

INSTALLATION MANUAL

Automatic Dicing Saw

DAD3220

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READ CAREFULLY BEFORE USING THIS MANUAL

Introduction

This machine is a dicing saw to cut materials such as silicon wafers, glass substrates and ceramic substrates (referred collectively as "workpiece" hereafter).

The machine contains rotary sections with parts that operate at high speed; high-voltage sections with danger of causing electric shock and drive sections where the workers' physical parts and/or clothing may get caught.

Failure to handle this machine properly may lead to serious injury or death.

Read before using the machine

Before using the machine, read this manual thoroughly and follow strictly all the instructions set forth in this manual.

To assure safety during work associated to operation and maintenance of this machine, it is vital for every worker to know where the potential safety hazards lie in this machine. Although it is difficult for DISCO to foresee each and every potential safety hazard, various precautionary notes and warnings have been included in this manual and the separate Safety Manual to identify and provide preventive knowledge against all foreseeable hazards. Strict observance of all these precautions and other relevant instructions set forth in this manual and the separate Safety Manual is thus essential for increased safety assurance.

The safety features of the machine may be seriously affected, in case this machine is modified without gaining the prior consent from DISCO or repaired in a manner not stated in this manual.

Therefore, never attempt to modify or repair this machine in a manner not approved by DISCO.

Extent of responsibility



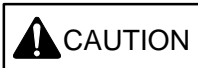
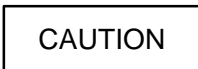
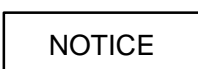
- DISCO shall not be responsible for any accident due to any of the following events.
 - When equipment of another manufacturer is added to the machine
 - When the machine or part of the machine is transported, reused, resold or modified
 - When supplied parts or parts designed by users are mounted on the machine
 - It is possible that we are not able to carry out repair or maintenance work for reasons of safety and health care of our service or repair personnel, if the machine user refuses to disclose the names and contents of processing materials being used and/or processing piping, for reasons of confidentiality or trade secret protection.
-

Hazard level

The safety precautions set forth in this document are classified into DANGER, WARNING and CAUTION categories which represent three degree of hazards latent in the machine. These categories are defined as detailed below in accordance with the seriousness and probability level of the hazard. In addition to the above three safety precaution levels, CAUTION without the safety alert symbol (⚠) and NOTICE are used to give safety usage instructions to the user.

Before using the machine, be sure to read and understand all the associated safety precautions set forth in the manual.

Hazard levels are classified as follows:

	If you cannot avoid the incident in question, <u>a critical situation in which either critical injury or death is very likely to result.</u> This symbol is used for the incident in which the injury is critical and there is high probability of occurrence.
	If you cannot avoid the incident in question, <u>a serious situation in which either critical injury or death may result.</u> This symbol is used for the incident in which the injury is serious but there is not high probability of occurrence.
	If you cannot avoid the incident in question, <u>a medium or slight injury may result.</u> This symbol is used for the incident in which the injury is slight and there is not high probability of occurrence.
	If you cannot avoid the incident in question, <u>an accident of property damage may occur.</u>
	Indicates <u>the safe way of using the machine as well as precautions to avoid accidents resulting in damage to property.</u>

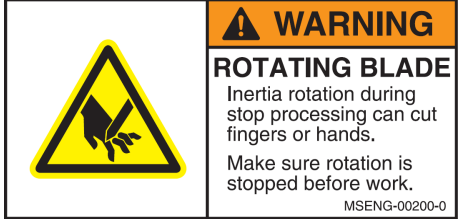

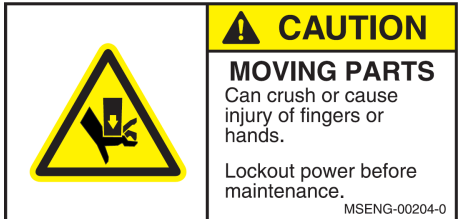


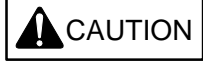
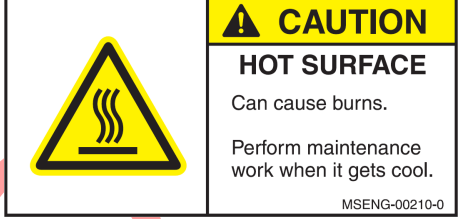

Safety label

Safety labels are affixed to the potentially hazardous sections of this machine.

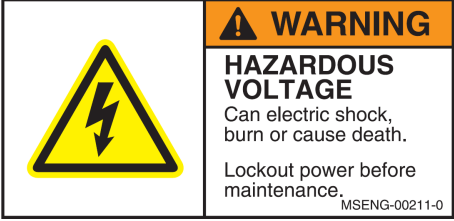





Before using this machine, verify the label positions and thoroughly understand the hazard levels and hazard descriptions.

- The language used for the safety labels affixed to the machine outer covers can be requested by customers.

The language used for the safety labels affixed to the machine interior is only either Japanese or English.

Label	Hazard Level	Hazard Descriptions
 <p>WARNING ROTATING BLADE Inertia rotation during stop processing can cut fingers or hands. Make sure rotation is stopped before work. MSENG-00200-0</p>		<p>There is a danger that your hands or fingers may be cut by the rotating blade.</p> <ul style="list-style-type: none"> • Do not place your hands or fingers near the blade or flange until the spindle comes to a complete stop. • Do not open the covers until the spindle comes to a complete stop. • It takes approximately 15 seconds for the spindle to stop completely after the stop process is executed (including in case of EMO and a power failure).
 <p>CAUTION MOVING PARTS Can crush or cause injury of fingers or hands. Lockout power before maintenance. MSENG-00204-0</p>		<p>There is a possibility that your hands or fingers may get caught and injured in the drive sections.</p> <ul style="list-style-type: none"> • Do not position your hands or fingers in the drive sections. • Before performing maintenance work, make sure to shut off the machine power and lock out the breaker.
 <p>CAUTION MOVING PARTS Can crush or cause injury of fingers or hands. Only qualified personnel should perform maintenance work. MSENG-00207-0</p>		<p>There is a possibility that yours hands or fingers may be caught and injured by the drive sections.</p> <ul style="list-style-type: none"> • Do not position your hands or fingers near the drive sections. • The maintenance work of the machine should be done only by operators with the maintenance qualification.
 <p>CAUTION HOT SURFACE Can cause burns. Perform maintenance work when it gets cool. MSENG-00210-0</p>		<p>There is a possibility that you may burn your hands or fingers by touching the hot parts of the machine.</p> <ul style="list-style-type: none"> • Turn off the machine, and then perform maintenance work only after the machine cools down sufficiently.

Safety label (Continued)

Label	Hazard Level	Hazard Descriptions
 <p>⚠ WARNING HAZARDOUS VOLTAGE Can electric shock, burn or cause death. Lockout power before maintenance. <small>MSENG-00211-0</small></p>		<p>There is a danger that you may die or get seriously injured from electric shocks.</p> <ul style="list-style-type: none"> • Do not touch the electrically charged sections. • Before performing maintenance work, make sure to shut off the machine power, and lock out the breaker.
 <p>⚠ WARNING LINE VOLTAGE ALWAYS PRESENT Can electric shock, burn or cause death. <small>MSENG-00212-0</small></p>		<p>Even if you turn the power circuit breaker of the machine to "OFF" position, the primary side of the breaker remains energized. There is a danger that you may die or get seriously injured from electric shocks.</p> <ul style="list-style-type: none"> • Do not touch the energized sections.
 <p>MSAAA-00015-0</p>		<p>There is a possibility that you may burn your hands or fingers by touching the hot parts of the machine.</p> <ul style="list-style-type: none"> • Turn off the machine, and then perform maintenance work only after the machine cools down sufficiently.

DRAFT

INTRODUCTION

About this manual

This Installation Manual describes the installation procedures for the DISCO Automatic Dicing Saw 3000 Series Model DAD3220.

To ensure safety

In order to ensure safety, be sure to thoroughly read and fully understand the important safety information set forth in the separate Safety Manual, before performing any operation.

In installation or maintenance operation, be sure to follow the procedures set forth in this manual. Be sure that the machine should be installed and adjusted by a qualified person who has completed DISCO's education curriculum (hereinafter referred to as the maintenance personnel).


Definition of a manager and an operator

This manual defines a manager and an operator as follows:

Category	Applicable Personnel	Job Description
Manager	Management representative	The person who is responsible for overall management of the machine and the personnel.
Personnel	Maintenance personnel	The qualified person who received machine maintenance training offered by DISCO.
	Data maintenance personnel	The qualified person who is responsible for the management of software data used for the machine.
	Operator	The person who operates the machine to process workpieces.

Documentation for this machine

The following six manuals are provided for this machine. This manual is the Installation Manual indicated by the arrow.

Manual	Who should read	Contents
Safety Manual	<ul style="list-style-type: none">• Management representative• Data maintenance personnel• Maintenance personnel	Information for ensuring safety during machine operation, installation and maintenance
 Installation Manual	Maintenance personnel	Procedures for machine installation and adjustment
Operation Manual	Operator	Operational procedures to be performed by operators
Data Maintenance Manual	Data maintenance personnel	Screen contents for data entry and data setting procedures
Maintenance Manual	Maintenance personnel	Procedures for maintenance, inspection and adjustment of the machine performed by the customer's personnel.
Technical Reference	Maintenance personnel	Machine specifications/circuit diagrams Illustrations Parts lists

Unit notation

International System of Unit is adopted to express any unit. Also, all the pressure values are expressed in gauge pressure.

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READ CAREFULLY BEFORE USING THIS MANUAL

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ADDRESS LIST

IN AN EVENT OF AN ACCIDENT

A. INSTALLATION SPECIFICATIONS AND ENVIRONMENT

Contents of this chapter

This chapter describes the machine specifications and environment requirements including the installation space and piping connection positions.

Section No.	Title	Contents
1	Specifications	• Utilities requirements of the machine
2	Standard Packing Style on Delivery	• Standard dimensions and mass on delivery
3	Installation Environment	• Installation requirements
4	Piping and Wiring Connection	• Connection positions for piping and wiring

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1. Specifications

Specifications

1	Power requirements (Standard)	Voltage	3-phase 200-240V AC \pm 10 %
		Power frequency	50-60 Hz
		Noise	Do not use the machine in electrically noisy environments. The tests listed below are conducted for this machine. <u>Standards</u> IEC: 61000-4-4 Electrical fast transient/burst immunity test (JIS: C1000-4-4 Electrical fast transient/burst immunity test) <u>Outline of test</u> \pm 2.0 kV (Charge voltage)
		Grounding	Facility-side ground connection must be made according to the local regulations.
		Maximum power	3.5 kVA (1.5 kW spindle installed)
		Leakage current	15 mA or less (If the earth leakage breaker is used for the plant facilities for protection purpose, use a breaker whose sensed current is 30 mA or more.)
	Power requirements (Transformer specification)	Voltage	3-phase 380-415V AC \pm 10 %
		Power frequency	50-60 Hz
		Noise	Do not use the machine in electrically noisy environments. The tests listed below are conducted for this machine. <u>Standards</u> IEC: 61000-4-4 Electrical fast transient/burst immunity test (JIS: C1000-4-4 Electrical fast transient/burst immunity test) <u>Outline of test</u> \pm 2.0 kV (Charge voltage)
		Grounding	Facility-side ground connection must be made according to the local regulations.
	Maximum power	3.5 kVA (1.5 kW spindle installed)	
	Leakage current	15 mA or less (If the earth leakage breaker is used for the plant facilities for protection purpose, use a higher harmonic-measured breaker whose sensed current is 30 mA or more.)	

Specifications (Continued)

2	Air	Supply pressure	Range: 0.5-0.8 MPa Variation: ± 0.01 MPa
		Degree of filtration	0.00001 mm/99.5 % or higher
		Residual oil content	0.1 ppm
		Atmospheric dew point	-15 °C or lower
		Connection port	Rc(PT)1/4 female
		Maximum consumption flow rate	170 L/min (ANR) (except for the use of air gun) The values shown above are for reference and will differ depending on the actual conditions applied.
3	Water Wheel coolant water	Pressure	0.2-0.4MPa Variation: ± 0.01 MPa If wheel coolant pressure is low due to your utility situation, please consult your DISCO sales representative.
		Water temperature	Room temperature +2°C Variation: within $\pm 1^\circ\text{C}$
		Water quality	Consult your DISCO sales representative in the following cases: <ul style="list-style-type: none"> • When using cutting fluid/oil • When using water including impurities that may have harmful effects on the machine
		Connection port	Rc (PT) 1/4 female
		Maximum consumption flow rate	4.0 L/min The maximum flow rate fluctuates depending on the wheel cover to be used or Optional Accessories to be attached.
		Spindle coolant water	Pressure
	Water temperature		Equal to room temperature Variation: within $\pm 1^\circ\text{C}$ Fluctuation in water temperature may adversely affect cutting accuracy due to expansion or shrinkage of spindle.
	Water quality		If the chlorine (Cl), iron (Fe), copper (Cu) or sodium (Na) content or electrical conductivity is high, mechanical parts corrosion or piping clogging may be caused.
	Connection port		Rc(PT)1/4 female
	4	Water drainage	Consumption
Connection port			Duct hose 32.0 mm ID
5	Duct	Exhaust capacity	1.5 m ³ /min If the employed duct capacity is less than 1.5 m ³ /min, consult your nearest DISCO office.
		Connection port	Duct hose 50.6 mm ID
6	Outside dimensions	Main body dimensions	500 W × 900 D × 1,670 H mm Without protrusion and status indicator (335 mm)

Specifications (Continued)

7	Dry mass	550 kg • If you select the transformer unit for use outside Japan (45 kg) or uninterruptible power supply (50 kg), the mass of these equipment would be added to the machine's mass.
8	Paint color	Munsell No. 2.5GY 8.0/0.5

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2. Standard Packing Style on Delivery

Standard packing style on delivery

The table below shows the standard packing style and mass of the machine on delivery.

Main Body Dimensions (mm)	Mass (kg)
500 W × 900 D × 1670 H	Approx. 550

- In transferring, secure enough space so that the machine will pass safely through the selected route. (Information: At least a space of approximately 610 mm wide is necessary for a person to work sitting.)
- The status indicator (335 mm) and other protrusions are not included in the above dimensions.
- If you select the transformer unit for use outside Japan or uninterruptible power supply, the mass of these equipment would be added to the machine's mass.

Optional Accessory	Mass (kg)
Transformer unit for use outside Japan	Approx. 45
Uninterruptible power supply	Approx. 50

3. Installation Environment

Summary of this section

This section describes the space required to install the machine and other environment requirements.

Section No.	Title	Contents
3-1	Installation Site	• Illustration of the installation site
3-2	Environment Requirements	• Environment requirements to install the machine
3-3	Environment for Storage and Transport	• Storage environment • Transport environment

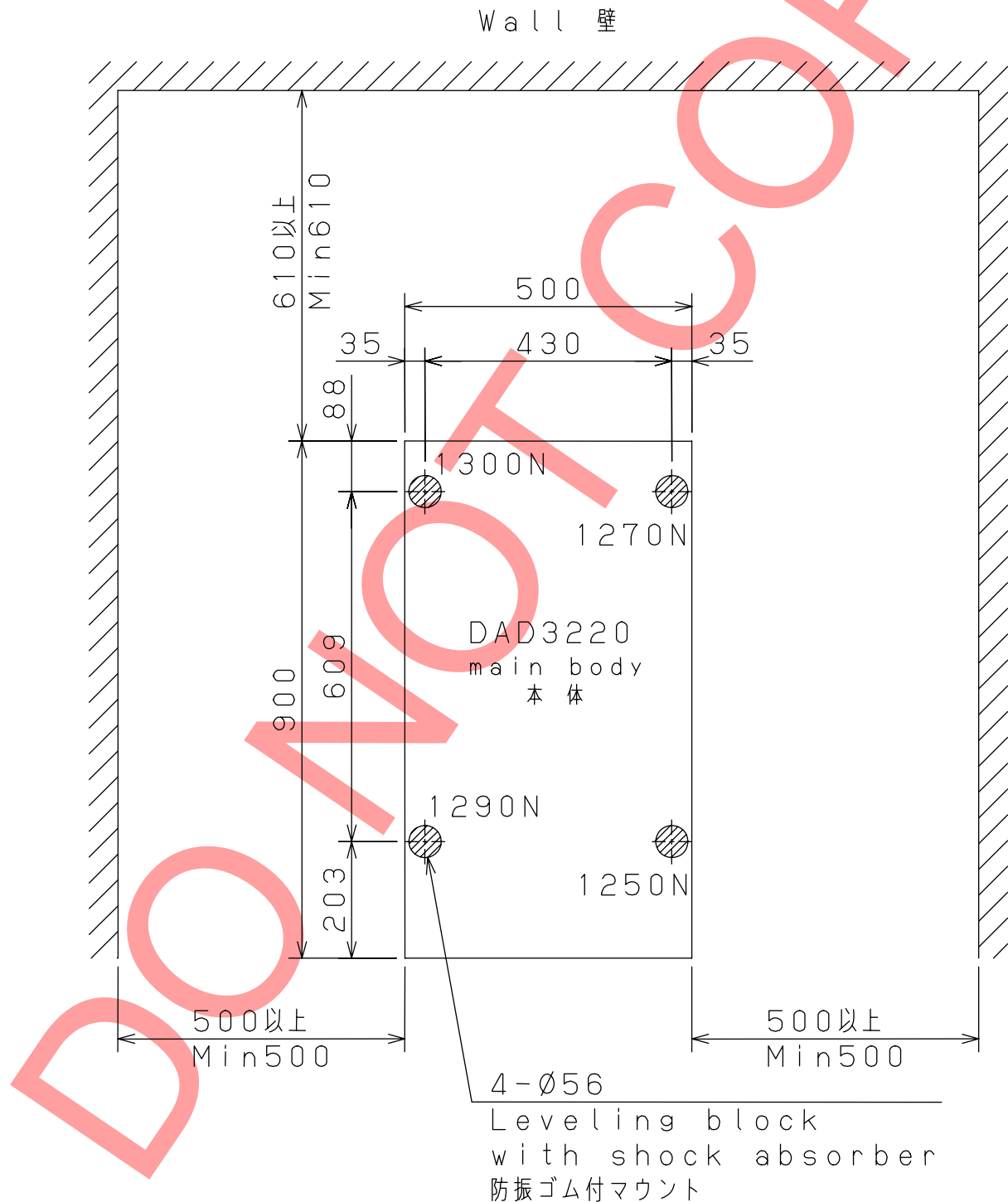
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3-1. Installation Site

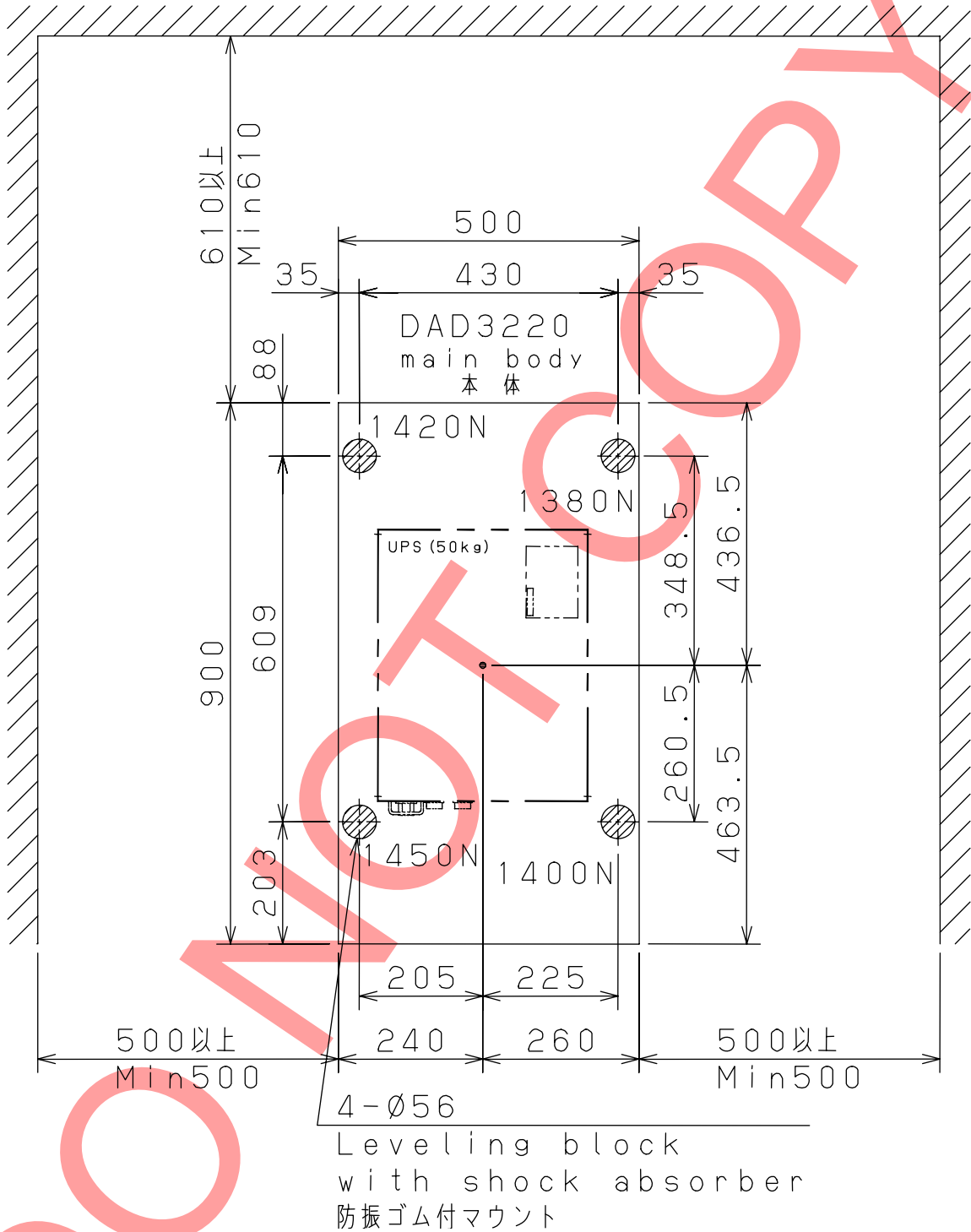
Installation precautions

- In installation site selection, ease of operation and maintenance must be taken into consideration.
- Avoid the place where temperature variations are great.
- In installation, secure 380 mm of maintenance space between the top face of the machine and the ceiling of the room (2,050 mm high from the floor).

