



Samsung SMT In-Line System

Loader

LD-100E

Operations Manual



Warning

To use the equipment (Loader) safely, read the manual to see necessarily and use before the utility of the equipment
The person whom it wasn't educated about this equipment,
Do not operate this equipment.

Samsung SMT In-Line System

Loader

LD-100E

Operations Manual

First Edition: July, 2002

Samsung Techwin Co., Ltd.

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For the questions, error or improvement on the this manual and equipment, contact to the followings

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Warning

The equipment mentioned in this manual is designed for the prevention of the damage to the equipment operator along with the workers. The workers means the personnel working for the S/W programming, installation and maintenance or repair of the accessory device such as the basic system hardware or the accessories.

The transportation of equipment shall be preformed at the case when the endurable packing material and the prevention cover against the electricity are available. Improper preparation of safety device may cause the damage to the personnel.

Famecs Corporation will not have any responsibility for the improper operation of equipment at the improper place. In addition, Famecs Corporation will not have any responsibility for the operation of equipment neglecting the standard safety rule or cautions.

This equipment conforms to the standard for the prevention of radio interference in the commercial and industrial area. So, if this equipment is used in the residential area, it may cause the interference to the radio or television. This equipment shall be used correctly according to the requirements in this manual.

INTRODUCTION

Thank you very much for your procurement of LOADER (hereinafter called “equipment”) of Famecs Corporation.

It is the equipment which LOADER uses Magazine Rack and supply with PCB to the following process equipment automatically.

Because there are a starting part and a device run by an air pressure and a power part to this equipment, if user uses improper, it can get a serious injury.

Here, a user includes all which installation, maintenance or repair basic hardware and software.



Before Using Equipment

- ◆ Be sure to read this manual before application of this equipment to get familiar with the contents of it. This manual shall be kept nearby after reading so that it may be available anytime if questionable.
- ◆ The person whom it wasn't educated about this equipment, do not operate this equipment.
- ◆ In order to safe an operation of equipment and maintenance, it is important that a user is well informed about the part that can interfere with safety. As for the item related to this, reference wishes for a safety item.
- ◆ Repair and maintenance work not specified in this manual is done by the service man of our company. User shall not do this kind of work at his discretion. Otherwise, unexpected accident may occur.
- ◆ Repair equipment with the method that wasn't approved, or remodeled is never regrettable.

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For Safety


For correct and safe operation of this equipment, the rules and instructions specified in this manual shall be followed.

The fundamental items to be followed commonly for the operation of this equipment are as follows.

- ◆ Repair and maintenance work not specified in this manual is done by the service man of our company. User shall not do this kind of work at his discretion. Otherwise, the unexpected accident may occur.
- ◆ Do not put any part of body (hand, head etc) into the range of operation par. It may cause the harmful hurt.
- ◆ For minimization of damage from the unexpected accident, be sure to put the hand on EMG button (emergency stop button) in order to stop the machine at any time.
- ◆ Do not operate the combustible gas or at the seriously polluted area.

In this manual, the items carefully kept for the safety are recommended as follows.

<p>•</p>  <p>Warning</p>	<p>The warning by this symbol describes that the accident may occur the worker may be hurt unless the described items are followed. Be sure to follow the items described herein.</p>
--	---

 <p>Caution</p>	<p>If the contents described according to this mark are not followed, equipment or the integrated program or data may be damaged or worker may be hurt. Be sure to follow the contents described</p>
---	--

Safety Precaution

It is stick to the situation that labels of following each paragraph are designated to this equipment.

For the safe use of equipment, please observe a demonstrative section of each label.

If a label drops or was damaged, please refer to pertinent figure in this manual, and stick with a new label.

An inquiry item about an order of label or an improvement and a suggestion item are referring to C/S center or sales department of our company.

The equipment front

It is stick to the front of equipment the following label.

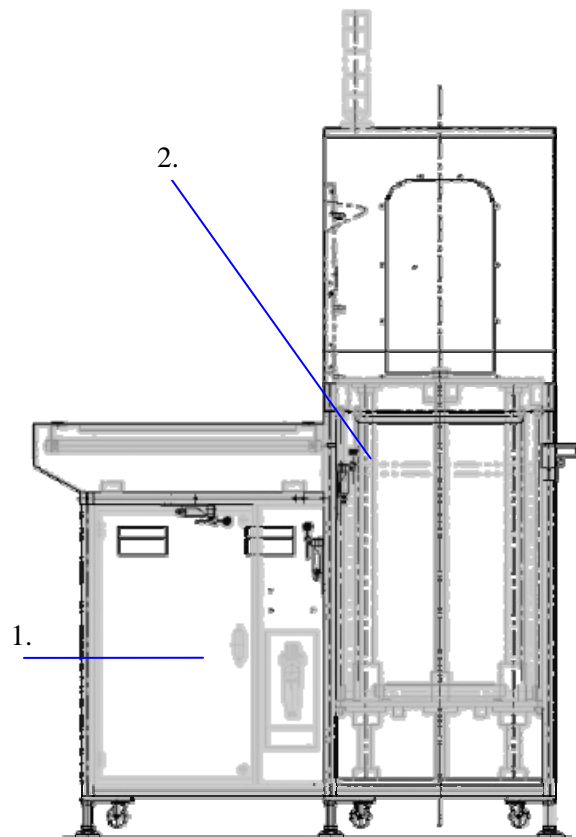
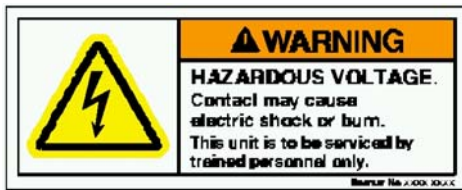


Figure 0-1 The safety label that is stick to the equipment front



High voltage is spreading over the cover inside or a connector part. Please pay attention in a shock.

For maintenance, block off a main electric power source, and please certainly install a lock device.



Do not put hands during drive.

Because a mobile object is included a place stick to this label, if it picks up a physical part to the equipment inside and puts whether it disassembles during starting or opens cover, it is very dangerous.

Stop the equipment before service.

So that complement maintenance and an error take action, at first let equipment stop.

The equipment backside

It is stick to the backside of equipment the following label.

