disco

MAINTENANCE 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.

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:

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

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 Do not position your hands or fingers near the wheel Keep the safety cover closed.
Capture Label ACAUTION	A 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 ACAUTION	A 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	A WARNING	A risk of receiving an electric shock exists. Be alerted.
General Label	A WARNING	Warnings (including danger/caution) in general

INTRODUCTION

About this manual

This Maintenance Manual, written for maintenance personnel, describes about the customer-side maintenance and inspection/adjustment works and their procedures for 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 handling the machine.

In maintaining or inspecting the machine, which should be performed by the qualified maintenance personnel (hereinafter referred to as maintenance personnel) who have completed DISCO's maintenance training, 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.
	Maintenance personnel	Qualified person who has completed DISCO's machine maintenance training to engage in maintenance of the machine.
Operator	Data maintenance personnel	Qualified person who manages the software data of the machine.
	Machine operator	Engages in operation of the machine for grinding wafers.

Minimum retention period of maintenance functional parts

The maintenance functional parts required for repair or modification of the machine will be retained by Disco for at least seven years after the B/L date.

Part replacement

- Be sure to use the genuine DISCO brand for the replaced parts. If you use any parts other than the genuine DISCO brand, DISCO shall assume no liability for any damage arising therefrom.
- When you replace a component that incorporates the certified parts, be sure to choose the one of the same model for replacement.
- When you replace critical parts, consult your nearest DISCO office or DISCO service office. If you replace any critical parts without prior consent of DISCO, DISCO shall assume no liability for any damage arising therefrom.

Part warranty period

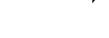
Part warranty period is as follows:

Part	Warranty period
Electrical parts having contact points	Six months from the B/L date
Consumable parts	Not warranty
Parts other than the above	12 months from the B/L date

Documentation for this machine

The following five manuals are provided for the machine. This manual is the Maintenance Manual in the list below indicated by an arrow.

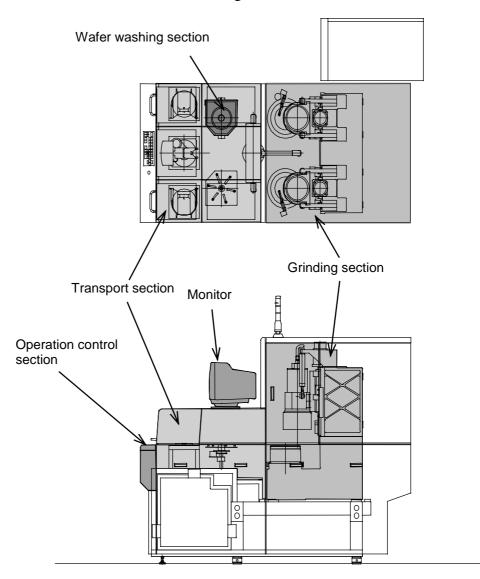
Manual	Who should read	Contents
Installation Manual	Maintenance personnel	Procedures to install the machine and to make installation-related adjustments
Operation Manual	Machine operator	Operational procedures to be performed by the machine operator
Data Maintenance Manual	Data maintenance personnel	Contents of the screens on which data entries are madeData 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

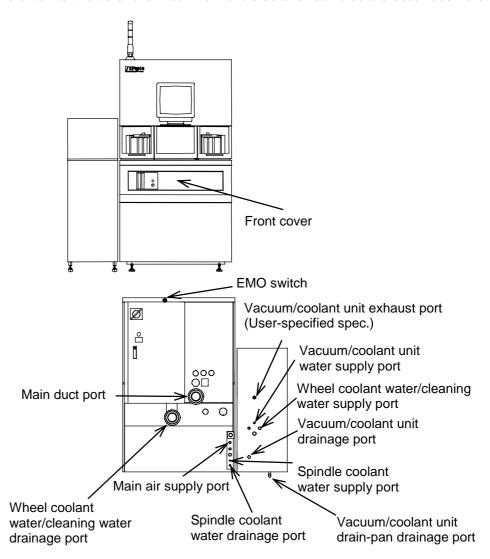
International System of Unit is adopted to express any unit. The values in the parenthesis are reference data. Also, all the pressure values are expressed in gauge pressure.

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	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.

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

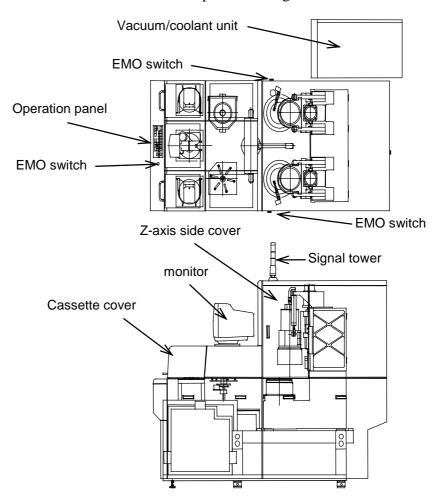


Name	Function
EMO switch	Switch used to shut OFF the machine power when the machine becomes faulty or acts abnormally.
Front cover	Inside of this cover are the meters and gauges of the machine.
Vacuum/coolant unit exhaust port (User-specified spec.)	Exhaust port of the vacuum/coolant unit
Vacuum/coolant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

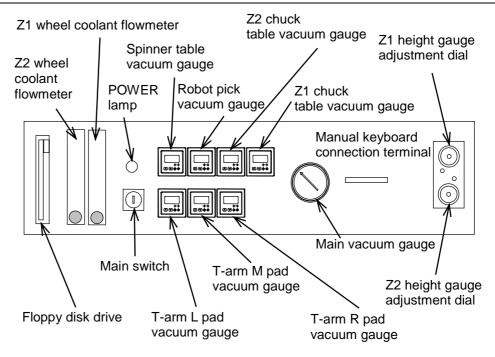
External view (Machine front-side and rear-side) (Continued)

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

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	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 lights of the pilot lamp indicate the operating status of the machine. The red light flashes when an error occurs.

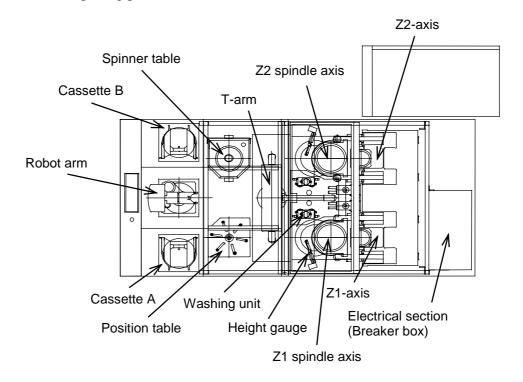


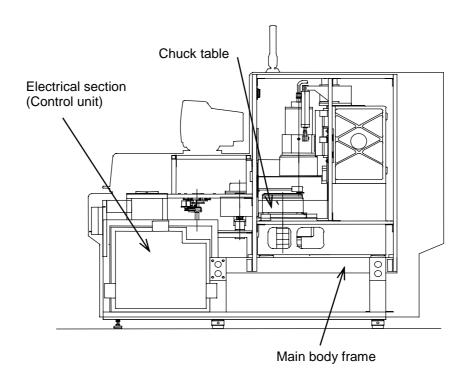
Name	Function
Z2 wheel coolant flowmeter	Flow meter of Z2 wheel coolant water
Z1 wheel coolant flowmeter	Flow meter of Z1 wheel coolant water
POWER lamp	Lamp that lights while the machine power is turned ON.
Spinner table vacuum gauge	Gauge to indicate the vacuum pressure of the spinner table
Robot pick 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.

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





Name	Function
Robot arm	- 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.

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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 the machine, as well as the protective mechanisms incorporated into the machine.

Section No.	Title	Contents
1	General Safety Precautions	 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 in Maintaining/Servicing the Machine	 Safety precautions to be fully understood before you perform maintenance on the machine. Safety precautions to be observed when you perform maintenance on the machine.
3	Inherently Hazardous Areas and Ways to Avoid Hazards	- Potentially hazardous sections of the machine and the ways to avoid hazards (explained by hazard type)
4	Emergency OFF Switch (EMO Switch)	- Explanation about the emergency OFF switch (EMO switch)
5	Power Circuit Breaker	- Explanation about the power circuit breaker
6	Interlock Mechanism	- Explanation about the interlock mechanisms incorporated into the machine
7	Safety Labels	Types of the safety labels used for the machineLocations of the safety labels attached to the machine
8	Critical Component List	- List of the critical components used in the machine

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 workers who perform maintenance on the
 machine to thoroughly read the safety precautions set forth in the
 Maintenance 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.

Safety Precautions in Maintaining/Servicing the Machine

Safety precautions to be observed in maintaining/servicing the machine

This section describes about the safety precautions that should be fully understood and observed when you perform maintenance on 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 min⁻¹(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.

- Evolution of hydrogen gas

Waste water containing silicon particles must not be kept in airtight containers or the like. It may cause evolution of hydrogen gas that could react explosively with heat or flame when they are closely present.



- Movable parts

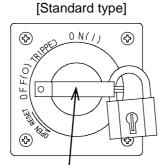
If your hands or fingers are positioned in a drive section in action, they may be caught or cut off. While a drive section is operating, do not touch it. Also, avoid placing your hands or fingers in an operating space of movable parts.



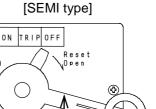
- Robot section/wafer transport section
 If your hands or fingers are positioned in the robot section or wafer
 transport section in action, they may be caught or cut off. Keep your
 hands and fingers away from such sections or their operating space
 while they are in action.
- Spinner and chuck table 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.
- Air supply ON/OFF during machine power OFF Even if the machine power is turned OFF, the air-operated parts of the transport section and the spinner section may move when you turn ON/OFF the air system.
 - Keep your hands and fingers away to prevent them from being caught or cut off from those air-operated parts and their operating spaces when you turn ON/OFF the air system.
- 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.



- Power circuit breaker lever lockout
 When you perform a maintenance work with the machine power
 turned OFF, lock out the power circuit breaker lever of the machine
 with a padlock or the like to prevent the machine from being
 inadvertently activated by other persons.
 - 1) Turn the machine main switch key to "OFF" position and pull the key out.
 - 2) Turn the power circuit breaker lever on the rear of the machine to "OFF" position.
 - 3) Lock out the breaker lever with a padlock or the like.



Breaker lever



Breaker lever

Release

- 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.
- Interlock mechanism deactivation during unit operation
 The interlock mechanism is deactivated when a unit operation is
 conducted from the unit operation screen. In such an occasion,
 make sure to keep your hands and fingers away from the movable
 sections of the machine to protect them from possible hazards such
 as capture or cutoff.



- Handling of Solenoid valve

When you manually operate a solenoid valve, the interlock mechanism of the machine is deactivated. In such an occasion, make sure to keep your hands and fingers away from the movable sections of the machine to protect them from possible hazards such as capture or cutoff.

It can also happen that a drive axis interferes to damage a machine part. Use care when you manually operate solenoid valves.

- 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.
- Machine with UPS unit (optional accessory)
 Even if the facility-side power is turned OFF, a hazardous voltage still remains in the machine equipped with the uninterruptible power supply unit (UPS). Never position your hands or fingers in an energized section of the machine, or you may receive an electric shock that could result in severe injury or death.
- Maintenance key storage
 The machine has the interlocked Z-axis side covers and breaker box cover that are locked by the maintenance key. This key must be stored with due care by the qualified maintenance personnel.

 Performing of the maintenance works that require the use of the maintenance key must be carefully performed by the qualified maintenance personnel.
- Stepping motor section
 The T-am, position table, and robot of the machine use the stepping motor for their driving. The stepping motor remains heated even after the machine power is turned OFF. When you perform maintenance on the parts around the stepping motor, wait at least 30 minutes after the machine power is turned OFF.



- Maintenance work with the machine outer covers removed The machine outer covers removed for performing a maintenance work on the machine should be placed sufficiently away from the working area. If the covers are placed against the machine, they may fall when an earthquake or other accident occurs and injure a person performing maintenance on the machine.



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 <u>at least one</u>
 <u>minute</u> 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.
- Wheel installation/removal

The wheel installation/removal work itself could cause the spindle to gall. Make sure that air is kept supplied to the spindle while the wheel is installed or removed. Also be careful not to exert any force to the spindle in its axial direction.

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 illustrates the inherently hazardous sections of the machine and describes the ways to avoid such potential hazards by hazard type.

Section No.	Title
3-1	Locations and Preventive Measures of Operation-related Potential Hazards
3-2	Locations and Preventive Measures of Maintenance-related Potential Hazards

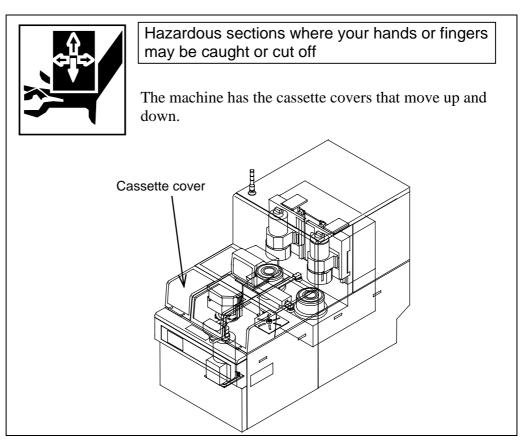
3-1. Locations and Preventive Measures of Operationrelated Potential Hazards

Summary of this section

This section describes the locations where operation-related mechanical hazards may be latent and the measures to prevent them by hazard type.

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.

3-2. Locations and Preventive Measures of Maintenance-related Potential Hazards

Summary of this section

This section describes the locations where maintenance-related mechanical hazards may be latent and the measures to prevent them by hazard type.

Hazardous locations inside the machine outer covers

There are the locations inside the machine outer covers where catching, cutoff, capture, or electric shock hazards may be latent as shown in the figure below.

Hazardous locations inside the machine outer covers

Machine outer cover removal reveals hazardous sections of the machine where parts of your body or clothing may be captured, cut off, and caught or you may receive an electric shock.

[1]: Catching/cutoff hazard locations

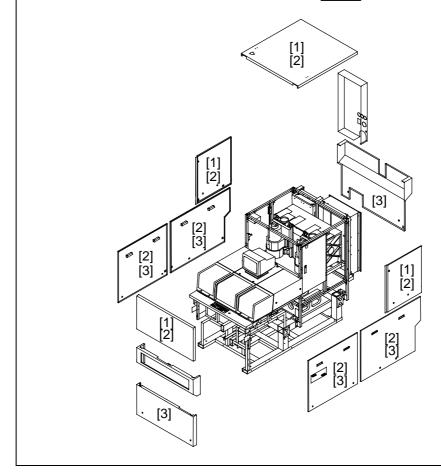


[2]: Capture hazard locations

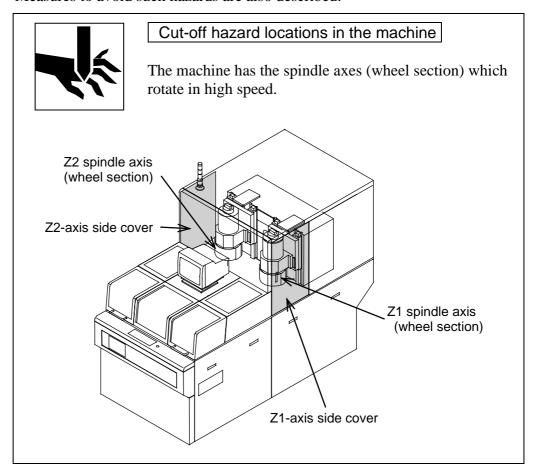


[3]: Electric shock hazard locations



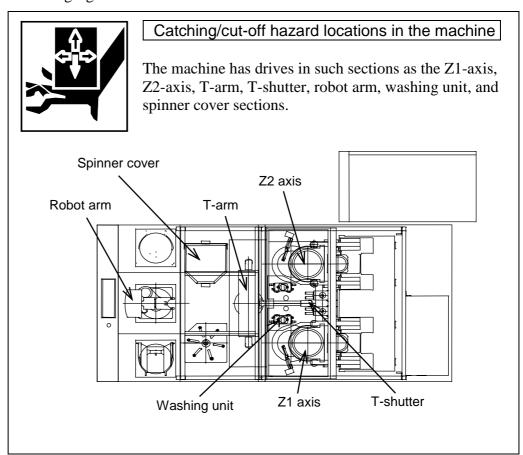


Cut-off hazard locations in the machine are shown in the following figure. Measures to avoid such hazards are also described.



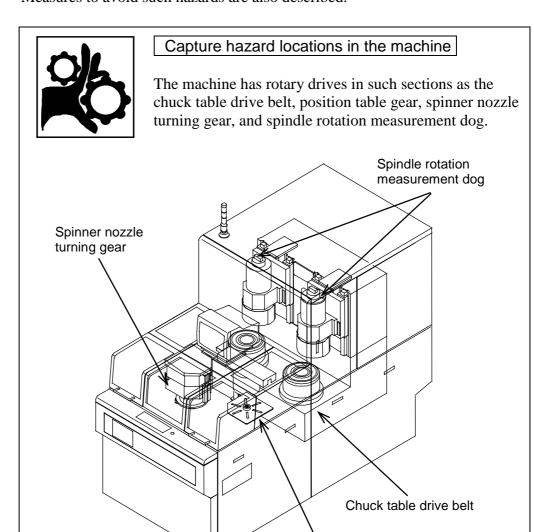
Inherently hazardous area	Spindle axis (wheel section)
Cause of hazard	If your hands or fingers are placed in the spindle section when the spindle is rotating or moving up and down, they may be cut off.
Avoidance method	It takes up to 15 seconds for a rotating spindle (7000 min ⁻¹ (rpm)) to come to a standstill. When you open the grinding section side cover, wait for at least 15 seconds after stopping spindle rotation. Also make sure that spindle rotation is completely stopped when you open the wheel cover.

Catching and cut-off hazard locations in the machine are shown in the following figure. Measures to avoid such hazards are also described.



Inherently	- Z1-axis / Z2-axis
hazardous area	- T-arm rotating area
	- T-arm extension/contraction area
	- T-shutter
	- Robot arm
	- Spinner cover vertical motion area
	- Washing unit drive area
Cause of hazard	If your hands or fingers are positioned in a motor-
	driven or air-cylinder operated section in action, they
	may be caught or cut off.
Avoidance method	Machine maintenance works must be performed by
	qualified maintenance personnel.
	Before performing a maintenance work, make sure
	that the motor driven or air-cylinder operated sections
	are brought to a complete stop.

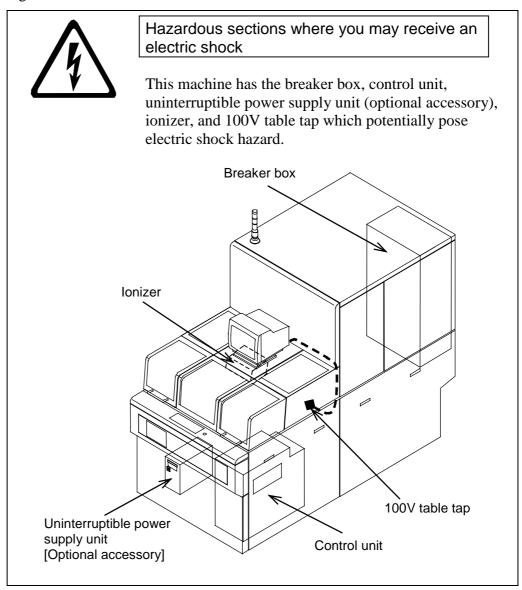
Capture hazard locations in the machine are shown in the following figure. Measures to avoid such hazards are also described.



Inherently hazardous area	 Chuck table drive belt Position table gear Spinner nozzle turning gear
	- Spindle rotation measurement dog
Cause of hazard	If your hands or fingers are placed in a rotary section in action, they or your clothing may be captured. As a result, you may get severely injured.
Avoidance method	Machine maintenance works must be performed by qualified maintenance personnel. Before performing a maintenance work, make sure that the drive sections are brought to a complete stop.

Position table gear

Electric shock hazard locations in the machine are shown in the following figure. Measures to avoid such hazards are also described.



Inherently	- Breaker box
hazardous area	- Control unit
	- Uninterruptible power supply unit
	[optional accessory]
	- Ionizer
	- 100V table tap
Cause of hazard	If you come into contact with an energized section,
	you may receive an electric shock that could be fatal.
Avoidance method	Before performing maintenance on any of the above
	units, turn OFF the facility-side power and lock it out
	with a padlock or the like instrument.

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 for 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

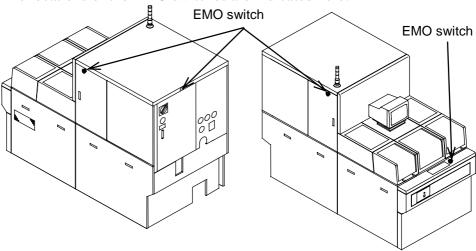
Once a spindle enters the free-running state (in which the rotation cannot be braked) due to power failure or error occurrence, it takes about 30 minutes for the spindle to come to a complete stop. Make sure that air supply is not stopped until the spindle completely stops rotating.

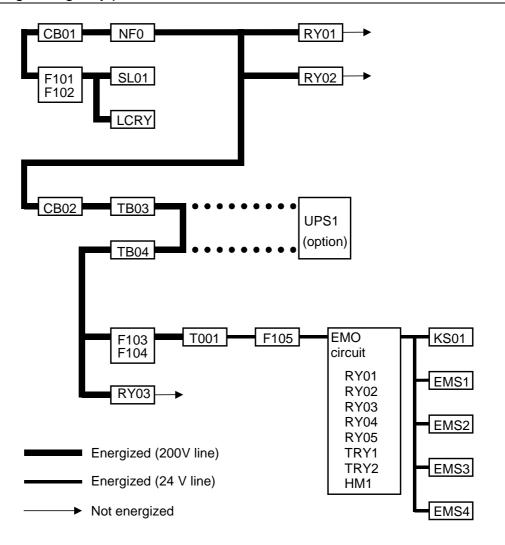


To activate EMO switch	Press the EMO switch button.
To reset EMO switch	Rotate the EMO switch button clockwise (in the direction of the arrows). The switch then pops up to clear the emergency OFF condition.
What will happen after EMO switch is pressed	The following process follows EMO switch activation. It takes about 15 seconds for a rotating spindle to come to a complete stop. EMO switch is pressed. Spindle stop action Wheel coolant OFF 2 sec. Spindles stop rotating. Machine power OFF

EMO switch locations

The locations of the EMO switches are indicated here.





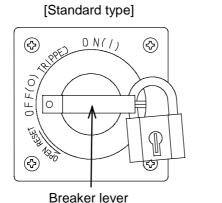
5. Power Circuit Breaker

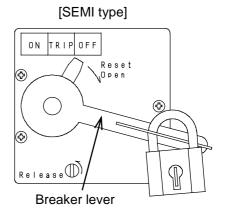
About power circuit breaker

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.





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.

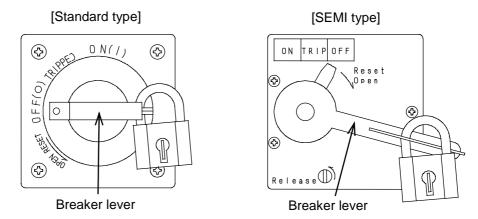
OPEN/RESET

To open the breaker box, move the lever to this position and then pull it toward you.

[Electrical ratings of the breaker]

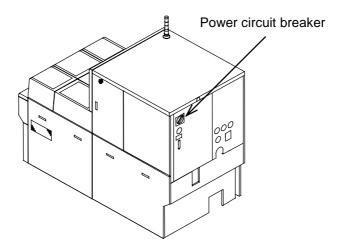
	Standard type	SEMI type
AC supply system	3-phase, 3-wire	3-phase, 3-wire
Number of poles	3	3
Rated current	60 A	60 A
Interrupting capacity	10 kA (at 230 VAC)	22 kA (at 240 VAC)
	(IEC947-2)	(UL489)

Before you perform a maintenance work with the machine power turned OFF, lock out the power circuit breaker lever with a padlock or the like to prevent the machine from being inadvertently activated by other persons.



Power circuit breaker location

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

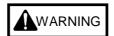


6. Interlock Mechanism

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.

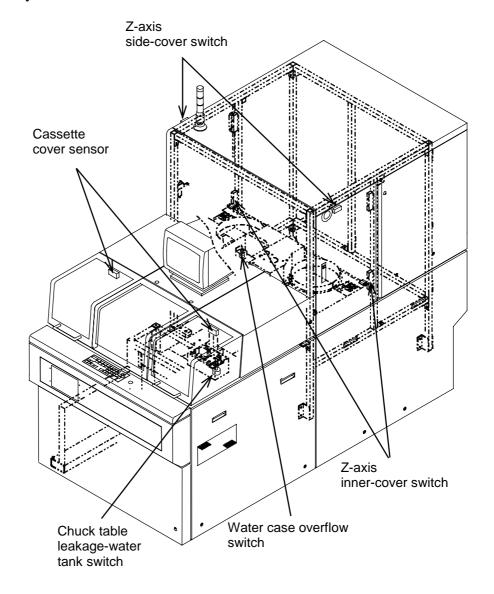


- It takes up to 15 seconds for a rotating spindle to come to a standstill. Never position your hands or fingers near its rotary section while the spindle is still rotating. Before performing a maintenance or inspection work, make sure that spindle rotation is completely stopped.
- If any water leak 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.

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



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).

								(Opera	ation	perfo	rmed	upon :	abno	rmali	ty det	ectio	n			(Categ	ory	İ
					1	2	3 4	1 5	6	7 8	9 1	0 11	12 13	14 1	5 16	17 1	8 19	20 2	21 22	23	24			i
		*1: Varies with the user parameter setup. *2: Affects lines other than the power supply control console power supply, and Z-axis servo driver power supply.				_	Power supply control circuit power supply		Main power supply line shutoff	Optional external unit power supply shutoff Vacuum/coolant power supply shutoff		Z-axis stop after retrea	Chuck table rotation Z-axis operation cyu	Chuck table rotation cycle stop			Position table operation cycle stop	T-arm operation cycle stop	Spinner table rotation cycle stop Spinner table rotation immediate stop		Wheel coolant supply st	Equipment safety II		
	Code	Detected abnormality	Detector code	Detection device	*1	*1			*2															Remarks
_	A0001	Z1 side cover open	LS205	Door switch												\vdash				Н	-	1		Kemarks
	A0001	Z2 side cover open	LS213	Door switch	•										_	+				Н	ŀ			
8	C0854	Z1 inner cover open	MS206	Proximity switch	•		-	+				-	٠.	Н.			٠.			Н	•		_	
Iĕ	C0904	Z2 inner cover open	MS214	Proximity switch	•						•	•	·	Η.		•	•		•		• H			
ä	B0402	Cassette A cover open	MS220	Proximity switch	•						-	Ť		1	•	1	Ť		-	т		i		
	B0403	Cassette B cover open	MS228	Proximity switch	•						H				•	H				Н		i		
	C0803	Main air (secondary side) pressure drop	PS105	Pressure switch	•						•	•	•		•	•	•	П	•	П	•		Р	Actuates when the pressure is not higher than 0.4 MPa.
AIR	C0803	Main air primary side pressure drop (option)	DT325	Pressure sensor	•	٠					•	•	•		•	•	•		•		•		Р	Actuates when the pressure is not higher than 0.4 MPa.
	A0019	Auxiliary air primary side pressure drop (option)	DT125	Pressure sensor	•	•																	Р	Actuates when the pressure is not higher than 0.4 MPa.
	D0989	Vacuum pump water supply flow rate abnormality	DVC010(FLS1)	Unit internal flow switch	*	*	,	* *	*	* *	•	•	•		•	•	•		•	•	•	Е		Actuates when the flow rate is not higher than 3 L/min. *Shut off after retreat operation.
	A0033	Spindle coolant level drop 1 (option)	DVC010C	Unit internal float switch	•						Ш									\Box			Р	·
	C0827	Spindle coolant level drop 2 (option)	DVC010C	Unit internal float switch	•	•					•	•	•		•	•	•		•		•		Р	
Z	C0852	Z1 wheel coolant flow rate decrease	FLS107,FLS107A	Flow switch	•	•					$ \cdot $	•	•		•	Ŀ	•		•	Ц	•		Р	The lower- and upper-limits are 1.5 and 3 L/min, respectively.
ОТОК	C0902	Z2 wheel coolant flow rate decrease	FLS115,FLS115A	Flow switch	•	•					•	•	•		•	•	•		•		•		Р	The lower- and upper-limits are 1.5 and 3 L/min, respectively.
٥	C0851	Z1 spindle coolant flow rate decrease	FLS108	Flow switch	•	•					$ \cdot $		·		•	ŀ	•		•	Ц	•		Р	Actuates when the flow rate is not higher than 1 L/min.
	C0901	Z2 spindle coolant flow rate decrease	FLS116	Flow switch	•	•					•	•	•		•	•	•		•		•		Р	Actuates when the flow rate is not higher than 1 L/min.
	C0805	Water case internal water level abnormality	FLTS113	Float switch	•	•	_				•	•	•	_	•	•	•	_	•		•		Р	
	D0962	Chuck table water leakage	FLTS312	Float switch	*	*	,	*	*	* *	•	•	•		•	•	•		•		• -			
	D0963	Water leakage (option)	DT119	Water leakage detector	•	•	,	*	*	* *	•	•	•		•	•	•		•	•	• H	l E	Р	*Shut off after retreat operation.

								Ope	eratio	on pe	rform	ned u	oon a	abnor	mali	ty dete	ction				Ca	ategor	ry	
					1 2	3	4 5									17 1		20 2	1 22	23 2	4	Ť		
		*1: Varies with the user parameter setup. *2: Affects lines other than the power supply control circonsole power supply, and Z-axis servo driver power.			1 Indication (Pilot lamp)		Console power supply shutoff				2 Z-axis operation immedi		2 13	4 Chuck table rotation cycle s		17 1	9 T-arm operation	T-arm operation cycle	Spinner table rotation cycle stop	Spindle coola	Human safety		Process safety P	
									Ш				П											
	Code	Detected abnormality	Detector code	Detection device	*1 *1	1		*2					l i											Remarks
	C0807	Vacuum pump pressure drop	UNT1(VS1)	Unit internal pressure sensor	• •					•		•	•	•	•	•	•	•	•	•	,			Actuates when the pressure is not higher than 65 kPa.
	B0454	Robot vacuum abnormality	DT602	Vacuum sensor	• •				П			•		•	•			•	•					Actuates when the pressure is not higher than 53 kPa.
<	B0455	Robot vacuum abnormality	DT602	Vacuum sensor	• •							•		•	•			•	•					Actuates when the pressure is not higher than 53 kPa.
ACUUN	B0658	T-arm R-pad vacuum abnormality	DT607	Vacuum sensor	• •				П			•		•	•		•		•					Actuates when the pressure is not higher than 53 kPa.
Ž	B0660	T-arm M-pad vacuum abnormality	DT547	Vacuum sensor	•							•		•	•		•		•					Actuates when the pressure is not higher than 53 kPa.
	B0662	T-arm L-pad vacuum abnormality	DT567	Vacuum sensor	• •				П			•		•	•		•		•					Actuates when the pressure is not higher than 53 kPa.
	B0704	Spinner table vacuum abnormality	DT627	Vacuum sensor	• •							•		•	•	•	•	•	•					Actuates when the pressure is not higher than 53 kPa.
	D0960	Z1 spindle inverter abnormality	ACMD1	Inverter internal circuit	* *		* 1	* *	*	*		•	•	·	•	•	•		•	•	,			Shut off after retreat operation.
	D0961	Z2 spindle inverter abnormality	ACMD2	Inverter internal circuit	* *		* 1	* *	*	*		•	•	·	•	•	•		•	•	•	E	P	Shut off after retreat operation.
	A0005	Z1 spindle motor overcurrent	ANLG1	Software	• •	_			Ш														Р	
	A0006	Z2 spindle motor overcurrent	ANLG1	Software	• •	_			Ш													ΕI		
	C0855	Z1-axis servo driver abnormality	ACSMD1	Servo driver internal circuit	• •	_			Ш	•	_		•			•	•	•		•	_		P	
	C0905	Z2-axis servo driver abnormality	ACSMD2	Servo driver internal circuit	• •	_			П	•			•		•	•	•	•	_	•		E		
	C0856	Z1 chuck table servo driver abnormality	ACSMD3	Servo driver internal circuit	• •	_			Н	•		٠	•		_	•	•	•	1	•			Р	
_	C0906	Z2 chuck table servo driver abnormality	ACSMD4	Servo driver internal circuit	• •	4				•		•	•	•		•	•	•	,	•	<u> </u>		Р	Object off of the author of the author
No.	D0964	Spinner inverter abnormality	ACMD3	Inverter internal circuit		_				* •	\blacksquare	•	٠	_ '	•	•	•	_	+	• •	_			Shut off after retreat operation.
0	B0460	Robot X-axis rotation abnormality	DT612	Photointerrupter	• •	_	++					-	+			\vdash	+				+		_	In the initialization process only.
R	B0461	Robot □-axis rotation abnormality	DT632	Photointerrupter	• •	_	+						\blacksquare			\vdash	-			_	_		<u>. </u>	In the initialization process only.
	B0462 B0656	Robot Z-axis rotation abnormality T-arm CW rotation abnormality	DT652 DT330	Photointerrupter Photointerrupter			++		H		+		+	•	•	Н.	•		•				P P	In the initialization process only.
	B0672	T-arm CW rotation abnormality	DT330	Photointerrupter	•	_					\blacksquare	-	_	•	•		•		•		+		P	
	B0657	T-arm CCW rotation abnormality	DT330	Photointerrupter		_			H			-		•	•				•		-		P	
	B0673	T-arm CCW rotation abnormality	DT330	Photointerrupter	• •	_			H					•	•		•		•				P	
	B0668	T-arm neutral rotation abnormality	DT542	Photointerrupter		_			П			-		•	·		•		•		_		P	
	B0652	T-arm UP rotation abnormality	DT701	Photointerrupter		_			Ħ					•	•		•		•				P	
	B0674	T-arm UP rotation abnormality	DT701	Photointerrupter					П					•	•	1			•		Т		P	
		1	-			_	_	_	_		_	_	_		_									

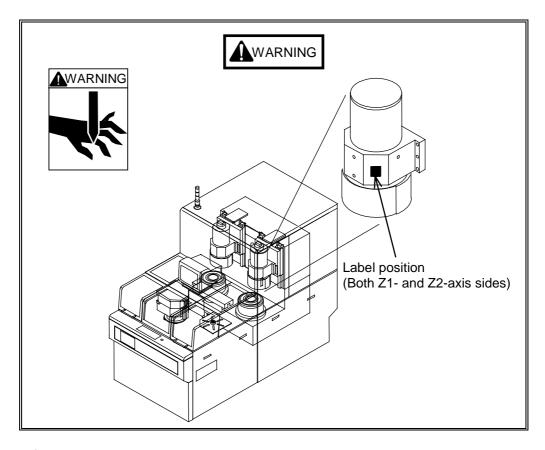
Calegory	
Equipment safety Human safety T Wheel coolant supply shutoff Spinner table rotation cycle stop Spinner table rotation immediate stop Position table operation immediate stop Position table operation immediate stop Position table operation immediate stop Chuck table rotation cycle stop Chuck table rotation immediate stop Caxis operation immediate stop Z-axis operation immediate stop Vacuum/coolant power supply shutoff Z-axis drive section power supply shutoff Power supply control circuit power: Alarm (buzzer) Indication (Pilot lamp) p. *1: Variant of the power supply shutoff power supply shutoff Power supply control circuit power: *1: Variant of the power supply shutoff power supply shutoff Power supply shutoff Power supply control circuit power: *1: Variant of the power supply shutoff Power s	Process safety •
*1: Varies with the user parameter setup.	Process safety P
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	ı
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console nower supply, and 7-axis servic driver nower supply lines	ı
Consolic power suppry, and Z-axis servo unver power suppry intes.	ı
	ı
	ı
Code Detected abnormality Detector code Detection device *1 *1 *2	Remarks
	P
	P
	P In the initialization process only.
	Р
	P
	P
	P Shut off after retreat operation.
1111-1 11111-11111 11111-1111 1111-1111 1111-1111-1111 1111-1111-1111 1111-1111-1111-1111-1111-1111-1111-111-111-111-111-111-111-111-111-111-111-111-111-11-111-111-11	P
A0031 Fan motor abnormality (in control box) FN1,2,3,6,7 Internal circuit	
D0980 Circuit breaker box internal temperature abnormality THS103 Temperature switch * * * * * * * • • • • • • • • • • • •	Shut off after retreat operation.
D0983 T1 transformer temperature abnormality THS110A Temperature switch * * * * * * * • • • • • • • • • E	Shut off after retreat operation.
D0983 T2 transformer temperature abnormality THS110B Temperature switch * * * * * * * • • • • • • • • E	Shut off after retreat operation.
D0960 Z1 spindle motor temperature abnormality THS003 Temperature switch * * * * * * * * • • • • • • E	Shut off after retreat operation.
D0961 Z2 spindle motor temperature abnormality THS004 Temperature switch * * * * * * * * * * * * * * * * * * *	Shut off after retreat operation.
D0984 AC power supply fuse blowout F101-F111 Fuse alarm contact * * * * * * * • • • • • • • • • E	Shut off after retreat operation.
D0987 DC power supply fuse blowout F001-F005 Fuse alarm contact * * * * * * * • • • • • • • • • • • •	
	P Shut off 10 seconds later.
7 Ground fault ELB1 Ground-fault circuit interrupter • • • • • • • • • • • • • • • • • • •	
D0986 EMO switch ON RY07 Relay contact * * * * * * • • • • • • • • • • • • •	P Shut off 2 seconds later.
	Shat on 2 seconds later.
C0827 Refrigerator abnormality (option) DVC010C Unit internal circuit • • • • • • • • • • • • • • • • • • •	P
	P
	P In the full-auto mode only.
C C0821 Inner circular area height gauge amplifier abnormality DT010 Amplifier internal circuit • •	P In the full-auto mode only.
7 Outer circular area height gauge amplifier abnormality	
A0023 Option Option Amplifier internal circuit • •	P In the full-auto mode only.
Outer circular area height gauge amplifier abnormality	P. In the full-auto mode only
	P In the full-auto mode only.
C0822 Cottor circuit gauge ampliner abriofinally DT020 Amplifier internal circuit	

7. Safety Labels

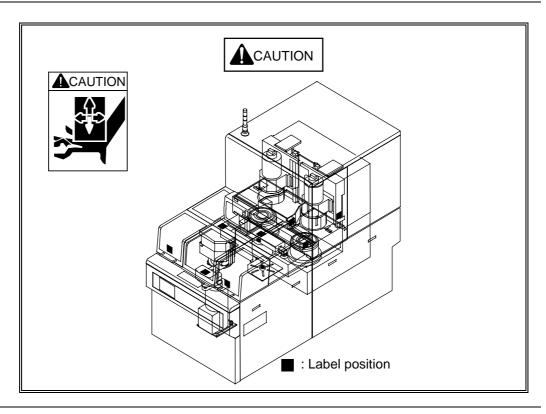
About safety labels

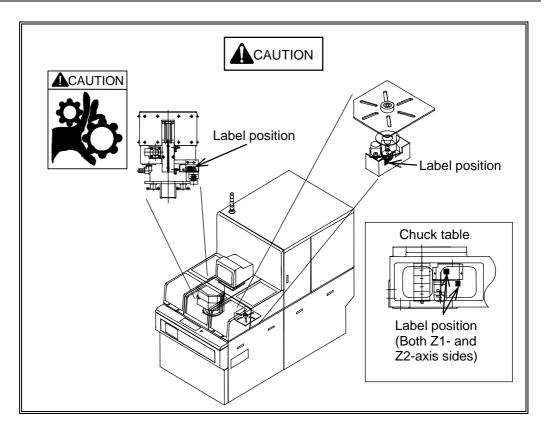
The safety labels carrying hazard descriptions are attached to the locations in the machine where potential hazards exist and they are defined as follows.