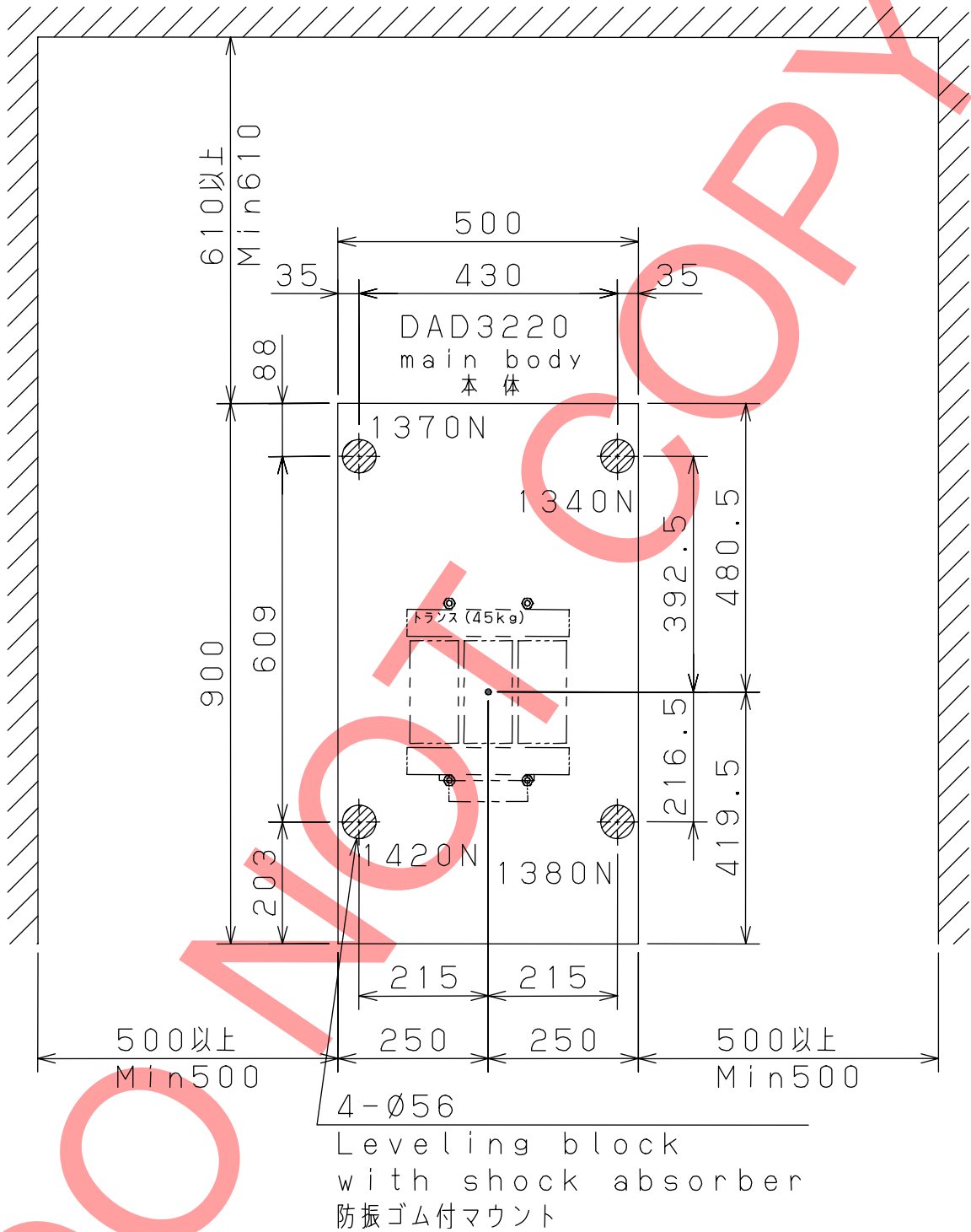
Installation drawing [Standard]



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Wall 壁



3-2. Environment Requirements

Environment requirements

This machine realizes highly accurate applications by employing highly precision axis units. The installation environment, therefore, gives a great effect on the machine accuracy.

Ambient temperature (room temperature)	20 to 25 °C (variation: within ± 1 °C)
Ambient relative humidity	55% \pm 15% (no condensation)
Treatment for waterproof and drainage	If water leakage should occur, the floor surface and downstairs might be damaged. Therefore, provide the floor surface with an appropriate treatment for waterproof and drainage. (The water leakage detection system by adding the drain pan will be available soon. Please contact DISCO office or DISCO service office for the detailed specification.)
Wheel coolant water temperature	Room temperature +2 °C (variation: within ± 1 °C)
Spindle coolant water temperature	Equal to room temperature (variation: within ± 1 °C) Fluctuation in water temperature may adversely affect cutting accuracy due to expansion or shrinkage of spindle.
Power requirements	Standard spec: 3-phase 200 - 240V AC \pm 10 % Transformer specification: 3-phase 380 - 415V AC \pm 10 % <ul style="list-style-type: none"> • The leakage current is 15 mA or less. If the earth leakage breaker is used for the plant facilities for protection purpose, use a higher harmonic-measured breaker whose sensed current is 30mA or more. • Significant voltage fluctuation must be avoided. • A momentary power failure must not occur with the employed power source. • Do not use the machine in electrically noisy environments. The tests listed below are conducted for this machine. <u>Standards</u> IEC: 61000-4-4 Electrical fast transient/burst immunity test (JIS: C1000-4-4 Electrical fast transient/burst immunity test) <u>Outline of test</u> ± 2.0 kV (Charge voltage)
Duct	Rated displacement: 1.5 m ³ /min
Grounding	Facility-side ground connection must be made according to the local regulations.
Altitude	Altitude of 1000 m or lower * When the altitude of the site is 1000 m or higher, consult your nearest DISCO.
Ensure that an air source, a water source, drain pipes and a power source are located near the machine.	
The insides of the employed piping hoses must be free of dirt.	
Be sure to install the machine on the floor that has adequate strength. And when the installation site uses the raised floor, please consult your nearest DISCO about its strength. (→For the load capacity of the installation floor, see the section 3-1 of this chapter, [Installation Site].)	
In installation avoid the place where noises, vibrations, heat or oil mist occurs or near a fan, a ventilating opening or oil mist source.	
If the machine is used or kept in the environment where dirt and dust float around, precision parts of the machine may be worn out or get dirty quickly, which could shorten the part life or adversely affect processing and part quality. If you need to use or keep the machine in the environment where dirt and dust float around, please consult DISCO sales representatives.	
Machine anchors are optionally available. They are designed to provide human/equipment protection in the event of an earthquake or other disaster. It is recommended that the machine be secured with these anchors.	

3-3. Environment for Storage and Transport

Environment for storage and transport

The environmental conditions for storage and transport would wield a profound influence on the machine's accuracy when it is operated.

Ambient temperature (room temperature)	5 to 40 °C
Ambient relative humidity	35 to 70% (no condensation)
Machine anchors are optionally available. They are designed to provide human/equipment protection in the event of an earthquake or other disaster. It is recommended that the machine be secured with these anchors.	
In installation avoid the place where noises, vibrations, heat or oil mist occurs or near a fan, a ventilating opening or oil mist source.	
Drain water from the machine before storage and transport.	
Before starting operation of the machine after storage or transport, make sure to grease its driving axes.	
If the machine is used or kept in the environment where dirt and dust float around, precision parts of the machine may be worn out or get dirty quickly, which could shorten the part life or adversely affect processing and part quality. If you need to use or keep the machine in the environment where dirt and dust float around, please consult DISCO sales representatives.	

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4. Piping and Wiring Connection

Summary of this section

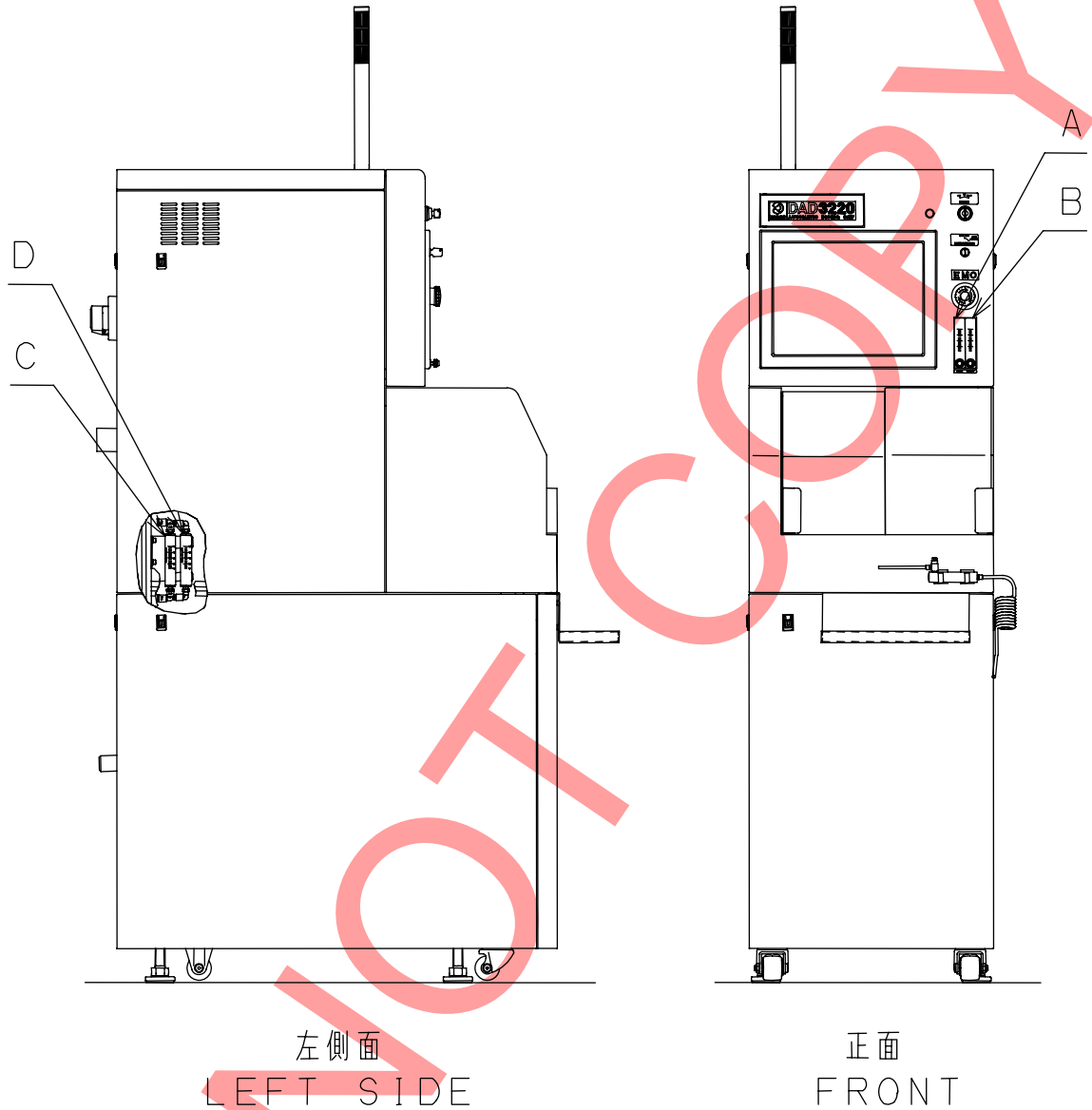
In this section, the connection of piping and wiring are illustrated.

Section No.	Title	Contents
4-1	Positions of Piping Connection	• Piping connection diagram of the machine
4-2	Piping and Wiring Connection	• Piping and wiring connection

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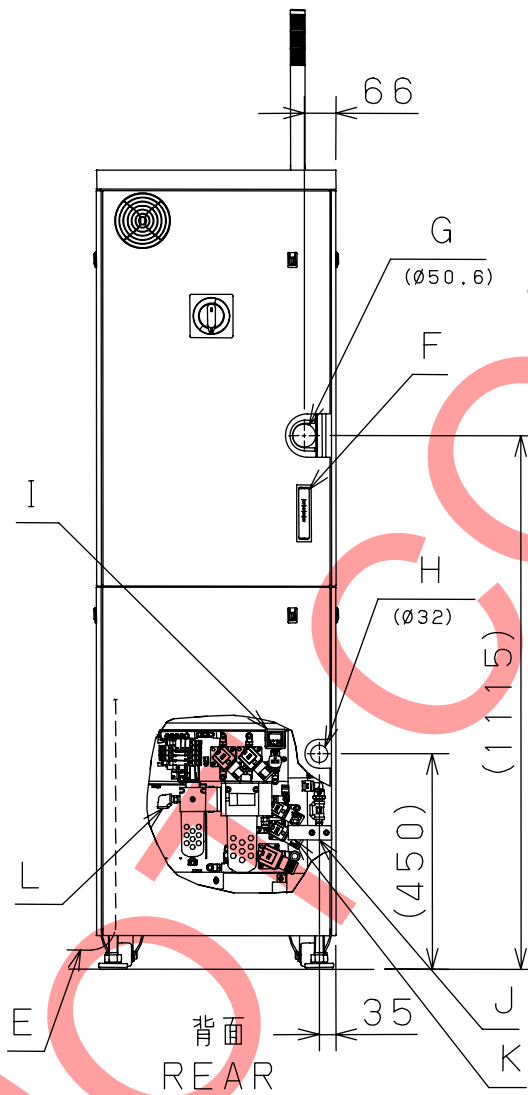
4-1. Positions of Piping Connection

Positions of piping connection



No.	Name	Remarks
A	Wheel coolant water (blade cooler) flowmeter	Wheel cover section
B	Wheel coolant water (shower) flowmeter	Wheel cover section
C	Wheel coolant water (blade cooler) flow rate sensor	Wheel cover section [optional accessory]
D	Wheel coolant water (shower) flow rate sensor	Wheel cover section [optional accessory]

Positions of piping connection (Continued)



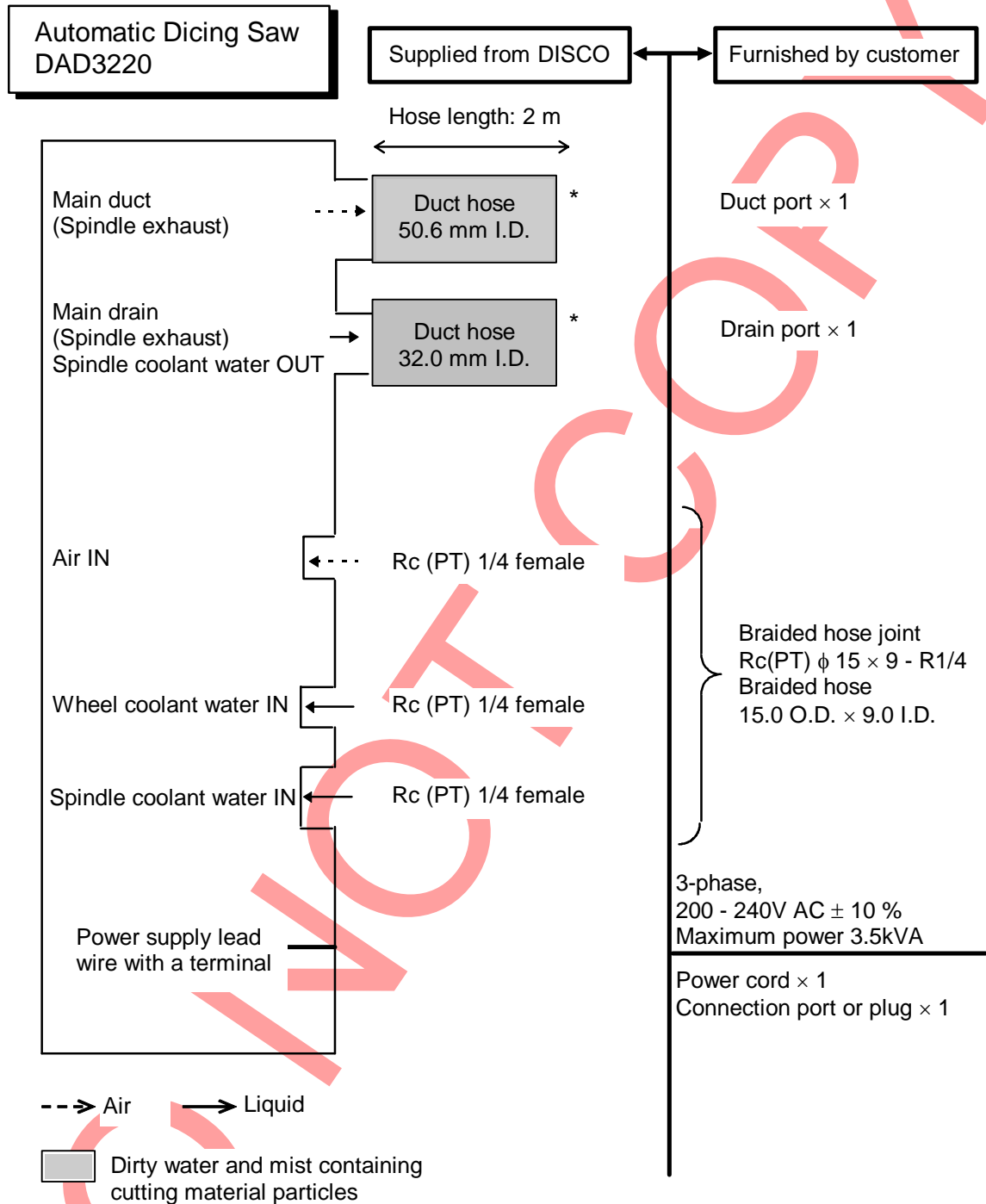
(UNIT: mm)

No.	Name	Remarks
E	Power source	
F	Flow rate sensor of spindle coolant water	
G	Main duct*	50.6 I.D. Duct hose
H	Main drain*	32.0 I.D. Duct hose
I	Air pressure sensor	
J	Wheel coolant water IN	Rc (PT) 1/4
K	Spindle coolant water IN	Rc (PT) 1/4
L	Air IN	Rc (PT) 1/4

* Discharges dirty water and mist containing cutting particles.

4-2. Piping and Wiring Connection

Piping and wiring connection



Note:

- 1) The optional piping is not included in the above diagram.
- 2) Pipe bands are provided with the parts marked with an asterisk (*).
- 3) The connecting parts to be furnished by the customer may vary depending on the installation site and connection method. For details, please consult your DISCO sales representative.
- 4) All the hoses and joints required for installation are available as optional accessories.
It is recommended to use swage lock type joints if you prepare joints by yourself.

B. INSTALLATION AND TRANSFERRING OPERATION

Summary of this chapter

This chapter describes the installation operation, necessary adjustments for installation and the transferring operation.

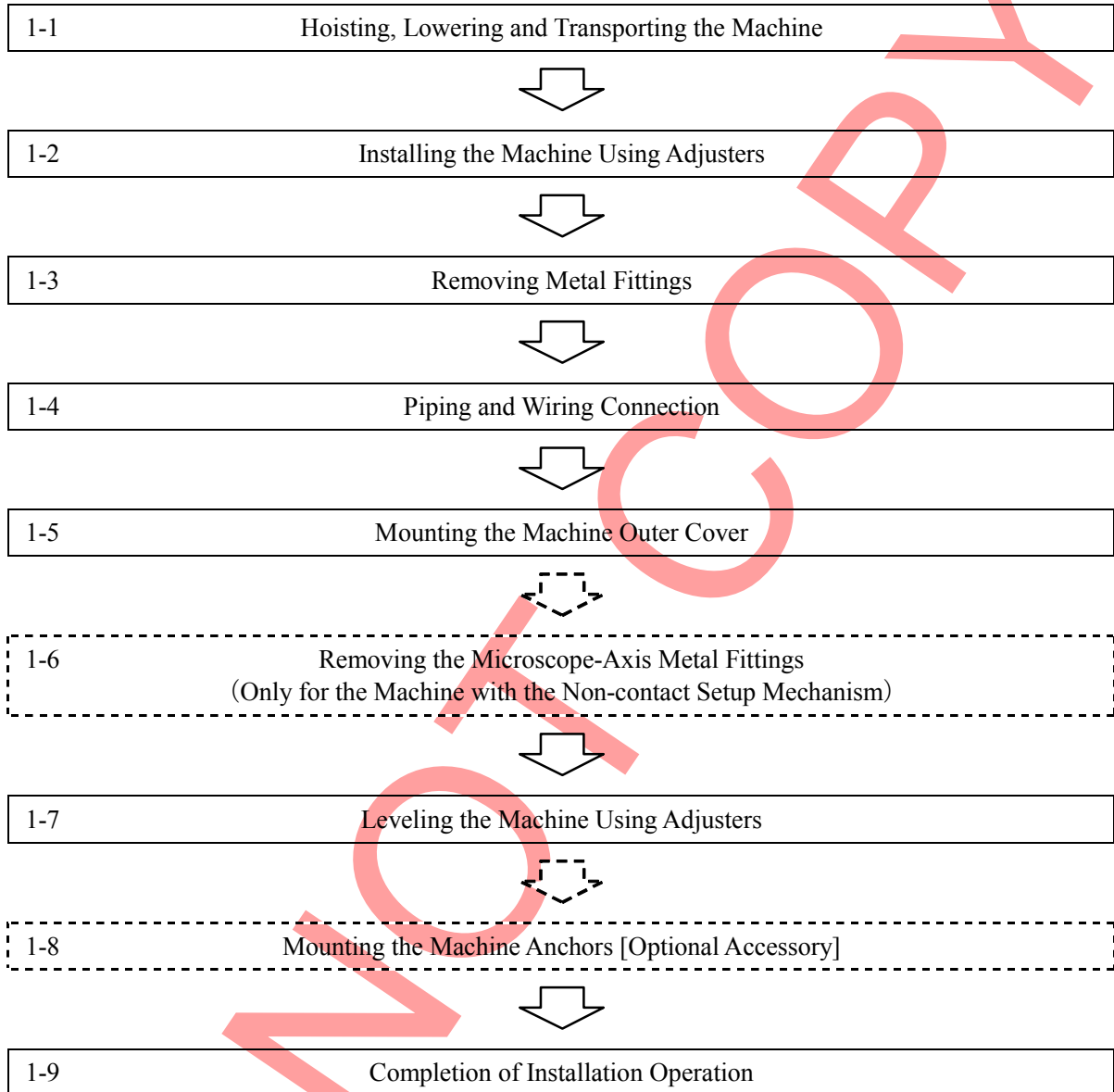
Section No.	Title	Contents
1	Installation Operation	<ul style="list-style-type: none">• Procedures of installation• Necessary adjustments accompanied with installation
2	Transferring Operation	<ul style="list-style-type: none">• Procedures of machine transfer

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1. Installation Operation

Operation flow

The procedure of installation operation consists of the following steps.





Air exhaust, water drainage, and cutting particles must be properly managed/disposed of in compliance with applicable environmental regulations

Due to the nature of its processing characteristics, harmful substances may be produced depending on the types of workpiece it processes.

Securing the installed machine with the "machine fixation anchor metal" is recommended

DISCO provides "machine fixation anchor metal" as an optional accessory for human/equipment protection in the event of an earthquake or other disaster.

The floor on which the machine is installed should be provided with sufficient waterproofing and drainage treatment

When water leaks, the floor surface of the installation site or downstairs may be damaged.

Periodically inspect the water pipe fittings to make sure that no water leaks from them

When water leaks, the floor surface of the installation site or downstairs may be damaged.

NOTICE

Use the safety goggles, protective gloves, stepstools, flashlights and alcohol which are available in your factory or comply with your factory's standards

Safety goggles, protective gloves, stepstools, flashlights and alcohol are not supplied with the machine.

