Chapter 8 Inspection and maintenance

This chapter explains checkpoints and procedures for daily and periodic inspections to use the machine safely and to prevent possible trouble.
Before beginning inspection or maintenance work, be sure to read "1. Precautions" in this chapter and follow the instructions.

Contents

1. Precautions

Be sure to observe the following precautions when performing the inspection or maintenance work.

- Periodic inspection or maintenance work must be performed by or under the direction of person who has received training from YAMAHA.
- Always turn off the power to the machine before inspecting mechanical components. If the power to the machine needs to be turned on during inspection, make sure that no part of anyone's body comes within the machine movement range.
- Be careful not to allow any foreign matter to enter the machine during inspection or maintenance work.
- Use only the lubricants and grease specified by YAMAHA or a YAMAHA sales representative.
- When replacing parts, always use parts approved by YAMAHA or a YAMAHA sales representative.
- Do not modify any parts in the machine. Modification may result in poor performance or threaten operator safety.

2. Inspection and maintenance

2.1 Daily inspection

To prevent unwanted trouble, the following points should be checked on a daily basis before and after using the machine.

■ **Daily checkpoints**

Checkpoints	Check items	Refer to
Air pressure	Check that “0.40MPa” and “0.33MPa” are shown at the upper and lower portions of the air pressure display, respectively.	"1.1 Air regulator unit" in Appendix
Air conditioner unit (option)	Check the drain tank once a day, especially in wet season with high humidity, and drain the tank. When the tank is filled with water, an alarm buzzer sounds and the air conditioner unit will stop after 10 minutes if left undrained.	
Conveyor unit	Check that no foreign matter, solder or debris is on the conveyor rail, edge clamp, board flap, push-up jig (machine using optional push-up jigs), push-up plate, etc. Check that no matrix pins come loose from the push-up table.	"4. Conveyor unit" in Chapter 1
Extended exit conveyor (option)	Check that no board remains on the conveyor. Check that no solder and debris adheres to the conveyor.	
Squeegee Squeegee head	Check that the mount knobs of the squeegee head are tightened firmly. Check that the squeegee is securely attached to the squeegee holder. (The squeegee mount knobs are tightened firmly.) Check that there are no scratches, nicks and wear on the scraper. Check that there are no foreign matter, debris and solder adhesion. Remove the squeegees after work and clean them with cleaning paper or cloth. (When using a urethane squeegee, do not immerse the squeegee in alcohol. The urethane scraper may expand.)	"3. Printing section" in Chapter 1
Cleaning unit	Check that the cleaner gauze roll is set correctly. Check also that the cleaner gauze is filled with cleaning alcohol.	"5. Cleaning unit" in Chapter 1
Mask frame stopper pin position	Check that the mask frame stopper pin position is correct.	"2.1 Mask size and mask stopper pin position" in Appendix
Mask clamp	Check that there are no foreign matter, debris and solder adhesion.	"3. Printing section" in Chapter 1
Mask	Check that there are no foreign matter, debris, solder adhesion, warp and scratches.	Mask manufacturer's instruction manual
Solder	Check that solder has returned to room temperature and is well agitated and rolled.	Solder manufacturer's instruction manual
Touch screen (option)	Check that there are no scratches or grime on the screen surface.	See "Precautions when handling the touch screen" below

● Precautions when handling the touch screen

Take the following precautions when handling the touch screen (option).

- The touch screen surface is made of acrylic resin. Do not scratch its surface with a pointed tools or hard objects. Use the finger pad to operate the buttons on the touch screen.
- To clean the touch panel surface, wipe gently with a soft cloth moistened with synthetic detergent diluted with water and then wrung-out well. Never use volatile chemicals such as benzine, thinner or alcohol.
- To prevent dust adhesion due to static electricity, we recommend using an anti-electrostatic agent.

2.2 Periodic inspection (Weekly/Monthly)

In addition to daily inspection, periodic inspections (weekly and monthly) are essential to ensure safe and efficient use of the machine.
We recommend setting an earlier inspection interval if parts are subject to frequent usage.

2.2.1 Parts to be replaced during periodic replacement

If parts need to be replaced as a result of the periodic inspection, use the spare parts listed below.

