

2002-03

disco

OPERATION MANUAL

Fully Automatic In-Feed Surface Grinder

DFG841

Software Version: ENM0000X-Series

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READ CAREFULLY BEFORE USING THIS MANUAL

Introduction

This machine grinds silicon wafers (hereinafter called wafers) and, therefore, has rotary sections which rotate at high speed, high-voltage sections which present electric shock hazard and drive sections which may catch the operating personnel's body and clothing.

If the machine is not properly operated, safety hazards that could result in serious injury or death may occur.

Read before using the manual


Thoroughly read this manual beforehand and follow the instructions set forth in it when you handle the machine.

To assure safety in operating and maintaining the machine, it is important that you know the locations of the potential safety hazards. It is difficult for DISCO to predict each and every potential hazard. However, this manual carries various precautionary notes and warnings for the machine wherever presence of any safety hazard is foreseeable. For increased safety assurance, therefore, it is essential that you observe all the precautions and other relevant instructions set forth in this manual.

If you modify the machine without prior consent of DISCO or repair it in a manner not stated in this manual, the safety assurance features of the machine may be seriously affected.




Never attempt to modify or repair the machine in a manner not approved by DISCO.

Hazard level

The safety precautions set forth in this document are classified into DANGER, WARNING and CAUTION categories, representing the three levels of hazards latent in the machine. These categories are defined as detailed below in accordance with the seriousness and occurrence probability of the hazards. 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.







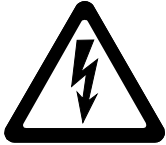



Before using the machine, be sure to read and understand all the associated safety precautions set forth in the manual.

The hazard levels defined for the machine are detailed as follows:

 DANGER	<p><u>A critical situation in which either critical injury or death is very likely to result</u> if the incident in question cannot be avoided.</p> <p>This symbol is used for the incident in which the injury is critical and there is a high probability of occurring it.</p>
 WARNING	<p><u>A serious situation in which either critical injury or death may result</u> if the incident in question cannot be avoided</p> <p>This symbol is used for the incident in which the injury is serious but the probability of occurring it is not so high.</p>
 CAUTION	<p>If you cannot avoid the incident in question, <u>a medium or slight injury may result</u>.</p> <p>This symbol is used for the incident in which the injury is slight and the probability of occurring it is not so high.</p>
CAUTION	<p>If you cannot avoid the incident in question, <u>an accident involving property damage may result</u>.</p>
NOTICE	<p>Indicates <u>the safe way of using the machine as well as the instructions to prevent accidents involving property damage from occurring</u>.</p>

Safety labels

The safety labels as defined below are attached to the hazardous sections of the machine. Before using the machine, confirm the label positions and thoroughly read and understand the precautions and warnings represented by the labels.

Label	Hazard Level	Meaning of Label
Rotary Blade Label 	 WARNING	Your hands or fingers may be cut off by the rotating blade. Observe the following precautions for at least 15 seconds after stopping spindle rotation. <ul style="list-style-type: none">- Do not position your hands or fingers near the wheel.- Keep the safety cover closed.
Capture Label 	 CAUTION	There is a danger that your hands, fingers or clothing may be captured and, as a result, wounded or cut off. Do not position your hands or fingers in any drive section.
Driving Section Label 	 CAUTION	There is a danger that your hands or fingers may get caught in a drive section. Do not position your hands or fingers in any drive section.
Electrical Shock Hazard Label 	 WARNING	A risk of receiving an electric shock exists. Be alerted.
General Label 	 WARNING	Warnings (including danger/caution) in general

INTRODUCTION

About this manual

This manual describes the operation procedures of Fully Automatic In-Feed Surface Grinder Model DFG841.

To ensure safety

To ensure safety, be sure to thoroughly read and understand the contents of this manual before proceeding with the operation work.
Note that this manual is based on the software version of ENM0000X-series.

In operating the machine, make sure that the procedures set forth in this manual are followed.

Definition of a manager and an operator

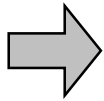
This manual defines a manager and an operator of the machine as follows:

Category	Applicable Personnel	Job and Responsibility
Manager	Management representative	Engages in overall management of the machine and its operators.
Operator	Maintenance personnel	Qualified person who has completed DISCO's machine maintenance training to engage in maintenance of the machine.
	Data maintenance personnel	Qualified person who manages the software data of the machine.
	Machine operator	Engages in operation of the machine for grinding wafers.

Documentation for this machine

The following five manuals are provided for the machine.

This manual is the Operation Manual in the list below indicated by an arrow.



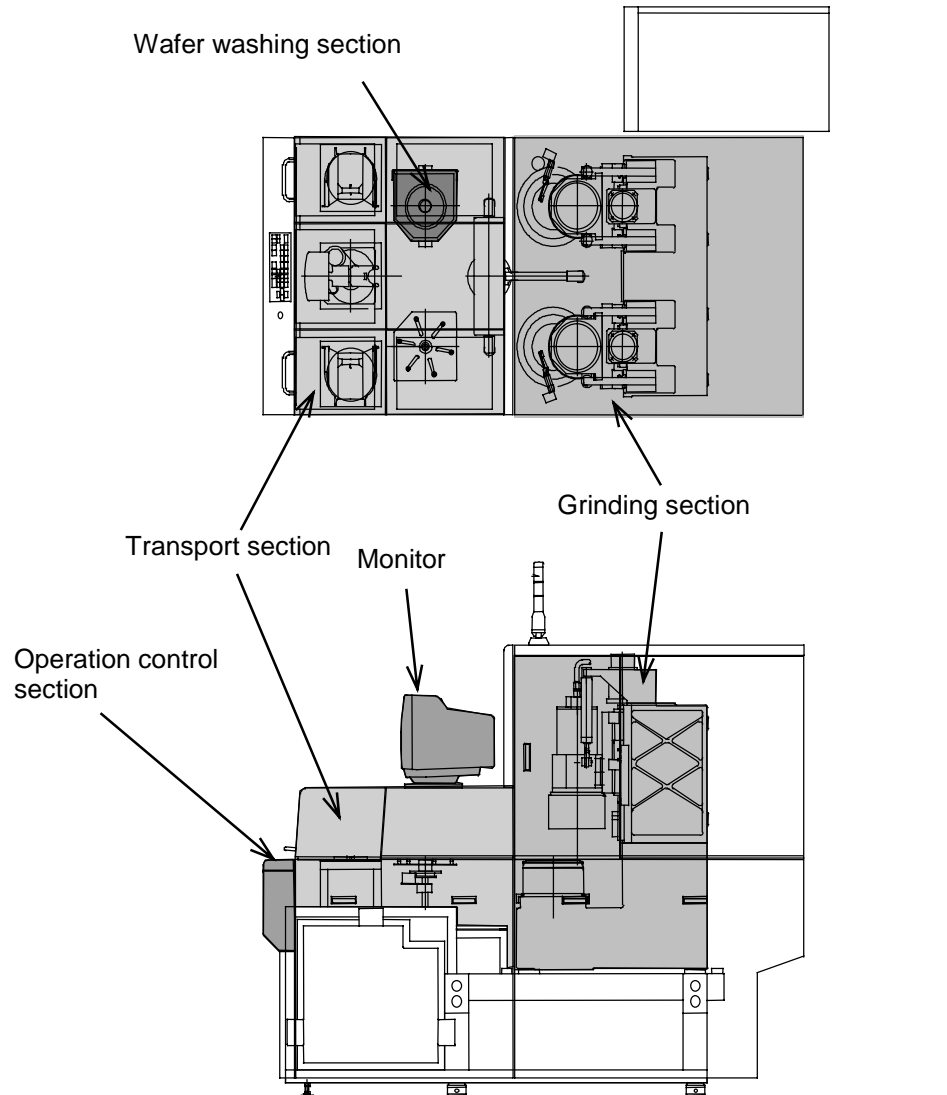
Manual	Who should read	Contents
Installation Manual	Maintenance personnel	Procedures to install the machine and to make installation-related adjustments
Operation Manual	Machine operator	Operational procedures to be performed by the machine operator
Data Maintenance Manual	Data maintenance personnel	- Contents of the screens on which data entries are made - Data setting procedures
Maintenance Manual	Maintenance personnel	Servicing, inspection and adjustment procedures to be performed by the customer
Technical Reference	Maintenance personnel	Machine specifications, circuit diagrams, illustrations and part lists

Unit notation

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

Machine structure

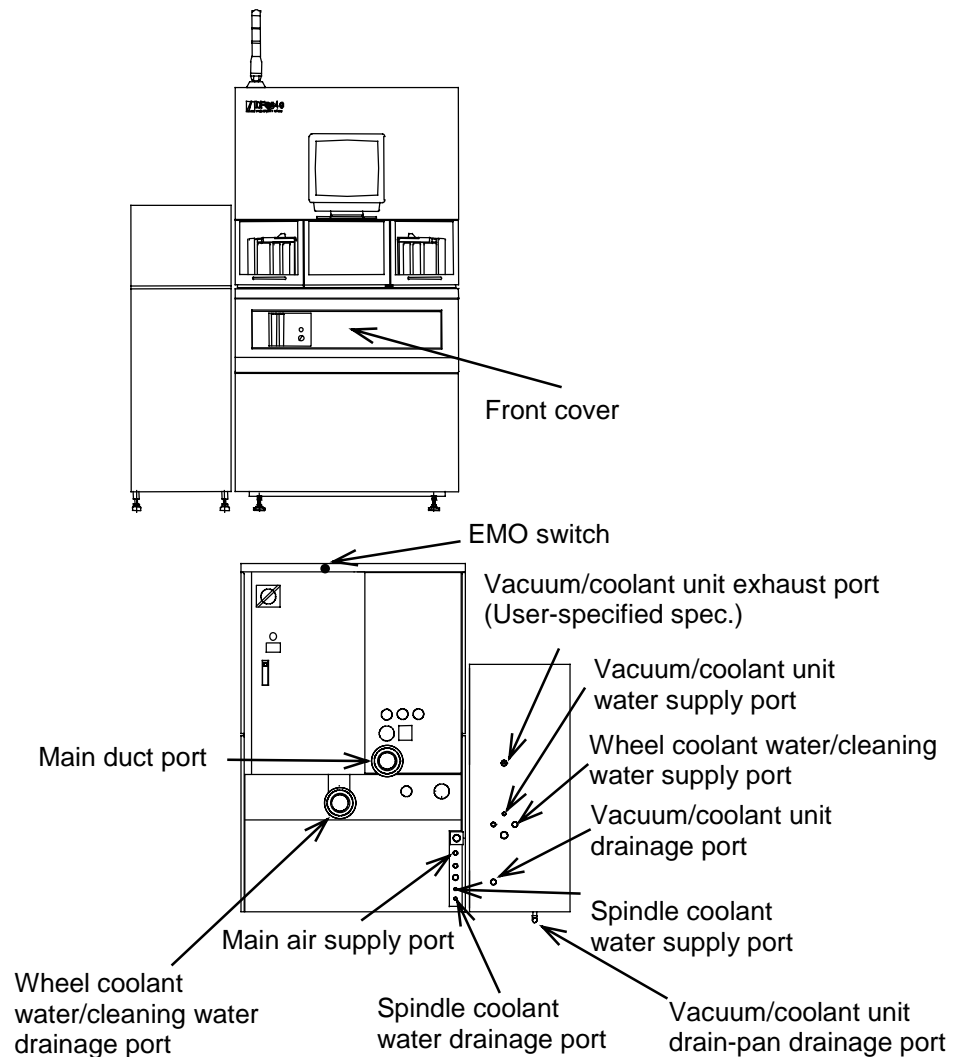
The machine consists of the following sections.



Name	Function
Operation control section	Through its operation panel, inputs machine data and manipulates various operations.
Monitor	Displays the various screens operated from the operation panel.
Transport section	<ul style="list-style-type: none">- Takes out wafers from the cassette to transport them to the grinding section.- Returns the ground wafers back into the cassette.
Wafer washing section	Washes the ground wafers on the spinner table.
Grinding section	Grinds wafers.

External view (Machine front-side and rear-side)

The external views of the machine front-side and rear-side are described here.



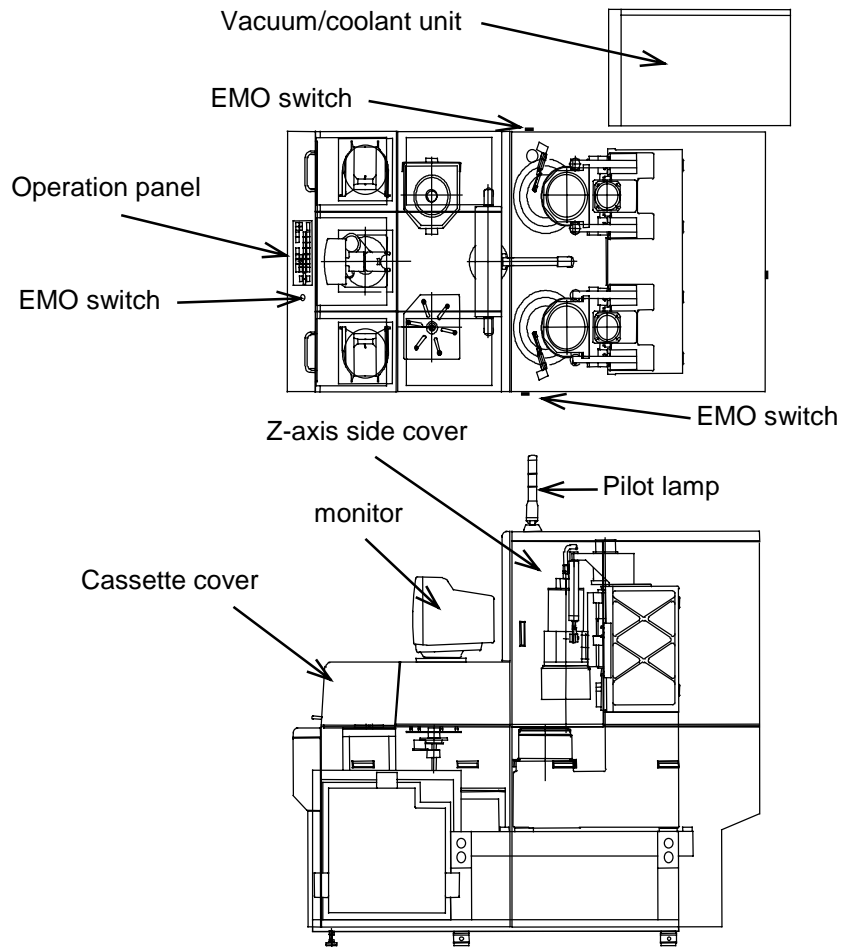
Name	Function
EMO switch	Switch used to shut OFF the machine power when the machine becomes faulty or acts abnormally.
Front cover	Inside of this cover are the meters and gauges of the machine.
Vacuum/coolant unit exhaust port (User-specified spec.)	Exhaust port of the vacuum/coolant unit
Vacuum/coolant unit water supply port	Water supply port of the vacuum/coolant unit

External view (Machine front-side and rear-side) (Continued)

Name	Function
Wheel coolant water/cleaning water supply port	Supply port of wheel coolant water and cleaning water (Vacuum/coolant unit)
Vacuum/coolant unit drainage port	Drainage port of the vacuum/coolant unit
Spindle coolant water supply port	Supply port of spindle coolant water
Vacuum/coolant unit drain-pan drainage port	Drainage port of the vacuum/coolant unit drain-pan
Spindle coolant water drainage port	Drainage port of spindle coolant water
Main air supply port	Supply port of main air
Wheel coolant water/cleaning water drainage port	Drainage port of wheel coolant water and cleaning water
Main duct port	Duct port of the machine main body

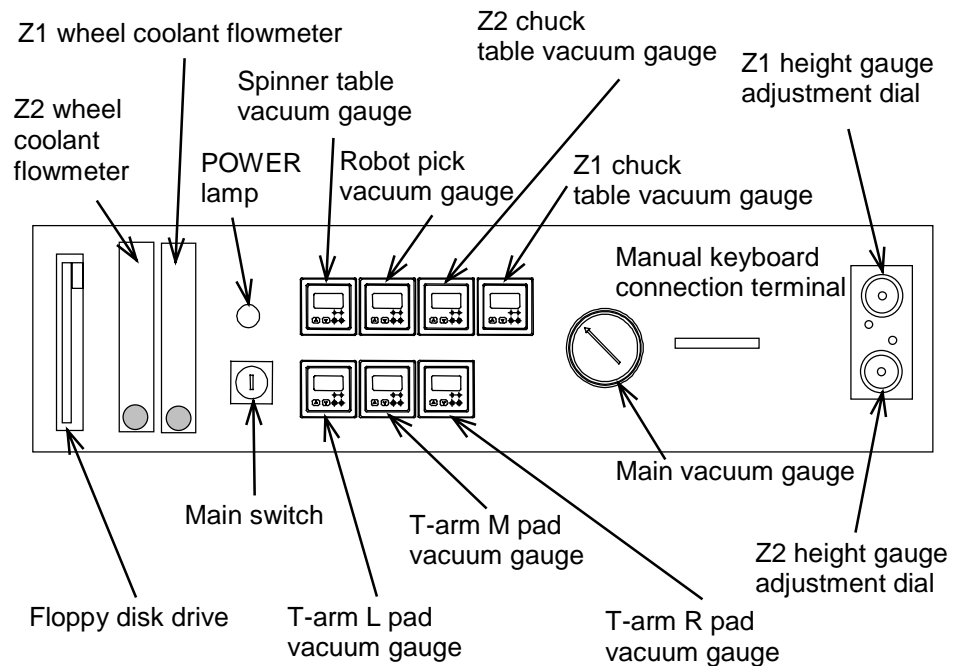
External view (Machine top side and right side)

The external views of the machine top-side and right-side are described here.



Name	Function
Operation panel	Operating control key panel.
EMO switch	Switch used to shut OFF the machine power when the machine becomes faulty or acts abnormally.
Vacuum/coolant unit	<ul style="list-style-type: none">- Produces a vacuum and supplies it to the machine main body.- Pressurizes wheel coolant water and supplies it to the machine main body.
Cassette cover	Functions as a safety device.
Monitor	Displays the various operation screens used to operate the machine.
Z-axis side cover	Functions as a safety device.
Pilot lamp	The green and yellow lamps of the signal tower indicate the operating status of the machine. The red lamp flashes when an error occurs.

Gauges and meters inside the front cover



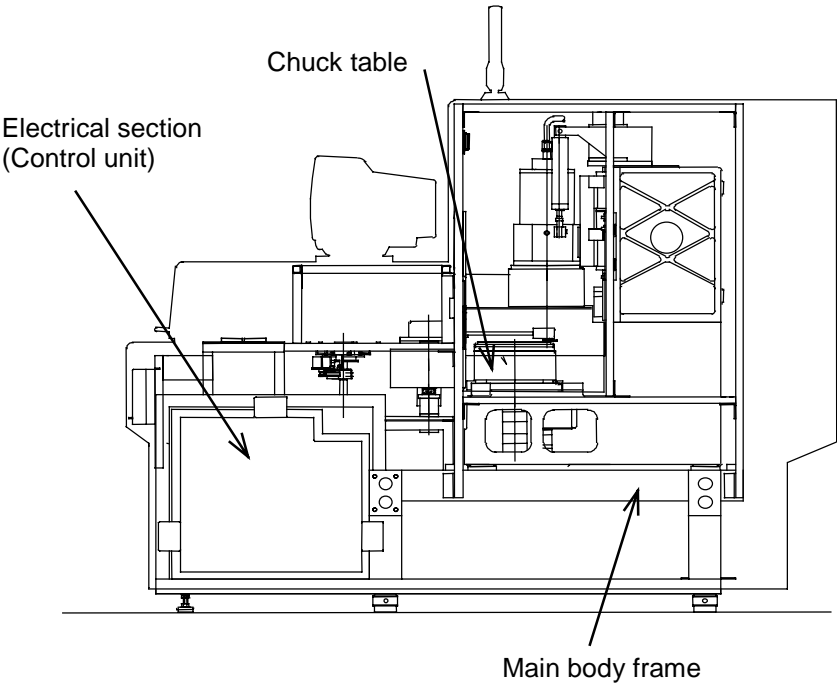
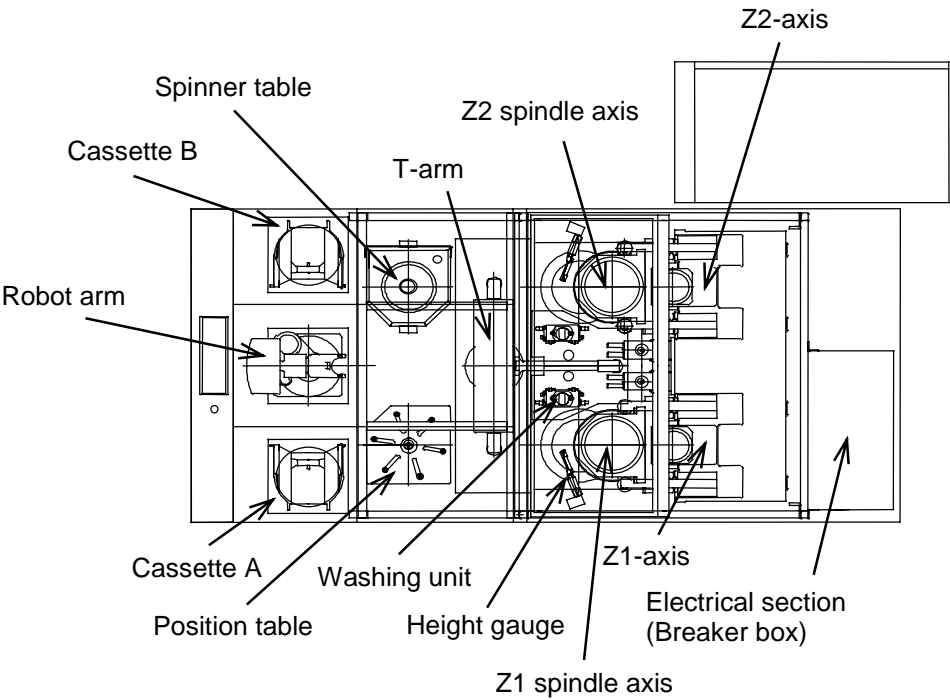
Name	Function
Z2 wheel coolant flowmeter	Flow meter of Z2 wheel coolant water
Z1 wheel coolant flowmeter	Flow meter of Z1 wheel coolant water
POWER lamp	Lamp that lights while the machine power is turned ON.
Spinner table vacuum gauge	Gauge to indicate the vacuum pressure of the spinner table
Robot pick vacuum gauge	Gauge to indicate the vacuum pressure of the robot pick
Z2 chuck table vacuum gauge	Gauge to indicates the vacuum pressure of the Z2 chuck table
Z1 chuck table vacuum gauge	Gauge to indicates the vacuum pressure of the Z1 chuck table
Z1 height gauge adjustment dial	Adjustment dial for the Z1 height gauge.
Z2 height gauge adjustment dial	Adjustment dial for the Z2 height gauge.
Main vacuum gauge	Gauge to indicates the supply pressure of vacuum supplied from the vacuum/coolant unit.
Manual keyboard connection terminal	Terminal (front-side) for connecting the manual keyboard to individually operate such machine units as the robot, position table, T-arm and spinner table for maintenance purposes.

Gauges and meters inside the front cover (Continued)

Name	Function
T-arm R pad vacuum gauge	Gauge to indicates the vacuum pressure of the T-arm R pad (located at the right-hand side of the T-arm as viewed from the machine front side)
T-arm M pad vacuum gauge	Gauge to indicates the vacuum pressure of the T-arm M pad (located at the center of the T-arm as viewed from the machine front side)
T-arm L pad vacuum gauge	Gauge to indicates the vacuum pressure of the T-arm L pad (located at the left-hand side of the T-arm as viewed from the machine front side)
Main switch	Machine power switch. The switch key is inserted here to turn ON/OFF the machine power.
Floppy disk drive	External data storage device.

Machine components and their functions

The composing parts of the machine and their functions are described here.



Machine components and their functions (Continued)

Name	Function
Robot arm	<ul style="list-style-type: none"> - Takes wafers (before grinding) out of the cassette to transport them onto the position table. - Stores the ground wafers (after they are washed and dried on the spinner table) into the cassette.
Cassette B	Platform onto which a cassette containing wafers to be ground is placed (left-hand side platform as viewed from the machine front side)
Spinner table	Table on which the ground wafers are washed and air-dried
T-arm	Transports wafers to/from the grinding section and between the Z1-side chuck table and the Z2-side chuck table.
Z1/Z2 spindle axis	Rotates the wheel mounted on its end to grind wafers.
Z2-axis	Moves the Z2 spindle axis up and down.
Electric section	Electric section to control the machine movements.
Z1-axis	Moves the Z1 spindle axis up and down.
Height gauge	Measures the thickness of wafers in the grinding process.
Washing unit	Washes the chuck table surface.
Position table	Table on which wafers are centered
Cassette A	Platform onto which a cassette containing wafers to be ground is placed (right-hand side platform as viewed from the machine front side)
Chuck table (Z1-side / Z2-side)	Table on which wafers are ground. The chuck table rotates while a wafer is ground on it.
Main body frame	Supports the machine main body.

CONTENTS

READ CAREFULLY BEFORE USING THIS MANUAL

INTRODUCTION Intro-1

CONTENTS Contents-1

A. IMPORTANT SAFETY INFORMATION..... A-1

- 1. General Safety Precautions..... A-2
- 2. Safety Precautions to be Observed during Machine Operation A-4
- 3. Inherently Hazardous Areas and Ways to Avoid Hazards A-8
- 4. Emergency OFF Switch (EMO Switch)..... A-9
- 5. Power Circuit Breaker A-12
- 6. Interlock Mechanism A-14
- 7. Safety Labels A-18
- 8. Noise Data A-22

B. WHOM TO CONTACT IN AN EMERGENCY ..B-1

C. COMPONENT NAMES.....C-1

- 1. Overall View and Drive Sections of the Machine C-2
- 2. Operation Panel C-4
 - 2-1. Arrangement of Keys on Operation Panel..... C-5
 - 2-2. Functions of Keys on Operation Panel C-6
 - 2-2-1. Keys to Start/Stop Operations and Clear Alarm Condition..... C-7
 - 2-2-2. Keys to Call up Special Screens..... C-8
 - 2-2-3. Keys to Set up/Change/Select/Call up Data C-9

CONTENTS

D. OPERATION	D-1
1. Machine Startup	D-3
1-1. Opening Valves of Air, Water, Drain, and Exhaust and Turning ON the Power of Plant Facility	D-4
1-2. Checking of Supply Air Pressure and Power Reception.....	D-5
1-3. Turning ON the Machine Power	D-7
1-4. Initialization.....	D-10
1-5. Warm up.....	D-13
2. Full Auto Operation	D-17
2-1. Pre-operational Preparations.....	D-18
2-2. Grinding Data Check	D-19
2-3. Wafer Cassette Setting.....	D-22
2-4. Cassette ID Entry	D-25
2-5. Full Auto Operation Execution.....	D-28
2-5-1. Starting of Full Auto Operation.....	D-29
2-5-2. Continuation of Full Auto Operation	D-35
2-5-3. Termination of Full Auto Operation	D-37
2 - 6 . Correction of Finished Wafer Thickness Data / Interruption of Full Auto Operation / Wafer Recovery	D-39
2-6-1. Correction of Finished Wafer Thickness Data.....	D-40
2-6-2. Interruption of Full Auto Operation	D-43
2-6-2-1. Interruption after Grinding and Purging Loaded Wafers	D-44
2-6-2-2. Interruption after Purging Loaded Wafers without Grinding	D-46
2-6-2-3. Forcible Termination.....	D-49
2-6-3. Wafer Recovery Function	D-52
2-6-3-1. Wafer Recovery.....	D-53
2-6-3-2. Halting of Wafer Recovery.....	D-56
3. Operation Status Check	D-57
3-1. STATUS Screen.....	D-58
3-1-1. Calling up the STATUS Screen.....	D-59
3-1-2. Contents of the STATUS Screen	D-60
3-2. PROCESS STATUS Screen	D-62
3-2-1. Calling up the PROCESS STATUS Screen	D-63
3-2-2. Contents of the PROCESS STATUS Screen.....	D-64
3-3. HISTORY Screen	D-65

CONTENTS

3-3-1. Calling up the HISTORY Screen.....	D-66
3-3-2. Contents of the HISTORY screen.....	D-68
4. Termination of Machine Operation	D-70
4-1. Turning OFF Spindle Rotation and Wheel Coolant Water Supply	D-71
4-2. Turning OFF the Machine Power	D-73
4-2-1. Power OFF with Main Switch	D-74
4-2-2. Power OFF from the POWER OFF screen	D-76
4-3. Turning OFF the Power and Closing the Valves of Air, Water, Drain, and Exhaust at Plant Facility Side	D-79

E. ERROR RECOVERY E-1

1. Error Classes	E-3
2. Error Recovery	E-4
2-1. Handling of Cassette Related Errors	E-7
2-2. Handling of Errors Demanding Wafer Removal.....	E-9
2-3. Handling of Wafer Transportation Related Errors.....	E-11
2-4. Handling of Cassette Cover Related Errors.....	E-14
2-5. Handling of Position Table Related Errors.....	E-16
2-6. Handling of T-arm Related Errors.....	E-18
2-7. Handling of Spinner Related Errors	E-21
2-8. Handling of Errors Relating to Grinding Wafer Thickness	E-23
2-9. Handling of Washing Unit Related Errors	E-25
3. Error History Check (HISTORY Screen).....	E-27

INDEX..... Index-1

ADDRESS LIST

IN AN EVENT OF AN ACCIDENT

A. IMPORTANT SAFETY INFORMATION

Contents of this chapter

This chapter describes about the various precautions to be observed for safety assurance when you handle and operate the machine, as well as the protective mechanisms incorporated into the machine.

Section No.	Title	Contents
1	General Safety Precautions	<ul style="list-style-type: none">- Overall safety precautions to be fully understood before you handle the machine.- Overall safety precautions to be observed when you handle the machine.
2	Safety Precautions to be Observed during Machine Operation	<ul style="list-style-type: none">- Safety precautions to be fully understood before you operate the machine.- Safety precautions to be observed when you operate the machine.
3	Inherently Hazardous Areas and Ways to Avoid Hazards	<ul style="list-style-type: none">- Potentially hazardous sections of the machine and the ways to avoid hazards (explained by hazard type)
4	Emergency OFF Switch (EMO Switch)	<ul style="list-style-type: none">- Explanation about the emergency OFF switch (EMO switch)
5	Power Circuit Breaker	<ul style="list-style-type: none">- Explanation about the power circuit breaker
6	Interlock Mechanism	<ul style="list-style-type: none">- Explanation about the interlock mechanisms incorporated into the machine
7	Safety Labels	<ul style="list-style-type: none">- Types of the safety labels used for the machine- Locations of the safety labels attached to the machine
8	Noise Data	<ul style="list-style-type: none">- Noise data of this machine (noise level by measured location)

1. General Safety Precautions

General safety precautions

This section describes about the general safety precautions that should be understood and observed when you handle the machine.

NOTICE

- Responsibility of instructing workers
Make sure to instruct the operators of this machine to thoroughly read the safety instructions set forth in Section 2, [Safety Precautions to be Observed during Machine Operation] in Chapter A of the Operation Manual before proceeding to work. Also, if the workers perform various tasks, direct them to read the safety instructions set forth in the associated manuals as well.
For this machine, the Installation Manual, Operation Manual, Data Maintenance Manual, Maintenance Manual, and Technical Reference are provided.
- Providing guidance to workers who seem to have difficulty in understanding safety instructions
Thoroughly explain to workers who seem to have difficulty in understanding the safety instructions set forth in chapter A of this manual until they full grasp their meanings.
- Periodical inspection
The machine must be inspected on a periodic basis.
If any accidents occur while an appropriate periodic inspection program is not adhered to, DISCO shall assume no responsibility for any consequences arising therefrom.
- Maintenance personnel
Machine maintenance must be carried out by the qualified maintenance personnel who have completed DISCO's training program.
- Installing safety devices without fail
If any parts or covers incorporating safety interlocks (automatic stop function, etc.) are broken, immediately stop operating the machine and contact your nearest DISCO office or DISCO service office.
- Air exhaust, water drainage, and contamination (cutting dust) control
Due to the nature of its processing characteristics, the machine may produce harmful substances depending on the types of the wafers it grinds. Air exhaust, water drainage, and contamination control/disposal must be properly implemented in compliance with the applicable environmental protection codes.

NOTICE

- Terminals for interlock connection with plant facility side (user-specified spec.)

To allow the plant facility side to have the interlock mechanisms for air exhaust and water drainage control, this machine is equipped with the terminals for making interlock connection with the plant facility side. For details of the interlock connection, contact your nearest DISCO office or DISCO service office.