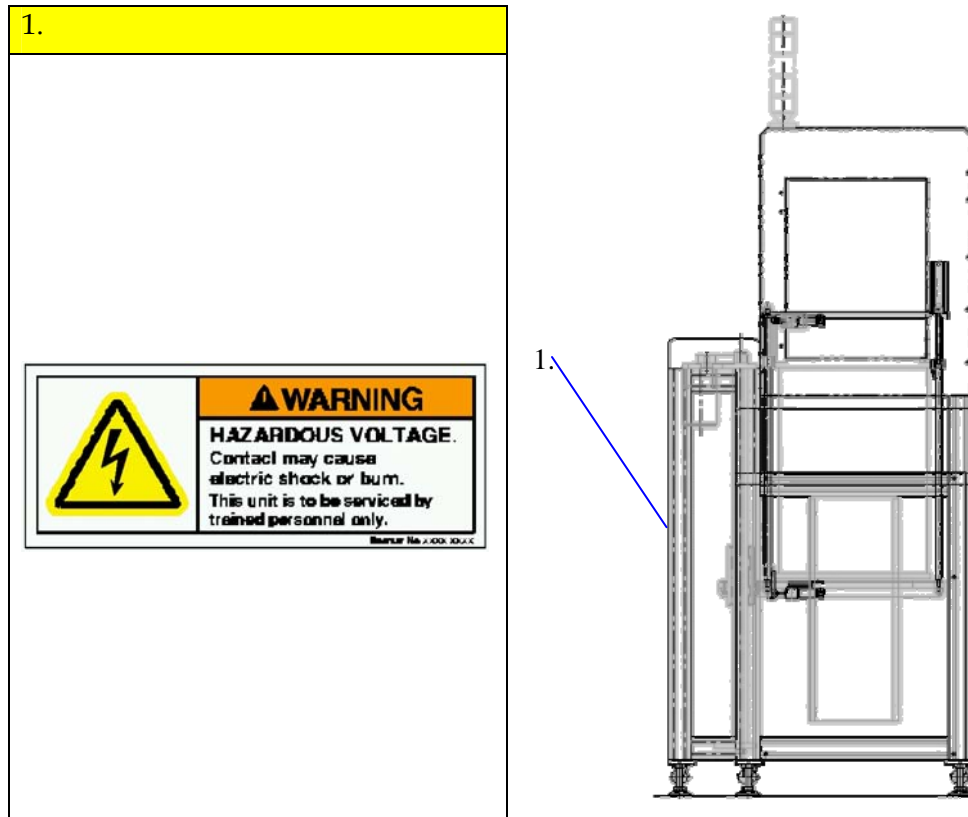
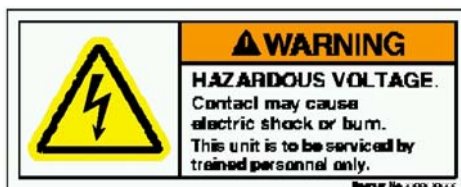


Figure 0-2 The safety label that is stick to the equipment backside



High voltage is spreading over the cover inside or a connector part. Please pay attention in a shock.

For maintenance, block off a main electric power source, and please certainly install a lock device.

For Warranty

The warranty, if any trouble is found in this equipment, is performed as follow.

Warranty contents	The defect or any trouble on material or workmanship for the part consisting of this equipment has any defect is repaired free of charge.
Warranty period	The warranty period is expired for the following cases: <ul style="list-style-type: none">• 18 months after delivery• one year after installation• 2400 hours operation passed
Warranty excluding items	<p>The warranty is excluded for the following cases:</p> <ul style="list-style-type: none">• The problem due to the natural wear out or the change during the application as per the time elapsed or the change (discoloring of paints and coating and aging of consumable part paint)• The delicate sensible phenomena not affecting the quality and function (the generator sound, motor rotating sound)• The trouble due to the environment condition (moisture, impurities, dust on machine, oil-mist etc) <p>The troubles due to the following cases are also excluded from the warranty:</p> <ul style="list-style-type: none">• Force major such as Earthquake, typhoon, flood, lightning, accident or fire.• The modification not be agreed by our company or our agent.• Application non-designated parts or lubrication oil.• Insufficient or wrong check and repair.• Adjustment by the others rather than designated agent.

However, the contents agreed during the contract of equipment overrides the above.

For Manual

- ◆ Related manual

The followings are those related to this manual.

This equipment manual (Operations Manual)

Loader Operations Manual

- ◆ Font used in this manual

The rules for the font used in this manual

The contents written in Italic letter marked in double question mark (“ ”) are the title or the section of the manual included in the references.

Refer to “*Loader Operations Manual*”.

Refer to “*Section 1.1 Abstract (1-1page)*”.

- ◆ Symbols used in this manual


The meanings of symbol used in this manual are as follows:

 Note

Marked for the part describing contents related to the explanation.

 Memo

Marked for the definitions of useful information or terms related to the description.

<ul style="list-style-type: none">•  Warning	The warning by this symbol describes that the accident may occur the worker may be hurt unless the described items are followed. Be sure to follow the items described herein.
--	--


 Caution	If the contents described according to this mark are not followed equipment or the integrated program or data may be damaged or worker may be hurt. Be sure to follow the contents described
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Table of Contents

Main Contents

INTRODUCTION.....	i
For Safety	ii
Safety Precaution.....	iii
For Warranty	vi
For Manual.....	vii
Table of Contents	viii
Main Contents	viii
List of Figures.....	ix
List of Tables.....	ix
Chapter 1. Overview	1-1
1.1. Summary.....	1-1
1.1.1. External view.....	1-1
1.1.2. Structure.....	1-2
1.2. Specification	1-3
Chapter 2. Operations of Equipment.....	2-1
2.1. Moving and Installing	2-1
2.1.1. Moving.....	2-1
2.1.2. Installing	2-1
Signal Relay	2-3
2.2. Precautions	2-3
Operations of the Machine	2-4
2.2.1. Preparations.....	2-4
2.2.2. Manipulation of the Loader.....	2-4
2.2.3. Operation panel and functions (GP).....	2-5
2.2.4. Manual operation	2-5
2.2.5. Automatic operation	2-6
2.3. Tower Lamp Functions	2-7
2.3.1. Operation functions	2-7
2.3.2. Solutions for red indication lamp	2-7
Chapter 3. Maintenance	3-1
3.1. Adjustment and Inspection.....	3-1
3.1.1. Adjustment of the PCB pushing point	3-1
3.1.2. Adjustment of the lift conveyor stopping position	3-2
3.1.3. Belt replacement	3-3
3.2. Troubleshooting	3-5
Chapter 4. Drawings	4-1