■ **Replacement parts (conveyor related)**

Part No.	Part name	Q'ty	Location used	Replacement interval
KHT-M9123-00X	CONV. EDGE PLATE	1	Board clamp	Replace the part according to the worn away status observed during inspection.
KHT-M9127-01X	TRANSFER BELT W2	1	Conveyor belt at printing stage (Feb. 2011 or earlier)	
KHT-M9127-02X	TRANSFER BELT W2	1	Conveyor belt at printing stage (March 2011 or later)	
KHT-M9314-01X	TRANSFER BELT W1	1	Conveyor belt at entrance/exit	
KHT-M9314-11X	TRANSFER BELT W3L	1	Conveyor belt of extended conveyor	

■ **Replacement parts (filter related)**

Part No.	Part name	Q'ty	Location used	Replacement interval
KGR-M9933-FXX	FILTER, SPARE	3	Filter of ejector for mask vacuum	Replace the filter 1 or 2 years after delivery. As a general guide, replace the filter if it becomes dirty when checked from the outside.
KGY-M3710-4XX	INL, FILTER ELEMENT	1	In front of blower on rear of machine	
KHW-M8501-10X	ELEMENT	1	Air filter for primary air supply	As a general guide, replace the filter if it becomes dirty when checked from the outside
KHW-M8501-20X	MANTLE	1	Mist filter for primary air supply	

CAUTION

Part Nos. are subject to change without prior notice. When ordering a replacement part, contact your local sales dealer to check its part No.

2.2.2 Recommended grease

When lubricating axis ball screws and linear guides according to the periodic inspection checkpoints, use only the grease stated in the list below.

■ **Recommended grease**

Lubrication point	Grease name	YAMAHA part No.	Notes
Ball screws and leaner guides of all axes	GREASE PACK (accessory)	K48-M3851-10X	NSK LR3

■ **Precautions when handling grease**

WARNING

INFLAMMATION MAY OCCUR IF GREASE OR LUBRICANT GETS IN THE EYES. BEFORE HANDLING THE GREASE, WEAR SAFETY GOGGLES TO ENSURE THE GREASE WILL NOT COME IN CONTACT WITH THE EYES.

WARNING

INFLAMMATION MAY OCCUR IF THE GREASE OR LUBRICANT COMES INTO CONTACT WITH SKIN. BE SURE TO WEAR PROTECTIVE GLOVES TO PREVENT CONTACT WITH SKIN.

WARNING

DO NOT TAKE ORALLY OR EAT THE GREASE OR LUBRICANT. EATING WILL CAUSE DIARRHEA AND VOMITING.

CAUTION

When storing the grease after use, tightly close the cap of the grease tube or container to prevent dust and moisture from entering inside. Store it in a dark place to avoid direct sunlight, and keep away from fire and heating sources.

2.2.3 List of periodic inspection checkpoints

Use the inspection check sheet to periodically inspect the machine.
The inspection check sheet describes the contents of the inspections to be performed weekly or monthly in addition to the daily inspection described in the previous section.
Make a copy of the inspection check sheet (sample) stated on the next page and use it for the periodic inspection. Or, it is recommended that the customer prepares an appropriate inspection sheet in such format and properly perform the periodic inspection with it.

CAUTION

Periodic inspections must be performed by or under the direction of person who has received training from YAMAHA or a YAMAHA sales representative.

CAUTION

Warm up the machine and wipe away excess grease before greasing up the lubrication points.

■ Inspection check sheet (Sample)