Label	Hazard Level	Meaning of Label
Rotary Blade Label	A WARNING	There is a danger that 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. - Do not position your hands or fingers near the wheel. - Keep the safety cover closed.
Capture Label	A 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 ACAUTION	A 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	A WARNING	A risk of receiving an electric shock exists. Be alerted.
General Label	A WARNING	Warnings (including danger/caution) in general

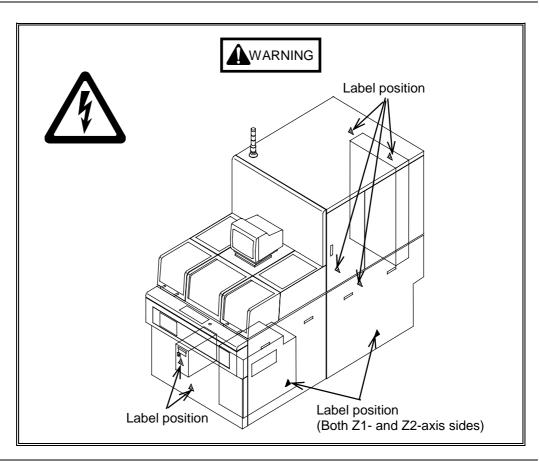


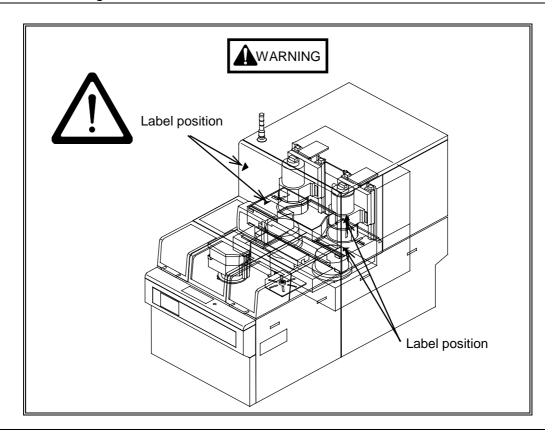
Locations of labels for cautioning against drive section





Locations of labels for warning against electric shock





8. Critical Component List

Summary of this section

The critical component list provides the pieces of information indicated in the table below for each of the critical parts employed in the machine.

Information included in critical component list
Parts ID
Description
Maker
Type No.
DISCO part No.

About replacement of critical parts

Critical parts should in no case be replaced without prior consent of DISCO. DISCO shall assume no responsibility for the consequences of any unauthorized replacement of the critical parts.

Critical component list (1/3)

Parts ID Description		Maker	Type No.	DISCO Part No.
Breaker box	·		•	
CB01	Circuit breaker	Mitsubishi Electric Corp.	NF60SP3P60AST200VAXF5SPTCL 5SP3	AGCB060A-345
CB02,CB03	Circuit breaker	Matsushita Electric Works,Ltd.	BBC210N·TUV	AGCB010A-310
CB04,CB05,CB06	Circuit breaker	Matsushita Electric Works,Ltd.	BBC315N•TUV	AGCB015A-309
F101,F102	Fuse (alarm)	Daito Communication Apparatus Co.,Ltd.	P405H 0.5A DAITO	APP405H-0.5A
F103,F104,F116,F120	Fuse (alarm)	Daito Communication Apparatus Co.,Ltd.	P413H 1.3A DAITO	APP413H-1.3A
F105,F117,F118	Fuse (alarm)	Daito Communication Apparatus Co.,Ltd.	P430H 3.0A DAITO	APP430H-3.0A
F106,F107	Fuse (glass)	Littelfuse Inc	218008	AP218008
F108,F109	Fuse (alarm)	Daito Communication Apparatus Co.,Ltd.	P450H 5.0A	APP450H-5.0A
F110,F111,F112	Fuse (glass)	Littelfuse Inc	218005	AP218005
F113,F114,F115	Fuse (glass)	Littelfuse Inc	21806.3	APG006.3AIEC
F119	Fuse (alarm)	Daito Communication Apparatus Co.,Ltd.	P475H 7.5A DAITO	APP475H-7.5A
F121	Fuse (alarm)	Daito Communication Apparatus Co.,Ltd.	P420H 2.0A DAITO	APP420H-2.0A
HM01	Hour meter	Matsushita Electric Industrial Co.,Ltd.	TH634	ARTH634-A4
LCRY	Leak current sensor	Matsushita Electric Works,Ltd.	BAV828-1032-98	BA828103298
NF00	Noise filter	Okaya Electric Industries CO.,Ltd.	3SUP-H75H-ER-4	BN3SUPH75HER
NF04,NF05	Noise filter	Okaya Electric Industries CO.,Ltd.	3SUP-H20H-ER-4	BN3SUPH20HER
NF06	Noise filter	Okaya Electric Industries CO.,Ltd.	3SUP-H10H-ER-4	BN3SUPH10HER
RY01,RY02	Magnetic contactor	Matsushita Electric Works,Ltd.	BMR6650N• TUV/UL	AAMATA3D-006
RY03	Magnetic contactor	Matsushita Electric Works,Ltd.	BMR61030N• TUV/UL	AAMATA3R-020
RY04	Safety relay unit	Omron Corporation	G9D-301	BAG9D-301
RY05	Relay (control)	Omron Corporation	G2R-2-SND-TU DC24V	ABG2R2SNDTD3
SL01	LED (AC adapter)	Idec Izumi Coporation	APW226DW(HW-VL3)	SDAPW226DW
T001	Transformer	Sanyu Electric. Co.,Ltd.	ENH0542	ATDOXENH0542
THS104	Thermostat (bimetal)	Matsuo Electric. Co.,Ltd.	MQT8S 45°C 1A X W.R	RGMQT8S45BWR
TRY1,TRY2	Timer relay	Omron Corporation	H3DE-H AC/DC24V S-SERIES	ACH3DEHS-C3

Critical component list (2/3)

Parts ID	Description	Maker	Type No.	DISCO Part No.
Control unit				
ACSMD1,ACSMD2	AC servo motor driver	Matsushita Electric Industrial Co.,Ltd.	DV85040LDMB	BA85040LDMB
ACSMD3,ACSMD4	AC servo motor driver	Matsushita Electric Industrial Co.,Ltd.	MSD023A1XX	BAMSD023A1XX
DPS1	Switching power supply	Densei-Lambda K.K.	RWS100A-5/A	BDRWS100A5A
DPS2	Switching power supply	Densei-Lambda K.K.	LWD30-1212	BDLWD30-1212
DPS3	Switching power supply	Densei-Lambda K.K.	RWS50A-12/A	BDRWS50A12A
DPS4	Switching power supply	Densei-Lambda K.K.	EWS300-24	BDEWS300-24
DPS5	Linear power supply	Densei-Lambda K.K.	NND15-1515	BDNND15-1515
F001,F002,F005	Fuse (alarm)	Daito Communication Apparatus Co.,Ltd.	SP435L	APSP435L3.5A
F003	Fuse (alarm)	Daito Communication Apparatus Co.,Ltd.	SP410L-1.0A	APSP410L-1A
F004	Fuse (alarm)	Daito Communication Apparatus Co.,Ltd.	SP415L 1.5A TIME-LAG	APSP415L1.5A
NF1,NF2	Noise filter	TDK Corporation	ZAC2210-11 250V 10A TDK	BNZAC2210-11
NF3	Noise filter	Okaya Electric Industries CO.,Ltd.	3SUP-H20H-ER-4	BN3SUPH20HER
RACK	Rack (98 bus/16 slots)	Ebrains,Inc.	750-PCR16C2	GCEBR-0029
STMD1,STMD2,STMD4 ,STMD5,STMD6, STMD7	Stepping motor driver	Asahi Engineering Co.,Ltd.	AK-BX511-DIT5	BAKBX511DIT5
基板				
ANLG1,ANLG2	Analog circuit board (A/D-D/A)	Interface Corporation	SPE-0329	FBPCB-0282
CPU1	CPU circuit board	Wacom Engineering Co.,Ltd.	BPN-4D8-166	FBPCB-0233
CUTR	4-channel counter circuit board	Interface Corporation	AZI-6202	FBPCB-0044
DIO1-3	Parallel I/O circuit board	Interface Corporation	SPE-0087	FBPCB-0082
GRP1	Text graphic circuit board	Wacom Engineering Co.,Ltd.	BPN-MTG-002	FBPCB-0182
SDFC1	Hard disk unit	Wacom Engineering Co.,Ltd.	BPN-SBF-320	FBPCB-0295
MCON1-3	4-axis motor control circuit board	Cosmo Techs Co.,Ltd.	QPG-45	FBPCB-0043

Critical component list (3/3)

Parts ID	Description	Maker	Type No.	DISCO Part No.
Interlock				
EMS1-4	Push button switch	Idec Izumi Coporation	HW1B-V413R	AHHW1B-V413R
FLTS113,FLTS312	Float switch	Nippon Automation Co.,Ltd.	FSA-0601-BS1	MODLHE18
LS205,LS213	Door interlock switch	Hirose Cherry Precision Co.,Ltd.	F87B-B12L	AFF87B-B12L
MS220,MS228	Proximity switch	Nippon Automation Co.,Ltd.	RS-803 NO	AJRS-803NO
MS206,MS214	Magnet switch	Nippon Automation Co.,Ltd.	RS-1 NO	AJRS-1NO
機能部品			•	·
CRT1	Color monitor	Totoku Electric Co.,Ltd.	CDT1571A	BBCDT1571A91
FDD	3.5 inch floppy disk driver	Wacom Engineering Co.,Ltd.	FD-235HG-A497	BA235HG-A497
IONZ	Ionizer	Simco Japan,Inc.	C-30D50P	BAC-30D50P
IONZ	Ionizer	Simco Japan,Inc.	C-30D60P	BAC-30D60P
KS01	Selector switch	Idec Izumi Coporation	HW1K-31B22N2	AHHW1K31B22N
M-KEY	Manual key board unit	Elcom Co.,Ltd.	045CLM-M-B24	BA045CLMMB24
OP1	Operation panel unit	Elcom Co.,Ltd.	049CLR-N-B13	BA049CLRNB13
SL02	Lamp (LED)	Omron Corporation	M16-TG-24D	AQM16-TG24D
付属品			•	·
UNT1	Vacuum/coolant unit	Kashiyama Industry Co.,Ltd.	DVC010	MOWFH001C
Option				•
UNT1A	Vacuum/coolant unit	Kashiyama Industry Co.,Ltd.	DVC010C	MOWFH002C
UNT2	Duct unit	Akamatsu Elsctric Mfg.Co.,Ltd.	HVS-40D	MOWLH005
UNT3	Water temperature control unit	Kanto Seiki Co.,Ltd.	DTU151	MOWJH001B
UPS1	Uninterruptible power system	Daito Powertoron,Ltd	BA12558S24CA	BA8412558S24CA

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

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

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

Central Regional Sales & Service Office 4392 Sunbelt Drive Addison, TX 75001

U. S. A.

Phone 1-972-267-9500 FAX 1-972-267-5612

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

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

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)

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)

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

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C . MACHINE COVERS

This chapter describes about the locations and functions of the covers of the machine.

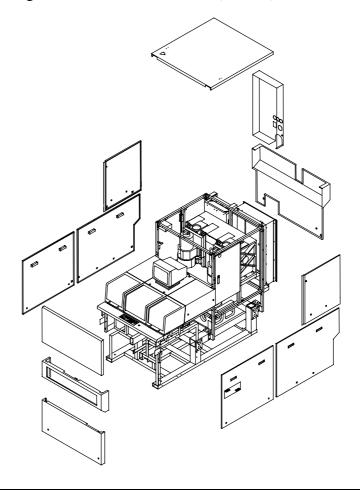
Section No.	Title	Contents
1	Machine Outer Covers	- Layout of the machine outer
		covers
2	Side Covers	- Descriptions on the side covers
3	Machine Inner Covers	- Descriptions on the water case
		covers
		- Descriptions on the wheel covers
4	Cassette Covers	- Descriptions on the cassette
		cover
5	Breaker Box Cover	- Descriptions on the breaker box
		cover

1. Machine Outer Covers

Layout of machine outer covers

The figure below shows the layout of the machine outer covers.

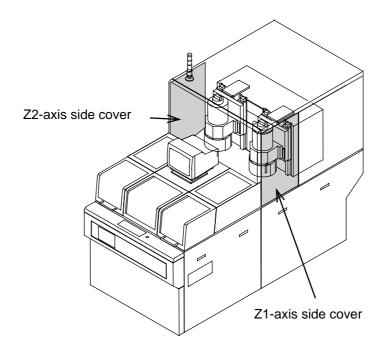
To remove the machine outer covers, it is necessary to remove the retaining screws fastening them with an Allen wrench (2.5 mm).



2. Side Covers

Locations of the side covers

The machine has the side cover at each side of the machine.



Name	Function
Z1-axis/Z2-axis	Cover installed at each side of the machine covering
side cover	the grinding section (spindle section). It functions as
	a safety guard.
	If this cover opens during spindle rotation or
	machine initialization, the machine makes an
	emergency stop.

The procedures to open/close the Z-axis side cover are described here.

Step No.	Do This
1	Insert the maintenance key into the keyhole located on the cover handle.
2	Turn the key clockwise and then pull it out. Maintenance key
3	Press the button above the cover handle. - The handle then pops up toward you. Button Handle
4	Hold the handle and pull it toward you to open the cover (the Z1-side door opens to the left and the Z2-side door opens to the right).
5	To close the cover, follow the above steps in reverse order.

3. Machine Inner Covers

Locations of the machine inner covers

Installed at the grinding section inside the side cover are the water-case cover and wheel cover (for both Z1-axis and Z2-axis sides).

NOTICE

If the water case cover or wheel cover is broken, contaminants may enter the grinding chamber and adhere to the machine inner parts. Visually check to make sure that these covers are not broken before starting machine operation.



Z1 water case cover



Z1 wheel cover

Name	Function
Z1/Z2 wheel cover	Wheel section cover to prevent contaminants from scattering around
	This cover needs to be opened during wheel replacement.
Z1/Z2 water case cover	Water case section cover to function as a safety guard
	If this cover opens while the spindle is rotating, the machine makes an emergency stop.
	It also prevents contaminants from scattering around.

The procedures to open/close the water case cover are described here. (The procedures described here open/close the Z2 water case cover by way of example.)

NOTICE

Move the Z-axis to its upper end position before you open the water case cover. The water case cover cannot be opened unless the Z-axis is in its upper end position.

Step No.	Do This
1	Open the Z-axis side cover.
2	Move the Z-axis to its upper end position in unit operation.
3	Turn the handle of the water case cover toward the machine front side direction by 90 degrees.
	Handle
	Turn the handle so that its end points toward the machine front side. Water case over
4	Hold the handle and pull it up to open the cover.
5	
ິວ	To close the cover, follow the above steps in reverse order.

Procedures to open/close the wheel cover

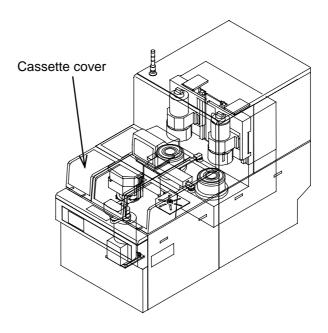
The procedures to open/close the wheel cover are described here. (The procedures described here open/close the Z2 wheel cover by way of example.)

Step No.	Do This
1	Open the Z-axis side cover
2	Open the water case cover.
3	Hold the knob of the wheel cover and move it along the cover in the direction of the machine front side. The cover slides to open. Spindle Knob Slide the cover toward the machine front side.
4	To close the cover, follow the above steps in reverse order.

4. Cassette Covers

Locations of the cassette covers.

The cassette covers locate at the front side of the machine.

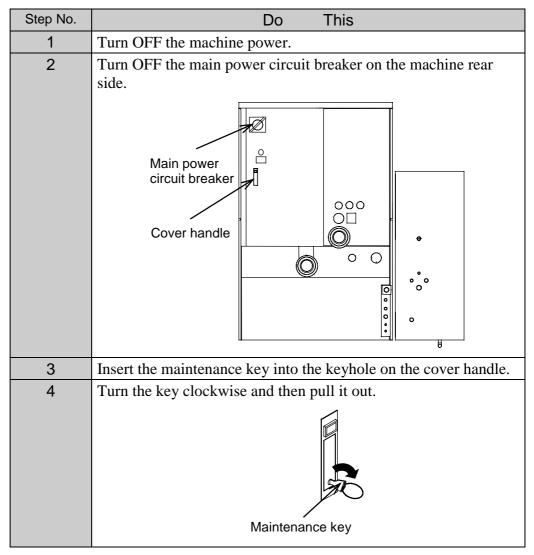


Name	Function
, ,	Cassette section cover to function as a safety guard If this cover opens while the robot is in action, the robot stops moving.

5. Breaker Box Cover

Procedures to open/close the breaker box cover

The procedures to open/close the breaker box cover are described here.



Procedures to open/close the breaker box cover (Continued)

Step No.	Do This
5	Press the button above the handle. - The handle then pops up toward you. Button Handle
6	Hold the handle and pull it toward you to open the cover.
7	To close the cover, follow the above steps in reverse order.

D. GRINDING RELATED MAINTENANCE WORKS

Contents of this chapter

This chapter describes about the procedures to perform the following grinding-related maintenance works.

Section No.	Title	Contents
1	Wheel Position Setup	- Procedures to perform wheel position setup
2	Dressing	- Procedures to perform dressing
3	Wheel Replacement	- Procedures to replace the wheel
4	Self-grinding	- Procedures to perform self- grinding
5	Finished Wafer Thickness and TTV Correction	- Procedures to check and correct finished wafer thickness variation
		- Procedures to check and correct TTV
6	Height Gauge Check/Adjustment	- Procedures to adjust the height gauge
7	Chuck Table Maintenance	- Construction of the chuck axis inclination adjustment mechanisms
		- Procedures to replace the chuck table
		Procedures to check the inclination of the chuck tableProcedure to adjust the
		inclination of the chuck table.
8	Wafer Recovery	- Descriptions on the wafer recovery function
9	Wafer Size Change	- Procedures to change the grinding wafer size

1. Wheel Position Setup

Summary of this section

This section describes about the procedures to perform wheel position setup.

Section No.	Title	Contents
1-1	Manual Setup Sequence	- Procedures to manually perform wheel position setup
1-2	Auto Setup Sequence	- Procedures to automatically perform wheel position setup (The machine needs to be equipped with the auto setup unit [optional accessory].)

About wheel position setup

The wheel position setup process establishes the wheel tooth end position measured from the chuck table surface to save it as the Z-axis reference position for grinding (setup position) into the machine memory.

There are the following two methods to perform wheel position setup:

Setup method	Description
Manual setup	In this method, establishing of the Z-axis position and saving the established setup position into the machine memory are manually operated from the handy panel.
Auto setup	In this method, the defined setup position is automatically detected by the auto setup unit. It is essential that the machine is equipped with the auto setup unit [optional accessory] to perform auto setup.

1-1. Manual Setup Sequence

Summary of this section

This section describes about the procedures to perform manual wheel position setup following the manual setup sequence.

Operation flow

The manual setup sequence should proceed as describe below.

1-1-1	Starting Manual Setup Sequence
1-1-2	Performance of Manual Setup
1-1-3	Setup Position Check
1-1-4	Completing Setup Sequence

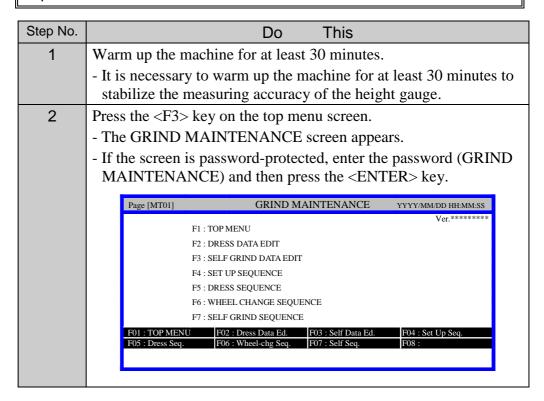
1-1-1. Starting Manual Setup Sequence

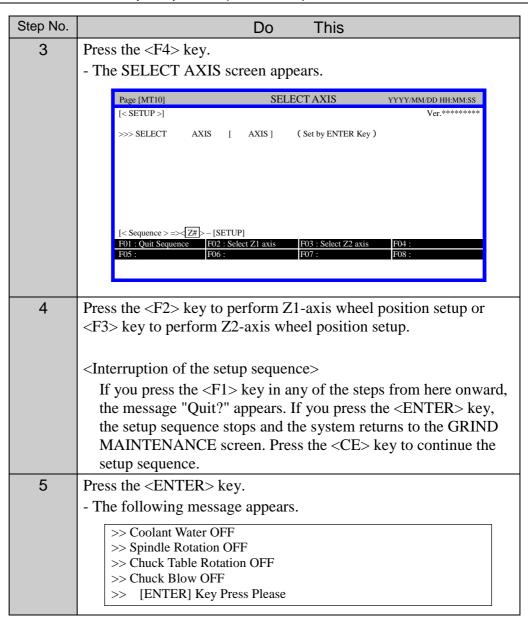
Procedures to start the manual setup sequence

This section describes about the procedures to start the manual wheel position setup sequence and select the axis for performing the setup.

NOTICE

The height gauge is used for measuring the chuck table. To stabilize the measuring accuracy of the height gauge, make sure to warm up the machine for at least 30 minutes. Unless the machine is sufficiently warmed up, accurate measurement results cannot be expected.





1-1-2. Performance of Manual Setup

Procedures to perform manual setup

The procedures to perform manual wheel position setup and program into the machine memory the established setup position are described here.

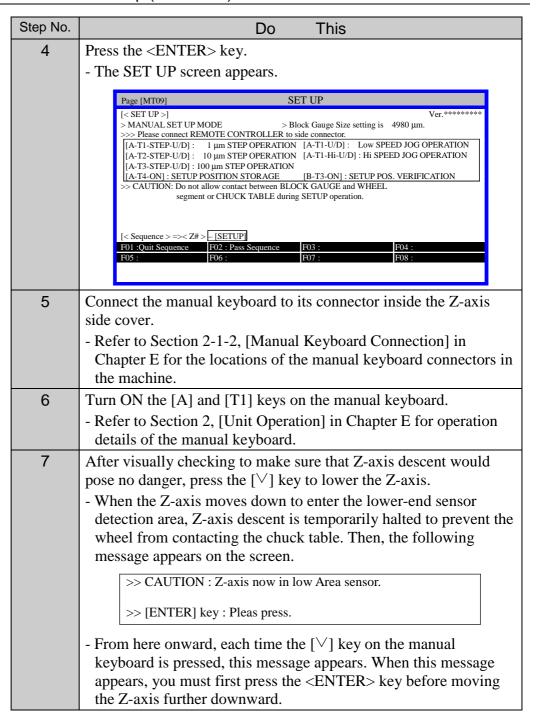


Never position your hand under the wheel when the Z-axis is moved up and down. Also, do not position your hand near the Z-axis and its operating space while the Z-axis is in action. Observe these precautions to prevent your hand and fingers from being caught or cut off.

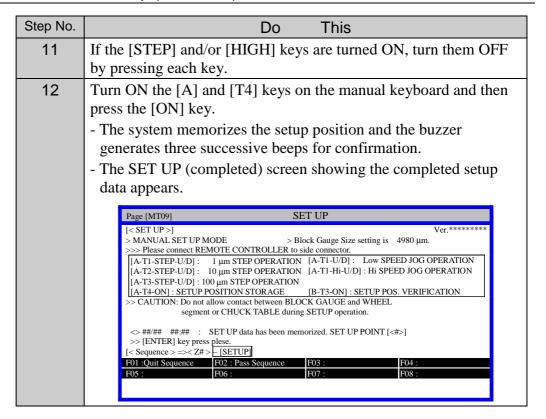
NOTICE

Never attempt to move the Z-axis while the block gauge is placed on the chuck table. Otherwise, the Z-axis may catch the block gauge, causing the machine or wheel to break.

Cton No	Do Thio
Step No.	Do This
	(Continued from the previous section)
1	Check to be sure that the following message is shown on the
	screen.
	>> Coolant Water OFF
	>> Spindle Rotation OFF
	>> Chuck Table Rotation OFF
	>> Chuck Blow OFF
	>> [ENTER] key : Please press.
2	Press the <enter> key.</enter>
	- The following message appears.
	>> Please open the side cover, and ready to SETUP.
	>> After ready to, [ENTER] key press please.
3	Open the side cover and water case cover at the Z-axis side where
	wheel position setup is going to be performed.



Step No.	Do This
8	 Insert the provided block gauge between the chuck table and the wheel tooth edge to determine the wheel setup position. Make sure that the Z-axis is stopped when you insert the block gauge. Insert the block gauge at a position (grinding point) where the distance between the chuck table surface and the wheel tooth is narrowest. Wheel setup position> The defined setup position is where the 5000 μm (5.00 mm) section of the block gauge can be smoothly inserted/removed but the 5020 μm (5.02 mm) section cannot be inserted (when the set up block gauge thickness is 4980 μm.)
	Wheel Block gauge Tooth 5000 μm 5020 μm 5040 μm Chuck table
	Z2-axis Spindle Grinding point Chuck table
9	 Move the Z-axis using the step feed function to fine-tune the setup position. - Make sure to take out the inserted block gauge before moving the Z-axis. - Using the step feed function, the Z-axis can be moved by the specified amount when the [△] or [∨] key is pressed. First, turn ON the [STEP] key and then press one of the following keys as needed to specify the moving amount. [T1] key: 1 μm [T2] key: 10 μm [T3] key: 100 μm
10	When the Z-axis is finally moved to the appropriate setup position, remove the block gauge.



1-1-3. Setup Position Check

Procedures to check the setup position

This section describes about the procedures to check if the established setup position is correct.

Step No.	Do This
	(Continued from the previous section)
1	Turn ON the [A] and [T1] keys on the manual keyboard.
2	Press the $[]$ key to move up the Z-axis by approximately 5 mm.
3	Turn ON the [B] and [T3] keys and then press the [ON] key.
	- The Z-axis automatically moves to the setup position.
4	Insert the block gauge into the gap between the chuck table and the wheel tooth edge to verify that the setup position is correct.
	- If the setup position is not correct, repeat the steps 8 and beyond in the previous section, [Performance of Manual Setup] to establish the correct setup position.
5	Remove the block gauge.

1-1-4. Completing Setup Sequence

Procedures to complete the setup sequence

Step No.	Do This
	(Continued from the previous section)
1	Press the <enter> key.</enter>
	- The Z-axis retreats to its upper end position.
	- The following message appears.
	>> Please Close inner cover and side cover.
	>> Please press [ENTER] key after closing side cover.
2	Disconnect the manual keyboard from its connector.
3	Close the water case cover and the Z-axis side cover.
4	Press the <enter> key.</enter>
	- The setup sequence completes and the GRIND MAINTENANCE
	screen appears.

1-2. Auto Setup Sequence (Optional Accessory)

Summary of this section

This section describes about the procedures to perform auto wheel position setup following the auto setup sequence.

Prior to starting the auto wheel position setup

To perform auto wheel position setup, it is essential that the machine is equipped with the auto setup unit (optional accessory).

It is also necessary that the "Z1 (Z2) Set Up Method" parameter in the EDIT PARAMETER (GRIND) screen is set to "Auto". Refer to Section E-3-1, [Parameters in EDIT PARAMETER (GRIND) Screen] in Data maintenance Manual for details of the parameter.

Operation flow

The auto setup sequence should proceed as describe below.

1-2-1 Starting Auto Setup Sequence



1-2-2 Performance of Auto Setup

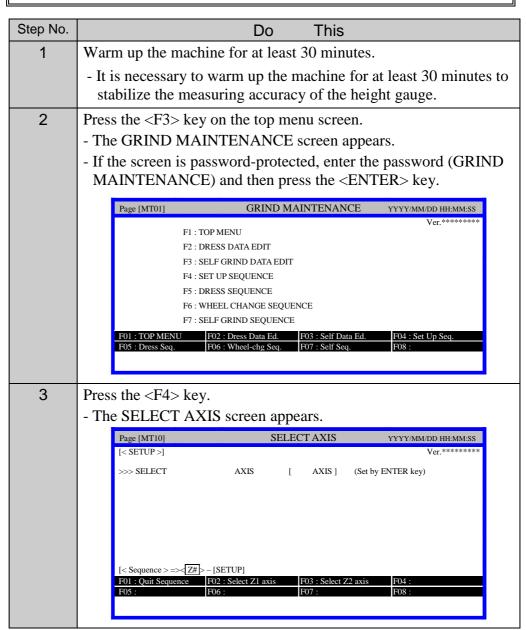
1-2-1. Starting Auto Setup Sequence

Procedures to start the auto setup sequence

This section describes about the procedures to start the auto setup sequence and select the axis for performing the setup.

NOTICE

The height gauges is used for measuring the chuck table. To stabilize the measuring accuracy of the height gauge, make sure to warm up the machine for at least 30 minutes. Unless the machine is sufficiently warmed up, accurate measurement results cannot be expected.