- Machine installation environment

If the employed machine installation environment does not comply with DISCO's recommendations, rust formation may be incurred by moisture condensation or other unfavorable elements to the detriment of grinding accuracy. It is therefore essential that the recommended machine installation environmental conditions (room temperature, humidity, wheel and spindle coolant water temperatures, etc.) be complied with.

For the recommended environmental conditions, refer to section 1, [Specifications and Environmental Requirements of the Machine] in chapter C of the Installation Manual.

- Machine transfer/disposal

When it is necessary to transfer or dispose of the machine, contact your nearest DISCO office or DISCO service office. Disco will provide you with detailed information and precautions required in carrying out such works.

2. Safety Precautions to be Observed during Machine Operation

Safety precautions to be observed during machine operation

This section describes about the safety precautions that should be fully understood and observed when you operate the machine.



- Wheel section

The wheel has a sharp blade edge. If your hands or fingers come into contact with it, they may be wounded or cut off. Do not place your hands or fingers beneath the wheel. While the spindle rotates, do not touch the wheel nor attempt to open the wheel cover.

Note that it takes up to 15 seconds for a rotating spindle ($7000 \text{ min}^{-1}(\text{rpm})$) to come to a standstill. It is also well to remember that once the spindle enters the free-running state (in which the rotation cannot be braked) due to power failure or error occurrence, it continues to run for about 30 minutes. Never position your hands in the spindle section.

- Use of Air

The only gaseous material allowed to be used with this machine is air. If nitrogen (N_2) or other gas is used instead of air, it may fill the machine room and cause oxygen deficiency for breathing, thereby incurring serious personal illness or death.

- Use of water

The only liquid material allowed to be used with this machine is water. Using other liquid than water may bring about detrimental effects on your health. If any harmful liquid contacts your skin or you inhale its vapor, it could cause serious illness or death. It may also corrode the machine to invoke abnormal movements.

- Movable parts

If your hands or fingers are positioned in a drive section in action, they may be caught or cut off. While a drive section is operating, do not touch it. Also, avoid placing your hands or fingers in an operating space of movable parts.

- Robot section/wafer transport section

If your hands or fingers are positioned in the robot section or wafer transport section in action, they may be caught or cut off. Keep your hands and fingers away from such sections or their operating space while they are in action.

- Spinner and chuck table rotary sections

If your hands or fingers are positioned in the rapidly rotating spinner or chuck table section, they may be wounded or cut off. Do not place your hands and fingers in such sections.



- Spinner cover

The spinner cover moves up and down. If your hands or fingers are positioned in the spinner cover section in action, they may be caught or cut off by the moving cover. While the spinner cover is operating, keep your hands and fingers away from it or its operating space.

- When the machine or floor is wet with water

Operating the machine while its interior or floor is wet with water may cause an electric shock hazard that could result in serious injury or death. If the machine or floor is wet with water, shut off electrical power supply at the circuit breaker of this machine and at the facility power source, lock them out with padlocks or the like, and wipe the machine and floor dry. Do not turn ON the facility-side power supply until the machine and floor completely dry.

- Air ON/OFF while the machine is turned OFF

Even when the machine power is turned OFF, the movable parts of the transport sections and the spinner section may move if you turn ON/OFF the air system.

Keep your hands and fingers away from those movable parts and their operating spaces when you turn ON/OFF the air system to prevent your hands and fingers from being caught or cut off.

- Emergency OFF switch (EMO switch)

When the emergency OFF switch (EMO switch) is pressed, the machine power is turned OFF. However, a hazardous voltage still remains in the machine even after the machine power is turned OFF. Do not position your hands in an energized section as you may get an electric shock that could result in serious injury or death. When you perform a maintenance work, shut OFF the facility side power first.

- Broken wafer removal and cleanup

When you remove a broken wafer or clean the affected area, wear protective gloves and goggles and use tweezers. If you perform such works with bare hands, your hands or fingers may be cut or stuck.

Before proceeding with the works, turn OFF the machine power and make sure that all axes are brought to a stop.

- Provision of the work step

The EMO switches provided on each side (1 each) and on the rear side (1) of the machine are positioned relatively high to reach. Use adequately wide (flat) steps as needed during maintenance so that the EMO switches are easily accessible all the time.



- If the operation panel is wet with water
The operation panel is waterproofed. However, if the machine is operated while the operation panel is considerably wet with water, electric leakage may occur to invoke erratic machine movements, thereby causing an accident.
If the operation panel is wet, immediately wipe it dry with a dry cloth.
- Convenience power outlet within the machine
The convenience power outlet within the machine (an extra power outlet provided inside the machine) should be used for DISCO-designated ancillary equipment only.
If any equipment other than the specified ancillary equipment is connected to the convenience power outlet within the machine, the power supply to the machine may become inadequate or the machine may malfunction to incur an accident.

CAUTION

- Turning the power back ON
When turning ON the machine power, be sure that at least one minute has elapsed since the last power OFF. If the power is turned ON/OFF successively, the hard disk or other machine components may fail.
- Spindle idling before machine shut off
The spindle section is designed so that the spindle shaft is lifted by means of air. If the spindle is stopped without being allowed to idle or stopped with air supply immediately turned OFF, grinding dust may adhere to the spindle section, causing the spindle to gall.
Before stopping spindle rotation for machine shutoff, allow it to idle for at least 10 minutes with the wheel coolant system turned ON. Then, stop the spindle and place the machine in the stand-by condition for 10 minutes with the wheel coolant system turned OFF but the air blow system turned ON.
- Spindle seizure
If air supply is shut off during spindle rotation, the spindle seizes up. Be sure to stop spindle rotation before shutting off the air supply.

NOTICE

- Coping with abnormal machine movements
If the machine acts abnormally, its investigation, adjustment, and repair must be carried out by qualified maintenance personnel.
- Cautioning against power/air/water supply ON/OFF by irrelevant persons during machine operation or maintenance
While operating or servicing the machine, be sure that the power, air, or water supply system is not turned ON/OFF by other persons. This precaution must be strictly observed particularly when the machine shares the same facilities with other equipment.
- Spindle free-run
To prevent the spindle from entering into the free-running state (in which the rotation cannot be braked), make sure to stop spindle rotation before turning OFF the machine power.
- Related equipment power OFF
Before troubleshooting or repairing the machine with its power turned OFF, turn OFF the power of the electrically connected equipment as well.
- Tools/materials storage
Make sure that no tools or materials are inadvertently left inside the machine.
- Installation space
When installing the machine, be sure to secure an adequate maintenance space. Ensure that nothing is placed in the maintenance area.

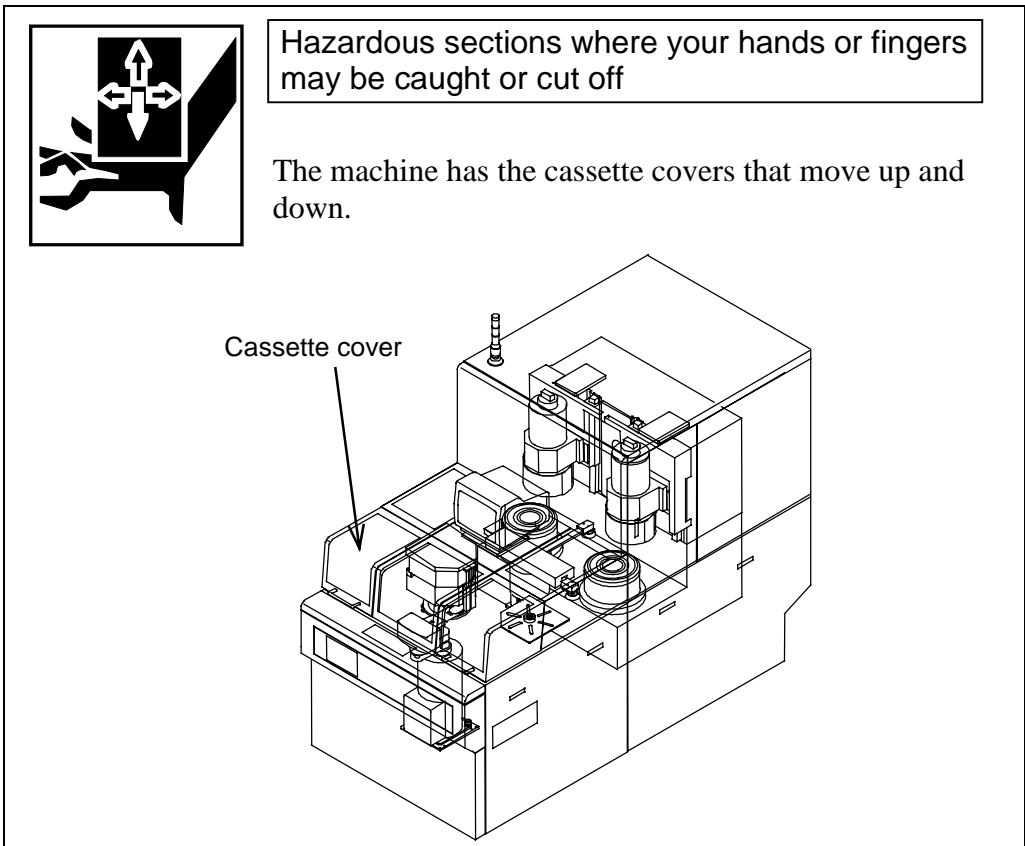
3. Inherently Hazardous Areas and Ways to Avoid Hazards

Summary of this section

This section describes the locations in the machine where operation-related hazards may be latent and the ways to prevent such potential hazards from occurring.

Hazardous sections where your hands or fingers may be caught or cut off

Hazardous sections where your hands or fingers may be caught or cut off are shown in the following figure. Measures to avoid such hazards are also described.



Inherently hazardous area	Cassette covers
Cause of hazard	If you place your hands or fingers under the cover when the cassette cover opens/closes, they may be caught or cut off by the cover.
Avoidance method	When you open the cassette cover, make sure that the opened cover is completely stopped.

4. Emergency OFF Switch (EMO Switch)

Function of EMO switch

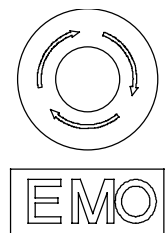
The EMO switch is a device to shut OFF machine power and avoid hazardous consequences when the machine becomes abnormal or faulty during its operation.



- It takes up to 15 seconds for a rotating spindle to come to a stop. To open the grinding section side cover after the EMO switch is pressed, wait at least 15 seconds. If your hands or fingers come into contact with a rotating spindle, they may be cut off.
- The machine power is automatically turned OFF upon emergency off switch activation. However, the power is still supplied to the main breaker primary side and the EMO circuit. Do not position your hands in an energized section, or you may receive an electric shock that could result in severe injury or death.
- The EMO switches provided on each side (1 each) and on the rear side (1) of the machine are positioned relatively high to reach. Use adequately wide (flat) steps as needed during maintenance so that the EMO switches are easily accessible all the time.

NOTICE

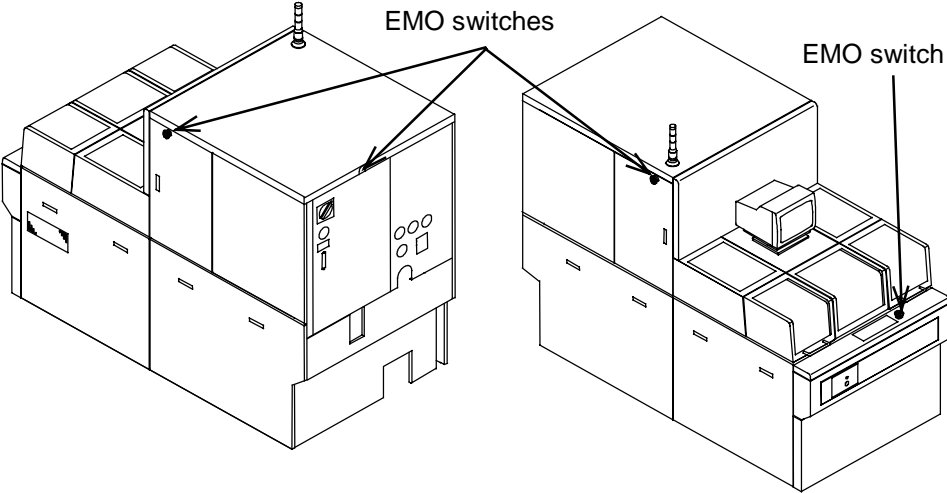
Once a spindle enters the free-running state (in which the rotation cannot be braked) due to power failure or error occurrence, it takes about 30 minutes for the spindle to come to a complete stop. Make sure that air supply is not stopped until the spindle completely stops rotating.



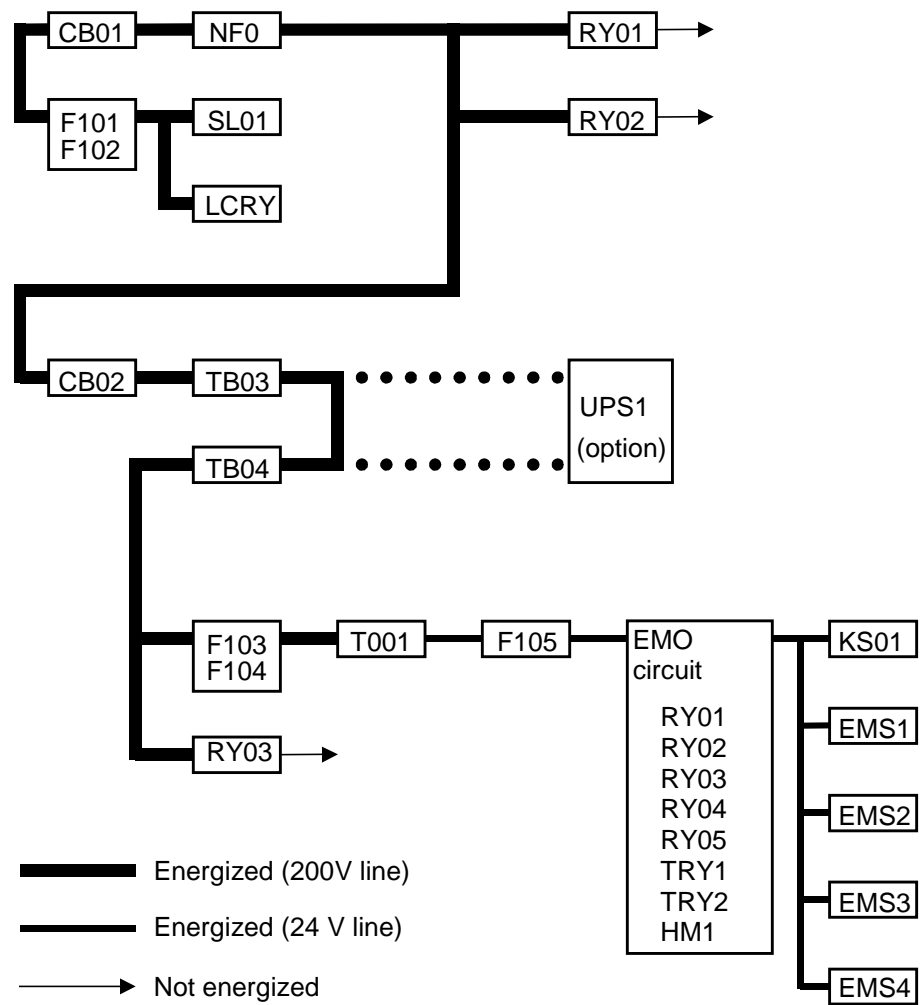
To activate EMO switch	Press the EMO switch button.
To reset EMO switch	Rotate the EMO switch button clockwise (in the direction of the arrows). The switch then pops up to clear the emergency OFF condition.
What will happen after EMO switch is pressed	<p>The following process follows EMO switch activation. It takes about 15 seconds for a rotating spindle to come to a complete stop.</p> <pre>graph TD Start([EMO switch is pressed.]) --> Spindle[Spindle stop action] Start --> Coolant[Wheel coolant OFF] Spindle -- 15 sec. --> Rotating[Spindles stop rotating.] Coolant --> Retraction[Z1/Z2 axis retraction
(0.2 mm up)] Retraction -- 2 sec. --> PowerOff[Machine power OFF]</pre>

EMO switch locations

The locations of the EMO switches are indicated here.



Energized lines during emergency power OFF



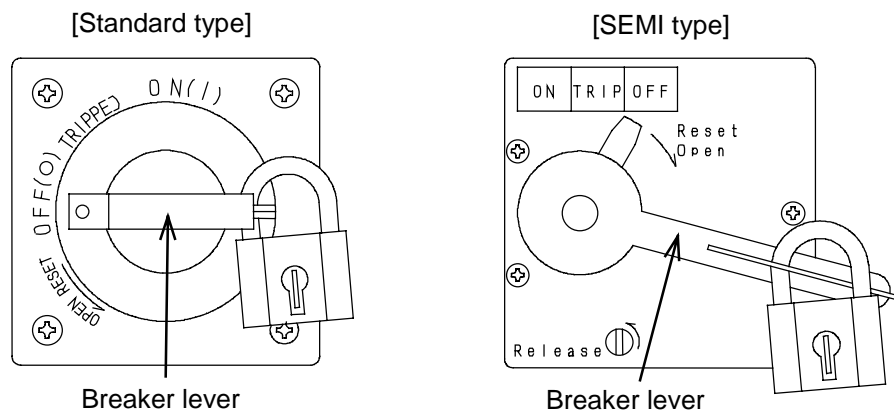
5. Power Circuit Breaker

About power circuit breaker

When a current beyond the rated capacity flows through the machine during its operation, the power circuit breaker automatically shuts OFF the power supply to the machine.

Specifications and ratings of power circuit breaker

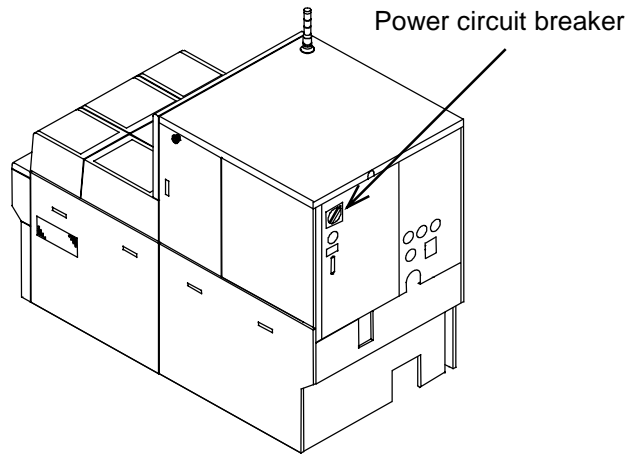
Specifications and electrical ratings of the power circuit breaker of the machine are described here.



ON	Turns ON the machine power.
TRIPPED	If a larger-than-the-rated current is loaded, the breaker lever automatically moves to this position to turn OFF the machine power. (To turn the power back ON, move the lever to "OFF" position once and then move it to "ON" position.)
OFF	Turns OFF the machine power. To turn the power back ON, wait at least one minute and then move the lever to "ON" position.
OPEN/RESET	To open the breaker box, move the lever to this position and then pull it toward you.

Power circuit breaker location

The location of the power circuit breaker is shown in the figure below.



6. Interlock Mechanism

About interlock mechanism

The interlock mechanisms of the machine are the devices that detect impending hazards to avoid their consequences.

This section describes the locations of the interlocks in the machine as well as the contents of the hazards they detect.



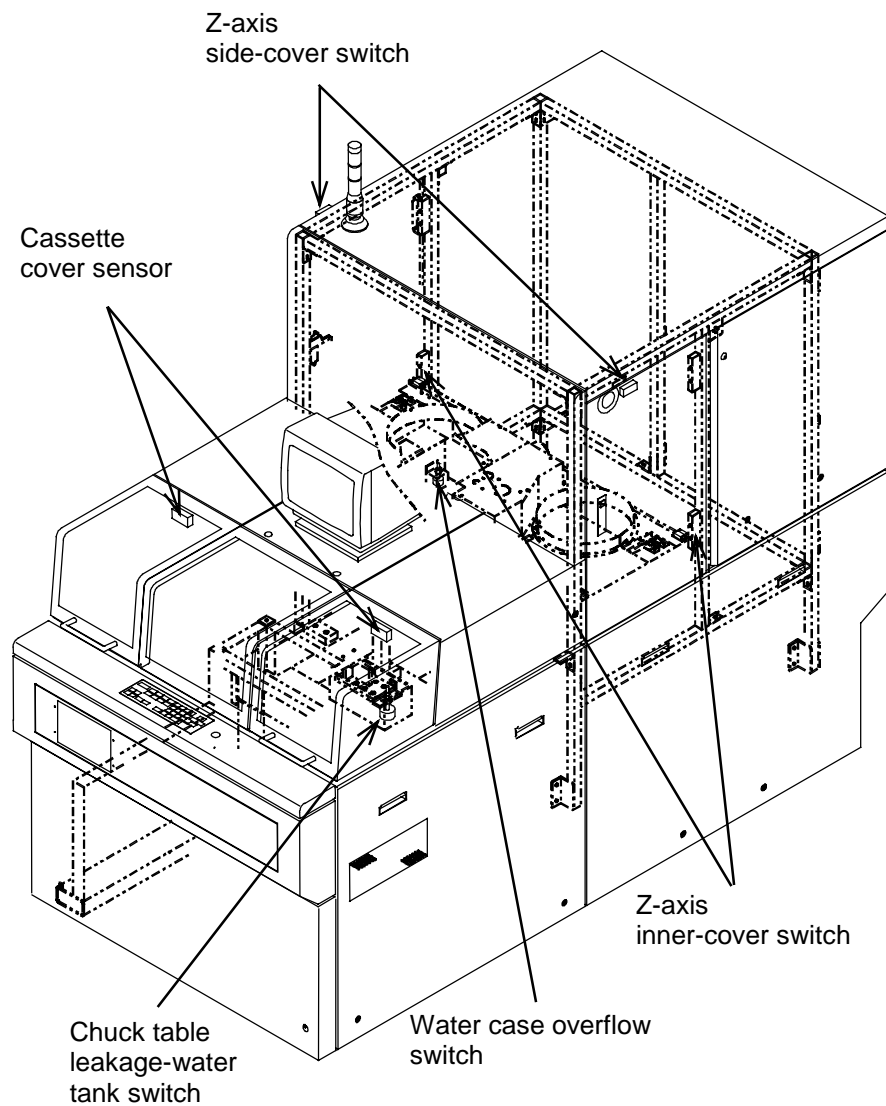
- It takes up to 15 seconds for a rotating spindle to come to a standstill. Never position your hands or fingers near its rotary section while the spindle is still rotating. Before performing a maintenance or inspection work, make sure that spindle rotation is completely stopped.
- If any water leak is detected, keep away from the wet portions of the machine or floor, shut off the machine power and facility power supplies, and lock them out with padlocks or the like. If you come into contact with the machine body or the floor wet with water, you may receive an electric shock that could result in serious injury or death. Even if the machine is turned OFF, it remains energized until the facility-side power supply is shut OFF.

NOTICE

It takes up to 15 seconds for a rotating spindle (7000 min⁻¹ (rpm)) to come to a standstill. Air supply must not be shut off until spindle rotation is completely stopped.








Locations of interlock devices

This machine incorporates the following switches and sensors that function as safety interlock mechanisms.



Contents of hazards detected by interlock devices

Hazards detected by the interlock devices of this machine are classified as follows. Actions taken by the machine upon hazard detection (during initialization, warming up and full auto operation) are also described.

Hazard detector	Hazard category	Hazardous section	Hazard level	Actions taken upon hazard detection
(1) Z-axis inner-cover switch	 Cutoff hazard  Catching hazard	- Spindle rotation section - Z1-axis drive - Z2-axis drive - T-shutter drive	[2]	- The Z1- and Z2-axes move upward to retreat. - The spindle rotation and wheel coolant supply systems come to an immediate stop. * It takes about 15 seconds for a spindle rotating at a speed of 7000 min ⁻¹ (rpm) to come to a standstill.
(2) Z-axis side-cover switch	 Cutoff hazard  Catching hazard	- Spindle rotation section - Z1-axis drive - Z2-axis drive - T-shutter drive	[2]	- The Z1- and Z2-axes move upward to retreat. - The spindle rotation and wheel coolant supply systems come to an immediate stop. * It takes about 15 seconds for a spindle rotating at a speed of 7000 min ⁻¹ (rpm) to come to a standstill.
(3) Cassette cover sensor	 Catching hazard	- Robot drive	[2]	- The robot operation comes to an immediate stop.
(4) Water case overflow switch	 Electric shock hazard due to water leakage	- Machine main body - Floor	[2]	- The Z1- and Z2-axes move upward to retreat. - The spindle rotation and wheel coolant supply systems come to an immediate stop. - Machine power is shut OFF.
(5) Chuck table leakage-water tank switch	 Electric shock hazard due to water leakage	- Machine main body - Floor	[2]	- The Z1- and Z2-axes move upward to retreat. - The spindle rotation and wheel coolant supply systems come to an immediate stop. - Machine power is shut OFF.

Contents of hazards detected by interlock devices (Continued)







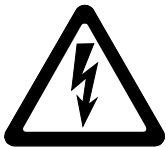



The definitions of the detected hazard levels are as follows.

Hazard level	Hazard condition
[1]	A grave hazard to the human body exists (an impending hazardous situation which, if not avoided, will result in death or severe injury).
[2]	A hazard to the human body exists (a potentially hazardous situation which, if not avoided, may result in death or severe injury).
[3]	A hazard to the human body exists (a potentially hazardous situation which, if not avoided, may result in minor or moderate injury).

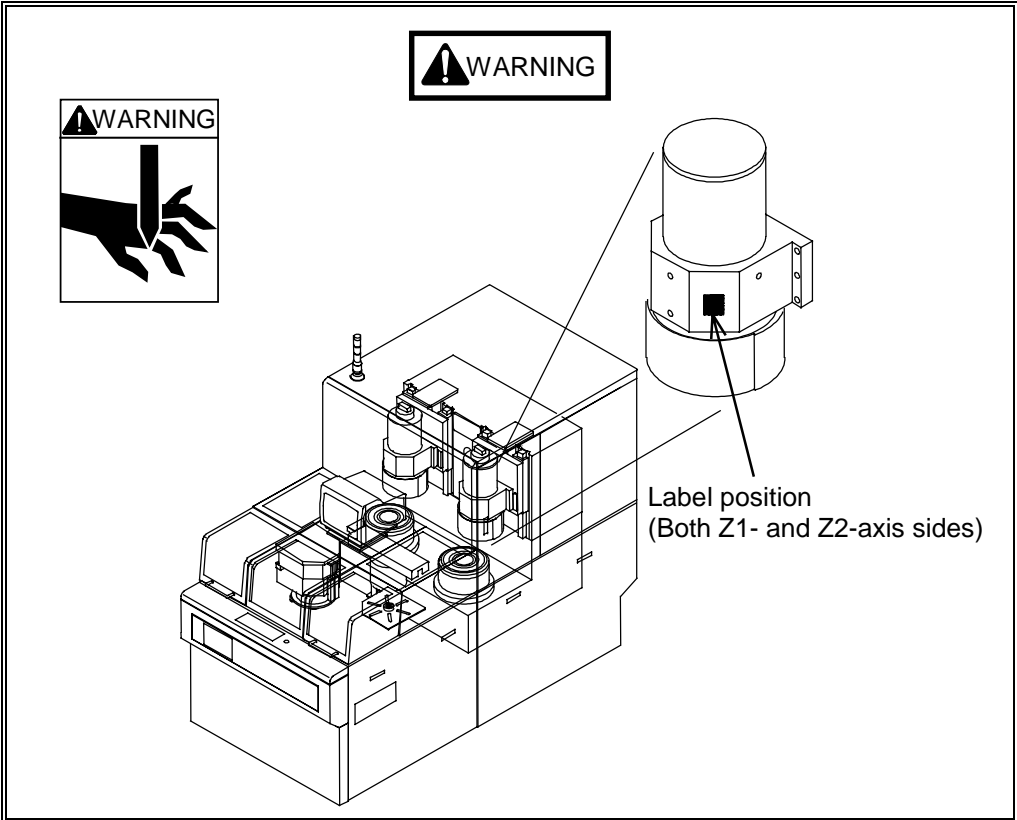
7. Safety Labels

About safety labels

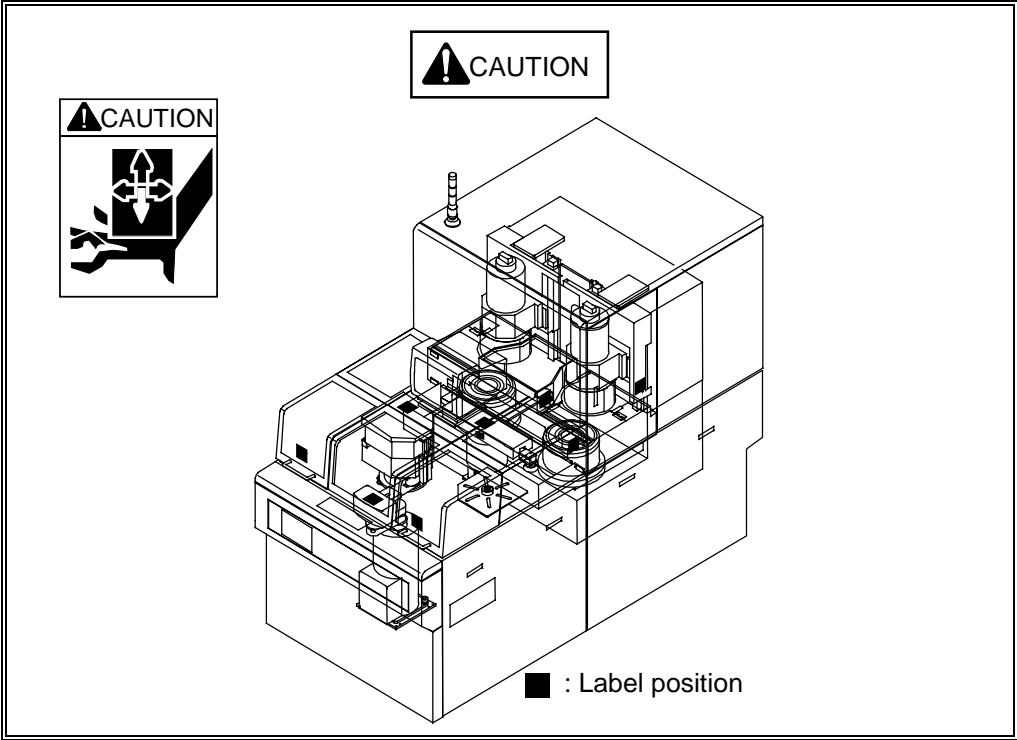
The safety labels carrying hazard descriptions are attached to the locations in the machine where potential hazards exist and they are defined as follows.