Section	Check item	Checkpoint	Contents of inspection/work	Weekly (Date)					Monthly	
				/	/	/	/	/	Cleaning	Lubrication
Conveyor unit	Main stopper	Contamination Operation, sensor	• Check that the operation timing is correct. • Check that no mounting part rattles. • Check for solder contamination.							
	Edge clamp Entrance/exit stopper	Operation, sensor	• Check that the edge clamp functions at an air pressure level of 0.1 MPa or less. • Check that the edge plate (metallic part of the edge clamp) for wear. • Check that the sensor of the entrance/exit stopper responds correctly.							
	Board flap	Contamination on backside of flap Operation, sensor	• Check that the sensor responds correctly. * Clean the solder contamination on the backside.							
	Conveyor belt	Contamination, napped surface, operation	• Check the board transfer belt for contamination, wear, or napping. * Clean the sensor surface if any dust or lint is on it.							
	Push-up plate	Operation, contamination on top surface	• Check that the push-up plate is leveled without noise when operating it with the board set. * Remove the matrix plate and clean the top surface of the plate.							
	PU-axis	Ball screw Linear guide	• Check for foreign matter or solder sticking. * As needed, wipe away excess grease after the grease has been applied.							
	W-axis timing belt	Crack, deterioration	• Check the belt for wear and the belt tension. * If the belt deteriorates, replace it.							
	W-axis conveyor auto width adjustment	Ball screw Linear guide	• Check for foreign matter or solder sticking. * As needed, wipe away excess grease after the grease has been applied.							
	Mask vacuum	Operation Vacuum filter	• Check that the mask vacuum functions correctly. * Check the filter. Clean or replace the filter if necessary.							
	MS-axis	Ball screw Linear guide	• Check the MS-axis unit for foreign matter or solder sticking. * As needed, wipe away excess grease after the grease has been applied.							
Vision camera unit related	Mask camera	Contamination on light lens Lighting status	• Check the light lens for contamination. • Turn on each light individually to check that it is lit correctly.							
	CX-axis	Ball screw Linear guide	Check for foreign matter or solder sticking. * As needed, wipe away excess grease after the grease has been applied.							
	Board camera	Lighting status	• Turn on each light individually to check that it is lit correctly.							
	Inspection camera (OP)	Lighting status	• Turn on each light individually to check that it is lit correctly.							
X-, Y-, and Z-axis	X1-axis, X2-axis	Ball screw Linear guide	Check for foreign matter or solder sticking. * As needed, wipe away excess grease after the grease has been applied.							
	Y-axis	Ball screw Linear guide								
	Z-axis	Trapezoid screw Guide								
Printing head	SY-axis	Ball screw Linear guide	• Check for foreign matter or solder sticking. * As needed, wipe away excess grease after the grease has been applied.							
	SZ-axis	Ball screw Linear guide								

Section	Check item	Checkpoint	Contents of inspection/work	Weekly (Date)					Monthly	
				/	/	/	/	/	Cleaning	Lubrication
Cleaner	Cleaner main unit	Up/down operation Roll sheet wind-up	• Check that the up/down operation timing is correct. • Check that the roll sheet is wound up correctly.							
	Cleaner head	Contamination inside head Solvent dispense status	Check the cleaning solvent dispense status or the head for contamination.							
	Suction unit hose	Crack, deterioration	* Check the hose for crack. If the hose deteriorates, replace it. • Check that the swing unit beside the cleaner head functions smoothly.							
	Suction unit	Filter inside suction unit Operation	* Clean the contamination of the filter. Replace the filter if necessary.							
Others	Each sensor	Contamination on sensor Operation	* Check the senor or dog for foreign matter or solder sticking. Clean the sensor or dog if necessary.							
	Air supply part	Air filter Mist filter	* Clean the contamination of the filter. Replace the filter if necessary.							
	Controller	Filter	* Clean the contamination of the filter. Replace the filter if necessary.							

2.2.4 Parts recommended for periodic replacement

For parts listed in the table below, it may be predicted that the service life of the part is expired or the part deteriorates even though no trouble is found through the visual check during the periodic inspection.
To maintain the performance of the machine at its optimal operating level, it is recommended to periodically replace these parts.

