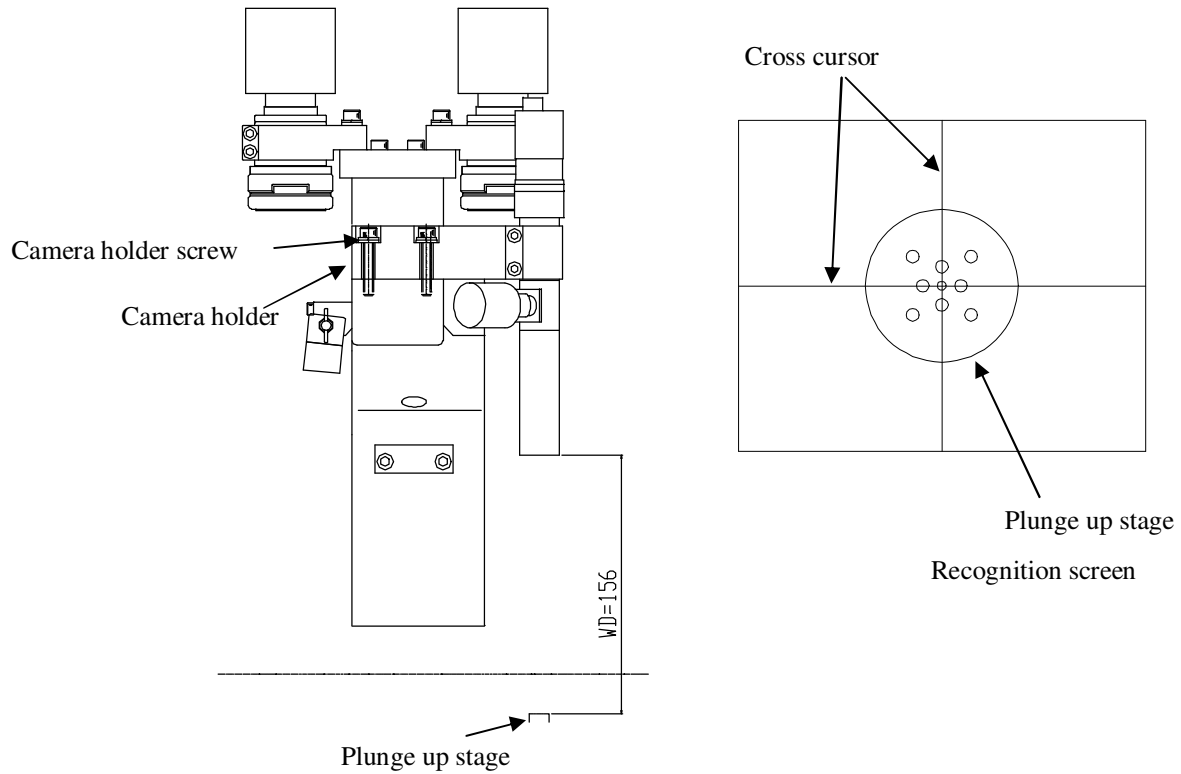


#### Procedure

- 1** Loosen up camera holder screw and adjust the length of plunge up stage top surface ~ tip of lens to be 156mm.
- 2** While checking on the image, adjust the focus to be on the top surface of plunge up stage, and then tighten the screw.

## 9.2 X, Y Position Adjustment

X, Y position adjustment of chip recognition is explained in the following.



### Procedure

- 1** Loosen up camera holder screw.
- 2** Display the recognition screen and adjust the cross cursor to be at the center of plunge up stage by adjusting the position of the camera holder, then tighten the screw.