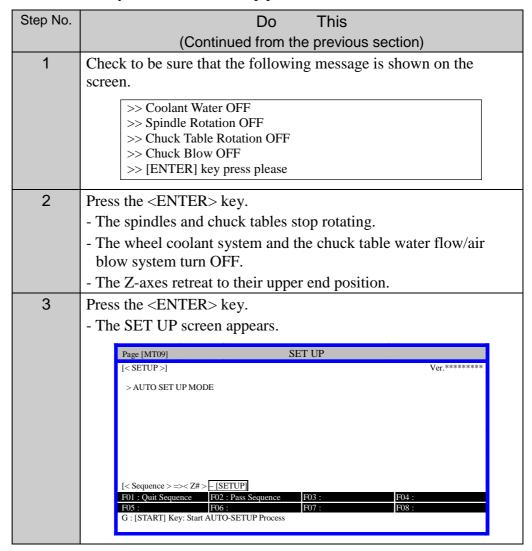
Procedures to start the auto setup sequence (Continued)

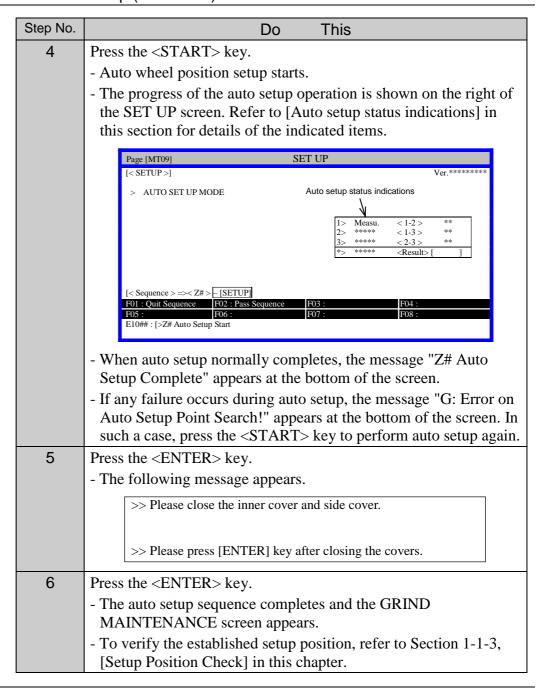
Step No.	Do This
4	Press the <f2> key to perform Z1-axis wheel position setup or <f3> key to perform Z2-axis wheel position setup.</f3></f2>
	<interruption of="" sequence="" setup="" the=""></interruption>
	If you press the <f1> key in any of the steps from here onward,</f1>
	the message "Quit?" appears. If you press the <enter> key, the</enter>
	setup sequence stops and the system returns to the GRIND
	MAINTENANCE screen. Press the <ce> key to continue the</ce>
	setup sequence.
5	Press the <enter> key.</enter>
	- The following message appears.
	>> Coolant Water OFF
	>> Spindle Rotation OFF
	>> Chuck Table Rotation OFF
	>> Chuck Blow OFF
	>> [ENTER] key press please

1-2-2. Performance of Auto Setup

Procedures to perform auto setup

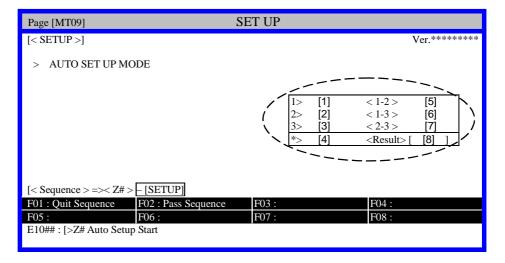
The procedures to perform auto wheel position setup and program into the machine memory the established setup position is described.





Auto setup status indication items on the SET UP screen are detailed here.

[Screen]



[Setting Item]

Item No.		Descriptions
[1] [2] [3]	In auto setup, setup position detection is performed 3 times. In a column, the detected setup position in each detecting action is shown. While auto setup position detection is being performed, "Measu." is displayed here.	
	1>	Detected setup position as a result of the first auto setup action
	2>	Detected setup position as a result of the second auto setup action
	3>	Detected setup position as a result of the third auto setup action
[4]	The show	average value of the detected auto setup positions ([1] - [3]) is wn.
[5]	μm	the difference between the setup position values [1] and [2] is 10 or less, [O] is shown. If the difference is larger than 10 μ m, [X] nown.
[6]	μm	the difference between the setup position values [1] and [3] is 10 or less, [O] is shown. If the difference is larger than 10 μ m, [X] nown.
[7]	μm	the difference between the setup position values [2] and [3] is 10 or less, [O] is shown. If the difference is larger than 10 μ m, [X] nown.
[8]	The	result of the performed setup operation is shown.
	OK	The auto setup process normally completed.
	NG	The auto setup process ended in failure. (Any of the above [5], [6], and [7] resulted in [X].)

2. Dressing

Summary of this section

This section describes about the procedures to perform dressing using the dressing sequence (sequence used for dressing purpose only).

About dressing

Dressing is a process to attain the appropriate blade condition of the wheel. In the dressing operation described here, the grinding wheel or self-grinding wheel grinds the dresser board.

Operation flow

Dressing operation using the dressing sequence should proceed as described below.

below.	
2-1	Starting Dressing Sequence
2-2	Wheel Position Setup (before Dressing)
2-3	Dresser Board Setting
2-4	Selection of Dressing Program
2-5	Performance of Dressing
2-6	Removal of Dresser Board
2-7	Wheel Position Setup (after Dressing)
2-8	Completing Dressing Sequence

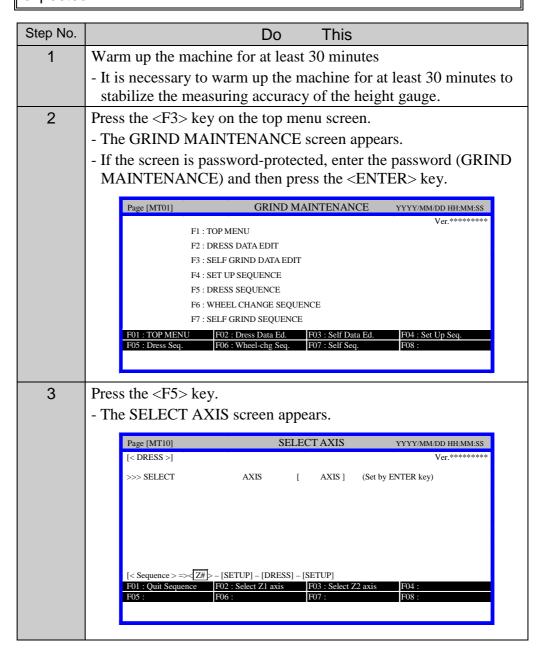
2-1. Starting Dressing Sequence

Procedures to start the dressing sequence

This section describes about the procedures to start up the dressing sequence and select the axis for performing dressing.

NOTICE

The height gauge is used for measuring the chuck table. To stabilize the measuring accuracy of the height gauge, make sure to warm up the machine for at least 30 minutes. Unless the machine is sufficiently warmed up, accurate measurement results cannot be expected.



Procedures to start the dressing sequence (Continued)

Step No.	Do This
4	Press the <f2> key to perform Z1-axis wheel dressing or <f3> key to perform Z2-axis wheel dressing.</f3></f2>
	<interruption dressing="" of="" sequence="" the=""></interruption>
	If you press the <f1> key in any of the steps from here onward, the message "Quit?" appears. If you press the <enter> key, the dressing sequence stops and the system returns to the GRIND MAINTENANCE screen. Press the <ce> key to continue the</ce></enter></f1>
	dressing sequence.
5	Press the <enter> key.</enter>
	- The following message appears.
	>> Coolant Water OFF >> Spindle Rotation OFF >> Chuck Table Rotation OFF >> Chuck Blow OFF >> [ENTER] key press please

2-2. Wheel Position Setup (before Dressing)

About wheel position setup

The wheel position setup process establishes and programs into the machine memory the wheel's reference position with respect to the chuck table. Refer to Section 1, [Wheel Position Setup] in this chapter for details.

Procedures to perform wheel position setup (before dressing)

Before starting dressing operation, wheel position setup for the selected Z-axis should be performed following the steps as described below.

Step No.	Do This
	(Continued from the previous section)
1	Perform wheel position setup referring to Section 1-1-2, [Performance of Manual Setup] in this chapter.
	- If the machine is equipped with the auto setup unit (optional accessory), perform wheel position set up referring to Section 1-2-2, [Performance of Auto Setup] in this chapter.
2	Verify that the established wheel setup position is correct referring to Section 1-1-3, [Setup Position Check] in this chapter.
	- Make sure to remove the inserted block gauge when you finish verifying the established wheel setup position.
3	When the wheel position check finishes, press the <enter> key. - The following message appears. >> Z-axis move to up-end >> [ENTER] key : Please press.</enter>

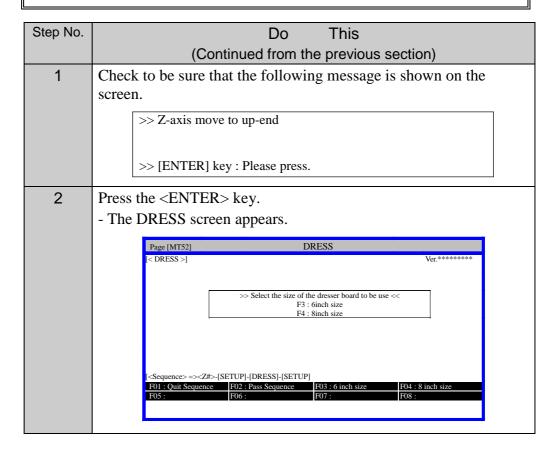
2-3. Dresser Board Setting

Procedures to set dresser board on chuck table

The procedures to set up a dresser board on the chuck table are described here.

NOTICE

- Using a faulty dresser board for dressing may cause damage to the wheel or the machine.
 - Check to be sure that the dresser board to be used has enough thickness and has no peels on its surface. Do not use dresser boards with faults.
- If you use a dresser board that is not suitable for the wheel to be dressed, the wheel may be damaged. Before you dress a wheel, check to make sure that the type of the employed dresser board is suitable for the wheel.



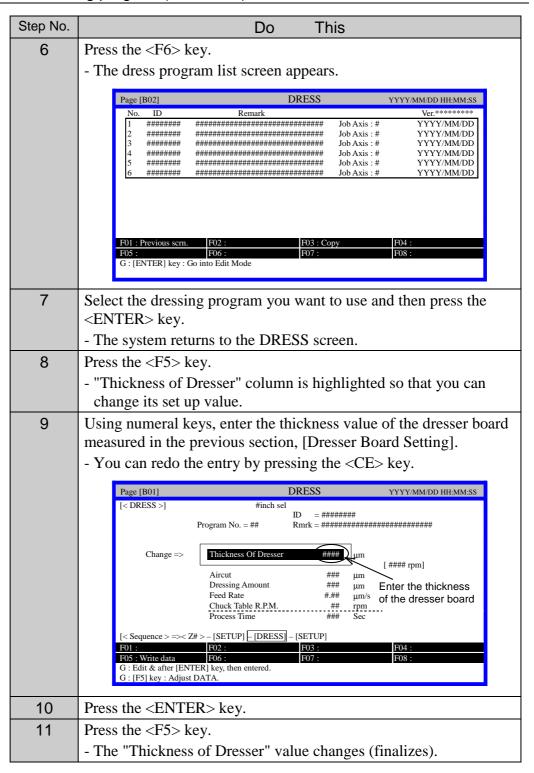
Step No.	Do This
3	Press the <f3> key to use the dresser board for 6" wafer wheels or the <f4> key to use the dresser board for 8" wafer wheels. - The Z-axis moves up to its upper end position. - The following message appears on the screen. >> Please put dresser board on the chuck table. >> Then set chuck vacuum ON (C-T1-ON Subkey Operation). >> The manual keyboard is active. >> Please press [ENTER] key.</f4></f3>
4	Measure the thickness of the dresser board to be used. - The thickness values of a dresser board greatly vary from one measuring point to another. The variations are particularly great when the dresser board is brand-new. Measure the board thickness at several points and enter the obtained maximum value.
5	Wipe the back surface of the dresser board with a lint-free cloth.Check to be sure that the dresser board is not peeled.If you put a line mark on the dresser board surface with a felt-tipped pen or the like, it is useful for assessing the dressing result later.
6	Mount the dresser board on the center of the chuck table.
7	Turn ON the [C] and [T1] keys on the manual keyboard and press the [ON] key. - The chuck table vacuum system turns ON to secure the dresser board.
8	Push the dresser board by hand to verify that it does not move. - If the dresser board moves or if it is secured off-center on the chuck table, remove the board from the chuck table by following the procedure described below and then repeat the steps 5 and beyond. - Procedure to remove the dresser board- 1) Press the [OFF] key on the manual keyboard.
	2) Turn ON the [C] and [T2] keys and then press the [ON] key. - The chuck table water flow/air blow system turns ON. 3) Remove the dresser board.

2-4. Selection of Dressing Program

Procedures to select dressing program

The procedures to select the dressing program used for dressing and register the dresser board thickness value to the selected program are described here.

Step No.	Do This
	(Continued from the previous section)
1	Press the <enter> key.</enter>
	- The following message appears.
	>> Please close the inner cover and side cover.
	>> Please press [ENTER] key after closing the covers.
2	Disconnect the manual keyboard from its connector.
3	Close the wheel cover, water case cover, and Z-axis side cover.
4	Press the <enter> key.</enter>
	- The following message appears.
	>> Coolant Water ON
	>> Spindle Rotation ON
	>> [ENTER] key press please
	>> [ENTER] key press preuse
5	Press the <enter> key.</enter>
	- The wheel coolant system turns ON.
	- The spindle starts rotating.
	- The DRESS screen appears.
	Page [B01] DRESS YYYY/MM/DD HH:MM:SS
	[< DRESS >] #inch sel ID = ########
	Program No. = ## Rmrk = ###################################
	Thickness Of Dresser #### μm
	Spindle R.P.M. #### rpm [#### rpm] Aircut ### µm Dressing Amount ### um
	Feed Rate #.## μm/s
	Chuck Table R.P.M. ## rpm Process Time ### Sec
	[< Sequence > =>< Z# > - [SETUP]
	FOI : Quit Sequence FO2 : Pass Sequence FO5 : BIOW ON/OFF FO4 : Water ON/OFF FO5 : Edit thickness FO6 : Program List FO7 : Vacuum ON/OFF FO8 : Spindle ON/OFF G : [START] key : to confirm board thickness
	G. [START] Rey. to commit total uncaress



2-5. Performance of Dressing

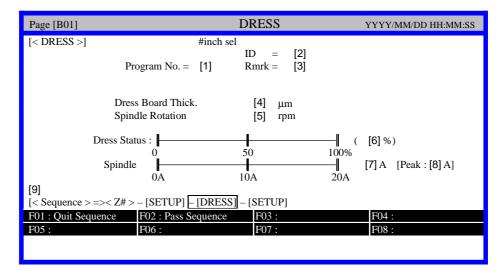
Procedures to perform dressing

The procedures to perform dressing are described here. The DRESS screen is also detailed.

Step No.	Do This
Ctop 110.	(Continued from the previous section)
1	Check the data settings on the DRESS screen.
'	- For details of the setup items on the DRESS screen, refer to
	Section 4-3, [Dress Data Edit Screen] in Chapter D of the Data
	Maintenance Manual.
	- If the set up data is not correct, select the correct dressing
	program referring to the previous section, [Selection of Dressing
	Program].
2	Press the <start> key.</start>
	- The message "thickness OK?" appears and blinks.
3	Verify that the set up value for "Thickness of Dresser" is correct.
	- If it is incorrect, press the <ce> key and enter the correct value</ce>
	by following the steps described in the previous section.
4	Press the <start> key.</start>
	- The dressing process starts with the dress execution screen
	displayed.
	- Refer to [Dress execution screen] on the next page for details of the dress execution screen.
	the dress execution screen.
	Page [B01] DRESS YYYY/MM/DD HH:MM:SS
	[< DRESS >] #inch sel ID = ######## Program No. = ## Rmrk = ###################################
	Подаш 10. – ят Кішк – яппаппяппаппаппаппапп
	Dress Board Thick. #### μm Spindle Rotation #### rpm
	Dress Status : (## %)
	0 50 100% Spindle ##A [Peak:##A]
	0A 10A 20A
	[< Sequence > =>< Z# > - [SETUP] <u>[DRESS]</u> - [SETUP] F01 : Quit Sequence F02 : Pass Sequence F03 : F04 :
	F05 : F06 : F07 : F08 :
	If the masses of the This was grown and the seculiar the
	- If the message "> This program can not be working." appears when you press the <start> key, select the correct program</start>
	referring to the previous section, "Selection of Dressing
	Program".
	- When the dressing process completes, the message "G:
	Completed DRESS" appears at the bottom of the screen.

The dress execution screen is detailed here:

[Screen]



[Setting Item]

Item No.	Descriptions
[1]	Dress program number is shown.
[2]	Program ID is shown.
[3]	Comment on the program is shown.
[4]	Set-up dresser board thickness is shown.
[5]	Present spindle rotative speed is shown.
[6]	Progress of dressing is indicated in bar graph and percentage value.
[7]	Spindle current real-time value is indicated in bar graph and numeric value (Unit: A). The red mark on the indicator bar indicates the peak current value. Pay attention to this value to check if dressing is properly performed.
[8]	Spindle current peak value during dressing is shown in numeric value (A).
[9]	The sequence operation flow is shown.

2-6. Removal of Dresser Board

Procedures to remove dresser board from chuck table

The procedures to remove the dresser board from the chuck table after finishing dressing operation are described here.

NOTICE

Grinding dust, if allowed to stay on the wheel cover or chuck table, may adversely affect the machine's grinding accuracy.

After you remove the dresser board, clean the inside of the water case with the chuck table water flow/air blow system turned ON.

Step No.	Do This
	(Continued from the previous section)
1	When dressing finishes, press the <enter> key.</enter>
	- The following message appears on the screen.
	>> Coolant Water OFF >> Spindle Rotation OFF >> Chuck Table Rotation OFF >> Chuck Blow OFF >> [ENTER] key press please
2	Press the <enter> key.</enter>
	- The following message appears on the screen.
	>> Please open the side cover, and ready to SETUP.
	>> After ready to, [ENTER] key press please.
3	Open the Z-axis side cover and water case cover.
4	Connect the manual keyboard to its connector inside the Z-axis side cover.
5	Press the <enter> key.</enter>
	- The wheel coolant system turns OFF.
	- The spindle and chuck table stop rotating.
	- The chuck table water flow/air blow system turns OFF.
	- The following message appears on the screen.
	>> Please remove dresser board from the chuck table. Vacuum OFF (C-T1-OFF) Chuck Blow (C-T2-ON) Subkey Operate
	>> The manual keyboard is active. >> Please press [ENTER] key.

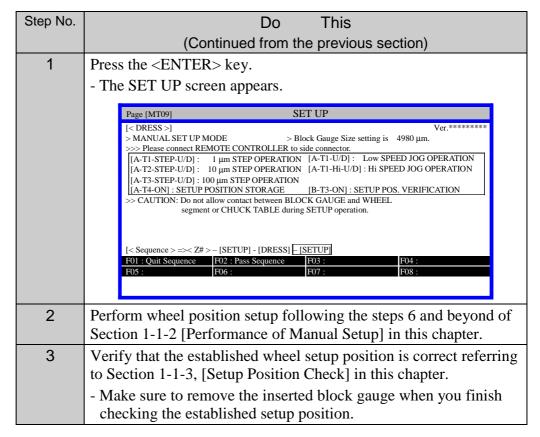
Procedures to remove dresser board from chuck table (Continued)

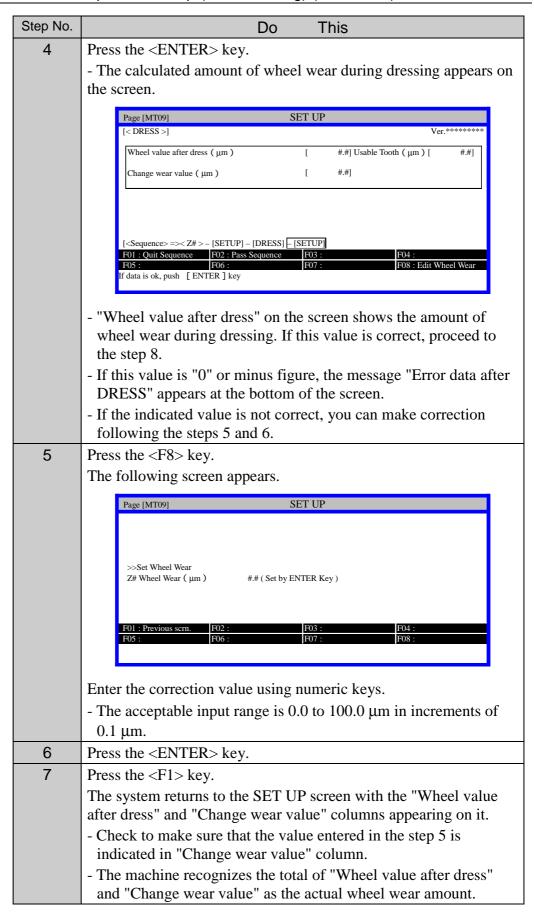
Step No.	Do This
	(Continued from the previous section)
6	Turn ON the [C] and [T1] keys on the manual keyboard and press
	the [OFF] key.
	- The chuck table vacuum system turns OFF.
7	Turn ON the [C] and [T2] keys and press the [ON] key.
	- The chuck table water flow/air blow system turns ON.
8	Remove the dresser board.
9	Wash away grinding dust deposited on the wheel and chuck table using a hand shower.
10	Turn ON the [C] and [T2] keys on the manual keyboard and press the [OFF] key.
	- The chuck table water flow/air blow system turns OFF.

2-7. Wheel Position Setup (after Dressing)

Procedures to perform wheel position setup (after dressing)

Wheel position setup should be performed again when dressing operation finishes.





Procedures to perform wheel position setup (after dressing) (Continued)

Step No.	Do This				
8	Press the <enter> key to save the values indicated on the screen ("Wheel value after dress" and "Change wear value"). The following message appears. Change & Save Wheel Wear data, OK? [ENTER: Yes / No : CE]</enter>				
	<saving amount="" of="" the="" wear="" wheel=""> If you press the <enter> key here, the values indicated on the screen are saved as the wheel wear amount. If you press the <ce> key, the values are not saved and the system returns to the step 4.</ce></enter></saving>				

2-8. Completing Dressing Sequence

Procedures to complete the dressing sequence

Step No.	Do This						
	(Continued from the previous section)						
1	After verifying that the established wheel setup position is correct, press the <enter> key. - The Z-axis moves to its upper end position. - The following message appears on the screen. >> Please close the inner cover and side cover. >> Please press [ENTER] key after closing the covers.</enter>						
2	Disconnect the manual keyboard from its connector.						
3	Close the water case cover and the Z-axis side cover.						
4	Press the <enter> key.</enter>						
	- The dressing sequence completes and the GRIND MAINTENANCE screen appears.						

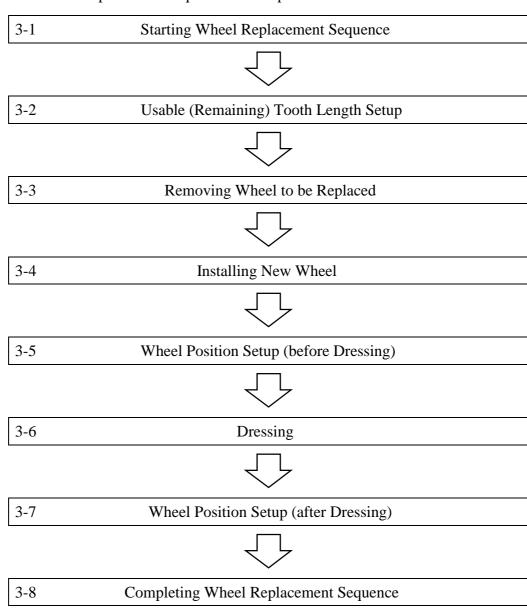
3. Wheel Replacement

Summary of this section

This section describes about the procedures to replace the wheel using the wheel replacement sequence.

Operation flow

The wheel replacement sequence should proceed as described below.



Be sure to observe the following safety precautions when you replace the wheel.



- If you put your hands or fingers in the spindle section while the spindle is still rotating, they may be cut off. Before starting the wheel replacing work, visually check to make sure that spindle rotation is completely stopped. After the occurrence of an alarm condition in particular, it can happen that the spindle inverter gets out of control and enters the free-running state.
- While the wheel replacing work is underway, make sure that no other persons touch the machine. Inadvertent activation of the Zaxis or spindle could cause an accident involving cutting off of your hands and fingers.
- During wheel replacement, the Z-axis is moved up and down with the safety covers opened. Make sure that no parts of your body come into contact with the driving sections as they could be caught or cut off.

NOTICE

- Check to be sure that no tools or block gauge are left in the machine when the wheel replacing work is done. If you proceed to the next step with such irrelevant items left in the machine, they may be scattered or caught by the machine units, causing the machine to break.
- Be careful not to drop the wheel. Dropping the wheel during its removal may damage the wheel tooth, chuck table or height gauge.
- Wheels having unduly chipped teeth must not be used.
 Use of a wheel with one-fourth or more of its tooth chipped may cause wheel vibration during grinding and, as a result, break the wheel and wafer.
- Make sure to confirm the wheel model number before wheel replacement and the dresser board type before dressing. Using of a wrong item may incur wheel or wafer breakage.

The following tools should be readied to replace the wheel.

Torque wrench
Allen wrench (5 mm)
Block gauge
Lint-free cloth
Alcohol

Oilstone
Wheel for replacement (new wheel)

Dresser board

For #360 wheel: GC150 For #2000 wheel: GC600

For self-grinding wheel: GC150

3-1. Starting Wheel Replacement Sequence

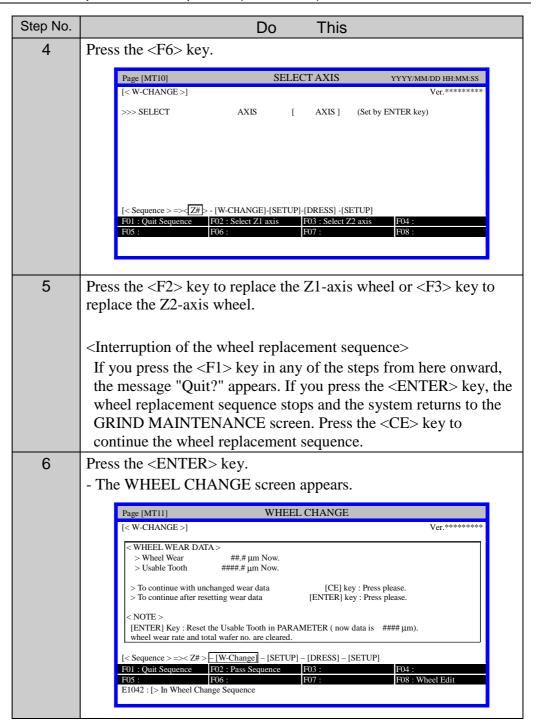
Procedures to start wheel replacement sequence

This section describes the procedures to start up the wheel replacement sequence and select the axis replacing its wheel.

NOTICE

The height gauge is used for measuring the chuck table. To stabilize the measuring accuracy of the height gauge, make sure to warm up the machine for at least 30 minutes. Unless the machine is sufficiently warmed up, accurate measurement results cannot be expected.

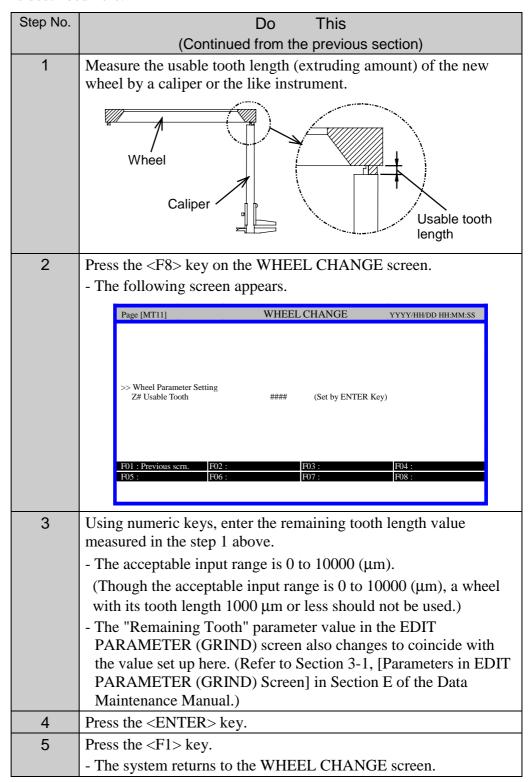
Step No.						
•	Do This					
	If there is not any dressing program suitable for the new wheel, edit one.					
	- Refer to Section 4, [Set up and Edition of Dressing Program Data] in Chapter D of the Data Maintenance Manual for details.					
2 Warm	n up the machine for at least 30 minutes.					
	- It is necessary to warm up the machine for at least 30 minutes to stabilize the measuring accuracy of the height gauge.					
3 Press	the <f3> key on the top menu screen.</f3>					
	- The GRIND MAINTENANCE screen appears.					
	- If the screen is password-protected, enter the password (GRIND					
IVIA	MAINTENANCE) and then press the <enter> key.</enter>					
	Page [MT01] GRIND MAINTENANCE YYYY/MM/DD HH:MM:SS					
	Ver.*******					
	F1 : TOP MENU F2 : DRESS DATA EDIT					
	F2 : DRESS DATA EDIT F3 : SELF GRIND DATA EDIT					
	F4 : SET UP SEQUENCE					
	F5 : DRESS SEQUENCE					
	F6: WHEEL CHANGE SEQUENCE					
	F7 : SELF GRIND SEQUENCE					
	F01 : TOP MENU F02 : Dress Data Ed. F03 : Self Data Ed. F04 : Set Up Seq.					
	F05 : Dress Seq. F06 : Wheel-chg Seq. F07 : Self Seq. F08 :					

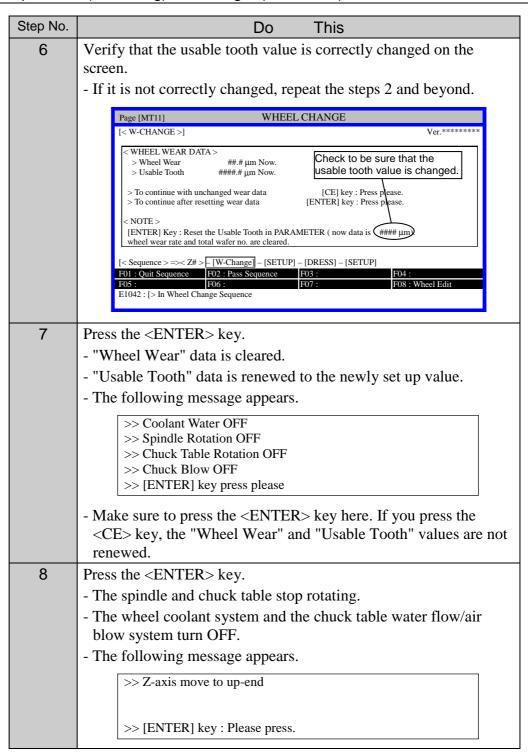


3-2. Usable (Remaining) Tooth Length Setup

Procedures to set up usable (remaining) tooth length

The procedures to set up the usable (remaining) tooth length of the new wheel is described here.





3-3. Removing Wheel to be Replaced

Procedures to remove the wheel to be replaced



If you attempt to remove the wheel while the spindle is still rotating, your hands or fingers may be cut off. Before starting the wheel removing work, check to be sure that spindle rotation is completely stopped.

Otan Na	р ті				
Step No.	Do This				
	(Continued from the previous section)				
1	Press the <enter> key.</enter>				
	- The Z-axis retreats to its upper end position.				
	- The following message appears.				
	>> Please open the side cover, and change wheel				
	>> The manual keyboard is active. >> Completed changing, [ENTER] key press please.				
2	Open the Z-axis side cover and water case cover of the Z-axis side where wheel replacement is going to be made.				
3	Open the wheel cover.				
4	Using an Allen wrench (5 mm), remove the six wheel retaining screws.				
	- When you remove the screws, firmly hold the wheel. When you remove the last screw to detach the wheel, take extra care not to drop the wheel.				
	- Be careful not to lose any screw.				
	Wheel retaining screw (6 pcs) Wheel				

Procedures to remove the wheel to be replaced (Continued)

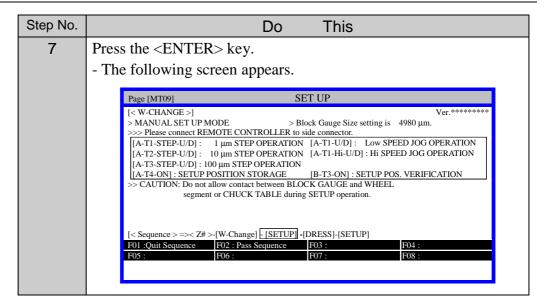
Step No.	Do This			
5	Remove the wheel.			
	- Be careful not to drop the wheel.			
	- Make sure that the wheel does not touch the chuck table or the			
	height gauge.			

3-4. Installing New Wheel

Procedures to install the new wheel

Step No.	Do This				
	(Continued from the previous section)				
1	Check to make sure that the type number of the wheel to be installed is correct.				
2	Wipe dirt off the mounting surfaces of the spindle and the wheel with a lint-free cloth moistened with alcohol and oilstone.				
3	Mount the wheel in such a manner that the wheel screw holes and spindle screw holes align each other. (Turn the wheel by hand to align the screw holes, while the spindle axis should be immobilized.)				
4	Insert the wheel retaining screws (6 pcs.) into their positions. With an Allen wrench, turn the screws finger-tight for now.				
5	With the provided torque wrench, tighten the screws in the order 1 through 6 as shown in the figure below (tightening torque: 4 N·m).				
6	When all the retaining screws are firmly fastened, turn the wheel by hand to check for any abnormality.				

Procedures to install the new wheel (Continued)



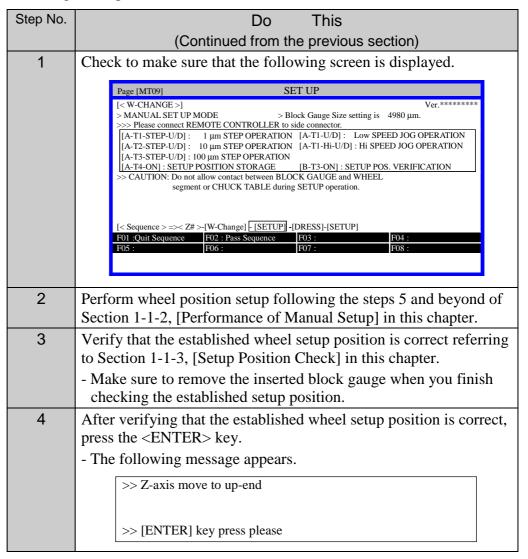
3-5. Wheel Position Setup (before Dressing)

About setup

The wheel position setup process establishes and programs into the machine the wheel's reference position with respect to the chuck table. Refer to Section 1, [Wheel Position Setup] in this chapter for details.

Procedure to perform wheel position setup (before dressing)

Before dressing the new wheel, wheel position setup should be performed following the steps as described below.