List of Figures

Figure 0-1 The safety label that is stick to the equipment front.....	iii
Figure 0-2 The safety label that is stick to the equipment backside.....	v
Figure 1-1. External view of the Loader(LD-100E).....	1-1
Figure 1-2. Structure of the loader(LD-100E).....	1-2
Figure 2-1. Installation of the Loader1/2	2-1
Figure 2-2. Installation of the Loader 2/2	2-2
Figure 2-3. Signal relay	2-3
Figure 2-4. Preparation items for operation of the Loader	2-4
Figure 2-5. Operation panel and functions.....	2-5
Figure 2-6. Tower lamp	2-7
Figure 3-1. Check for the PCB and PCB cylinder	3-1
Figure 3-2. Adjustment for counter bar.....	3-1
Figure 3-3 Adjustment for the pushing cylinder.....	3-2
Figure 3-4. Adjustment of the magazine ejection position.....	3-2
Figure 3-5. Adjustment of the magazine insertion position	3-3
Figure 3-6. Items related to belt replacement	3-3

List of Tables

Table 1-1 Specification of loader	1-3
Table 2-1. Operation sequence of the loader	2-4
Table 2-2. Solutions for red indication lamp	2-7
Table 3-1. Loader troubleshooting.....	3-5

Chapter 1. Overview

1.1. Summary

This machine is a device that automatically supplies PCBs to the next process by utilizing the magazine rack. It does not take up space because of its compact design. Upper and lower clamps are installed, so the accuracy and stability of the magazine position have been improved. Also, In-Line operation is possible by connecting it to other devices, such as the Inserter (insertion machine), Screen Printer, Component Placer (Chip Mounter), A.P.T., and others.

1.1.1. External view

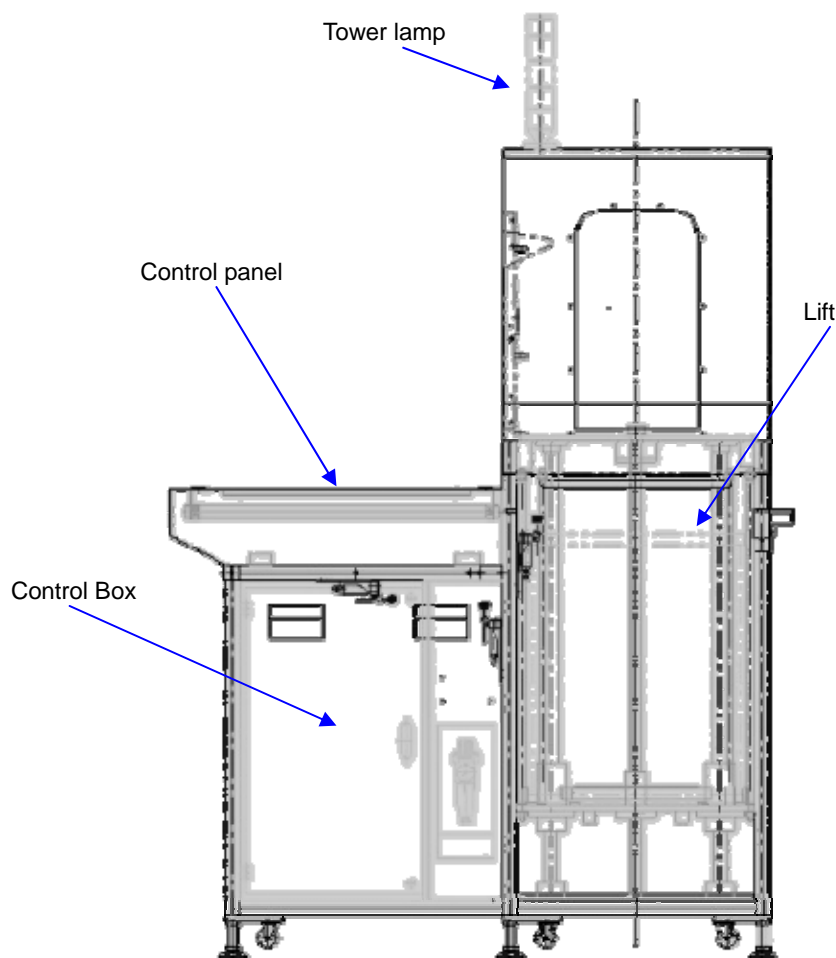


Figure 1-1. External view of the Loader(LD-100E)