1-1. Hoisting, Lowering and Moving the Machine

Summary of this section

In order to hoist/lift or lower the machine, you have to use a crane or forklift.
This section explains the individual procedure to hoist and lower the machine by the equipment you use.

Section No.	Title	Contents
1-1-1	Hoisting and lowering the machine by a crane	<ul style="list-style-type: none">• The procedures for hoisting and lowering the machine by a crane
1-1-2	Hoisting and lowering the machine by a forklift	<ul style="list-style-type: none">• The procedures for hoisting and lowering the machine by a forklift
1-1-3	Moving the machine by hand push	<ul style="list-style-type: none">• The procedures for moving the machine by hand push

DO NOT COPY

1-1-1. Hoisting and lowering the machine by a crane

Before operation

Have on hand the following jigs to hoist or lower the machine with a crane.



Use the specified hoisting jigs when hoisting the machine

If the machine is hoisted or lowered using hoisting gear other than the dedicated jigs, the hoisting gear may be broken due to insufficient strength or center-of-gravity may be displaced, causing the machine to fall down. This may result in severe injury or death of any person underneath the machine. Also, the machine may be damaged.

Hoisting jigs [Optional accessory]

Item	DISCO Part ID	Qty.
[1] Dedicated hoisting jig	JIG LKKJ-010001-2	4
[2] Sling A	SLING (4 m) LKKJ-010002-0	2
[3] Shackle A [5] Shackle B	SHACKLE LENJ-910035-0	4
[4] Hoisting bar	HANGER LJUJ-910003-0	1
[6] Sling B	SLING (1 m) LJEJ-910004-0	2
Anti-displacement bolt	HEXAGON SOCKET HEAD CAP SCREW MSS060055UN-0	4
Hoisting jig retaining bolt	HEXAGON SOCKET HEAD CAP SCREW MSS100025UN-0	12
Washer	PLAIN WASHER MWP1-100-UN-0	12
Spring washer	SPRING LOCK WASHER MWS1-100-UN-0	12
Nut	HEXAGON NUT M6N-060-1UN-0	4

Others

Safety shoes, protective gloves



While the machine is hoisted or lowered, stay away from the area beneath and around the machine

If the machine should fall while the machine is hoisted or lowered, persons in such area may be crushed to death or severely injured. Or if the machine should swing like a pendulum, they may be caught between the machine and wall or hit by the machine to death or severely injured.

Ensure that the employed crane is rated for a hoisting load of 750 kg or heavier and withstands the machine weight, boom length and hoisting angle

If the machine should fall while the machine is hosted or lowered, persons beneath or near it may be crushed to death or severely injured. Note that the mass of the machine including the hoisting jigs is approximately 750 kg.



Be sure to firmly secure the displacement prevention bolts to the hoisting jigs

If the displacement prevention bolts come off from the hoisting jigs during hoisting, the hoisted machine may lose balance and fall. If the machine falls, you could be crushed to death or seriously injured.

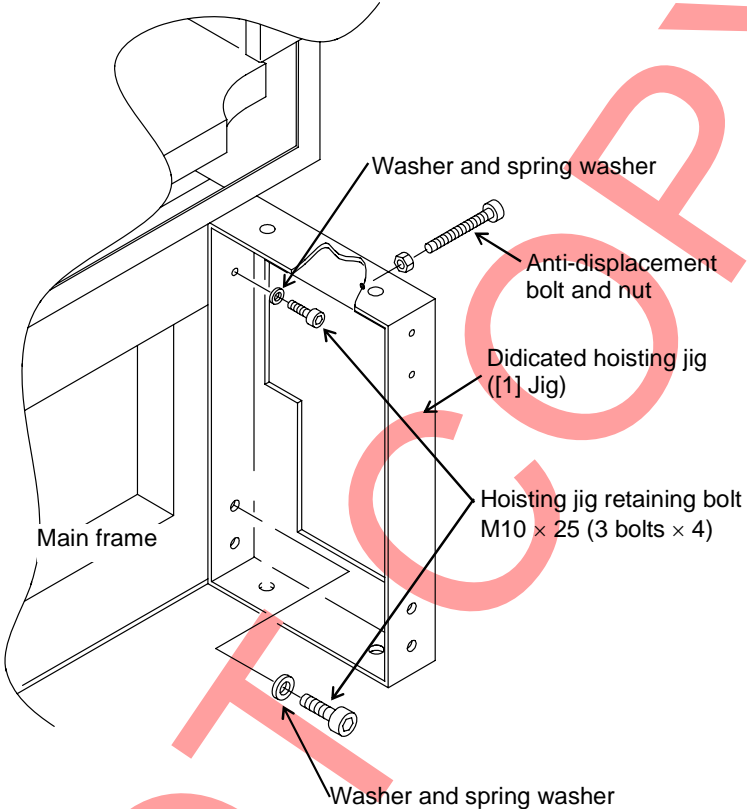
Make sure to firmly secure the shackles

If the shackles are disengaged from the jigs during machine hoisting, the hoisted machine may lose balance and drop. If the machine falls, you could be crushed to death or seriously injured.

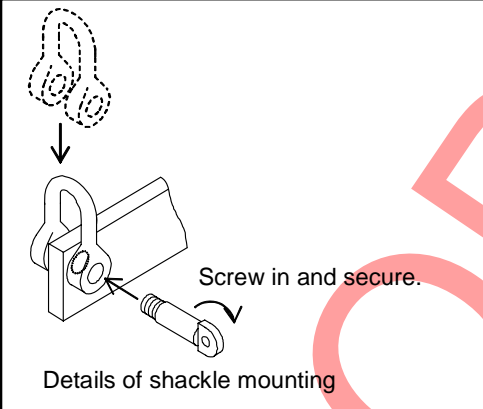
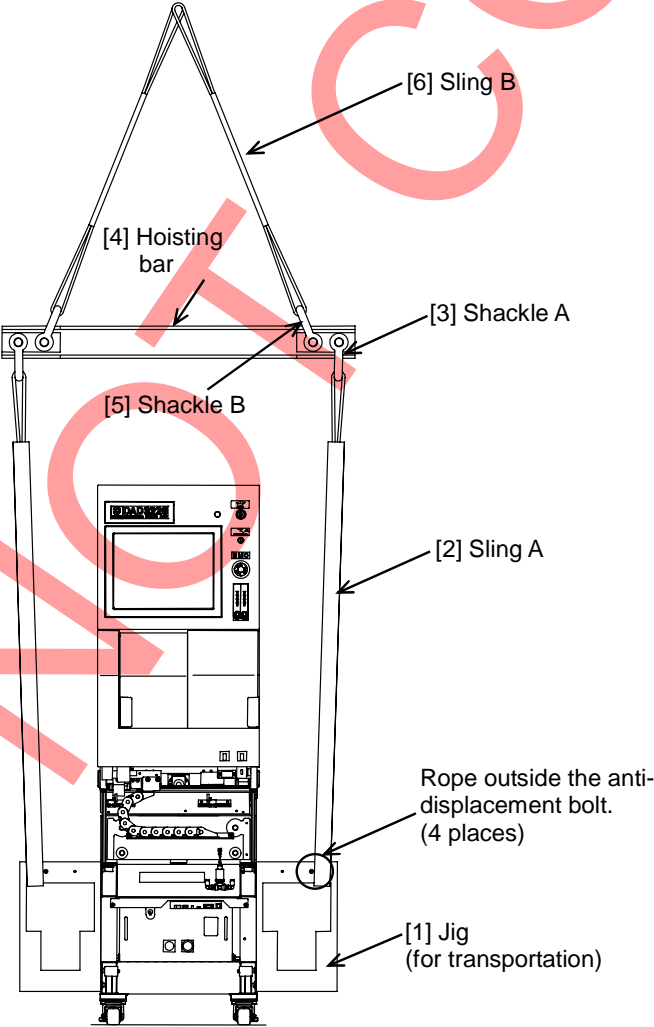
Make sure to wear safety shoes and protective gloves throughout the machine hoisting/lowering process

Your feet or hands could be caught or cut off by the machine while the machine is hoisted or lowered.

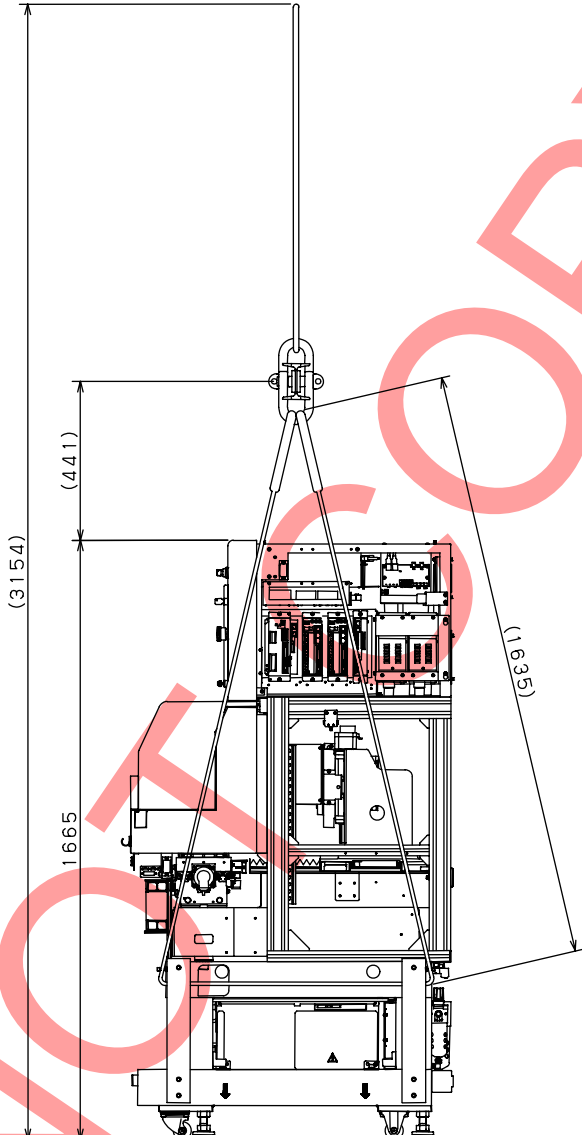
Procedures for hoisting and lowering the machine by a crane (Continued)

Step No.	Procedure
1	Wear the safety shoes and protective gloves.
2	Secure the dedicated hoisting jig ([1] Jig) to the main frame of the machine with bolts. 
3	Mount the anti-displacement bolts (4 places) to the secured "[1] jig".
4	Thread "[2] Sling A" into "[1] jig".
5	Hook "[2] Sling A" to the anti-displacement bolt.
6	Thread "[2] Sling A" into "[3] Shackle A".
7	Mount the "[3] Shackle A" (with "[2] Sling A") to the "[4] Hoisting bar".
8	Thread "[6] Sling B" into "[5] Shackle B".
9	Mount the "[5] Shackle B" (with "[6] Sling B") to the "[4] Hoisting bar".

Procedures for hoisting and lowering the machine by a crane (Continued)

Step No.	Procedure
10	<p data-bbox="389 293 770 322">Thread "[6] Sling B" to the crane.</p> <div data-bbox="668 353 1158 766" style="border: 1px solid black; padding: 5px; margin: 10px 0;">  <p data-bbox="868 622 1091 651">Screw in and secure.</p> <p data-bbox="711 723 1007 752">Details of shackle mounting</p> </div>  <p data-bbox="959 853 1070 882">[6] Sling B</p> <p data-bbox="655 1010 778 1061">[4] Hoisting bar</p> <p data-bbox="979 1084 1126 1113">[3] Shackle A</p> <p data-bbox="655 1173 802 1202">[5] Shackle B</p> <p data-bbox="979 1319 1102 1348">[2] Sling A</p> <p data-bbox="975 1547 1209 1630">Rope outside the anti-displacement bolt. (4 places)</p> <p data-bbox="959 1704 1158 1756">[1] Jig (for transportation)</p>

Procedures for hoisting and lowering the machine by a crane (Continued)

Step No.	Procedure
<p>10 (Continued)</p>	
<p>11</p>	<p>Make sure that the ropes do not come into contact with any part of the machine, and then start hoisting.</p> <p>The mass of the machine including the hoisting jigs is approximately 750 kg. Ensure that the employed crane rating is adequate for the machine weight. Also, be sure that the employed wires and other hoisting accessories are appropriate for the machine weight.</p> <ul style="list-style-type: none"> • When lifting, be careful not to give an impact to the machine. • Do not tilt the machine. • Do not apply any undue force to the covers of the machine.
<p>12</p>	<p>Lower the machine.</p> <ul style="list-style-type: none"> • When lowering, be careful not to give an impact to the machine.

1-1-2. Hoisting and lowering the machine by a forklift

Before operation

Have on hand the following jigs to lift or lower the machine with a forklift.



Use the specified hoisting jigs when hoisting the machine

If the machine is hoisted or lowered using hoisting gear other than the dedicated jigs, the hoisting gear may be broken due to insufficient strength or center-of-gravity may be displaced, causing the machine to fall down. This may result in severe injury or death of any person underneath the machine. Also, the machine may be damaged.

Hoisting jig [Optional accessory]

Item	DISCO Part ID	Qty.
[1] Dlicated hoisting jig	JIG LKKJ-010001-2	4
Anti-displacement bolt	HEXAGON SOCKET HEAD CAP SCREW MSS060055UN-0	4
Hoisting jig retaining bolt	HEXAGON SOCKET HEAD CAP SCREW MSS100025UN-0	12
Washer	PLAIN WASHER MWP1-100-UN-0	12
Spring washer	SPRING LOCK WASHER MWS1-100-UN-0	12
Nut	HEXAGON NUT M6N-060-1UN-0	4

Other

Safety shoes, protective gloves



While the machine is hoisted or lowered, stay away from the area beneath and around the machine

If the machine should fall while the machine is hoisted or lowered, persons in such area may be crushed to death or severely injured. Or if the machine should swing like a pendulum, they may be caught between the machine and wall or hit by the machine to death or severely injured.

Ensure that the employed forklift is rated for a hoisting load of 750 kg or heavier and withstands the machine weight, boom length and hoisting angle

If the machine should fall while the machine is hosted or lowered, persons beneath or near it may be crushed to death or severely injured. Note that the mass of the machine including the hoisting jigs is approximately 750 kg.

Check the insertion position of the fork on the drawing before starting the operation

If the fork of the forklift is not correctly positioned under the machine, it may cause the machine to topple or fall off the forklift during transportation, causing nearby persons seriously injured or crushed to death.

Make sure that the fork of the forklift is correctly inserted into the designated position so that the gravity center of the machine is on the center of the forklift

If the fork of the forklift is not correctly positioned under the machine, it may cause the machine to topple or fall off the forklift during transportation, causing nearby persons seriously injured or crushed to death.

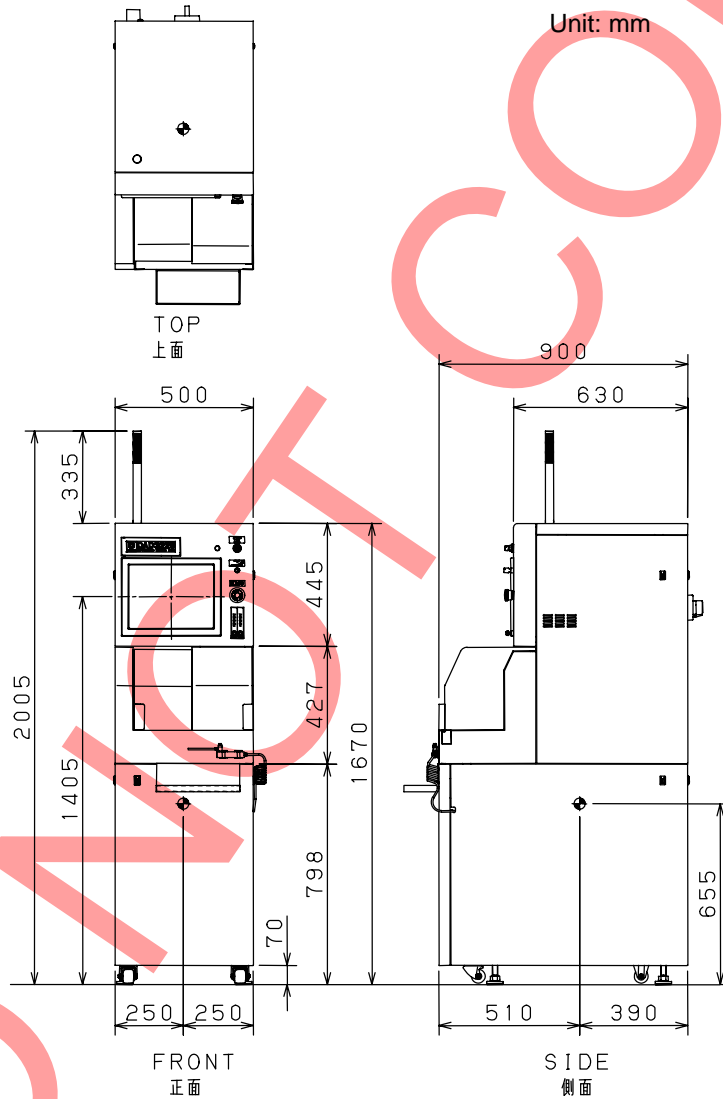
Ensure that there is no person in the machine transfer route and the area around it

If the machine should topple or fall off the forklift, persons in such area may be severely injured or crushed to death.



Move the machine slowly

The center of gravity of the machine is positioned as shown in the drawing below. When the forklift is moved at an excessively high speed, the machine might fall and persons under the machine could receive its weight, which would result in serious injury or death.



Make sure to wear safety shoes and protective gloves throughout the machine hoisting/lowering process

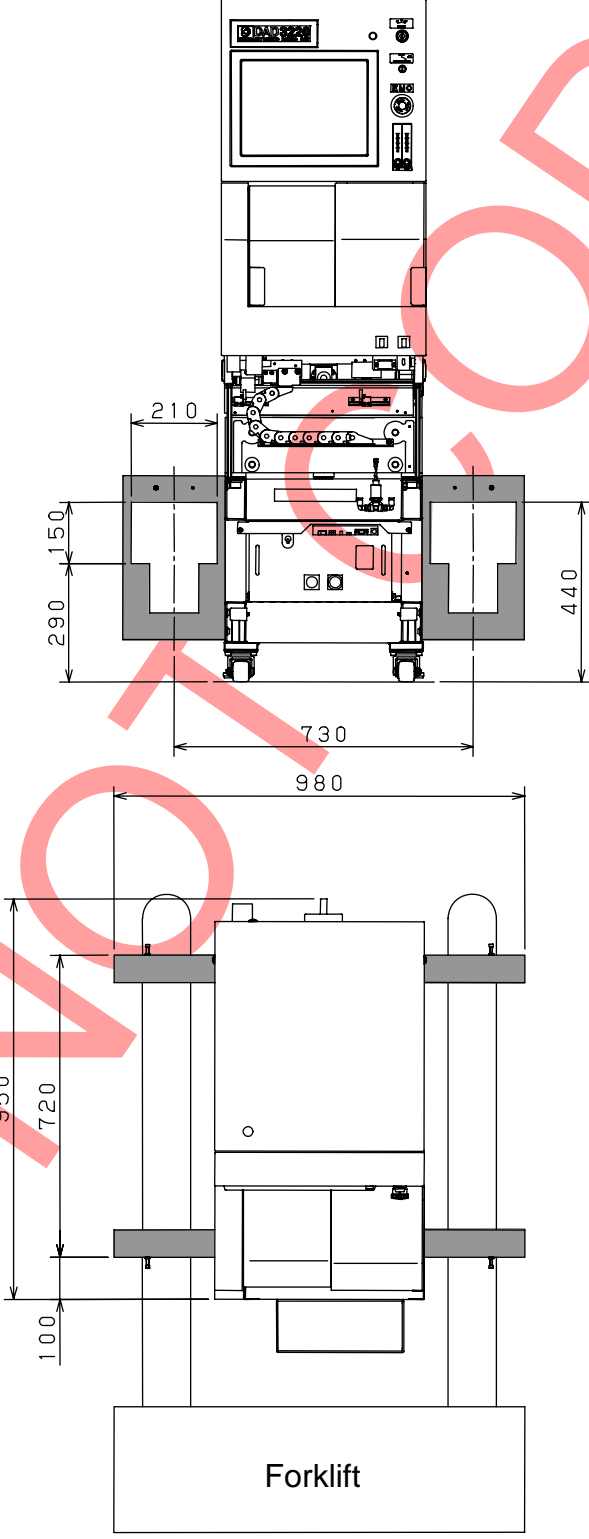
Your feet or hands could be caught or cut off by the machine while the machine is hoisted or lowered.

CAUTION

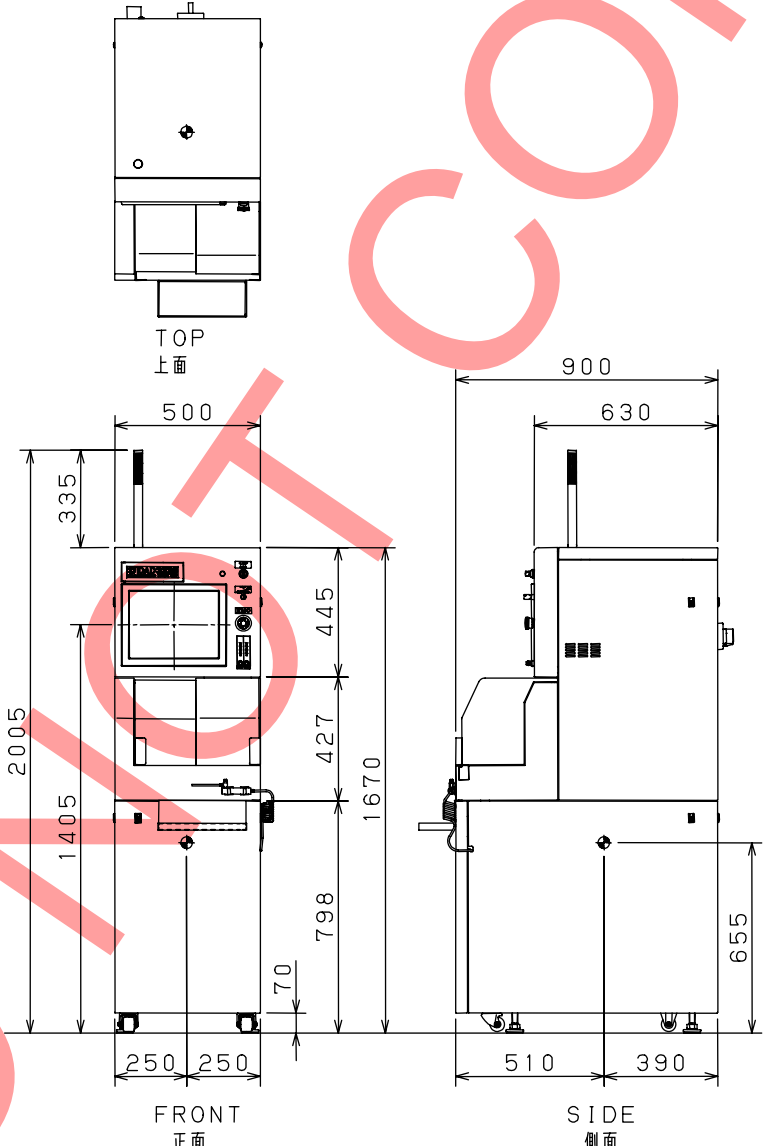
When transferring the machine, use a flat transfer route

When the machine passes a floor that is bumpy or with varying surface levels while transferred, impacts are applied to the machine, which may have an adverse effect on its processing accuracy.