3-6. Dressing

About dressing

Dressing is a process to attain the appropriate blade condition of the wheel. In the dressing operation performed here, the newly installed wheel grinds the dresser board.

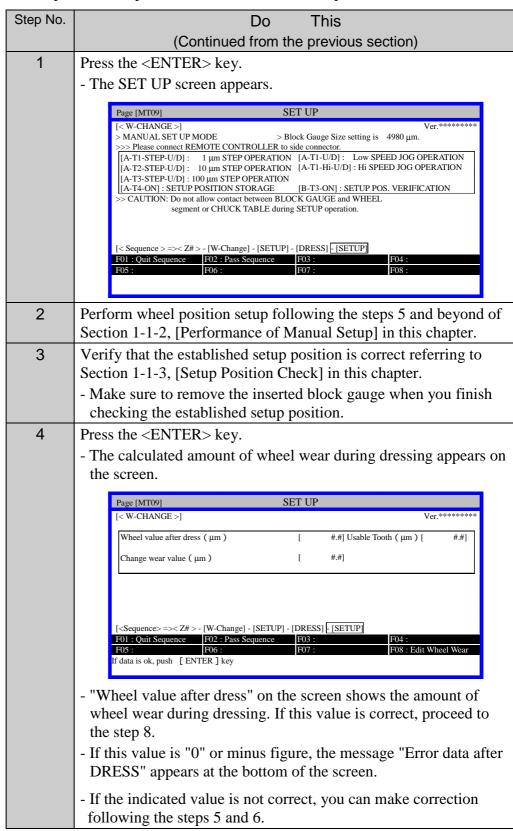
Procedure to perform dressing

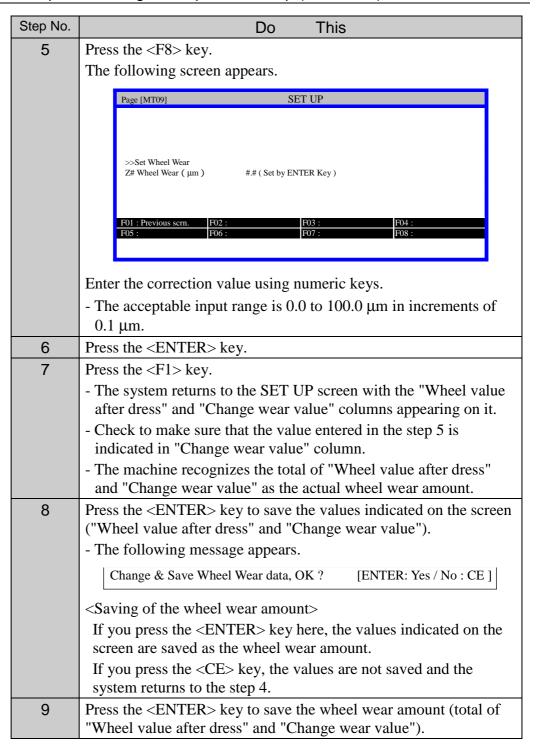
Step No.	Do This
	(Continued from the previous section)
1	Dress the newly installed wheel referring to Sections 2-3 through 2-6 in this chapter.

3-7. Wheel Position Setup (after Dressing)

Procedures to perform post-dressing wheel position setup

Wheel position setup for the dressed wheel should proceed as described below.





3-8. Completing Wheel Replacement Sequence

Procedures to complete wheel replacement sequence

NOTICE

If the machine is not sufficiently warmed up, the grinding accuracy of the machine is adversely affected. Make sure to warm up the machine for at least 30 minutes before you start grinding wafers.

Step No.	Do This				
	(Continued from the previous section)				
1	Press the <enter> key.</enter>				
	- The following message appears on the screen.				
	>> Please close the inner cover and side cover.				
	>> Please press [ENTER] key after closing the covers.				
2	Disconnect the manual keyboard from its connector.				
3	Close the wheel cover, water case cover and Z-axis side cover.				
4	Press the <enter> key.</enter>				
	- The wheel replacement sequence completes and the GRIND MAINTENANCE screen appears.				
5	Before you start grinding wafers, warm up the machine for at least 30 minutes.				
	- For the procedures to warm up the machine, refer to Section 1-5, [Warm up] in Chapter D of the Operation Manual.				
6	When warming up of the machine finishes, the wheel replacement work completes.				

4. Self-grinding

About self-grinding

Self-grinding is a process in which a self-grinding wheel grinds the chuck table to fine-tune the inclination of the chuck table against the spindle axis for maintaining machine's high grinding accuracy.

Timing of Self-grinding

Self-grinding should be performed when a situation such as described below arises.

- 180 days have past since the last self-grinding performance for the chuck table.
- The chuck table is replaced.
- Variation in the thickness value of the finished wafers is out of the acceptable range (only when the chuck table is considered to be a cause.

Operation flow

This section describes about the procedure to perform self-grinding in the flow of the operation steps as described below.

4-1	Initialization				
4-2	Removing the Wheel for Replacement				
4-3	Installing the Self-grinding Wheel				
4-4	Wheel Position Setup				
4-5	Setting of Dresser Board for Self-grinding Wheel				
4-6	Dressing Program Selection				
	$\overline{\Box}$				

ation now (Continued)
	4-7	Dressing of Self-grinding Wheel
	4-8	Removal of Dresser Board for Self-grinding Wheel
	4-9	Wheel Position Setup after Dressing
	4-10	Performance of Self-grinding
	4-11	Height Gauge Indication Value Check
	4-12	Chuck Table Inclination Check
	4-13	Installation of Grinding Wheel
	4-14	Cleaning of Chuck Table



- If you put your hands or fingers in the spindle section while the spindle is still rotating, they may be cut off. Before starting the wheel replacing work, visually check to make sure that spindle rotation is completely stopped. After the occurrence of an alarm condition in particular, it can happen that the spindle inverter gets out of control and enters the free-running state.
- While the wheel replacing work is underway, make sure that no other persons touch the machine. Inadvertent activation of the Zaxis or spindle could cause an accident involving cutting off of your hands and fingers.
- During wheel replacement, the Z-axis is moved up and down with the safety covers opened. Make sure that no parts of your body come into contact with the driving sections as they could be caught or cut off.

NOTICE

- Check to be sure that no tools or block gauge are left in the machine when the wheel replacing work is done. If you proceed to the next step with such irrelevant items left in the machine, they may be scattered or caught by the machine units, causing the machine to break.
- Be careful not to drop the wheel. Dropping the wheel during its removal may damage the wheel tooth, chuck table or height gauge.
- Wheels having unduly chipped teeth must not be used.
 Use of a wheel with one-fourth or more of its tooth chipped may cause wheel vibration during grinding and, as a result, break the wheel and wafer.
- Make sure to confirm the wheel model number before performing self-grinding and the dresser board type before performing dressing. Using of a wrong item may incur wheel or chuck table breakage.

The following tools should be readied to perform self-grinding.

Torque wrench
Allen wrench (5 mm)
Block gauge
Inclination measuring jig (dial gauge)
Oilstone
Alcohol
Lint-free cloth
Brush
Self-grinding wheel
(IF-01-1-SG-M or M2)
Dresser board (GC150)
(For self-grinding wheels)

4-1. Initialization

Procedures to initialize the machine

Procedures to initialize the machine and to set up the data needed for self-grinding are described here.

Step No.	Do This
1	Effect initialization of the machine.
	- Refer to section 1-4, [Initialization] in Chapter D of the Operation Manual for the procedures to initialize the machine.
2	 Set up or edit a self-grinding program to be used for self-grinding operation as needed. Refer to section 5, [Set up and Edition of Self-grinding Program Data] in Chapter D of the Data Maintenance Manual for details.
3	Dress the wheel to be used for performing self-grinding. If there is not any dressing program applicable to the wheel, edit one. - Refer to section 4, [Set up and Edition of Dressing Program Data] in Chapter D of the Data Maintenance Manual for details.

4-2. Removing the Wheel for Replacement

Procedures to remove the wheel

The procedures to remove the wheel are described here.



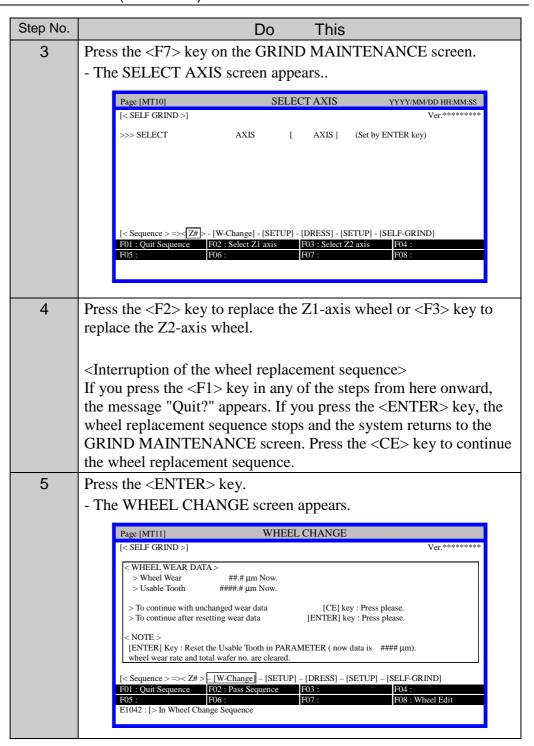
- If you place your hands or fingers in the spindle section while the spindle is still rotating, they may be cut off. Before starting the wheel replacing work, visually check to make sure that spindle rotation is completely stopped.
- During warming up operation, the spindle is rotated. If you place your hands or fingers in the rotating spindle section, they may be cut off. Before you remove the wheel, stop warming up operation and visually check to be sure that spindle rotation is completely stopped.

NOTICE

Be careful not to drop the wheel. Dropping the wheel during its removal may damage the wheel tooth, chuck table or height gauge.

Also, be careful so that the wheel does not hit the chuck table or height gauge during its removal.

Step No.	Do This
	(Continued from the previous section)
1	Warm up the machine for at least 30 minutes.
	- It is necessary to warm up the machine for at least 30 minutes to stabilize the measuring accuracy of the height gauge.
2	Press the <f3> key on the top menu screen.</f3>
	- The GRIND MAINTENANCE screen appears.
	- If the screen is password-protected, enter the password (GRIND MAINTENANCE) and then press the <enter> key.</enter>



Step No.	Do This
6	Press the <enter> key. - "Wheel Wear" data is cleared. - "Usable Tooth" data is renewed to the set up value. - The following message appears. >> Coolant Water OFF</enter>
7	Press the <enter> key. - The spindle and chuck table stop rotating. - The wheel coolant system and the chuck table water flow/air blow system turn OFF. - The following message appears. >> Z-axis move to up-end >> [ENTER] key press please</enter>
8	Press the <enter> key. - The Z-axis retreats to its upper end position. - The following message appears. >> Please open the side cover, and change wheel >> The manual keyboard is active. >> Completed changing, [ENTER] key press please.</enter>
9	Open the Z-axis side cover, water case cover, and wheel cover at the Z-axis side where wheel replacement is going to be made.

Procedures to remove the wheel (Continued)

Step No.	Do This
10	Using an Allen wrench (5 mm), remove the six wheel retaining screws. - While you remove the screws, hold the wheel by hand to prevent the spindle axis from rotating. - When you remove the screws, firmly hold the wheel. When you remove the last screw to detach the wheel, take extra care not to drop the wheel. - Be careful not to lose any screw. Wheel retaining screw (6)
11	Remove the wheel. - Make sure that the wheel does not contact the chuck table or the height gauge here.

4-3. Installing the Self-grinding Wheel

Procedures to install the self-grinding wheel

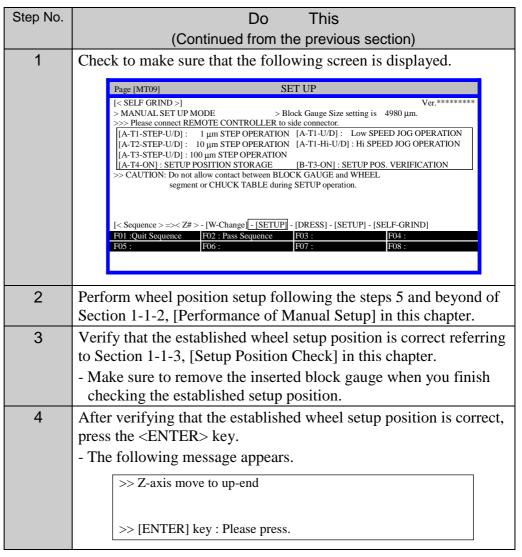
The procedures to install the self-grinding wheel are described here.

-	
Step No.	Do This (Continued from the previous section)
1	Check to make sure that the type number of the self-grinding wheel to be installed is correct. (IF-01-1-SG-M or M2)
2	Wipe dirt off the mounting surfaces of the spindle and the wheel with a lint-free cloth moistened with alcohol and oilstone.
3	Mount the wheel in such a manner that the wheel screw holes and spindle screw holes align each other. (Turn the wheel by hand to align the screw holes, while the spindle axis should be immobilized.)
4	Insert the screws (6 pcs.) into their positions. With an Allen wrench (5mm), turn the screws finger-tight for now.
5	With the provided torque wrench (5mm), tighten the screws in the order 1 through 6 as shown in the figure below (tightening torque: 4 N·m).
6	When all the retaining screws are firmly fastened, turn the wheel by hand to check for any abnormality.
7	Press the <enter> key. - The following screen appears. Page [MT09] SET UP [< SELF GRIND>] Ver.*******</enter>
	> MANUAL SET UP MODE
	F01 : Quit Sequence F02 : Pass Sequence F03 : F04 : F05 : F06 : F07 : F08 :

4-4. Wheel Position Setup (Self-grinding)

Wheel position setup procedures

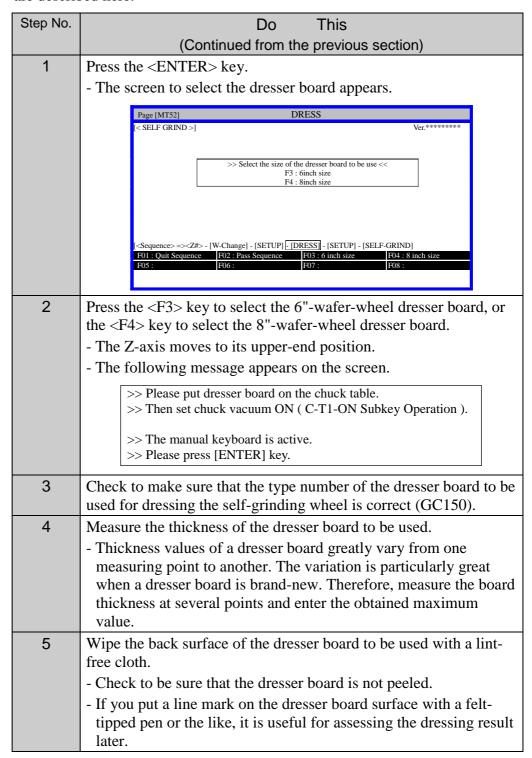
The procedures to perform wheel position set up after installing the self-grinding wheel are described here.



4-5. Setting of Dresser Board for Self-grinding Wheel

Procedures to set up the dresser board for self-grinding wheel

The procedures to set up the dresser board for dressing the self-grinding wheel are described here.



Procedures to set up the dresser board for self-grinding wheel (Continued)

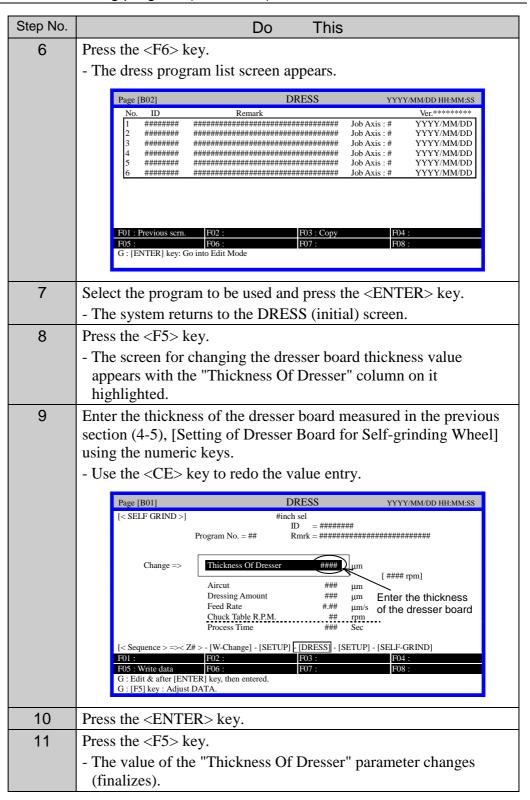
Step No.	Do This
6	Mount the dresser board on the center of the chuck table.
7	Select [C] and [T1] keys on the manual keyboard and press the [ON] key. - The chuck table vacuum system turns ON to secure the dresser board.
8	Push the dresser board by hand to verify that it does not move. - If the dresser board moves or if it is secured off-center on the chuck table, remove the board from the chuck table by following the procedure described below and then repeat the step 5 and beyond.
	<pre><procedure board="" dresser="" remove="" the="" to=""> 1) Press the [OFF] key on the manual keyboard. 2) Select [C] and [T2] keys and then press the [ON] key. - The chuck table water flow/air blow system turns ON 3) Remove the dresser board.</procedure></pre>

4-6. Dressing Program Selection

Procedures to select the dressing program

The procedures to select the dressing program to be used for dressing the self-grinding wheel and to enter the thickness of the dresser board to the program are described here.

Step No.	Do This
	(Continued from the previous section)
1	Press the <enter> key.</enter>
	- The following message appears.
	>> Please close inner cover and side cover.
	>> Please press [ENTER] key after closing side cover.
2	Remove the manual keyboard from its connector.
3	Close the wheel cover, water case cover, and Z-axis side cover.
4	Press the <enter> key.</enter>
	- The following message appears.
	>> Coolant Water ON
	>> Spindle Rotation ON
	>> [ENTER] Key press please
5	Press the <enter> key.</enter>
	- The wheel coolant system turns ON.
	- The spindle starts rotating.
	- The DRESS (initial) screen appears.
	Page [B01] DRESS YYYY/MM/DD HH:MM:SS
	[< SELF GRIND >] #inch sel ID = ########
	Program No. = ## Rmrk = ###################################
	Dressed Axis Z# Axis Thickness Of Dresser #### μm
	Spindle R.P.M. #### rpm [#### rpm] Aircut ### μm
	Dressing Amount ### μm Feed Rate #.## μm/s
	Chuck Table R.P.M. ## rpm Process Time ### Sec
	[< Sequence > =>< Z# > - [W-Change] - [SETUP] [DRESS] - [SETUP] - [SELF-GRIND]
	F01 : Quit Sequence F02 : Pass Sequence F03 : Blow ON/OFF F04 : Water ON/OFF F05 : Edit thickness F06 : Program List F07 : Vacuum ON/OFF F08 : Spindle ON/OF
	G: [START] key: to confirm board thickness



4-7. Dressing of Self-grinding Wheel

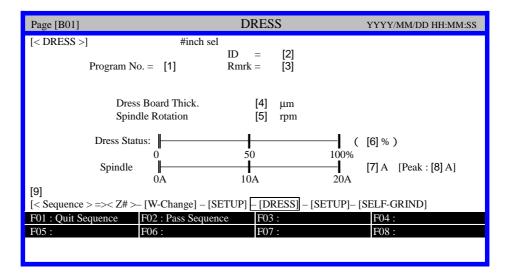
Procedures to dress the self-grinding wheel

This section describes the procedures to dress the self-grinding wheel as well as the contents of the dress execution (DRESS) screen.

Step No.	Do This
	(Continued from the previous section)
1	Check the data settings on the DRESS screen.
	- For details of the setup items on the DRESS screen, refer to
	Section 4-3, [Dress Data Edit Screen] in Chapter D of the Data
	Maintenance Manual.
	- If the set up data is not correct, select the correct program
	referring to Section 4-6, [Dressing Program Selection].
2	Press the <start> key.</start>
	- The message "thickness OK?" appears and blinks.
3	Verify that the value of "Thickness Of Dresser" on the screen is
	correct.
	- If the value is incorrect, press the <ce> key and correct the value</ce>
	by following the steps described in the previous section (4-6).
4	Press the <start> key.</start>
	- The dressing process starts with the dress execution screen
	displayed.
	- Refer to "Dress execution screen" on the next page for details of
	the dress execution screen.
	Page [B01] DRESS YYYY/MM/DD HH:MM:SS
	[< SELF GRIND >] # inch sel ID == ########
	Program No. = ## Rmrk == ##################################
	Dress Board Thick. #### µm Spindle Rotation #### rpm
	Dress Board Thick. #### μm Spindle Rotation #### rpm Dress Status :
	Dress Board Thick. #### μm Spindle Rotation #### rpm Dress Status :
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	Dress Board Thick. #### µm Spindle Rotation #### rpm Dress Status:

The contents of the dress execution screen are described here.

[Screen]



[Setting Item]

Item No.	Descriptions
[1]	Dressing program No. is shown.
[2]	Program ID is shown.
[3]	Comment on the program is shown.
[4]	Setup dresser board thickness is shown.
[5]	Present spindle rotative speed (min ⁻¹ (rpm)) is shown.
[6]	Progress of dressing operation is indicated in bar graph and
	percentage value.
[7]	Spindle current real-time value is indicated in bar graph and
	numeric values (Unit: A).
	The red mark on the bar indicates the spindle peak current value.
	Pay attention to this value to check if dressing operation is properly
	performed.
[8]	Spindle current peak value during dressing is shown.
[9]	The operation sequence flow is shown.

4-8. Removal of Dresser Board for Self-grinding Wheel

Procedures to remove the dresser board

This section describes about the procedures to remove the dresser board from the chuck table after finishing dressing of the self-grinding wheel.

NOTICE

Grinding dust, if allowed to stay on the wheel cover or chuck table, may cause grinding failures. After removing the dresser board, carefully clean the inside of the water case with the chuck table water flow/air blow system turned ON.

Step No.	Do This
	(Continued from the previous section)
1	When the dressing process completes, press the <enter> key.</enter>
	- The following message appears on the screen.
	>> Coolant Water OFF
	>> Spindle Rotation OFF
	>> Chuck Table Rotation OFF
	>> Chuck Blow OFF >> [ENTER] Key press please
	L 1 13 F F
2	Press the <enter> key.</enter>
	- The following message appears on the screen.
	>> Please open the side cover, and ready to SETUP.
	A francos du to TENTED I les umasse mlasse
	>> After ready to, [ENTER] key press please.
3	Open the Z-axis side cover, water case cover and wheel cover.
4	Connect the manual keyboard to its connector inside the Z-axis
	side cover.
5	Press the <enter> key.</enter>
	- The wheel coolant system turns OFF.
	- Spindle rotation and chuck table rotation both turn OFF.
	- The chuck table water flow/air blow system turns OFF.
	- The following message appears on the screen.
	>> Please remove dresser board from the chuck table. Vacuum OFF (C-T1-OFF) Chuck Blow (C-T2-ON) Subkey Operate
	>> The manual keyboard is active.
	>> Please press [ENTER] key.
6	Turns ON the [C] and [T1] keys on the manual keyboard and then
U	Turns ON the [C] and [T1] keys on the manual keyboard and then press the [OFF] key.
	- The chuck table vacuum system turns OFF.
	The chuck table vacuum system tums Of T.

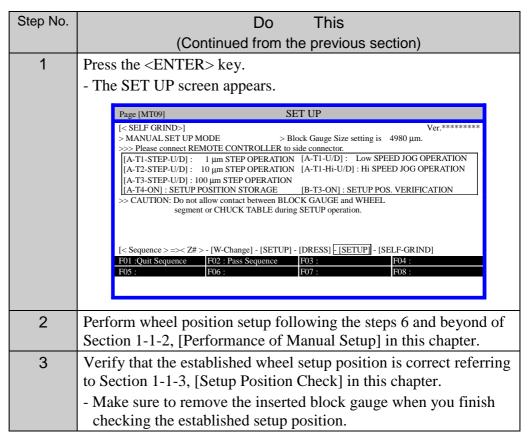
Procedures to remove the dresser board (Continued)

Step No.	Do This
7	Turns ON the [C] and [T2] keys and then press the [ON] key.
	- The chuck table water flow/air blow system turns ON.
8	Remove the dresser board.
9	Wash away grinding dust deposited on the wheel and chuck table
	using a hand shower.

4-9. Wheel Position Setup after Dressing

Procedures to perform wheel position setup after dressing

Wheel position setup should be performed again after the self-grinding wheel is dressed



4-10. Performance of Self-grinding

Procedure to perform self-grinding operation

This section describes the procedures to perform self-grinding operation.



If the machine is not sufficiently warmed up, the grinding accuracy of the machine is adversely affected. Make sure to warm up the machine for at least 30 minutes before you start self-grinding operation.

Step No.	Do This
	(Continued from the previous section)
1	When you finish wheel position setup after the wheel is dressed,
	press the <enter> key.</enter>
	- The following message appears.
	>> Please close inner cover and side cover.
	>> Please press [ENTER] key after closing side cover.
2	Close the wheel cover, water case cover and Z-axis side cover.
3	Press the <enter> key.</enter>
	- The following message appears.
	>> Coolant Water ON
	>> Spindle Rotation ON
	>> [ENTER] Key press please
	[ENTER] Key press prease
4	Press the <enter> key.</enter>
	- The wheel coolant system turns ON.
	- The spindle starts rotating.
	- The SELF GRIND screen appears.
	Page [S01] SELF GRIND YYYY/MM/DD HH:MM:SS
	[< SELF GRIND >] ID == #########
	Program No. == Sf # Rmrk == ##################################
	Self Grinding Amount ## μm Aircut (μm) ## P1->P2Thick. (μm) ##.# P2->P3Thick. (μm) ##.#
	P1 Grind (μm) -##.# P2 Grind (μm) -##.# P3 Grind (μm) -##.#
	Feed Rate (μm/s) #.## Feed Rate (μm/s) #.## Feed Rate (μm/s) #.##
	Chuck Table (rpm) ## Chuck Table (rpm) ## Chuck Table (rpm) ## Escape Thic (μm) #.#
	Spark Out (rev) # Feed Rate (µm/s) #.## Chuck Table (rpm) ## Chuck Table (rpm) ## Process Time (s) [###]
	Total Amount of Self-Grind µm / Times [< Sequence >=>< Z# > - [W-Change] - [SETUP] - [DRESS] - [SETUP] - [SELF-GRIND]
	F01 : Quit Sequence
	G: [START] key: Start Self-Grinding

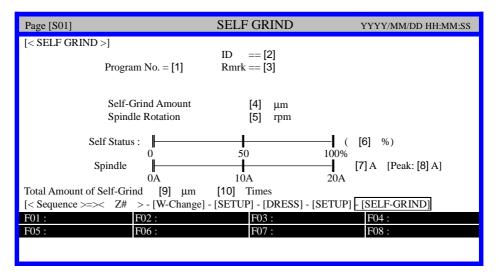
Step No.	Do This
5	Wait in this state for at least 30 minutes to warm up the machine. - Self-grinding is an important process to achieve the machine's grinding accuracy. Make sure to warm up the machine for at least 30 minutes before starting self-grinding operation.
6	Check the setup data displayed on the SELF GRIND screen.
	- For details of the setup items on the SELF GRIND screen, refer to Section 5-3, [Self Grind Data Edit Screen] in Chapter D of the Data Maintenance manual.
	- If you want to use another self-grinding program, press the <f06> key to call up the self-grinding program list screen and select the program you want to use from the list.</f06>
7	Press the <start> key.</start>
	- The self-grinding operation starts with the self-grind execution screen displayed.
	- Refer to "Self-grind execution screen" in this section for details
	of the self-grind execution screen.
	Page [S01] SELF GRIND YYYY/MM/DD HH:MM:SS
	[< SELF GRIND >]
	Self-Grind Amount ## μm
	Spindle Rotation #### rpm
	Self Status : (##%) 0 50 100% Spindle ## A [Peak: #.# A]
	0A 10A 20A Total Amount of Self-Grind ## μm # Times [< Sequence >=>< Z# > - [W-Change] - [SETUP] - [DRESS] - [SETUP] - [SELF-GRIND]
	F01: F02: F03: F04: F05: F06: F07: F08:
	- When the self-grinding operation completes, the following
	message appears at the bottom of the screen.
	G : Completed Self-Grinding G : [ENTER] key : Exit Self-Grinding mode G : Next [START] : Start additional Self-Grinding
	- If the message "> This program can not be working." appears
	when you press the <start> key, press the <f6> key to call up the self-grinding program list screen and select the correct</f6></start>
	program.
	- To continuously run another self-grinding operation, press the
	<start> key (not the <enter> key) here. If you press the <start> key, self-grinding restarts from where the previous</start></enter></start>
	self-grinding operation finished.

Procedures to perform self-grinding operation (Continued)

Step No.	Do This
8	Press the <enter> key.</enter>
	- The following message appears.
	>> If you like to grind wafer, Please change the wheel. >> Please adjust the height gauge. (Exit After the adjustment, display turn to menu.) >> [ENTER] Key press please

Contents of the self-grind execution screen are described here.

[Screen]



[Setting Item]

Item No.	Descriptions
[1]	Self-grind program No. is shown.
[2]	Program ID is shown.
[3]	Comment on the program is shown.
[4]	Setup "Self-Grind Amount" (cutting depth) is shown.
[5]	Present spindle rotative speed (min ⁻¹ (rpm)) is shown.
[6]	Progress of self-grinding operation is indicated in bar graph and percentage value.
[7]	Spindle current real-time value is indicated in bar graph and numeric value (Unit: A). The red mark on the bar indicates the spindle peak current value. Pay attention to this value to check if self-grinding operation is properly performed.
[8]	Spindle current peak value during self-grinding is shown.
[9]	Total self-grinding amount (μm) so far cut off in successive operation runs (more than once) is shown.
[10]	Total number of self-grinding operation runs so far performed in successive operation runs (more than once) is shown.

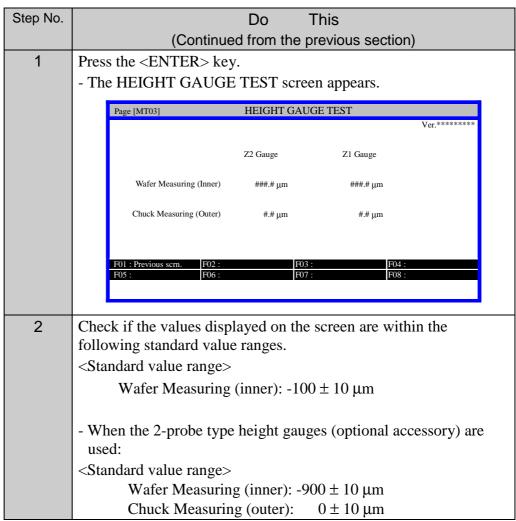
4-11. Height Gauge Indication Value Check (Self-grinding)

About height gauge indication value check

When self-grinding operation finishes, each height gauge should be checked as to whether its wafer measurement (inner circumference) and chuck measurement (outer circumference) value indications are within the acceptable ranges. Unless they are within the standard value ranges, normal wafer grinding results cannot be expected for the machine.

Procedures to check the height gauge indication values

The procedures to check the height gauge indication values are described here.



Procedures to check the height gauge indication values (Continued)

Step No.	Do This
3	If there is a value(s) that is outside the standard value range, correction of that value by adjusting the height gauge amplifier will be necessary. Refer to the section 6-3, [Height Gauge Amplifier Adjustment] in this chapter to adjust the height gauge amplifier. - If there is a value(s) that deviates from its standard value by ± 50 µm or more, adjustment of the height gauge itself will be necessary. Refer to section 6-4, [Height Gauge Adjustment] to adjust the height gauge.
4	When checking/adjusting of the height gauge value indications complete, return to the GRIND MAINTENANCE screen by pressing the <f1> key.</f1>

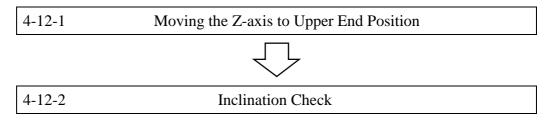
4-12. Chuck Table Inclination Check

Operation flow

Inclination check of the chuck tables should be made to see if self-grinding of the chuck tables has been correctly achieved.

Unless the measured inclination values are within the standard value ranges, normal wafer grinding results cannot be expected for the machine.

This section describes the procedures to check the inclination of the chuck tables in the flow of the operation steps as indicated below.



4-12-1. Moving the Z-axis to Upper End Position

Procedures to move the Z-axis to upper end position

To install the inclination measuring jig to the Z-axis spindle, move the Z-axis to its upper end position by following the steps described below.



During warming up operation, the spindle is rotated. If you place your hands or fingers in the rotating spindle section, they may be cut off. Before you remove the wheel, stop warming up operation and visually check to be sure that spindle rotation is completely stopped.

Step No.	Do This
	(Continued from the previous section)
1	Return to the top menu screen and press the <f5> key.</f5>
	- The MACHINE MAINTENANCE screen appears.
	- If the screen is password-protected, enter the password (MAINTENANCE).
2	Press the <f2> key.</f2>
_	- The UNIT OPERATION/MONITOR screen appears.
3	Press the <f2> key to move the Z1-axis to its upper end position</f2>
	or <f3> key to move the Z2-axis to its upper end position.</f3>
	- The unit operation (Z1 or Z2) screen appears.
4	Open the Z-axis side cover, water case cover, and wheel cover at
	the side where the Z-axis is moved to its upper end position for
	retreat.
5	Connect the manual keyboard to its connector at the Z-axis side
	where the inclination check is going to be performed.
	- Refer to Section 2-1-2, [Manual Keyboard Connection] in
	Chapter E for the locations of the manual keyboard connectors in
	the machine.
6	Turn ON the [A] and [T1] keys on the manual keyboard.
7	After visually checking that Z-axis ascent would pose no danger,
	press the $[\land]$ key to move the Z-axis to its upper end position.
	- For details of the operation of the manual keyboard, refer to
	Section 2, [Unit Operation] in Chapter E.

4-12-2. Inclination Check

Procedures to check inclination of the chuck tables

This section describes about the procedures to check the inclination of the chuck tables.

CHUCK tabl	CG.
Step No.	Do This (Continued from the previous section)
1	Remove the wheel from the spindle axis end referring to the step 3 and beyond of Section 3-3, [Removing Wheel to be Replaced] in this chapter.
2	Attach the inclination measuring jig to the spindle at the Z-axis side where self-grinding operation has been performed. - Screw in the mounting screw of the inclination measuring jig to the screw hole of the spindle axis as shown below. - Z1-axis- Spindle Screw hole Inclination measuring jig
0	
3	Adjust the dial gauge retaining screw and the dial gauge itself so that the gauge end passes through the center of the chuck table surface and that the gauge dial is easily readable. Dial gauge retaining screw Chuck table Dial gauge
4	Move down the Z-axis in unit operation until the dial gauge end lightly touches the chuck table surface.Refer to section 2, [Unit Operation] in Chapter E for details of the unit operation.