1.1.2. Structure

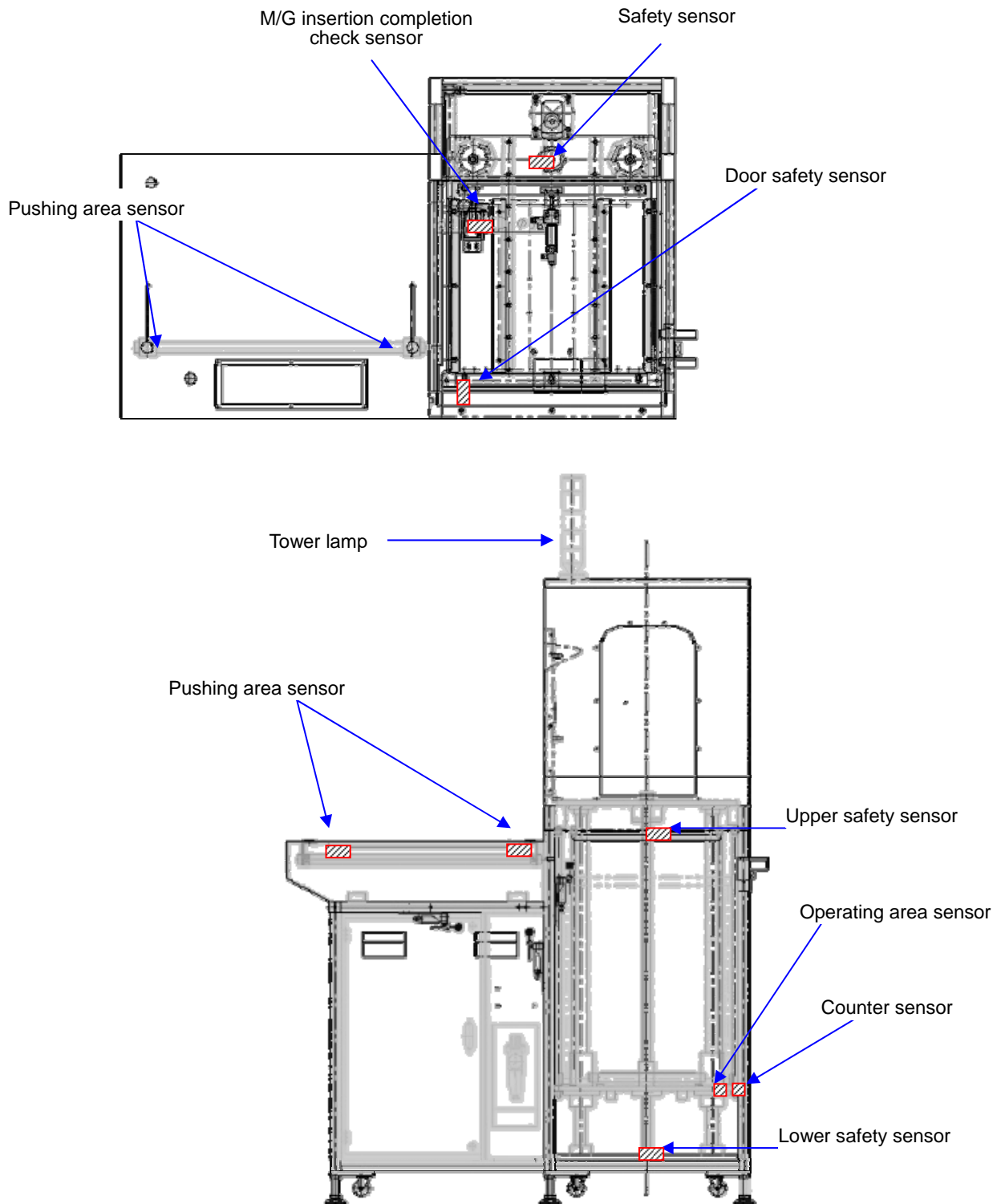


Figure 1-2. Structure of the loader(LD-100E)

1.2. Specification

Table 1-1 Specification of loader

▶ S-Series: LD-100E

No	Classification	Specifications
1	Magazine Rack Dimension	(W)318 × (L)355 × (H)570 mm
2	Board Transfer Dimension	Min: 50 × 50mm Max: 250 × 330mm 0.5t ~ 2.0t
3	Board Transfer Direction	Left → Right, Right → Left (Standard is front, rear is available on demand)
4	Board Transfer Height	950±50mm (option: 750±10mm)
5	Board Transfer Pitch	TYPE : 10, 20, 30, 40 mm/Pitch
6	Board Feed Time	About 4.0 sec
7	Incoming Power	230V, 50Hz
8	Use Air Pressure	5 ~ 7kgf / cm ²
9	External Dimension	(W)858×(L)1031×(H)1760 (LD-100E)
10	Weight	About 110 kg (LD-100E)
11	Magazine changing time	Under 35 sec
12	Control Mode	Control by PLC
13	PCB storing capacity	50 PCB / Magazine (based on 10mm Pitch) (Another Pitch or storing capacity is on demand)

▶ L-Series: LD-100LE

No	Classification	Specifications
1	Magazine Rack Dimension	(W)400 × (L)460 × (H)570 mm
2	Board Transfer Dimension	Min: 70 × 70mm Max: 330 × 430mm 0.5t ~ 2.0t
3	Board Transfer Direction	Left → Right, Right → Left (Standard is front, rear is available on demand)
4	Board Transfer Height	950±50mm (option: 750±10mm)
5	Board Transfer Pitch	TYPE : 10, 20, 30, 40 mm/Pitch
6	Board Feed Time	About 4.0 sec
7	Incoming Power	230V, 50Hz
8	Use Air Pressure	5 ~ 7kgf / cm ²
9	External Dimension	(W)995×(L)1230×(H)1760 (LD-100LE)
10	Weight	About 130 kg (LD-100LE)
11	Magazine changing time	Under 35 sec

12	Control Mode	Control by PLC
13	PCB storing capacity	50 PCB / Magazine (based on 10mm Pitch) (Another Pitch or storing capacity is on demand)

▶ *LL-Series: LD-100LLE*

No	Classification	Specifications
1	Magazine Rack Dimension	(W)530 × (L)535 × (H)570 mm
2	Board Transfer Dimension	Min: 70 × 70mm Max: 460 × 510mm 0.5t ~ 2.0t
3	Board Transfer Direction	Left → Right, Right → Left (Standard is front, rear is available on demand)
4	Board Transfer Height	950±50mm (option: 750±10mm)
5	Board Transfer Pitch	TYPE : 10, 20, 30, 40 mm/Pitch
6	Board Feed Time	About 4.0 sec
7	Incoming Power	230V, 50Hz
8	Use Air Pressure	5 ~ 7kgf / cm ²
9	External Dimension	(W)1070×(L)1315×(H)1855(LD-100XLE)
10	Weight	About 210 kg (LD-100XLE)
11	Magazine changing time	Under 35 sec
12	Control Mode	Control by PLC
13	PCB storing capacity	50 PCB / Magazine (based on 10mm Pitch) (Another Pitch or storing capacity is on demand)

▶ *Combination Series: LD-300SLE*

No	Classification	Specifications
1	Magazine Rack Dimension	(W)318×(L)355×(H)570 mm (S-Type) (W)400×(L)460×(H)570 mm (L-Type)
2	Board Transfer Dimension	Min: 50 × 50mm Max: 330 × 430mm 0.5t ~ 2.0t
3	Board Transfer Direction	Left → Right, Right → Left (Standard is front, rear is available on demand)
4	Board Transfer Height	950±50mm (option: 750±10mm)
5	Board Transfer Pitch	TYPE : 10, 20, 30, 40 mm/Pitch

6	Board Feed Time	About 4.0 sec
7	Incoming Power	230V, 50Hz
8	Use Air Pressure	5 ~ 7kgf / cm ²
9	External Dimension	(W)905×(L)2240×(H)1720 (LD-300SLE)
10	Weight	About 280 kg (LD-300SLE)
11	Magazine changing time	Under 35 sec
12	Control Mode	Control by PLC
13	PCB storing capacity	50 PCB / Magazine (based on 10mm Pitch) (Another Pitch or storing capacity is on demand)

▶ *Combination Series: LD-300XLSE*

No	Classification	Specifications
1	Magazine Rack Dimension	(W)318×(L)355×(H)570 mm (S-Type) (W)530×(L)535×(H)570 mm (XL-Type)
2	Board Transfer Dimension	Min: 50 × 50mm Max: 460 × 510mm 0.5t ~ 2.0t
3	Board Transfer Direction	Left → Right, Right → Left (Standard is front, rear is available on demand)
4	Board Transfer Height	950±50mm (option: 750±10mm)
5	Board Transfer Pitch	TYPE : 10, 20, 30, 40 mm/Pitch
6	Board Feed Time	About 4.0 sec
7	Incoming Power	230V, 50Hz
8	Use Air Pressure	5 ~ 7kgf / cm ²
9	External Dimension	(W)1042×(L)2565×(H)1720(LD-300XLSE)
10	Weight	About 300 kg (LD-300XLSE)
11	Magazine changing time	Under 35 sec
12	Control Mode	Control by PLC
13	PCB storing capacity	50 PCB / Magazine (based on 10mm Pitch) (Another Pitch or storing capacity is on demand)

Chapter 2. Operations of Equipment

2.1. Moving and Installing

2.1.1. Moving

- ◆ For convenience of move, this machine has four rubber wheels (casters).
- ◆ When moving this machine, make sure that it does not receive excessive vibration or shock.
- ◆ Pay extra attention to the lift part of the machine, which is heavy and important.
- ◆ To prevent dislocation, anti-shock rubbers are attached on the Up-Down Screw.