Label	Hazard Level	Meaning of Label
Rotary Blade Label 	 WARNING	<p>There is a danger that your hands or fingers may be cut off by the rotating blade.</p> <p>Observe the following precautions for at least 15 seconds after stopping spindle rotation.</p> <ul style="list-style-type: none"> - Do not position your hands or fingers near the wheel. - Keep the safety cover closed.
Capture Label 	 CAUTION	<p>There is a danger that your hands, fingers or clothing may be captured and, as a result, wounded or cut off.</p> <p>Do not position your hands or fingers in any drive section.</p>
Driving Section Label 	 CAUTION	<p>There is a danger that your hands or fingers may get caught in a drive section.</p> <p>Do not position your hands or fingers in any drive section.</p>
Electrical Shock Hazard Label 	 WARNING	<p>A risk of receiving an electric shock exists. Be alerted.</p>
General Label 	 WARNING	<p>Warnings (including danger/caution) in general</p>

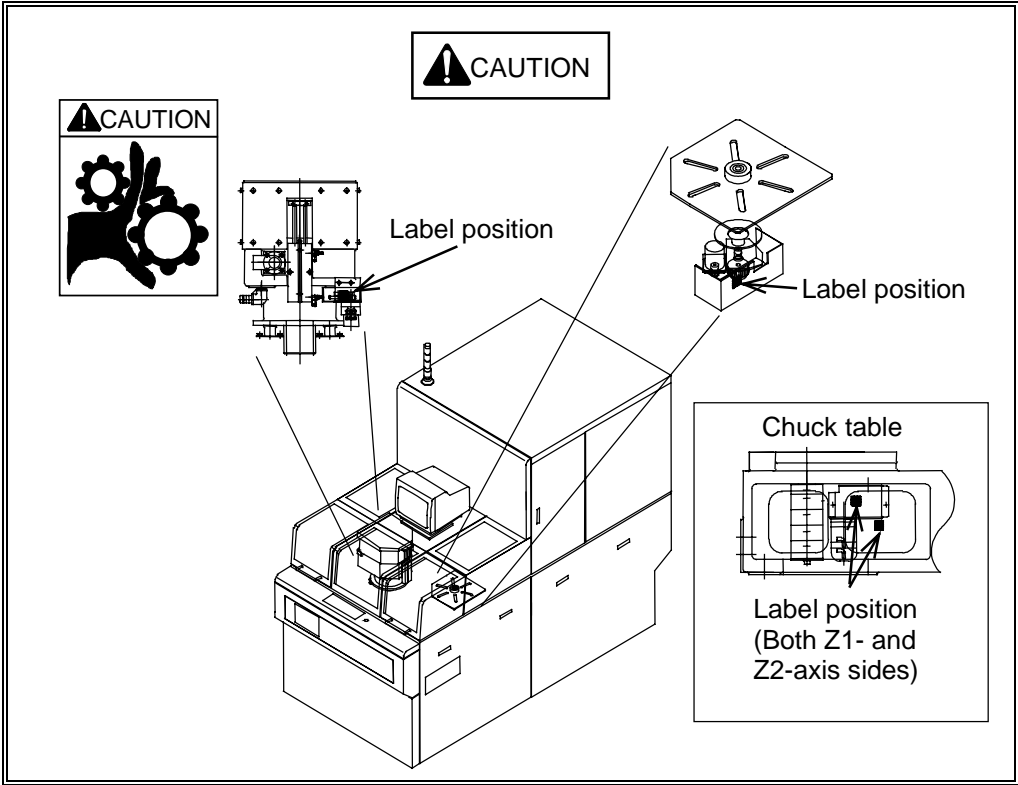
Locations of labels for warning against rotary blade



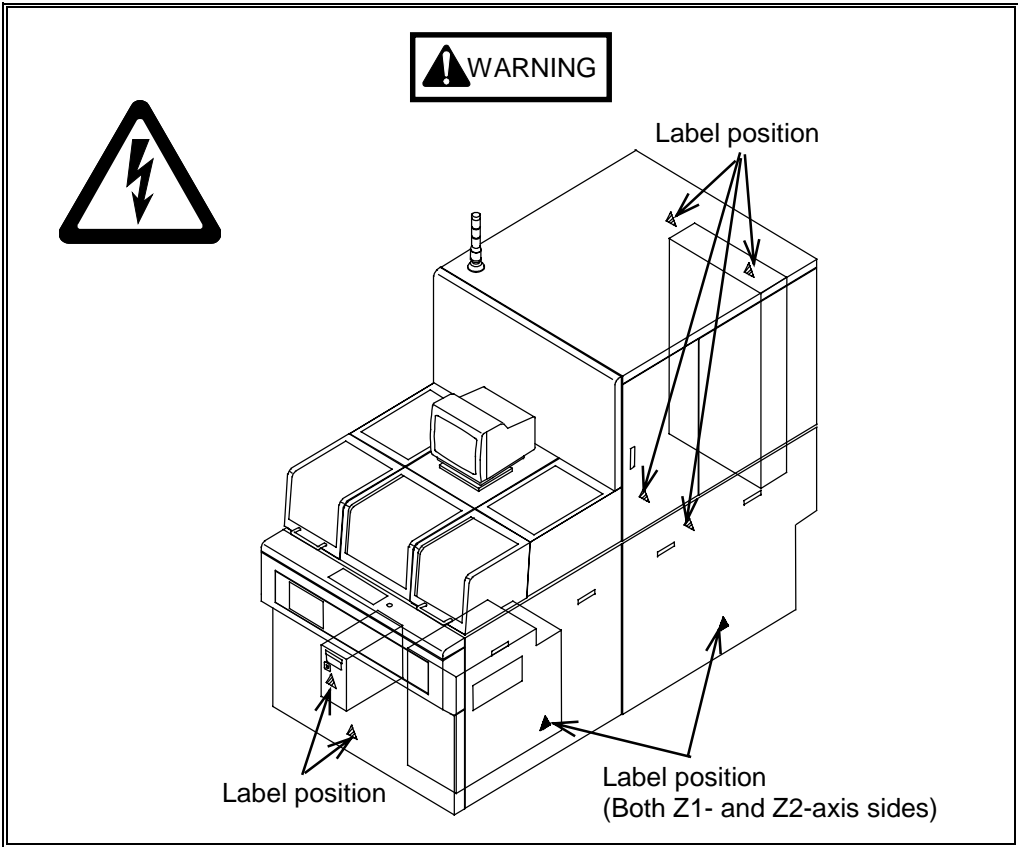
Locations of labels for cautioning against drive section

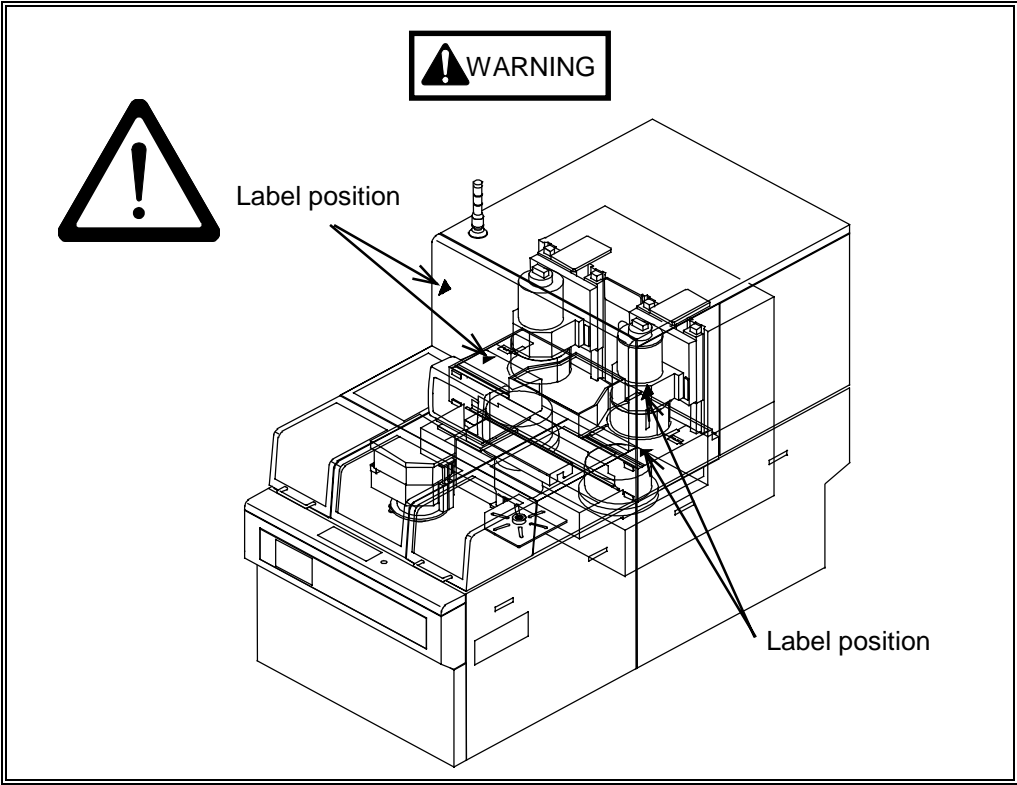


Locations of labels for cautioning against capture



Locations of labels for warning against electric shock



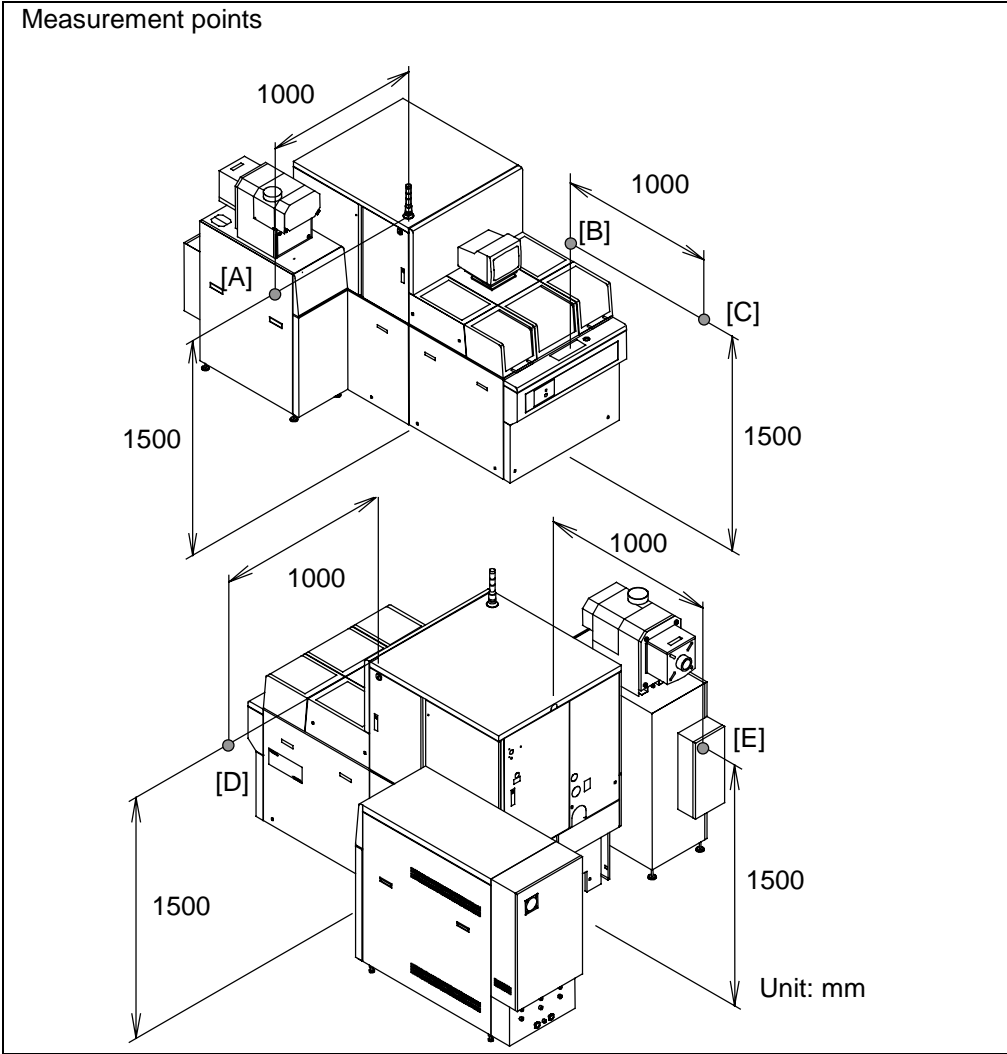


8. Noise Data

Measurement Conditions

Item	Condition
Test Instrument	RION NA-20
Background noise level	47 [dB(A)]
Measurement points	1 m away from the machine and 1.5 m above the floor (see the figure below)

Measurement Points



Measured noise levels

The following noise level values are for reference only. They may vary depending on the conditions used.

Measurement Points	Noise Level of the Machine During Warming up (dB (A))	Noise Level of the Machine During Grinding (dB (A))
A	70	70
B	68	70
C	67	69
D	69	70
E	70	70

B. WHOM TO CONTACT IN AN EMERGENCY

Contents of This Chapter

This chapter shows addresses of DISCO offices to contact in an emergency. Immediately get in touch with the following 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.

Section No.	Regions	Locations
1	JAPAN	Tokyo
		Osaka
		Kyusyu
		Sendai
		Suwa
		Nagoya
2	ASIA	Singapore
		Thailand
		Malaysia
		Philippines
		Korea
		Taiwan
		Hong Kong
		India
		China
3	U.S.A.	U.S.A.
		Canada
4	EUROPE	Germany
		France
		United Kingdom
		Israel

1. JAPAN OFFICE ADDRESS

JAPAN

DISCO CORPORATION

Japan Head Office	14-3, Higashi Kojiya 2-chome Ota-ku, Tokyo 144-8650 Phone 81-3-3743-0111 FAX 81-3-3743-5810
Overseas Sales / PS Company	Phone 81-3-3743-5813
Osaka Branch Office	3-12, Nishi Nakajima 6-chome Yodogawa-ku, Osaka 532-0011 Phone 81-6-6302-4501 FAX 81-6-6302-0258
Kyushu Branch Office	16-14, Kamisuizenji 2-chome Kumamoto-shi 862-0951 Phone 81-96-385-3411 FAX 81-96-384-1410
Sendai Regional Office	2nd. Floor, Sendai Bldg. Ekimae-kan 1-17, Itsutsubashi 1-chome Aoba-ku, Sendai-shi, Miyagi 980-0022 Phone 81-22-262-3345 FAX 81-22-262-3346
Suwa Regional Office	3rd. Floor, Center Bldg. 12, Okita-machi, 3-chome Suwa-shi, Nagano 392-0013 Phone 81-266-52-0814 FAX 81-266-52-0815
Nagoya Regional Office	1st. Floor, Kitamura No.4 Bldg. 80, Akegaoka, Meito-ku Nagoya-shi, Aichi 465-0033 Phone 81-52-776-6350 FAX 81-52-776-6380

2. ASIA OFFICE ADDRESS

SINGAPORE

DISCO HI-TEC (SINGAPORE) PTE., LTD.

Blk 2 Kaki Bukit Ave 1
#03-06/08 Kaki Bukit Industrial Estate
Singapore 417938
Singapore
Phone 65-7473737
FAX 65-7450266

THAILAND

DISCO HI-TEC (THAILAND) CO., LTD.

16th Floor, Lao Peng Nguan Tower 1
333 Viphavadi-Rangsit Road
Lard Yao, Cnatuchak
Bangkok 10900, Thailand
Phone 66-2-6188441
FAX 66-2-6188440

MALAYSIA

DISCO HI-TEC (MALAYSIA) SDN. BHD.

21A Tingkat 1
Jalan USJ 10/1D UEP
47620 Subang Jaya
Selangor, Darul Ehsan, Malaysia
Phone 60-3-563-72606
FAX 60-3-563-72439

Penang Regional Office

1-02-01 Persiaran Bukit Jambul Satu
Kompleks Sri Relau
11900 Penang, Malaysia
Phone 60-4-644-5502
FAX 60-4-645-2285

PHILIPPINES

AUROTECH SYSTEMS (PHIL'S), INC.

121 Buencamino Street
Alabang, Muntinglupa
Philippines
Phone 63-2-809-0155
FAX 63-2-807-7419

KOREA

D.I. CORPORATION

Disco Sales & Service
Department

D.I Building
58-6, Nonhyun-Dong
Kangnam-ku, Seoul, Korea
Phone 82-2-546-5501
FAX 82-2-3446-8087

TAIWAN

HAPPY POLE, LTD.

8th Floor, 8-1, No.41
Section 2, Roosevelt Road
Taipei, Taiwan R. O. C.
Phone 886-22-3960651
886-22-3960652
886-22-3966717
FAX 886-22-3943943

HONG KONG (CHINA)

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

INDIA

H. FILLUNGER & CO., PVT. LTD.

Post Box No.2526
11/4, Pusa Road
New Delhi 110 005
India
Phone 91-11-5787428
91-11-5726052
FAX 91-11-5762961

CHINA

DISCO TECHNOLOGY (SHANGHAI) CO., LTD.

4th Floor, Block A, FaZhan Mansion
No. 51 RiJing Road
WaiGaoQiao Free Trade Zone
Shanghai, P. R. China 200131
Phone 86-21-58662516
FAX 86-21-58662517

3. U.S.A. OFFICE ADDRESS

U.S.A.

DISCO HI-TEC AMERICA, INC.

USA Head Office	3270 Scott Blvd. Santa Clara, CA 95054-3011 U. S. A. Phone 1-408-987-3776 FAX 1-408-987-3785
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Eastern Regional Sales & Service Office	360 Harvey Road, Building B, Unit 202 Manchester, NH 03103 U. S. A. Phone 1-603-656-9019 FAX 1-603-656-9018
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Southeastern Regional Sales & Service Office	4460 Brookfield Corporate Drive, Suite B Chantilly, VA 20151 U. S. A. Phone 1-703-815-2727 FAX 1-703-815-3573
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Central Regional Sales & Service Office	4392 Sunbelt Drive Addison, TX 75001 U. S. A. Phone 1-972-267-9500 FAX 1-972-267-5612
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Southwestern Regional Sales & Service Office	4411 South 40th Street, Suite D-5 Phoenix, AZ 85040-2950 U. S. A. Phone 1-602-431-1412 FAX 1-602-431-1437
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Northwest Regional Sales & Service Office	7931 SW Cirrus Drive Beaverton, OR 97008-5971 U. S. A. Phone 1-503-644-0323 FAX 1-503-643-8108
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LYONS & ASSOCIATES

832 Bellevue Avenue
Hulmeville, PA 19047
U. S. A.
Phone 1-215-750-6346
FAX 1-215-752-3216
Territory in charge: PA, DE, MD, VA, WV

MATRIX ASSOCIATES

303 Sweetwater Blvd. So.
Longwood, FL 32779
U. S. A.
Phone 1-407-862-1120
FAX 1-407-862-1123
Mobile phone 1-407-421-2341
Territory in charge: FL, GA, AL

LYONS & ASSOCIATES

620 Swamp Road
Doylestown, PA 18901
U. S. A.
Phone 1-215-345-7915
FAX 1-215-345-8089
Territory in charge: NY, NJ

LYONS & ASSOCIATES

c/o Resources for Electronics
24577 Green Valley Parkway
Elkhart, IN 46517
U. S. A.
Phone 1-219-875-1133
FAX 1-219-875-6873
Territory in charge: WI, IL, IN (Area Code 219 only)
MI (Area Codes 517, 616 only)

LYONS & ASSOCIATES

c/o Resources for Electronics
7800 John Elwood Drive
Centerville, OH 45459
U. S. A.
Phone 1-937-434-4941
FAX 1-937-434-9445
Territory in charge: OH, KY,
IN (Except Area Code 219)
MI (Except Area Codes 517, 616)

U.S.A. (Continued)

NET MERCURY

13438 Floyed Circle
Dallas, TX 75243
U. S. A.
Phone 1-972-783-1501
FAX 1-972-783-1574
Territory in charge: North half of TX, OK

NET MERCURY

2204 Forbes Drive, Suite 101
Austin, TX 78754
U. S. A.
Phone 1-512-835-2794
FAX 1-512-832-5274
Territory in charge: South half of TX, AR, LA,
MO, KS

JOHN CRANE & ASSOCIATES

PMB 147
34522 No. Scottsdale Road, D-8
Scottsdale, AZ 85262
U. S. A.
Phone 1-480-488-9898
FAX 1-480-488-9848
Territory in charge: Mexico (Central & East)

SEMITORR MIDWEST

19175 Market Avenue
Belle Plain, MN 56011
U. S. A.
Phone 1-612-873-2873
FAX 1-612-873-2327
Territory in charge: MN, IA, NE, ND, SD

UKE ENTERPRISES

631 East Chapman Avenue
Orange, CA 92866
U. S. A.
Phone 1-714-633-0463
FAX 1-714-639-4359
Territory in charge: Southern CA (South of
San Luis Obispo), Mexico (West)

U.S.A. (Continued)

UKE ENTERPRISES

4200 Beacon Place
Byron, CA 94514
U. S. A.
Phone 1-925-240-5483
FAX 1-925-513-3442
Mobile phone 1-408-209-9681
Territory in charge: Northern CA

SALES & SERVICE

17853 Santiago Blvd.
Bldg. 107, Suite 333
Villa Park, CA 92861
U. S. A.
Phone 1-714-532-6500
FAX 1-714-532-6131
Territory in charge: ID

CANADA

HEPAIRE PRODUCTS CORP.

P. O. Box 11026
Station "H"
Nepean, Ontario
Canada K2H7T8
Phone 1-613-831-3234
FAX 1-613-831-3235
Territory in charge: Eastern Canada

4. EUROPE OFFICE ADDRESS

GERMANY

DISCO HI-TEC EUROPE GmbH

Liebigstrasse 8
D-85551 Kirchheim b. Muenchen
Germany
Phone 49-89-90903-0
FAX 49-89-90903-199

FRANCE

DISCO HI-TEC FRANCE SARL

Provence Office
Espace Beauvalle-Bat. C
6, rue Mahatma Gandhi
F-13090 Aix-en-Provence
France
Phone 33-442910020
FAX 33-442910029

UNITED KINGDOM

DISCO HI-TEC UK LTD.

151 London Road
East Grinstead/West Sussex RH19 1ET
United Kingdom
Phone 44-1342-313165
FAX 44-1342-313177

ISRAEL

NEW TECHNOLOGY R.K. LTD.

3 Ben Gurion Street
P.O. Box 2227
Kfar-Azar 55000
Israel
Phone 972-3-6356650
FAX 972-3-6357750

C. COMPONENT NAMES

Contents of this chapter

This chapter describes about the overall view as well as the drive sections of the machine. The arrangement of the keys on the operation panel and their functions are also described.

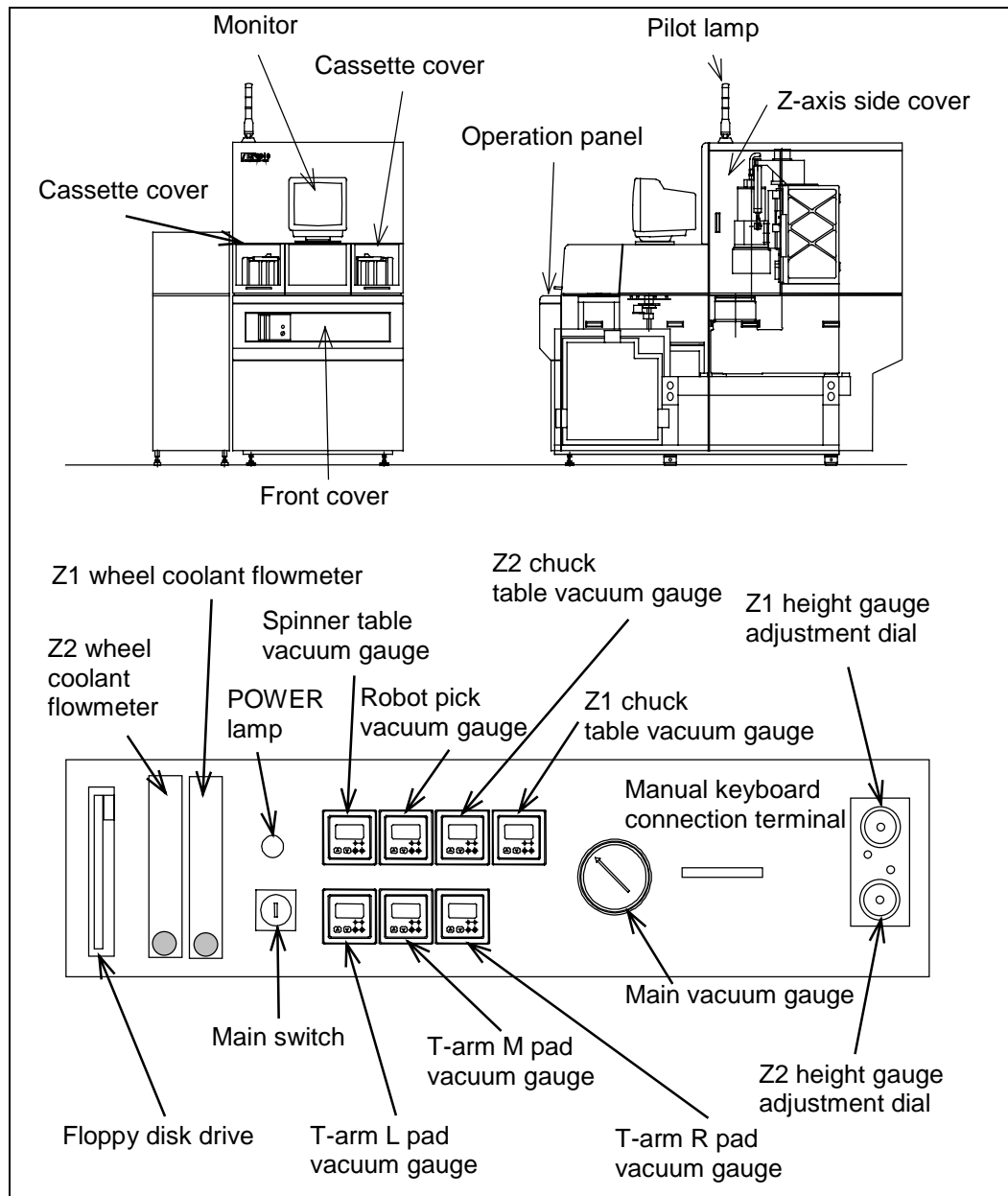
Section No.	Title	Contents
1	Overall View and Drive Sections of the Machine	- External view of the machine - Drive sections of the machine
2	Operation Panel	- Arrangement of the keys on the operation panel - Functions of the keys on the operation panel

1. Overall View and Drive Sections of the Machine

External view

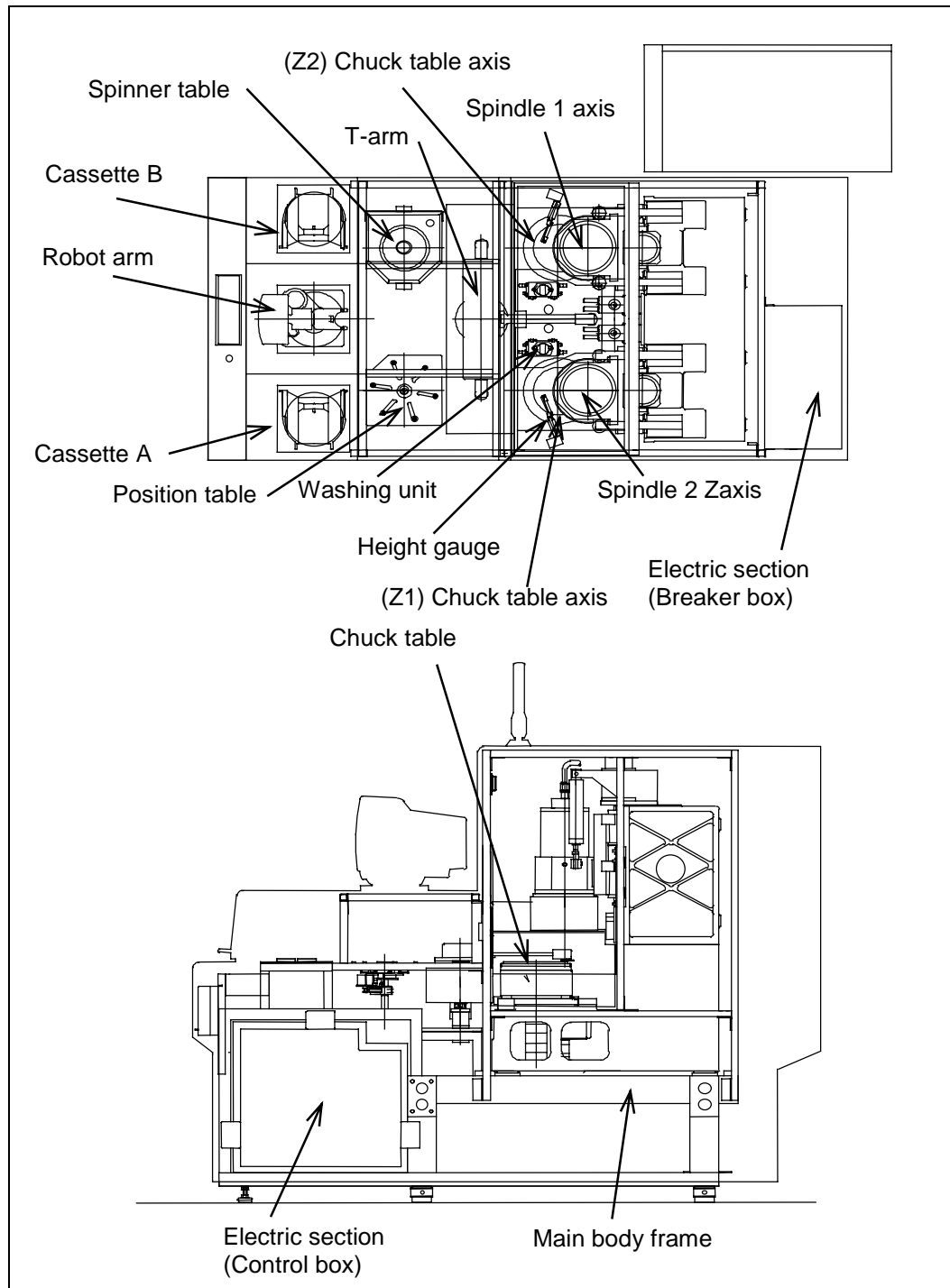
The monitor, pilot lamp, operation panel, and the covers (such as the side covers, cassette covers, and front cover) make up the exterior of the machine.

There exist meters and gauges inside the front cover.



Drive sections of the machine

The driving sections of the machine include the (Z1/Z2) spindle, (Z1/Z2) chuck table, robot arm, spinner table, T-arm, washing unit, (Z1/Z2) height gauge and position table.



2. Operation Panel

Summary of this section

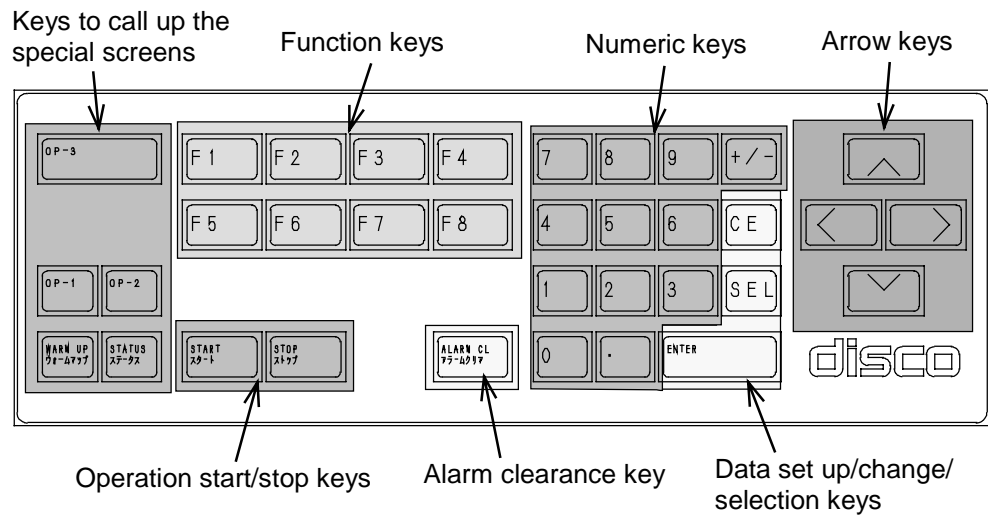
This section describes about the arrangement of the keys on the operation panel and their functions.

Section No.	Title	Contents
2-1	Arrangement of Keys on Operation Panel	- Arrangement of the keys on the operation panel - Grouping of the keys by function
2-2	Functions of Keys on Operation Panel	- Description of the keys by function

2-1. Arrangement of Keys on Operation Panel

Arrangement of the keys

The keys on the operation panel are arranged as follows.



Grouping of the keys by function

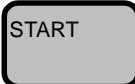

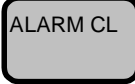
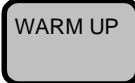
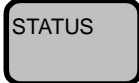
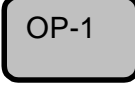
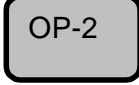
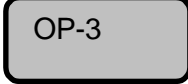












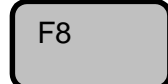
The keys on the operation panel are grouped by function as follows:

Function	Key to be used	
Start/stop of operations	[START], [STOP]	
Alarm clearance	[ALARM CL]	
Calling up of the special screens	[WARM UP], [STATUS], [OP-1], [OP-2], [OP-3]	
Data setting/change/selection	Numeric keys	[0] to [9], [.] , [+/-]
	Arrow keys	[], [], [<], [>]
	Data setting/change/selection keys	[ENTER], [CE], [SEL]
	Function keys	[F1] to [F8]

2-2. Functions of Keys on Operation Panel

Summary of this section

This section describes about the keys on the operation panel by function.



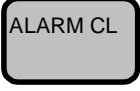
Section No.	Title	Contents
2-2-1	Keys to Start/Stop Operations and Clear Alarm Condition	  
2-2-2	Keys to Call up Special Screens	    
2-2-3	Keys to Set up/Change/Select/Call up Data	<p>- Numeric keys</p>  to  ,   <p>- Arrow keys</p>     <p>- Data set up/change/selection keys</p>    <p>- Function keys</p>  to 

2-2-1. Keys to Start/Stop Operations and Clear Alarm Condition

Summary of this section

The keys to start/stop various operations and clear alarm condition are described here.

Functions of the keys

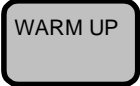

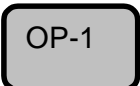
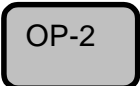
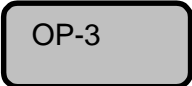
Key	Function
	Initiates automatic grinding (full auto) and other machine operations.
	Halts automatic grinding (full auto) and other machine operations.
	If this key is pressed when an error occurs, the alarm indication is cleared and the buzzer sound stops.

2-2-2. Keys to Call up Special Screens

Summary of this section

The keys to call up the special screens are described here.