Step No.	Procedure
1	Wear the safety shoes and protective gloves.
2	Secure the dedicated hoisting jig to the main frame of the machine with bolts. <div style="text-align: center; margin-top: 20px;"> </div>
3	Ensure the flat route to move the machine.

Step No.	Procedure
4	<p data-bbox="387 293 1091 322">Insert the fork into the dedicated hoisting jig, as shown below.</p> <p data-bbox="416 353 927 387">[Position for inserting the fork (unit: mm)]</p> 

Procedures for hoisting and lowering the machine by a forklift (Continued)

Step No.	Procedure
5	<p>Lift and carry the machine with the forklift. The mass of the machine including the hoisting jigs is approximately 750 kg. Make sure to use the forklift whose carrying capacity is greater than the weight of the machine.</p> <ul style="list-style-type: none"> • When lifting, be careful not to give an impact to the machine. • Do not tilt the machine. • Do not apply any undue force to the covers of the machine. <p>[Center of gravity (unit: mm)]</p>  <p>TOP 上面</p> <p>FRONT 正面</p> <p>SIDE 側面</p>
6	<p>Lower the machine with the forklift.</p> <ul style="list-style-type: none"> • When lowering, be careful not to give an impact to the machine.

1-1-3. Moving the machine by hand-push

Before operation

Have on hand the following equipment when moving the machine by hand-push.

Safety shoes, protective gloves

Procedures for transferring the machine by hand-push



Do not place your feet or hands under the machine during the operation

If the machine should topple down while it is transferred, you may be caught under the machine, or if the adjuster should come off, your feet or hands may be caught or cut off by the machine.

Wear safety shoes and protective gloves during the operation

Your feet and hands could be caught or cut off by the machine.

CAUTION

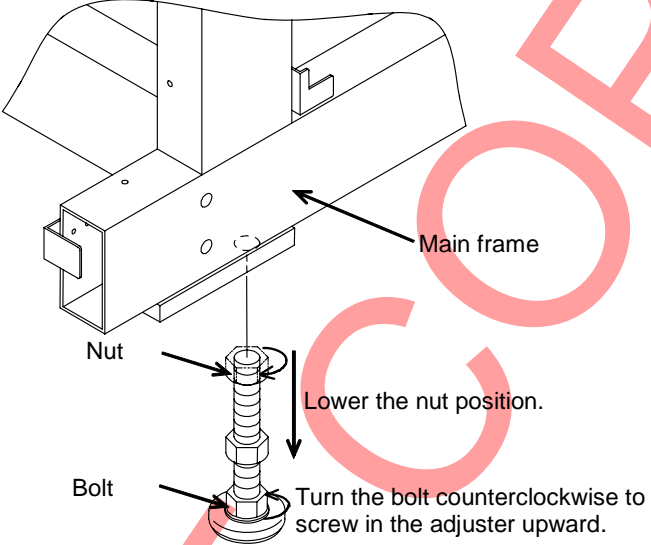
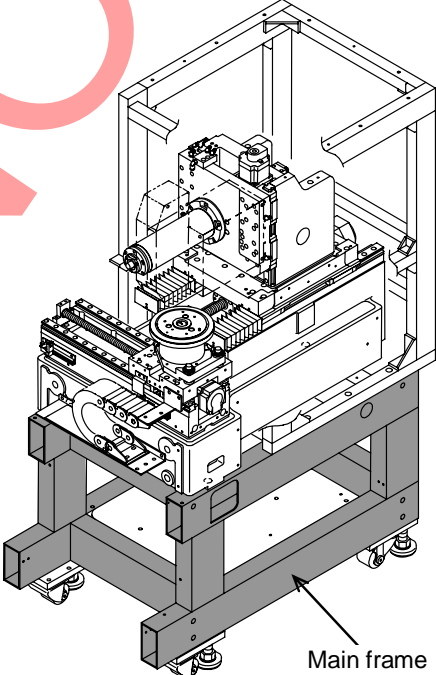
When transferring the machine, use a flat transfer route

When the machine passes a floor that is bumpy or with varying surface levels while transferred, impacts are applied to the machine, which may have an adverse effect on its processing accuracy.

Push the main body frame to move the machine

If the covers and sub-frame are pushed or pulled while the machine is transferred, the resin cover might be broken or sub-frame might be bent.

Procedures for transferring the machine by hand-push (Continued)

Step No.	Procedure
1	Wear the safety shoes and protective gloves.
2	Make sure that all casters put firmly on the floor.
3	<p>Make sure that all four adjusters are located higher than the casters.</p> <ul style="list-style-type: none"> • When the adjuster is located lower than the caster, turn the bolt of the adjuster counterclockwise with a wrench until tight. 
4	<p>Ensure enough space so that the machine will pass safely through the selected route. (Information: At least a space of approximately 610 mm wide is necessary for a person to work sitting.)</p>
5	<p>Push the main frame of the machine to move the machine.</p> <ul style="list-style-type: none"> • To move the machine, push only the main frame. 

1-2. Installing the Machine with the Adjusters

Before operation

Have on hand the following tools for installing operation.

30 mm wrench

Safety shoes and protective gloves

Procedures for installing the machine with the adjusters

The casters attached underneath the machine make the machine transferring operation easier. When the machine reaches the intended installation site, you have to take measures to prevent the machine from moving easily with casters. For this purpose, it is necessary to jack up the machine up using the adjusters.



Do not place your feet or hands under the machine during jacking operation

If the machine should topple down while it is jacked up, you may be caught under the machine, or if the adjuster should come off, your feet or hands may be caught or cut off by the machine.

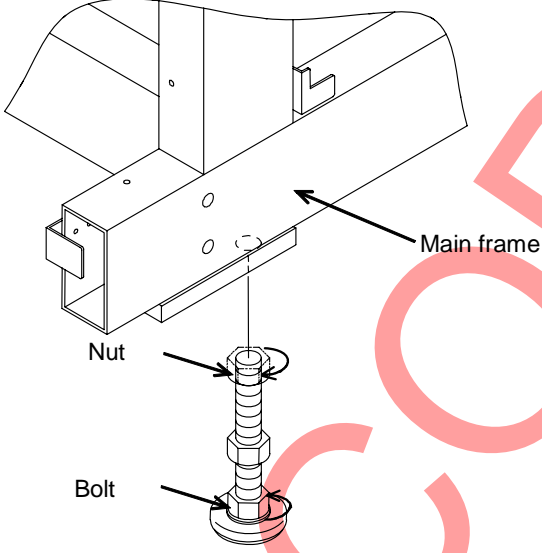
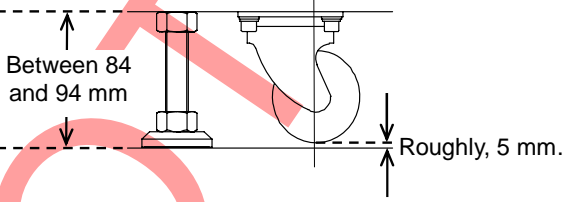
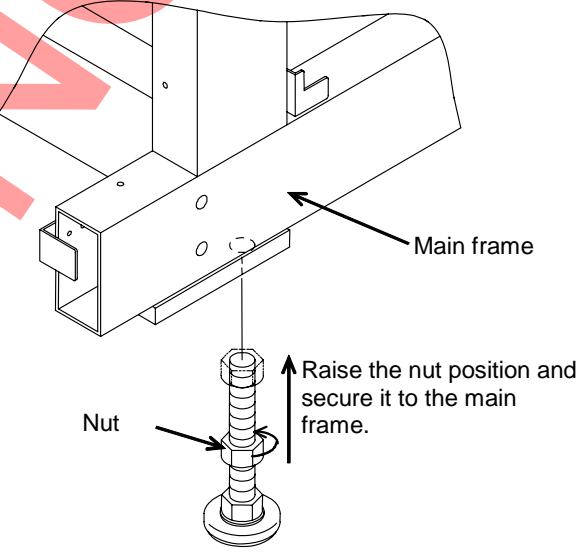
The adjusters must be adjusted so that the distance between the machine bottom surface and floor surface becomes between 84 and 94 mm

If the machine is jacked up higher than this, the adjusters may come off. If the adjusters comes off during jacking operation, your feet or hands may be caught or cut off by the machine.

Wear safety shoes and protective gloves during the operation

Your feet and hands could be caught or cut off by the machine.

Procedures for installing the machine with the adjusters (Continued)

Step No.	Procedure
1	Wear the safety shoes and protective gloves.
2	<p>To loosen the nut of the adjuster (4 places), turn it clockwise.</p>  <p>Main frame</p> <p>Nut</p> <p>Bolt</p>
3	<p>With a wrench, turn the bolt of the adjuster (4 places) counterclockwise to raise the machine so that the machine is roughly parallel to the floor surface. * As a rough guide, the space between the caster and floor surface is 5 mm.</p>  <p>Between 84 and 94 mm</p> <p>Roughly, 5 mm.</p>
4	<p>Turn the nut of the adjuster (4 places) counterclockwise until it hits the main frame, and then fasten the nut.</p>  <p>Main frame</p> <p>Nut</p> <p>Raise the nut position and secure it to the main frame.</p>

1-3. Removing the Metal Fittings

About removal of metal fittings

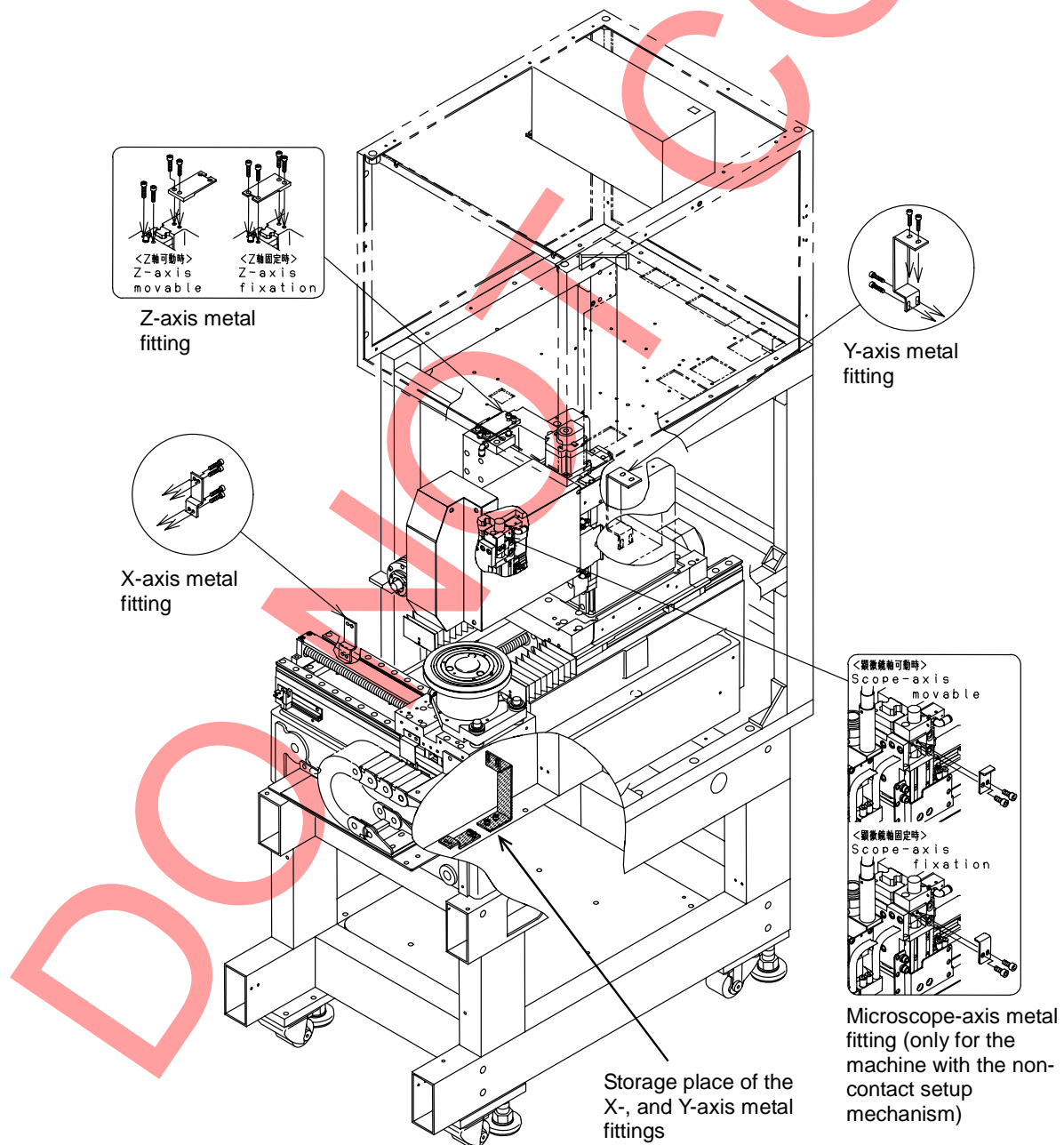
Prior to machine shipment, the drive axes of the machine are secured with the dedicated metal fittings to prevent the axes from being displaced due to vibration during transport. Before installing the machine, therefore, it is necessary to remove such metal fittings and retaining screws of the X-, Y-, Z-, and microscope-axis (only for the machine with the non-contact setup mechanism).

Before operation

Have on hand the following tools for removing the metal fittings.

4 mm Allen wrench
5 mm Allen wrench
Phillips screwdriver

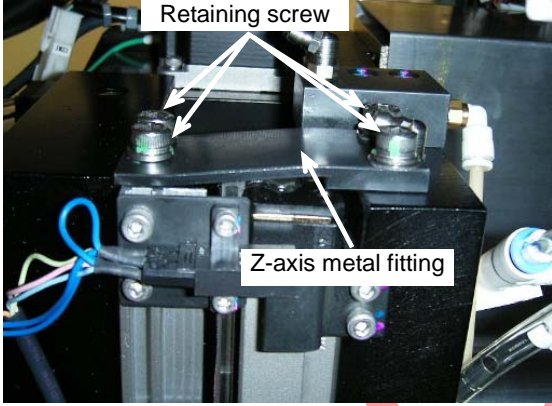
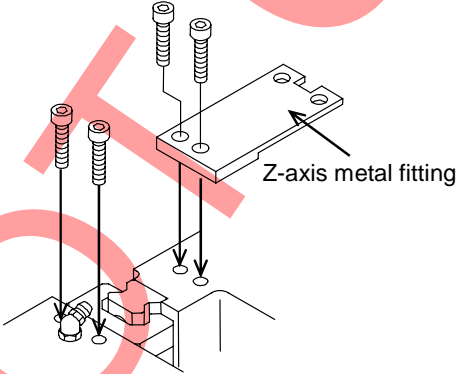

Locations of the metal fittings



Procedures for removing the metal fittings

Step No.	Procedure				
1	<p data-bbox="389 293 1385 353">Loosen the retaining screws (M5) of the X-axis metal fitting (4 places) and then remove the metal fitting.</p> <div data-bbox="628 371 1177 864"> </div> <div data-bbox="687 869 1118 898"> <p>Retaining screw X-axis metal fitting</p> </div> <table border="1" data-bbox="427 931 1377 1043"> <thead> <tr> <th data-bbox="427 931 852 969">Item</th> <th data-bbox="852 931 1377 969">DISCO Part ID</th> </tr> </thead> <tbody> <tr> <td data-bbox="427 969 852 1043">X-axis metal fitting</td> <td data-bbox="852 969 1377 1043"> FIXTURE (X) LKKN-010036-0 </td> </tr> </tbody> </table>	Item	DISCO Part ID	X-axis metal fitting	FIXTURE (X) LKKN-010036-0
Item	DISCO Part ID				
X-axis metal fitting	FIXTURE (X) LKKN-010036-0				
2	<p data-bbox="389 1077 1385 1137">Loosen the retaining screws (M5) of the Y-axis metal fitting (4 places) and then remove the metal fitting.</p> <div data-bbox="612 1155 1031 1727"> </div> <div data-bbox="783 1155 959 1184"> <p>Retaining screw</p> </div> <div data-bbox="1031 1447 1166 1498"> <p>Y-axis metal fitting</p> </div> <div data-bbox="727 1731 903 1760"> <p>Retaining screw</p> </div> <table border="1" data-bbox="427 1794 1377 1906"> <thead> <tr> <th data-bbox="427 1794 852 1832">Item</th> <th data-bbox="852 1794 1377 1832">DISCO Part ID</th> </tr> </thead> <tbody> <tr> <td data-bbox="427 1832 852 1906">Y-axis metal fitting</td> <td data-bbox="852 1832 1377 1906"> FIXTURE (Y) LKKN-010038-0 </td> </tr> </tbody> </table>	Item	DISCO Part ID	Y-axis metal fitting	FIXTURE (Y) LKKN-010038-0
Item	DISCO Part ID				
Y-axis metal fitting	FIXTURE (Y) LKKN-010038-0				

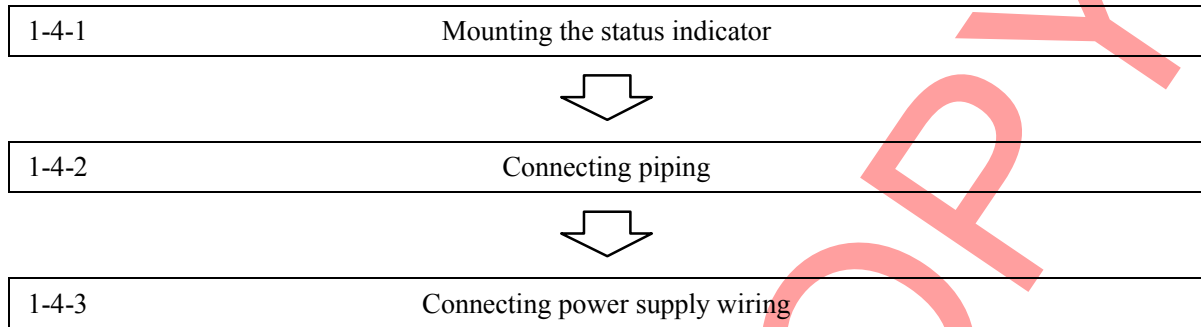
Procedures for removing the metal fittings (Continued)

Step No.	Procedure				
3	<p>Loosen the retaining screws (M6) of the Z-axis metal fitting (4 places) and then remove the metal fitting.</p>  <table border="1" data-bbox="427 763 1374 880"> <thead> <tr> <th data-bbox="427 763 850 808">Item</th> <th data-bbox="850 763 1374 808">DISCO Part ID</th> </tr> </thead> <tbody> <tr> <td data-bbox="427 808 850 880">Z-axis metal fitting</td> <td data-bbox="850 808 1374 880"> FIXTURE (Z) LKKN-010039-1 </td> </tr> </tbody> </table>	Item	DISCO Part ID	Z-axis metal fitting	FIXTURE (Z) LKKN-010039-1
Item	DISCO Part ID				
Z-axis metal fitting	FIXTURE (Z) LKKN-010039-1				
4	<p>Mount the removed Z-axis metal fitting and the retaining screws as shown below.</p> 				
5	<p>Mount the removed X- and Y-axis metal fittings to the left-side machine frame for safekeeping.</p> 				
6	<p>Since it is necessary to move the axis in order to remove the microscope-axis metal fittings (only for the machine with the non-contact setup mechanism), perform the removal operation after turning the power on. →How to remove the microscope-axis metal fittings, see section 1-6 of chapter B, [Removing the microscope-axis metal fittings (Only for the machine with the non-contact setup mechanism)]</p>				

1-4. Piping and Wiring Connection

Operation flow

The procedure for mounting the status indicator and connecting piping and wiring consists of the following steps.



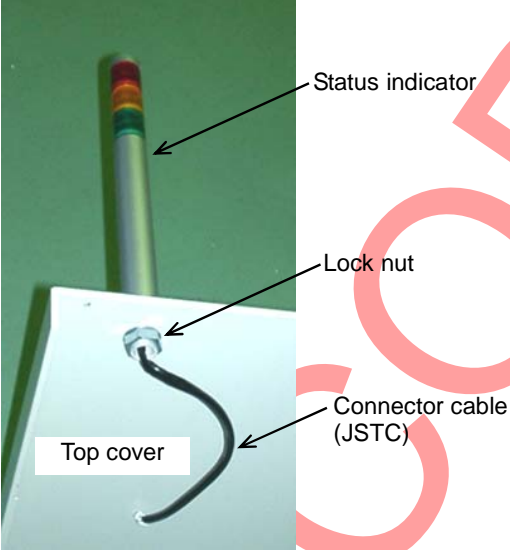
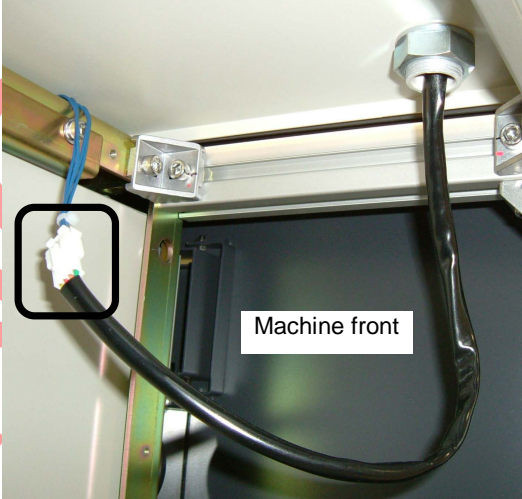
Before operation

Have on hand the following tools for piping and wiring connection.

3 mm Allen wrench
24 mm wrench
27 mm wrench
Swage lock type joint [Rc(PT) ϕ 15 \times 9-R1/4 (Qty: 3)]
Braided hose [O.D. 15.0 \times I.D. 9.0 (Qty: 3)]
Flatblade screwdriver (For wire clamp)
Phillips screwdriver (For power connection)

1-4-1. Mounting the status indicator

Procedures for mounting the status indicator

Step No.	Procedure
1	<p data-bbox="387 342 1348 405">From the hole on the top cover, thread the connector cable of the status indicator and secure the status indicator to the top cover with the lock nut.</p> 
2	<p data-bbox="387 992 798 1025">Mount the top cover to the machine.</p>
3	<p data-bbox="387 1037 1364 1099">Connect the connector cable (JSTC) of the status indicator to the mating machine-side connector.</p> 

Continued in the next section.

1-4-2. Connecting piping

Procedures for connecting piping



When the piping connection operation for the wheel coolant water and spindle coolant water is completed, check that there is no looseness of the joints in the connections

If water leakage should occur, the floor surface and downstairs might be damaged.