Step No.	Do This
5	Move the dial gauge end to a left point on the chuck table (as viewed from the machine top side) to set up a reference position for inclination measurement by setting the gauge dial to "0" there.
6	Move the dial gauge end to the center and right positions respectively on the chuck table and register the measured values. Spindle axis (Measuring point: right) (Measuring point: center) Chuck table assembly Machine front side
7	Check if the measured values are in the standard value ranges as indicated below. <standard range="" value=""> Left: 0 (reference point) Center: $0 \pm 1 \ \mu m$ Right: $-20 \pm 5 \ \mu m$</standard>
8	Remove the inclination measuring jig from the spindle axis end.
9	If the measured values of both the center and right points are within the standard value ranges, it is not be necessary to adjust inclination of the chuck table assembly. In that case, proceed to Section 4-13, [Installation of Grinding Wheel] in this chapter. - If there is a value that is outside the standard value range, inclination adjustment of the chuck table using the inclination adjustment mechanism of the chuck table assembly is required. Refer to Section 7-4, [Chuck Assembly Inclination Adjustment] in this chapter to adjust the inclination of the chuck table assembly. - If values in the standard value ranges still cannot be obtained, it is then necessary to perform self-grinding operation for the chuck table all over again by referring to the procedures in Section 4-1 and beyond in this chapter.

4-13. Installation of Grinding Wheel

Procedures to install the grinding wheel

You cannot use the self-grinding wheel (IF-01-1-SG-M or M2) for grinding wafers. The procedures to replace the self-grinding wheel with the grinding wheel are described here.

Step No.	Do This (Continued from the previous section)
1	 Install the grinding wheel. Refer to Section 3, [Wheel Replacement] in this chapter for the procedures to replace the wheel. Since the self-grinding wheel has already been removed at this stage, the steps 4 and 5 in Section 3-3, [Removing Wheel to be Replaced] should be skipped.

4-14. Cleaning of Chuck Table

Procedures to clean the chuck table

Contaminants are generated in the process of self-grinding the chuck table. This section describes the procedures to clean the chuck table.

Step No.	Do This
	(Continued from the previous section)
1	Press the <f5> key on the top menu screen.</f5>
	- The MACHINE MAINTENANCE screen appears.
	- If the screen is password-protected, enter the password
	(MAINTENANCE) and then press the <enter> key.</enter>
2	Press the <f2> key.</f2>
	- The UNIT OPERATION/MONITOR screen appears.
3	Press the <f2> key to clean the Z1-axis side chuck table or <f3></f3></f2>
	key to clean the Z2-axis side chuck table.
	- The unit operation (Z1 or Z2) screen appears.
4	Open the side cover, water case cover, and wheel cover at the Z-
	axis side where chuck table washing will be performed.
5	Connect the manual keyboard to its connector at the Z-axis side where chuck table washing will be performed.
	- Refer to Section 2-1-2, [Manual Keyboard Connection] in
	Chapter E for the locations of the manual keyboard connectors in
	the machine.
6	Turn ON the [C] and [T2] keys on the manual keyboard and then
	press the [ON] key.
	- The chuck table water flow/air blow system turns ON.
7	Wash contaminants away from the chuck table.
	- Cleaning of contaminants should be made with the chuck table
	water flow/air blow system turned ON.
	- Use a hand shower and brush to wash away contaminants.
8	Remove the manual keyboard from its connector.
9	Close the wheel cover, water case cover, and Z-axis side cover.
10	Return to the top menu screen by pressing the <f1> key twice.</f1>
11	When cleaning of the chuck tables finishes, the self-grinding
	operation sequence completes.

5. Finished Wafer Thickness and TTV Correction

Summary of this section

This section describes about the procedures to check and correct thickness variation of ground wafers from their target thickness values for achieving high grinding accuracy of the machine.

Operation flow

Wafer thickness variation check/correction should proceed following the operation steps as described below.

5-1 Chuck Table Axis Inclination Check



5-2 Check/Correction of Finished Wafer Thickness Variation



5-3 Check/Correction of TTV

5-1. Chuck Table Axis Inclination Check

Procedures to check the inclination of the chuck table axes

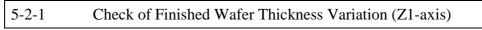
For the purpose of providing reference data for wafer thickness variation check/correction in the ensuing sections, the inclination of the Z1 and Z2 chuck table axes should be measured here following the procedures as described below.

Step No.	Do This
1	Press the <f8> key on the WARM UP screen.</f8>
	- Warming up of the machine stops.
2	Move the Z1-axis to its upper end position in the unit operation (Z1) screen.
	- Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.
3	Measure and record the inclination values (center- and right-point values) of the Z1 chuck table axis with the chuck table mounted on it.
	- Refer to Section 4-12-2, [Inclination Check] in this chapter for the procedures to check the inclination of the chuck table axis.
4	Following the same procedures as used for the inclination check of the Z1 chuck table axis, measure and record the inclination values of the Z2 chuck table axis.

5-2. Check/Correction of Finished Wafer Thickness Variation

Operation flow

Check/correction of finished wafer thickness variation in Z1-axis grinding and Z2-axis grinding should proceed following the operation steps as described below.





5-2-2 Check of Finished Wafer Thickness Variation (Z2-axis)

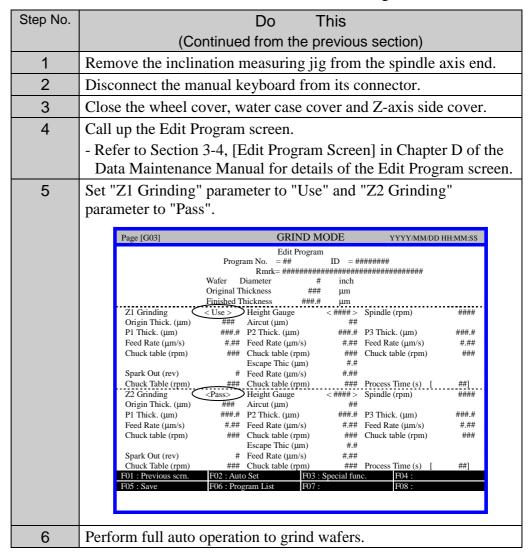


5-2-3 Correction of Finished Wafer Thickness Variation (Z1-axis/Z2-axis)

5-2-1. Check of Finished Wafer Thickness Variation (Z1-axis)

Procedures to check finished wafer thickness variation in Z1-axis grinding

This section describes about the procedures to grind wafers at the Z1-axis side alone and check finished wafer thickness variation of the ground wafers.



Procedures to check finished wafer thickness variation in Z1-axis grinding (Continued)

Step No.	Do This		
7	Using a linear gauge or the like, measure the thickness values of the ground wafers. - Record the measured thickness values of the ground wafers. - Measure the thickness values at 5 points on each wafer as shown in the figure below.		
	[2]		
	[4] [1] [5]		
	[3]		
	<measured values=""></measured>		
	Z-axis used Measured thickness value		
	(1) (2) (3) (4) (5)		
	Z1		
	(Unit: μm)		
8	If the measured values are outside the acceptable value range, go to Section 5-2-3, [Correction of Finished Wafer Thickness Variation (Z1-axis/Z2-axis)] to set up an offset value for correction. - If the measured values are within the acceptable value range, proceed to the next section, [Check of Finished Wafer Thickness Variation (Z2-axis)].		

Continued to the next section or Section 5-2-3.

5-2-2. Check of Finished Wafer Thickness Variation (Z2-axis)

Procedures to check finished wafer thickness variation in Z2-axis grinding

This section describes about the procedures to grind wafers at the Z2-axis side alone and check finished wafer thickness variation of the ground wafers.

Step No.	Do This		
	(Continued from the previous section)		
1	Call up the Edit Program screen Refer to Section 3-4, [Edit Program Screen] in Chapter D of the Data Maintenance Manual for details of the Edit Program screen.		
2	Set "Z1 Grinding" parameter to "Pass" and "Z2 Grinding" parameter to "Use".		
	Page [G03] GRIND MODE YYYY/MM/DD HH:MM:SS		
3	Perform full auto operation to grind wafers.		

Procedures to check finished wafer thickness variation in Z2-axis grinding (Continued)

Step No.	Do This		
4	Using a linear gauge or the like, measure the thickness values of the ground wafers. - Record the measured thickness values of the ground wafers. - Measure the thickness values at 5 points on each wafer as shown in the figure below.		
	[2]		
	[4] [1] [5]		
	[3]		
	<measured values=""></measured>		
	Z-axis used Measured thickness value		
	(1) (2) (3) (4) (5)		
	Z2		
	(Unit: μm)		
5	If the measured values are outside the acceptable value range, go to Section 5-2-3, [Correction of Finished Wafer Thickness Variation (Z1-axis/Z2-axis)] to set up an offset value for correction.		
	- If the measured values are within the acceptable value range, proceed to Section 5-3, [Check/Correction of TTV].		

Continued to the next section or Section 5-3.

5-2-3. Correction of Finished Wafer Thickness Variation (Z1-axis and Z2-axis)

Procedures to correct finished wafer thickness variation

The following two parameters are available for correcting finished wafer thickness variation.

Parameter	Description
Height Offset	A value (µm) representing the deviation of the actual finished-wafer-thickness value from the target thickness value, which can be set up for the Z1-axis and Z2-axis respectively. Enter a minus (-) value to decrease and a plus value (+) to increase the finished wafer thickness value. The "Height Offset" data setting is commonly effective for all grinding programs. - Height Offset value can be set up in the "(Z1/Z2) Height Offset" parameter in the EDIT PARAMETER (HEIGHT GAUGE) screen. - It can also be set up on the PAUSE screen during full auto operation. (The value set up here, however, is cleared when the full auto operation terminates.)
Height Adjust	A value (µm) representing the deviation of the actual finished-wafer-thickness value from the target thickness value, which can be set up for the Z1-axis and Z2-axis respectively. The difference of this parameter from Height Offset parameter is that the correction value can be set up for each grinding program. - Height Adjust value can be set up in the "(Z1/Z2) Height Adjust" parameter in the Automatic Program Set, Edit screen.

[Example of offset value setup]

The offset value setup example below is based on the following data that has been obtained after performing Z1-axis grinding with the target thickness set to 420 µm.

Axis used		Measured t	hickness valu	ue (unit:μm)	
	(1)	(2)	(3)	(4)	(5)
Z1	416	418	418	418	418

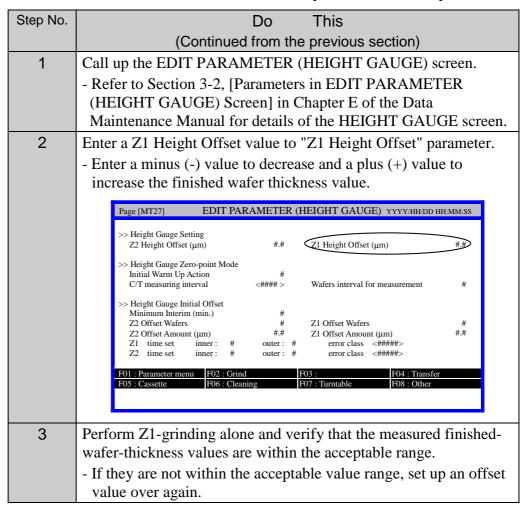
<Offset value setup example>

Axis used	Set up value (unit: μm)
	Z1 Height Offset or Z1 Height Adjust
Z1	(+) 2

Use either the "Height Offset" parameter or the "Height Adjust" parameter only to correct finished wafer thickness variation. If you set up the both, the correction amount will be the total of the set up values of the two parameters.

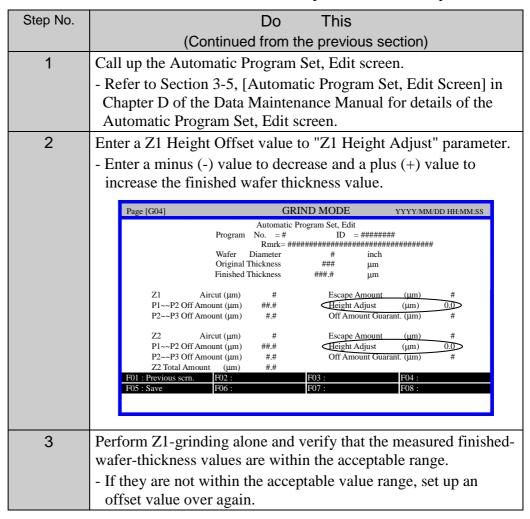
The procedures to correct finished wafer thickness variation using the "Height Offset" parameter are described here. The procedures described here are for correcting the variation in Z1-axis grinding. Use the same procedures for correcting the variation in Z2-axis grinding by replacing the "Z1" items with the "Z2" items.

- Use either the "Height Offset" parameter or the "Height Adjust" parameter only to correct finished wafer thickness variation. If you set up the both, the correction amount will be the total of the set up values of the two parameters.



The procedures to correct finished wafer thickness variation using the "Height Adjust" parameter are described here. The procedures described here are for correcting the variation in Z1-axis grinding. Use the same procedures for correcting the variation in Z2-axis grinding by replacing the "Z1" items with the "Z2" items.

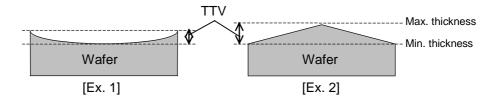
- Use either the "Height Offset" parameter or the "Height Adjust" parameter only to correct finished wafer thickness variation. If you set up the both, the correction amount will be the total of the set up values of the two parameters.



5-3. Check/Correction of TTV

About TTV

TTV (Total Thickness Variation) is a calculated value to express the thickness difference within a ground wafer (maximum thickness - minimum thickness).

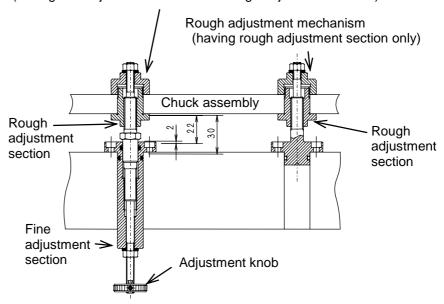


TTV value of approximately 2 μm (in 8-inch wafer grinding) will normally be obtained if self-grinding is appropriately performed for the chuck table used (refer to Section 4 in this chapter). TTV adjustment described in this section should be made when a TTV value of 1 μm or smaller needs to be achieved.

TTV correction should be made at the Z2-axis side using the inclination adjustment mechanisms of the Z2 chuck assembly. Each chuck assembly has three inclination adjustment mechanisms, two of which have both the fine and rough adjustment sections and the other has rough adjustment section only.

The fine adjustment sections only should be used for TTV adjustment and the rough adjustment sections should not be used.

Fine/rough adjustment mechanism (having fine adjustment section and rough adjustment section)



The chuck assembly moves up/down as the adjustment knob of the fine adjustment section of the fine/rough adjustment mechanism is turned in CCW/CW direction. The acceptable adjustment range is \pm 50 μ m (\pm 0.5 turn).

CW direction	The chuck assembly moves down. (approx. 100 μm/turn).
CCW direction	The chuck assembly moves up. (approx. 100 μm/turn).

^{*} The turning direction of the adjustment knob is as viewed from the machine bottom side.

The procedures to adjust TTV are described here.

Step No.	Do This		
1	Measure and calculate TTV and check the surface shapes of ground wafers.		
	[Examples of the surface shapes of ground wafers]		
	[1] [2] [3] [4]		
2	Remove the cover on the Z2-axis side as shown in the figure below.		
	<z2-axis side=""></z2-axis>		
	Remove this cover for TTV adjustment at the Z2-axis side.		

Step No.	Do This		
3	 Adjust TTV by turning the adjustment knob of the fine adjustment section of the associated fine/rough adjustment mechanism. The fine/rough adjustment mechanism (A1/A2) to be used and the turning direction of its adjustment knob depend on the surface shape of the ground wafers. Refer to the table below (the turning direction of the adjustment know is as viewed from the machine bottom side). Refer to the figure below for the locations of the fine/rough adjustment mechanisms A1 and A2. If you cannot adjust TTV properly by the use of the adjustment knob, contact your nearest DISCO office or DISCO service office. 		
	Z2-axis Spindle Chuck table Fine/rough adjustment mechanism (2 for each chuck assembly) Rough adjustment mechanism (1 for each chuck assembly)		
	Shape of ground wafer surface (Refer to step 1.) Inclination adjustment mechanism (fine adjustment section) to be used A1 CW A1 CCW A2 CCW A2 CCW		
4	After TTV adjustment, check finished wafer thickness variation again referring to Section 5-2-2, [Check of Finished Wafer Thickness Variation (Z2-axis)] in this chapter.		

6. Height Gauge Check/Adjustment

Summary of this section

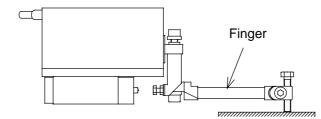
This section describes about the procedures to adjust the height gauge as well as the configuration of the entire height gauge system.

Section No.	Title	Contents
6-1	Height Gauge System Configuration	- Configuration of the height gauge system and the names of its components
6-2	Height Gauge Indication Value Check	- Procedure to check the height gauge indication values
6-3	Height Gauge Amplifier Adjustment	- Procedure to adjust the height gauge amplifier
6-4	Height Gauge Adjustment	- Procedure to adjust the height gauge

Precaution in handling the height gauge

NOTICE

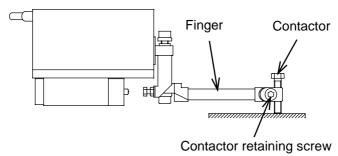
Moving the finger beyond the specified range may cause deformation of the spring inside the height gauge, which could adversely affect the gauge's measuring accuracy. It may also cause the seal section to curl, which could incur oil leakage. Be careful not to move the finger by hand beyond the specified range (out: 7 mm, in: 14 mm) when you adjust the height gauge.



6-1. Height Gauge System Configuration

Main parts of the height gauge

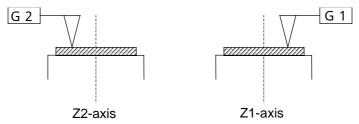
Main parts of the height gauge are described here.



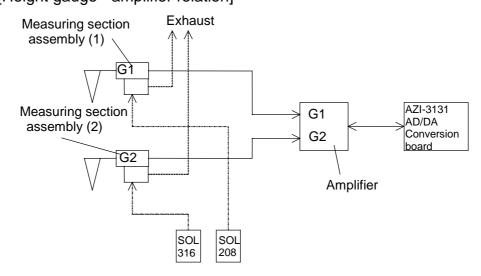
Configuration of the height gauge system of the machine

The standard set up machine is equipped with one height gauge amplifier, G1 of which is for the Z1 height gauge use and G2 of which is for the Z2 height gauge use.

[Measuring position]



[Height gauge - amplifier relation]



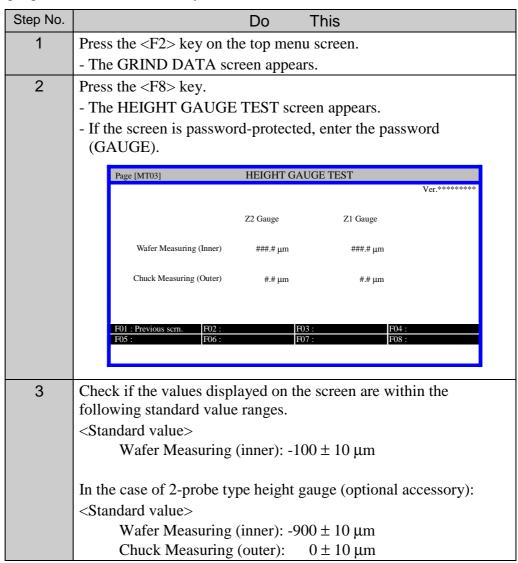
6-2. Height Gauge Indication Value Check

About height gauge indication value check

Before starting full auto operation, each height gauge should be checked as to whether its wafer measurement (inner circumference) and chuck measurement (outer circumference) value indications are within the acceptable ranges. Unless they are within the standard value ranges, normal wafer grinding results cannot be expected for the machine.

Procedures to check the height gauge indication values

The procedures to check the height gauge indication values on the HEIGHT GAUGE TEST screen are described here. If any indicated value is outside its standard value range, adjustment of the height gauge (amplifier or height gauge itself) will be necessary.



Procedures to check the height gauge indication values (Continued)

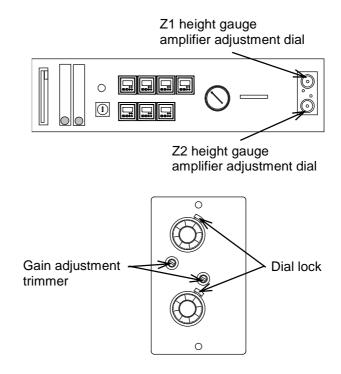
Step No.	Do This
4	If there is any value that is outside the standard value range, correction of that value by adjusting the associated height gauge amplifier will be necessary. Refer to Section 6-3, [Height Gauge Amplifier Adjustment] in this chapter to adjust the height gauge amplifier.
	- If there is any value that deviates from the standard value by \pm 50 μ m or more, adjustment of the height gauge itself will be necessary. Refer to section 6-4, [Height Gauge Adjustment] to adjust the height gauge.

6-3. Height Gauge Amplifier Adjustment

Locations of the amplifier adjustment dials

The height gauge amplifier adjustment dials are located inside the machine front cover (right side) as shown in the figure below.

The gain adjustment trimmers should not be used for adjustment under normal circumstances as they have already been adjusted at the factory before machine shipment.



When any of the height gauge indication values is not within its standard value range, the associated height gauge amplifier should be adjusted. Refer to Section 6-2, [Height Gauge Indication Value Check] in this chapter for the procedures to check the height gauge indication values.

NOTICE

- Before proceeding to adjust the amplifier, check if height gauge coolant water is flowing normally on the height gauge and its temperature is appropriately maintained. If these conditions are not met, you cannot adjust the amplifier properly.
- Touching the gain adjustment trimmers on the amplifier while adjusting the amplifier will adversely affect the measuring accuracy of the height gauge. Do not touch them.

Step No.	Do This		
1	Make sure that height gauge coolant water is flowing normally on the height gauge and its temperature is appropriately maintained.		
2	Call up the unit operation screen (Z1 or Z2) for the Z-axis side where the height gauge amplifier adjustment is going to be made.		
3	Select the [D] and [T1] keys on the manual keyboard.		
	- Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.		
4	Move down the height gauge by pressing the $[\lor]$ key on the manual keyboard.		
5	Check the values of "Gauge (Inner)" and "Gauge (Outer)" indicated on the screen.		
	- If the indicated value(s) deviates by ± 50 μm or more from its standard value, make adjustment of the height gauge system itself referring to section 6-4, [Height Gauge Adjustment]. <standard value=""> Gauge (Inner): -100 ± 10 μm</standard>		
	- In the case of 2-probe type height gauge (optional accessory):		

Procedures to adjust the height gauge amplifier (Continued)

Step No.	Do This
6	Unlock the dial lock of the height gauge amplifier to be adjusted.
	- Do not touch the gain adjustment trimmers.
	Gain adjustment trimmer Dial lock
7	Turn the amplifier adjustment dial to obtain a value that is within
	the range of \pm 1 μm from the standard value as indicated in the step 5.
8	Move up and down the height gauge several times through unit operation.
	 Verify that both the "Gauge (Inner)" and "Gauge (Outer)" values are within the standard value ranges and that their repeatability falls within ± 1 range. If the above value ranges cannot be obtained, go back to the step 3 and repeat the adjustment procedure over again.
	3 and repeat the adjustment procedure over again.

6-4. Height Gauge Adjustment

Procedures to adjust the height gauge

Adjustment of the height gauge should be made when any of the height gauge indication values checked in Section 6-2, [Height Gauge Indication Value Check] deviates from its standard value by \pm 50 μ m or more. The adjustment procedures are as follows.

NOTICE

- Moving the finger beyond the specified range may cause deformation of the spring inside the height gauge, which could adversely affect the gauge's measuring accuracy. It may also cause the seal section to curl, which could incur oil leakage. Be careful not to move the finger by hand beyond the specified range (out: 7 mm, in: 14 mm) when you adjust the height gauge.
- Contactor is an instrument that makes minute thickness measurements. If it is shocked, its measuring accuracy will be adversely affected. Handle it with special care.

Step No.	Do This
1	Set the objective amplifier adjustment dial to 5.00.
	Z1 height gauge amplifier adjustment dial
	Z2 height gauge amplifier adjustment dial
2	Call up the unit operation screen for the Z-axis.
	- To adjust the height gauge at the Z1-axis side:
	Unit operation screen for Z1-axis
	- To adjust the height gauge at the Z2-axis side:
	Unit operation screen for Z2-axis
	- Refer to Section 2, [Unit Operation] in Chapter E for details of
	the unit operation.
3	Select the [D] and [T1] keys on the manual keyboard.
4	Move down the height gauge by pressing the $[\lor]$ key on the manual keyboard.

Step No.	Do This
5	Loosen the contactor retaining screw while supporting the finger by hand. - Be careful not to exert any shock on the height gauge. - Never attempt to move the finger.
	Contactor retaining screw
6	Turn the contactor for adjustment so that the "Gauge (Inner)" and "Gauge (Outer)" values shown on the unit operation screen will fall within the standard value ranges.
	$<$ Standard value> Gauge (Inner): -100 \pm 10 μm
	- In the case of 2-probe type height gauge (optional accessory):
	<standard value=""> Gauge (Inner): -900 ± 10 μm</standard>
	Gauge (Outer): $0 \pm 10 \mu \text{m}$
7	Lightly fasten the contactor retaining screw.
8	 Move up and down the height gauge several times through unit operation. Verify that both the "Gauge (Inner)" and "Gauge (Outer)" values are within the standard value ranges and that their repeatability falls within ± 1 range.
	- If the above conditions are not met, go back to the step 3 and repeat the adjustment procedures all over again.
9	Tighten the contactor retaining screw (tightening torque: 2.45 ± 0.49 N·m)
10	 Check the tightness of the contactor. It is judged normal if the contactor does not rotate when a torque of 0.2 N⋅m is applied. If the contactor rotates, it is necessary to replace the finger with new one. Contact your nearest Disco office or Disco service office.

7. Chuck Table Maintenance

Summary of this section

This section describes about the procedures to replace as well as to make inclination adjustment of the chuck table. Replacing of the chuck table should follow the self-grinding sequence (since self-grinding is performed when the chuck table is replaced).

Checking or adjusting of the chuck table inclination can be made through unit operation (on the Z1 screen/Z2 screen).

Operation flow

Replacing of the chuck table should proceed following the operation steps as described below.

7-1	Starting the Self-grinding Sequence
7-2	Removal of Chuck Table
7-3	Chuck Assembly Inclination Check
7-4	Chuck Assembly Inclination Adjustment
7-5	Installation of Chuck Table
7-6	Chuck Table Inclination Check

Make sure to observe the following safety precautions when you replace or make inclination adjustment of the chuck table



- If you put your hands or fingers in the spindle section while the spindle is still rotating, they may be cut off. Before starting the wheel replacing work, visually check to make sure that spindle rotation is completely stopped. After the occurrence of an alarm condition in particular, it can happen that the spindle inverter gets out of control and enters the free-running state.
- While the wheel replacing work is underway, make sure that no other persons touch the machine. Inadvertent activation of the Zaxis or spindle could cause an accident involving cutting off of your hands and fingers.
- During wheel replacement, the Z-axis is moved up and down with the safety covers opened. Make sure that no parts of your body come into contact with the driving sections as they could be caught or cut off.
- During warming up operation, the spindle is rotated. If you place your hands or fingers in the rotating spindle section, they may be cut off. Before you remove the wheel, stop warming up operation and visually check to be sure that spindle rotation is completely stopped.

NOTICE

- Check to be sure that no tools or block gauge are left in the machine when the wheel replacing work is done. If you proceed to the next step with such irrelevant items left in the machine, they may be scattered or caught by the machine units, causing the machine to break.
- Be careful not to drop the chuck table or inclination measuring jig when you replace or perform maintenance on the chuck table.
 Dropping them may damage the chuck table or height gauge.

Prior to starting the work

The following tools should be readied to perform maintenance on the chuck table.

Torque wrench
Allen wrench (5 mm)
Lint-free cloth
Oil stone
Alcohol
Chuck table for replacement (new chuck table)

7-1. Starting the Self-grinding Sequence

Procedures to start the self-grinding sequence

The self-grinding sequence should be started following the operation steps as described below.

Step No.	Do This
1	Initialize the machine.
	- Refer to Section 1-4, [Initialization] in Chapter D of the
	Operation Manual for the procedures to initialize the machine.
2	Remove the wheel.
	- Refer to Section 4-2, [Removing the Wheel for Replacement] in
	Chapter D for the procedures to remove the wheel.

Continued to the next section.

7-2. Removal of Chuck Table

Procedures to remove the chuck table

The procedures to remove the chuck table are described here.

NOTICE

- When you remove the chuck table, be careful not to bump it against the height gauge or other machine part. If the chuck table is scratched or nicked, it will adversely affect the machine's grinding accuracy.
- Hold the chuck table with both hands as it is heavy.

Step No.	Do This
	(Continued from the previous section)
1	Using an Allen wrench (5mm), remove the chuck table retaining screws (12 pcs.)
2	Press down the chuck table to displace it rearward for removal. - The chuck table is held to the chuck table assembly by means of water. So, it becomes easily removable if you slightly lift it while allowing air to enter from its corners.
3	Wipe the back surface of the removed chuck table with a lint-free cloth.
4	Store the removed chuck table in a safe place so that it will not be flawed.
5	Turn ON the machine power.

Continued to the next section.

7-3. Chuck Assembly Inclination Check

About inclination check

The spindle axis and the chuck assembly axis are both slightly inclined by design. Inclination check of the chuck assembly should be made to check if they are properly inclined each other.

Inclination check procedures

The procedures to check if the chuck table assembly is properly inclined are described here.

Step No.	Do This	
	(Continued from the previous section)	
1	Make sure that spindle rotation is completely stopped.	
2	Attach the inclination measuring jig to the Z-axis spindle which will be used for self-grinding. - Screw in the mounting screw of the inclination measuring jig into	
	the screw hole of the spindle axis as shown in the figure below.	
	Spindle Dial gauge retaining screw Dial gauge Screw hole Chuck assembly Inclination measuring jig	
3	Adjust the dial gauge retaining screw and the dial gauge itself so that the gauge end passes through the center of the chuck table assembly surface and that the gauge dial is easily readable.	
4	Move the Z-axis down in unit operation until the dial gauge end lightly touches the chuck table assembly surface.Refer to Section 2, "Unit Operation" in Chapter E for details of the unit operation.	
5	Move the dial gauge end to a left point on the chuck table assembly (as viewed from the machine top side) to set up a reference position for inclination measurement by setting the gauge dial to "0" there.	

Step No.	Do This		
6	Move the dial gauge end to the center and right positions respectively on the chuck assembly surface and register the measured values.		
	Spindle axis		
	(Reference point: left) (0) (Measuring point: right) (-20 ± 2 μm)		
	(Measuring point: center) (-11 ± 1 μm) Chuck table assembly		
7	Check if the measured values are in the standard value ranges as indicated below.		
	<standard value=""></standard>		
	Left: 0 (reference point)		
	Center: $-11 \pm 1 \mu m$ Right: $-20 \pm 2 \mu m$		
8	If the measured values of both the center and right points are within the standard value ranges, it is not be necessary to adjust inclination of the chuck table assembly. In that case, proceed to Section 7-5, [Installation of Chuck Table] in this chapter.		
	- If there is a value that is outside the standard value range, inclination adjustment of the chuck table assembly must be made. Refer to Section 7-4, [Chuck Assembly Inclination Adjustment] in this chapter to adjust the inclination of the chuck table assembly.		

Continued to Section 7-4 or 7-5.

7-4. Chuck Assembly Inclination Adjustment

Summary of this section

This section describes the procedures to adjust the inclination of the chuck table assembly when the value(s) measured in section 7-3, [Chuck Assembly Inclination Check] is outside the standard value range.

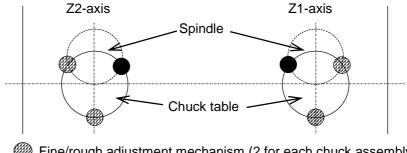
If the measured values of both the center and right points are within the standard value ranges, it is not necessary to adjust the inclination of the chuck table assembly. In that case, proceed to section 7-5, [Installation of Chuck Table].

Locations of inclination adjustment mechanisms

Since the spindle axis is fixed, inclination adjustment of the spindle axis versus chuck assembly axis of this machine should be made using the inclination adjustment mechanisms of the chuck table assembly.

Each chuck assembly has three inclination adjustment mechanisms, two of which have both the fine and rough adjustment sections and the other has the rough adjustment section only.

The fine adjustment sections only should be used for inclination adjustment and the rough adjustment sections should not be used.



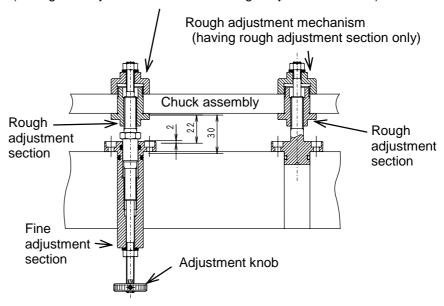
Fine/rough adjustment mechanism (2 for each chuck assembly)

Rough adjustment mechanism (1 for each chuck assembly)

Configuration of inclination adjustment mechanism (Fine/rough adjustment mechanism and rough adjustment mechanism)

Configuration of the inclination adjustment mechanism is described here.

Fine/rough adjustment mechanism (having fine adjustment section and rough adjustment section)



Configuration of inclination adjustment mechanism (Fine/rough adjustment mechanism and rough adjustment mechanism) (Continued)

Name		Function	
Fine adjustment	The adjustment knob of the fine adjustment section of the		
section of the	fine/rough adjustment mechanism is turned in CCW or		
Fine/rough		to move up or down the chuck assembly.	
adjustment	•	t adjust the inclination of the chuck	
mechanism	assembly properly by the use of the adjustment knob,		
	contact your office.	nearest DISCO office or DISCO service	
	(The turning direction of the adjustment knob is as		
	viewed from t	he machine bottom side.)	
	CW	The chuck assembly moves down.	
	direction	(approx. 0.1 mm/turn).	
	CCW	The chuck assembly moves up.	
	direction	(approx. 0.1 mm/turn).	
Rough adjustment	The rough adj	ustment mechanism or the rough	
mechanism and		ction of the fine/rough adjustment	
the rough		turned in CCW or CW direction to move	
adjustment	up or down th	e chuck assembly.	
section of the	- The rough ac	djustment section should be used for special	
Fine/rough	adjustments such as the adjustment after the chuck table		
adjustment	is replaced.		
mechanism	(The turning direction is as viewed from the machine		
	bottom side.)		
	CW	The chuck assembly moves down.	
	direction	(approx. 1.1 mm /turn).	
	CCW	The chuck assembly moves up.	
	direction	(approx. 1.1 mm /turn).	