Functions of the keys


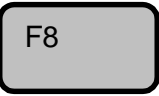







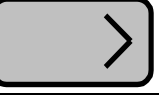



Key	Function
	If this key is pressed on the top menu screen, the WARM UP screen for performing warming up operation appears.
	If this key is pressed on the top menu screen or during full auto operation, the STATUS screen appears.
  	Keys to call up the special screens to perform special functions.

2-2-3. Keys to Set up/Change/Select/Call up Data

Summary of this section

The keys to set up or change the machine data such as "grinding amount", "wafer size" and "grinding speed", and to call up the specific functions or data are described here.

Functions of the keys

Key	Function
 to 	Function keys to select specific functions. The available function keys followed by their function descriptions are indicated at the bottom of each screen.
 to 	Used to enter numerals.
	Used to enter decimals.
	Effects numerical data sign changeover between + (plus) and - (minus).
   	Used to move the cursor.
	Used to change the settings of the grinding data and parameters.
	Finalizes the selected data setting. Also used to execute operations.
	Erases the data of an item over which the cursor is positioned. Also used to cancel operations.

D. OPERATION

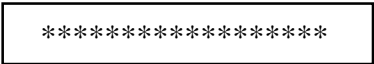
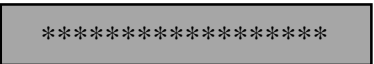

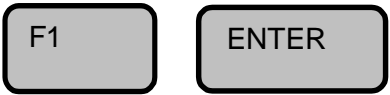



Contents of this chapter

This chapter describes about the procedures to operate the machine in the flow of the operation steps as described below.

Section No.	Title	Contents
1	Machine Startup	- Procedures to start up the machine
2	Full Auto Operation	- Procedures to grind wafers in the full automatic operation mode (full auto operation)
3	Operation Status Check	- Descriptions on the STATUS screen - Descriptions on the PROCESS STATUS screen - Description on the HISTORY screen
4	Termination of Machine Operation	- Procedures to terminate machine operation.

Nominal Conventions

This manual uses the following typographic conventions in this chapter.

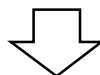
This	Represents
	Operation that the operator should perform
	Operation that the machine automatically performs
	The screen that is called up
	Keys on the operation panel (to be pressed by the operator)
	Order or flow of the operation steps
	<ul style="list-style-type: none">- Procedures to counter a trouble- Procedures to perform an exceptional operation
	Flow of the operation steps when countering a trouble or performing an exceptional operation

1. Machine Startup

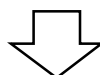
Operation flow

This section describes the procedures to start up the machine in the flow of the operation steps as described below.

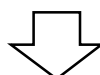
1-1	Opening Valves of Air, Water, Drain, and Exhaust and Turning ON the Power of Plant Facility
-----	--



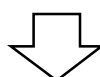
1-2	Checking of Supply Air Pressure and Power Reception
-----	---



1-3	Turning ON the Machine Power
-----	------------------------------



1-4	Initialization
-----	----------------



1-5	Warm up
-----	---------

1-1. Opening Valves of Air, Water, Drain, and Exhaust and Turning ON the Power of Plant Facility

Procedures to open the valves of air, water, drain, and exhaust and turn ON the power at the plant facility side

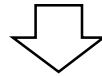
The procedures to open the valves of air, water, drain, and exhaust and turn ON the power at the plant facility side are described here.

Some of these valves may be constantly kept open in some plants. Check with your plant facility supervisor about their conditions first.

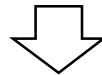


Operating the machine while its interior or floor is wet with water may cause an electric shock hazard that could result in severe personal injury or death. If the machine or floor is wet with water, shut OFF power supply at the machine circuit breaker and facility power source, lock them out with padlocks or the like instrument, and then dry the affected area. Never turn ON the facility-side power until the machine and floor are completely dry.

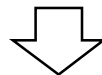
Open the valves of exhaust air and drain water.



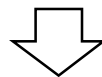
Open the valve of air.



Open the valves of spindle coolant water and wheel coolant water.



Turn ON the power at the plant facility side.



!!! The machine startup procedures continue to the next section. !!!

1-2. Checking of Supply Air Pressure and Power Reception

Procedure to check the supply air pressure and power reception

!!! This section is continued from: !!!

Section 1-1, [Opening Valves of Air, Water, Drain, and Exhaust and Turning ON the Power of Plant Facility]

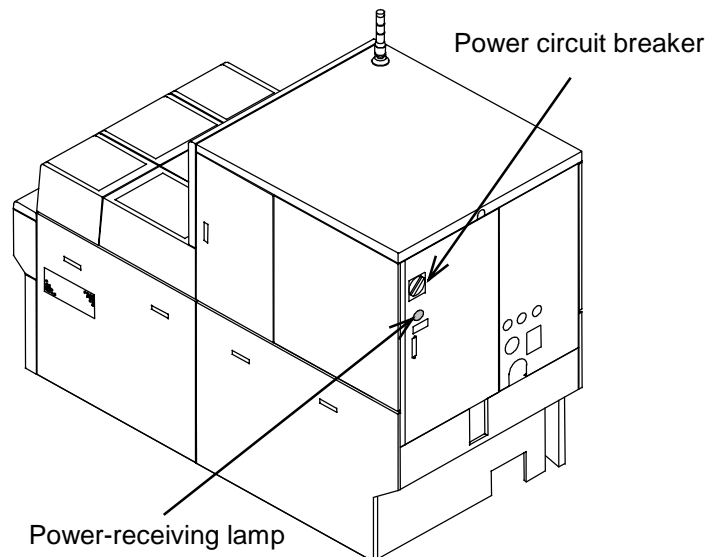


Go to the rear of the machine.



Check to make sure that the power-receiving lamp is illuminating.

- The power-receiving lamp locates under the power circuit breaker.



If the power-receiving lamp is not lit:

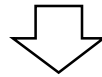
Recheck the procedures of section 1-1, [Opening Valves of Air, Water, Drain, and Exhaust and Turning ON the Power of Plant Facility] in this chapter.

If the lamp still fails to light:

Contact your maintenance personnel for corrective action.

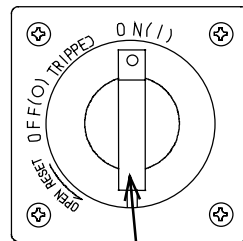


Procedure to check the supply air pressure and power reception (Continued)



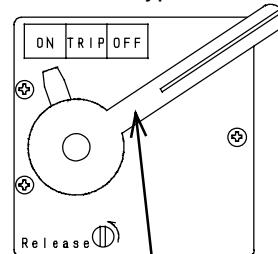
Turn the circuit breaker lever to "ON" position.

【Standard type】



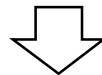
Breaker lever

【SEMI type】

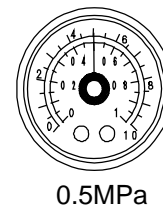
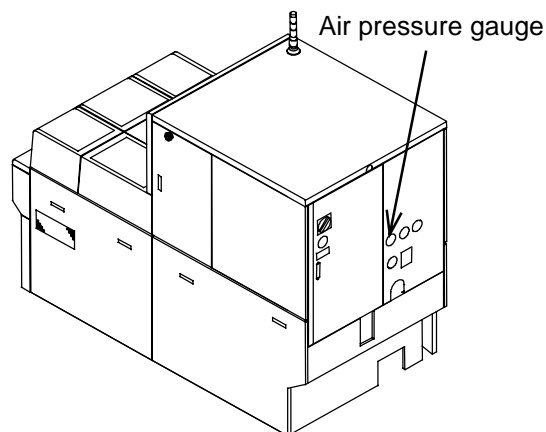


Breaker lever

If the circuit breaker is locked out with a padlock or the like:
Ask your maintenance personnel to open the lockout.



Check to make sure that the air pressure gauge reads 0.5 MPa.

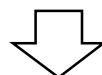


If the indicated value greatly deviates from 0.5 MPa:
Recheck the procedures of section 1-1, [Opening Valves of Air, Water, Drain, and Exhaust and Turning ON the Power of Plant Facility] in this chapter.

If a proper gauge reading is still not obtained:
Contact your maintenance personnel for corrective action.



When checking of the indicators on the machine rear side completes, return to the machine front side.



!!! The machine startup procedures continue to the next section. !!!

1-3. Turning ON the Machine Power

Procedure to turn ON the machine power

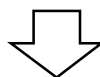


Never attempt to turn ON the machine power when its interior or floor is wet with water or other liquid. Otherwise, you may receive an electric shock that could result in severe injury or death.

NOTICE

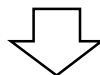
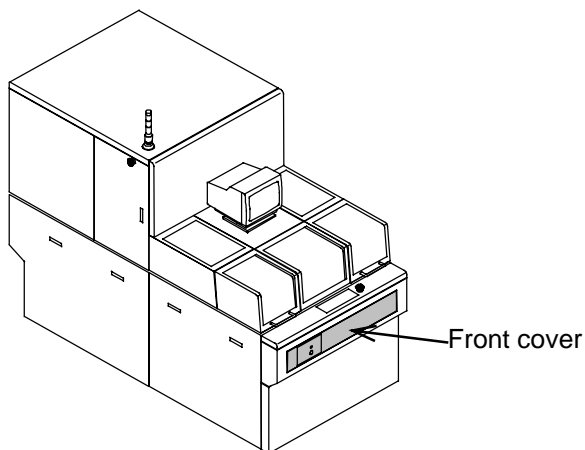
When turning ON the machine power, be sure that at least one minute has elapsed since the last power OFF. If the power is turned ON/OFF successively, the hard disk or other machine components may fail.

!!! This section is continued from: !!!
Section 1-2. [Checking of Supply Air Pressure and Power Reception]



Open the front cover.

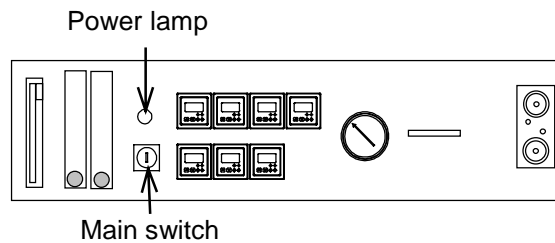
- Gently push and then release the cover to open it.



Procedure to turn ON the machine power (Continued)



Insert the main switch key into its key slot located inside the front cover.



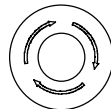
Turn the key clockwise to "START" position and leave the key there.

- The power lamp above the main switch then glows green.

If the lamp does not light upon main switch ON:

It is conceivable that one of the EMO switches is being activated. Clear activation of all the EMO switches referring to the following instruction.

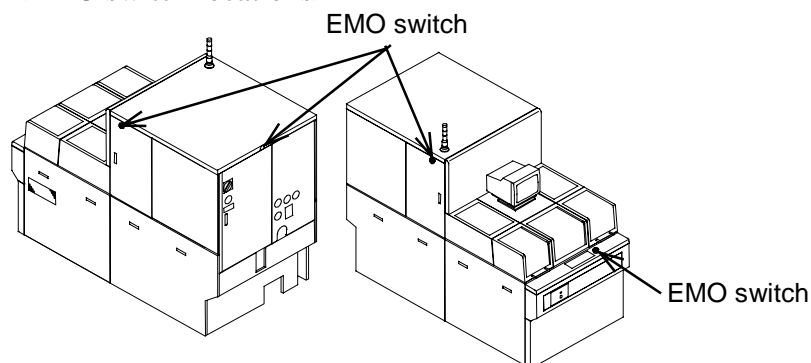
<Releasing of EMO switch>



Turn the EMO switch button clockwise (in the direction of the arrows). It then pops up to be released.



<EMO switch locations>



If the POWER lamp still does not light after all the EMO switches are released:

Immediately contact your maintenance personnel for corrective action.



In about one minute, the top menu screen appears on the monitor.



Procedure to turn ON the machine power (Continued)



Page [A02]	MENU	YYYY/MM/DD HH:MM:SS	
Ver.*****			
F1 : MACHINE INITIALIZE			
F2 : GRINDING			
F3 : GRIND MAINTENANCE			
F4 : PARAMETER SET			
F5 : MACHINE MAINTENANCE			
F7 : EXTRA			
WARM UP TIME 0 ————— 50 ————— 100% (/ min)			
F01 : Initialize	F02 : Grinding	F03 : Grind Maint.	F04 : Parameter Set
F05 : Machine Maint.	F06 : Maker Maint.	F07 : Extra	F08 :
G: [F1] - [F2] Please choose. ([F3] - [F6] Password Required)			



Check to be sure that the top menu screen is displayed.

If nothing appears on the monitor screen after one minute has elapsed:

Turn OFF the main switch, wait for at least one minute and then restart the machine.

If the machine still does not start up:

Contact your maintenance personnel for corrective action.

If the following message appears on the monitor screen upon power ON:

Immediately contact your maintenance personnel without clearing the message.

DFG EMERGENCY STOP INFORMATION

DATE & TIME : 2002/XX/XX XX:XX:XX
CODE : XXXX
SOURCE : XXXXXXXX XXXXX

The above message indicates that a C- or D-class error has occurred in the machine startup process. (Refer to Section 1, [Error Classes] in Chapter E for details of the error classes.)



Close the front cover.



!!! The machine startup procedures continue to the next section. !!!

1-4. Initialization

About initialization

Initialization is the process in which movable components of the machine return to their respective origins (initial positions). The machine components move with reference to their initial positions during grinding operation. Initialization of the machine must always be performed before starting grinding operation.

Initialization procedure

The procedure to initialize the machine is described here.

!!! This section is continued from: !!!
Section 1-3, [Turning ON the Machine Power]



Check to be sure that the top menu screen is displayed on the monitor.



Visually check the inside of the machine to make sure that there are no wafers, tools, or other irrelevant items left in the machine.



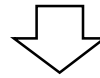
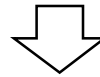
F1



Page [E01]	INITIALIZE		YYYY/MM/DD HH:MM:SS
Ver.*****			
>> Please make sure that nothing is placed on following parts			
1) ROBOT AREA / T-ARM AREA			
2) POSITION TABLE			
3) SPINNER TABLE			
4) Z1 / Z2 CHUCK TABLE			
F01 : Previous sern.	F02 :	F03 : Initial Z1	F04 :
F05 :	F06 :	F07 :	F08 :
G : [START] key : Start Initializing			



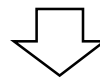
Initialization procedure (Continued)



The initialization process starts with the initialization (start) screen displayed.

- The initialization status indication for the respective machine units changes in the following order:

[Wait] [Active] [Finish]



Page [E01]		INITIALIZE	
		Ver.*****	
1> Robot	Initializing	[Active]	
2> Position Table	Initializing	[Active]	
3> T-Arm	Initializing	[Active]	
4> Z1 Axis	Initializing	[Active]	
5> Z2 Axis	Initializing	[Active]	
6> Spinner	Initializing	[Active]	
F01 :	F02 :	F03 :	F04 :
F05 :	F06 :	F07 :	F08 :
E1004: <> Initial Start			

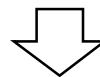


If an error occurs in the initialization process:

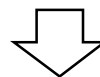
Go to the top menu screen by pressing the <F1> key and redo the initialization procedure from the beginning.

If the error repeatedly occurs:

Contact your maintenance personnel for corrective action.



When the initialization process normally completes, the message "Initializing completed already." appears on the screen.



Initialization procedure (Continued)



Page [E01]

INITIALIZE

Ver.*****

1> Robot

Initializing

[Finish]

2> Position Table

Initializing

[Finish]

3> T-Arm

Initializing

[Finish]

4> Z1 Axis

Initializing

[Finish]

5> Z2 Axis

Initializing

[Finish]

6> Spinner

Initializing

[Finish]

>> Initializing completed already. <<

F01 :

F02 :

F03 :

F04 :

F05 :

F06 :

F07 :

F08 :

E1005 : <> Initial Completed

G : [ENTER] key press please ...



ENTER



Top menu



!!! The machine startup procedures continue to the next section. !!!

1-5. Warm up

About warm up

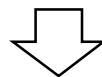
Warm up is the process in which the machine idles with the spindles and chuck tables rotated and the wheel coolant water and chuck table water flow/air blow systems turned on for at least 30 minutes to achieve the machine's continued accuracy.

Procedure to warm up the machine

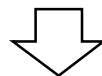
NOTICE

If the machine is not sufficiently warmed up (less than 30 minutes), instable machine accuracy may result. Make sure to warm up the machine for at least 30 minutes.

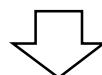
!!! This section is continued from: !!!
Section 1-4, [Initialization]



Check to make sure that the top menu screen is displayed.



WARM UP



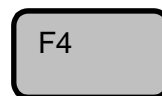
Page [E02]	WARM UP		YYYY/MM/DD HH:MM:SS	
ACTUAL STATUS		SET : (Mode)		(Value)
>> Z1 Axis Spindle R.P.M.	>>Stop<<	0 (rpm)	<Rotate>	#### (rpm)
Coolant	>>Stop<<		<Active>	
Chuck R.P.M.	>>Stop<<	0 (rpm)	<Rotate>	## (rpm)
Chuck Blow	>>Stop<<		<Active>	
>> Z2 Axis Spindle R.P.M.	>>Stop<<	0 (rpm)	<Rotate>	#### (rpm)
Coolant	>>Stop<<		<Active>	
Chuck R.P.M.	>>Stop<<	0 (rpm)	<Rotate>	## (rpm)
Chuck Blow	>>Stop<<		<Active>	
>> Warm Up Time		0 (min)		## (min)
<> After Auto, Coolant C/T Rot/Blow on according to parameter above : < Set >				
F01 : Previous scrn.	F02 : Syc. C/T washer	F03 : Syc. interval-P	F04 : Start	
F05 :	F06 :	F07 : Pause/Restart	F08 : Stop	



Procedure to warm up the machine (Continued)



Check with your maintenance personnel to make sure that all data on the WARM UP screen are correctly set up.



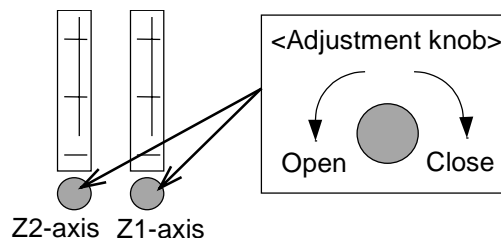
Warming up of the machine starts.



Page [E02]		WARM UP		YYYY/MM/DD HH:MM:SS	
ACTUAL STATUS			SET : (Mode)	(Value)	
>> Z1 Axis Spindle R.P.M.			>>Rotate<<	0 (rpm)	<Rotate> #### (rpm)
Coolant			>>Blow<<		<Active>
Chuck R.P.M.			>>Rotate<<	0 (rpm)	<Rotate> ## (rpm)
Chuck Blow			>>Blow<<		<Active>
>> Z2 Axis Spindle R.P.M.			>>Rotate<<	0 (rpm)	<Rotate> #### (rpm)
Coolant			>>Blow<<		<Active>
Chuck R.P.M.			>>Rotate<<	0 (rpm)	<Rotate> ## (rpm)
Chuck Blow			>>Blow<<		<Active>
>> Warm Up Time				0 (min)	## (min)
<> After Auto, Coolant C/T Rot/Blow on according to parameter above : < Set >					
F01 : Previous scrn.		F02 : Syc. C/T washer		F03 : Syc. interval-P	
F04 : Start		F05 :		F06 :	
F07 : Pause/Restart		F08 : Stop			



Make sure that both the Z1/Z2 wheel coolant flowmeters located inside the machine front cover indicate a flow rate in the range from 2.0 to 3.5 L/min respectively.



If a flow rate outside the specified range is indicated;

Turn the adjustment knob of the associated flowmeter to obtain a value within the specified range.



Procedure to warm up the machine (Continued)



Wait in this state for at least 30 minutes.

- This process is called "warm up" operation.

To interrupt the warm-up operation:

F8

Press the key.

To check the elapsed time from the start of the warm-up operation:

F1

Press the key on the WARM UP screen to call up the top menu screen.



In the "WARM UP TIME" column of the top menu screen, you can see the elapsed time from the start of the warm-up operation shown in bar graph and numeric value.



To return to the WARM UP screen, press the

WARM UP

key.



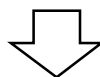
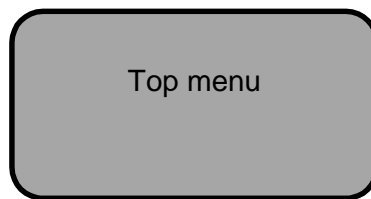
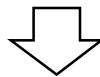
When the specified warm-up time elapses, the indication ">>Warm Up<<" at the bottom of the screen disappears.



F1



Procedure of warm up operation (Continued)

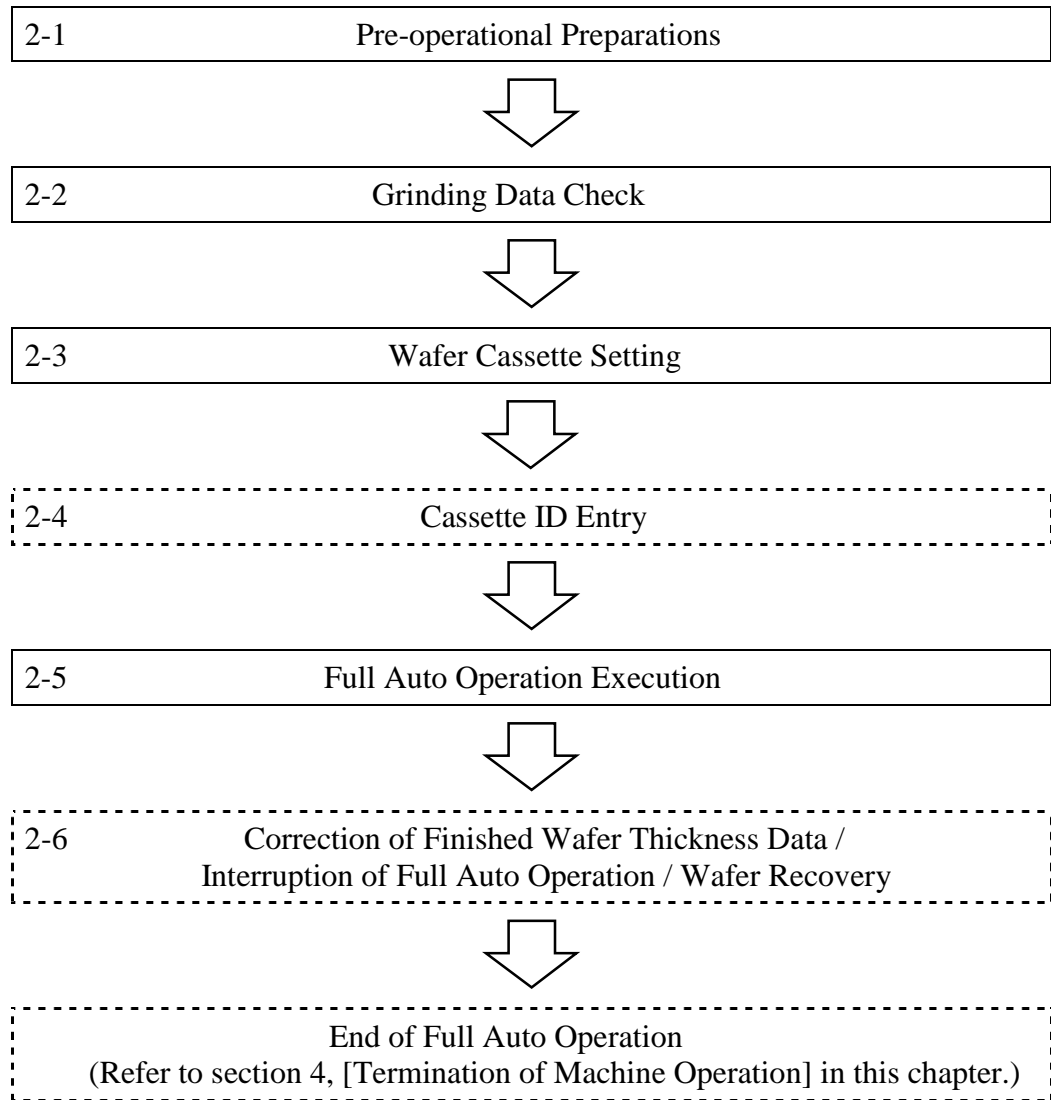


!!! Starting up of the machine now completes !!!

2. Full Auto Operation

Operation flow

This section describes about the procedures to grind wafers in the full automatic operation mode (hereinafter referred to as "full auto operation") in the flow of the operation steps as described below.



2-1. Pre-operational Preparations

Procedure of pre-operational preparations

Visually check the inside of the machine to see if there are any wafers or tools left in the machine.

If any wafers or tools are left in the machine:

Ask your maintenance personnel to remove such irrelevant items.



Check to be sure that the top menu screen is displayed.

If a screen other than the top menu screen is displayed:

Return to the top menu screen by pressing the

F1

key.



Check to be sure that the machine startup process as described in section 1, [Machine Startup] in this chapter has been completed.

If the machine startup process has not been completed:

Complete the process referring to section 1 of this chapter.



Have on hand wafers to be ground. Check with your maintenance personnel about the grinding conditions that will be used for grinding the wafers. The items to be checked are as follows.

- Grinding program number
- Wafer size
- Original wafer thickness (wafer type)
- Finished wafer thickness



!!! The full auto operation procedures continue to the next section. !!!

2-2. Grinding Data Check

About grinding data check

The grinding data check process checks if the correct grinding program is selected and if the registered data for grinding (such as original wafer thickness, wafer size, and finished wafer thickness) is correct.

Procedure to check grinding data

The procedure to check the data used for grinding is described here.

!!! This section is continued from: !!!
Section 2-1, [Pre-operational Preparations]



Check to be sure that the top menu screen is displayed.



F2



Page [G01]		GRIND DATA		YYYY/MM/DD HH:MM:SS	
Program No. #					
ID == #####					
Rmrk== #####					
Wafer Diameter # inch					
Original Thickness ### μm					
off amount (##)					
Z2 Finished Thickness ### μm Z1					
GR mode sel <####> start <#> GR mode sel <####> start <#>					
ZZ- GRIND : [Use]		SPINDLE : [Rotate]		Z1- GRIND : [Use]	
GAUSE : [Set]		C-WATER : [Blow]		GAUSE : [Set]	
CST-B : [None]		C-LEVEL : [LOW]		CST-A : [None]	
C-LEVEL : [LOW]				C-LEVEL : [LOW]	
F01 : TOP MENU		F02 : Edit Program		F03 : Input est. ID	
F05 : Save		F06 : Program List		F07 : Chg Thick. list	
G : [SEL] key: Change data				F08 : Test H-Gauge	
G : [START] key: Start FULL AUTO operation.					

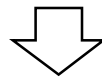
Grind data setup status



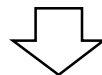
If there is any data item shown in red or yellow (excluding "CST-A" and "CST-B") in the "Grind data setup status" column:
Ask your maintenance personnel to take a corrective action.



Procedure to check grinding data (Continued)

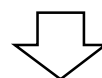


Verify that the program number, wafer size, original wafer thickness and finished wafer thickness data confirmed in section 2-1, [Pre-operational Preparations] agree with those indicated in the GRIND DATA screen.



If both data don't agree:

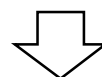
F6



Page [G02]		GRIND DATA LIST		YYYY/MM/DD HH:MM:SS	
No.	ID	Remark	Grind Data		Ver.:*****
1	#####	#####	# inch	### <###	YYYY/MM/DD
2	#####	#####	# inch	### <###	YYYY/MM/DD
3	#####	#####	# inch	### <###	YYYY/MM/DD
4	#####	#####	# inch	### <###	YYYY/MM/DD
5	#####	#####	# inch	### <###	YYYY/MM/DD
6	#####	#####	# inch	### <###	YYYY/MM/DD
7	#####	#####	# inch	### <###	YYYY/MM/DD
8	#####	#####	# inch	### <###	YYYY/MM/DD
9	#####	#####	# inch	### <###	YYYY/MM/DD
10	#####	#####	# inch	### <###	YYYY/MM/DD
11	#####	#####	# inch	### <###	YYYY/MM/DD
12	#####	#####	# inch	### <###	YYYY/MM/DD

F01 : Previous scrn.	F02 :	F03 : Copy	F04 :
F05 :	F06 :	F07 :	F08 :

G : [ENTER] key: Go into Edit Mode



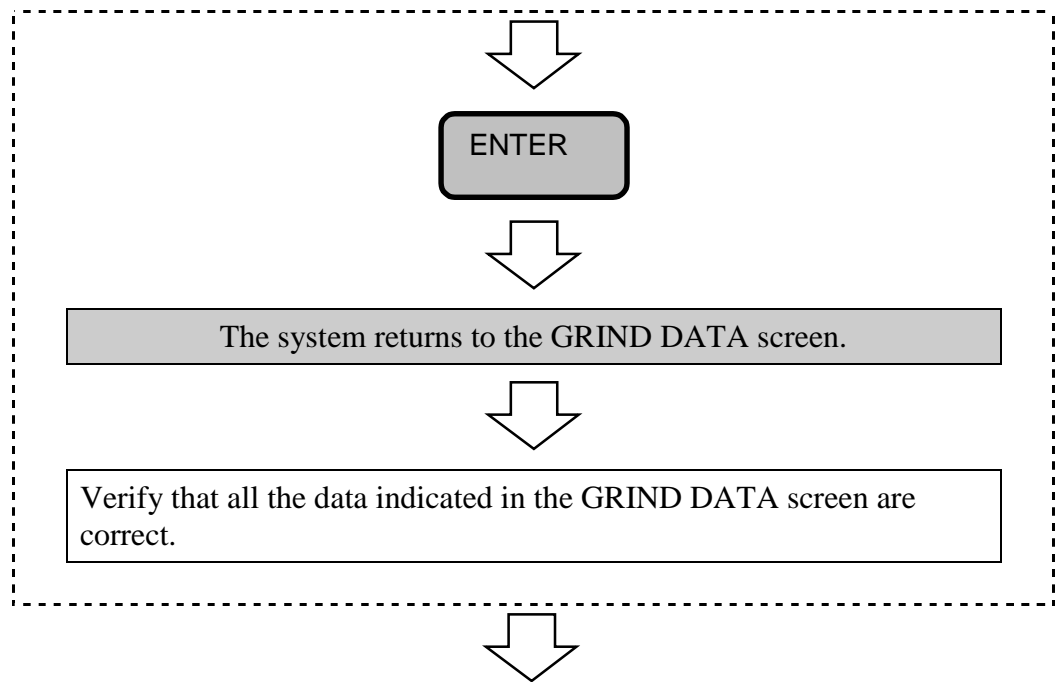
Using the  or  key, select the correct program number to be used.

If the program number to be used cannot be found:

Contact your maintenance personnel.



Procedure to check grinding data (Continued)



!!! The full auto operation procedures continue to the next section. !!!

2-3. Wafer Cassette Setting

About wafer cassette setting

Wafers to be ground are contained in a cassette and placed on the cassette stage.

Procedure to set a wafer cassette on the cassette stage



If your hands or fingers are positioned in the robot section or wafer transport section in action, they may be caught or cut off.
Before replacing the cassette, check to be sure that the cassette you are going to remove has finished its processing.

NOTICE

When you place a cassette on the cassette stage, make sure that no wafer is protruding out of its slots.
A wafer protruding out of the cassette may come into contact with the robot arm and be damaged.

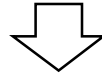
!!! This section is continued from: !!!
Section 2-2, [Grinding Data Check]



Check to be sure that the wafers to be ground are correctly set in a cassette.

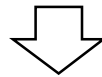
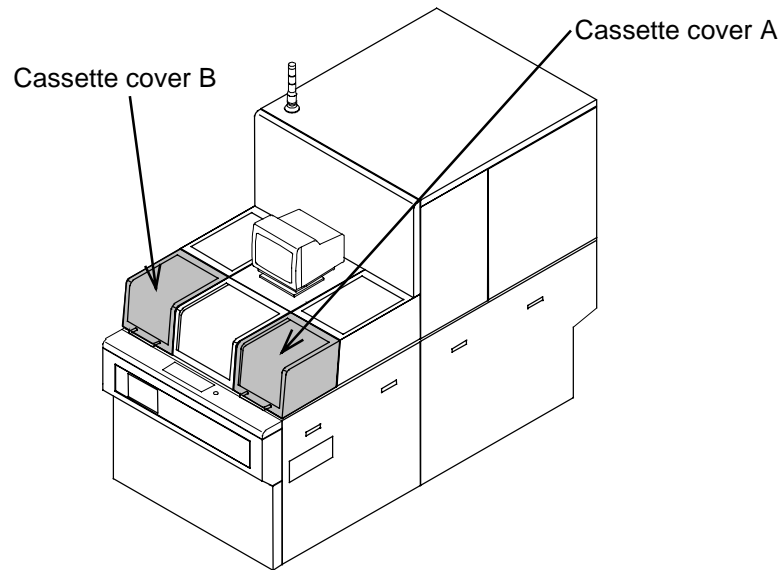


Procedure to set a wafer cassette on the cassette stage (Continued)

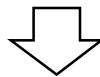


Open the cassette cover.