A hose and hard piping line between the machine drain port and the plant-side drain inlet must be inclined

If the hose and hard piping line are positioned in parallel to or higher than the drain port, water remains in the hose, which may cause water leakage from the hose joint. It may also cause water leakage from the water case.

CAUTION

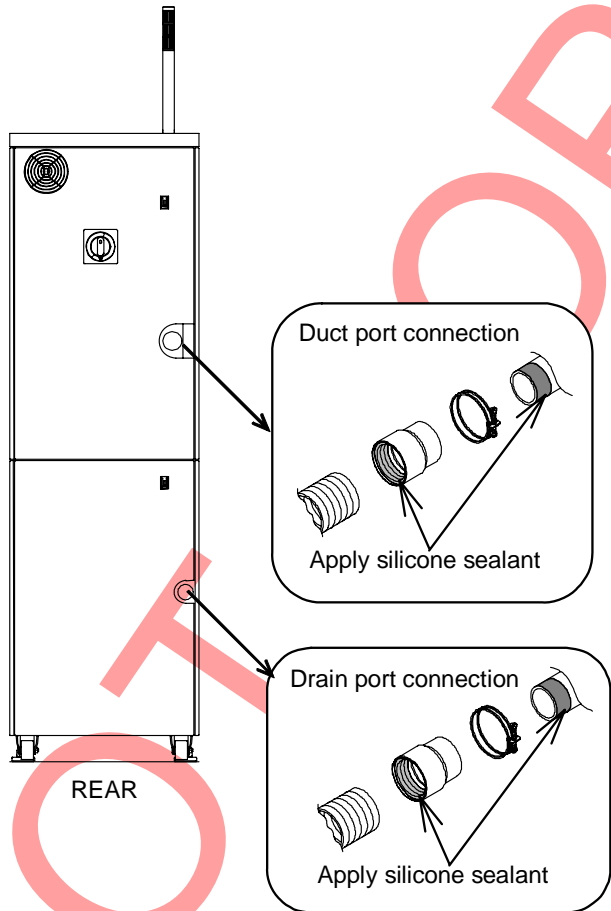
Ensure that air supply connection coupling is properly completed

Inadequate connections will cause the pipe to be disconnected. If the air pipe is disconnected during spindle rotation, the spindle may fail.

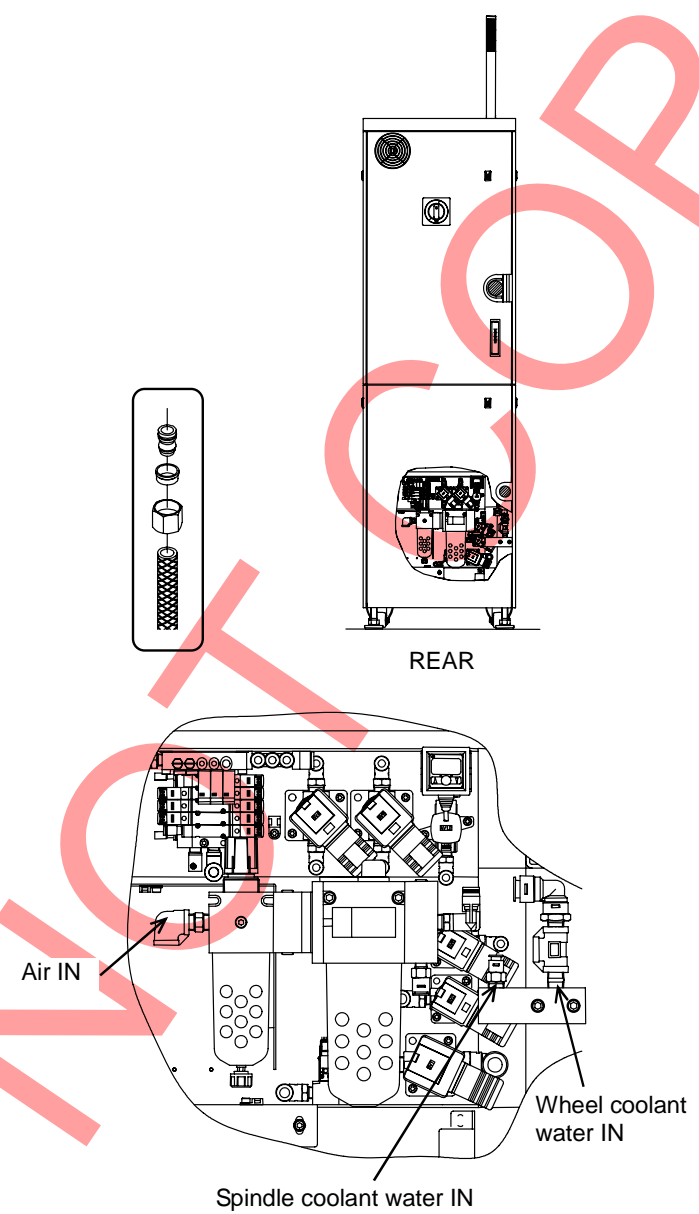
Operate the piping carefully not to connect the hoses of wheel and spindle coolant water incorrectly

When the quality of wheel and spindle coolant water is different from each other, improper piping of the water could lead to workpiece breakage or deterioration of cutting accuracy.

Procedures for connecting piping (Continued)

Step No.	Procedure (Continued from the previous section)
1	<p>As shown below, connect the hoses to the drain and duct exhaust ports at the back of the machine.</p> <ul style="list-style-type: none">• Apply silicone sealant to the hose and cuff joints.  <p>The diagram illustrates the rear of a machine with two ports. The top port is labeled 'Duct port connection' and the bottom port is labeled 'Drain port connection'. Both connections show a hose being attached to a cuff, with an arrow pointing to the joint and the text 'Apply silicone sealant'.</p>

Procedures for connecting piping (Continued)

Step No.	Procedure
2	<p>Using joints, connect the braided hoses to the supply ports of the individual utility manifold, as indicated below.</p> <ul style="list-style-type: none"> • It is recommended that the customer use a swage lock type joint as indicated in the figure. The swage lock type joint is available as an optional accessory.  <p style="text-align: center;">REAR</p> <p style="text-align: center;">Air IN</p> <p style="text-align: center;">Spindle coolant water IN</p> <p style="text-align: center;">Wheel coolant water IN</p>
3	Make sure that the connected joints are not loosened.

Continued in the next section.

1-4-3. Connecting power supply wiring

Procedures for connecting power supply wiring



When you make power cable connection, make sure to connect the PE line of the cable first and confirm its connection

If you come into contact with the machine when its PE line is not connected, you may receive an electric shock that could result in severe injury or death.

Do not turn ON the facility power source until the machine and the floor completely dry when they are wet with water

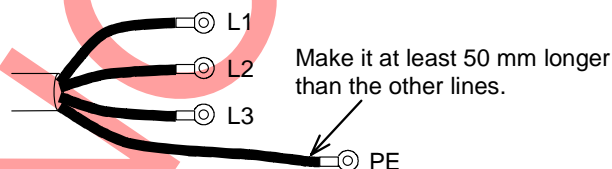
You may get an electric shock which could result in serious injury or death. Shut OFF power supply at the circuit breaker of this machine and facility power source, lock them out with padlocks or the like, and then wipe the machine and the floor dry.

Before connecting the power cables, be sure to shut OFF the facility power source

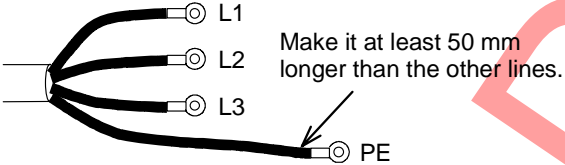
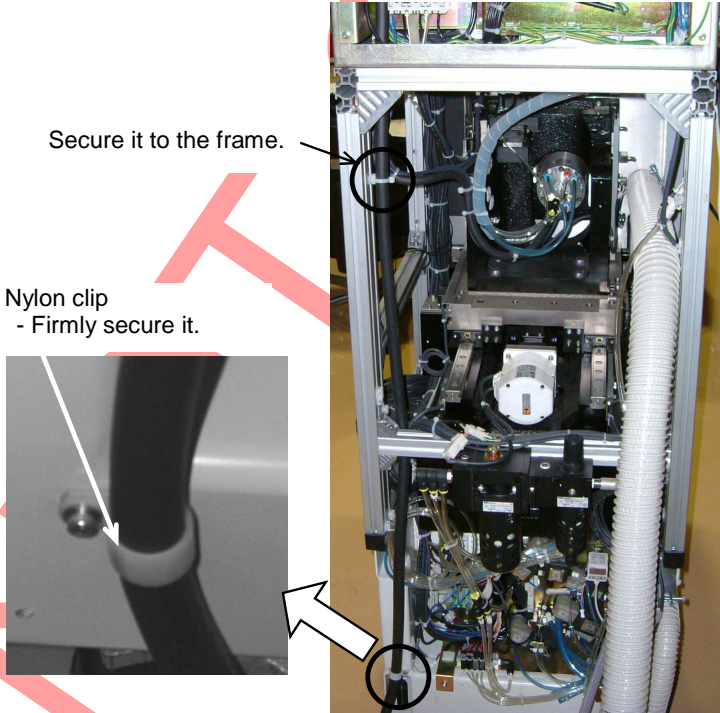
If you connect power cables while the electricity is flowing through the machine, you may receive an electric shock that may lead to serious injury or death.

Make sure that the PE line of the power cable is at least 50 mm longer than the L1/L2/L3 lines

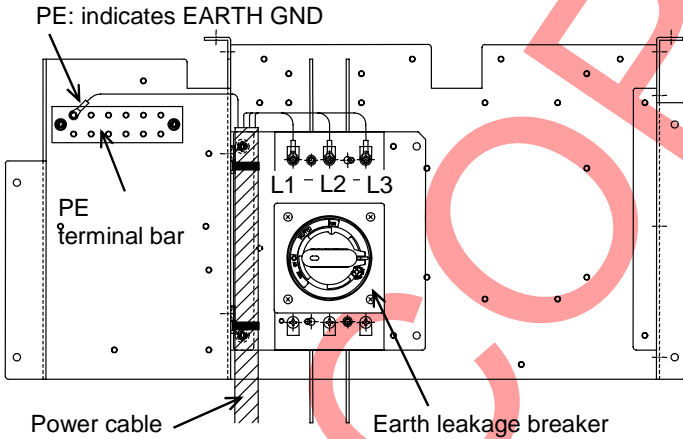
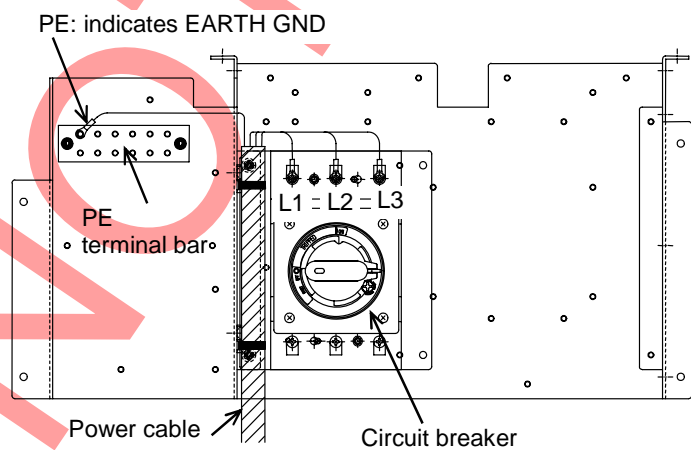
If the PE line of the power cable is loosened or disconnected while the load is applied to the cable, you may receive an electric shock from leaked current.



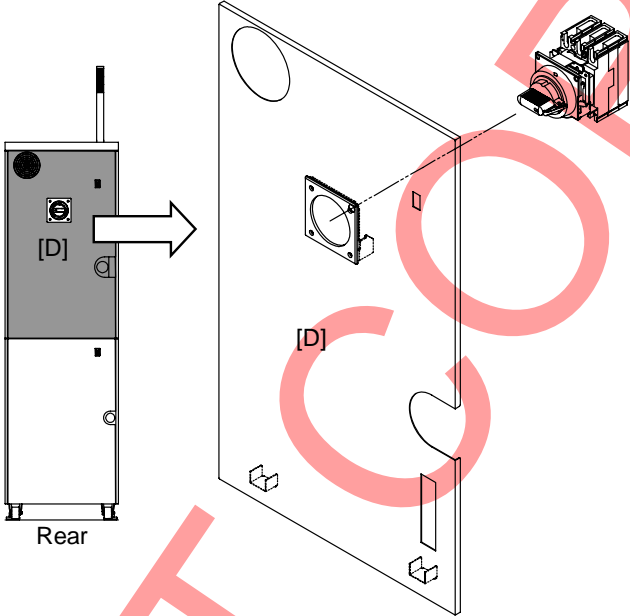
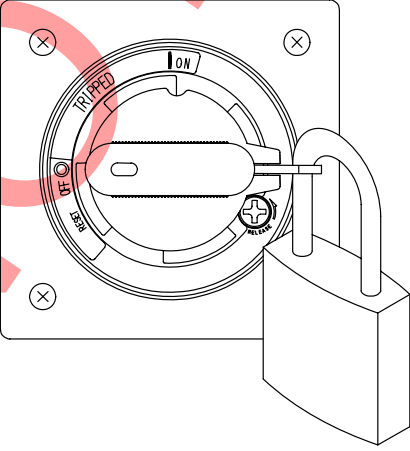
Procedures for connecting power supply wiring (Continued)

Step No.	Procedure (Continued from the previous section)
1	<p>Have on hand the cable, terminals and other items required for power cable connection.</p> <ul style="list-style-type: none"> • Make sure that the PE line of the power cable is at least 50 mm longer than the L1/L2/L3 lines. 
2	<p>Confirm that the circuit breaker lever is positioned at the "OFF" position.</p> <ul style="list-style-type: none"> • If not, turn the lever to the "OFF" position.
3	<p>Route the power cable to the inner side of the machine, as shown below.</p> <ul style="list-style-type: none"> • Screw down the retaining screw (M4) of the nylon clip to firmly secure the power cable so that it does not move. 

Procedures for connecting power supply wiring (Continued)

Step No.	Procedure								
4	<p>As indicated below, connect and fasten the power cable to the machine wiring terminal.</p> <ul style="list-style-type: none"> • In power cable connecting, be sure to connect the PE line first. • Before connecting the machine to the facility power source, connect the cables of optional accessories such as a transformer and UPS (Uninterruptible Power Supply). <p>[Standard specification]</p>  <p>[Transformer specification (380 to 415 VAC)]</p> <p>If a transformer is selected as an optional accessory, the earth leakage breaker is mounted on the transformer section. On the electrical system section, the circuit breaker is mounted.</p>  <p>[Power cable specifications (for standard and transformer specifications)]</p> <table border="1" data-bbox="470 1646 1332 1803"> <tbody> <tr> <td>Part number</td> <td>DWCN0412D02-0</td> </tr> <tr> <td>Part name</td> <td>CABLE (CABTYRE UE/STO)</td> </tr> <tr> <td>Nominal cross - sectional area</td> <td>12AWG (Equivalent to 3.5SQ)</td> </tr> <tr> <td>No. of conductors</td> <td>4</td> </tr> </tbody> </table>	Part number	DWCN0412D02-0	Part name	CABLE (CABTYRE UE/STO)	Nominal cross - sectional area	12AWG (Equivalent to 3.5SQ)	No. of conductors	4
Part number	DWCN0412D02-0								
Part name	CABLE (CABTYRE UE/STO)								
Nominal cross - sectional area	12AWG (Equivalent to 3.5SQ)								
No. of conductors	4								

Procedures for connecting power supply wiring (Continued)

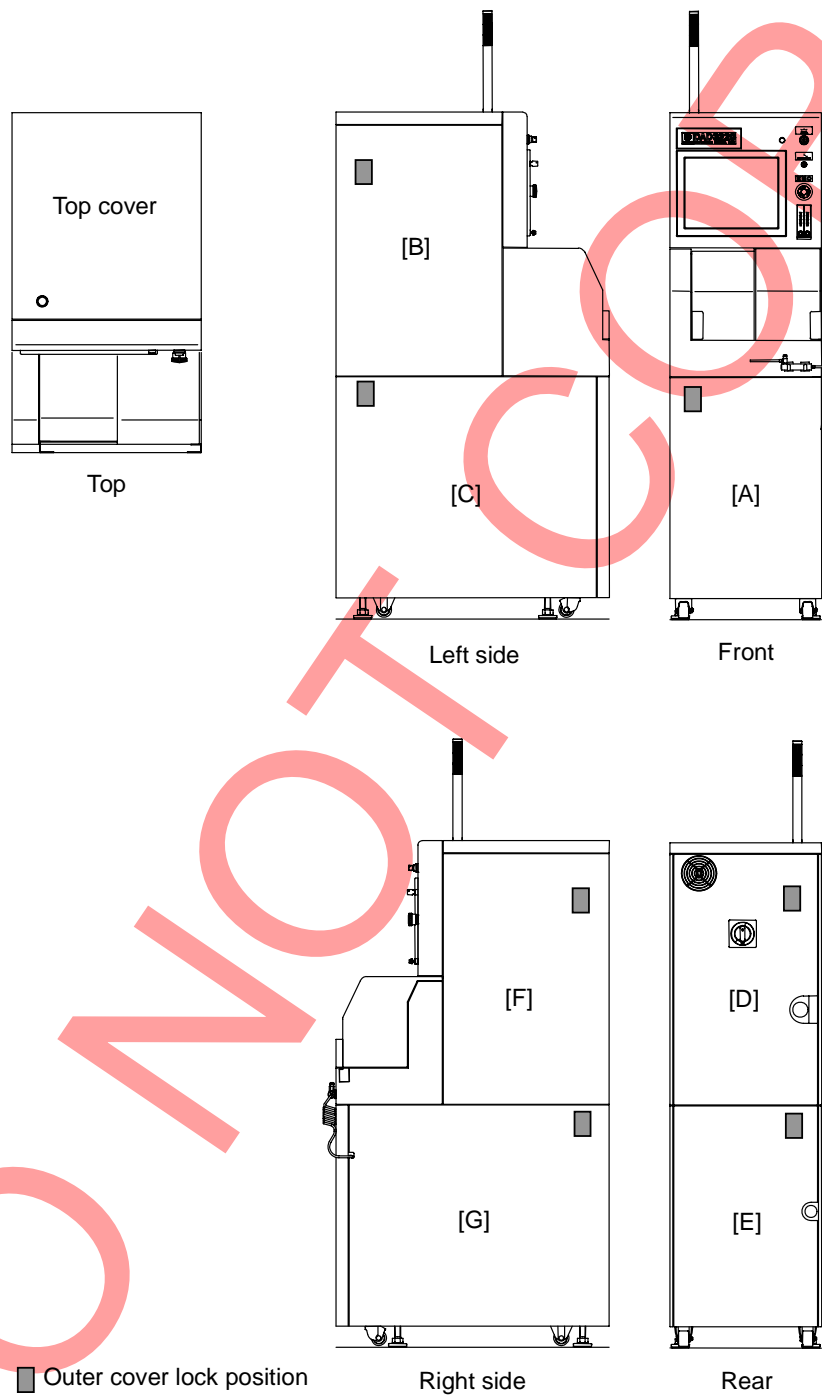
Step No.	Procedure
5	<p>Check to make sure that the PE line terminal is not strained when you lightly pull down the power cable by hand.</p> <ul style="list-style-type: none"> • If the PE line terminal is strained, it means that the PE line is not long enough. Use a PE line with enough length.
6	<p>Install the [D] cover.</p> 
7	<p>Lock up the circuit breaker lever with a padlock or the like.</p> 
8	<p>Connect the power cable to the facility power source.</p> <ul style="list-style-type: none"> • When you make cable connection to the facility power source, be sure to connect the PE wire first using a adequately long PE wire. • Before connecting the machine to the facility power source, connect the cables of optional accessories such as a transformer and UPS (Uninterruptible Power Supply).

1-5. Mounting the Machine Outer Cover

Machine outer cover configuration

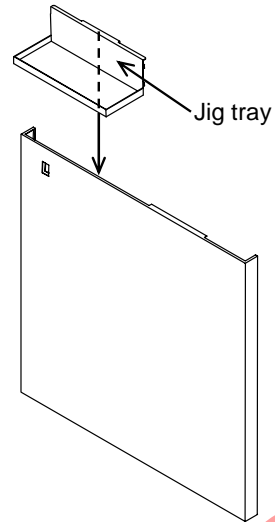
The machine outer cover is configured as shown below.

- The top cover should be mounted before the cover [F].
- The covers [C] and [G] should be mounted before the cover [A].

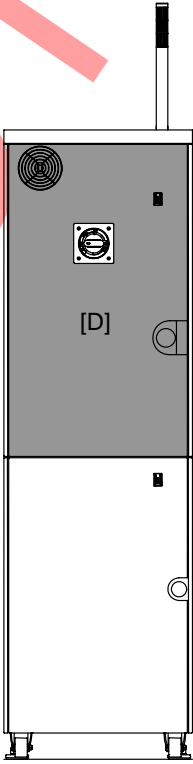


When using the jig tray

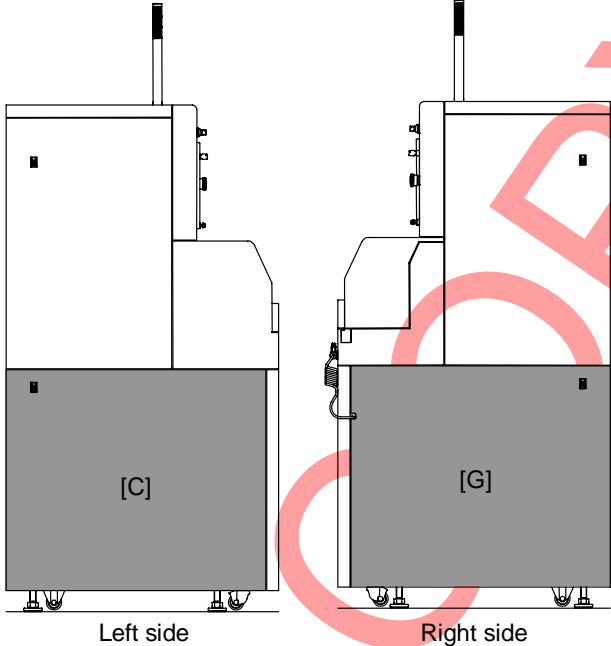
When using the jig tray, attach it to the cover first, and then mount the cover to the machine.