2.1.2. Installing

- ◆ Before installation, make sure that there is no irregularity in the control box.
- ◆ Set the Pitch to '1', secure the magazine with clamps by pressing the manual button, and press the <Up> button to bring it up.
- ◆ Insert a PCB in the first groove of the magazine rack and level it with the conveyor rail of the rear machine by adjusting the height of the Foot Screw.
- ◆ Bring the magazine lift down by pressing the <DOWN> button, place the PCB on the last groove of the magazine rack and check if it is level with the conveyer rail of the rear machine.

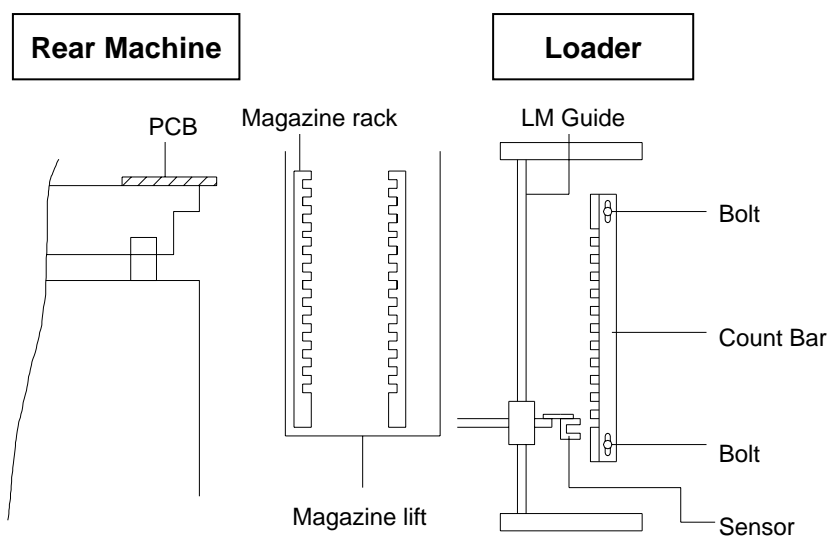
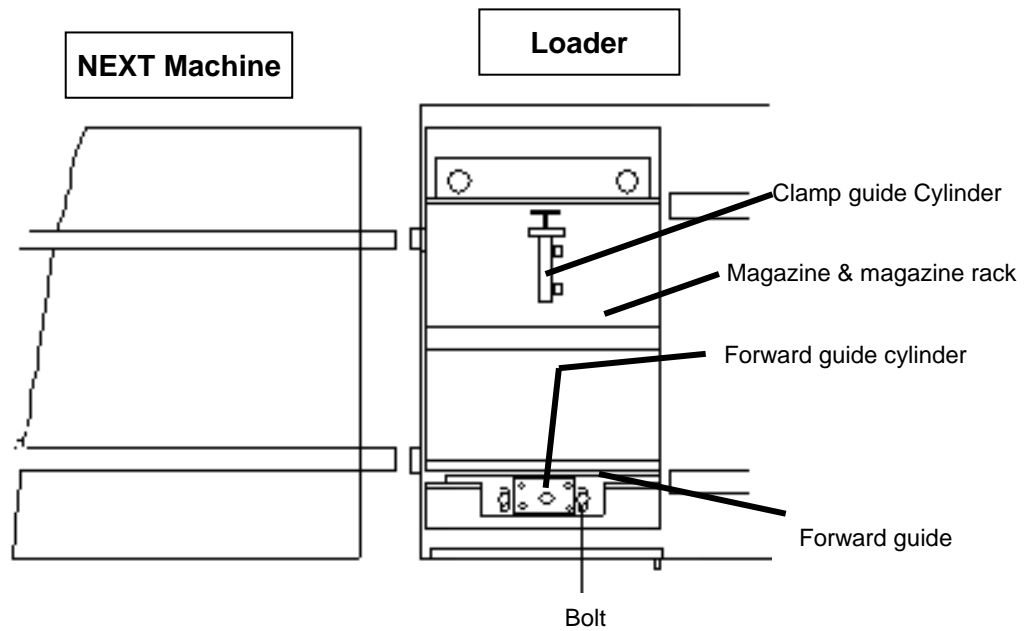


Figure 2-1. Installation of the Loader1/2

- ◆ Bring up the magazine lift while the magazine clamp cylinder is on and move the machine so that the conveyor rail of the rear machine is level with the groove of the

magazine rack. Bring down the magazine lift again and check if the conveyor rail of the rear machine is level with the groove of the magazine rack.

- ◆ To control the up and down position of the front guide, use the handle on the upper part of the lift.



◆
Figure 2-2. Installation of the Loader 2/2

Signal Relay

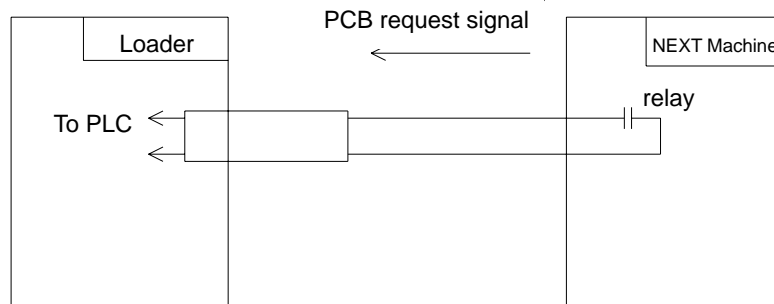



Figure 2-3. Signal relay

- ◆ To feed the PCB, this machine receives a PCB request signal from the front machine and starts operation.
- ◆ The operation continues until the request signal from the front machine is off.
- ◆ Other interface specifications are available on a pre agreement basis.