## 10

## Island Recognition Adjustment

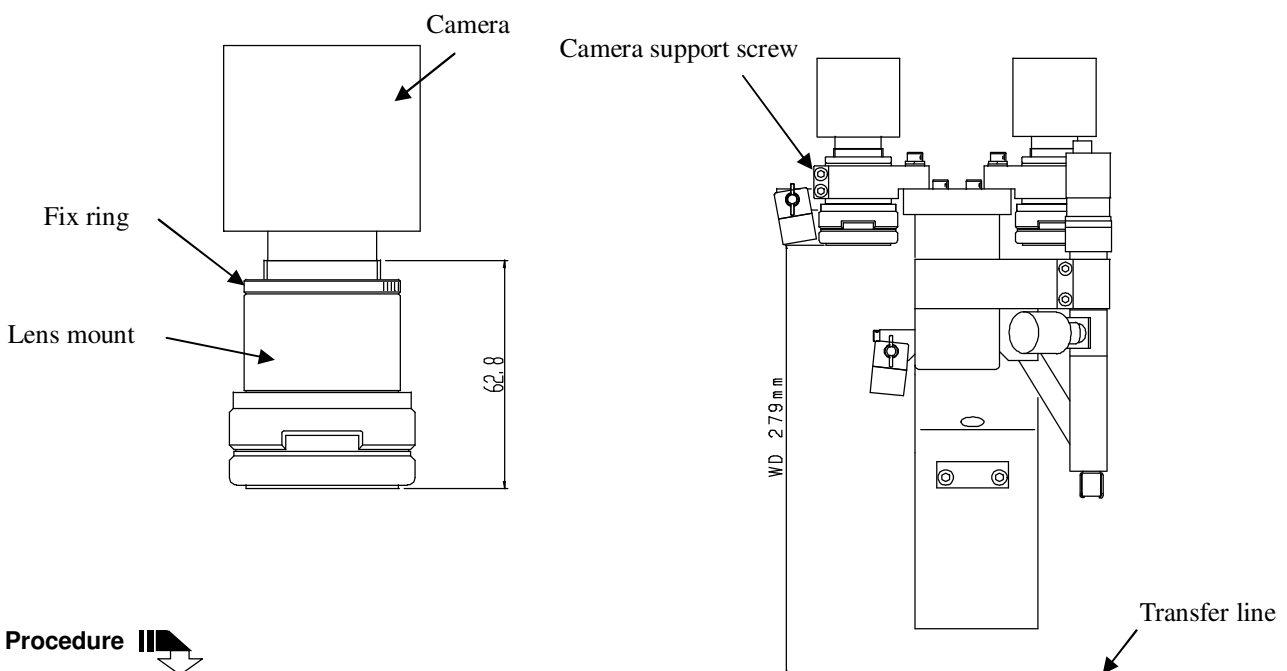
This is the explanation on adjustment of Island Recognition.

The operations here are the basic adjustments required during product conversion and part replacement.

Carry out the adjustments as the following procedures.

## 10.1 Focus Adjustment

Focus adjustment of island recognition camera is as explained in the following.



Procedure

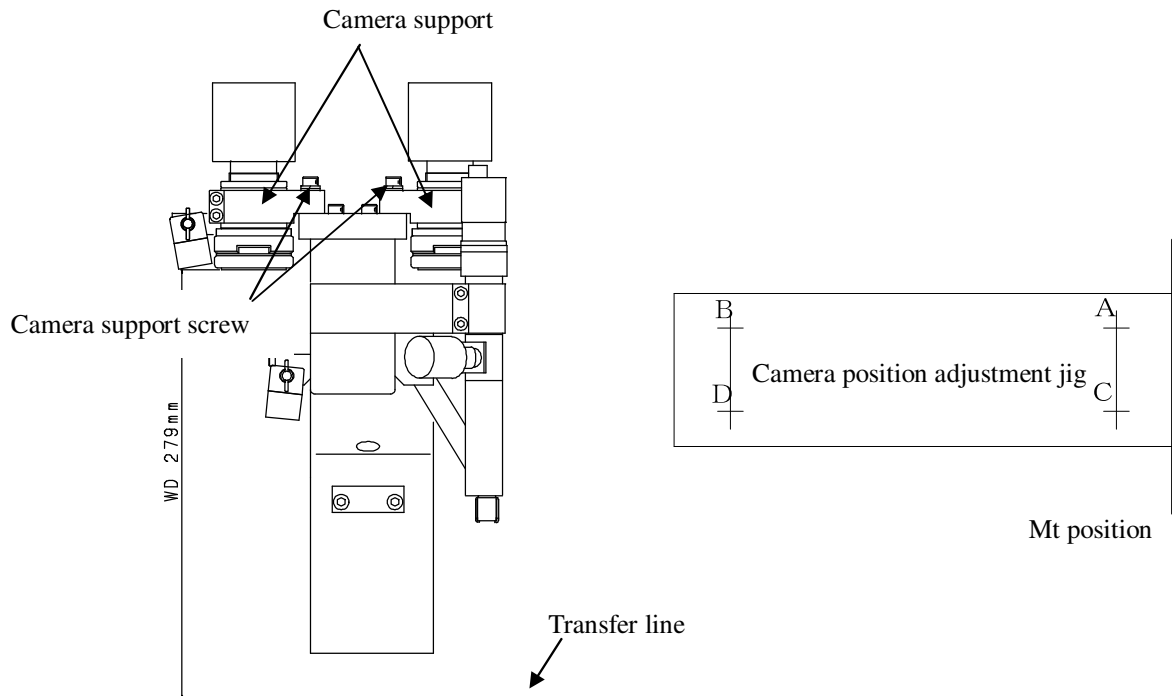
- 1** Reduce the lens diaphragm to 2.8 (minimum).
- 2** Adjust the length of camera fixing surface ~ tip of lens to be 62.8mm using the lens mount.  
(Loosening the fix ring and turning the lens mount can adjust the length).
- 3** Place adapter plate at origin position (align to transfer line) and adjust the distance of adapter plate ~ tip of lens to be 279mm by adjusting the camera support.
- 4** Loosen up the camera support and while looking at the image, adjust the focus to be on the top surface of adapter plate and then adjust its height. Tighten the screw.