The procedures to adjust the inclination of the chuck table assembly are described here.

described	more.			
Step No.	Do This			
	(Continued from the previous section)			
1	Remove the cover as shown in the figure below at the Z-axis side where the inclination adjustment is going to be made.			
	<z2-axis side=""> <z1-axis side=""></z1-axis></z2-axis>			
	A			
	Remove this cover for adjusting inclination of the Z2 chuck table assembly. Remove this cover for adjusting inclination of the Z1 chuck table assembly.			
2	Using the adjustment knob of the fine adjustment section of the associated fine/rough adjustment mechanism, adjust the inclination of the chuck assembly so that the measured inclination values (on the center and right measuring points) fall within their acceptable value ranges. - Refer to Section 7-3, [Chuck Assembly Inclination Check] in this chapter for the procedures to measure the inclination values of the chuck assembly and their reference values. - Turning the adjustment knob in CW direction moves down the chuck assembly (0.1 mm/turn). - Turning the adjustment knob in CCW direction moves up the chuck assembly (0.1 mm/turn). (The turning direction is as viewed from the machine bottom side.) - If you cannot adjust the inclination of the chuck assembly properly by the use of the adjustment knob, contact your nearest DISCO office or DISCO service office.			
	Adjustment knob			
3	Install the cover removed in the step 1.			
	·			

Continued to the next section.

7-5. Installation of Chuck Table

Procedures to install the chuck table

This section describes the procedures to install the chuck table when inclination check/adjustment of the chuck assembly completes.

NOTICE

- If dirt or any other foreign matter exists between the chuck table and chuck table assembly, the finished wafer shapes (TTV in particular) will be adversely affected. Before installing the chuck table, make sure that there is no foreign matter between the chuck table back surface and the chuck table assembly surface.
- Mount the chuck table on the chuck table assembly gently so that no physical shock is exerted. If the chuck table or chuck assembly is nicked or scratched, the machine's grinding accuracy is adversely affected.

Do This
(Continued from the previous section or Section 7-3)
If the machine power is turned ON, turn it OFF.
- The chuck table cannot be turned by hand unless the machine
power is turned OFF.
Wipe dirt off the chuck table back surface and the chuck table
assembly surface using a lint-free cloth moistened with alcohol
and oilstone.
Mount the chuck table on the chuck table assembly in such a
manner that the chuck table assembly screw holes and the chuck
table screw holes align each other.
Insert the chuck table retaining screws (12 pcs.) into the screw
holes. With an Allen wrench (5 mm), turn the screws finger-tight
for now.
With the provided torque wrench, tighten the screws equally in the
order of 1 through 12 as shown in the figure below (tightening
torque: 4 N·m).
12 7 2
5
10
3
8 6
Turn ON the machine power.
Perform self-grinding of the chuck table.
- For the procedures to perform self-grinding, refer to Section 4-3,
[Installing the Self-grinding Wheel] through Section 4-11,
[Height Gauge Indication Value Check] in Chapter D.

Continued to the next section.

7-6. Chuck Table Inclination Check

About chuck table inclination check

The spindle axis and the chuck table are both slightly inclined by design. Inclination check of the chuck table should be made to check if they are properly inclined each other.

Inclination check procedures

The procedures to check if the chuck table is properly inclined are described here.

Step No.	Do This
	(Continued from the previous section)
1	Make sure that spindle rotation is completely stopped.
2	Attach the inclination measuring jig to the spindle at the Z-axis side where chuck table inclination check is going to be performed. - Screw in the mounting screw of the inclination measuring jig into the screw hole of the spindle axis as shown in the figure below. Spindle Dial gauge retaining screw Dial gauge Chuck assembly Inclination measuring jig
3	Adjust the dial gauge retaining screw and the dial gauge itself so that the gauge end passes through the center of the chuck table surface and that the gauge dial is easily readable.
4	Move the Z-axis down in unit operation until the dial gauge end lightly touches the chuck table surface.Refer to Section 2, "Unit Operation" in Chapter E for details of the unit operation.
5	Move the dial gauge end to a left point on the chuck table surface (as viewed from the machine top side) to set up a reference position for inclination measurement by setting the gauge dial to "0" there.

Step No.	Do This	
6	Move the dial gauge end to the center and right positions respectively on the chuck table surface and register the measured values.	
	Spindle axis	
	(Reference point: left) (0) (Measuring point: right) (-20 ± 2 μm)	
	(Measuring point: center) (-11 ± 1 μm) Chuck table assembly	
7	Check if the measured values are in the standard value ranges as	
	indicated below. <standard value=""> Left: 0 (reference point) Center: 0 ± 1 μm Right: -20 ± 5 μm</standard>	
	- If there is a value that is outside the standard value range, inclination adjustment of the chuck table assembly must be made. Refer to Section 7-4, [Chuck Assembly Inclination Adjustment] in this chapter to adjust the inclination of the chuck table assembly.	
8	Remove the inclination measuring jig from the spindle axis end.	

8. Wafer Recovery

About wafer recovery

The wafer recovery function automatically recovers the wafers that are left in the various machine units when a situation such as described below occurs during full auto operation. Cracked wafers, however, may not be recoverable depending on their conditions.

- The machine power turns OFF due to a D-class error occurrence.
- A power-related failure (such as power outage) occurs.
- The EMO switch button is pressed.
- Full auto operation is forcibly terminated. (Refer to Section 2-6-2-3, [Forcible Termination] in Chapter D of the Operation Manual.)

Procedures to recover wafers left in the machine

The procedures to recover the wafers left in the various machine units are described here.



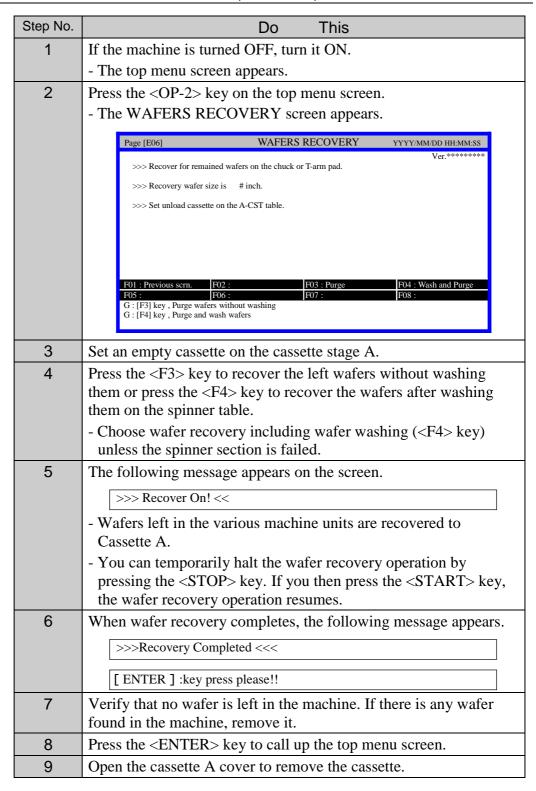
Wear protective gloves and goggles and use tweezers to manually remove broken wafers. If you handle them with bare hands, your hands may get stung.

Also make sure to turn OFF the machine power and check that all axes are completely stopped before proceeding with manual wafer removal.

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.



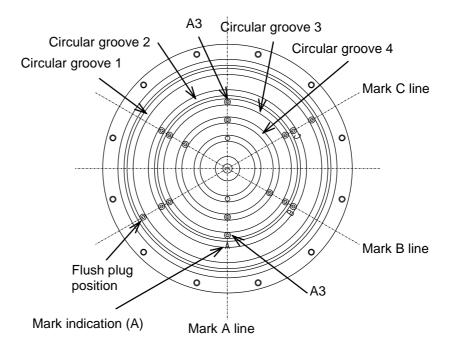
9. Wafer Size Change

About grinding wafer size change (when the universal chuck table is used)

When you change the grinding wafer size combination from the factory-set one, you must change the vacuum lines under the chuck table as well. It is also necessary to change the related parameter settings in the Maker Maintenance screen. Contact your nearest DSICO office or DISCO service office when you change the grinding wafer size combination.

Locations of flush plugs (for reference)

The layout of the flush plugs in the universal chuck table varies by the combination of the grinding wafer sizes.



Wafer size combination	Flush plug position
4,5,6 inch	A3,B2,B4,C1,C3
4,5,8 inch	A3,B2,B4,C2,C3
4,6,8 inch	A3,B3,B4,C2,C3
5,6,8 inch	B3,B4,C2,C3

^{*} The flush plug position "A3" is where the circular groove 3 and the mark A line meets.

E. MACHINE MAINTENANCE

Contents of this chapter

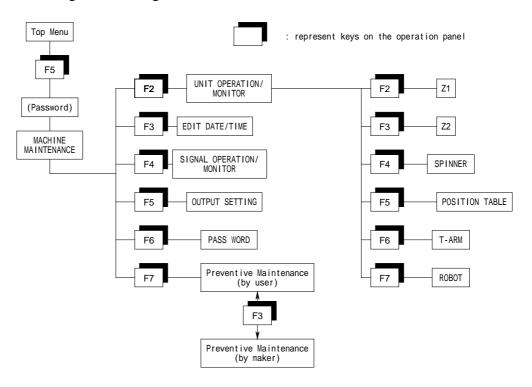
This chapter explains the various maintenance operations that can be selected from the MACHINE MAINTENANCE screen.

Section No.	Title	Contents
1	MACHINE MAINTENANCE Screen	- Configuration of the MACHINE MAINTENANCE screen
2	Unit Operation	- Procedures to independently operate the various machine units
3	Time and Date Editing	- Procedures to edit the date and time of the machine
4	Signal Monitoring	 Procedures to perform signal monitoring Contents of the SIGNAL OPERATION/MONITOR screen
5	External Indicator Setting	- Procedures to change the pilot lamp and buzzer settings
6	Password Setting	- Procedures to check and change the password settings
7	Preventive Maintenance Function	- Explanation about the preventive maintenance function

1. MACHINE MAINTENANCE Screen

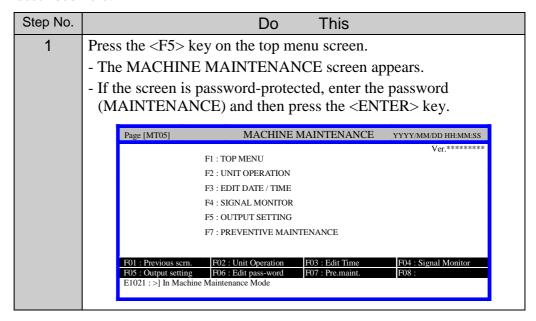
Menu Tree of the MACHINE MAINTENANCE Screen

Following is the configuration of the MACHINE MAINTENANCE screen.



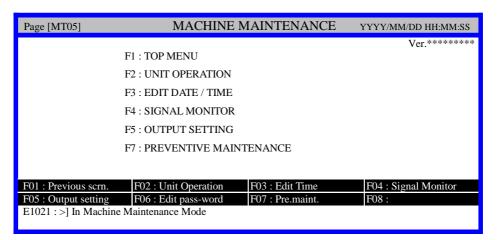
Calling up the MACHINE MAINTENANCE Screen

The procedures to call up the MACHINE MAINTENANCE screen are described here.



The MACHINE MAINTENANCE screen is detailed here.

[Screen]



[Function Key]

Press	То
F1	Return to the top menu screen.
F2	Call up the UNIT OPERATION/MONITOR screen.
F3	Call up the EDIT DATE/TIME screen.
F4	Call up the SIGNAL OPERATION/MONITOR screen.
F5	Call up the OUTPUT SETTING screen.
F6	Call up the PASS WORD screen.
F7	Call up the Preventive Maintenance Screen.
F8	(Not used)

2. Unit Operation

About unit operation

In unit operation, various machine units can be independently operated through the use of the manual keyboard. This function allows individual operation of the machine units for maintenance purposes.

On the respective unit operation screen, you can also check the status of the input/output signals relating to the unit.

Summary of this section

This section describes the procedures to perform unit operation. Each unit operation screen is also detailed.

Section No.	Title	Contents
2-1	Unit Operation Procedures	- Procedures to independently operate the machine units
2-2	Unit Operation Screens	- Details of each unit operation screen

2-1. Unit Operation Procedures

Summary of this section

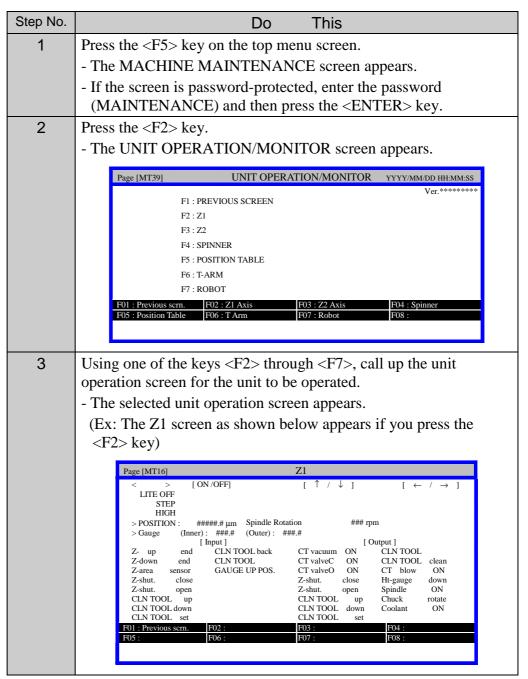
This section describes about the procedures to perform unit operation following the operation steps as indicated below.

2-1-1	Calling up of Unit Operation Screen	
2-1-2	Manual Keyboard Connection	
2-1-3	Performance of Unit Operation	

2-1-1. Calling up of Unit Operation Screen

Procedures to call up unit operation screen

To perform unit operation, the unit operation screen for the unit to be operated must be called up. The procedures to call up the unit operation screen are described here.



Continued to the next section.

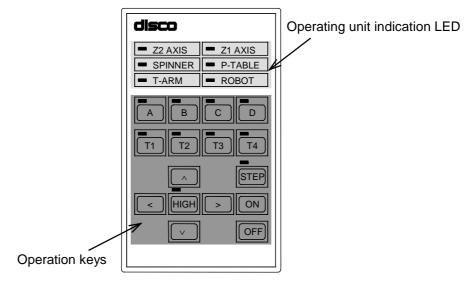
2-1-2. Manual Keyboard Connection

About manual keyboard

The manual keyboard is used to operate the various machine units independently. It is variously connected to its connectors in the machine depending on the unit to operate.

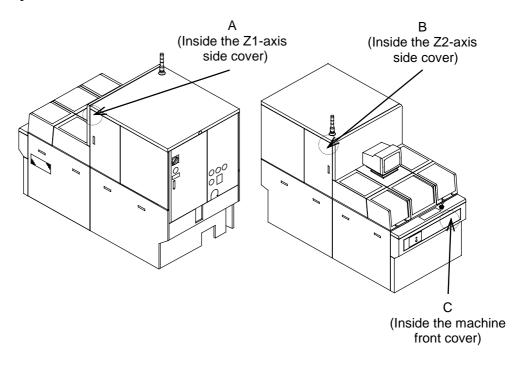
Configuration of manual keyboard

The manual keyboard is configured as shown in the figure below.



Operating uni indication	Z1 AXIS	Lights when the unit operation of the Z1-axis is available.
LED	Z2 AXIS	Lights when the unit operation of the Z2-axis is available.
	SPINNER	Lights when the unit operation of the spinner table is available.
	P-TABLE	Lights when the unit operation of the position table is available.
	T-ARM	Lights when the unit operation of the T-arm is available.
	ROBOT	Lights when the unit operation of the robot is available.
Operation	$A \cdot B \cdot C \cdot D$	Keys to select the operations to
keys	T1 • T2 • T3 • T4	perform. When pressed for selection, the LED on the upper left corner of
	STEP • HIGH	the selected key comes on. To cancel
		the selection, press the same key again to extinguish the LED.
	• • < • >	Keys to execute (or stop) operations.
	ON · OFF	

Locations of the manual keyboard connectors in the machine are shown in the figure below. The keyboard connector to be used depends on the unit to operate.



Unit to operate	Connector
- Z1-axis	A (inside the Z1-axis side cover)
- Z2-axis	B (inside the Z2-axis side cover)
RobotPosition TableSpinner tableT-arm	C (inside the machine front cover)

Manual keyboard connection

The procedure to connect the manual keyboard to its connector is described here.

Step No.	Do This
	(Continued from the previous section)
1	Connect the manual keyboard correctly to its connector referring to the above explanations.

Continued to the next section.

2-1-3. Performance of Unit Operation

Procedures to perform unit operation

Unit operation is performed through the use of the manual keyboard. In this section, the basic operation procedures and the configuration of the unit operation screen common to all the units are described.

For details of the operable items and key allocation on each unit screen, refer to section 2-2, [Unit Operation Screens].

NOTICE

Before you perform unit operation, check to be sure that no wafers or tools are left inside the machine. If the drive sections of the machine move with such irrelevant items left in the machine, machine breakage may result.

Step No.	Do This	
	(Continued from the previous section)	
1	Turn ON one of the [A], [B], [C] and [D] keys on the manual keyboard.	
	- If you press the selected key to turn it ON, its LED on the upper left corner comes ON. If you press the same key again, the LED goes off and the key is turned OFF.	
2	Turn ON one of the [T1], [T2], [T3] and [T4] keys.	
3	Turning ON of the [HIGH] or [STEP] key is also required for certain operations.	
	- There are some operations that cannot be performed when the [HIGH] or [STEP] key is turned ON.	
4	Press the cursor key ($[\land]$ [\lor] [\gt]), [ON] key or [OFF] key as needed.	
	- The selected function is executed.	
	- If not, wrong keys may have been pressed or the manual keyboard may have been erroneously connected.	

2-2. Unit Operation Screens

Summary of this section

This section describes about the executable operations as well as the input/output signals that can be checked on each of the unit operation screens.

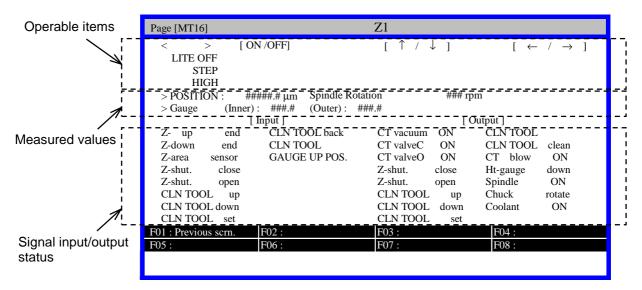
Section No.	Title	Contents
2-2-1	Configuration of Unit Operation Screen	- Configuration of the unit operation screen
2-2-2	Unit Operation Screen for Z1-axis/Z2-axis	- Details of the unit operation (Z1/Z2) screen
2-2-3	Unit Operation Screen for Spinner	- Details of the unit operation (SPINNER) screen
2-2-4	Unit Operation Screen for Position Table	- Details of the unit operation (POSITION TABLE) screen
2-2-5	Unit Operation Screen for T-arm.	- Details of the unit operation (T-ARM) screen
2-2-6	Unit Operation Screen for Robot	- Details of the unit operation (ROBOT) screen

2-2-1. Configuration of Unit Operation Screen

Configuration of unit operation screen

Configuration of the unit operation screen is described here using the Z1-axis screen by way of example.

Besides performance of unit operation, the input/output signals from the machine sensors, switches, etc. relating to the unit can be checked on the unit operation screen.



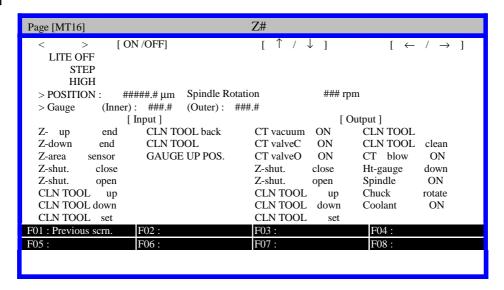
Item	Description
Operable items	Executable operations for the unit are indicated Refer to sections 2-2-2 through 2-2-6 for details of the operable items and key allocation for the respective screens.
	 Meanings of the operable item indications on the above screen (example) are as follows. If you press the [△] key (or [∨] key) on the manual keyboard when both the [STEP] and [HIGH] keys are turned OFF (LITE OFF), the Z1-axis moves up (or down) in low speed.
	 If you press the [△] key (or [∨] key) when the [STEP] key is turned ON, the Z1-axis moves up (or down) by 1 μm If you press the [△] key (or [∨] key) when the [HIGH] key is turned ON, the Z1-axis moves up (or
	down) in high speed.
Measured values	Measured values relating to the selected unit are shown.
Signal input/output status	The signal input/output status of the machine sensors, switches, etc. relating to the unit is indicated. Showing a signal item in reverse video (highlighted) means that the item as it is indicated is active.

2-2-2. Unit Operation Screen for Z1-axis/Z2-axis

Unit operation (Z1/Z2) screen

The unit operation (Z1/Z2) screen is detailed here.

[Screen]



[Measured value indications]

Item	Description	
POSITION	The Z1-axis (Z2-axis) position (µm) with reference to its initial position is	
	shown.	
Spindle Rotation	The present spindle rotative speed (rpm) is shown.	
Gauge (Inner)	Height gauge measurement value (inner circumference) is shown.	
Gauge (Outer)	Height gauge measurement value (outer circumference) is shown.	

[Input status]

Item	Highlighted when
Z - up end	The Z1-axis (Z2-axis) is in the upper limit position.
Z - down end	The Z1-axis (Z2-axis) is in the lower limit position.
Z - area sensor	The Z1-axis (Z2-axis) is in the detection area of the area sensor.
Z-shut close	(Not used in this machine)
Z-shut open	(Not used in this machine)
CLN TOOL up	The washing unit is in UP position.
CLN TOOL down	The washing unit is in DOWN position.
CLN TOOL set	The washing unit is in the operation position.
CLN TOOL back	The washing unit is in the escape position.
CLN TOOL	The washing unit is operating (swaying back and forth).
GAUGE UP POS. The height gauge is in UP position.	

[Output status]

Item	Highlighted when	
CT vacuum ON	The chuck table vacuum system turns ON.	
CT valveC ON	The chuck table vacuum valve (Center) turns ON.	
CT valveO ON	The chuck table vacuum valve (Outer circumference) turns ON.	
Z-shut. close	(Not used in this machine)	
Z-shut. open	(Not used in this machine)	
CLN TOOL up	The washing unit moves to UP position.	
CLN TOOL down	The washing unit moves to DOWN position.	
CLN TOOL set	The washing unit moves to the operation position.	
CLN TOOL	The washing unit operates (starts swaying back and forth).	
CLN TOOL clean	Cleaning water of the washing unit turns ON.	
CT blow ON	The chuck table water flow/air blow system turns ON.	
Ht-gauge down	The height gauge moves to DOWN position.	
Spindle ON	The spindle starts rotating.	
Chuck rotate	The chuck table starts rotating.	
Coolant ON	Wheel coolant water turns ON.	

[Key assignment] ("—" indicates no key selection: LITE OFF)

S	Selection key		Execution key	Operation details
A	T1	-	[]/[]	Z-axis jog movement in low speed
		STEP	[]/[]	Z-axis up/down movement by 1 μm step
		HIGH	[]/[]	Z-axis jog movement in high speed
	T2	-	[]/[]	Z-axis jog movement in low speed
		STEP	[]/[]	Z-axis up/down movement by 10 μm step
		HIGH	[]/[]	Z-axis jog movement in high speed
	Т3	-	[]/[]	Z-axis jog movement in low speed
		STEP	[]/[]	Z-axis up/down movement by 100 μm step
		HIGH	[]/[]	Z-axis jog movement in high speed
	T4	STEP	[]/[]	Z-axis up/down movement by 1mm step
		-	[ON] / [OFF]	Memorization of wheel setup position
В	T2	-	[ON] / [OFF]	Initialization (The Z-axis moves to its initial position.)
	Т3	-	[ON] / [OFF]	Setup position check (The Z-axis moves to its upper end position and then moves to the setup position.)
	T4	-	[ON] / [OFF]	Chuck table rotation (rotative speed set up in the GRIND DATA screen)
		-	[]/[]	Chuck table rotation (rotative speed set up in the WARM UP screen)
С	T1	-	[ON] / [OFF]	Chuck table vacuum ON/OFF
	T2	-	[ON] / [OFF]	Chuck table water flow/air blow ON/OFF
	Т3	-	[ON] / [OFF]	Wheel coolant ON/OFF
	T4	-	[ON] / [OFF]	Spindle rotation (rotative speed fixed to 600 rpm) ON/OFF *1
		-	[]/[]	Changing the spindle rotative speed to coincide it with that of the dressing program *2
		-	[<]/[>]	Changing the spindle rotative speed to coincide it with that of the self-grinding program *3
		HIGH	[ON] / [OFF]	Changing the spindle rotative speed to coincide it with that of the WARM UP screen *5
		HIGH	[]/[]	Changing the spindle rotative speed to coincide it with that of the GRIND DATA screen *4

Unit operation (Z1/Z2) screen (Continued)

Selection key		Execution key	Operation details	
D	T1	-	[]/[]	Height gauge up/down movement
	T2	-	[]/[]	Z-axis escape to its upper end position
		-	[<]/[>]	(Not used in this machine)
	Т3	-	[ON] / [OFF]	Washing unit action:
				- The brush rotates when the brush is installed.
				- No action when the oilstone is installed.
		-	[]/[]	Vertical movement of the washing unit
		-	[<]/[>]	Turning movement of the washing unit
		HIGH	[ON] / [OFF]	Washing sequence action
				- ON: The washing unit moves to the chuck table position to
				perform washing.
				- OFF: The washing unit move to the escape position.
		HIGH	[]/[]	Washing sequence action within the predefined time period (user-specified spec.)
		STEP	[ON] / [OFF]	Washing unit cleaning water ON/OFF
		STEP	[<]/[>]	Washing unit swaying (back and forth) action:
				- Swaying (back and forth) action when the oilstone is installed.
				- No action when the brush is installed.
	T4	-	[ON] / [OFF]	Z-axis initialization (moving to the Z-axis initial position)

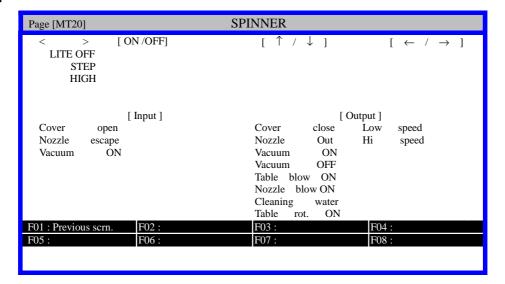
The operations *1 through *4 cannot be performed unless the operation *5 is turned ON ([ON] key is pressed). Turn ON the operation *5 before performing the operations 1 through *4.

2-2-3. Unit Operation Screen for Spinner

Unit Operation (SPINNER) Screen

The unit operation (SPINNER) screen is detailed here.

[Screen]



[Measured value indications]

There is no value-measuring items to be indicated in the unit operation (SPINNER) screen.

[Input status]

Item Highlighted when	
Cover open	The spinner cover is open.
Nozzle escape	The washing water nozzle is in the escape position.
Vacuum ON	The spinner table vacuum system is turned ON.

[Output status]

Item	Highlighted when	
Cover close	The spinner cover closes.	
Nozzle Out	The washing water nozzle turns to the operating position.	
Vacuum ON	The spinner table vacuum system turns ON.	
Vacuum OFF	The spinner table vacuum system turns OFF.	
Table all blow The spinner table air-blow system turns ON.		
Nozzle blow ON The nozzle air-blow system turns ON.		
Cleaning wafer	Wafer washing water turns ON.	
Table rot. ON	le rot. ON The spinner table rotation system turns ON	
Low speed	The spinner table rotates in low speed.	
Hi speed	The spinner table rotates in high speed.	

[Key assignment] ("—" indicates no key selection: LITE OFF)

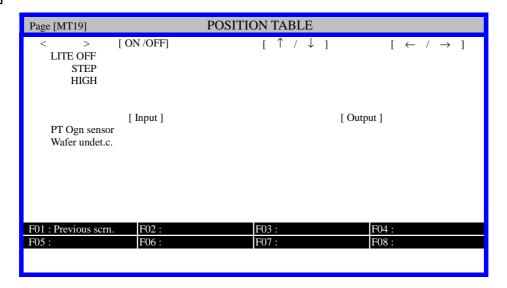
S	Selection key		Execution key	Operation details
A	T1	-	[ON] / [OFF]	Table vacuum ON/OFF
		STEP	[ON] / [OFF]	Table air blow ON/OFF
	T2	-	[<]/[>]	Nozzle turning
				(Operation condition: The T-arm is in NEUTRAL position.)
	T3	-	[ON] / [OFF]	Nozzle air blow ON/OFF
	T4	-	[ON] / [OFF]	Wafer washing water ON/OFF
В	T1	-	[ON] / [OFF]	Table rotation in low speed
				(Operation condition: The spinner cover is closed.)
		HIGH	[ON] / [OFF]	Table rotation in high speed
				(Operation condition: The spinner cover is closed.)
	T2	1	[]/[]	Spinner cover Open/Close movement
				(Operation condition: The T-arm is in NEUTRAL position.)
C	T1	-	[ON] / [OFF]	Sequence operation (spinner washing)
D	T4	-	[ON] / [OFF]	Spinner unit initialization

2-2-4. Unit Operation Screen for Position Table

Unit Operation (POSITION TABLE) Screen

The unit operation (POSITION TABLE) screen is detailed here.

[Screen]



[Measured value indications]

There is no value-measuring items to be indicated in the unit operation (POSITION TABLE) screen.

[Input status]

Item	Highlighted when
PT Ogn sensor	The wafer centering guide is in the initial position.
No Wafer det.	No wafer is detected.

[Output status]

There is no output signal items that are indicated in the unit operation (POSITION TABLE) screen.

[Key assignment] ("—" indicates no key selection: LITE OFF)

Selection key		Execution key	Operation details		
A	T1	-	[<] / [>] Jog movement for wafer centering (Limit: 4-inch wafer position)		
В	T1	-	[<]/[>] Wafer position (centered position) check (4-inch wafer)		
	T2	-	[<]/[>] Wafer position (centered position) check (5-inch wafer)		
	Т3	-	[<]/[>]	Wafer position (centered position) check (6-inch wafer)	
	T4	-	[<]/[>]	Wafer position (centered position) check (8-inch wafer)	
D	T4	-	[ON] / [OFF]	Position table unit initialization (including the robot)	

2-2-5. Unit Operation Screen for T-arm

Z-axis escape

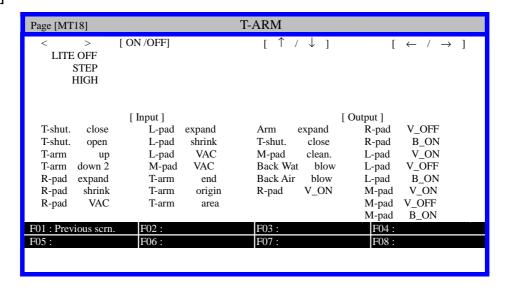
It is necessary to move the Z-axes to their upper end positions when you perform unit operation of the T-arm. The procedures to move the Z-axes to their upper end position are described here.

Step No.	Do This		
1	Select T-ARM on the UNIT OPERATION/MONITOR screen.		
	- The following message appears.		
	Escape up each Z axis		
	(YES [ENTER] key)		
2	Press the <enter> key.</enter>		
	- The Z-axes move to their upper end positions and the unit operation of the T-arm become operable.		

Unit operation (T-arm) screen

The unit operation (T-arm) screen is detailed here.

[Screen]



[Measured value indications]

There is no value-measuring items to be indicated in the unit operation (T-ARM) screen.

[Input status]

Item	Highlighted when		
T-shut close	T-shutter is closed.		
T-shut open	T-shutter is opened.		
T-arm up	The T-arm is in UP position.		
T-arm down2	T-arm is in DOWN position		
R-pad expand	The T-arm R-pad is extended.		
R-pad shrink	The T-arm R-pad is contracted.		
R-pad VAC	The T-arm R-pad vacuum system is turned ON.		
L-pad expand	The T-arm L-pad is extended.		
L-pad shrink	The T-arm L-pad is contracted.		
L-pad VAC	The T-arm L-pad vacuum system is turned ON.		
M-pad VAC	The T-arm M-pad vacuum system is turned ON.		
T-arm end	The T-arm is at its turning end position.		
T-arm origin	The T-arm is at its initial position.		
T-arm area	The T-arm is in the detection area of the area sensor.		

[Output status]

Item	Highlighted when	
Arm expand	The T-arm extends.	
T-shut close	The T-shutter closes.	
M-pad clean	T-arm M-pad washing water turns ON.	
Back Wat. blow	The wafer-back-surface washing water system turns ON	
Back Air blow	The wafer-back-surface air blow system turns ON.	
R-pad V-ON	The vacuum system of the T-arm R-pad turns ON.	
R-pad V-OFF	The vacuum system of the T-arm R-pad turns OFF.	
R-pad B-ON	The air blow system of the T-arm R-pad turns ON.	
L-pad V-ON	The vacuum system of the T-arm L-pad turns ON.	
L-pad V-OFF	The vacuum system of the T-arm L-pad turns OFF.	
L-pad B-ON	The air blow system of the T-arm L-pad turns ON.	
M-pad V-ON	The vacuum system of the T-arm M-pad turns ON.	
M-pad V-OFF	The vacuum system of the T-arm M-pad turns OFF.	
M-pad B-ON	The air blow system of the T-arm M-pad turns ON.	