- A cassette can be set on either of the cassette stages A and B.
If cassettes are set on the both cassette stages, grinding will proceed in the order of cassette A → cassette B in the standard setup.
(Set up of the cassette processing order can be changed. Check with your maintenance personnel for details.)

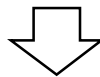
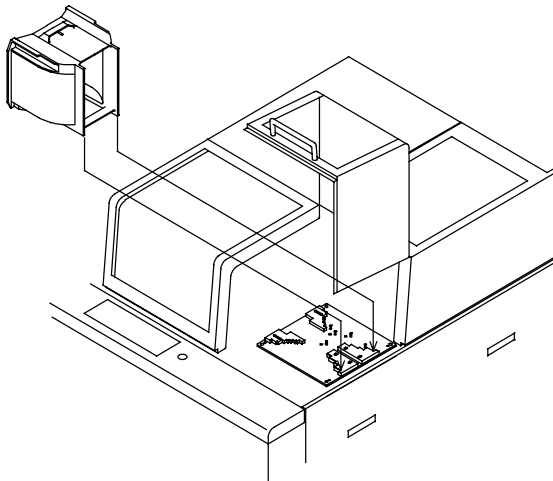


Procedure to set a wafer cassette on the cassette stage (Continued)

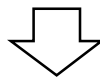


Place a cassette on the cassette stage.

- Gently place a cassette on the stage by pressing its rear end against the associated cassette size stepped stopper.



Close the cassette cover.



!!! The full auto operation procedures continue to the next section. !!!

2-4. Cassette ID Entry

About cassette ID

By setting up ID for each cassette, you can manage wafer grinding data by cassette.

This function is incorporated into the machine prior to its shipment upon customer's choice.

- If the machine has this function:

Full auto operation cannot be started without entering the cassette ID.

- If the machine does not have this function:

It is not necessary to set up the cassette ID. Proceed to Section 2-5. [Full Auto Operation Execution].

Contact your nearest DISCO office or DISCO service office if you want to change the use/disuse of this function.

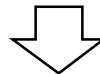
Procedure to enter Cassette ID

NOTICE

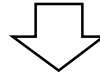
"ID" shown on the GRIND DATA screen and "Cassette ID" are completely different.

- "ID" on the GRIND DATA screen is set up for each grinding program.
- "Cassette ID" is set up for each cassette.
- Even if the machine does not have the Cassette ID function, you can enter the Cassette ID by pressing <F03: Input cst. ID>. However, its data is not registered.

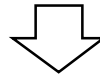
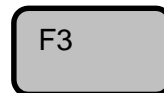
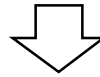
!!! This section is continued from: !!!
Section 2-3, [Wafer Cassette Setting]



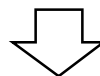
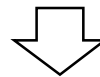
Procedure to enter Cassette ID (Continued)



Page [G01]		GRIND DATA		YYYY/MM/DD HH:MM:SS	
Program No. #					
ID == #####					
Rmrk== #####					
Wafer		Diameter		# inch	
Original Thickness		###		μm	
		off amount (##)	
Z2		Finished Thickness		### μm	
GR mode sel		<####>		start < #>	
Z2- GRIND : [Use]		SPINDLE : [Rotate]		Z1- GRIND : [Use]	
GAUSE : [Set]		C-WATER : [Blow]		GAUSE : [Set]	
CST-B : [None]		C-LEVEL : [LOW]		CST-A : [None]	
				C-WATER : [Blow]	
				C-LEVEL : [LOW]	
F01 : TOP MENU		F02 : Edit Program		F03 : Input cst. ID	
F04 : Process status		F05 : Save		F06 : Program List	
F07 : Chg Thick. list		F08 : Test H-Gauge			
G : [SEL] key: Change data					
G : [START] key: Start FULL AUTO operation.					



Page [G04]		CST. ID EDIT	
<div style="text-align: center; margin-top: 20px;">CASSETTE ID :</div> <div style="text-align: center; margin-top: 100px;">PREVIOUS ID :</div>			
F01 : Previous scrn.	F02 :	F03 :	F04 :
F05 :	F06 :	F07 :	F08 :



Procedure to enter Cassette ID (Continued)



Page [MT02]		EDIT ID / Comment	
[< Within 16w >]		Ver.*****	
<div style="border: 1px solid black; padding: 5px; text-align: center;">A B C D E F G H I J K L M N O P Q R S T U V W X Y Z # sp % & _ -</div>			
F01 : Edit Completed	F02 : Back Space	F03 : Clear Enter	F04 :
F05 :	F06 :	F07 :	F08 :
G : Choose a letter by cursor G : Use numeral key to input numeral.			



Enter the Cassette ID.

- Move the cursor onto a character you want to enter and press [ENTER] key to enter a character.
- Use numeral keys to enter numerals.
- Use [F02: Back Space] key to erase a character and [F03: Clear Enter] key to erase the entire character string.
- The cassette ID consists of up to 16 characters.



The cassette ID name is finalized.
The system returns to the GRIND DATA screen.

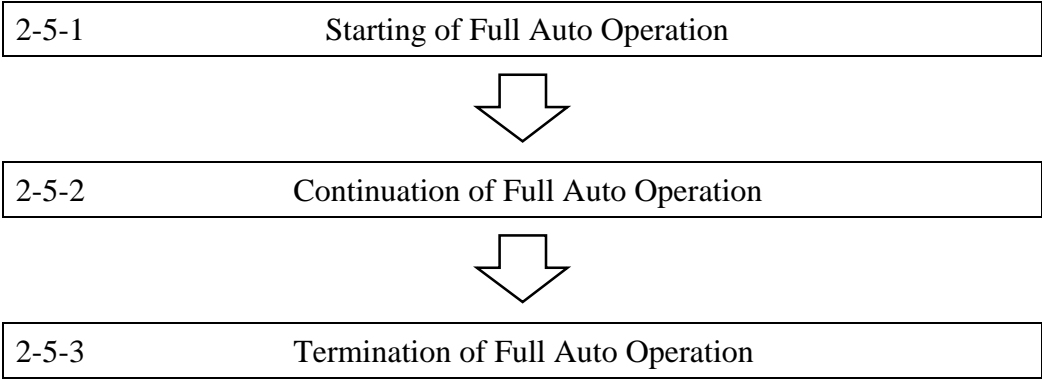


!!! Continued to the next section !!!

2-5. Full Auto Operation Execution

Operation flow

This section describes about he procedures to execute full auto operation in the flow of the operation steps as described below.



2-5-1. Starting of Full Auto Operation

Procedure to start up full auto operation

The procedure to start up full auto operation is described here.

!!!This section is continued from:!!!
Section 2-3, [Wafer Cassette Setting], or
Sectopm2-4, [Cassette ID Entry]



Check to be sure that the following procedures have been completed before starting full auto operation.

- Pre-operational Preparations (Section 2-1 in this chapter)
- Grinding Data Check (Section 2-2 in this chapter)
- Wafer Cassette Setting (Section 2-3 in this chapter)
- Cassette ID Entry (Section 2-4 in this chapter)

The "Cassette ID Entry" procedure should be checked only when this function is selected for the machine.



Page [G01]		GRIND DATA		YYYY/MM/DD HH:MM:SS	
Program No. #					
ID == #####					
Rmrk== #####					
Wafer Diameter # inch					
Original Thickness ### μm					
off amount (##)					
Z2		Finished Thickness ### μm		Z1	
GR mode sel <####> start <#>		GR mode sel <####> start <#>			
Z2- GRIND : [Use]		SPINDLE : [Rotate]		Z1- GRIND : [Use]	
GAUSE : [Set]		C-WATER : [Blow]		SPINDLE : [Rotate]	
CST-B : [None]		C-LEVEL : [LOW]		GAUSE : [Set]	
				C-WATER : [Blow]	
				CST-A : [None]	
				C-LEVEL : [LOW]	
F01 : TOP MENU		F02 : Edit Program		F03 : Input est. ID	
F04 : Process status		F05 : Save		F06 : Program List	
F07 : Chg Thick. list		F08 : Test H-Gauge			
G : [SEL] key: Change data					
G : [START] key: Start FULL AUTO operation.					

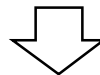
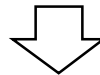


Grinding data setup status

Procedure to start up full auto operation (Continued)

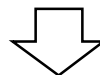
Check the items in the "Grinding data setup status" column of the GRIND DATA screen. The meanings of the colors used to show the conditions of these items are as follows.

- Blue
Ready to start full auto operation.
 - Yellow
Ready to start full auto operation, however the item needs re-checking.
 - Red
Not ready to start full auto operation (incomplete initialization, etc.)
The cassette is not set up.
- * If there is any item shown in red or yellow, ask your maintenance personnel to take a corrective action.

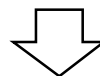


Full auto operation starts with the FULL AUTO screen displayed.

- Refer to [Contents of the FULL AUTO screen] in this chapter for details of the FULL AUTO screen.
- The green lamp of the pilot lamp lights while full auto operation is being executed.



When all wafers are ground and stored back into the cassette, the status indication for the cassette changes to "FINISH".



If you want to continue full auto operation by replacing the finished cassette with new one, follow the procedures described in Section 2-5-2, [Continuation of Full Auto Operation] in this chapter.

If you want to terminate full auto operation here, proceed to Section 2-5-3, [Termination of Full Auto Operation] in this chapter.

Contents of the FULL AUTO screen

When full auto operation is started, the FULL AUTO screen appears. The contents of the FULL AUTO screen are described here.

[Screen]

The screenshot shows the FULL AUTO screen with the following sections:

- Page [G05]**: Located at the top left.
- FULL AUTO**: The main title of the screen.
- Grinding program information section**: Located at the top right, containing:
 - Program Number. [11] ID : [12]
 - Remark : [13]
 - Wafer : [14] inch
 - <>MODE Air : Grind
 - Z1:SET [[15] : [16]]
 - Z2:SET [[17] : [18]]
 - Origin : Z2 [19] Z1 [20] μm
 - Finish : [21] [22] μm
 - Gauge : [23] [24] μm
 - outside Gauge : [25] [26] μm
 - Wheel Wear : [27] [28] μm
 - Set : [29] [30] A
 - Peak : [31] [32] A
 - Z1 [33] rpm
 - Z2 [34] rpm
- Wafer processing status section**: Located on the left side, containing:
 - Z2 ([7]) Z1
 - [8] [6]
 - ([9]) ([5])
 - [10] [4]
 - SP PT
 - [2] [3] [1]
 - C-B C-A
- Grinding status section**: Located at the bottom right, containing:
 - F01 : F02 : F03 : [35] F04 : Process status
 - F05 : F06 : F07 :
 - G: Completed Full Auto [ENTER] key press please.

Wafer processing status section

The indication items in the "Wafer processing status" section on the screen ([1] - [10]) are explained here.

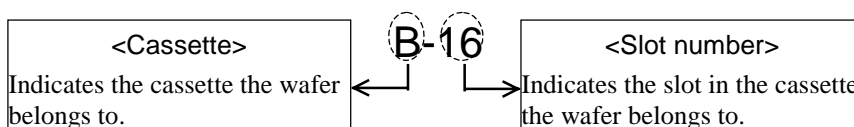
These items show the processing status of the wafers at the respective machine units. The wafers are identified by their wafer numbers (cassette/slot No.)

【Codes used for the machine units on the screen】

Code	Item number	Machine unit
C-A	[1]	Cassette stage A
C-B	[2]	Cassette stage B
Z1	[6]	Z1-axis
Z2	[8]	Z2-axis
PT	[4]	Position table
SP	[10]	Spinner table

【Example of wafer number indication】

The following example <B-16> shows that the wafer belongs to the 16th slot (counting from the lowest slot 1) of the cassette B.



Wafer processing status section (Continued)

[Indication Item]

Item No.	Descriptions	
[1] [2]	Processing status of the Cassette A ([1]) / Cassette B ([2]) is shown.	
	[>None]	No cassette is set or a cassette is improperly set on the cassette stage.
	[>Ready]	A cassette containing wafers to be ground is set.
	[Active]	Wafer loading (taking out from the cassette) is in progress or is ready.
	[Unload]	Wafer unloading (storing into the cassette) is in progress or is ready.
	[Finish]	Wafer unloading is completed.
	[Out CS]	A cassette is removed or displaced during loading or unloading of wafers.
[3]	Wafer No. of the wafer at the robot section is shown here.	
[4]	Wafer No. of the wafer at the position table is shown here.	
[5]	Wafer No. of the wafer at the T-arm just before the T-arm moves to the Z1-axis is shown.	
[6] [8]	Wafer No. of the wafer at the Z1-axis ([6]) / Z2-axis ([8]) is shown. The wafer No. is bracketed by the mark that indicates the processing status of the wafer.	
	↑ (No.) ↓	Under original-wafer-thickness check
	■ (No.) ■	Under P1 grinding
	■ (No.) ■	Under P2 grinding
	■ (No.) ■	Under P3 grinding
	= (No.) =	Under spark out operation
	> (No.) <	Under escape cut operation
	^ (No.) v	The spindle is moving up.
	[Clean]	The chuck table is being washed.
	[Zero-P]	The spindle is moving to its initial position.
	[Mes.]	Chuck table height check is in progress.
[7]	Wafer No. of the wafer at the T-arm just before the T-arm moves to the Z2-axis is shown.	
[9]	Wafer No. of the wafer at the T-arm just before the T-arm moves to the spinner table is shown.	
[10]	Wafer No. of the wafer at the spinner table is shown. The wafer No. is bracketed by the mark that shows the processing status of the wafer.	
	> (No.) <	Under washing on the spinner table

Grinding program information section

The indication items in the "Grinding program information" section on the screen ([11] - [20]) are explained here.

[Indication item]

Item No.	Descriptions	
[11]	The number of the grinding program being used is shown.	
[12]	The program ID is shown.	
[13]	Comment on the program is shown.	
[14]	Grinding wafer size is shown.	
[15] [17]	The indication here depends on the setting of "Air cut control select" parameter on the EDIT PARAMETER (GRIND) screen. - Refer to Section 3-1, [Parameters in EDIT PARAMETER (GRIND) Screen] in Chapter E of the Data Maintenance Manual for details of the "Air cut control select" parameter.	
	C/T	"Air cut control select" parameter is set to "Pass".
	IPG	"Air cut control select" parameter is set to "Set".
[16] [18]	The indication here depends on the setting of "Grinding mode select" parameter on the EDIT PARAMETER (GRIND) screen. - Refer to Section 3-1, [Parameters in EDIT PARAMETER (GRIND) Screen] in Chapter E of the Data Maintenance Manual for details of the "Grinding mode select" parameter.	
	C/T	"Grinding mode select" parameter is set to <Chuck>. This indication also appears during its <Chuck> period when the "Grinding mode select" parameter is set to <Ch Su> or <Su Ch>.
	Wsurf	"Grinding mode select" parameter is set to <Surf.> This indication also appears during its <Surf.> period when the "Grinding mode select" parameter is set to <Ch Su> or <Su Ch>.
[19]	Original wafer thickness (loaded wafer thickness) is shown.	
[20]	Finished wafer thickness is shown.	

Grinding status section

The indication items in the "Grinding status" section on the screen ([21] - [36]) are explained here.

[Indication item]

Item No.	Descriptions
[21] [22]	(Z1/Z2) Height gauge measurement value is shown. In the case of the 2-probe type height gauge (optional accessory), the value of "Inner circ. value - Outer circ. value" is shown here.
[23] [24]	In the case of the 2-probe type height gauge (optional accessory), (Z/Z2) outer circ. value is shown.
[25] [26]	Wheel wear amount per wafer is shown here.
[27] [28]	Set up value of "Spindle Current Pre-Alarm (A Code) Setting" parameter on the EDIT PARAMETER (GRIND) screen is shown here. - Refer to Section 3-1, [Parameters in EDIT PARAMETER (GRIND) Screen] in Chapter E of the Data Maintenance Manual for details of the "Spindle Current Pre-Alarm (A Code) Setting" parameter.
[29] [30]	(Z1/Z2) peak spindle current value (A) from the start of the full auto operation is shown.
[31] [34]	(Z1/Z2) present spindle current value is shown.
[32] [35]	(Z1/Z2) present spindle current value is shown in bar graph.
[33] [36]	(Z1/Z2) spindle rotative speed is shown

2-5-2. Continuation of Full Auto Operation

About continuation of full auto operation

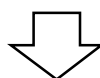
Full auto operation can be continuously executed by replacing the finished cassette with new one.

To make this function effective, however, cassette change must be made while processing of the other cassette is still in progress. If processing of the other cassette has already been finished, full auto operation automatically terminates.

Procedure to continue full auto operation

The procedure to continue full auto operation is described here.

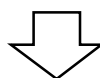
!!! This section is continued from: !!!
section 2-5-1, [Starting of Full Auto Operation]



Check to be sure that the status indication on the screen of the finished cassette is "Finish".



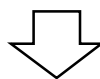
Open the cassette cover and remove the finished cassette.



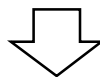
The cassette status indication changes from "Finish" to ">None".



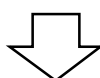
Set a new cassette containing unprocessed wafers.



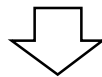
The cassette status indication changes from ">None" to ">Ready".



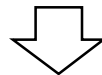
Close the cassette cover.



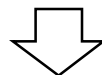
Procedure to continue full auto operation (Continued)



Full auto operation continues with the same grinding conditions.



Repeat the above procedure until all cassettes are processed.



!!! The full auto operation execution procedures continue
to the next section. !!!

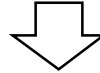
2-5-3. Termination of Full Auto Operation

About termination of full auto operation

Full auto operation terminates when processing of the cassettes set on the both cassette stages completes.

Procedure to terminate full auto operation

!!! This section is continued from: !!!
Section 2-5-1, [Starting of Full Auto Operation] or
Section 2-5-2, [Continuation of Full Auto Operation]

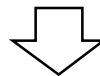


Full auto operation automatically terminates when processing of all the set up cassettes completes.

- When full auto operation terminates, the green lamp of the pilot lamp flashes and the buzzer sounds.



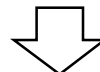
The message "G: Completed Full Auto. [ENTER] key press please." appears at the bottom of the screen.



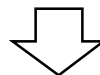
Open the cassette cover and remove the finished cassette.



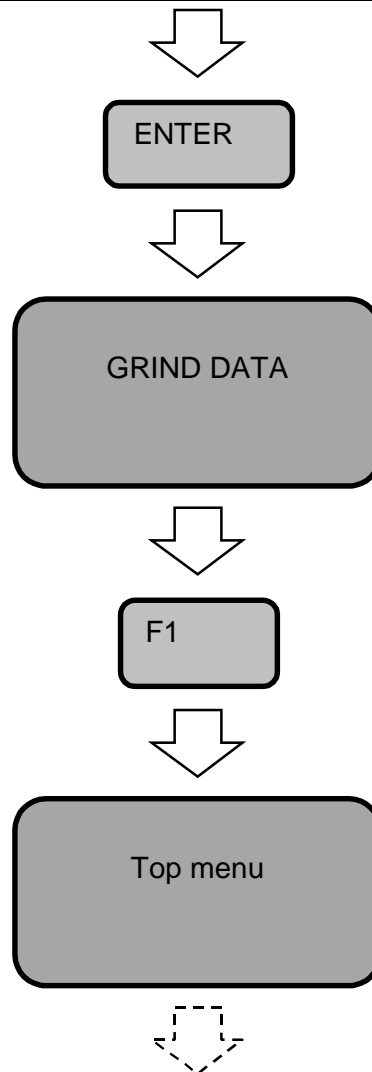
The cassette status indication changes from "Finish" to ">None".



Close the cassette cover.



Procedure to terminate full auto operation (Continued)



To terminate the machine operation, refer to Section 4, [Termination of Machine Operation] in this chapter.

2 - 6 . Correction of Finished Wafer Thickness Data / Interruption of Full Auto Operation / Wafer Recovery

Summary of this section

This section describes about the procedures to correct the finished wafer thickness data during full auto operation.

It also describes the procedures to interrupt full auto operation as well as the wafer recovery function for restoring the wafers that are left in the various machine units when full auto operation forcibly terminates.

Section No.	Title	Contents
2-6-1	Correction of Finished Wafer Thickness Data	- Procedures to temporarily halt full auto operation and correct the finished wafer thickness data in the range of $\pm 20.0 \mu\text{m}$
2-6-2	Interruption of Full Auto Operation	- Various procedures to interrupt full auto operation.
2-6-3	Wafer Recovery Function	- Procedures to automatically recover the wafers left in the machine back into cassette when full auto operation ended abnormally.

Safety precautions



The machine does not immediately stop at the press of the <STOP> key during full auto operation.

If you position your hands or fingers in a drive section in action, they may be caught or cut off. Make sure that the machine is completely stopped when you perform the works described in this section.

2-6-1. Correction of Finished Wafer Thickness Data

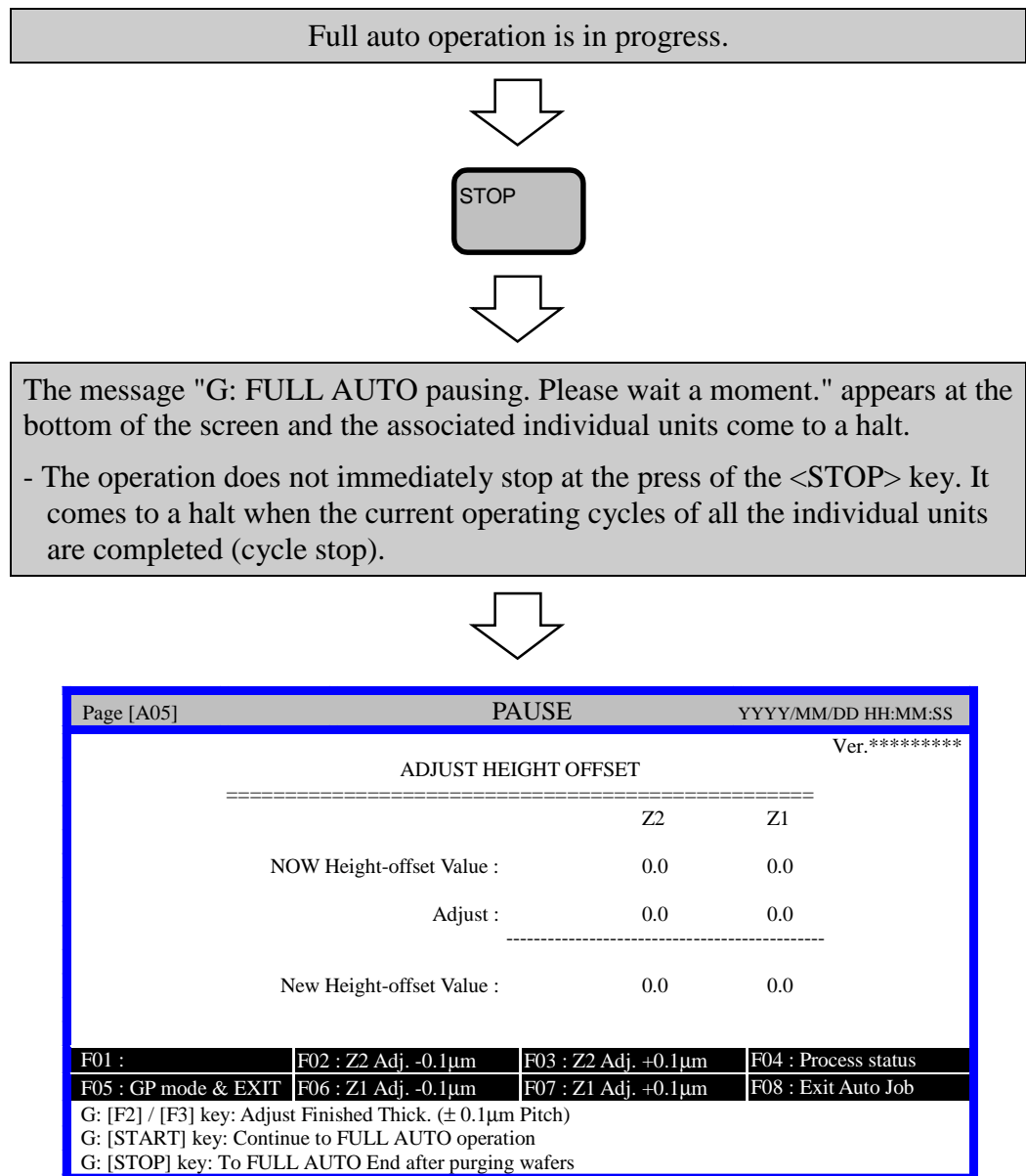
About finished wafer thickness data correction

This function corrects the finished wafer thickness data during full auto operation in the range of $\pm 20.0 \mu\text{m}$.

To correct the data, the full auto operation is temporarily halted. The corrected values are cancelled when the full auto operation terminates.

Procedure to correct the finished wafer thickness data

The procedure to correct the finished wafer thickness data during full auto operation is described here.



Procedure to correct the finished wafer thickness data (Continued)



Using the following function keys, enter the offset value to "(Z1/Z2) Adjust" column on the screen.

F2

: Corrects the finished wafer thickness value for Z2 axis by -0.1 μ m.

F3

: Corrects the finished wafer thickness value for Z2 axis by +0.1 μ m.

F6

: Corrects the finished wafer thickness value for Z1 axis by -0.1 μ m.

F7

: Corrects the finished wafer thickness value for Z1 axis by +0.1 μ m.

- The example below shows that the finished wafer thickness value for the Z2-axis has been corrected by +3.2 μ m and the finished wafer thickness value for the Z1-axis has been corrected by -0.6 μ m.

[Example]

Page [A05]		PAUSE		YYYY/MM/DD HH:MM:SS	
				Ver.*****	
ADJUST HEIGHT OFFSET					
=====					
		Z2		Z1	
NOW Height-offset Value :		0.0		0.0	
Adjust :		3.2		-0.6	

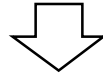
New Height-offset Value :		3.2		-0.6	
F01 :		F02 : Z2 Adj. -0.1μm		F03 : Z2 Adj. +0.1μm	
F04 : Process status					
F05 : GP mode & EXIT		F06 : Z1 Adj. -0.1μm		F07 : Z1 Adj. +0.1μm	
F08 : Exit Auto Job					
G: [F2] / [F3] key: Adjust Finished Thick. (± 0.1μm Pitch)					
G: [START] key: Continue to FULL AUTO operation					
G: [STOP] key: To FULL AUTO End after purging wafers					



START



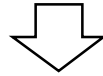
Procedure to correct the finished wafer thickness data (Continued)



The corrected finished wafer thickness values become effective.



FULL AUTO



Full auto operation resumes.

- When the full auto operation terminates, the corrected values are canceled.

2-6-2. Interruption of Full Auto Operation

Summary of this section

This section describes about the procedures to interrupt full auto operation.

Interruption methods defined by ensuing machine actions

Summarized below are the three interruption methods of full auto operation defined by the ensuing machine actions after interruption.

Machine action upon interruption	Refer to
Grinds all the wafers that are already loaded from the cassette. ↓ Unloads the ground wafers back into the cassette. ↓ Terminates full auto operation	Section 2-6-2-1 [Interruption after Grinding and Purging Loaded Wafers]
Unloads all the loaded wafers back into the cassette without grinding them. ↓ Terminates full auto operation	Section 2-6-2-2 [Interruption after Purging Loaded Wafers without Grinding]
Immediately stops grinding and transporting operations. ↓ Forcibly terminates full auto operation.	Section 2-6-2-3 [Forcible Termination]

2-6-2-1. Interruption after Grinding and Purging Loaded Wafers

Procedure to interrupt full auto operation after grinding and purging the loaded wafers

The procedure to terminate full auto operation after grinding and unloading the wafers that are already loaded is described here.

Full auto operation in progress

Page [G05]

FULL AUTO

YYYY/MM/DD HH:MM:SS

Z2

()

()

SP

C-B

Z1

()

PT

C-A

Program Number.

ID :

Remark :

Wafer : inch

Z2 Z1

<>MODE Air : Grind

Origin :

Z1:SET :

Finish :

Z2:SET :

Gauge :

outside Gauge :

Wheel Wear :

µm

µm

µm

µm

µm

Set :

Peak :

A

A

Z1 A

0A

10A

20A

rpm

Z2 A

rpm

F01 :

F02 :

F03 :

F04 : Process status

F05 :

F06 :

F07 :

F08 :

G: Completed Full Auto [ENTER] key press please.

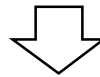


The message "G: FULL AUTO pausing. Please wait a moment." appears at the bottom of the screen and the associated individual units come to a halt.

- The operation does not immediately stop at the press of the <STOP> key. It comes to a halt when the current operating cycles of all the individual units are completed (cycle stop).

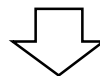
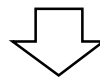


Procedure to interrupt full auto operation after grinding and purging the loaded wafers
(Continued)



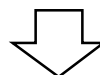
Page [A05]		PAUSE		YYYY/MM/DD HH:MM:SS	
				Ver.*****	
ADJUST HEIGHT OFFSET					
=====					
		Z2		Z1	
NOW Height-offset Value :		0.0		0.0	
Adjust :		0.0		0.0	

New Height-offset Value :		0.0		0.0	
F01 :		F02 : Z2 Adj. -0.1μm		F03 : Z2 Adj. +0.1μm	
F04 : Process status					
F05 : GP mode & EXIT		F06 : Z1 Adj. -0.1μm		F07 : Z1 Adj. +0.1μm	
F08 : Exit Auto Job					
G: [F2] / [F3] key: Adjust Finished Thick. (± 0.1μm Pitch)					
G: [START] key: Continue to FULL AUTO operation					
G: [STOP] key: To FULL AUTO End after purging wafers					

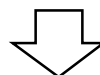


The message "G: Now purging the wafers. Please wait a moment..." appears at the bottom of the screen.

- The wafers that are already in the loading process are ground.
- Loading of wafers (taking out wafers from the cassette) no more takes place.



When unloading of all the ground wafers into the cassette completes, full auto operation terminates.



Remove the cassette.

- Wafers already ground and not ground coexist in the cassette.

2-6-2-2. Interruption after Purging Loaded Wafers without Grinding

Procedure to interrupt full auto operation after purging the loaded wafers without grinding them

The procedure to terminate full auto operation after unloading the loaded wafers back into the cassette without grinding them is described here.

In this interruption method, it can happen that the wafers finishing Z1-axis grinding (rough grinding) only are unloaded into the cassette.

Full auto operation in progress

Page [G05]		FULL AUTO		YYYY/MM/DD HH:MM:SS			
Z2 () Z1		Program Number. ID :					
() ()		Remark :					
SP PT		Wafer : inch Z2 Z1					
C-B C-A		<>MODE Air : Grind Origin : μm					
		Z1:SET : Finish : μm					
		Z2:SET : Gauge : μm					
		outside Gauge : μm					
		Wheel Wear : μm					
		Set : A					
		Peak : A					
		Z1 A | 0A | 10A | 20A rpm					
		Z2 A | rpm					
F01 :		F02 :		F03 :		F04 : Process status	
F05 :		F06 :		F07 :		F08 :	
G: Completed Full Auto [ENTER] key press please.							



The message "G: FULL AUTO pausing. Please wait a moment." appears at the bottom of the screen and the associated individual units come to a halt.

- The operation does not immediately stop at the press of the <STOP> key. It comes to a halt when the current operating cycles of all the individual units are completed (cycle stop).