■ **Periodic replacement parts**

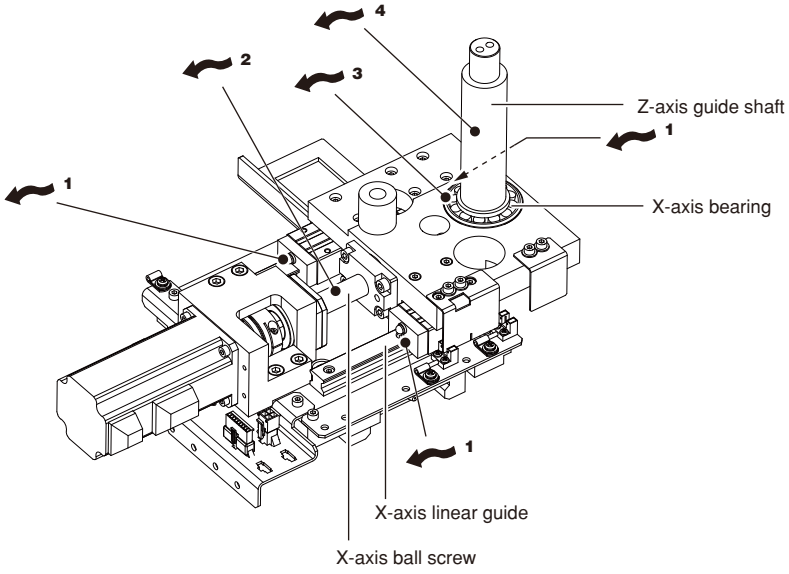
Part No.	Part name	Q'ty	Location used	Replacement interval
KHT-M3674-0XX	TUBE 25	1	ø25-suction hose connected from the left side of the cleaner unit to the rear of the machine.	Replace periodically every time the total production quantity reaches 3 million boards.
KHU-M3756-0XX	PUMP	1	Solvent pump	Replace every time the number of suction unit operation cycles reaches 1,440 thousand cycles. Check the operation records on the [Unit log]-[Cleaner] tab screen.
KHW-M8582-40X	VALVE	1	EA valve	Replace every time the operation count reaches 20 millions.

3. List of lubrication locations

3.1 X-, Y-, and Z-axis

3.1.1 X1-axis and X2-axis

Lubrication locations of X-axis



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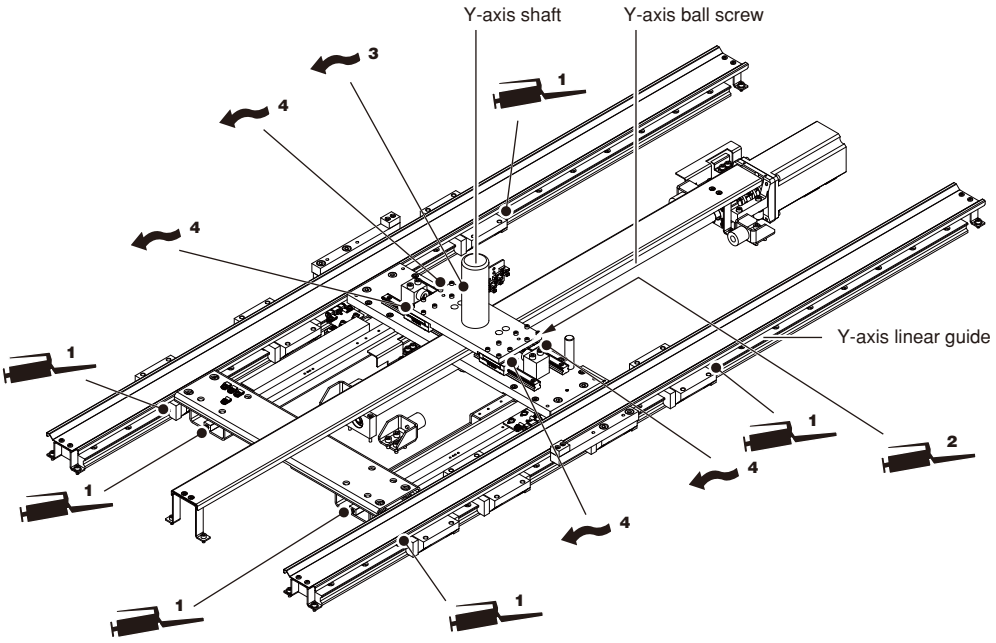
	Lubrication point	Lubrication location	Interval	Lubrication method
1	X-axis linear guide	3	Monthly	Manual lubrication
2	X-axis ball screw	1		Manual lubrication
3	X-axis bearing	1		Manual lubrication
4	Z-axis guide shaft	1		Manual lubrication