[Key assignment] ("—" indicates no key selection: LITE OFF)

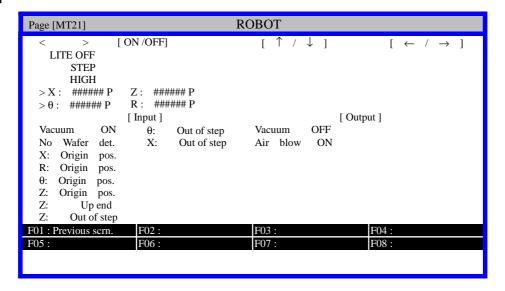
Selection key		Execution key	Operation details		
A	T1	-	[ON] / [OFF]	7] / [OFF] R-Pad vacuum	
		STEP	[ON] / [OFF]	R-Pad air-blow	
	T2	-	[ON] / [OFF]	L-Pad vacuum	
		STEP	[ON] / [OFF]	L-Pad air-blow	
	Т3	-	[ON] / [OFF]	M-Pad vacuum	
		STEP	[ON] / [OFF]	M-Pad air-blow	
	T4	-	[]/[]	T shutter open/close	
В	T1	-	[]/[]	T-arm up/down	
	T2	-	[<]/[>]	<u> </u>	
		STEP	[<]/[>]	Extension/contraction of R-arm	
		HIGH	[<]/[>]	Extension/contraction of L-arm	
	Т3	-	[<]/[>]	T-arm jog movement	
	T4	-	[]/[]	T shutter open/close	
С	T1	-	[ON] / [OFF]	Wafer-back-surface wash water ON/OF (for wafer before being placed on the spinner table)	
	T2	-	[ON] / [OFF]	Wafer-back-surface drying air ON/OF (for wafer before being placed on the spinner table)	
	Т3	-	[ON] / [OFF]	M-pad washing water ON/OFF	
	T4	-	[]/[]	T shutter open/close	
D	T1	-	[ON] / [OFF]	Sequence operation (loading)	
		STEP	[ON] / [OFF]	Sequence operation (unloading)	
	T4	-	[ON] / [OFF]	T-arm unit initialization	

2-2-6. Unit Operation Screen for Robot

Unit operation (ROBOT) screen

The unit operation (ROBOT) screen is detailed here.

[Screen]



[Measured value indications]

Item	Description
X:	The robot X-axis position (pulse) with reference to the initial position is shown.
Z:	The robot Z-axis position (pulse) with reference to the initial position is shown.
θ:	The robot θ -axis position (pulse) with reference to the initial position is shown.
R:	The robot R-axis position (pulse) with reference to the initial position is shown.

[Input status]

Item	Highlighted when		
Vacuum ON	The robot pick vacuum sensor is turned ON.		
No wafer det.	The robot pick wafer sensor is turned OFF.		
X: Origin pos.	The robot X-axis is in the initial position.		
R: Origin pos.	The robot R-axis is in the initial position.		
θ: Origin pos.	The robot θ -axis is in the initial position.		
Z: Origin pos.	The robot Z-axis is in the initial position.		
Z: Up end	The robot Z-axis is in the upper end position.		
Z: Out of step	The robot Z-axis step-out sensor is turned ON.		
θ: Out of step	The robot θ -axis step-out sensor is turned ON.		
X: Out of step	The robot X-axis step-out sensor is turned ON.		

[Output status]

Item	Highlighted when
Vacuum OFF	The robot pick vacuum system turns OFF.
Air blow ON The robot pick air-blow system turns ON.	

[Key assignment] ("—" indicates no key selection: LITE OFF)

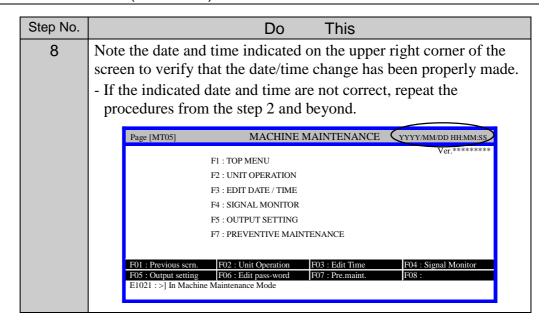
Selection key		Execution key	Operation details		
A	T1	-	[]/[]	Robot X-axis jog movement	
	T2	-	[<]/[>]	Robot θ-axis jog movement	
	Т3	-	[]/[]	Robot Z-axis jog movement	
		STEP	[]/[]	Robot Z-axis index movement	
	T4	-	[<]/[>]	Robot R-axis jog movement	
В	T1	-	[ON] / [OFF]	Cassette A loading check (θ-axis + Z-axis + R-axis)	
		STEP	[ON] / [OFF]	(Not used in this machine)	
	T2	-	[ON] / [OFF]	Cassette B loading check (θ -axis + Z-axis + R-axis)	
		STEP	[ON] / [OFF]	(Not used in this machine)	
	T3	-	[ON] / [OFF]	Check of the position where the robot pick height and the position	
			50357 / 503557	table height become the same (θ -axis + Z-axis + R-axis)	
	T4	-	[ON] / [OFF]	Check of the position where the robot pick height and the spinner table height become the same $(\theta$ -axis + Z-axis + R-axis)	
С	T1	_	[ON] / [OFF]	Robot pick vacuum	
		-	[]/[]	(Not used in this machine)	
		STEP	[ON] / [OFF]	Robot pick air-blow	
		STEP	[]/[]	(Not used in this machine)	
	T2	-	[ON] / [OFF]	Wafer loading check (from Cassette A to the position table)	
		STEP	[ON] / [OFF]	Wafer loading check (from Cassette B to the position table)	
		HIGH	[ON] / [OFF]	(Not used in this machine)	
	Т3	-	[ON] / [OFF]	Wafer unloading check (from the spinner table to Cassette A)	
		STEP	[ON] / [OFF]	Wafer unloading check (from the spinner table to Cassette B)	
		HIGH	[ON] / [OFF]	(Not used in this machine)	
D	T1	-	[]/[]	Roabot X-axis 0.1 mm STEP movement	
		STEP	[]/[]	Robot X-axis 0.5 mm STEP movement	
		HIGH	[]/[]	Robot X-axis 1.0 mm STEP movement	
	T2	-	[<]/[>]	Robot θ-axis 0.1 ° step movement	
		STEP	[<]/[>]	Robot θ-axis 0.5 ° step movement	
	Т3	-	[]/[]	Robot Z-axis 0.1 mm STEP movement	
		STEP	[]/[]	Robot Z-axis 0.5 mm STEP movement	
		HIGH	[]/[]	Robot Z-axis 1.0 mm STEP movement	
	T4	-	[ON] / [OFF]	Robot unit initialization	
		STEP	[<]/[>]	Robot R-axis 0.1 mm STEP movement	

3. Time and Date Editing

Procedures to edit time and date

On the EDIT DATE/TIME screen, you can set up the time and date for the machine. If the time and date displayed on the screen are not correct, follow the steps below to correct them.

Step No.	Do This			
1	Press the <f5> key on the top menu screen.</f5>			
	- The MACHINE MAINTENANCE screen appears.			
	- If the screen is password-protected, enter the password			
	(MAINTENANCE) and then press the <enter> key.</enter>			
2	Press the <f3> key.</f3>			
	- The EDIT DATE/TIME screen appears.			
3	Enter the date (year-month-date) into the "New Date (yy-mm-dd)" column.			
	- The example below shows that the date is changed to January 12,			
	2000.			
	Page [MT08] EDIT DATE/TIME Ver.*******			
	Present Time/Date Year: #### Month: ## Day: ## Hour: ## Minuite: ## Second: ##			
	Present Time/Date Year; #### Month: ## Day: ## Hour: ## Minuite: ## Second: ## New Date (yy-mm-dd) 2000-01-12			
	New Time (hh-mm-ss)			
	F01 : Previous scrn. F02 : F03 : F04 : F05 : F06 : F07 : F08 :			
4	Press the <enter> key.</enter>			
	- The cursor moves to the "New Time (hh-mm-ss)" column.			
	- If any improper entry is made, the message "Inputted illegal data"			
	appears.			
5	Enter the time ("hour-minute-second") into the "New Time (hh-			
	mm-ss)" column.			
	- To set the time to 12:20, for example, enter "12-20-00" into the column.			
6	Press the <enter> key.</enter>			
U	- The message "[F1] key: Press please." appears.			
	- If any improper entry is made, the message "Inputted illegal data"			
	appears.			
7	Press the <f1> key.</f1>			
	- The MACHINE MAINTENANCE screen appears.			



4. Signal Monitoring

Summary of this section

On the SIGNAL OPERATION/MONITOR screen, you can switch between the ON/OFF settings of the output signals and can also check the status of the input signals that are not displayed on the unit operation screens.

This section describes the operations executable on the SIGNAL OPERATION/MONITOR screen.

Section No.	Title	Contents
4-1	Signal Output Operation	- Procedures to perform signal output operation
4-2 Input Signal Check		- Procedures to check input signals

4-1. Signal Output Operation

Procedures of signal output operation

The procedures to perform signal output operation on the SIGNAL OPERATION/MONITOR screen are described here.



If you position your hands or fingers in the driving sections of the machine in action, they may be caught or cut off. Take extra care during signal output operation in which the interlock mechanism is disabled.

NOTICE

Check to be sure that no tools or wafers are left in the machine before performing signal output operation. If you start signal output operation with such irrelevant items left in the machine, they may be scattered or caught by the machine units, causing the machine to break.

Step No.	Do This	
1	Press the <f5> key on the top menu screen The MACHINE MAINTENANCE screen appears.</f5>	
	- If the screen is password-protected, enter the password (MAINTENANCE) and then press the <enter> key.</enter>	
2	Press the <f4> key The SIGNAL OPERATION/MONITOR screen appears.</f4>	
	Page [MT14] SIGNAL OPERATION/MONITOR >> Output mode Buzer1(On) Sig-T R On Sig-T Y On Sig-T G On Z1CT-Vc-ON Z1CT-Vl-Md Z1CT-Vl-Ot Buzer2(Fl) Sig-T R Fl Sig-T Y Fl Sig-T G Fl Z2CT-Vc-ON Z2CT-Vl-Md Z2CT-Vl-Ot Z1 serv ON Z1CT servON Z1 ASP SET Z1ASP RET Z1CT-Bl-ON S-Air Chng ************ Z2 serv ON Z2CT servON Z2 ASP SET Z2ASP RET Z2CT-Bl-ON Coolant ON *********** >> Input monitor 2-MA ps.OK VPthrnalOK WClevel OK VP ps. OK 1-SA ps.OK 1-MA ps.OK CT leak OK C1thrnalOK CL tank OK DUthrnalNG DUfilterNG IN.HGAm OK Ot.HGAm OK SP-Inv OK Z1water OK Z1coolerOK Z1SDcov.cl Z1INcov.cl Z1 Setup Z1 posi.OK Z1serv alm Z2water OK Z2CoolerOK Z2SDcov.cl Z2INcov.cl Z2 Setup Z2 posi.OK Z2Serv alm Z1-Inv. OK Z1CTsrv.al CA- 3" Set CA- 4" Set CA- 5" Set CA- 6" Set CA- 6	
	F01 : Previous scrn. F02 : F03 : F04 : F05 : F06 : F07 : F08 : F08 : F07 : F08 : F08 : F09	
3	Move the cursor ([>] mark on the screen) to the objective signal output item.	

Step No.	Do This
4	Press the <enter> key.</enter>
	- The selected item is highlighted and its output setting is enabled.
	- Enabling the output setting of a signal item could trigger malfunctioning of the machine (ex. error occurrence). In such a case, turn OFF the machine once and restart it after waiting for at least one minute.
5	To disable the output setting of a signal item, move the cursor to the item and press the <enter> key.</enter>
	- Indication of the item returns to normal video and its output setting is disabled.

Signal items available for output setting

The signal items that are available for output setting are shown in the ">>Output mode" group on the SIGNAL OPERATION/MONITOR screen. They are detailed as follows.

Item	Description (Machine action following signal output enabling)
Buzzer1 (On)	The buzzer sounds continuously.
Buzzer2 (Fl)	The buzzer sounds intermittently.
Sig-T R On	The pilot lamp red light turns ON.
Sig-T R Fl	The pilot lamp red light flashes.
Sig-T Y On	The pilot lamp yellow light turns ON.
Sig-T Y Fl	The pilot lamp yellow light flashes.
Sig-T G On	The pilot lamp green light turns ON.
Sig-T G Fl	The pilot lamp green light flashes.
Z1CT-Vc-ON	Z1 chuck table vacuum ON
Z2CT-Vc-ON	Z2 chuck table vacuum ON
Z1CT-V1-Md	Z1 chuck vacuum valve (middle) ON
Z2CT-V1-Md	Z2 chuck vacuum valve (middle) ON
Z1CT-V1-Ot	Z1 chuck vacuum valve (outer) ON
Z2CT-V1-Ot	Z2 chuck vacuum valve (outer) ON
Z1 Serv ON	Z1 axis servo motor lock ON
Z2 Serv ON	Z2 axis servo motor lock ON
Z1CTservON	Z1 chuck table servo motor lock ON
Z2CTservON	Z2 chuck table servo motor lock ON
Z1 ASP SET	The Z1 axis moves to the set up position detected by the auto setup unit
	(optional accessory).
Z2 ASP SET	The Z2 axis moves to the set up position detected by the auto setup unit
	(optional accessory).
Z1 ASP RET	The Z1 auto set up unit (optional accessory) moves to the escape position.
Z2 ASP RET	The Z2 auto set up unit (optional accessory) moves to the escape position.
Z1CT-B1-ON	Z1 chuck table water flow/air blow ON
Z2CT-B1-ON	Z2 chuck table water flow/air blow ON
S-Air Chng	The air supply route is switched to the sub-air circuit (optional accessory).
Coolant ON	Wheel coolant ON

4-2. Input Signal Check

Procedures to check input signals

The procedures to check the input signals on the SIGNAL OPERATION/MONITOR screen are described here.

Step No.	Do This	
1	Press the <f5> key on the top menu screen.</f5>	
	- The MACHINE MAINTENANCE screen appears.	
	- If the screen is password-protected, enter the password	
	(MAINTENANCE) and then press the <enter> key.</enter>	
2	Press the <f4> key.</f4>	
	- The SIGNAL OPERATION/MONITOR screen appears.	
	Page [MT14] SIGNAL OPERATION/MONITOR	
	>> Output mode Buzer1(On) Sig-T R On Sig-T Y On Sig-T G On Z1CT-Vc-ON Z1CT-Vl-Md Z1CT-Vl-Ot	
3	Check if the input signal items are highlighted or not to know their	
	status.	
	- If a signal item is highlighted, it means that the signal as it is	
	indicated is input (turned ON).	
	- If a signal item is not highlighted, it means that the signal as it is	
	indicated is not input (turned OFF).	

Input signal items

The input signal items that can be checked on the SIGNAL OPERATION/MONITOR screen appear in the ">>Input monitor" group column on the screen. They are detailed as follows.

Item	Highlighted when
2-MA ps.OK	Main air pressure is normal.
VPthrmalOK	Vacuum pump temperature is normal
WClevelOK	Water level of the water case is normal.
VP ps. OK	Vacuum pump pressure is normal
1-SA ps.OK	Primary side sub-air pressure is normal.
1-MA ps.OK	Primary side main air pressure is normal.
CT leak OK	No water leakage from the chuck table
CLthrmalOK	Coolant temperature is normal
CL tank OK	Water level of the coolant tank is normal.

Item	Highlighted when
DUthrmalNG	Duct unit temperature is abnormal.
DUfilterNG	Filters in the duct unit are clogged.
IN.HGAm OK	Height gauge (inner circ.) amplifier is normal.
Ot.HGAm OK	Height gauge (outer circ.) amplifier is normal.
SP-Inv OK	The spinner inverter is normal.
Z1water OK	Z1 wheel coolant flow rate is normal.
Z2water OK	Z2 wheel coolant flow rate is normal.
Z1coolerOK	Z1 spindle coolant flow rate is normal.
Z1coolerOK	Z2 spindle coolant flow rate is normal.
Z1SDcov.cl	The Z1 side cover is closed.
Z2SDcov.cl	The Z2 side cover is closed.
Z1INcov.cl	The Z1 inner cover is closed.
Z2INcov.cl	The Z2 inner cover is closed.
Z1 Set up	The Z1 axis is at its setup position.
Z2 Set up	The Z2 axis is at its setup position.
Z1 posi.OK	Z1-axis motion completed
Z2 posi.OK	Z2-axis motion ompleted
Z1serv alm	Z1-axis servo alarm occurs.
Z2serv alm	Z2-axis servo alarm occurs.
Z1-Inv. OK	The Z1 spindle inverter is normal.
Z2-Inv. OK	The Z2 spindle inverter is normal.
Z1CTsrv.al	Z1 chuck table servo alarm occurs.
Z2CTsrv.al	Z2 chuck table servo alarm occurs.
CA-3" Set	3" Cassette is set on the cassette stage A.
CB-3" Set	3" Cassette is set on the cassette stage B.
CA-4" Set	4" Cassette is set on the cassette stage A.
CB-4" Set	4" Cassette is set on the cassette stage B.
CA-5" Set	5" Cassette is set on the cassette stage A.
CB-5" Set	5" Cassette is set on the cassette stage B.
CA-6" Set	6" Cassette is set on the cassette stage A.
CB-6" Set	6" Cassette is set on the cassette stage B.
CA-8" Set	8" Cassette is set on the cassette stage A.
CB-8" Set	8" Cassette is set on the cassette stage B.
CA cov. cl	The cassett-A cover is closed.
CB cov. cl	The cassett-B cover is closed.
Z1 ASP ESC	The Z1 auto setup unit (optional accessory) is in escape position.
Z2 ASP ESC	The Z2 auto setup unit (optional accessory) is in escape position.
Z1 ASP TBL	The Z1 auto setup unit (optional accessory) is in operation (table) position.
Z2 ASP TBL	The Z2 auto setup unit (optional accessory) is in operation (table) position.
Z1 ASP LMT	The Z1 auto setup unit (optional accessory) is moved to the detection area
72 A CD I ME	of the limit sensor.
Z2 ASP LMT	The Z21 auto setup unit (optional accessory) is moved to the detection area
71 DC 7fa :	of the limit sensor.
Z1-PG-Zfc+	The Z-phase plus (+) signal from the Z1-axis encoder is input.
Z2-PG-Zfc+	The Z-phase plus (+) signal from the Z2-axis encoder is input.

5. External Indicator Setting

Condition setting change for external indicators

On the OUTPUT SETTING screen, you can change the condition settings for the buzzer and pilot lamp by following the steps described below.

Step No.	Do This	
1	Press the <f5> key on the top menu screen. - The MACHINE MAINTENANCE screen appears. - If the screen is password-protected, enter the password (MAINTENANCE) and then press the <enter> key.</enter></f5>	
2	Press the <f5> key. - The OUTPUT SETTING screen appears. - If an indicator item (buzzer/lamp) for a certain condition is marked by "O", it means the item is enabled for the condition.</f5>	
	Page [MT15]	
3	Using cursors keys, move the cursor to the objective condition column under the objective indicator item.	
4	Press the <enter> key. - A mark "O" appears on the column and the condition setting for the indicator item is enabled. - If both "ON" and "FLK" are enabled for the same condition, "ON" takes precedence and becomes effective.</enter>	
5	To disable the currently enabled setting (marked "O"), place the cursor on the left of the "O" mark and then press the <ce> key.</ce>	
6	When changing of the condition settings completes, press the <f1> key. - The changes become effective and the system returns to the MACHINE MAINTENANCE screen.</f1>	

6. Password Setting

Summary of this section

The password settings of the machine can be checked and changed on the PASS WORD screen. The screen is also available for comment editing.

This section describes the procedure to check or change the password settings.

Section No.	Title	Contents
6-1	Password Types	Types of the passwords available for the machineDetails of the respective password types
6-2	Password Check	- Procedures to check the passwords
6-3	Password Change	- Procedures to change the password

Effective use of password

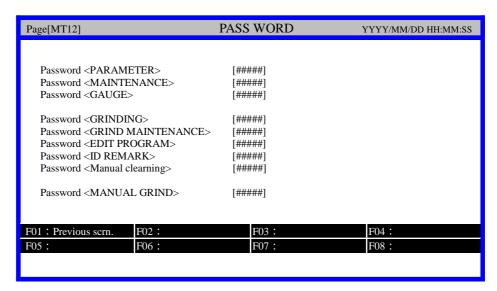
Nine password types are available for this machine such as the password to enter the parameter edition screen.

Once a password for changing parameter data is set up, for example, the parameter data cannot be changed by those who do not know the password. By utilizing the password-protection function, accesses to the specific works can be limited to the qualified persons only.

6-1. Password Types

Available password types

Nine password types are available for this machine. Setting or changing of the password is made on the PASS WORD screen.



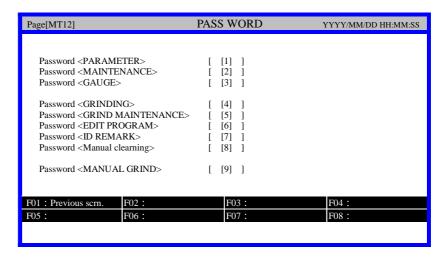
The available nine password types are detailed as follows.

Password type	Description
Password (PARAMETER)	Entered to call up: - EDIT PARAMETER screen - FILE MAINTENANCE screen - GRIND RECORD screen Entry of this password is also required to change the data on the WARM UP screen or the WARMUP DETAILS SETTING screen.
	Factory-shipped setting: [1919]
Password (MAINTENANCE)	Entered to call up: - MACHINE MAINTENANCE screen Factory-shipped setting: [9001]
Password (GAUGE)	Entered to call up: - HEIGHT GAUGE TEST screen Factory-shipped setting: [1919]
Password (GRINDING)	Entered to call up: - GRIND DATA screen Factory-shipped setting: [blank] (not set up)

Available password types (Continued)

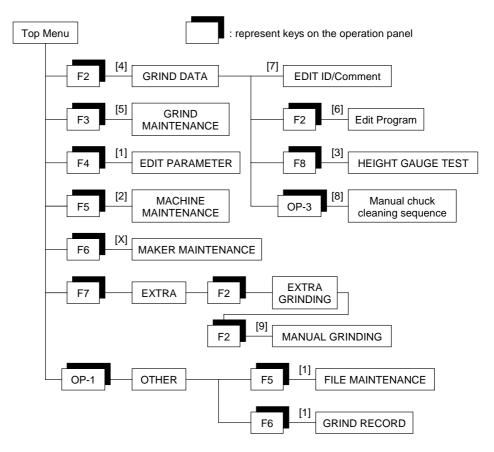
Password type	Description
Password	Entered to call up:
(GRIND MAINTENANCE)	- GRIND MAINTENANCE screen
	Factory-shipped setting: [blank] (not set up)
Password	Entered to call up:
(EDIT PROGRAM)	- Edit Program screen
	Factory-shipped setting: [blank] (not set up)
Password	Entered to call up:
(ID REMARK)	- EDIT ID/Comment screen
	Factory-shipped setting: [blank] (not set up)
Password	Entered to call up:
(MANUAL CLEANING)	- Manual chuck cleaning sequence screen
	Factory-shipped setting: [blank] (not set up)
Password	Entered to call up:
(MANUAL GRIND)	- MANUAL GRINDING screen
	Factory-shipped setting: [blank] (not set up)

The screens that require password entry to be called up are described here.



Entry of the password ([1] through [9]) indicated in the above screen is required when you enter the corresponding screen ([1] through [9]) in the following screen menu tree.

To change data on the WARM UP screen and on the WARMUP DETAILS SETTING screen, entry of the password [1] is required.

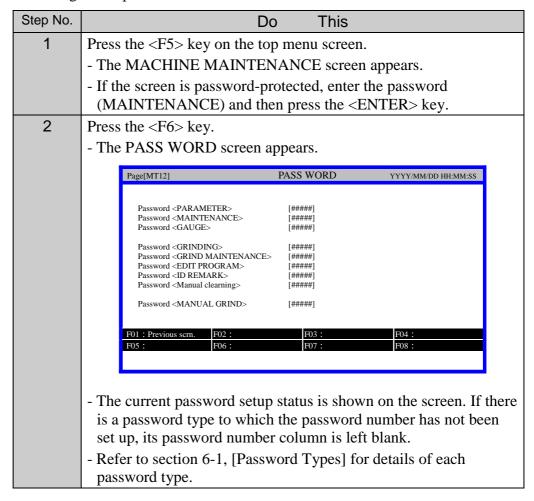


^{*} The password [X] to enter the MAKER MAINTENANCE screen is not open to the customers.

6-2. Password Check

Procedures to check passwords

The current password settings can be checked on the PASS WORD screen by following the steps described below.



6-3. Password Change

Procedures to change password

The procedures to change the password (number) on the PASS WORD screen are described here.

Step No.	Do This	
1	Call up the PASS WORD screen referring to Section 6-2, [Password Check] in this chapter.	
2	Move the cursor to the objective password using cursor keys.	
3	Press the <enter> key.</enter>	
	- The password edition screen on which the current set up of the selected password is displayed appears.	
	Page [MT12] PASS WORD	
	[< Within 5 >] Ver.*******	
	#### ^^	
	F01 : Edit Completed	
4	Delete the current password number.	
	- Press the <f2> key to delete one character at a time.</f2>	
	- Press the <f3> key to delete the entire character string.</f3>	
5	Using numeric keys, enter the new password (number of up to 5 digits).	
6	When editing of the new password number finishes, press the <f1> key.</f1>	
	- If you press the <f1> key without entering the new password, the system sets "no password (blank)" for the screen. In such a case, the screen can be called up without password entry.</f1>	

7. Preventive Maintenance Function

Preventive maintenance function

This function is provided for ease of managing the periodic checkup and maintenance work items.

On the Preventive Maintenance screen, the time intervals for performing the periodic checkups and maintenance related works are set up. The elapsed time since the last checkup/maintenance performance and the remaining time to the next due date are also indicated on the screen. When the setup time of any work item on the screen elapses, a warning message appears at the bottom of the screen.

The preventive maintenance function uses the following two screens.

Screen	Contents
Preventive Maintenance (by maker) screen	Factory-set standard work items (such as consumable parts replacement or periodic checkup) are indicated. Adding or changing of the work items is not possible.
Preventive Maintenance (by user) screen	User can register the work items of their own.

Summary of this section

This section describes in details the preventive maintenance function.

Section No.	Title	Contents
7-1	Configuration of Preventive Maintenance Screen	- Configuration of the Preventive Maintenance screen
7-2	Preventive Maintenance (by Maker) Screen	- Descriptions on the Preventive Maintenance (by maker) screen.
7-3	Preventive Maintenance (by User) Screen	- Descriptions on the Preventive Maintenance (by user) screen.

7-1. Configuration of Preventive Maintenance Screen

Calling up the Preventive Maintenance screen

The procedures to call up the Preventive Maintenance screen are described here.

Step No.			Do		This	;					
1	Press	s the $\langle F5 \rangle$ key of	on the top	menu	scre	en.					
	- The	MACHINE M	AINTEN A	NCE	Escre	een a	ppea	ırs.			
		ne screen is pass	-				-				
	(M	AINTENANCE	and then	press	the	<en< th=""><th>TER</th><th>k> key.</th><th></th></en<>	TER	k> key.			
2	Press	the $<$ F7 $>$ key.									
	- The	Preventive Ma	intenance	(by n	nake	r) scı	een	appears.			
	- You	ı can switch bet	ween the	'Prev	entix	e M	ainte	nance (by			
		ker)" and "Preve						=			
		*	entive mai	пспа	lice	(by t	1861)	screens using	,		
	the	<f3> key.</f3>									
	- The	e following scree	en by way	of ex	amp	le is	the '	Preventive			
		_			•				- The following screen by way of example is the "Preventive Maintenance (by maker)" screen.		
			, ~								
		` •									
		Page [MT50]	Prever	tive Ma	intenaı	nce	YYY	YY/MM/DD HH:MM:SS			
		` •		tive Ma	intenaı	nce	YYY	YY/MM/DD HH:MM:SS [1/10] Page			
		Page [MT50] >> Preventive maintenance Work Item	e (by maker)	Time	Stat	Left	Graph	[1/10] Page Start Time			
		Page [MT50] >> Preventive maintenance Work Item 01: Facility supply air pres	e (by maker) s.ck. 7E	Time #D	Stat #D	Left #D		[1/10] Page			
		Page [MT50] >> Preventive maintenance Work Item	s.ck. 7E wheel) 7E	Time #D #D	Stat	Left	Graph	[1/10] Page Start Time 'YY/MM/DD HH:MM			
		Page [MT50] >> Preventive maintenance Work Item 01: Facility supply air press 02: Fac'ty sup.wat. press.(s 04: Water leaks in/out of m	s.ck. 7E wheel) 7E spindle) 7E nachine 7E	Time #D #D #D #D	Stat #D #D #D	Left #D #D #D #D	Graph	[1/10] Page Start Time 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM			
		Page [MT50] >> Preventive maintenance Work Item 01: Facility supply air pres 02: Fac'ty sup.wat. press.(v 03: Fac'ty sup.wat press (o 04: Water leaks in/out of m 05: Height gauge visual in:	s.ck. 7E wheel) 7E spindle) 7E aachine 7E spect'n. 7E	Time #D #D #D #D	Stat #D #D #D #D	Left #D #D #D #D #D	Graph	[1/10] Page Start Time 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM			
		Page [MT50] >> Preventive maintenance Work Item 01: Facility supply air pres 02: Fac'ty sup.wat. press.(s 03: Fac'ty sup.wat. press.(s 04: Water leaks in/out of 05: Height gauge visual in 06: Vac. pump water flow	s.ck. 7E wheel) 7E spindle) 7E nachine 7E spect'n. 7E rate ck. 7E	Time #D #D #D #D #D #D	Stat #D #D #D #D #D	Left #D #D #D #D #D #D	Graph	[1/10] Page Start Time 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM			
		Page [MT50] >> Preventive maintenance Work Item 01: Facility supply air pres 02: Fac'ty sup.wat. press.(s 04: Water leaks in/out of m 05: Height gauge visual in: 06: Vac. pump water flow 07: Chucktable blow-clean	s.ck. 7E wheel) 7E pindle) 7E aachine 7E spect'n. 7E rate ck. 7E ing 7E	Time #D #D #D #D #D #D	Stat #D #D #D #D #D #D	Left #D #D #D #D #D #D #D #D	Graph	[1/10] Page Start Time 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM 'YY/MM/DD HH:MM			
		Page [MT50] >> Preventive maintenance Work Item 01: Facility supply air pres 02: Fac'ty sup.wat. press.(s 03: Fac'ty sup.wat. press.(s 04: Water leaks in/out of 05: Height gauge visual in 06: Vac. pump water flow	s.ck. 7E sheel) 7E spindle) 7E spect'n. 7E rate ck. 7E ing 7E	Time #D #D #D #D #D #D #D #D #D	Stat #D #D #D #D #D	Left #D #D #D #D #D #D	Graph	[1/10] Page Start Time 'YY/MM/DD HH:MM			
		Page [MT50] >> Preventive maintenance Work Item 01: Facility supply air pres 02: Fac'ty sup.wat. press.(s 04: Water leaks in/out of n 05: Height gauge visual in: 06: Vac. pump water flow i 07: Chucktable blow-clean 08: Mist leakage check	s.ck. 7E wheel) 7E pindle) 7E spect'n. 7E rate ck. 7E ing 7E ing 7E	Time #D #D #D #D #D #D #D #D #D	Stat #D #D #D #D #D #D #D	Left #D #D #D #D #D #D #D #D #D	Graph	Start Time			
		Page [MT50] >> Preventive maintenance Work Item 01: Facility supply air pres 02: Fac'ty sup.wat. press.(s 03: Fac'ty sup.wat. press.(s 04: Water leaks in/out of m 05: Height gauge visual in: 06: Vac. pump water flow 07: Chucktable blow-clean 08: Mist leakage check 09: Ionizer electrode clean 10: Reg./Fil.set contaminat	s.ck. 7E wheel) 7E pindle) 7E tachine 7E	Time #D	Stat #D	Left #D	Graph	Start Time 'YY/MM/DD HH:MM			
		Page [MT50] >> Preventive maintenance Work Item 01: Facility supply air pres 02: Fac'ty sup.wat. press.(s 04: Water leaks in/out of m 05: Height gauge visual in: 06: Vac. pump water flow i 07: Chucktable blow-clean 08: Mist leakage check 09: Ionizer electrode clean 10: Reg./Fil.set contaminat F01: Previous scrn.	s.ck. 7E wheel) 7E pindle) 7E tachine 7E tachine 7E tachine 7E ting 7E ting 7E ting 7E ting 7E	Time #D	Stat #D	Left #D	Graph	[1/10] Page Start Time 'YY/MM/DD HH:MM			
		Page [MT50] >> Preventive maintenance Work Item 01: Facility supply air pres 02: Fac'ty sup.wat. press.(s 04: Water leaks in/out of m 05: Height gauge visual in: 06: Vac. pump water flow: 07: Chucktable blow-clean 08: Mist leakage check 09: Ionizer electrode clean 10: Reg./Fil.set contaminan F01: Previous scrn.	s.ck. 7E wheel) 7C spindle) 7E spect'n. 7E rate ck. 7E ring 7E	Time #D	Stat #D	Left #D	Graph	Start Time 'YY/MM/DD HH:MM			

The Preventive Maintenance screen is detailed as follows.

[Screen]

Page [MT50]	Prevent	tive Ma	intenaı	nce	YYY	YY/MM/DD HH:MM:SS
>> Preventive maintenance ([1])					[[2] / [3]] Page
Work Item		Time	Stat	Left	Graph	Start Time
[4]	[5]	[6]	[7]	[8]	[9]	[10]
06: ####################################	7D	#D	#D	#D		'YY/MM/DD HH:MM
07: ####################################	7D	#D	#D	#D		'YY/MM/DD HH:MM
08: ####################################	7D	#D	#D	#D		'YY/MM/DD HH:MM
09: ####################################	7D	#D	#D	#D		'YY/MM/DD HH:MM
10: ####################################		#D	#D	#D		'YY/MM/DD HH:MM
F01 : Previous scrn. F02 : N	Next Page	F03	: by use	r	F0	4 : Change data
F05 : Manual page F06 : Previ		F07		1		8 : Start
[11]						

[Setting Item]

Item No.	Descriptions
[1]	Screen name ("Preventive Maintenance (by maker)" or "Preventive Maintenance (by user)" screen) is shown. The "Preventive Maintenance (by maker)" and "Preventive Maintenance (by user)" screens can be switched using the <f3> key.</f3>
[2]	Current page No. is shown.
[3]	Total page No. is shown.
[4]	Work Item (such as periodic checkup item) is shown. Up to 50 work items (5 pages) can be set up by the user on the Preventive maintenance (by user) screen. On the Preventive maintenance (by maker) screen, 64 work items are preset.
[5]	Standard time interval (unit: day) for performing the work item is shown on the Preventive Maintenance (by maker) screen. It is not displayed on the Preventive Maintenance (by user) screen.
[6]	Time interval (unit: day) for performing the work item is set up.
[7]	Time (unit: day) elapsed since the start of the elapsed time count (indicated in item [10] "Start Time") is shown.
[8]	Remaining time (unit: day) of the interval set up in item [6] ("Time") is shown. When the remaining time is running out, this data turns red and flashes.
[9]	Ratio of the elapsed time is indicated in bar graph. When the elapsed time is less than 70 % of the specified interval period, the graph is displayed in light blue. If the elapsed time becomes 70 % or more of the specified interval period, the color changes to yellow. When the remaining time is running out, the graph is displayed in red, flashing.

[Setting Item]

Item No.	Descriptions
[10]	Date/time the elapsed time count starts for the set up work item is shown.
[11]	If there is any work item for which the time interval set up in item [6] has expired, the message "PM - MAINTENANCE REQUIRED "appears at the bottom of the screen.