2.2. Precautions

 Caution	<ul style="list-style-type: none"> ◆ Be sure to ground the machine. ◆ Be sure to stop the machine before any checks. ◆ Do not attempt any unnecessary adjustments. ◆ Do not lean on the machine. ◆ When the exact cause of a problem is not found, stop the machine and contact us.
---	--

Operations of the Machine

2.2.1. Preparations

No.	Name	Functions
1	Power Source	Power source for the Loader
2	Signal In	PCB request signal from the pre-processing machine.
3	Air Regulator	Air control for the Loader
4	Operation Panel	Operation buttons

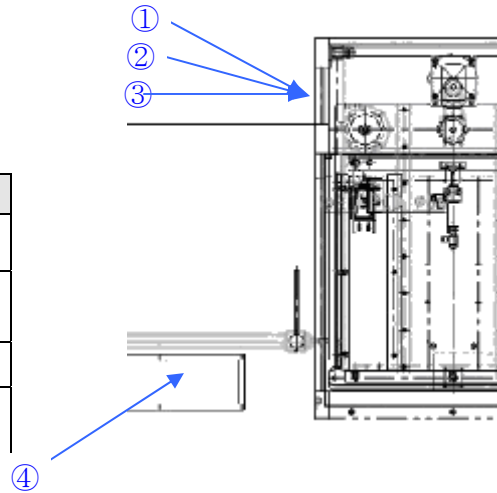


Figure 2-4. Preparation items for operation of the Loader

- ◆ Connect the power cable to appropriate power supply.
- ◆ Supply clean air from the air filter (remove dust, oil, and water).
- ◆ Set the air pressure of mainframe to 5~7kg/cm².
- ◆ Set the ELB of control area to on and turn on the Power Switch of the operation panel.

2.2.2. Manipulation of the Loader

The Loader operates in 3 distinct steps; loading, working, and unloading.

Table 2-1. Operation sequence of the loader

Name	Description
Loading area	From the position where the magazine is supplied to the lift to the first receiving position.
Working area	From the first receiving position to the last receiving position
Unloading area	From the last receiving position to the ejection position (Upper conveyor)

2.2.3. Operation panel and functions (GP)

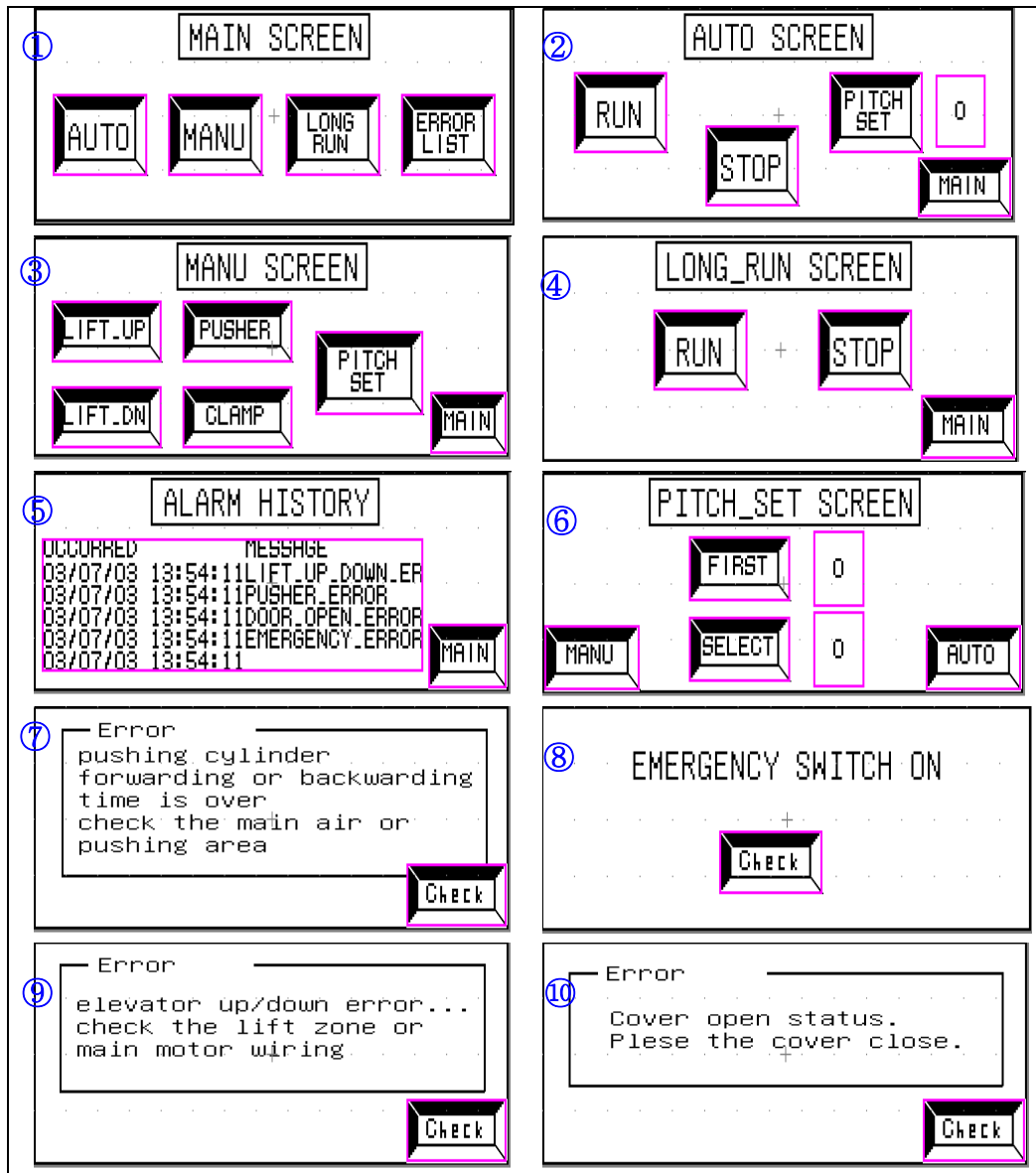


Figure 2-5. Operation panel and functions

2.2.4. Manual operation

- ① Turn the selection S/W to MAN MODE.
- ② The machine operates according to the on or off status of the manual switches.
- ③ Press the desired button.

2.2.5. Automatic operation

- ① Turn the selection S/W to AUTO MODE.
- ② Check the pitch used by the magazine and set the pitch by using pitch select.