3.1.2 Y-axis

Lubrication locations of Y-axis



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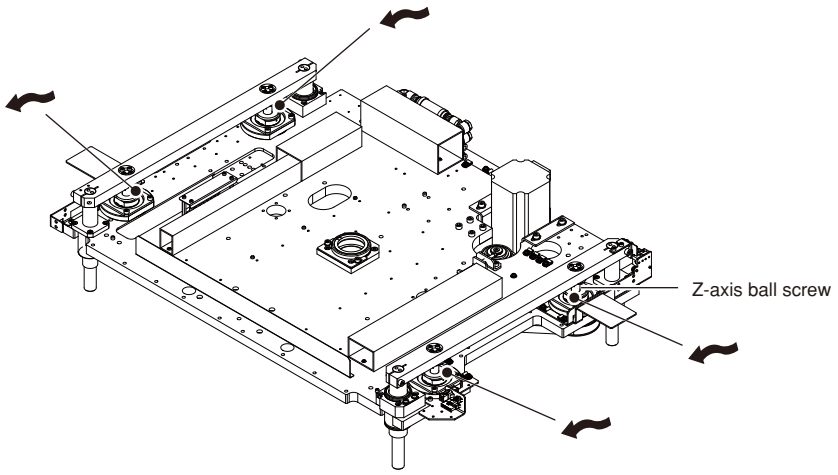
	Lubrication point	Lubrication location	Interval	Lubrication method
1	Y-axis linear guide	6	Monthly	Grease gun
2	Y-axis ball screw	1		Grease gun
3	Y-axis shaft	1		Manual lubrication
4	Linear guide in X direction	4		Manual lubrication

3.1.3 Z-axis

Lubrication locations of Z-axis



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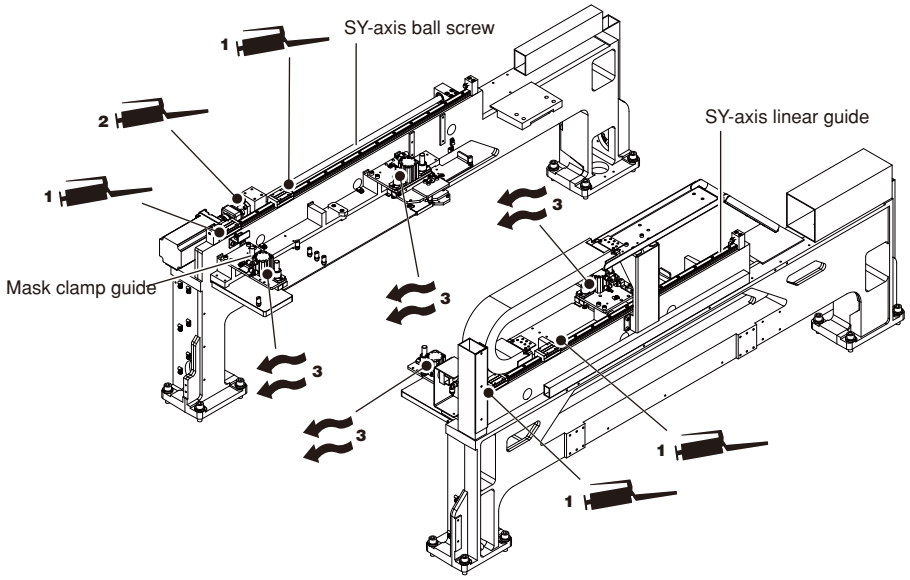
	Lubrication point	Lubrication location	Interval	Lubrication method
	Y-axis ball screw	4	Monthly	Manual lubrication