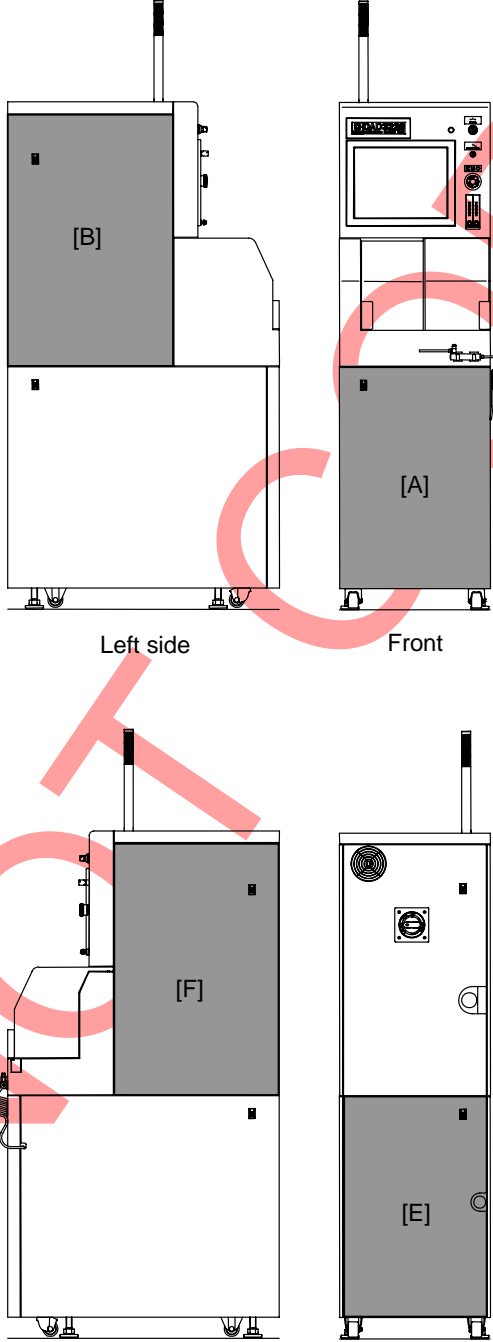
Procedures for mounting the machine outer cover

Step No.	Procedure
1	Make sure that the top cover and status indicator are already mounted. →For the procedure for mounting the top cover and status indicator; See the section 1-4-1, [Mounting the status indicator].
2	Make sure that the cover [D] is already attached.  <p>The diagram shows the rear view of a machine. The machine is a vertical cabinet with a dark grey upper section and a white lower section. The label '[D]' is placed on the dark grey section, indicating the location of the cover. The word 'Rear' is written below the machine. The machine has a vertical antenna on top and various ports and indicators on the front panel.</p>

Procedures for mounting the machine outer cover (Continued)

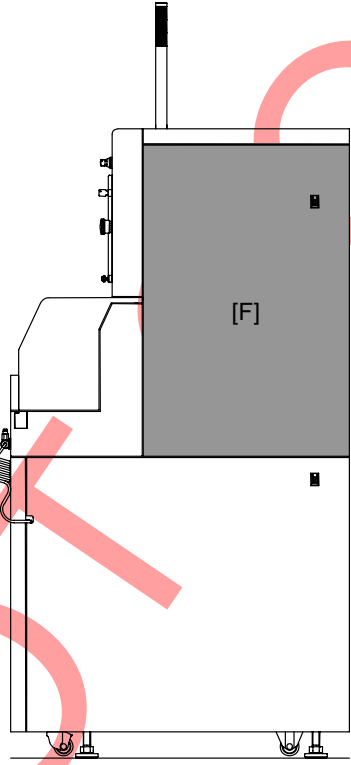
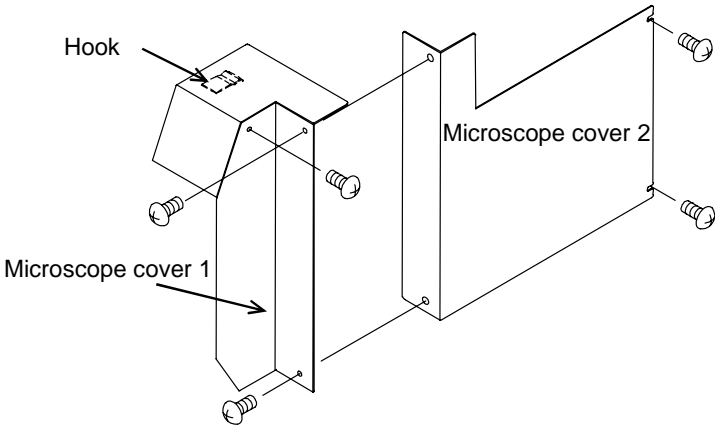
Step No.	Procedure
3	<p data-bbox="387 293 735 322">Mount the covers [C] and [G].</p>  <p>The diagram illustrates the mounting of two covers, [C] and [G], on a machine. On the left, cover [C] is shown being attached to the left side of the machine. On the right, cover [G] is shown being attached to the right side. Both covers are shaded gray and are mounted on a base with four casters. The machine's main body is white with a vertical pipe on top. The labels 'Left side' and 'Right side' are positioned below their respective diagrams.</p>

Procedures for mounting the machine outer cover (Continued)

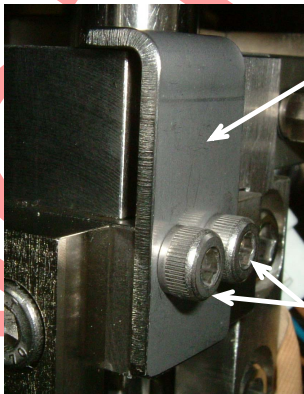
Step No.	Procedure
4	<p data-bbox="387 293 831 322">Mount the covers [A], [B], [E] and [F].</p>  <p data-bbox="746 965 842 994">Left side</p> <p data-bbox="1034 965 1098 994">Front</p> <p data-bbox="738 1688 850 1718">Right side</p> <p data-bbox="1038 1688 1098 1718">Rear</p>

1-6. Removing the microscope-axis metal fittings (Only for the machine with the non-contact setup mechanism)


Procedure for removing the microscope-axis metal fittings

Step No.	Procedure
1	<p>Remove the cover [F] and store it sufficiently away from the working area. →For the procedure to remove covers; See the section B-2-1-2, [Removing the machine outer cover].</p>  <p style="text-align: center;">Right side</p>
2	Open the microscope section cover.
3	<p>Remove the microscope cover 1.</p> <ul style="list-style-type: none"> The microscope cover 1 is secured with truss head screws (M3) in three places. The hook on the backside of this cover is hitched on the microscope section. In order to remove the microscope cover 1, slide it to the right and pull it toward you. 

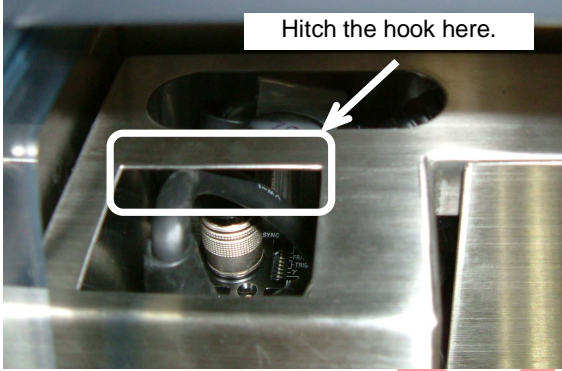

Procedure for removing the microscope-axis metal fittings (Continued)

Step No.	Procedure				
4	Loosen the screws on the rear of the microscope cover 2.				
5	Slide the microscope cover 2 to the front of the machine, and then remove it.				
6	Close the microscope section cover.				
7	Mount the cover [F]. →For the procedure to mount covers; See the section B-1-5 of, [Mounting the Machine Outer Cover].				
8	Turn on the facility-side power.				
9	Release the lock of the breaker lever and turn on the breaker.				
10	Insert the key into the main switch.				
11	Turn the key to the "START" position to turn on the power of the machine.				
12	Press the <System Initial> button. • The system initialization is effected.				
13	With the axis operation keyboard, move the Y-axis to the front by about 40 mm. • When the Y-axis is moved beyond 40 mm, the microscope section cover will interfere with the microscope cover and the microscope section cover will not open fully.				
14	Turn off the main switch and pull out the key.				
15	Turn off the breaker located on the backside of the machine, and then lock the breaker lever with a padlock.				
16	Shut off the facility-side power.				
17	Open the microscope section cover.				
18	Unscrew the retaining screws (M4) of the microscope-axis metal fitting (2 places) and then remove the metal fittings. <div style="text-align: center;">  </div> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Item</th> <th>DISCO Part ID</th> </tr> </thead> <tbody> <tr> <td>Microscope-axis metal fitting</td> <td>FIXTURE (SCOPE AXIS) LKKP-010031-0</td> </tr> </tbody> </table>	Item	DISCO Part ID	Microscope-axis metal fitting	FIXTURE (SCOPE AXIS) LKKP-010031-0
Item	DISCO Part ID				
Microscope-axis metal fitting	FIXTURE (SCOPE AXIS) LKKP-010031-0				

Procedure for removing the microscope-axis metal fittings (Continued)

Step No.	Procedure
19	<p>Mount the removed metal fittings and retaining screws, as shown below.</p> <ul style="list-style-type: none"> • Take care about the direction of the metal fitting. <div data-bbox="628 353 932 743" style="display: inline-block; vertical-align: middle;">  </div>
20	Close the microscope section cover.
21	Turn on the facility-side power.
22	Unlock the breaker lever and turn on the breaker.
23	Insert the key into the main switch.
24	Turn the key to the "START" position to turn on the power of the machine.
25	<p>Press the <System Initial> button.</p> <ul style="list-style-type: none"> • The system initialization is effected.
26	Turn off the main switch and pull out the key.
27	Turn off the breaker located on the backside of the machine, and then lock the breaker lever with a padlock.
28	Shut off the facility-side power.
29	Remove the cover [F].
30	Slide the removed microscope cover 2 from the front of the machine to mount it to its original position.

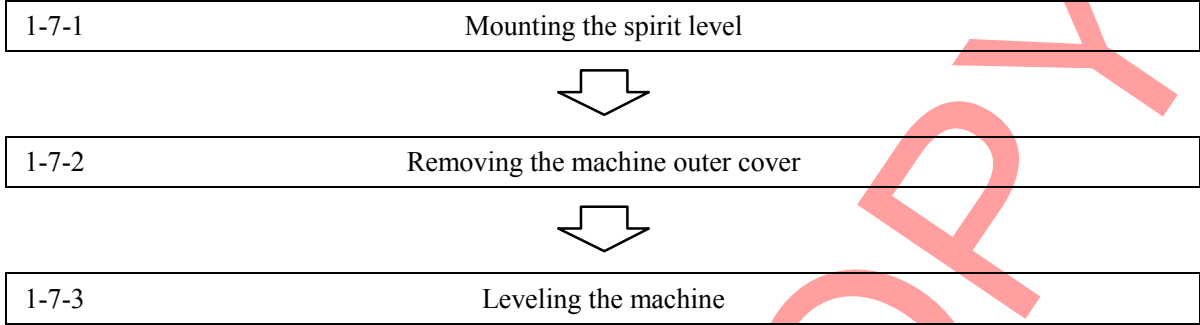
Procedure for removing the microscope-axis metal fittings (Continued)

Step No.	Procedure
31	<p>Mount the removed microscope cover 1.</p> <ul style="list-style-type: none"> • There is a hook on the microscope cover 1. Slide the microscope cover 1 from the front to the rear of the machine and hitch the hook to the position shown below.  <p><u>The state both microscope covers are mounted</u></p> 
32	Push the microscope cover 1 to the left and then secure it with the retaining screw.
33	Mount the cover [F].

1-7. Leveling the Machine with the Adjusters

Operation flow

The procedure for leveling the machine with the adjusters consists of the following steps.



Before operation

Have the following equipment on hand to level the machine using the adjusters.

Spirit level (Minimum tick: 20 $\mu\text{m}/\text{m}$)
30 mm wrench
Safety shoes and protective gloves

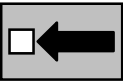
1-7-1. Mounting the spirit level

Mounting the spirit level



Wear safety shoes and protective gloves during the operation

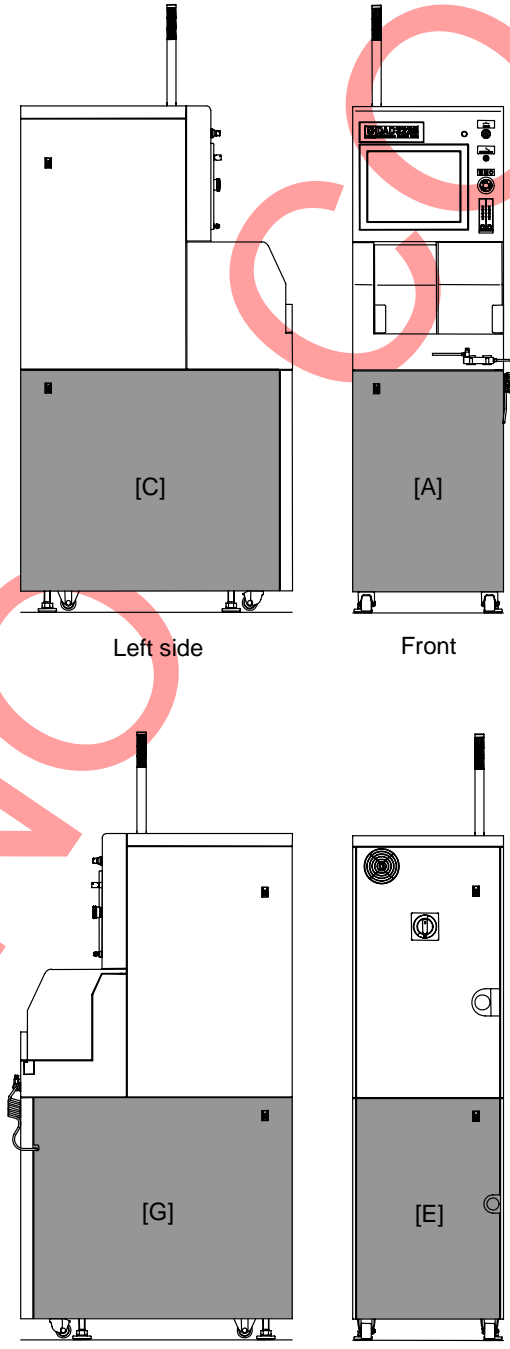
Your feet and hands could be caught or cut off by the machine.

Step No.	Procedure
1	Wear the safety shoes and protective gloves.
2	Turn ON the facility power supply.
3	Unlock the lever of the circuit breaker, and then turn ON the circuit breaker.
4	Insert the key into the main switch.
5	Rotate the key to "START" position to turn ON the machine.
6	Press the <System Initial> button. • System initialization will be effected.
7	 With the button on the software keyboard, move the chuck table to a location under the spindle section.
8	Open the splash cover.
9	Make sure that there is no dirt or other foreign matters on the upper surface of the table base. Place a spirit level on the table base.
10	Close the splash cover.

Continued in the next section.

1-7-2. Removing the machine outer cover

Procedures for removing the machine outer cover

Step No.	Procedure (Continued from the previous section)
1	Turn OFF the main switch and then remove it.
2	Turn OFF the circuit breaker at the back of the machine and lock out the breaker lever with a padlock or the like.
3	Shut OFF the facility power supply.
4	<p>Remove the covers [A], [C], [E] and [G].</p> <ul style="list-style-type: none"> • Before removing the covers [C] and [G], remove the cover [A]. <div style="text-align: center;">  <p>The diagrams illustrate the machine from four perspectives, each with a specific cover highlighted in grey for removal:</p> <ul style="list-style-type: none"> Left side: Cover [C] is highlighted. Front: Cover [A] is highlighted. Right side: Cover [G] is highlighted. Rear: Cover [E] is highlighted. </div>

Continued in the next section.

1-7-3. Leveling the machine

Procedures for leveling the machine

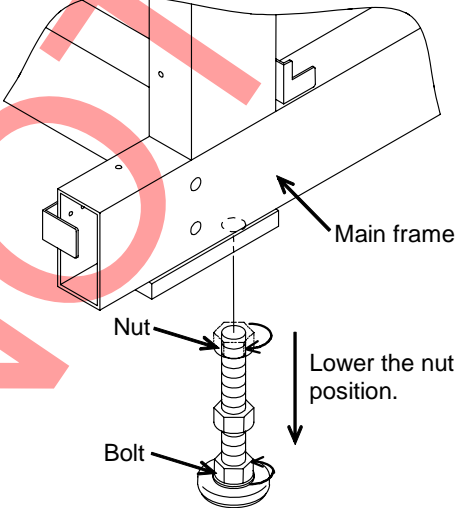
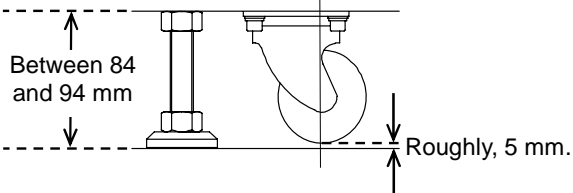


Do not place your feet or hands under the machine during jacking operation

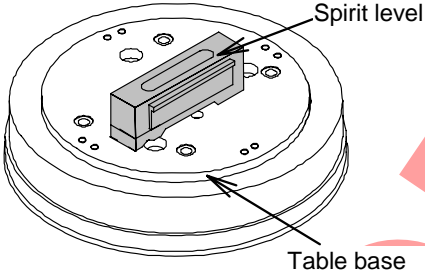
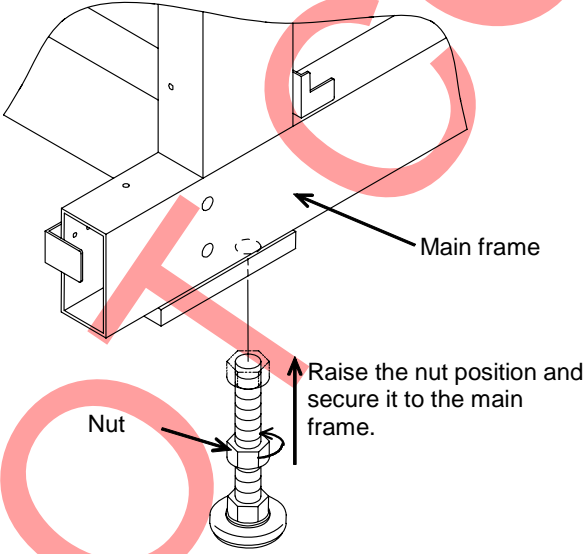
If the machine should topple down during jacking operation, you may be caught under the machine, or if the adjuster should come off, your feet or hands may be caught or cut off by the machine.

The adjuster must be adjusted so that the distance between the machine bottom surface and floor surface becomes between 84 and 94 mm

If the machine is jacked up higher than this, the adjuster may come off. If the adjuster comes off during jacking operation, your feet or hands may be caught or cut off by the machine.

Step No.	Procedure (Continued from the previous section)
1	Turn the nuts of the adjusters (4 places) clockwise to loosen them evenly. 
2	With a wrench, turn the bolt of the adjuster (4 places) counterclockwise until the adjuster touches the floor surface. * As a rough guide, the space between the caster and floor surface is 5 mm. 

Procedures for leveling the machine (Continued)

Step No.	Procedure
3	<p>With a spirit level, level the machine until the spirit level reads 0.02 mm/1 m or lower for both the X- and Y-direction.</p> 
4	<p>With a wrench, turn the nut of the adjuster (4 places) counterclockwise until it hits the main frame.</p> <ul style="list-style-type: none"> • The position of the adjuster is fixed. 
5	<p>Remove the spirit level from the table base surface.</p>
6	<p>Secure the machine to the floor with the machine anchors. →For the anchoring procedure, see section 1-8 of this chapter, [Mounting the Machine Anchors [Optional Accessory]].</p>

1-8. Mounting the Machine Anchors [Optional Accessory]

Before operation

Have on hand the following equipment for mounting the machine anchors.

13 mm wrench
18 mm wrench
Safety shoes and protective gloves

DO NOT COPY



Wear safety shoes and protective gloves during the operation

Your feet and hands could be caught or cut off by the machine.

Step No.	Procedure
1	Wear safety shoes and protective gloves.
2	<p>As shown below, secure the machine to the floor surface using the machine anchors.</p> <ul style="list-style-type: none"> The installing positions of the machine anchors are indicated with arrows on the main frame.

1-9. Completion of Installation Operation

Procedures for completion of installation operation

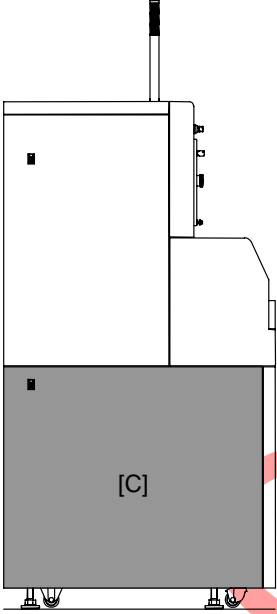
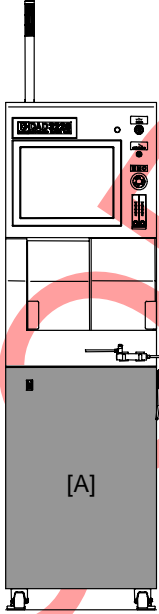
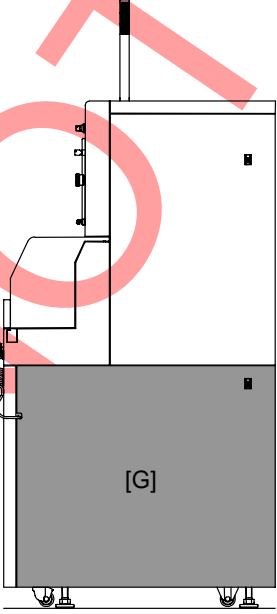
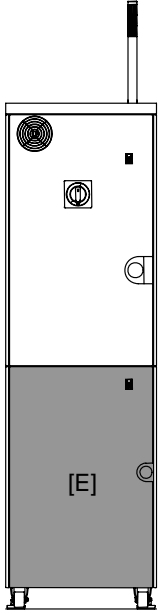


When the installation work is completed, check that there is no water leakage from any piping while feeding the wheel coolant water and spindle coolant water

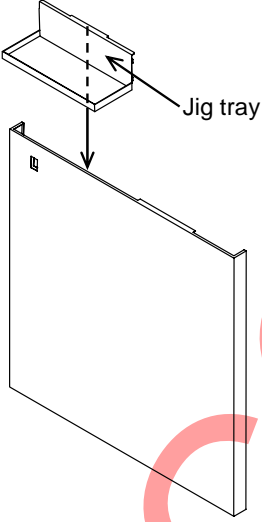
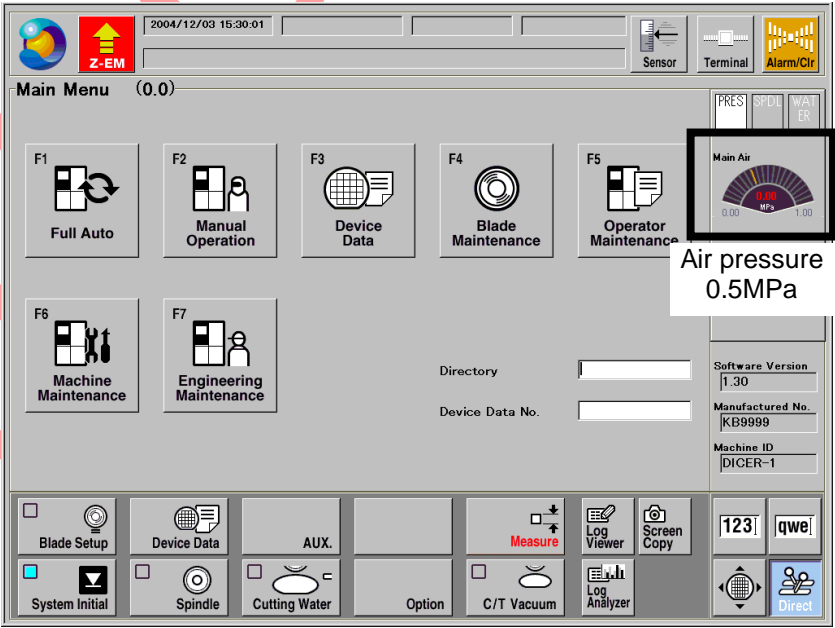
If water leakage should occur, the floor surface and downstairs might be damaged.