Pitch	①: 10mm	②: 20mm	③: 30mm	④: 40mm
--------------	---------	---------	---------	---------
- ③ Supply the magazine loaded with PCBs to the lower part and start operation by pressing the start button.
- ④ When the magazine is supplied, whether the magazine is loaded or not is checked at the lift. If it is loaded, then it waits at the conveyor. If it is not loaded, the lift conveyor is turned on and it is loaded on the lift. Only after the magazine is loaded in the lift and confirmed, the top and bottom of the magazine are clamped and it goes up.
- ⑤ When the lift is up and the initial PCB pick up position is set, then it waits for the PCB request signal from the front machine.
- ⑥ When the PCB request signal is relayed to the loader, the PCB feed cylinder supplies the PCB.
- ⑦ When the PCB is fed, it is lifted by the set pitch (ex. 1 pitch – 1 notch) and waits for the next feed signal.
- ⑧ When the last pushing is done, the lift goes up and stops at the magazine ejection area.
- ⑨ When the ejection of the magazine from the lift is confirmed, the lift goes down to the magazine insertion location and continues the next operation.
- ⑩ When the emergency stop button (Emergency Switch) is pressed at any time during operation, all functions at the point stop. When the start S/W is on, operation continues.
- ⑪ If the magazine is deviated from the magazine confirmation signal, after checking the magazine during 0.5 seconds, the magazine is lowered to the initial position.
- ⑫ Even though it is restarted because of power break, operation continues.

2.3. Tower Lamp Functions

2.3.1. Operation functions



No	Name	Color	Description
1	Abnormal indication Lamp	Red	When an error is occurred, flashes with one-second interval. Lights when the emergency stop button is pressed.
2	Magazine Supply Lamp	Blue	Flashes with one-second interval when the magazine is not supplied.
3	Operation Lamp	Green	Lights when automatic operation, off when manual operation.

Figure 2-6. Tower lamp

2.3.2. Solutions for red indication lamp

Table 2-2. Solutions for red indication lamp

No	Problem	Solution
1	Used magazines are fully loaded on the lower ejection conveyor, so magazines are not ejected.	Remove the magazines loaded on the lower conveyor and reset by pressing the emergency stop switch. Return the emergency stop switch, turn the start switch to on, then the magazines are ejected and automatic operation continues.
2	During the magazine's insertion to or ejection from the lift, it is stuck.	Take care of the problem and reset by pressing the emergency stop switch. Return the emergency stop switch, and turn on the start switch to continue the operation.
3	While the PCB supply Cylinder is in operation, the PCB gets stuck and doesn't move forward (when a jam occurs, the cylinder is returned)	Take care of the problem (remove the PCB etc.) and reset by pressing the emergency stop switch. Return the emergency switch and continue the operation by turning on the start button.

Refer to "3.2 Troubleshooting (page 3-5)" for more information.

Chapter 3. Maintenance

3.1. Adjustment and Inspection

3.1.1. Adjustment of the PCB pushing point

- ① First check for level status, and then check if the PCB is placed at the $\frac{2}{3}$ point of the cylinder bar that feeds the PCB.

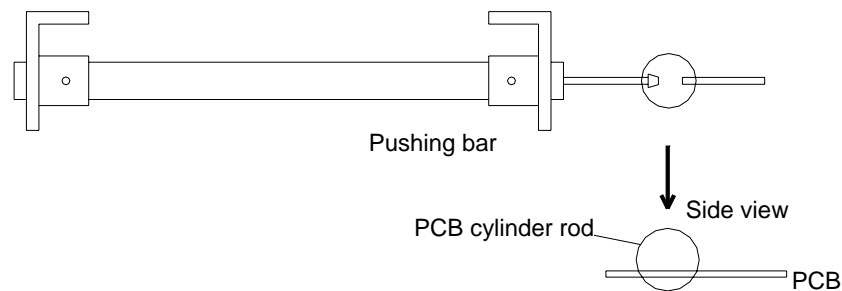


Figure 3-1. Check for the PCB and PCB cylinder

- ② If the heights of the PCB and the PCB bar are not identical, unscrew the bolts on the counter bar on the rear right, adjust the position, screw the bolts, and check the position by moving it up and down.
- ③ When adjusting the Counter bar, be sure to adjust so that it does not get skewed to the right or left. And be sure not to break the sensor during the up and down movements.

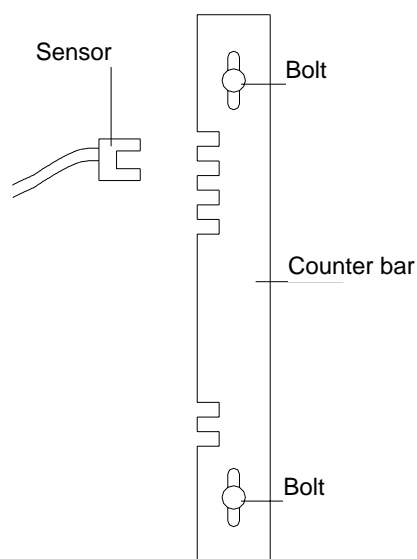


Figure 3-2. Adjustment for counter bar

-
- ④ After the adjustment, adjust the height of the machine referring to "2.1 Moving and Installing (page 2-1)".
 - ⑤ After the adjustment, be sure to screw the lock nut of the foot screw.
 - ⑥ Adjust the pushing cylinder so that the center of the PCB can be pushed. Also adjust the scales of the front and back accurately so that the pushing bar proceeds in parallel.

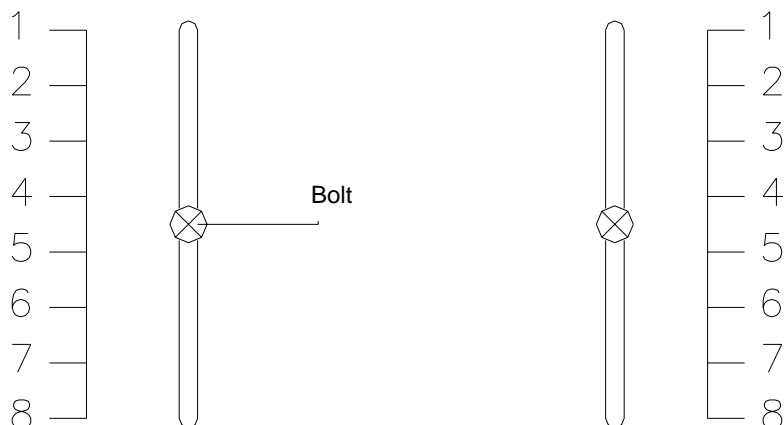


Figure 3-3 Adjustment for the pushing cylinder

3.1.2. Adjustment of the lift conveyor stopping position

- ① Adjustment of the magazine ejection position: Make the lift conveyor and the upper rail conveyor parallel to each other by controlling the upper limit S/W of the magazine lift up and down.