3.2 Printing head

3.2.1 SY-axis

Lubrication locations of SY-axis



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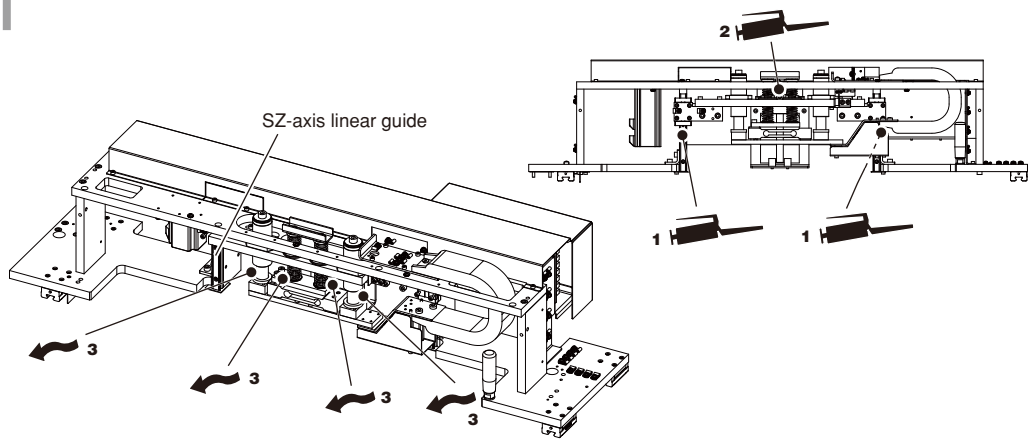
	Lubrication point	Lubrication location	Interval	Lubrication method
1	SY-axis linear guide	4	Monthly	Grease gun
2	SY-axis ball screw	1		Grease gun
3	Mask clamp guide	8		Manual lubrication

3.2.2 SZ-axis

Lubrication locations of SZ-axis



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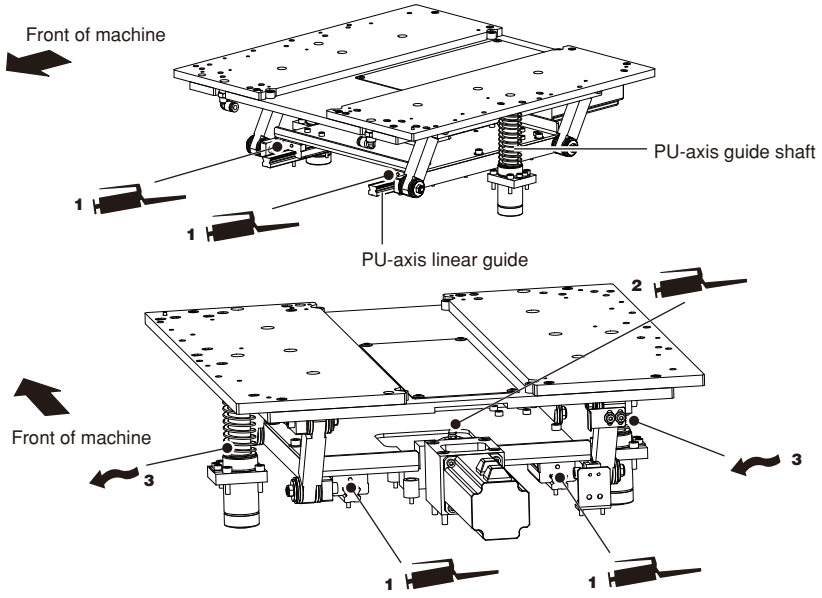
	Lubrication point	Lubrication location	Interval	Lubrication method
1	SZ-axis linear guide	2	Monthly	Grease gun
2	SZ-axis ball screw	1		Grease gun
3	Shaft guide, spring	4		Manual lubrication