Procedure to interrupt full auto operation after purging the loaded wafers without grinding them (Continued)



Page [A05]		PAUSE		YYYY/MM/DD HH:MM:SS	
				Ver.*****	
ADJUST HEIGHT OFFSET					
=====					
		Z2		Z1	
NOW Height-offset Value :		0.0		0.0	
Adjust :		0.0		0.0	

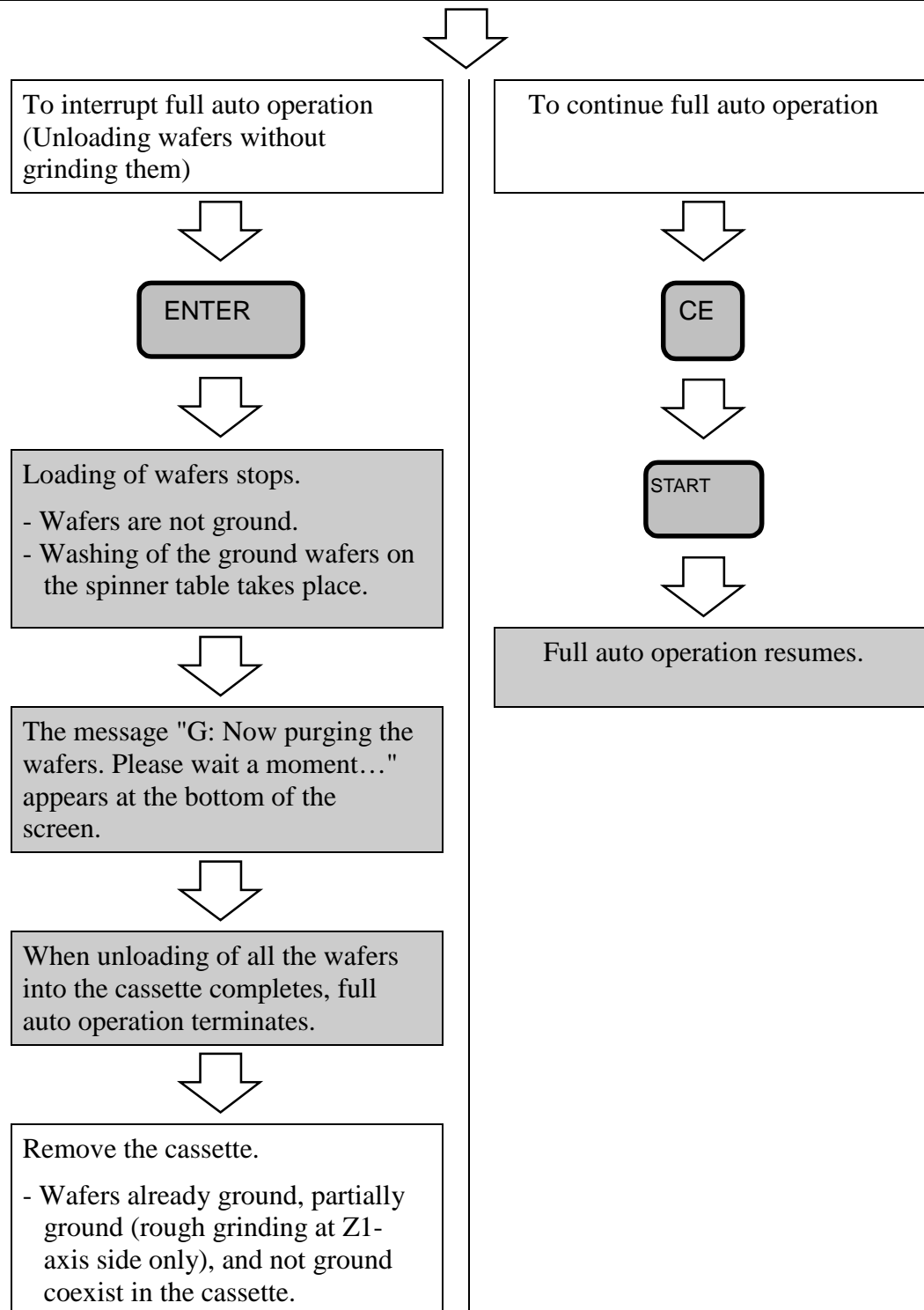
New Height-offset Value :		0.0		0.0	
F01 :		F02 : Z2 Adj. -0.1μm		F03 : Z2 Adj. +0.1μm	
F04 : Process status					
F05 : GP mode & EXIT		F06 : Z1 Adj. -0.1μm		F07 : Z1 Adj. +0.1μm	
F08 : Exit Auto Job					
G: [F2] / [F3] key: Adjust Finished Thick. (± 0.1μm Pitch)					
G: [START] key: Continue to FULL AUTO operation					
G: [STOP] key: To FULL AUTO End after purging wafers					



The following message appears on the center of the screen.
">>>>Confirm? [[ENTER]: Yes/No : [CE]]"



Procedure to interrupt full auto operation after purging the loaded wafers without grinding them (Continued)



2-6-2-3. Forcible Termination

About forcible termination

When full auto operation is forcibly terminated, wafers remain in the various individual units. Ask your maintenance personnel to remove those wafers.

Procedure to forcibly terminate full auto operation

The procedure to forcibly terminate full auto operation by immediately stopping grinding and transporting actions of the machine is described here



When you remove a broken wafer or clean the affected area, wear protective gloves and goggles and use tweezers.
If you perform such works with bare hands, your hands or fingers may be cut or stuck.

Full auto operation is in progress.



The message "G: FULL AUTO pausing. Please wait a moment." appears at the bottom of the screen and the associated individual units come to a halt.

- The operation does not immediately stop at the press of the <STOP> key. It comes to a halt when the current operating cycles of all the individual units are completed (cycle stop).



Procedure to forcibly terminate full auto operation (Continued)



Page [A05]		PAUSE		YYYY/MM/DD HH:MM:SS	
				Ver.*****	
ADJUST HEIGHT OFFSET					
=====					
		Z2	Z1		
NOW Height-offset Value :		0.0	0.0		
Adjust :		0.0	0.0		

New Height-offset Value :		0.0	0.0		
F01 :	F02 : Z2 Adj. -0.1μm	F03 : Z2 Adj. +0.1μm	F04 : Process status		
F05 : GP mode & EXIT	F06 : Z1 Adj. -0.1μm	F07 : Z1 Adj. +0.1μm	F08 : Exit Auto Job		
G: [F2] / [F3] key: Adjust Finished Thick. (± 0.1μm Pitch)					
G: [START] key: Continue to FULL AUTO operation					
G: [STOP] key: To FULL AUTO End after purging wafers					

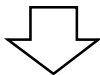
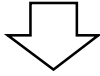
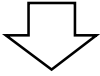


The following message appears on the center of the screen.
">>>>Confirm? [[ENTER]: Yes/No : [CE]]"

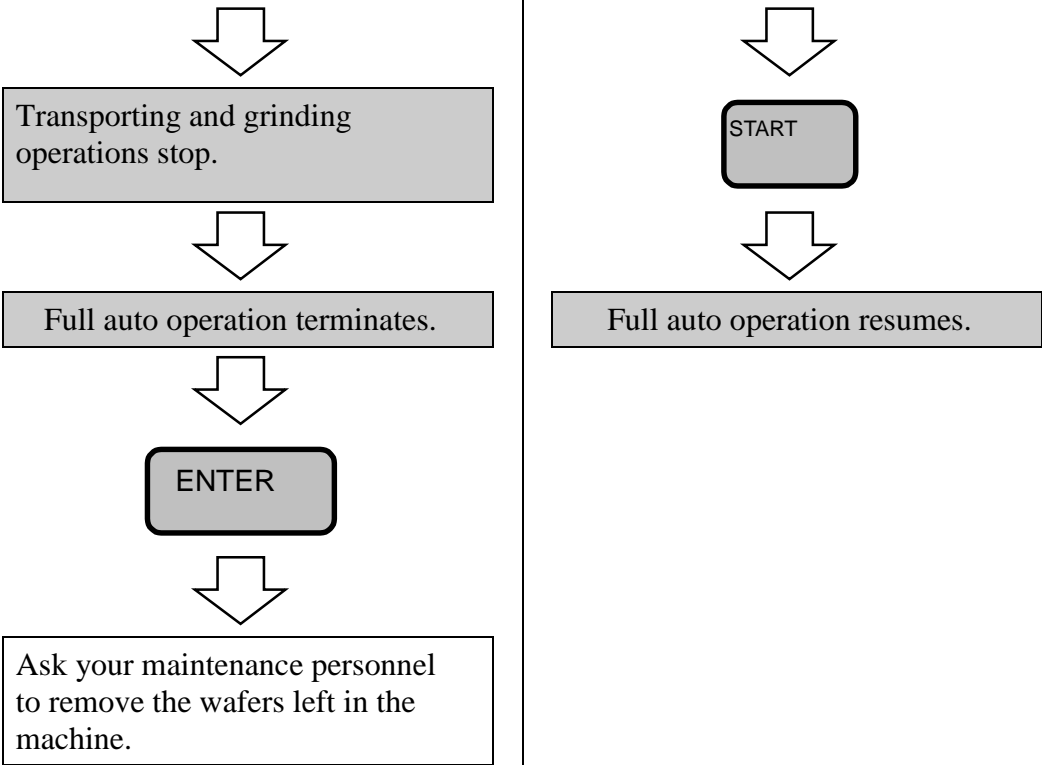


To interrupt full auto operation
(forcible termination)

To continue full auto operation



Procedure to forcibly terminate full auto operation (Continued)



2-6-3. Wafer Recovery Function

About wafer recovery function

This function recovers the wafers that are left in the various units of the machine when one of the situations as described below occurs.

- The machine power turns OFF due to a D-class error during full auto operation.
- A power-related trouble (such as power failure) occurs during full auto operation.
- The EMO switch is pressed during full auto operation.
- Full auto operation is forcibly terminated (See section 2-6-2-3).
- A C-class error occurs during full auto operation.

NOTICE

If you perform the wafer recovery operation initiated by the <F3> key (recovery of wafers without washing/drying them on the spinner table), waterdrops from the wet wafers, when the wafers are transported by the robot, may cause the sensor section of the robot to fail.

Make sure to perform the wafer recovery operation initiated by the <F4> key (recovery of wafers after washing/drying them on the spinner table) unless the spinner section is failed.

Summary of this section

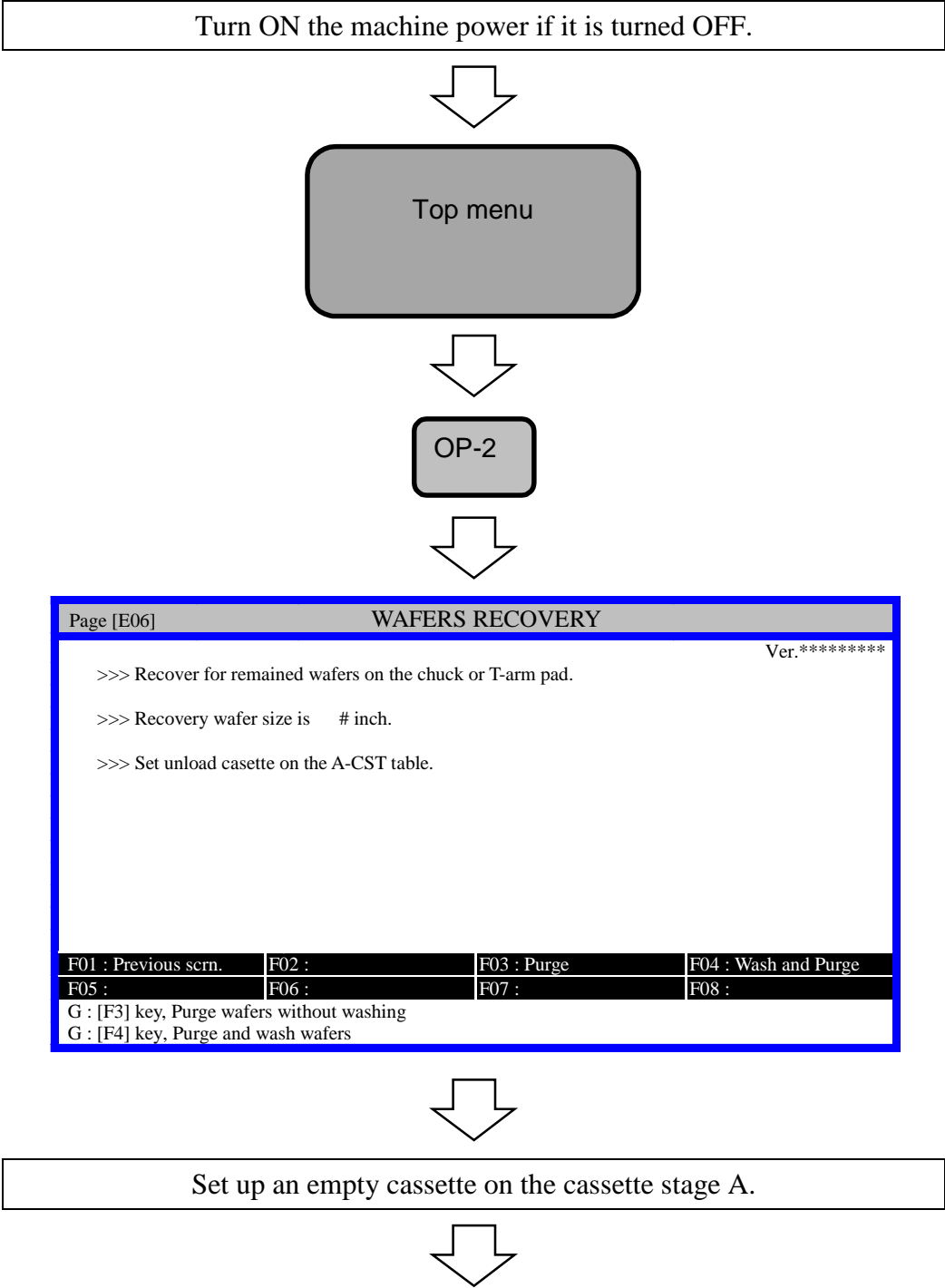
This section describes about the procedure to recover the wafers left in the machine as well as the procedure to halt the recovery operation.

Section No.	Title	Contents
2-6-3-1	Wafer Recovery	- Procedure to recover the wafers left in the machine.
2-6-3-2	Halting of Wafer Recovery	- Procedure to halt the wafer recovery operation.

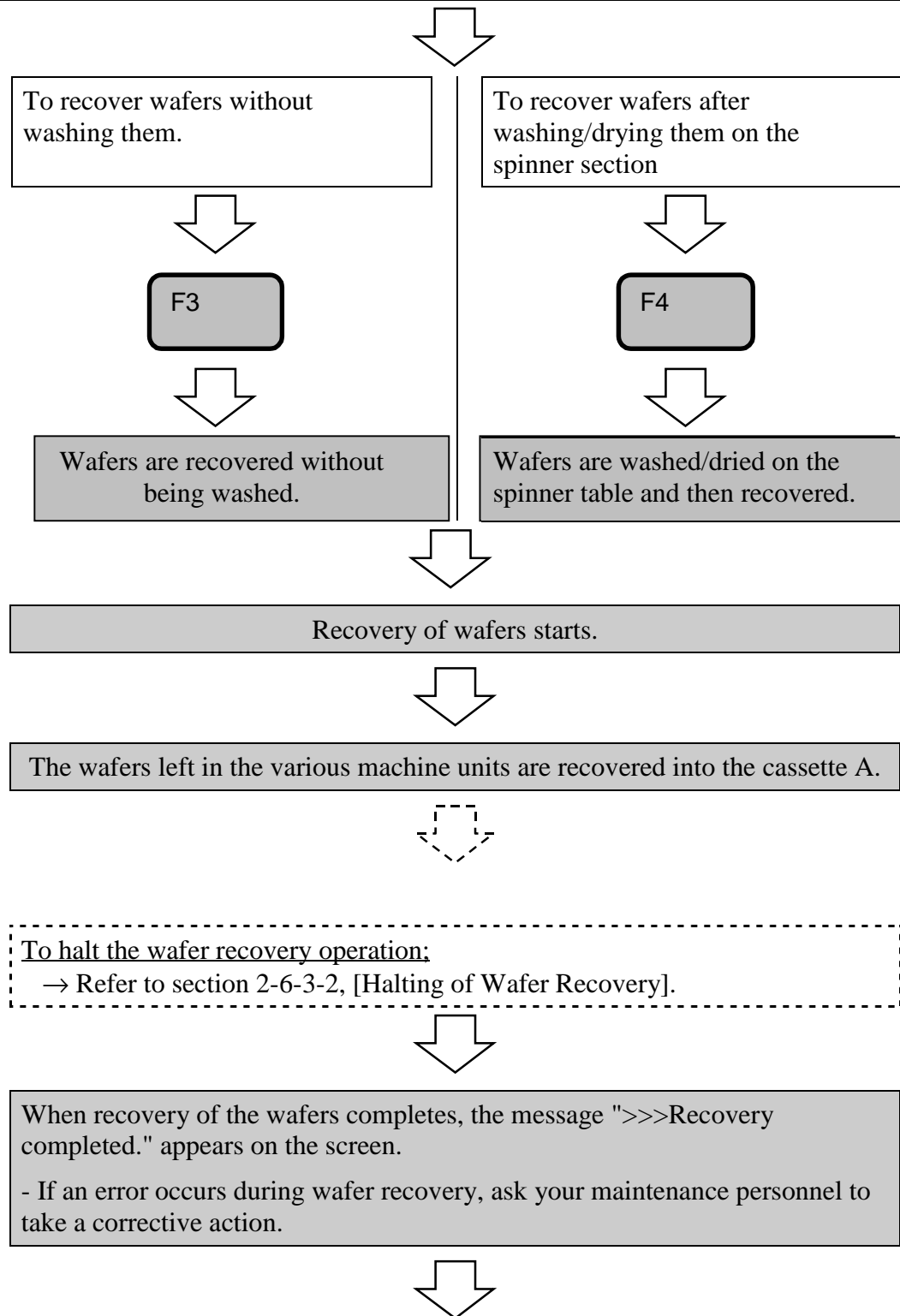
2-6-3-1. Wafer Recovery

Procedure to recover wafers left in the machine

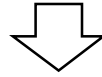
The procedure to recover the wafers left in the various machine units is described here.



Procedure to recover wafers left in the machine



Procedure to recover wafers left in the machine (Continued)

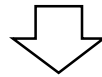


Check the inside of the machine to verify that there are no wafers left in the machine.

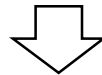
- Some wafers may not be successfully recovered depending on their conditions.

If there are wafers still left in the machine:

Ask your maintenance personnel to remove them.



ENTER

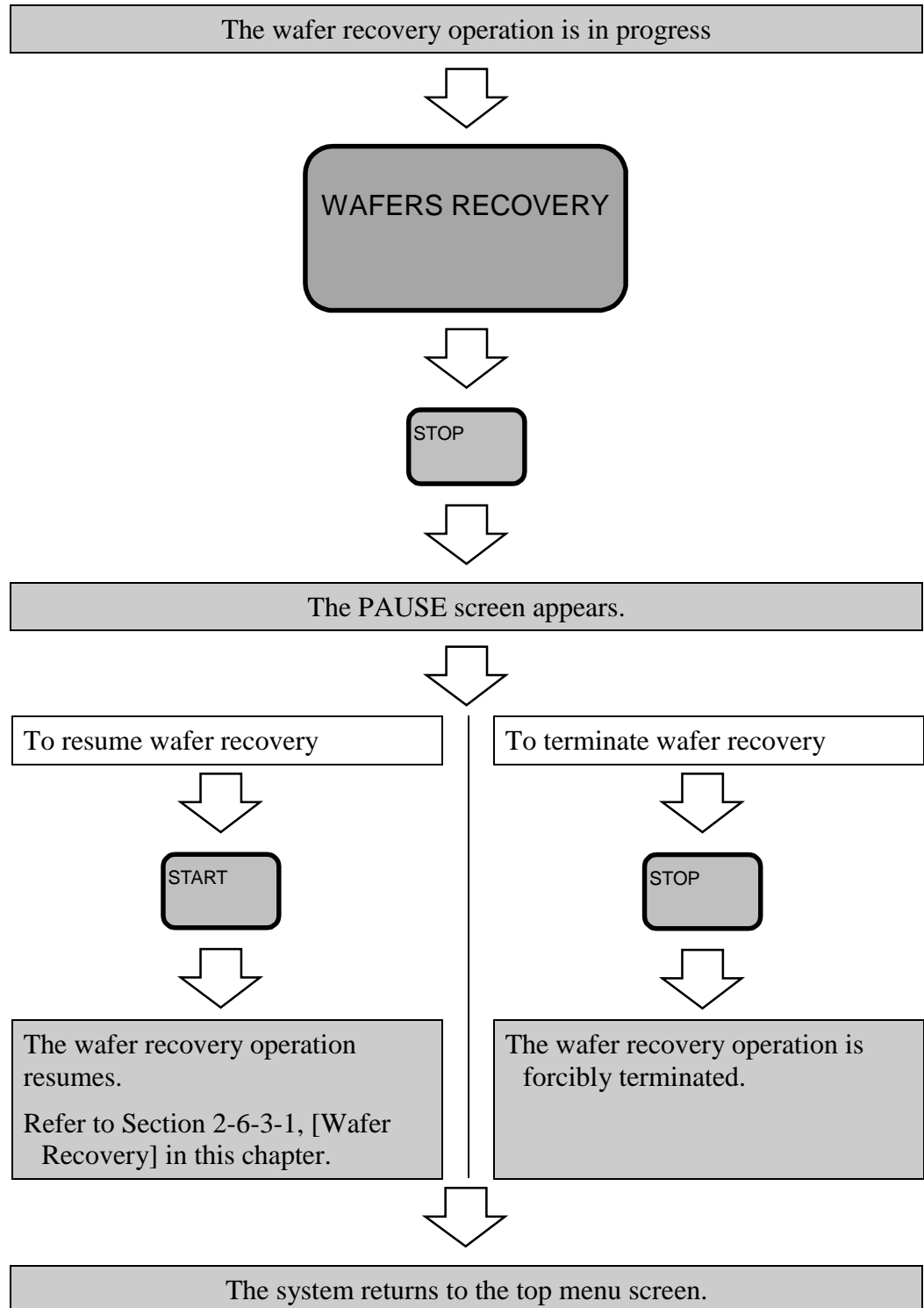


Open the cassette cover to remove the cassette from the cassette stage A.

2-6-3-2. Halting of Wafer Recovery

Procedure to halt the wafer recovery operation

The procedure to halt the wafer recovery operation is described here.



3. Operation Status Check

Summary of this section

This section describes about the screens (STATUS screen/PROCESS STATUS screen/HISTORY Screen) to check the operation status of the machine.

Section No.	Title	Contents
3-1	STATUS Screen	<ul style="list-style-type: none">- Contents of the STATUS screen- Procedure to call up the STATUS screen
3-2	PROCESS STATUS Screen	<ul style="list-style-type: none">- Contents of the PROCESS STATUS screen- Procedure to call up the PROCESS STATUS screen
3-3	HISTORY screen	<ul style="list-style-type: none">- Contents of the HISTORY screen- Procedure to call up the HISTORY screen

3-1. STATUS Screen

About STATUS screen

The following items can be checked on the STATUS screen.

- Spindle conditions (spindle current value, rotative speed)
- Wheel conditions (remaining tooth length, wear rate, estimated number of wafers to be ground)
- Machine operation status (accumulated full-auto operation time, the total number of wafers processed)

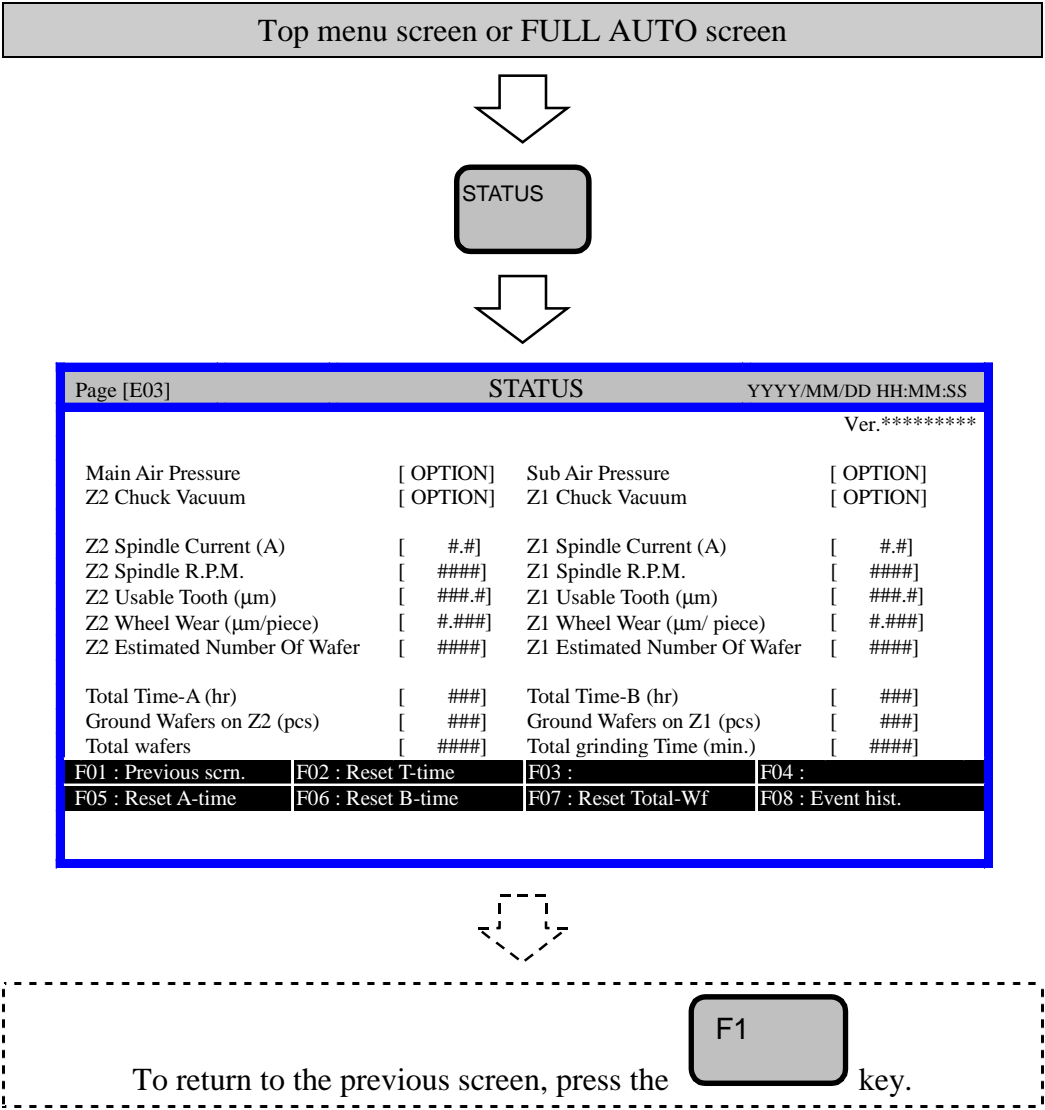
Summary of this section

This section describes about the procedure to call up the STATUS screen as well as the contents of the screen.

Section No.	Title	Contents
3-1-1	Calling up the STATUS Screen	- Procedure to call up the STATUS screen.
3-1-2	Contents of the STATUS Screen	- Descriptions on the indication items of the STATUS screen

3-1-1. Calling up the STATUS Screen

Procedure to call up the STATUS screen



3-1-2. Contents of the STATUS Screen

Indications on the STATUS screen

[Screen]

Page [E03]		STATUS		YYYY/MM/DD HH:MM:SS			
Ver.*****							
Main Air Pressure	[	[1]	]	Sub Air Pressure	[	[1]]
Z2 Chuck Vacuum	[	[2]	]	Z1 Chuck Vacuum	[	[2]]
Z2 Spindle Current (A)	[	[3]	]	Z1 Spindle Current (A)	[	[3]]
Z2 Spindle R.P.M.	[	[4]	]	Z1 Spindle R.P.M.	[	[4]]
Z2 Usable Tooth (μm)	[	[5]	]	Z1 Usable Tooth (μm)	[	[5]]
Z2 Wheel Wear (μm/ piece)	[	[6]	]	Z1 Wheel Wear (μm/ piece)	[	[6]]
Z2 Estimated Number Of Wafer	[	[7]	]	Z1 Estimated Number Of Wafer	[	[7]]
Total Time-A (hr)	[	[8]	]	Total Time-B (hr)	[	[8]]
Ground Wafers on Z2 (pcs)	[	[9]	]	Ground Wafers on Z1 (pcs)	[	[9]]
Total wafers	[	[10]	]	Total grinding Time (min.)	[	[11]]
F01 : Previous scrn.		F02 : Reset T-time		F03 :		F04 :	
F05 : Reset A-time		F06 : Reset B-time		F07 : Reset Total-Wf		F08 : Event hist.	

NOTICE

The above screen is the STATUS screen called up from the top menu screen.

On the STATUS screen called up (during full auto operation) from the FULL AUTO screen, the function keys <F01: Previous scrn.> and <F08: Event hist.> only appear and are available.

[Indication items on the STATUS screen]

Item No.	Descriptions
[1]	(Not used)
[2]	(Not used)
[3]	Present spindle current value is shown.
[4]	Present spindle rotative speed is shown.
[5]	The remaining wheel tooth length is shown. When it becomes smaller than 1000 μm, ask your maintenance personnel to replace the wheel with new one.
[6]	The wheel-tooth wear rate per wafer is shown here. Note that the wear rate soon after wheel position setup may differ from the actual rate due to an error inherent in the wheel position setup. $\text{Wear rate} = \frac{(\text{Initial wheel tooth length}) - (\text{Remaining wheel tooth length})}{\text{Number of wafers ground since the last wheel replacement}}$

Indications on the STATUS screen (Continued)

Item No.	Descriptions
[7]	<p>The estimated number of wafers that can be ground by the currently mounted wheel is shown here.</p> <p>Note that the estimated number of wafers soon after wheel position setup may differ from the actual number due to an error inherent in the wheel position setup.</p> $\text{Estimated number of wafers to be ground} = \frac{(\text{Remaining wheel tooth length}) - (\text{Minimum wheel tooth length})}{\text{Wheel wear rate}}$ <p>The "minimum wheel tooth length" used in the above equation is preset as a parameter. Check the setup value with your maintenance personnel.</p>
[8]	<p>The elapsed time of full-auto operation (from "start" to "stop" including the paused period) is shown here.</p> <p>Two types of the time counters, A and B, are available.</p> <ul style="list-style-type: none"> - Pressing the <F5> key resets the counter A to "0". - Pressing the <F6> key resets the counter B to "0".
[9]	<p>The number of wafers ground since the last Z1/Z2 wheel replacement is shown.</p> <ul style="list-style-type: none"> - Pressing the <F7> key resets the number of wafers to "0".
[10]	<p>The cumulative number of wafers unloaded by the robot (including the wafers that were not ground) is shown.</p>
[11]	<p>The cumulative (actual) time of full auto operation (from "start" to "stop" excluding the paused period) is shown here.</p> <ul style="list-style-type: none"> - Pressing the <F2> key resets the counter to "0".

[Function Key]

Press	To
F1	Return to the top menu screen.
F2	Reset "Total grinding Time" to 0.
F3	Not used
F4	Not used
F5	Reset "Total Time-A" to 0.
F6	Reset "Total Time-B" to 0.
F7	Reset "Total wafers" to 0.
F8	Call up the HISTORY screen.

3-2. PROCESS STATUS Screen

About PROCESS STATUS screen

You can see the processing status of the wafers in the finished cassette on the PROCESS STATUS screen. You can also identify the wafers that were not ground because of their abnormal original thickness (too thick/too thin) on the screen.

Summary of this section

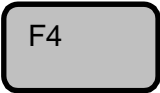
This section describes about the procedure to call up the PROCESS STATUS screen as well as the contents of the screen.

Section No.	Title	Contents
3-2-1	Calling up the PROCESS STATUS Screen	- Procedure to call up the PROCESS STATUS screen.
3-2-2	Contents of the PROCESS STATUS Screen	- Descriptions on the indication items of the PROCESS STATUS screen.

3-2-1. Calling up the PROCESS STATUS Screen

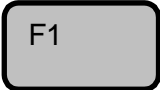
Procedure to call up the PROCESS STATUS screen

- Call up one of the following screens:
- FULL AUTO screen
 - PAUSE screen (during full-auto operation)
 - GRIND DATA screen



Page [G11]		PROCESS STATUS		YYYY/MM/DD HH:MM:SS	
		1 *****	16 *****	1 *****	16 *****
		2 *****	17 *****	2 *****	17 *****
		3 *****	18 *****	3 *****	18 *****
		4 *****	19 *****	4 *****	19 *****
		5 *****	20 *****	5 *****	20 *****
		6 *****	21 *****	6 *****	21 *****
		7 *****	22 *****	7 *****	22 *****
		B 8 *****	23 *****	A 8 *****	23 *****
		9 *****	24 *****	9 *****	24 *****
		10 *****	25 *****	10 *****	25 *****
		11 *****		11 *****	
		12 *****		12 *****	
		13 *****		13 *****	
		14 *****		14 *****	
		15 *****		15 *****	
F01 : Previous scrn.		F02 :	F03 :	F04 :	
F05 :		F06 :	F07 :	F08 :	



To return to the previous screen, press the  key.

3-2-2. Contents of the PROCESS STATUS Screen

Indications on the PROCESS STATUS screen

The contents of the PROCESS STATUS screen are described here.