- Adjust similarly for camera at Mt side and dispenser side.

## 10.2 X, Y, $\theta$ Position Adjustment

Island recognition camera X, Y,  $\theta$  position adjustment is as explained in the following.



### Procedure

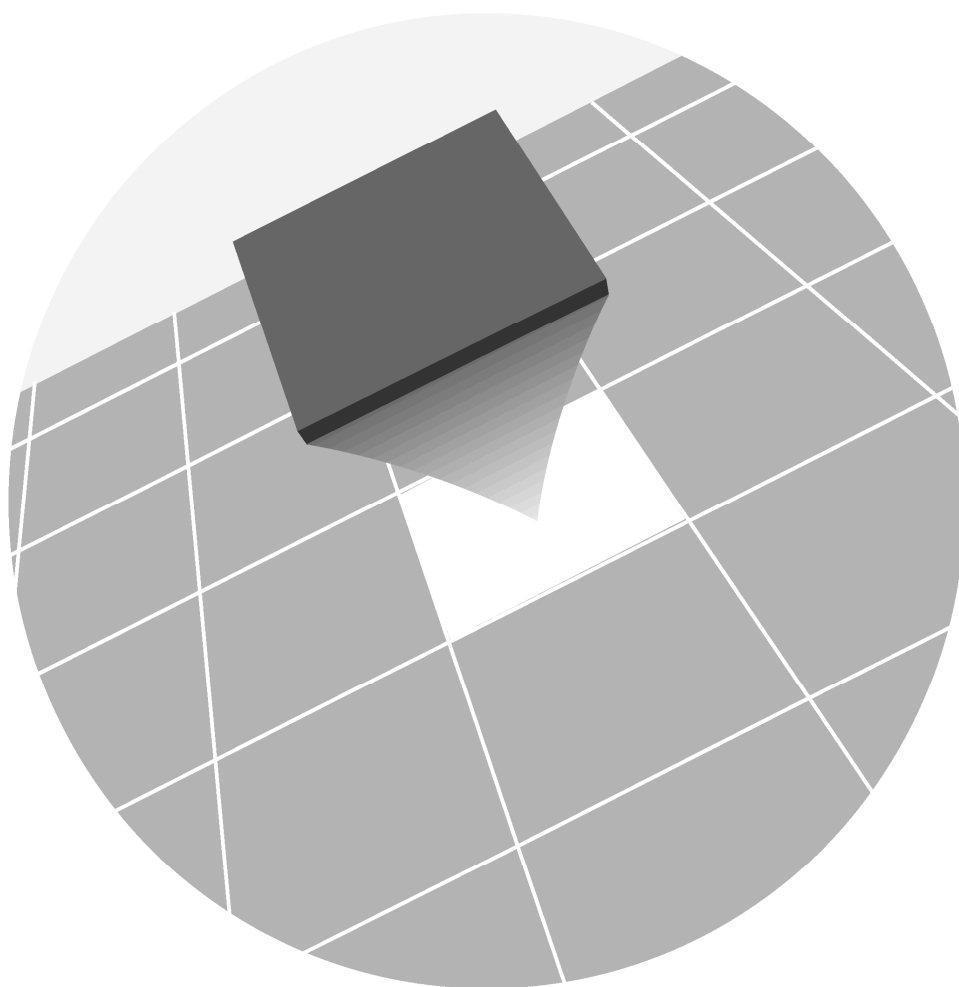
- 1** Transfer the camera position adjustment jig until its tip is near Mt position.
- 2** Switch OFF servo motor, and rotate the pulley of transfer motor shaft by hands to align the tip of jig at Mt position.
- 3** Display the image using recognition edit mode and set the digital zoom magnification to X10.
- 4** Loosen up camera support screw and adjust the camera support position by adjusting the cross cursor on screen to point A marking line of Mt island recognition camera and point B marking line of dispenser position camera.
- 5** Display the image of the marking line on jig and using recognition edit mode, move the cross cursor to measure the length (pixel) from A-C for Mt camera and from B-D for dispenser position camera.
- 6** Enter the value of  $24/[\text{Measurement result}]$  into 「Screen Resolution」 parameter.
- 7** Carry out and repeat island recognition manual trace using actual lead frame and check that the image positions of Y multiple row islands are always displayed at the same position at each time.



# Die Bonder

*BESTEM-D01R Machine Manual*

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CANON MACHINERY INC.

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