DO NOT COPY

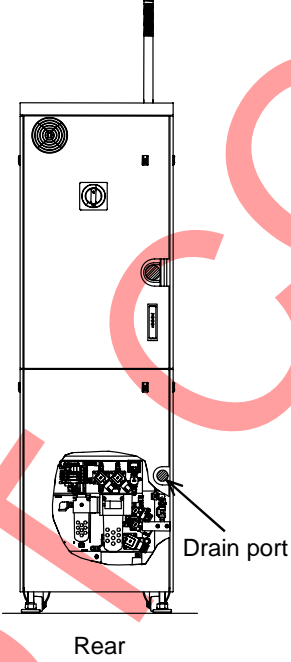
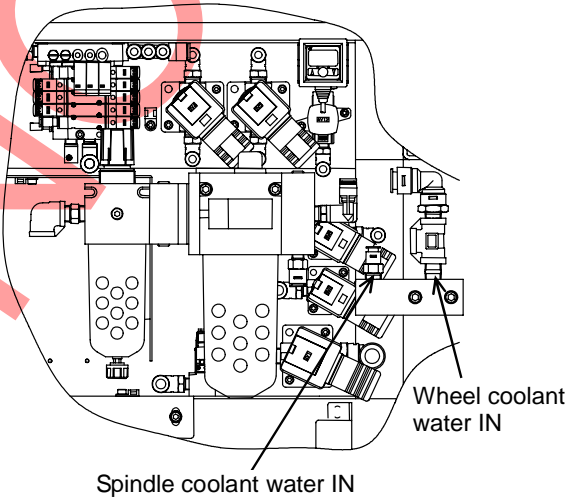
Procedures for completion of installation operation (Continued)

Step No.	Procedure
1	<p data-bbox="387 293 836 322">Mount the covers [A], [C], [E] and [G].</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p data-bbox="746 965 841 994">Left side</p> </div> <div style="text-align: center;">  <p data-bbox="1034 965 1098 994">Front</p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  <p data-bbox="738 1688 850 1718">Right side</p> </div> <div style="text-align: center;">  <p data-bbox="1038 1688 1098 1718">Rear</p> </div> </div>

Procedures for completion of installation operation (Continued)

Step No.	Procedure
1 (Continued)	<p>When using the jig tray, attach it to the cover first, and then mount the cover to the machine.</p> 
2	Turn ON the facility power supply.
3	Open the lock of the breaker at the back of the machine, and then turn ON the circuit breaker.
4	Insert the key into the main switch.
5	Turn ON the machine by rotating the key to the "START" position.
6	<p>Press the <System Initial> button.</p> <ul style="list-style-type: none"> • System initialization will be effected.
7	<p>Make sure that the air pressure displayed on the right side of the screen indicates 0.5 MPa or higher.</p> <p>→For the air adjustment procedures; See the section B-3 of Maintenance Manual, [Sensor Adjustment].</p> 

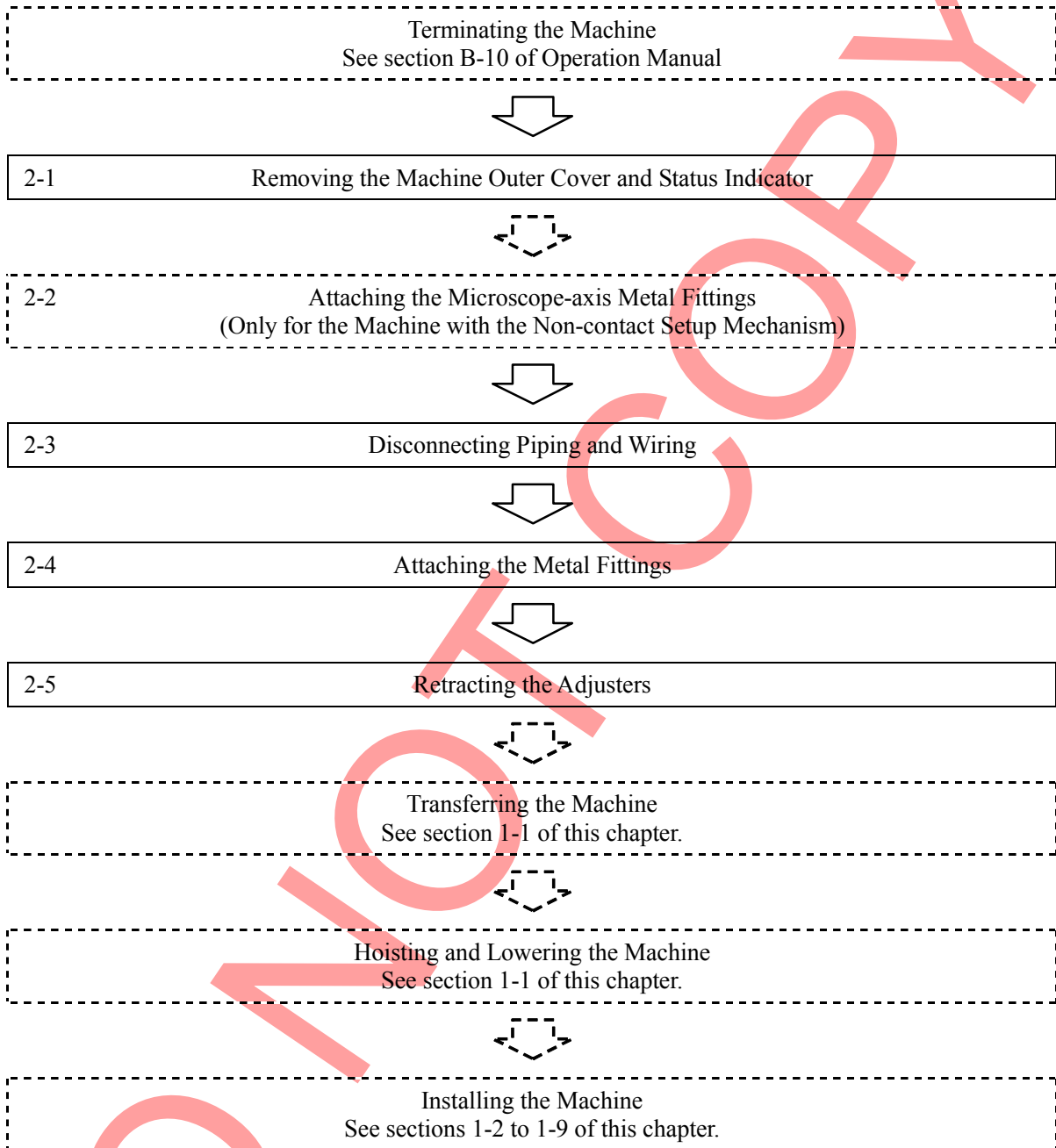
Procedures for completion of installation operation (Continued)

Step No.	Procedure
8	Mount the chuck table. →For the procedures to mount the chuck table; See the section B-1, [Chuck Table Replacement] of the Maintenance Manual.
9	Press the <Spindle> button.
10	Press the <Cutting Water> button.
11	Make sure that no water leaks from the drain port on the backside of the machine and piping for wheel and spindle coolant. <div style="text-align: center; margin-top: 20px;">  <p>Rear</p> </div> <div style="text-align: center; margin-top: 20px;">  <p>Spindle coolant water IN</p> <p>Wheel coolant water IN</p> </div>

2. Transferring Operation

Operation flow

The procedure for transferring operation of the machine consists of the following steps.



NOTICE

When it is necessary to transfer or dispose of the machine, contact DISCO service office

DISCO will provide you with detailed information and precautions required for carrying out such operation and manage the machine serial number file at the new installation site.

Use the safety goggles, protective gloves, stepstools, flashlights and alcohol which are furnished in your factory or comply with your factory's standards

Safety goggles, protective gloves, stepstools, flashlights and alcohol are not supplied with the machine.

DO NOT COPY

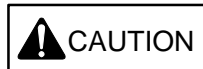
2-1. Removing the Machine Outer Cover and Status Indicator

Safety items for operation with the machine outer cover removed



Wait at least 20 minutes for the operation after the supply power is turned OFF.

There are some potential hazardous areas for burns inside of the machine. As the areas retain heat even after the machine is turned OFF, direct contact could cause burns.



The machine outer covers removed when performing maintenance on the machine should be placed far enough from the working area

Also make sure to replace the removed covers immediately after the maintenance is completed. If the covers are placed against the machine during operations, they may fall when an earthquake or other accident occurs and injure maintenance personnel at work.

Operation flow

The procedure for removing the machine outer cover and status indicator consists of the following steps.

2-1-1 Turning OFF the power



2-1-2 Removing the machine outer cover



2-1-3 Removing the status indicator

Before operation

Have on hand the following key to remove the machine outer cover.

Item	DISCO Part ID
Key	KEY(FASTENER) LHLC-010010-0

2-1-1. Turning OFF the power

Procedures for turning OFF the power

Step No.	Procedure
1	Press the <System Initial> button to effect system initialization.
2	Move the X-axis to the left until it stops.
3	Turn OFF the main switch.
4	<u>If you use a water temperature control unit;</u> Turn OFF the power of the unit.
5	Turn OFF the circuit breaker at the back of the machine.
6	Shut off the facility power supply.
7	Wait at least 20 minutes until the heat source cools down.

Continued in the next section.

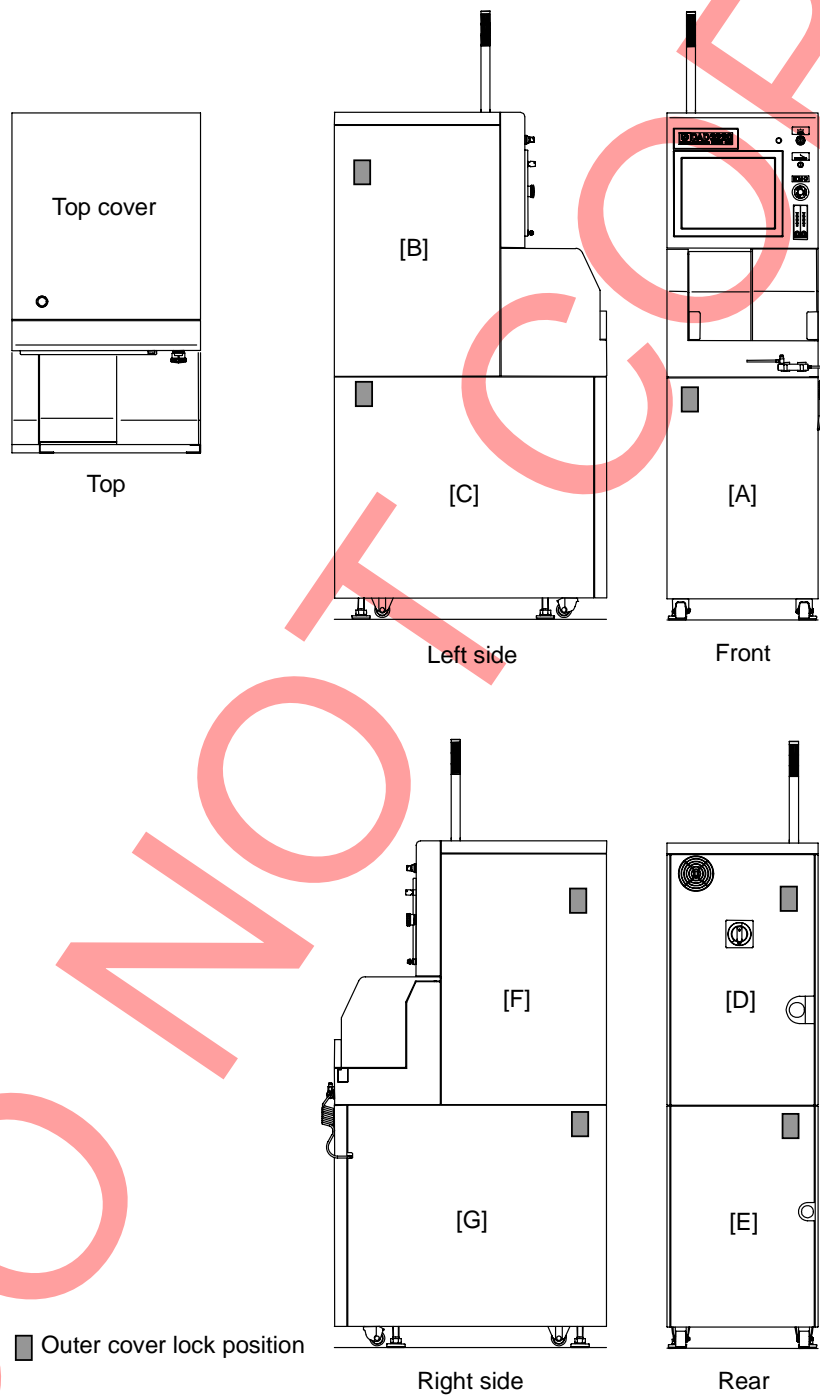
DO NOT COPY

2-1-2. Removing the machine outer cover

Machine outer cover configuration

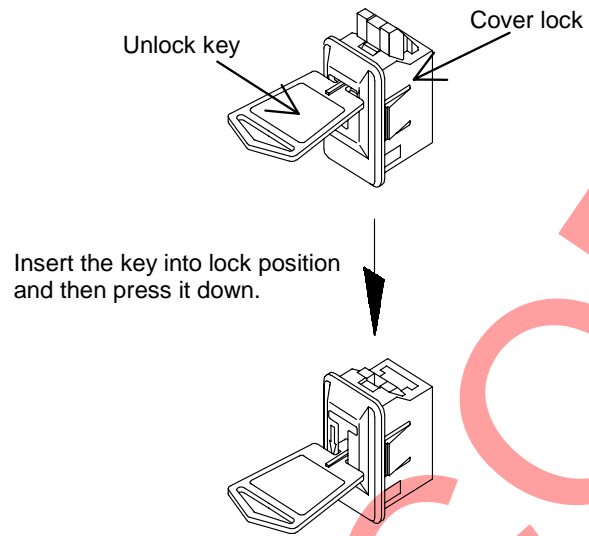
The machine outer cover is configured as shown below.

- The top cover is secured by hooking its protrusions on both sides on the frame or other part of the machine. Before removing the top cover, remove the cover [F] first, and then remove the top cover toward the left side of the machine.
- Before removing the covers [C] and [G], remove the cover [A].

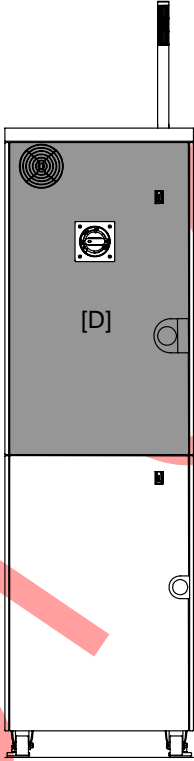
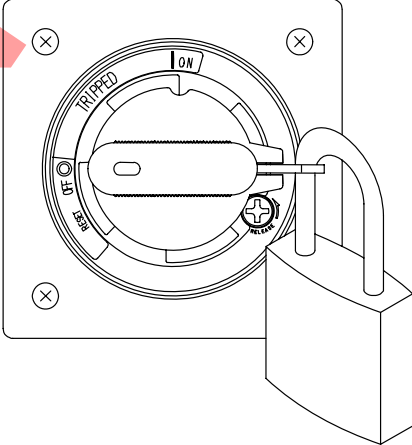


How to unlock the outer cover

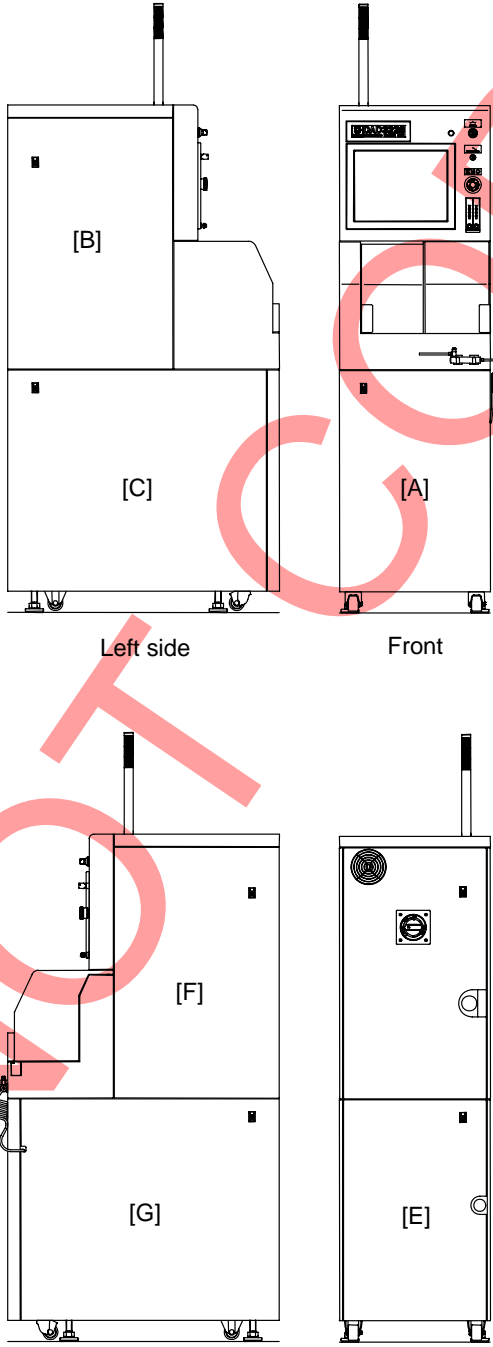
As shown below, insert the unlock key into the cover lock position in order to release the cover lock and remove the cover.



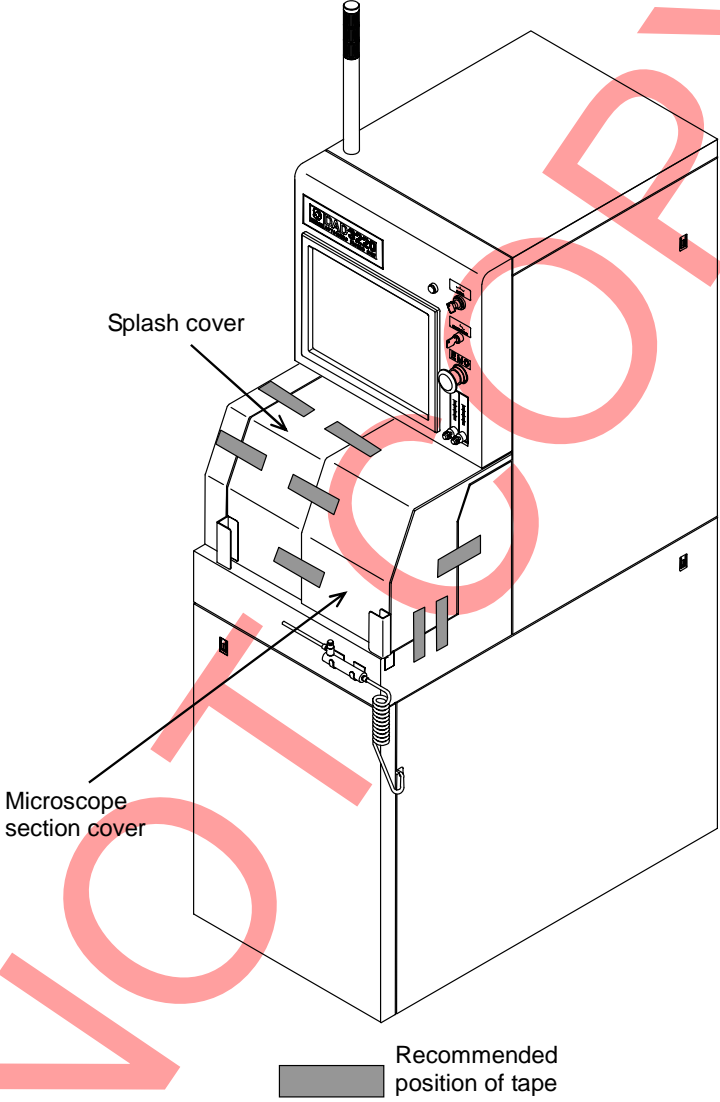
Procedures for removing the machine outer cover

Step No.	Procedure (Continued from the previous section)
1	Confirm the circuit breaker lever is positioned at "OFF" position. <ul style="list-style-type: none"> • The [D] cover cannot be removed when the circuit breaker lever at the "ON" position. • The circuit breaker lever cannot be positioned at the "ON" position once the [D] cover is removed.
2	Remove the [D] cover. <div style="text-align: center;">  <p>Rear side</p> </div>
3	Lock up the circuit breaker lever with a padlock or the like. <div style="text-align: center;">  </div>

Procedures for removing the machine outer cover (Continued)

Step No.	Procedure
4	<p>Remove the covers [A], [B], [C], [E], [F] and [G].</p> <ul style="list-style-type: none"> • Before removing the covers [C] and [G], remove the cover [A]. <div style="text-align: center;">  <p>The diagrams illustrate the machine from four perspectives, each with a cover labeled for removal:</p> <ul style="list-style-type: none"> Left side: Shows covers [B] (upper) and [C] (lower). Front: Shows cover [A] on the lower front panel. Right side: Shows covers [F] (upper) and [G] (lower). Rear: Shows cover [E] on the lower rear panel. </div>

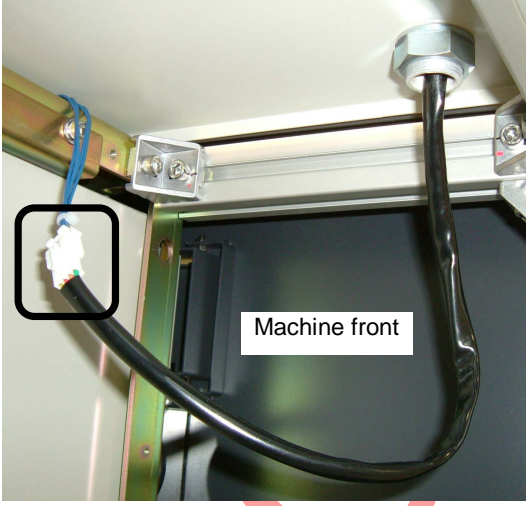
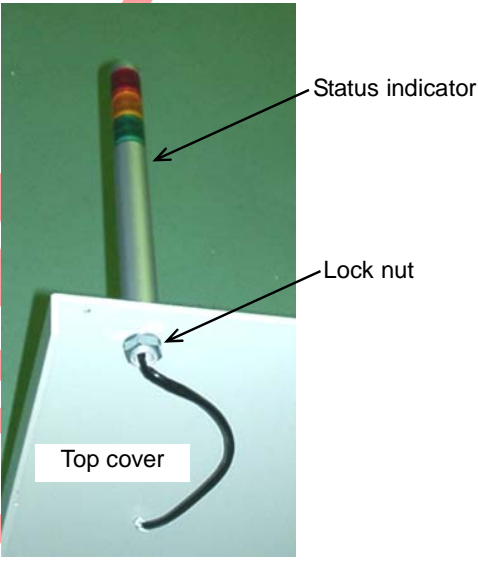
Procedures for removing the machine outer cover (Continued)

Step No.	Procedure
5	<p data-bbox="389 293 1385 353">Secure the microscope section cover and splash cover with an adhesive tape so that they will not open during transfer.</p>  <p data-bbox="644 680 783 707">Splash cover</p> <p data-bbox="539 1160 687 1211">Microscope section cover</p> <p data-bbox="932 1413 1098 1464">Recommended position of tape</p>
6	<p data-bbox="389 1496 1145 1523">Store the removed covers sufficiently away from the working area.</p>

Continued in the next section.