[Screen]

Page [G11]		PROCESS STATUS				YYYY/MM/DD HH:MM:SS				
			[2]		[2]		[2]		[2]	
			1	*****	16	*****	1	*****	16	*****
			2	*****	17	*****	2	*****	17	*****
			3	*****	18	*****	3	*****	18	*****
			4	*****	19	*****	4	*****	19	*****
			5	*****	20	*****	5	*****	20	*****
			6	*****	21	*****	6	*****	21	*****
			7	*****	22	*****	7	*****	22	*****
			8	*****	23	*****	8	*****	23	*****
			9	*****	24	*****	9	*****	24	*****
			10	*****	25	*****	10	*****	25	*****
			11	*****			11	*****		
			12	*****			12	*****		
			13	*****			13	*****		
			14	*****			14	*****		
			15	*****			15	*****		
F01 : Previous scrn.	F02 :	F03 :		F04 :						
F05 :	F06 :	F07 :		F08 :						

[Indication items on the PROCESS STATUS screen]

Item No.	Indication	Descriptions
[1]	A/B/	Cassette
[2]	1 to 25	Slot number of the cassette (the lowest slot is "1")
[3]	[<]	Indicates one of the following conditions for the wafer in the slot: "slot is empty", "wafer is lost", "stand-by", or "purged wafer (unloaded without grinding)".
	[*****]	Normally ground wafer (indicated in white)
	[Thin-n] [Thick-n]	The wafer was not ground because it was too thin or too thick. One of the following numbers 1 through 4 is filled into "n" depending on when and where it was detected to be too thin/thick. 1: Detected at Z1-axis side during grinding. 2: detected at Z1-axis side during thickness check. 3: Detected at Z2-axis side during grinding. 4: detected at Z2-axis side during thickness check.

3-3. HISTORY Screen

About HISTORY screen

On the HISTORY screen, you can see the past operation and error data registered in the machine (event log).

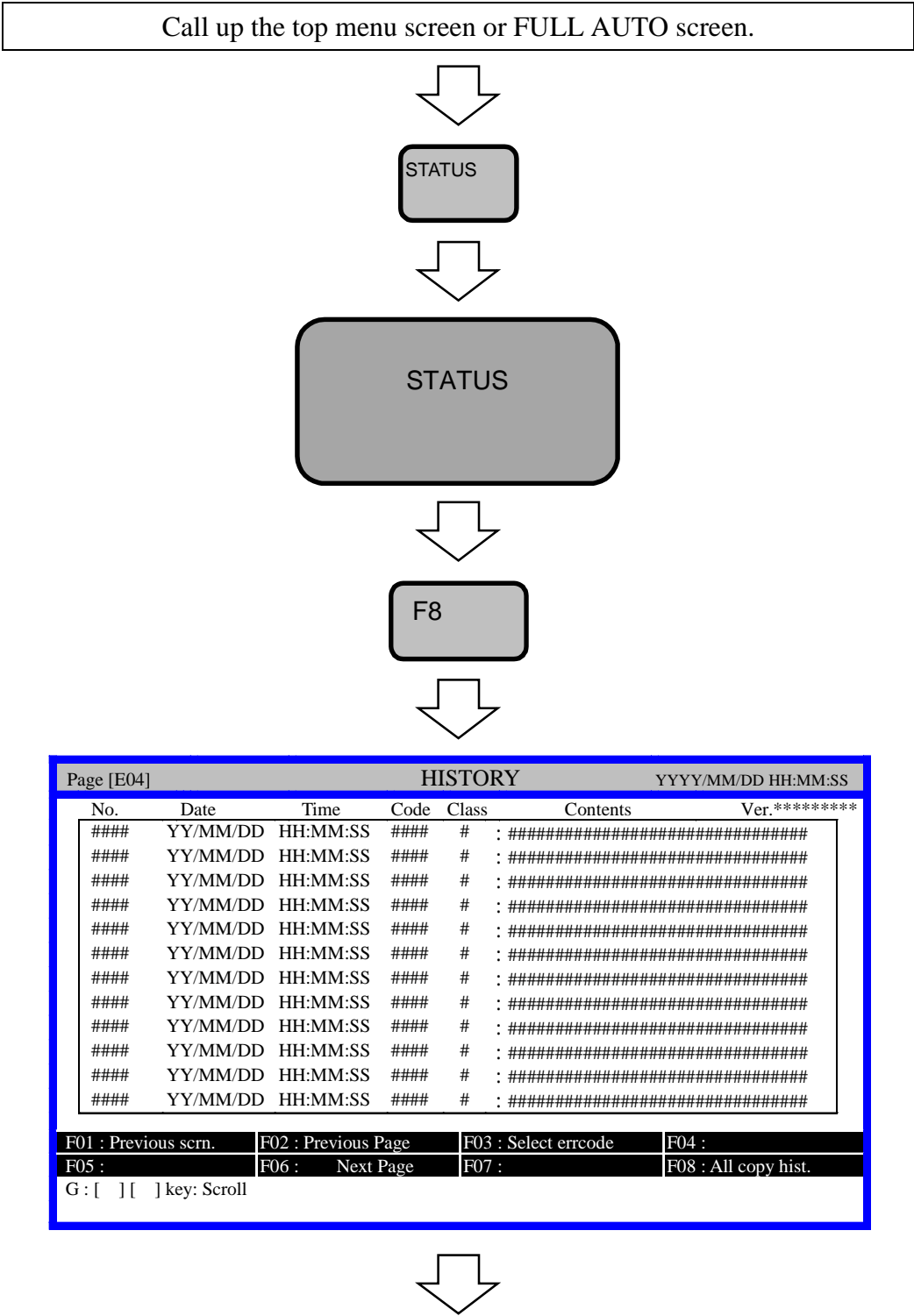
Contents of this section

This section describes about the procedure to call up the HISTORY screen as well as the contents of the screen.

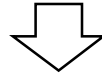
Section No.	Title	Contents
3-3-1	Calling up the HISTORY Screen	- Procedure to call up the HISTORY screen
3-3-2	Contents of the HISTORY Screen	- Descriptions on the indication items of the HISTORY screen

3-3-1. Calling up the HISTORY Screen



Procedure to call up the HISTORY screen

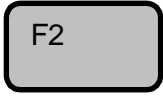



Procedure to call up the HISTORY screen (Continued)




All the past operation and error data are displayed.

- You can scroll up and down the screen by using the  and  keys.

- You can change the displayed page by using the  and  keys. One page contains 100 registered events (operation and error data).



To return to the previous screen, press the  key.

3-3-2. Contents of the HISTORY screen

Contents of the HISTORY screen

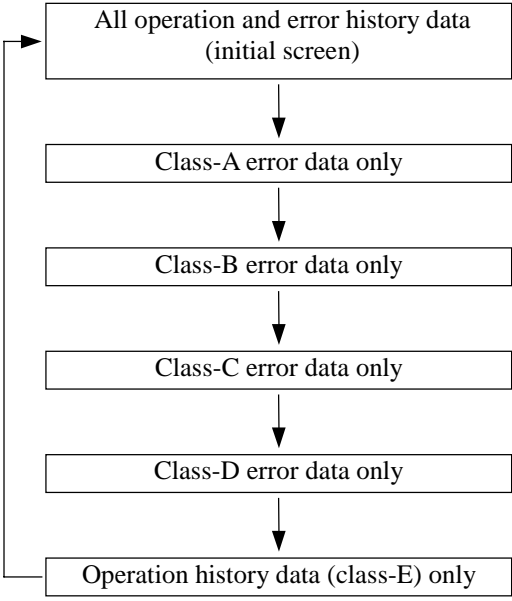
[Screen]

Page [E04]		HISTORY			YYYY/MM/DD HH:MM:SS		
No.	Date	Time	Code	Class	Contents	Ver.*****	
[1]	[2]	[3]	[4]	[5]	[6]		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
F01 : Previous scrn.							
F02 : Previous Page							
F03 : Select errcode							
F04 :							
F05 :							
F06 : Next Page							
F07 :							
F08 : All copy hist.							
G : [] [] key: Scroll							
Page No. [7]							

[Indication items on the HISTORY screen]

Item No.	Descriptions
[1]	The serial number given to each operational/error event is shown in the order of occurrence ("0001" to "9999"). When the number "9999" is reached, it starts with "0001" again.
[2]	The operation/error occurrence date is shown.
[3]	The operation/error occurrence time is shown.
[4]	The operation/error code (number) is shown.
[5]	The error class is shown. Refer to Section 1, [Error Classes] in Chapter E for details of the error classes. For operational events, "E" is shown in this column.
[6]	The error message or description on the executed operation is shown.
[7]	The page number (No.00 ~ 99) is shown.

[Function Key]

Press	To
F1	Return to the previous screen.
F2	Show the previous page (on which the events older than the ones on the current page are registered).
F3	<p>Switch on-screen displays. At each press of this key, the on-screen indication changes as follows.</p>  <pre> graph TD A[All operation and error history data (initial screen)] --> B[Class-A error data only] B --> C[Class-B error data only] C --> D[Class-C error data only] D --> E[Class-D error data only] E --> F[Operation history data (class-E) only] F --> A </pre>
F4	Not used
F5	Not used
F6	Show the next page (on which the events newer than the ones on the current page are registered).
F7	Not used
F8	<p>Copy the registered data into floppy disk. - Refer to Section 1-3, [Saving of Event History Data] in Chapter F of the Data Maintenance Manual.</p>

4. Termination of Machine Operation

Safety precautions to be observed when you terminate operation of the machine

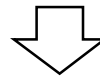
NOTICE

Upon termination of machine operation, make sure to ask your maintenance personnel to clean the inside of the grinding chamber. If silicon debris or other contaminants generated in the grinding process are allowed to exist, they may adhere to the machine drive or other sections, causing the machine to fail.

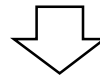
Operation flow

Machine operation should be terminated following the steps as described below.

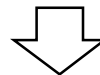
4-1 Turning OFF Spindle Rotation and Wheel Coolant Water Supply



Machine Cleaning (by maintenance personnel)



4-2 Turning OFF the Machine Power



4-3 Turning OFF the Power and Closing the Valves of Air, Water, Drain, and Exhaust at Plant Facility Side

4-1. Turning OFF Spindle Rotation and Wheel Coolant Water Supply

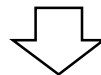
Procedure to turn OFF spindle rotation and wheel coolant water supply

The procedure to turn off spindle rotation and wheel coolant water supply is described here.

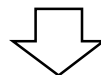
CAUTION

The spindle section is designed so that the spindle shaft is lifted by means of air. If the spindle is stopped without being allowed to idle or stopped with air supply immediately turned OFF, grinding dust may enter the spindle section, causing the spindle to gall. Before stopping spindle rotation for machine shutoff, allow the spindle to idle for at least 10 minutes with the wheel coolant system turned ON. Then, stop the spindle and place the machine in the stand-by condition for 10 minutes with the wheel coolant system turned OFF but the air blow system turned ON.

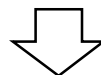
Idle the spindles with wheel coolant water turned ON for at least 10 minutes.



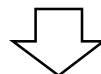
Call up the top menu screen.



WARM UP



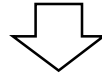
WARM UP



F8

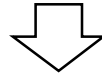


Procedure to turn OFF spindle rotation and wheel coolant water supply (Continued)

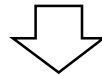


The message "E1013: ><Warm UP Stop" appears at the bottom of the screen and the spindles stop rotating and wheel coolant water stops flowing.

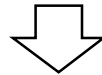
- Air to the spindles is still supplied at this stage.



F1

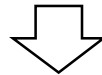


Top menu

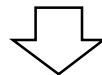


Wait for 10 minutes in this state.

- Meanwhile, visually check the inside of the machine to make sure that no wafers or irrelevant items are left in the machine.



Ask your maintenance personnel to clean the machine.



!!! The machine operation termination procedures
continue to the next section. !!!

4-2. Turning OFF the Machine Power

Summary of this section

This section describes about the methods to turn OFF the machine power. The method one is to manually turn OFF the power using the main switch located inside the front cover. The other method is turning OFF the power from the POWER OFF screen.

Section No.	Title	Contents
4-2-1	Power OFF with Main Switch	- Procedure to turn off the machine power with the main switch located inside the front cover
4-2-2	Power OFF from the POWER OFF Screen	- Procedure to turn off the machine power from the POWER OFF screen.

4-2-1. Power OFF with Main Switch

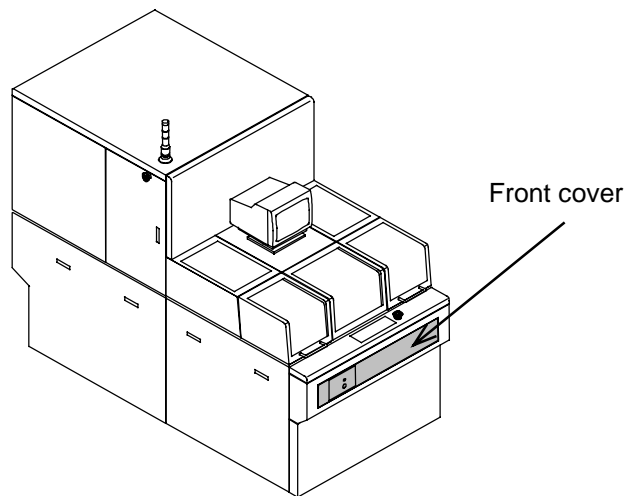
Procedure to turn off the machine power with the main switch

!!! This section is continued from: !!!
Section 4-1, [Turning OFF Spindle Rotation and Wheel
Coolant Water Supply]

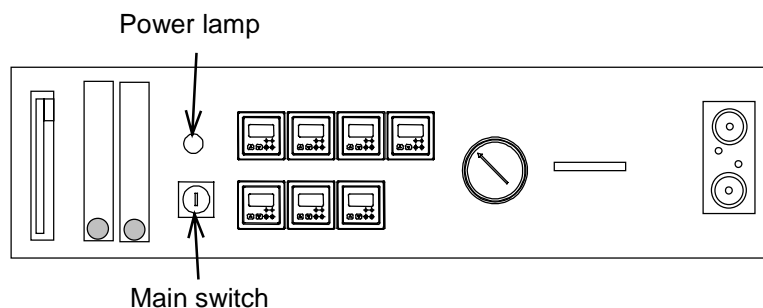


Open the front cover.

- Gently push the cover and then release it.



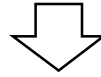
Insert the main switch key into its key slot inside the front cover.



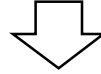
Turn the key counterclockwise to the "OFF" position.



Procedure to turn off the machine power with the main switch (Continued)

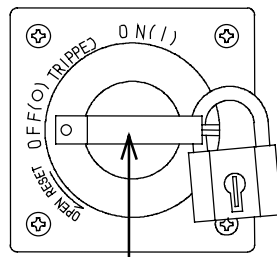


The power lamp located above the switch goes off.



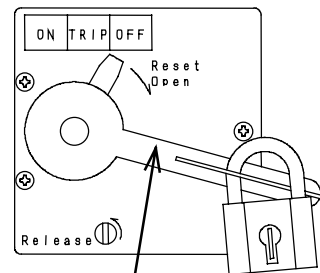
Turn the circuit breaker lever to the OFF position.

Standard type

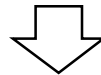


Breaker lever

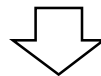
SEMI type



Breaker lever



Ask your maintenance personnel to lock out the circuit breaker lever.



!!! The machine operation termination procedures continue to
Section 4-3, [Turning OFF the Power and Closing the Valves of Air, Water,
Drain, and Exhaust at Plant Facility Side] !!!

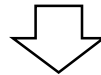
4-2-2. Power OFF from the POWER OFF screen

Procedure to turn OFF the machine power from the POWER OFF screen

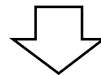
The procedure to turn OFF the machine power from the POWER OFF screen without using the switch key is described here.

If the machine power is turned OFF following the procedure as described here, the time the machine is turned OFF is recorded in the event history log of the machine. (Refer to section 3-3, [HISTORY Screen] in this chapter.)

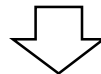
!!! This section is continued from: !!!
Section 4-1, [Turning OFF Spindle Rotation and Wheel
Coolant Water Supply]



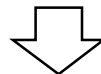
Call up the top menu screen.



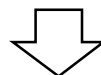
OP-1



The OTHER screen appears.



Page [OP1]		OTHER	
F1 : TOP MENU		Ver.*****	
F2 : MACHINE MODE DISPLAY			
F3 : PURGE WATER			
F4 : MACHINE POWER OFF			
F5 : FILE MAINTENANCE			
F6 : GRIND RECORD			
F01 : TOP MENU	F02 : Change Mode	F03 : Water Purge	F04 : M/C Power off
F05 : File Maint.	F06 : Grind record	F07 :	F08 :



Procedure to turn OFF the machine power from the POWER OFF screen (Continued)



F4



The POWER OFF screen appears.



Page [OP4]

POWER OFF

Ver.*****

F01 : Previous scrn.	F02 :	F03 :	F04 :
F05 :	F06 :	F07 :	F08 :

G : [START] key enter -> Start Power off operation



START



The message "Confirm?" appears.
- If you do not want to turn OFF the machine power, press the <CE> key.



ENTER



Procedure to turn OFF the machine power from the POWER OFF screen (Continued)



The message "Start Power off procedure!!" appears on the screen and then the machine power turns OFF.

- Once the <ENTER> key is pressed, the selection cannot be reversed.



Pull the key out of the switch.

- The switch key position remains at the "ON" position. It is not necessary to turn it to the "OFF" position.



When you start up the machine next time, insert the key and turn it to the "START" position.



!!! The machine operation termination procedures continue to
Section 4-3, [Turning OFF the Power and Closing the Valves of Air, Water,
Drain, and Exhaust at Plant Facility Side] !!!

4-3. Turning OFF the Power and Closing the Valves of Air, Water, Drain, and Exhaust at Plant Facility Side

Procedure to turn OFF the power and close the valves of air, water, drain, and exhaust at the plant facility side

CAUTION

- Before closing the air valve, make sure that the spindles are completely stopped rotating. Shutting off the air supply while the spindles are still rotating may cause the spindles to fail.
- Remained pressure in the water pipes could cause water in the pipes flow into the air pipes. After shutting off water and air supplies, expel the remained water in the water pipes using the hand shower of either the Z1 or Z2 axis side.

!!! This procedure is continued from: !!!
Section 4-2, [Turning OFF the Machine Power]



Turn OFF the power supply at the plant facility side.



Close the valves of spindle coolant water and wheel coolant water.



Close the valve of air.



Close the valves of exhaust air and drainage water.



Expel the remained water in the water pipes using the hand shower of either the Z1- or Z2-axis side.



!!! The machine operation termination procedures now complete. !!!

E. ERROR RECOVERY

Contents of this chapter

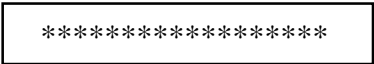
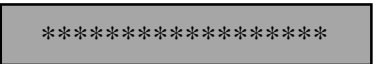

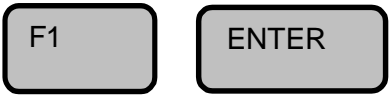



Error recovery is the process in which the machine recovers itself from an error condition and restores its normal state. Error recovery follows the error remedy process.

This chapter describes about the procedures to perform error recovery by machine unit. Error history data registered in the HISTORY screen is also explained here.

Section No.	Title	Contents
1	Error Classes	- Descriptions on classified error levels
2	Error Recovery	- Error recovery procedures by machine unit
3	Error History Check (HISTORY screen)	- Explanation about error history - Procedure to check the past error data (error history)

Nominal Conventions

This manual uses the following typographic conventions in this chapter.

This	Represents
	Operation that the operator should perform
	Operation that the machine automatically performs
	The screen that is called up
	Keys on the operation panel (to be pressed by the operator)
	Order or flow of the operation steps
	<ul style="list-style-type: none">- Procedures to counter a trouble- Procedures to perform an exceptional operation
	Flow of the operation steps when countering a trouble or performing an exceptional operation

1. Error Classes

About error classes

The errors issued by this machine are classified by their contents into the following four error levels. The error level of each error is identified by the alphabet preceding its error code number.

Classified error levels

The classified error levels are defined as follows.

Class	Indication	Contents
Class A	A****	Errors issued by way of caution/warning when incorrect operational steps are taken. When a class-A error occurs, press the <ALARM CL> key to clear the alarm condition and eliminate the error cause.
Class B	B****	When a class-B error occurs, full auto operation is temporarily halted. Press the <ALARM CL> key to clear the alarm condition and eliminate the error cause. If you then press the <START> key, error recovery is performed.
Class C	C****	When a class-C error occurs, the machine makes an emergency stop (all axes immediately come to a halt / spindles stop rotating / water supply stops). However, if the Z-axis is in the middle of the grinding process when the error occurs, it moves up 200 μm to escape and then stops. When a class-C error occurs, full auto operation cannot be continued.
Class D	D****	When a class-D error occurs, the machine power is automatically turned OFF (except the power to the power control circuit) to prevent an electric shock or fire hazard from occurring. When the machine power is turned back ON, the monitor screen displays the cause of the emergency stop.

2. Error Recovery

Safety precautions

Keep the following safety precautions in mind when you handle errors.



When you remove a broken wafer or cleaning the affected area, wear protective gloves and goggles and use tweezers.
If you perform such works with bare hands, your hands or fingers may be cut or stuck.

When a situation such as described below is encountered, be sure to ask your maintenance personnel to take an appropriate remedial action.

- An error not described in the manual occurs.
 - Error cause is unknown.
 - The same error recurs.
-

Summary of this section

This section describes about the procedures to take remedial actions against errors and perform error recovery by machine unit.

When an error occurs, make sure to take measures to prevent it from recurring.

Section No.	Title	Contents	Error code
2-1	Handling of Cassette Related Errors	- Procedure to handle the cassette related errors	A0004, A0024, A0025 A0026, B0400
2-2	Handling of Errors Demanding Wafer Removal	- Procedure to handle the errors that demand wafer removal	A0065, A0066, A0067 A0068
2-3	Handling of Wafer Transportation Related Errors	- Procedure to handle the errors relating to the wafer transportation sections	B0450, B0451, B0452 B0453, B0454, B0455 B0457, B0458, B0459 B0460, B0461, B0462 B0463, B0465, B0466 B0472, B0473, B0658 B0660, B0662, B0663 B0704
2-4	Handling of Cassette Cover Related Errors	- Procedure to handle the cassette cover related errors	B0402, B0403
2-5	Handling of Position Table Related Errors	- Procedure to handle the position table related errors	B0464, B0500
2-6	Handling of T-arm Related Errors	- Procedure to handle the T-arm related errors	A0281, B0650, B0651 B0652, B0653, B0656 B0657, B0664, B0665 B0666, B0667, B0668 B0669, B0670, B0671 B0672, B0673, B0674 B0675, B0676, B0677 B0678
2-7	Handling of Spinner Related Errors	- Procedure to handle the spinner related errors	B0700, B0701

Summary of this section (Continued)

Section No.	Title	Contents	Error code
2-8	Handling of Errors Relating to Grinding Wafer Thickness	- Procedure to handle the errors relating to grinding wafer thickness	B0547, B0548 B0552, B0553 B0597, B0598 B0602, B0603
2-9	Handling of Washing Unit Related Errors	- Procedure to handle the washing unit related errors	B0554, B0555 B0556, B0557 B0604, B0605 B0606, B0607

2-1. Handling of Cassette Related Errors

Error occurrence

An error of this kind occurs when a situation such as described below is encountered.

- A cassette is not correctly set on the cassette stage.
- The size of the set up cassette does not agree with that specified in the grinding data being used.

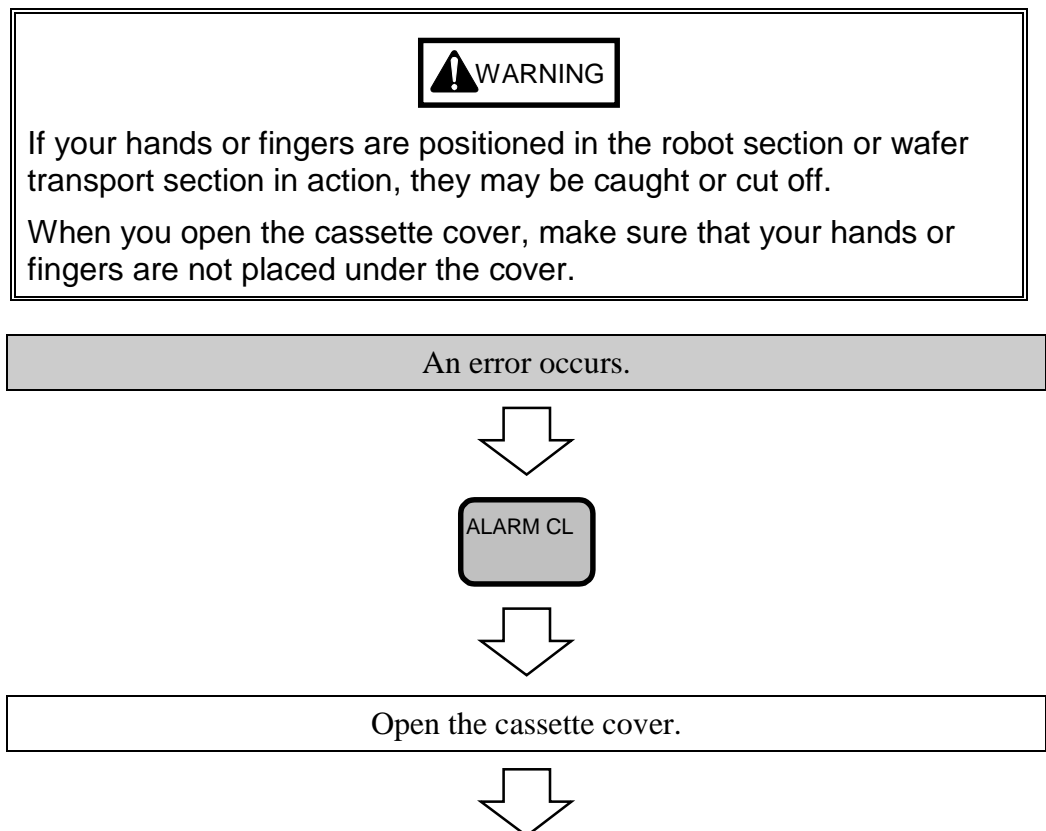
Error message

Followings are the associated error codes and error messages.

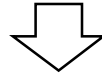
Error code	Error message
A0004	CASSETTE IS NOT IN POSITION
A0024	CASSETTE SIZE is not MATCH
A0025	CHANGING CST-A STATUS (OPERATE AGAIN)
A0026	CHANGING CST-B STATUS (OPERATE AGAIN)
B0400	CASSETTE was REMOVED DURING FULL AUTO

Error recovery procedure

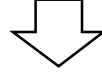
The procedure to handle a cassette related error is described here.



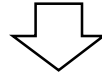
Error recovery procedure (Continued)



Reset the cassette in right position.



Close the cassette cover.



If the error recurs, ask your maintenance personnel to take an appropriate remedial action.

2-2. Handling of Errors Demanding Wafer Removal

Error Occurrence

An error of this kind occurs if there is a wafer at the wafer transport section at the start of full auto operation.

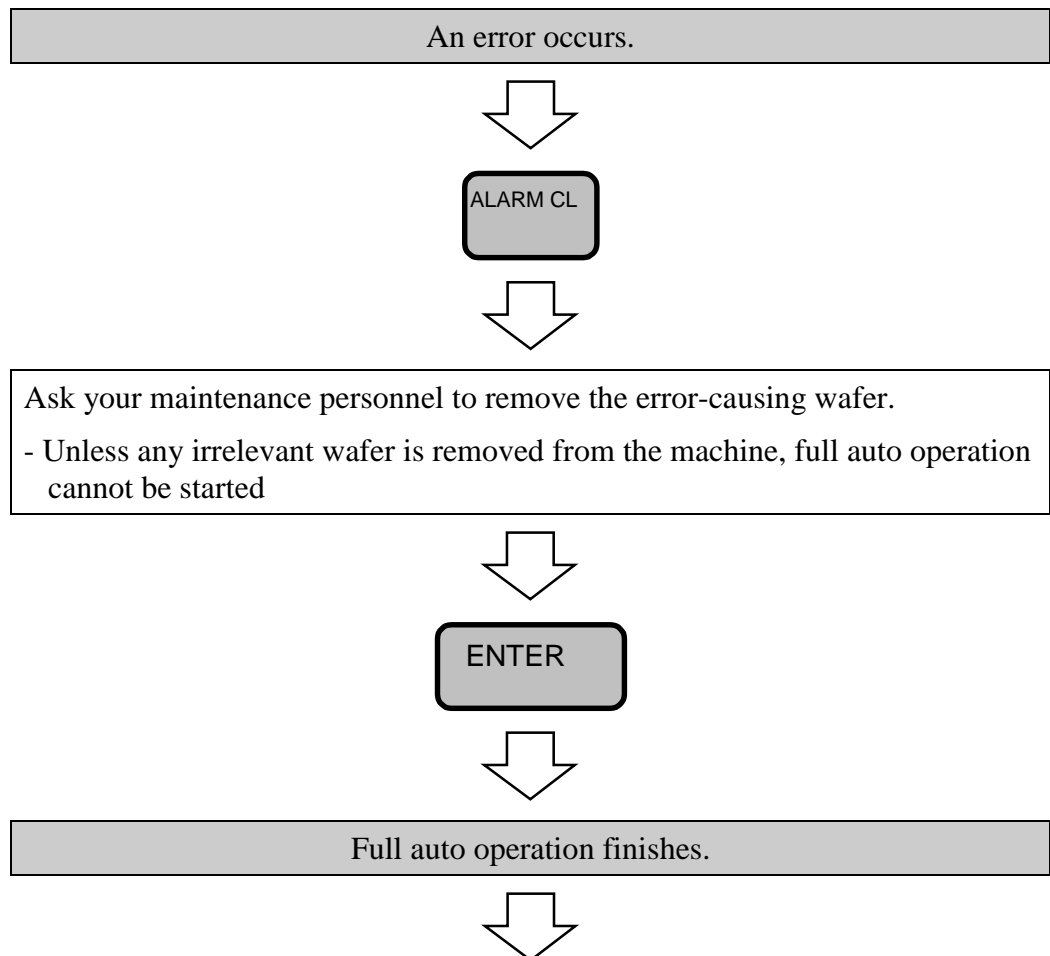
Error message

Followings are the associated error codes and error messages.

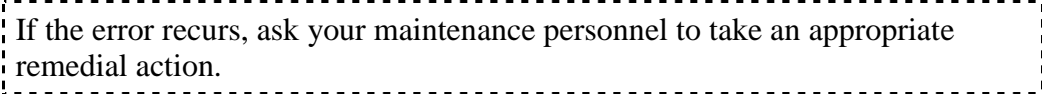
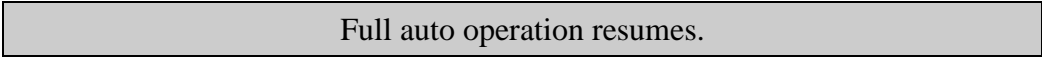
Error code	Error message
A0065	ROBOT WAFER SENSOR ON BEFORE FULL AUTO
A0066	ROBOT VACUUM SENSOR ON BEFORE FULL AUTO
A0067	ROBOT PICK-ARM WAFER SENSOR ON
A0068	ROBOT PICK-ARM VACUUM SENSOR ON

Error recovery procedure

The procedure to handle an error that demands wafer removal is described here.



Error recovery procedure (Continued)



2-3. Handling of Wafer Transportation Related Errors

Error occurrence

An error of this kind occurs when a situation such as described below is encountered.

- Broken wafer debris are adhered to the robot pick, T-arm pad, spinner table or position table.
- The vacuum sensor of the T-arm pad or spinner table is abnormal.
- The wafer sensor of the robot pick, position table or spinner table is abnormal.
- A wafer (being handled) is excessively warped.
- A wafer in the cassette or the cassette itself is not properly placed in position.


Error message

Followings are the associated error codes and error messages.

Error code	Error message
B0450	ROBOT:X-AXIS OPERATION TIME UP
B0451	ROBOT:θ-AXIS OPERATION TIME UP
B0452	ROBOT:Z-AXIS OPERATION TIME UP
B0453	ROBOT:R-AXIS OPERATION TIME UP
B0454	ROBOT:WAFER LOAD ERR(DETECT ON; VAC:OFF)
B0455	ROBOT:WAFER LOAD ERR(DETECT OFF; VAC:ON)
B0457	WFR MISS PICK UP at SPINNER(VAC: OFF)
B0458	ROBOT:WAFER UNLOAD ERR(VAC: ON)
B0459	WAFER RELEASE ERROR to POSITION TABLE
B0460	ROBOT:X-AXIS MISS-STEP DETECTED
B0461	ROBOT:θ-AXIS MISS-STEP DETECTED
B0462	ROBOT:Z-AXIS MISS-STEP DETECTED
B0463	ROBOT:LOST CASSETTE
B0465	ROBOT:WAFER UNLOAD ERR(DETECT WAFER: ON)
B0466	ROBOT:INCORRECT SEQUENCE
B0472	ROBOT:ARM WAFER MISHANDLING(LOADING)
B0473	ROBOT:ARM WAFER MISHANDLING (UNLOADING)
B0658	R-PAD WAFER RECEIVE ERROR (REMOVE WAFER)
B0660	M-PAD WAFER RECEIVE ERROR (REMOVE WAFER)
B0662	L-PAD WAFER RECEIVE ERROR (REMOVE WAFER)
B0663	L-PAD RELEASE ERROR (REMOVE WAFER)
B0704	VACUUM CHECK ERROR DURING SPINNER on

Error recovery procedure

The procedure to handle a wafer-transportation related error is described here.