3.3 Conveyor unit

3.3.1 PU-axis

Lubrication locations of PU-axis



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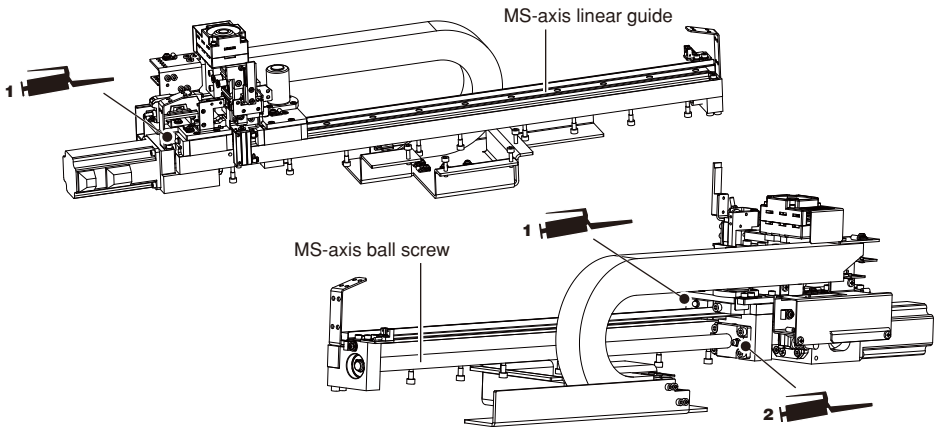
	Lubrication point	Lubrication location	Interval	Lubrication method
1	PU-axis linear guide	4	Monthly	Grease gun
2	PU-axis ball screw	1		Grease gun
3	PU-axis shaft guide	2		Manual lubrication

3.3.2 MS-axis

Lubrication locations of MS-axis



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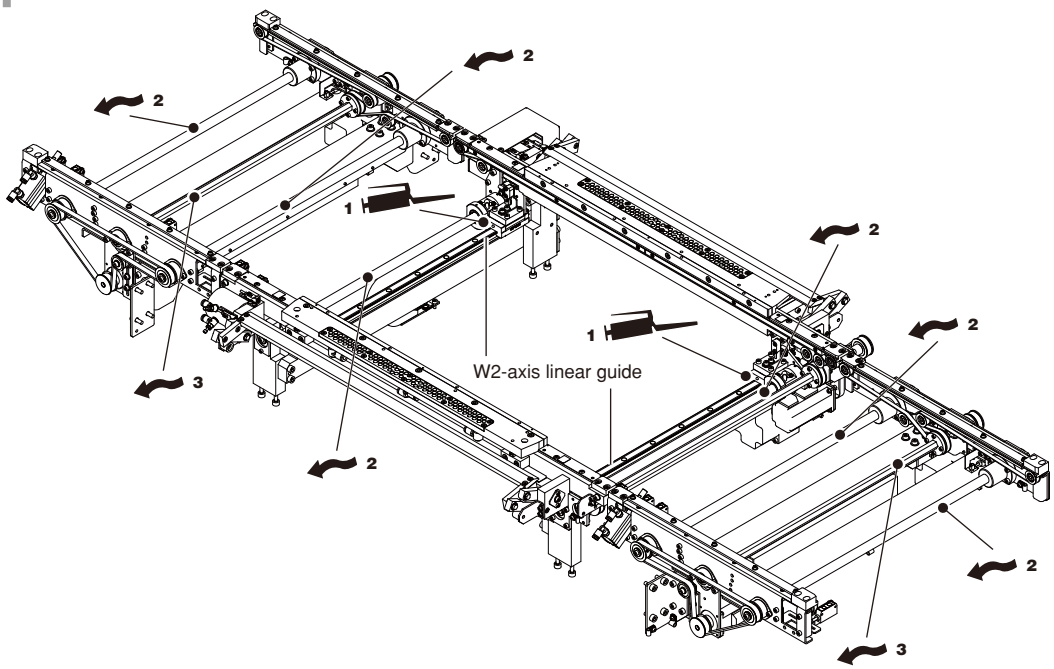
	Lubrication point	Lubrication location	Interval	Lubrication method
1	MS-axis linear guide	2	Monthly	Grease gun
2	MS-axis ball screw	1		Grease gun