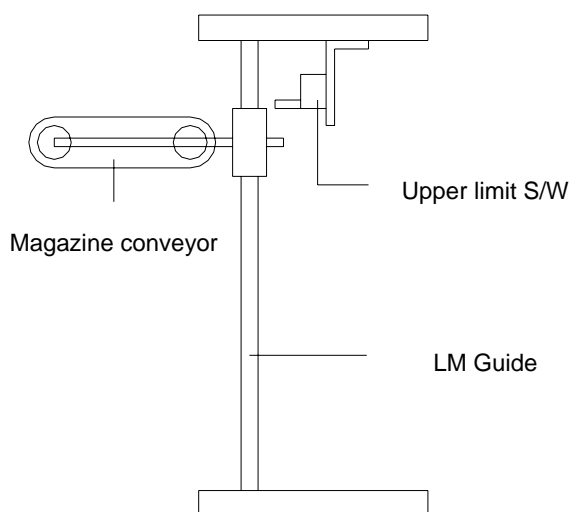


Figure 3-4. Adjustment of the magazine ejection position

- ② Adjustment of the magazine insertion position: Make the lift conveyor and the lower rail conveyor parallel to each other by controlling the lower limit S/W of the magazine lift up and down.

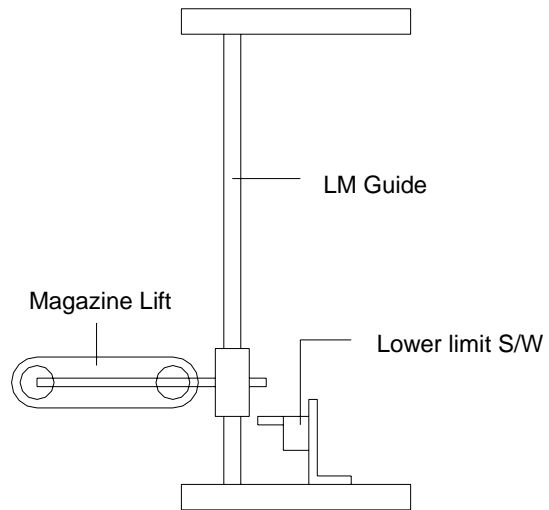


Figure 3-5. Adjustment of the magazine insertion position

3.1.3. Belt replacement

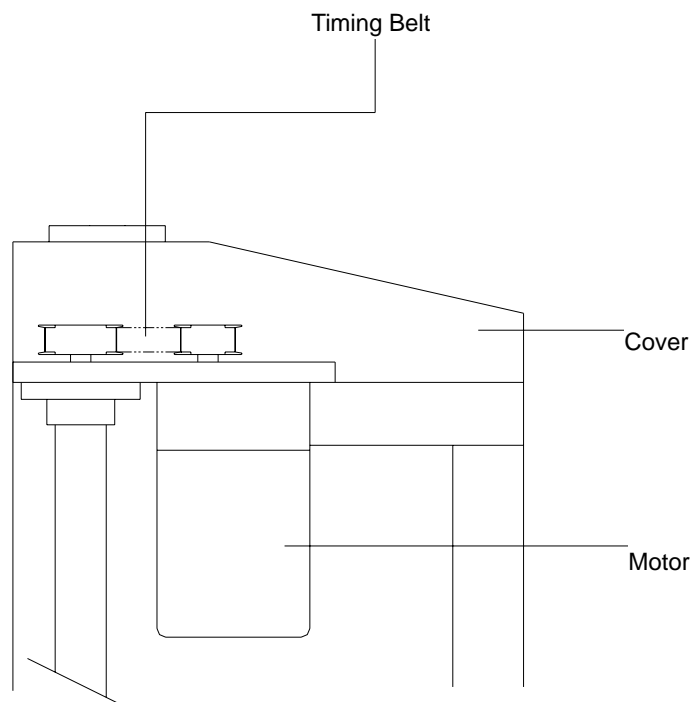


Figure 3-6. Items related to belt replacement

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- ① Remove the Tower Lamp and remove the cover.
 - ② Unscrew the motor lock bolt slightly to the extent that the motor can be moved back and forth, make the belt loose by moving the motor to the ball screw direction and replace it.
 - ③ After replacing the belt, move the motor to the point where the belt can maintain appropriate tension and screw the lock bolt.
 - ④ Operate the motor, check the belt, and put back the cover and the tower lamp.

3.2. Troubleshooting

Table 3-1. Loader troubleshooting

No	Problem	Reason	Solutions
1	The Up/Down operation of the magazine lift is not working.	Pushing cylinder sensor (front and rear) contact position error	① Readjust the contact position by moving the cylinder forward and backward to check the sensor condition. ② Adjust the speed of cylinder. ③ If it does not work, replace the sensor
		Magazine lift safety sensor operation error	① If there exists any obstacle in the safety sensor, remove it. ② Readjust the sensor position ③ If it does not work, replace the sensor
		Button contact inferiority (when manual drive)	① Replace the button switch
		Clamp cylinder operation inferiority	① Check the air supply condition ② Check the air cylinder.
2	The pushing cylinder is not working.	Pushing cylinder sensor (front and rear) contact position error	① Readjust the contact position by moving the cylinder forward and backward to check the sensor condition. ② Adjust the speed of cylinder. ③ If it does not work, replace the sensor.
		Solenoid valve inferiority	① Replace the solenoid valve.
		PLC power error	① Check the PLC power.
		During manual drive, the clamp should be set ON position.	① Check to see if the clamp cylinder is set ON position.
3	Magazine is not loaded onto the magazine lift.	Magazine is locked in the entrance position.	① Check to see if the lower conveyor and lift conveyor are horizontal and parallel. ② Check the magazine guide of the lift.

No	Problem	Reason	Solutions
4	Magazine is not discharged from the magazine lift.	Magazine is locked in the magazine discharging position.	① Check to see if the upper conveyor and lift conveyor are horizontal and parallel. ② Check the magazine guide of the lift.
		If the lift is full with the discharged magazine.	① Remove the discharged empty magazine.
		Magazine discharge sensor operation error.	① Readjust the sensor position. ② If it does not work, replace the sensor.
5	Not working as the set pitch	Count sensor error.	① Check and replace the sensor. ② Check and adjust the count bar.
6	The magazine clamp is not working.	Solenoid valve error	① Check and replace the solenoid valve.
		Poor condition of air supply.	① Check to see if the supply is 5kg/cm ² .
		PLC power error.	① Check the PLC power.
7	The pushing cylinder is working in manual mode, however, not working in automatic mode.	Signal system error	① Check the signal system.
8	Main motor (lift motor) is revolving; however, the magazine lift cannot work with Up/Down operation.	The locking bolts are unfastened.	① Check the pulley locking bolts.
		The belt has been cut off.	① Replace the belt.