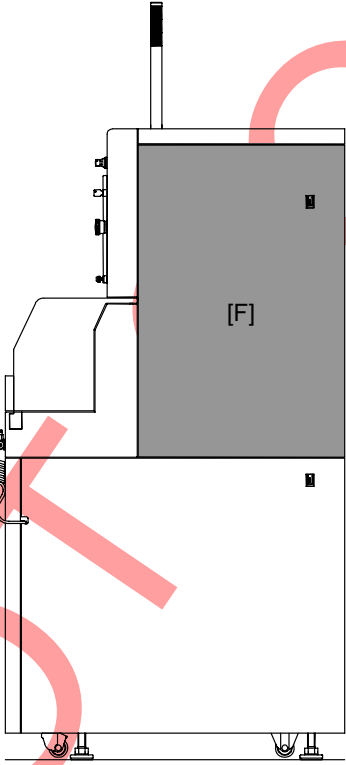
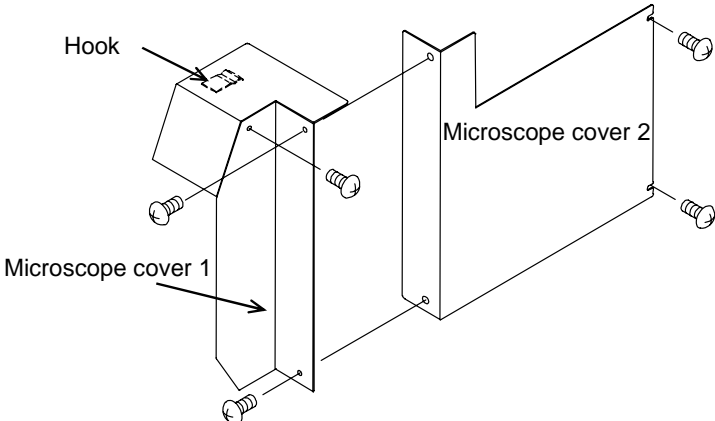
2-1-3. Removing the status indicator

Procedures for removing the status indicator

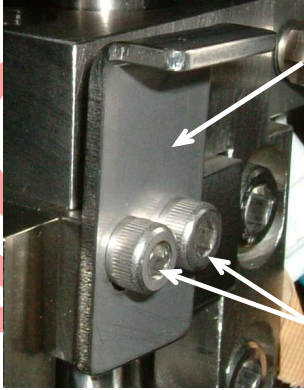
Step No.	Procedure (Continued from the previous section)
1	Disconnect the connector cable of the status indicator (JSTC). 
2	Remove the top cover.
3	Unfasten the lock nut of the status indicator, and then remove the status indicator. 
4	Wrap the status indicator with packing material.

2-2. Attaching the microscope-axis metal fittings (Only for the machine with the non-contact setup mechanism)

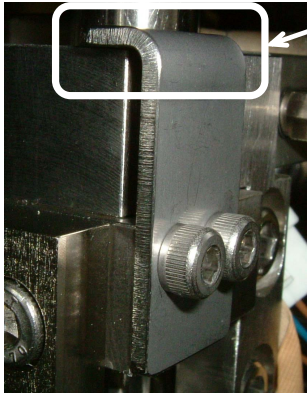
Procedure for attaching the microscope-axis metal fittings

Step No.	Procedure
1	<p>Remove the cover [F] and store it sufficiently away from the working area. →For the procedure to remove covers; see the section B-2-1-2, [Removing the machine outer cover].</p>  <p style="text-align: center;">Right side</p>
2	<p>Open the microscope section cover.</p>
3	<p>Remove the microscope cover 1.</p> <ul style="list-style-type: none"> The microscope cover 1 is secured with truss head screws (M3) in three places. The hook on the backside of this cover is hitched on the microscope section. In order to remove the microscope cover 1, slide it to the right and pull it toward you. 

Procedure for attaching the microscope-axis metal fittings (Continued)

Step No.	Procedure				
4	Loosen the screws on the rear of the microscope cover 2.				
5	Slide the microscope cover 2 to the front of the machine, and then remove it.				
6	Close the microscope section cover.				
7	Mount the cover [F]. →For the procedure to mount covers; See the section B-1-5, [Mounting the Machine Outer Cover].				
8	Turn on the facility-side power.				
9	Release the lock of the breaker lever and turn on the breaker.				
10	Insert the key into the main switch.				
11	Turn the key to the "START" position to turn on the power of the machine.				
12	Press the <System Initial> button. • The system initialization is effected.				
13	With the axis operation keyboard, move the Y-axis to the front by about 40 mm. • When the Y-axis is moved beyond 40 mm, the microscope section cover will interfere with the microscope cover and the microscope section cover will not open fully.				
14	Turn off the main switch and pull out the key.				
15	Turn off the breaker located on the backside of the machine, and then lock the breaker lever with a padlock.				
16	Shut off the facility-side power.				
17	Open the microscope section cover.				
18	Unscrew the retaining screws (M4) of the microscope-axis metal fitting (2 places) and then remove the metal fittings. <div style="text-align: center;">  </div> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Item</th> <th>DISCO Part ID</th> </tr> </thead> <tbody> <tr> <td>Microscope-axis metal fitting</td> <td>FIXTURE (SCOPE AXIS) LKKP-010031-0</td> </tr> </tbody> </table>	Item	DISCO Part ID	Microscope-axis metal fitting	FIXTURE (SCOPE AXIS) LKKP-010031-0
Item	DISCO Part ID				
Microscope-axis metal fitting	FIXTURE (SCOPE AXIS) LKKP-010031-0				

Procedure for attaching the microscope-axis metal fittings (Continued)

Step No.	Procedure
19	<p>Mount the removed metal fittings and retaining screws, as shown below.</p> <ul style="list-style-type: none"> • Take care about the direction of the metal fitting. <div data-bbox="655 356 962 748" style="display: inline-block; vertical-align: middle;">  </div>
20	Close the microscope section cover.
21	Turn on the facility-side power.
22	Unlock the breaker lever and turn on the breaker.
23	Insert the key into the main switch.
24	Turn the key to the "START" position to turn on the power of the machine.
25	<p>Press the <System Initial> button.</p> <ul style="list-style-type: none"> • The system initialization is effected.
26	Turn off the main switch and pull out the key.
27	Turn off the breaker located on the backside of the machine, and then lock the breaker lever with a padlock.
28	Shut off the facility-side power.
29	Remove the cover [F].
30	Slide the removed microscope cover 2 from the front of the machine to mount it to its original position.

Procedure for attaching the microscope-axis metal fittings (Continued)

Step No.	Procedure
31	<p>Mount the removed microscope cover 1.</p> <ul style="list-style-type: none"> • There is a hook on the microscope cover 1. Slide the microscope cover 1 from the front to the rear of the machine and hitch the hook to the position shown below. <div data-bbox="619 407 1182 779" data-label="Image"> </div> <p>The state both microscope covers are mounted</p> <div data-bbox="703 840 1098 1355" data-label="Image"> </div>
32	Push the microscope cover 1 to the left and then secure it with the retaining screw.
33	Mount the cover [F].

2-3. Disconnecting Piping and Wiring

Before operation

Have on hand the following tools for disconnecting piping and wiring.

30 mm wrench

Safety shoes and protective gloves

Procedures for disconnecting piping and wiring



Do not turn ON the facility power source until the machine and the floor completely dry when they are wet with water

You may get an electric shock which could result in serious injury or death. Shut OFF power supply at the circuit breaker of this machine and facility power source, lock them out with padlocks or the like, and then wipe the machine and the floor dry.

Be sure to disconnect the PE line last after disconnecting power supply cables

If you come into contact with the machine that is not grounded, you may receive an electric shock which could result in serious injury or death.

The wiring disconnection must be made after shutting OFF the machine power and the facility power supply

If you make any wiring disconnection while power is supplied, you may receive an electric shock which could result in serious injury or death.

Wear protective gloves/goggles and use tweezers to clean the inside of the machine and remove broken workpieces

If you perform such operation with bare hands, they may be cut or stabbed by the workpiece.

Lock out the water and air main valves

If any of the main valves (water or air) is opened by other persons during machine installation or maintenance, it may cause an accident or machine failure.

Step No.	Procedure
1	Disconnect the power cable from the facility power source. • Be sure to disconnect the PE wire last.
2	Shut OFF the facility-side master valve completely and disconnect pipes.
3	Wear the safety shoes and protective gloves.
4	Drain water from the machine. • When the floor or machine gets wet, wipe it dry with a cloth or the like.
5	Remove the machine anchors. →See section 1-8 of this chapter, [Mounting the Machine Anchors [Optional Accessory]].

2-4. Mounting the Metal Fittings

Safety precautions in attachment of the metal fittings



Perform the operation after the machine power, facility power supply and air are shut OFF

If your hands or fingers are placed in a drive section during axis metal fixture installation, they may be caught or cut off.

Before operation

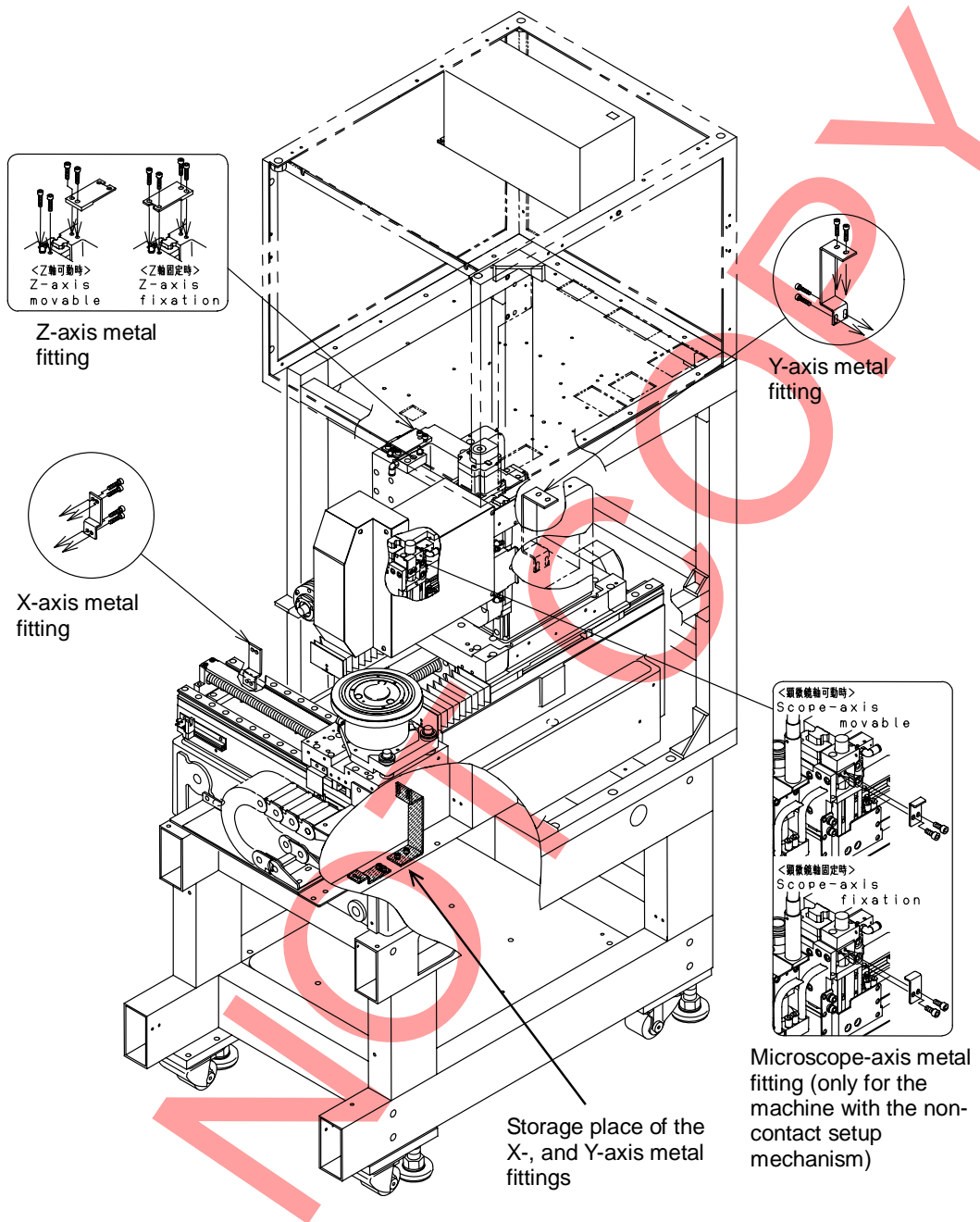
Have on hand the following tools for securing drive axes.

4 mm Allen wrench

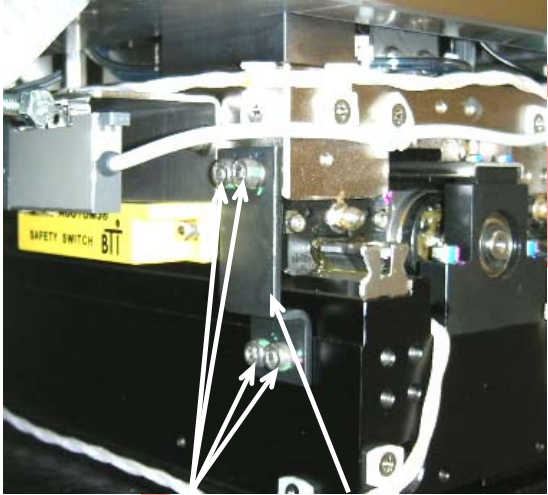
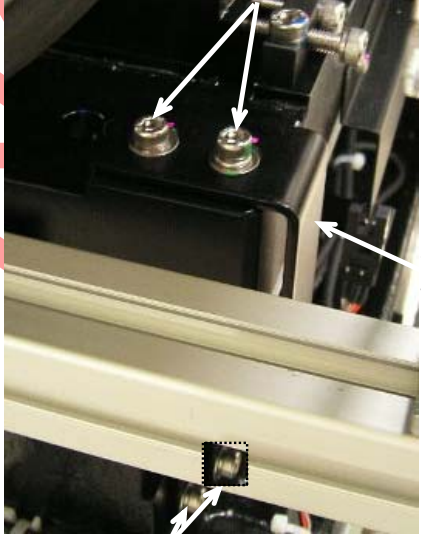
5 mm Allen wrench

Phillips screwdriver

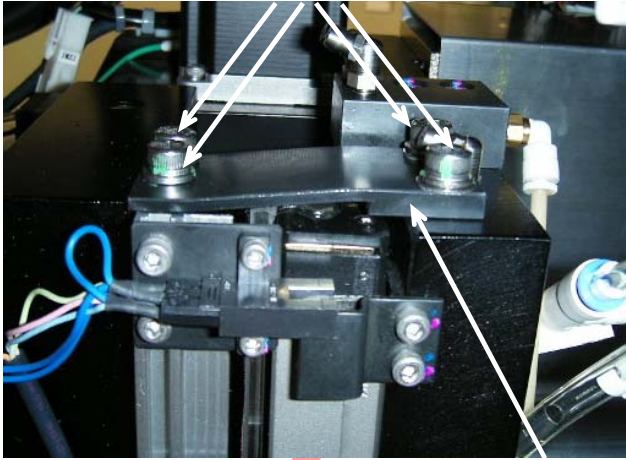
Locations of the metal fittings



Procedure for attaching the metal fittings

Step No.	Procedure				
1	(Only for the machine with the non-contact setup mechanism) Check that the microscope-axis metal fittings are attached properly. →If they are not attached properly, see section 2-2 of chapter B, [Attaching the microscope-axis metal fittings (Only for the machine with the non-contact setup mechanism)].				
2	Attach the X-axis metal fitting with the retaining screws (M5, 4 places). <div style="text-align: center;">  <p data-bbox="703 1010 879 1037">Retaining screw</p> <p data-bbox="916 1010 1114 1037">X-axis metal fitting</p> <table border="1" data-bbox="427 1061 1375 1173"> <thead> <tr> <th data-bbox="427 1061 852 1099">Item</th> <th data-bbox="852 1061 1375 1099">DISCO Part ID</th> </tr> </thead> <tbody> <tr> <td data-bbox="427 1099 852 1173">X-axis metal fitting</td> <td data-bbox="852 1099 1375 1173"> FIXTURE (X) LKKN-010036-0 </td> </tr> </tbody> </table> </div>	Item	DISCO Part ID	X-axis metal fitting	FIXTURE (X) LKKN-010036-0
Item	DISCO Part ID				
X-axis metal fitting	FIXTURE (X) LKKN-010036-0				
3	Attach the Y-axis metal fitting with the retaining screws (M5, 4 places). <div style="text-align: center;">  <p data-bbox="783 1256 959 1283">Retaining screw</p> <p data-bbox="1031 1541 1166 1597">Y-axis metal fitting</p> <p data-bbox="727 1827 903 1854">Retaining screw</p> <table border="1" data-bbox="427 1879 1375 1991"> <thead> <tr> <th data-bbox="427 1879 852 1917">Item</th> <th data-bbox="852 1879 1375 1917">DISCO Part ID</th> </tr> </thead> <tbody> <tr> <td data-bbox="427 1917 852 1991">Y-axis metal fitting</td> <td data-bbox="852 1917 1375 1991"> FIXTURE (Y) LKKN-010038-0 </td> </tr> </tbody> </table> </div>	Item	DISCO Part ID	Y-axis metal fitting	FIXTURE (Y) LKKN-010038-0
Item	DISCO Part ID				
Y-axis metal fitting	FIXTURE (Y) LKKN-010038-0				

Procedure for attaching the metal fittings (Continued)

Step No.	Procedure				
4	<p data-bbox="389 286 1200 322">Attach the Z-axis metal fitting with the retaining screws (M6, 4 places).</p> <div style="text-align: center;"> <p data-bbox="817 336 992 367">Retaining screw</p>  <p data-bbox="995 835 1197 866">Z-axis metal fitting</p> </div> <table border="1" data-bbox="427 889 1375 1003"> <thead> <tr> <th data-bbox="427 889 850 929">Item</th> <th data-bbox="850 889 1375 929">DISCO Part ID</th> </tr> </thead> <tbody> <tr> <td data-bbox="427 929 850 1003">Z-axis metal fitting</td> <td data-bbox="850 929 1375 1003"> FIXTURE (Z) LKKN-010039-1 </td> </tr> </tbody> </table>	Item	DISCO Part ID	Z-axis metal fitting	FIXTURE (Z) LKKN-010039-1
Item	DISCO Part ID				
Z-axis metal fitting	FIXTURE (Z) LKKN-010039-1				

DO NOT

2-5. Retracting the Adjusters

Before operation

Have the following equipment on hand for retracting the adjusters.

30 mm wrench

Safety shoes and protective gloves

Procedures for retracting the adjusters

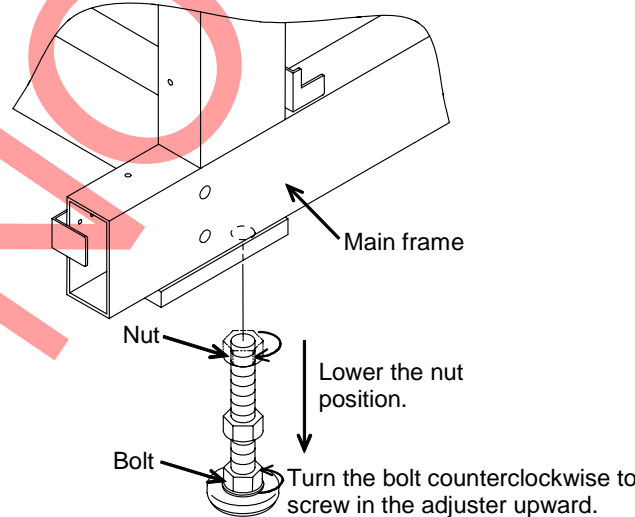


Do not place your feet or hands under the machine during jacking operation

If the machine should topple down while it is jacked up, you may be caught under the machine, or if the adjuster should come off, your feet or hands may be caught or cut off by the machine.

Wear safety shoes and protective gloves during the operation

Your feet and hands could be caught or cut off by the machine.

Step No.	Procedure
1	Wear safety shoes and protective gloves.
2	Turn the bolt of the adjuster (4 places) counterclockwise until it stops so that the position of the adjuster will be higher than the casters. 
3	Transfer the machine. →See section 1-1 of this chapter, [Hoisting, Lowering and Moving the Machine].
4	To hoist or lower the machine, →see section 1-1 of this chapter, [Hoisting, Lowering and Moving the Machine].
5	For the machine installation after transfer, see sections 1-2 to 1-9 of this chapter.

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ADDRESS LIST

Japan

Japan Head Office 13-11 Omori-Kita 2-chome, Ota-ku, Tokyo 143-8580, Japan (Overseas Sales Department) Phone: 81-3-4590-1100 Fax: 81-3-4590-1075	Osaka Branch Office 3-12, Nishi-Nakajima 6-chome, Yodogawa-ku, Osaka-shi, Osaka 532-0011 Japan (Sales Department) Phone: 81-6-6390-0388 Fax: 81-6-6302-0258
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USA

(Disco Offices)

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<p>NEW TRONICS CO., LTD. Flat F, 11th Floor, Valiant Ind. Bldg. 2-12 Au Pui Wan Street, Fotan, Shatin, N.T., Hong Kong Phone: 852-26871431 Fax: 852-26874283</p>	

IN AN EVENT OF AN ACCIDENT

Be sure to contact us

Immediately get in touch with the nearest DISCO or DISCO Service Office if a situation arises where an accident has occurred or might occur that involves injury or death during the operation of DISCO equipment.

Sales representative

Attach the business card of the DISCO sales representative you contact with, in the dotted lines below.

Attach the business card of your
DISCO sales representative.

DO NOT

The contact list is subject to change without notice.
The latest list is available on the Internet.

DISCO home page <http://www.disco.co.jp/>