3.3.3 W-axis (Conveyor auto width adjustment)

Lubrication locations of W-axis



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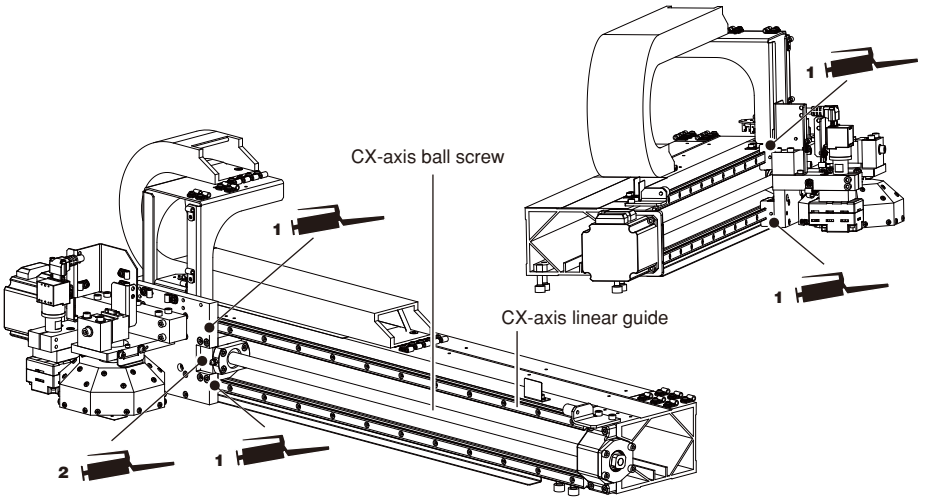
	Lubrication point	Lubrication location	Interval	Lubrication method
1	W2-axis linear guide	2	Monthly	Grease gun
2	Each W-axis ball screw	6		Manual lubrication
3	W1- and W3-axis hexagon spline	2		Manual lubrication

3.4 Vision camera unit

3.4.1 CX-axis

Lubrication locations of CX-axis



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	Lubrication point	Lubrication location	Interval	Lubrication method
1	CX-axis linear guide	4	Monthly	Grease gun
2	CX-axis ball screw	1		Grease gun

4. Conveyor unit adjustment

4.1 Adjusting the conveyor belt tension

The conveyor moves by belt drive to load boards ready for printing and to unload the finished boards. If the conveyor belts are too loose, they may slip on the pulleys causing unstable board transfer. If the belts are too tight, they may break or wear excessively. The tension of each belt on the fixed and movable rails should be adjusted evenly. If necessary, adjust the tension as follows:

Step 1 ***Press the emergency stop button.***

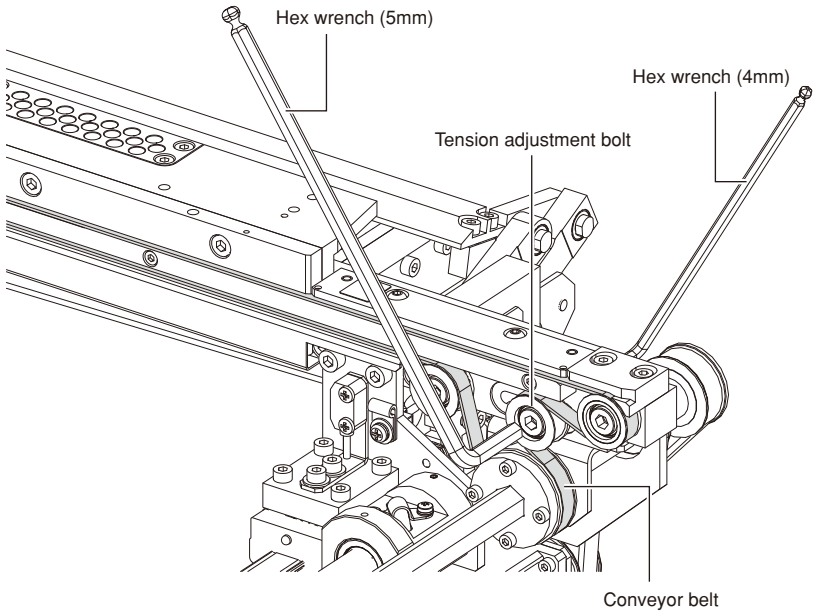
Step 2 ***Loosen the tension adjusting bolt.***

The tension adjusting bolt is located on the right side of the conveyor and linked to the idler on the belt side. Loosen the bolt (but do not remove it) using hex wrenches (4mm and 5mm).

Step 3 ***Adjust the belt tension.***

Slide the tension adjusting bolt towards the outer or inner side of the machine to adjust the tension.

Adjusting the conveyor belt tension



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Step 4 ***Retighten the tension adjustment bolt.***

Check the tension by hand, then run the conveyor belt and check that the motor pulley does not slip.