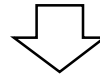
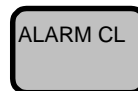
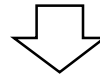
 **WARNING**

When you press the <START> key to perform error recovery, the drive sections such as the robot arm and T-arm start moving.

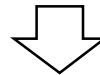
Make sure to close the covers of the drive sections wherever available before you press the <START> key.

If you position your hands or fingers in any drive section in action, they may be caught or cut off.

An error occurs.

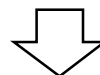
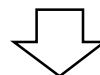


The message "G: [START]: Key Recover" appears at the bottom of the screen.

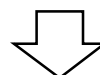


Ask your maintenance personnel to remove the error-causing wafer.

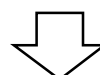
- Unless any irrelevant wafer is removed, full auto operation cannot be resumed.



Error recovery is performed.



When the error recovery process comes to an end, the message "G: RECOVER Job End" appears at the bottom of the screen.



Error recovery procedure (Continued)



START



Full auto operation resumes.



If the error recurs, ask your maintenance personnel to take an appropriate remedial action.

2-4. Handling of Cassette Cover Related Errors

Error occurrence

An error of this kind occurs when the cover of the cassette being processed opens during full auto operation. If such an error occurs, the robot immediately stops moving.


Error message

Followings are the associated error codes and error messages.

Error code	Error message
B0402	CASSETTE-A COVER OPEN DURING OPERATION
B0403	CASSETTE-B COVER OPEN DURING OPERATION

Error recovery procedure

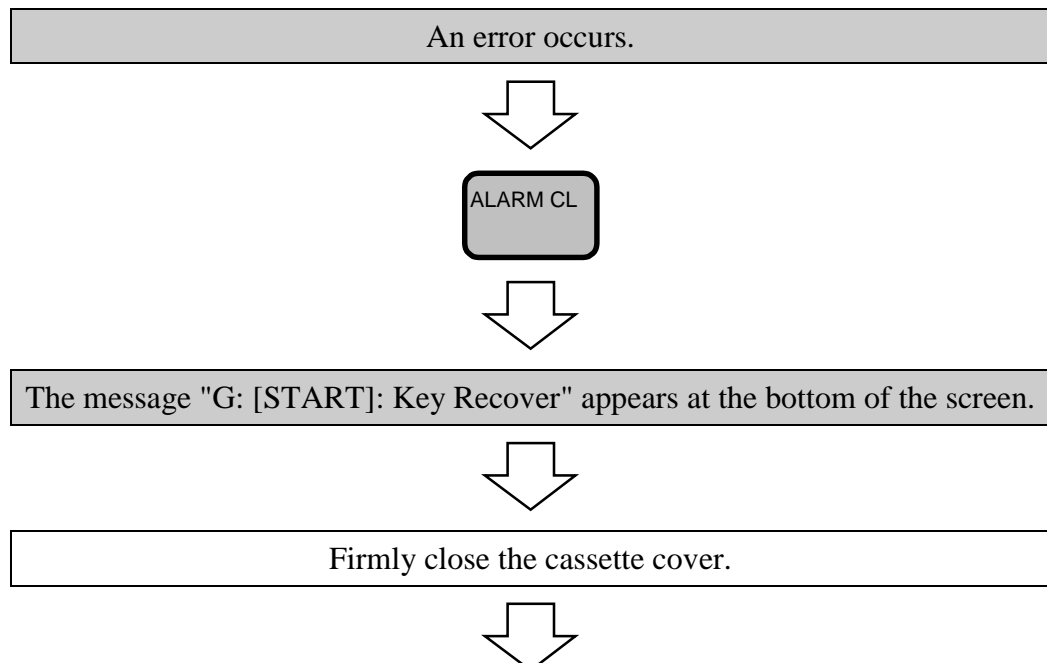
The procedure to handle a cassette cover related error is described here.

 **WARNING**

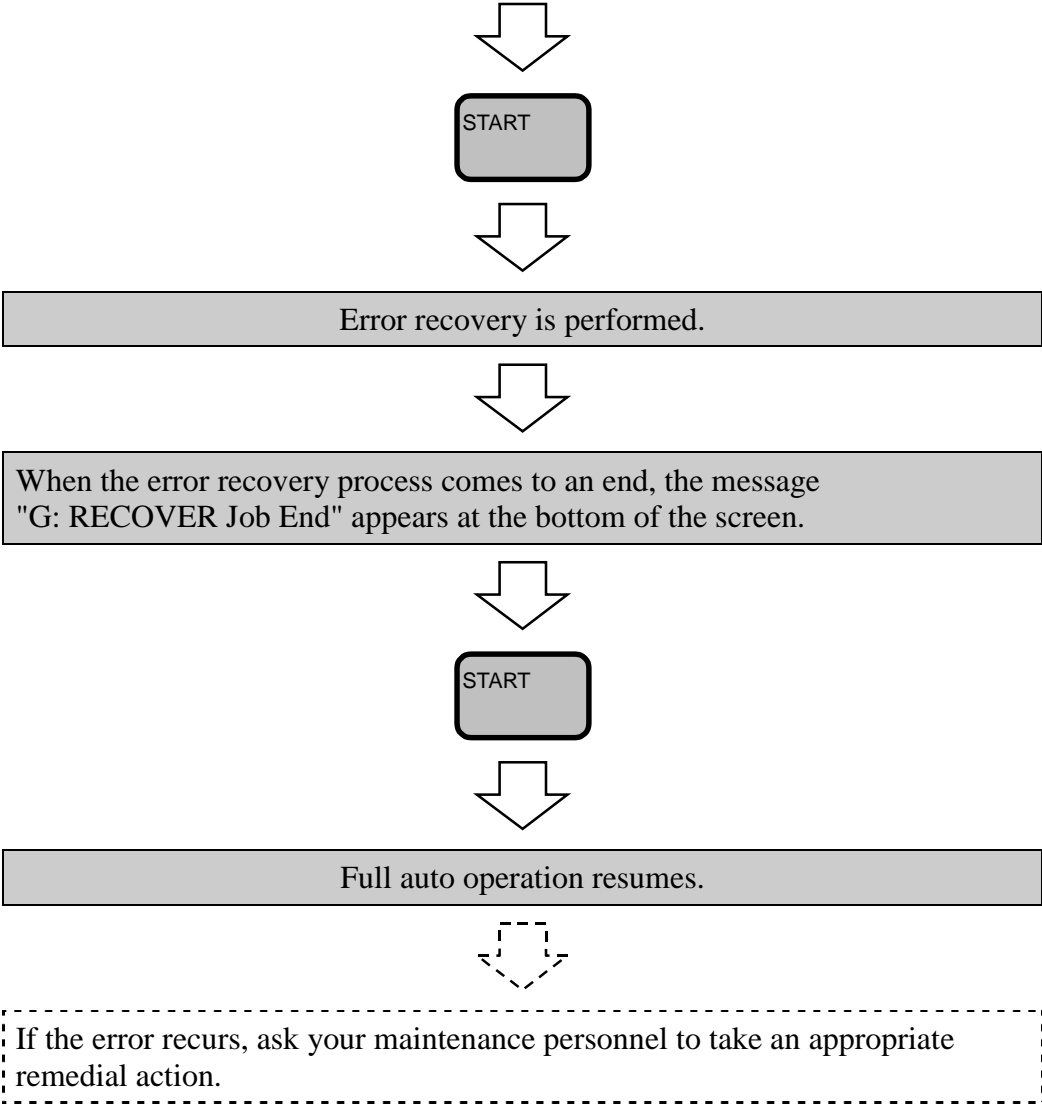
When you press the <START> key to perform error recovery, the drive sections such as the robot arm and T-arm start moving.

Make sure to close the covers of the drive sections wherever available before you press the <START> key.

If you position your hands or fingers in any drive section in action, they may be caught or cut off.



Error recovery procedure (Continued)



2-5. Handling of Position Table Related Errors

Error occurrence

An error of this kind occurs when a situation such as described below is encountered.

- Broken wafer debris are adhered to the position table.
- The wafer sensor of the position table is abnormal.
- A wafer (being handled) is excessively warped.


Error message

Followings are the associated error codes and error messages.

Error code	Error message
B0464	PLEASE REMOVE WAFER from POSITION TABLE
B0500	POSITION TABLE OPERATION TIME UP

Error recovery procedure

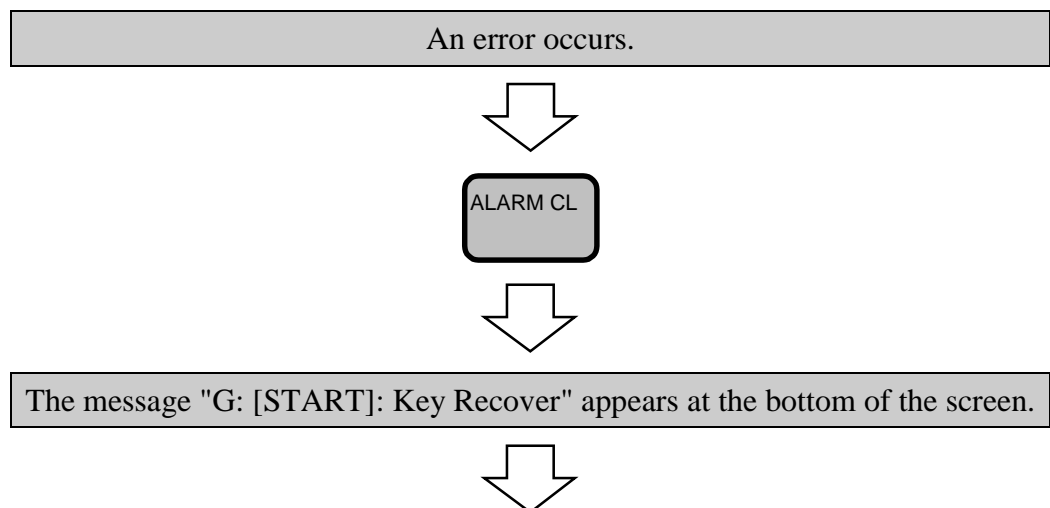
The procedure to handle a position table related error is described here.

 **WARNING**

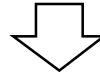
When you press the <START> key to perform error recovery, the drive sections such as the robot arm and T-arm start moving.

Make sure to close the covers of the drive sections wherever available before you press the <START> key.

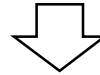
If you position your hands or fingers in any drive section in action, they may be caught or cut off.



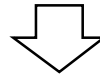
Error recovery procedure (Continued)



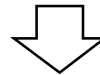
Ask your maintenance personnel to remove the error-causing wafer.
- Unless any irrelevant wafer is removed, full auto operation cannot be resumed.



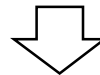
START



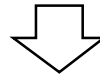
Error recovery is performed.



When the error recovery process comes to an end, the message
"G: RECOVER Job End" appears at the bottom of the screen.



START



Full auto operation resumes.



If the error recurs, ask your maintenance personnel to take an appropriate remedial action.

2-6. Handling of T-arm Related Errors

Error occurrence

An error of this kind occurs when there is a problem at the T-arm section.


Error message

Followings are the associated error codes and error messages.

Error code	Error message
A0281	T-ARM INITIAL TIMEOVER(DUE to Z-AXIS)
B0650	T-ARM EXTENSION TIME UP ERROR
B0651	T-ARM CONTRACTION TIME UP ERROR
B0652	T-ARM UPWARD TIME UP ERROR
B0653	T-ARM DOWNWARD TIME UP ERROR
B0656	T-ARM CW MOVEMENT TIME UP ERROR
B0657	T-ARM CCW MOVEMENT TIME UP ERROR
B0664	T-ARM UPPER/LOWER SENSORS BOTH on
B0665	T-ARM R-PAD TELESCOPING SENSORS BOTH on
B0666	T-ARM L-PAD TELESCOPING SENSORS BOTH on
B0667	SEP. SHUTTER BOTH OPEN/CLOSE SENSORS on
B0668	T-ARM MOVE ERROR (AREA SENSOR NOT ON)
B0669	T-ARM R-PAD VACUUM REMAINS on
B0670	T-ARM M-PAD VACUUM REMAINS on
B0671	T-ARM L-PAD VACUUM REMAINS on
B0672	T-ARM MISS-STEP DETECTED (CW MOVE)
B0673	T-ARM MISS-STEP DETECTED (CCW MOVE)
B0674	T-ARM MISS-STEP DETECTED (UP MOVE)
B0675	T-ARM MISS-STEP DETECTED (DOWN MOVE)
B0676	T-ARM R-PAD MISHANDLIND (VACUUM OFF)
B0677	T-ARM M-PAD MISHANDLIND (VACUUM OFF)
B0678	T-ARM L-PAD MISHANDLIND (VACUUM OFF)

Error recovery procedure

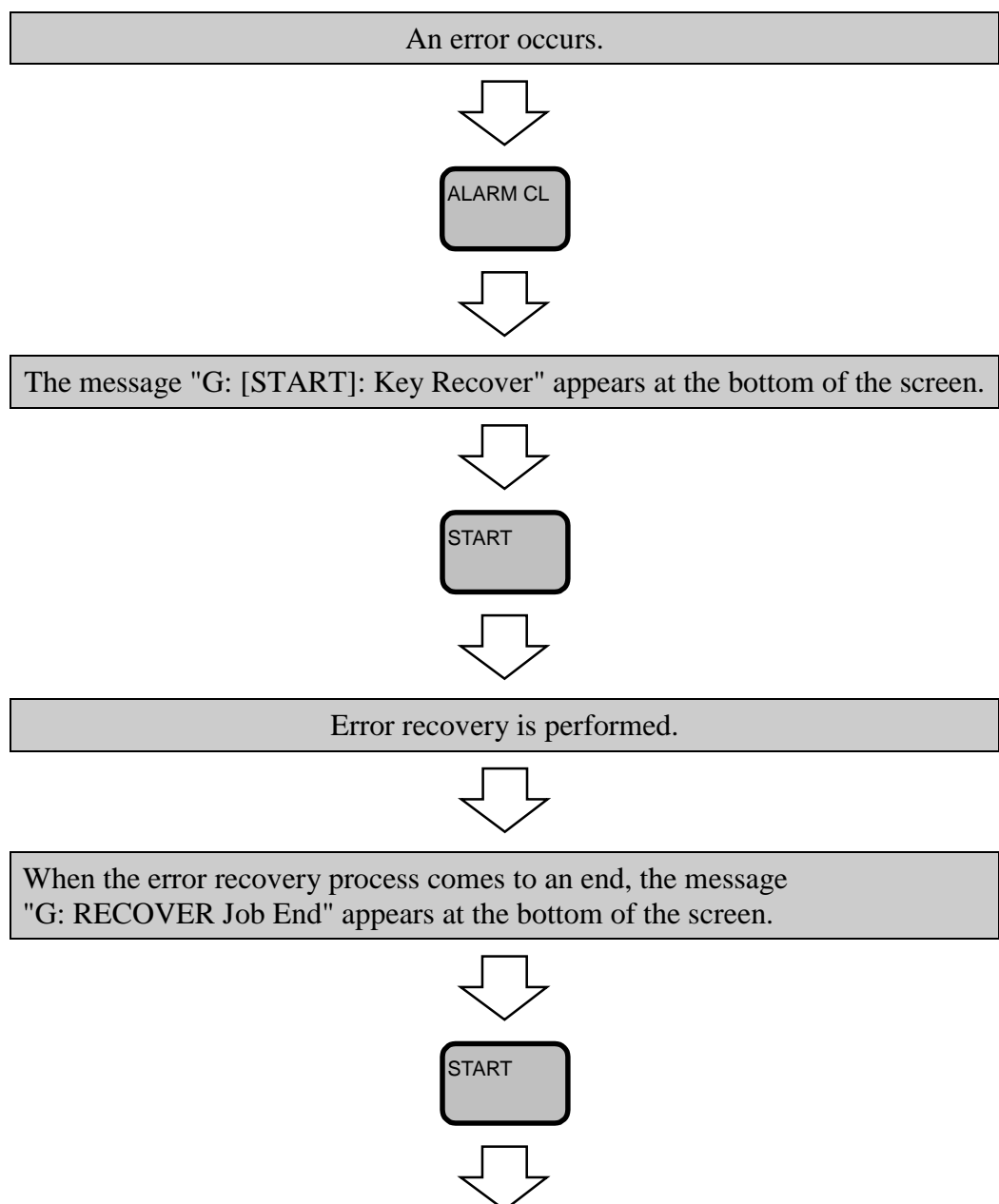
The procedure to handle a T-arm related error is described here.

 **WARNING**

When you press the <START> key to perform error recovery, the drive sections such as the robot arm and T-arm start moving.

Make sure to close the covers of the drive sections wherever available before you press the <START> key.

If you position your hands or fingers in any drive section in action, they may be caught or cut off.



Error recovery procedure (Continued)



Full auto operation resumes.



If the error recurs, ask your maintenance personnel to take an appropriate remedial action.

2-7. Handling of Spinner Related Errors

Error occurrence

An error of this kind occurs when there is a problem at the spinner section


Error message

Followings are the associated error codes and error messages.

Error code	Error message
B0700	SPINNER NOZZLE IN/OUT MOVE TIME UP ERROR
B0701	SPINNER COVER OPEN/CLOSE TIME UP ERROR

Error recovery procedure

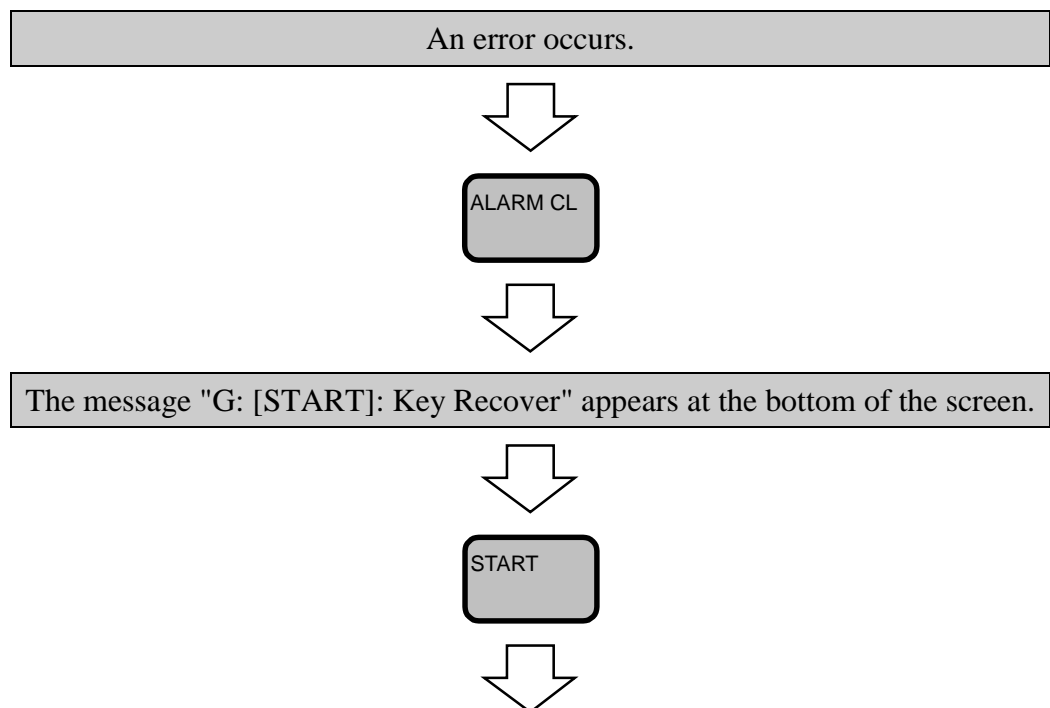
The procedure to recover a spinner related error is described here.

 **WARNING**

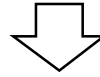
When you press the <START> key to perform error recovery, the drive sections such as the robot arm and T-arm start moving.

Make sure to close the covers of the drive sections wherever available before you press the <START> key.

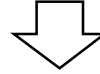
If you position your hands or fingers in any drive section in action, they may be caught or cut off.



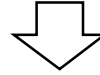
Error recovery procedure (Continued)



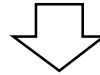
Error recovery is performed.



When the error recovery process comes to an end, the message "G: RECOVER Job End" appears at the bottom of the screen.



START



Full auto operation resumes.



If the error recurs, ask your maintenance personnel to take an appropriate remedial action.

2-8. Handling of Errors Relating to Grinding Wafer Thickness

Error occurrence

An error of this kind occurs when a wafer to be ground is abnormal in its thickness.

Error message

Followings are the associated error codes and error messages.

Error code	Error message
B0547	Z1 HEIGHT GAUGE WAFER THICKNESS IS MINUS
B0548	Z1 AXIS : GAGE DETECT ILLIGAL VALUE
B0552	Z1 GROUND WAFER is TOO THICK
B0553	Z1 GROUND WAFER is TOO THIN
B0597	Z2 HEIGHT GAUGE WAFER THICKNESS IS MINUS
B0598	Z2 AXIS : GAGE DETECT ILLIGAL VALUE
B0602	Z2 GROUND WAFER is TOO THICK
B0603	Z2 GROUND WAFER is TOO THIN

Error recovery procedure

The procedure to handle an error relative to the thickness of a wafer to be ground is described here.



When you press the <START> key to perform error recovery, the drive sections such as the robot arm and T-arm start moving.

Make sure to close the covers of the drive sections wherever available before you press the <START> key.

If you position your hands or fingers in any drive section in action, they may be caught or cut off.

An error occurs.



ALARM CL



Error recovery procedure (Continued)



Check with your maintenance personnel about the type of the set up wafers and the wafer type registered in the grinding program being used.



To continue grinding

To interrupt grinding here



Full auto operation resumes.



Referring to the procedures to interrupt full auto operation, purge wafers from the machine.

2-9. Handling of Washing Unit Related Errors

Error occurrence

An error of this kind occurs when there is a problem at the washing unit.

Error message

Followings are the associated error codes and error messages.

Error code	Error message
B0554	Z1 CLEAN BRUSH TIME UP ERR TURN to TABLE
B0555	Z1 CLEAN BRUSH TIME UP ERR TURN to ESCAP
B0556	Z1 CLEAN BRUSH TIME UP ERR UPWARD MOVE
B0557	Z1 CLEAN BRUSH TIME UP ERR DOWNWARD MOVE
B0604	Z2 CLEAN BRUSH TIME UP ERR TURN to TABLE
B0605	Z2 CLEAN BRUSH TIME UP ERR TURN to ESCAP
B0606	Z2 CLEAN BRUSH TIME UP ERR UPWARD MOVE
B0607	Z2 CLEAN BRUSH TIME UP ERR DOWNWARD MOVE

Error recovery procedure

The procedure to handle a washing unit related error is described.

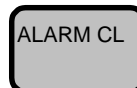


When you press the <START> key to perform error recovery, the drive sections such as the robot arm and T-arm start moving.

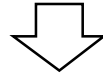
Make sure to close the covers of the drive sections wherever available before you press the <START> key.

If you position your hands or fingers in any drive section in action, they may be caught or cut off.

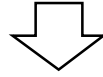
An error occurs.



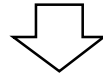
Error recovery procedure (Continued)



START



Make a retry action.
(Redo the same operation over again.)



If the error recurs, ask your maintenance personnel to take an appropriate remedial action.

3. Error History Check (HISTORY Screen)

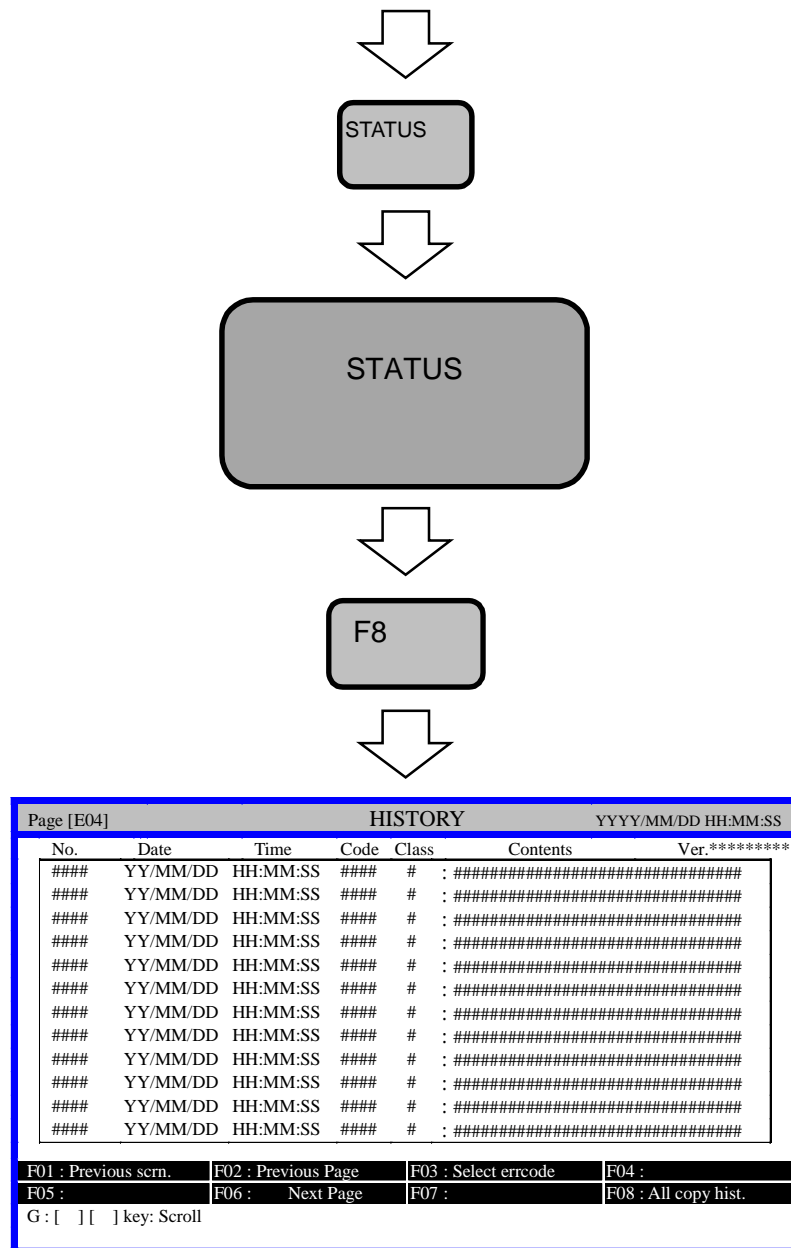
About error history

This machine records up to 9999 past error data (occurred time/date, contents) and operation data in 100 pages. The recorded error data and operation data can be seen in the HISTORY screen.

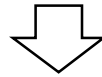
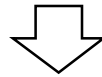
Procedure to check the past error data

The procedure to check the past error data is described here.



Call up the top menu screen or FULL AUTO screen.

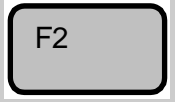



Procedure to check the past error data (Continued)

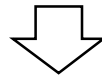



All the past error data are displayed.

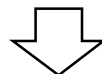
- You can scroll up and down the screen by using the  and  keys.

- You can change the displayed page by using the  and  keys. One page contains 100 registered events (operation and error data).

- Refer to the [Contents on the HISTORY screen] on the next page for the contents of the HISTORY screen.



When you finish checking the past error data, press the  key.



The system returns to the previous screen.

Contents of the HISTORY screen

The contents of the HISTORY screen is described here.

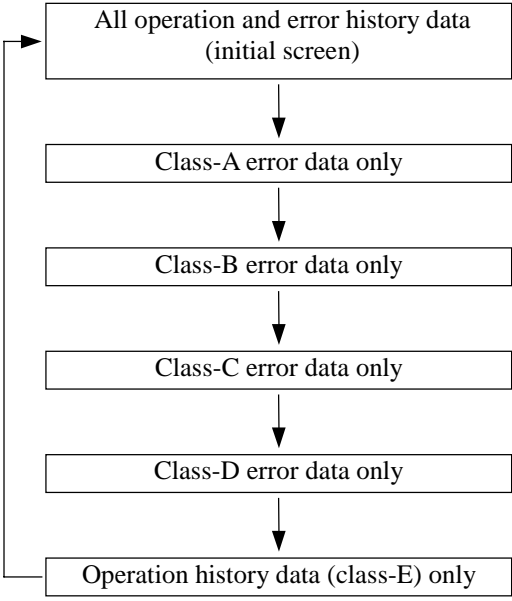
[Screen]

Page [E04]		HISTORY			YYYY/MM/DD HH:MM:SS		
No.	Date	Time	Code	Class	Contents	Ver.*****	
[1]	[2]	[3]	[4]	[5]	[6]		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
####	YY/MM/DD	HH:MM:SS	####	#	: #####		
F01 : Previous scrn.		F02 : Previous Page		F03 : Select errcode		F04 :	
F05 :		F06 : Next Page		F07 :		F08 : All copy hist.	
G : [] [] key: Scroll							
Page No. [7]							

[Indication items on the HISTORY screen]

Item No.	Descriptions
[1]	The serial number given to each error (and operation) event is shown in the order of occurrence ("0001" to "9999"). When the number "9999" is reached, it starts with "0001" again.
[2]	The error occurrence date is shown.
[3]	The error occurrence time is shown.
[4]	The error code (number) is shown.
[5]	The error class is shown. Refer to section 1, [Error Classes] in this chapter for details of the error classes.
[6]	The error message is shown.
[7]	The page number (No.00 ~ 99) is shown.

[Function Key]

Press	To
F1	Return to the previous screen.
F2	Show the previous page (on which the events older than the ones on the current page are registered).
F3	<p>Switch on-screen displays. At each press of this key, the on-screen indication changes as follows.</p>  <pre> graph TD A["All operation and error history data (initial screen)"] --> B["Class-A error data only"] B --> C["Class-B error data only"] C --> D["Class-C error data only"] D --> E["Class-D error data only"] E --> F["Operation history data (class-E) only"] F --> A </pre>
F4	Not used
F5	Not used
F6	Show the next page (on which the events newer than the ones on the current page are registered).
F7	Not used
F8	<p>Copy the registered data into floppy disk. - Refer to Section 1-3, [Saving of Event History Data] in Chapter F of the Data Maintenance Manual.</p>

INDEX

A

Arrangement of keys on operation panel C-5

C

Calling up the history screen..... D-66
 Calling up the process status screen D-63
 Calling up the status screen..... D-59
 Cassette cover related error recovery E-14
 Cassette id entry D-25
 Cassette related error recovery E-7
 Checking of supply air pressure and power reception D-5
 Cleaning brush related error recovery E-25
 Component names C-1
 Contents of the history screen D-68
 Contents of the process status screen D-64
 Contents of the status screen D-60
 Continuation of full auto operation D-35
 Correction of finished wafer thickness data /
 interruption of full auto operation / wafer recovery D-39
 Correction of finished wafer thickness data D-40

E

Emergency OFF switch (EMO switch) A-9
 Error classes E-3
 Error history data check (history screen)..... E-27
 Error recovery involving wafer removal E-9
 Error recovery E-1, E-4

F

Forcible termination D-49
 Full auto operation execution D-28
 Full auto operation D-17
 Functions of keys on operation panel C-6

G

General safety precautions A-2
 Grinding data check D-19
 Ground wafer thickness related error recovery E-23

H

Halting of wafer recovery D-56
 History screen D-65

I

Important safety information A-1
 Inherently hazardous areas and ways to avoid hazards A-8
 Initialization D-10
 Interlock mechanism A-14
 Interruption after grinding and purging loaded wafers D-44
 Interruption after purging loaded wafers without grinding D-46
 Interruption of full auto operation D-43

K

Keys to call up special screens C-8
 Keys to set up/change/select/call up data C-9
 Keys to start/stop operations and clear alarm condition C-7

M

Machine start up D-3

N

Noise Data A-22

O

Opening valves of air, water, drain, and exhaust
 and turning on the power of plant facility D-4
 Operation panel C-4
 Operation status check D-57
 Overall view and axial structure of the machine C-2

P

Position table related error recovery E-16
 Power circuit breaker A-12
 Power off by main switch D-74
 Power off from the power off screen D-76
 Pre-operational preparations D-18
 Process status screen D-62

S

Safety labels A-18
 Safety precautions to be observed during
 machine operation A-4
 Spinner related error recovery E-21
 Starting of full auto operation D-29
 Status screen D-58

T

T-arm related error recovery E-18
 Termination of full auto operation D-37
 Termination of machine operation D-70
 Turning off spindle rotation
 and wheel coolant water supply D-71
 Turning off the machine power D-73
 Turning off the power and closing valves of air, water,
 and drain/exhaust of plant facility D-79
 Turning on the machine power D-7

W

Wafer cassette setting D-22
 Wafer recovery function D-52
 Wafer recovery D-53
 Wafer transportation related error recovery E-11
 Warm up D-13
 WHOM TO CONTACT IN AN EMERGENCY B-1

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