[Function Key]

Press	То
F1	Return to the MACHINE MAINTENANCE screen.
F2	Display the previous page.
F3	Switch between "by maker" and "by user" screens.
F4	Enable data edition.
F5	(Not used)
F6	Display the next page.
F7	(Not used)
F8	If you press this key after editing a work item, the "Start Time" is registered and the elapsed time count starts for the work item.

7-2. Preventive Maintenance (by Maker) Screen

Summary of this section

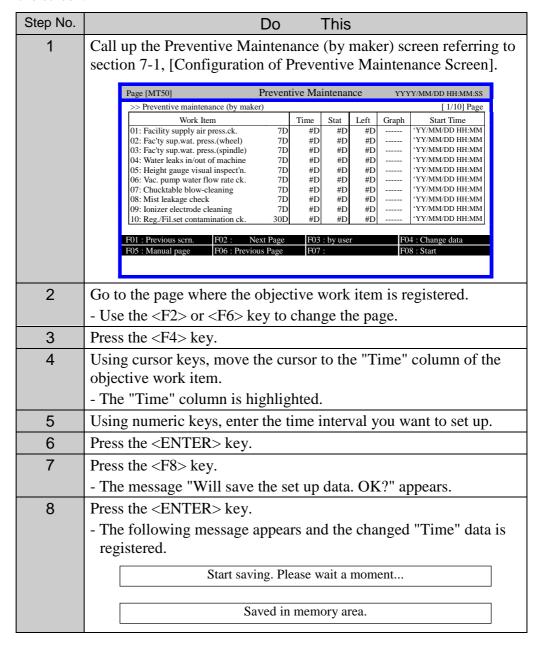
On the Preventive Maintenance (by maker) screen, 64 pre-defined work items and their default time intervals are indicated. Users can change the "Time" data only on this screen. The "Work Item" data cannot be changed. The work items registered and the procedures to change the "Time" data on the "by maker" screen are described here.

Section No.	Title	Contents
7-2-1	"Time" Data Change	- Procedures to change the "Time" data
7-2-2	Work Items Registered in "by Maker" Screen	- List of the work items registered in the "by Maker" screen

7-2-1. "Time" Data Change

Procedures to change "Time" data

The procedures to change the "Time" data on the Preventive Maintenance (by Maker) screen are described here. The "Work Item" data cannot be changed on the screen.



7-2-2. Work Items Registered in "by Maker" Screen

Work items registered in "by Maker" screen

There are the following 64 work items registered in the Preventive Maintenance (by maker) screen. The "Work Item" data on the screen cannot be changed.

No.	Work Item	Default Interval (day)
01	Facility supply air pressure check	7
02	Facility supply water pressure (wheel)	7
03	Facility supply water pressure (spindle)	7
04	Water leaks in/out of machine	7
05	Height gauge visual inspecti'n.	7
06	Vac. pump water flow rate ck.	7
07	Chuck table blow-cleaning	7
08	Mist leakage check	7
09	Ionizer electrode cleaning	7
10	Reg./Fil. set contamination ck.	30
11	Regulator/Filter set clog. ck.	30
12	Drain pipe clog check	30
13	Duct pipe clog/stag. water ck.	30
14	Seal unit tube water leak. ck.	30
15	Seal unit water leakage ck.	30
16	T-arm pad visual check	30
17	Robot movement check	30
18	Robot pick check	30
19	Robot pick vacuum pressure ck.	30
20	T-arm R pad vacuum press. ck.	30
21	T-arm M pad vacuum press. ck.	30
22	T-arm L pad vacuum press. ck.	30
23	Spinner table vacuum press ck.	30
24	H.G. retract speed visual ck.	30
25	Ht. gauge retract stroke ck.	30
26	Height gauge sensitivity ck.	30
27	Chucktable cleaning	30
28	Z1&Z2 side panel EMO funct. ck.	30
29	Z1&Z2 inner door condition ck.	30
30	Signal tower lamp light'g ck.	30
31	Z1 wafer shaping accuracy ck.	30
32	Z1 wafer thickness accuracy	30

Work items registered in "by Maker" screen (Continued)

No.	Work Item	Default Interval (day)
33	Z2 wafer shaping accuracy	30
34	Z2 wafer thickness accuracy	30
35	Chucktable angle accuracy	180
36	Filter element replacement	360
37	Filter element replacement	360
38	Filter element replacement	360
39	Oilstone scrab cyl. repl.	360
40	Oilstone pusher bushing repl.	360
41	Oilstone replacement	180
42	Oilstone seal replacement	360
43	T-shutter wiper replacement	360
44	Cassette block replacement	360
45	Cassette block replacement	360
46	Cassette block replacement	360
47	Cassette block replacement	360
48	Chucktable replacement	360
49	Joint replacement	730
50	Spinner seal (1) replacement	360
51	Spinner seal (2) replacement	360
52	Spinner seal (3) replacement	360
53	Spinner seal (4) replacement	360
54	Spinner seal tape replacement	360
55	Pad section bearing repl.	360
56	Pad section bearing repl.	360
57	T-arm stretch sect.wiper repl	360
58	Pad replacement	180
59	Pad replacement	180
60	Grommet replacement	360
61	Oilstone pusher cylinder repl.	360
62	Rubber pad replacement	180

7-3. Preventive Maintenance (by user) Screen

Summary of this section

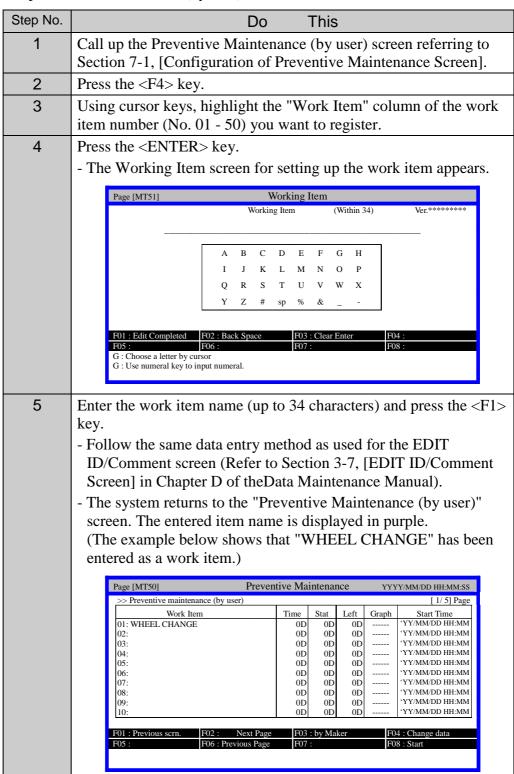
On the Preventive maintenance (by user) screen, up to 50 user specific work items can be set up. The procedures to register and change the user-defined work items are described here.

Section No.	Title	Contents
7-3-1	User-defined Work Item Registration	- Procedures to register the user- defined work item
7-3-2 User-defined Work Item Change		- Procedures to change the user- defined work item

7-3-1. User-defined Work Item Registration

Procedures to register user-defined work items

Follow the steps described below to register the user-defined work items on the preventive maintenance (by user) screen.



Step No.	Do This
6	Move the cursor to the "Time" column of the entered work item using the [>] key. - The "Time" column is highlighted.
7	Using numeric keys, enter the specified time interval. - The example below shows that the time interval for the entered work item is set to 180 days.
	Page [MT50] Preventive Maintenance YYYY/MM/DD HH:MM:SS
8	Press the <enter> key.</enter>
9	Repeat the steps 3 through 8 to set up other work items if any. - If you move to another page without saving the entered data, the data is erased. Before you press the <f2> or <f6> key to move to another page, be sure to save the entered data by pressing the <f8> key.</f8></f6></f2>
10	When registering of the work item(s) completes, press the <f8> key. - The message "Will save the set up data. OK?" appears.</f8>
11	Press the <enter> key. - The following message appears and the work item(s) and its data are registered. Start saving. Please wait a moment</enter>
	Saved in memory area.

7-3-2. User-defined Work Item Change

Procedures to change user-defined work item

The procedures to change the user-defined work item are described here. If you want to change the "Time" data only for a certain work item, follow the procedures described in Section 7-2-1, ["Time" Data Change].

Step No.	Do This	
1	Call up the Preventive Maintenance (by user) screen referring to Section 7-1, [Configuration of Preventive Maintenance Screen].	
2	Go to the page where the work item you want to change is registered. - Use the <f2> or <f6> key to change the page.</f6></f2>	
3	Press the <f4> key.</f4>	
4	Using cursor keys, move the cursor to the "Time" column of the objective work item. - The "Time" column is highlighted.	
5	Enter "0" and press the <enter> key The message "Will clear the set up data. OK?" appears.</enter>	
6	Press the <enter> key The "Time" data of the work item is deleted.</enter>	
7	Enter the new work item and its "Time" data referring to Section 7-3-1, [User-defined Work Item Registration].	

F. PROBLEMS AND REMEDIES

Contents of this chapter

This chapter describes about the possible causes, locations to be checked and remedial actions to be taken for the failures that occur at the startup of the machine and during machine operation and for the errors that occur when the machine is incorrectly operated.

Section No.	Title	Contents	
1	Safety Precautions in Troubleshooting	- Safety precautions that must be thoroughly understood and observed when you perform failure remedial works	
2	Failures without Error Messages on the Screen	- Locations to be checked and remedial actions to be taken for the failures (such as the failures at the machine startup) that are not reported on the screen	
3	Error Messages with Causes and Remedies	- List of the error messages of the machine with possible causes and remedies	

1. Safety Precautions in Troubleshooting

Safety precautions to be observed in troubleshooting

Make sure to observe the following safety precautions when you carry out the failure remedial works.



- Troubleshooting must always be carried out by qualified maintenance personnel.
- If you attempt to replace a machine part with the power turned ON, you may get an electric shock or have your body part caught by the driving sections of the machine, which could be fatal.
 Before replacing a machine part, be sure to turn OFF the facility-side power supply.
- If the machine has been brought to a stop due to water leakage, thoroughly dry the affected area before turning the power back ON. If you turn ON the power while the machine and the floor are not completely dry, you may get an electric shock that could result in severe injury or death.
- When you perform a maintenance work on the machine, be sure that the machine as well as its power, air and water supply systems are not touched or turned ON/OFF by other persons. If the machine power is turned ON while you are maintaining the machine, you may get an electric shock that could result in severe injury or death. Also, if the machine is inadvertently activated, a part of your body may be caught or cut off by the machine's driving sections.

2. Failures without Error Messages on the Screen

Summary of this section

Failures that are not reported on the screen are mainly those that occur at the startup of the machine. Those failures are brought about by various causes, but are grouped by error location here.

This section describes the causes, locations to be checked and remedial actions to be taken for those failures.

Failures that are not reported on the screen

Possible causes, locations to be checked and remedial actions to be taken for the failures that are not reported on the screen are described here.

Category			Problem		Probable cause	Check item/location	Judgment/remedy
	Power-receiving lamp	1)	The power-receiving lamp (L1) does not light. Blowout check hole Fuse (F101)	1.	No power is supplied from the facility-side power supply system.	Check whether 3-phase, 200 VAC power is supplied from the facility-side power source to the main circuit breaker (ELB1) primary side.	If the power is not supplied, check the facility-side power source.
				2.	Fuse (F101) is blown out.	Check the round hole on the fuse.(F101)	If the round hole looks whitish, the fuse is blown out. In such an instance, eliminate the cause of fuse blowout and then replace the fuse with new one.
				3.	The power-receiving lamp (SL01) is defective or its cable is broken.	Check whether single-phase, 200 VAC power is supplied to the power-receiving lamp terminal of the machine when the facility-side power is turned ON.	If the power is not supplied, the cable is broken. Replace the cable. If the lamp does not come on even when the power is supplied, the power-receiving lamp is defective and therefore it must be replaced.
(2)	Main circuit breaker (ELB1)	1)	Even if the main circuit breaker is turned ON, its lever soon drops to the trip position.	1.	Short-circuiting or electrical leakage has occurred.	Turn OFF the facility-side power and then check for insulation between the phase conductors and between the PE and each phase conductor. (CAUTION): Do not use a megohmmeter.	If 0Ω or low resistance value is encountered, it means that the power supply line is faulty. Contact your nearest DISCO office or DISCO service office.
(3)	Circuit breakers (CB01 through CB05)	1)	Even if the circuit breaker is turned ON, its lever soon drops to the trip position.	1.	Short-circuiting has occurred.	Turn OFF the facility power supply and then check for insulation between the phase conductors and between the FG and each phase conductor. (CAUTION): Do not use a megohmmeter.	If 0Ω or low resistance value is encountered, it means that the power supply line is faulty. Contact your nearest DISCO office or DISCO service office.

Category	Problem	Probable cause	Check item/location	Judgment/remedy
(4) Key switch	(4) Key switch 1) The machine power does not turn ON when the switch key is turned to	1. The key switch (KS01) is defective.	Turn OFF the facility power supply and then check whether the A and B contacts of the key switch normally function.	If the contacts do not normally function, the key switch is defective and therefore it must be replaced.
	the START position.	2. The EMO switch (EMS1, 2, 3, 4) is turned ON.	Check whether the EMO switches (EMS1,2,3,4) are all turned OFF.	If any EMO switch is turned ON, turn it OFF.
	ON OFF ON START	3. The optional uninterruptible power supply unit (UPS) is defective or its battery is weak or dead.	Check the UPS battery replacement time limit.	If the battery has been used beyond the specified replacement time limit, replace the battery. If the power still does not turn ON after the battery is replaced, the UPS may be defective. Contact your nearest DISCO office or DISCO service office.
	A contact X X O B contact X O	4. Fuse (F110/F111) is blown out.	Check the round hole on the fuse (F110/F111)	If the round hole looks whitish, the fuse is blown out. In such an instance, eliminate the cause of fuse blowout and then replace the fuse with new one.
		5. Transformer (T001) is defective.	Turn OFF the facility-side power and then make a continuity check of the primary-side coil and the secondary-side coil.	If there is no continuity, the transformer is defective and should be replaced with new one.
		6. The breaker box cover is open or the switch (SW105) is defective.	Check whether the breaker box cover is open or not.	If the cover is open, close it. If the machine power still does not turn ON after the cover is closed, the switch is defective. Replace the switch with new one.
		7. Relay (RY06 / 7) is defective.	Check if the operation indicator lamp of the relay (RY06 / 7) comes ON when the switch key is turned to the ON position.	If the operation indicator lamp does not turn ON, the relay is defective or the cable is broken. Check the cable. If the cable is normal, replace the relay.

Category	Problem	Probable cause	Check item/location	Judgment/remedy
(4) Key switch	The machine power does not turn ON when the switch key is turned to the START position.	8. Relay (RY05) is defective.	Turn OFF the facility-side power and then check the B contact (2-3, 6-7) for continuity.	If there is no continuity, the relay is defective or its cable is broken. Check the cable. If the cable is normal, replace the relay.
	ON START	9. Relay (RY03 / 4) is defective.	Check whether the operation indicator lamp of the (RY03 / 4) comes ON when the switch key is turned to the START position.	If the operation indicator lamp does not come ON, the relay is defective or its cable is broken. Check the cable. If the cable is normal, replace the relay.
	OFF ON START	10. Timer relay (TRY01) is defective.	Check whether the operation indicator lamp (red) of the relay (TRY01) comes ON when the switch key is turned to the START position.	If the operation indicator lamp does not come ON, the relay is defective or its cable is broken. If the cable is normal, replace the relay.
	A contact X X O B contact X O	11. Relay (RY01 / 2) is defective.	Check if the relay (RY01 /RY02 / RY03) turns ON when the key switch is turned to the START position.	If the relay does not turn ON, the relay is defective or its cable is broken. Check the cable. If the cable is normal, replace the relay.
	2) The machine power does not turn OFF when the switch key is turned to	1. The switch key is defective.	Turn OFF the facility-side power and then check whether the A and B contacts of the key switch normally function.	If the contacts do not normally function, the key switch is defective and should be replaced.
	the OFF position. (The Z-axis servo driver and DC power turn OFF at the expiration of the TRY01 set up time.)	2. Timer relay (TRY01) is defective.	Turn OFF the switch key to check whether the operation indicator lamp (red) of the timer relay (TRY01) blinks and then goes off when the predefined time elapses.	If the operation indicator lamp of the timer relay does not blink and go off, the timer relay is defective or its cable is broken. Check the cable. If the cable is normal, replace the timer relay.
(5) EMO switch	1) The machine power does not turn OFF upon EMO switch ON. (The Z-axis servo driver and DC power turn OFF at the expiration of the TRY07 set up time.)	The EMO switch is defective or its cable is broken.	Turn OFF the facility-side power and check whether the EMO switch B contact normally functions.	If the EMO switch B contact does not normally function, the EMO switch is defective or its cable is broken. Check the cable. If the cable is normal, replace the EMO switch.
(6) Cover switch (SW105)	The machine power does not turn OFF when the breaker box cover is opened.	The breaker cover switch is defective.	Turn OFF the facility-side power and check if the cover switch B contact normally functions.	If the cover switch B contact does not normally function, the switch is defective and should be replaced with new one.

Category	Problem	Probable cause	Check item/location	Judgment/remedy
(7) Monitor	1) The monitor shows nothing when the power	1. The monitor power switch is turned OFF.	Check whether the monitor power switch is turned ON.	If the switch is turned OFF, turn it ON.
	is turned ON (the power receiving lamp is lit.)	2. Transformer T002 is defective.	Check the output voltage of the T002 (output: 100 VAC ± 10 %).	If there is no power output, the transformer is defective and it should be replaced.
		3. The power plug is disconnected.	Check whether the monitor power plug is connected to the receptacle (PLS1).	If the plug is not connected, properly connect it to the receptacle.
		4. The power supply line is broken.	Check whether the single-phase, 100 V power is supplied to the receptacle (PLS1).	If the power is not supplied, the cable is broken and it should be replaced.
		5. The signal line is abnormal.	Check the signal line between the monitor and the graphic circuit board.	If the signal line connector is disconnected, connect it. If the cable is broken, replace it.
		6. The monitor is not properly adjusted or is defective.	Adjust the contrast and brightness of the monitor. Also check the relay cable.	If nothing appears after the adjustment, the monitor is defective and should be replaced. If the cable is broken, replace the
				cable.
		7. Fuse (F 108) is blown out.	Check the round hole on the fuse. (F 108)	If the round hole looks whitish, the fuse is blown. In such an instance, eliminate the cause of fuse blowout and then replace the fuse with new one.
		8. DPS5 (+5 V) is defective or its power supply line is broken.	Check whether the single-phase, 100 V power is supplied to TB26 (between L and N). Also check if +5V is output to TB26 (between +V and -V).	If the power is not supplied, the cable is broken and should be replaced. DPS5 is defective if +5 V is not output even when the power is supplied. In such a case, DPS5 should be replaced.
		9. The graphic board is defective or its power supply line is	Check if the DC +5 V power is supplied to TB10 (between +5 and GND).	If the power is not supplied, the cable is broken and should be replaced.
		broken.		The graphic board is defective if nothing appears on the monitor even when the power is supplied. In such a case, the board should be replaced.

	Category		Problem		Probable cause	Check item/location	Judgment/remedy
(7)	Monitor	1)	The monitor shows nothing when the power is turned ON (the power receiving lamp is lit.)	10	The CPU board or HDD board is defective.	Replace the board, if the spare board is on hand.	If the monitor returns back to normal after replacing the board, the (removed) board is defective.
(8)	Fan motor	1)	The motor for the (rack) fan (FN1 / 2 / 3) does not rotate.	1.	The power line is broken or the fan motor is defective.	Check if the single-phase, 100 V power is supplied to TB07 (1-2).	If the power is not supplied, the cable is broken and should be replaced. The fan motor is defective if the fan does not rotate even when the power is supplied. In such a case, the fan motor should be replaced.
(9)	(Optional) Outside unit	1)	The duct unit does not operate when the	1.	The circuit breaker (CB04) is turned OFF.	Check if CB04 is turned ON.	If the breaker is turned OFF, turn it ON.
			machine power is turned ON.	2.	The circuit breaker of the duct unit is turned OFF.	Check if the circuit breaker of the duct unit is turned ON.	If the breaker is turned OFF, turn it ON.
				3.	The power line is broken or the duct unit is defective.	Check if the 3-phase, 200 V power is supplied to the circuit breaker primary side of the duct unit.	If the power is not supplied, the cable is broken and should be replaced. If the duct unit does not operate even when the power is supplied, the duct unit is defective. Contact your nearest DISCO office or DISCO service office.

3. Error Messages with Causes and Remedies

Summary of this section

When a situation such as described below occurs when operating DFG841, an error is issued from the machine and is displayed on the screen.

- The machine is incorrectly operated.
- The machine acts abnormally.

This section lists up the error messages the machine issues together with their possible causes and the remedial actions to be taken against them.

Section No.	Title	Contents
3-1	A/B Class Errors with Causes and Remedies	- Causes and remedial actions to be taken for each of the A and B class errors
3-2	C/D Class Errors with Causes and Remedies	- Causes and remedial actions to be taken for each of the C and D class errors

Error messages of DFG841 are classified into four error classes A through D according to their error contents. Each error code is identified for its error level by the error-level indication alphabet preceding the code number. The error code [C0870], for example, is a class-C error.

The four error classes are described as follows.

Class	Indication	Meanings
Class A	A****	Errors of this level are issued for warning or alert in such an occasion as a wrong operational step is taken. When a class-A error occurs, press the <alarm cl=""> key to clear the alarm condition and then eliminate the error cause.</alarm>
Class B	B****	When a class-B error occurs, full auto operation is halted. Press the <alarm cl=""> key to clear the alarm condition and eliminate the error cause. If you then press the <start> key, The machine takes error recovery action.</start></alarm>
Class C	C****	Errors of this level are issued during full auto operation or during wheel maintenance. When a class-C error occurs, the machine comes to an emergency stop (all axes immediately come to a stop; the spindles stop rotating; and water supply stops). However, if an error occurs in the middle of the grinding process, the Z-axis moves up to retreat by 200 µm before it stops. If a class-C error occurs, the stopped full auto operation cannot be resumed.
Class D	D****	When a Class-D error occurs, the machine power turns OFF (except the power to the power supply control circuit) to prevent an electric shock or fire hazard. When the machine power is turned back ON, the monitor shows the information (cause, etc.) on the emergency stop.

3-1. A/B Class Errors with Causes and Remedies

Causes and remedies (class A and B errors)

This section describes about the causes and remedial actions to be taken for each of the class A and B errors. As for the causes and remedial actions to be taken for the class C and D errors, refer to section 3-2 in this chapter.

Code	Error message	Cause/remedy
A0001	Z1 : SIDE COVER OPEN	The Z1 side cover opens during full auto operation.
		- Close the side cover.
		- Check the side cover switch.
A0002	Z2 : SIDE COVER OPEN	The Z2 side cover opens during full auto operation.
		- Close the side cover.
		- Check the side cover switch.
A0003	PM - MAINTENANCE REQUIRED	There is a maintenance item registered in the preventive maintenance screen that has reached the preset maintenance execution due time.
		- Call up the preventive maintenance screen to check the item that is due.
		- After performing the maintenance work for the item, renew its data.
A0004	CASSETTE IS NOT IN POSITION	A cassette with unprocessed wafers is not set, or two or more cassette sizes are input from the cassette size sensor at the start of full auto operation.
		- Set a cassette containing unprocessed wafers in position.
		- Take out the set cassette once and then set it again.
		- Check the cassette size sensor.
A0005	Z1 : SPINDLE CURRENT is OVER PRE-SET	The Z1 spindle current value exceeds the value preset in "Z1 Spindle Current Pre-Alarm (A Code) Setting" parameter.
		- Check whether the preset parameter value is adequate.
		- Check the wheel for loss of abrasiveness.
A0006	Z2 : SPINDLE CURRENT is OVER PRE-SET	The Z2 spindle current value exceeds the value preset in "Z2 Spindle Current Pre-Alarm (A Code) Setting" parameter.
		- Check whether the preset parameter value is adequate.
		- Check the wheel for loss of abrasiveness.
A0007	Z1 : WHEEL HAS LITTLE USABLE TOOTH	The remaining tooth length of the Z1 wheel becomes smaller than the value preset in "Z1 Minimum Tooth" parameter during full auto operation.
		- Check the wheel's remaining tooth length, and if it reaches the limit, replace the wheel with new one.
		- Check whether the parameter ("Z1 Minimum Tooth") data setting is appropriate.
A0008	Z2 : WHEEL HAS LITTLE USABLE TOOTH	The remaining tooth length of the Z2 wheel becomes smaller than the value preset in "Z2 Minimum Tooth" parameter during full auto operation.
		- Check the wheel's remaining tooth length, and if it reaches the limit, replace the wheel with new one.
		- Check whether the parameter ("Z2 Minimum Tooth") data setting is appropriate.

Code	Error message	Cause/remedy
A0009	Z1 : SPINDLE ROTATION is LOW	Rotative speed of the Z1 spindle becomes lower than the speed preset in "Z1 SPD. Rotat. Pre-Alarm" parameter during full auto operation.
		- Stop full auto operation to check the conditions of the ground wafers.
		- Check whether the parameter ("Z1 SPD. Rotat. Pre-Alarm") data setting is adequate.
A0010	Z2 : SPINDLE ROTATION is LOW	Rotative speed of the Z2 spindle becomes lower than the speed preset in "Z2 SPD. Rotat. Pre-Alarm" parameter during full-auto operation.
		- Stop full auto operation to check the conditions of the ground wafers.
		- Check whether the parameter ("Z2 SPD. Rotat. Pre-Alarm") data setting is adequate.
A0011	PLEASE REMOVE WAFER from Z1 CHUCK TABLE	A wafer is detected on the Z1 chuck table at the start of initialization or full auto operation.
		- If there is a wafer on the chuck table, remove it. - If this error occurs even if no wafer exists on the chuck table, the chuck table may be clogged. Perform self-grinding of the chuck table. If the error still occurs, replace the
A0012	PLEASE REMOVE WAFER from Z2	chuck table with new one. A wafer is detected on the Z2 chuck table at the start of
710012	CHUCK TABLE	initialization or full auto operation.
		- If there is a wafer on the chuck table, remove it.
		- If this error occurs even if no wafer exists on the chuck table, the chuck table may be clogged. Perform self-grinding of the chcuck table. If the error still occurs, replace the chuck table with new one.
A0013	Z1 : WHEEL HAS NO USABLE TOOTH	The remaining tooth length of the Z1 wheel becomes smaller than the value preset in "Z1 Limit Tooth" parameter at the start of or during full auto operation. - Change the wheel.
		- Check whether the parameter data setting is appropriate.
A0014	Z2 : WHEEL HAS NO USABLE TOOTH	The remaining tooth length of the Z2 wheel becomes smaller than the value preset in "Z2 Limit Tooth" parameter at the start of or during full auto operation.
		- Change the wheel.
		- Check whether the parameter data setting is appropriate.
A0015	NO WAFER in the CASSETTE	All set up cassettes have been processed (there is no cassette with unprocessed wafers).
		- Set a new cassette with unprocessed wafers.
A0016	COOLANT TANK UNIT FILTER is CLOGGED	The filters of the vacuum/coolant unit (DVC010) are clogged Turn OFF DVC010 and check/replace the filters.
		- Check to make sure that the signal cable beetween DFG841 and DVC010 is correctedly connected and is not broken.
A0017	DUCT UNIT FILTER is CLOGGED	The filters of the duct unit [optional accessory] are clogged Turn OFF the duct unit and then check/replace the filters.
		 Check to make sure that the signal cable between DFG 841 and the duct unit is correctly connected and is not broken. Check the pressure switch of the duct unit for any
		defectiveness.

Code	Error message	Cause/remedy
A0018	CHILLER COOLANT TANK FILTER is CLOGGED	The filters of the spindle coolant supply unit (vacuum/coolant unit with chiller (DVC010C) [optional accessory]) are clogged Turn OFF DVC010C and check/replace the filters.
		- Check to make sure that the signal cable between DFG841 and DVC010C is correctly connected and is not broken.
A0019	2nd AIR PRESSURE is LOW	Air pressure of the sub-air circuit [optional accessory] decreases. (The machine can be kept operated without sub-air supply). - Check the supply pressure of sub-air at the facility side. - Check to make sure that the alarm setting of the sub-air
A0020	DUCT UNIT THERMAL TRIP	pressure gauge is 0.4 MPa (approx. 4 kgf/cm²). The inverter of the duct unit [optional accessory] trips.
7.0020	DOCT CIVIT THERWAL TRI	 Terminate full auto operation, turn OFF the circuit breaker of the duct unit once, and then restart the duct unit. If the error recurs, contact your nearest Disco office or Disco service office.
A0021	Z1 or Z2 HEIGHT GAUGE AMP. ERROR	An abnormal condition is detected in the height gauge amplifier. - Terminate full auto operation, turn OFF the machine power, wait for at least 1 minute, and then turn ON the machine power. - If the error recurs, contact your nearest DISCO office or DISCO service office.
A0022	Z1 HEIGHT GAUGE AMP. ERROR	The alarm contact of the Z1 height gauge amplifier turns OFF. - Possible causes include amplifier internal circuit failure, supply voltage failure, and cable breakage. - Check whether the connector on the rear of the height gauge amplifier is properly connected. - Check the power supply voltage (± 15 V).
A0023	Z2 HEIGHT GAUGE AMP. ERROR	The alarm contact of the Z2 height gauge amplifier turns OFF. - Possible causes include amplifier internal circuit failure, supply voltage failure, and cable breakage. - Check whether the connector on the rear of the height gauge amplifier is properly connected. - Check the power supply voltage (± 15 V).
A0024	CASSETTE SIZE is not MATCH	The size of the set up cassette does not agree with that defined in the grinding program. - Set a cassette of the correct size. - Change the cassette size data in the grinding program. - Check whether the cassette block mounting position is correct.
A0025 A0026	CHANGING CST-A STATUS (OPERATE AGAIN) CHANGING CST-B STATUS	The START key is pressed during the time period (about 3 sec) of cassette-status-indication change from "None" to "Ready" at the start of full-auto operation.
	(OPERATE AGAIN)	- Press the START key after the cassette status is changed to "Ready".

Code	Error message	Cause/remedy
A0027	Empty slots in cassette-A complete	(Optional)
A0028	Empty slots in cassette-B complete	This error message is issued at the end of the unloading process if there is any empty slot in the cassette. The wafer sensor of the robot arm detects empty slots according to the setting for it in the Maker Maintenance screen. - Set wafers in the empty slots beforehand.
A0029	Abnormal data find on <paramter data=""></paramter>	The machine detects an illegal parameter when it is turned ON.
A0030	Override switch turn off(OPERATE AGAIN)	The override switch [user-specified spec.] of the cassette cover is turned ON. - Turn OFF the override switch.
A0031	Detect contorl-unit's fan alarm	The cooling fan of the control unit is abnormal. - Turn OFF the machine, wait at least one minute and then restart the machine. - If the error recurs, contact your nearest DISCO office or Disco service office.
A0032	WATER LEAK HAS BEEN DETECTED (MAIN BODY)	The water leakage sensor (user-specified spec.) detects water leakage. - Immediately turn OFF the machine and check the bottom side of the machine.
A0033	CHILLER TANK LOW COOLING WATER LEVEL 1	Water level of the temperature-controlled-water tank of DVC011C decreases Replenish water in the tank.
A0034	Please set handling cover(OPERATE AGAIN)	The transport section cover is open or the cover sensor (user-specified spec.) is defective. - Close the transport section cover. - Check the cover sensor for any defectiveness.
A0035	ABNORMAL COOLING WATER(or COOLANT) TEMP.	Temperature of water in the temperature-controlled-water tank of DVC011C rises above or falls below the preset temperature level. - Turn OFF the machine and wait for at least 5 minutes and then restart the machine. - If the error recurs, contact your nearest DISCO office or DISCO service office.
A0036	Open flow: Finished wefer loading	Loading of all the wafers in the cassette completed.
A0037	Open flow: Please set unloading cassette	The cassette for unloading wafers is not set up.
A0038	Please input cassette ID.	The cassette ID is not input.
A0040	MID error	(User-specified spec.) An out-of-spec. MID code has been sent.
A0041	PPID error	(User-specified spec.) An out-of-spec. PPID code has been sent.
A0042	Z1 GROUND WAFER is TOO THICK	Thickness of a loaded wafer on the Z1 chuck table is larger than the Z1 setup value for <"Original Thickness" + "Aircut">. - Check the grinding program data. - Check the loaded wafer thickness.
A0043	Z1 GROUND WAFER is TOO THIN	Thickness of a loaded wafer on the Z1 chuck table is smaller than the Z1 setup data for "Finished Thickness". - Check the grinding program data. - Check the loaded wafer thickness.
A0044	N2 PRESSURE is LOW	(User-specified spec.) This error occurs if the pressure in the N ₂ circuit decreases Check the N ₂ supply pressure sensor.

Code	Error message	Cause/remedy
A0050	ROBOT INITIAL INCOMPLETE, CAN'T OPERATE	An attempt is made to operate the robot in the maintenance mode without executing its initialization. - Effect initialization of the robot.
A0051	ROBOT X CAN'T MOVE in PRESENT T POS.	The robot X-axis cannot be driven in unit operation unless the robot θ -axis is directed toward the cassette, spinner table, or position table.
A0052	ROBOT X-AXIS is ALREADY at LIMIT POS	An attempt is made to extend the robot X-axis in unit operation when it is already in the extension END position.
A0053	ROBOT X-AXIS is ALREADY at 0-POINT POS	An attempt is made to contract the robot X-axis in unit operation when it is already in its initial (contraction END) position.
A0054	ROBOT X not at 0-POINT, T CAN'T MOVE	An attempt is made to drive the robot θ axis in unit operation when the robot X-axis is not in the initial position.
A0055	ROBOT T ALREADY LIMIT CASSETTE-A POS.	An attempt is made to move the robot θ axis into CW direction in unit operation when it is already at the casette A (CW direction end) position.
A0056	ROBOT T ALREADY LIMIT CASSETTE-B POS.	An attempt is made to move the robot θ axis into CCW direction in unit operation when it is already at the casette B (CCW direction end) position.
A0057	ROBOT X not at 0-POINT, Z-AXIS CAN'T MOVE	An attempt is made to drive the robot Z-axis in unit operation when the robot X-axis is not in the initial position.
A0058	ROBOT Z is ALREADY in UP LIMIT POSITION	An attempt is made to move the robot Z-axis upward in unit operation when it is already in the UP END position.
A0059	ROBOT Z is ALREADY in DOWN LIMIT POS	An attempt is made to move the robot Z-axis downward in unit operation when it is already in the DOWN END position.
A0060	ROBOT X not at 0-POINT, R-AXIS CAN'T MOVE	An attempt is made to drive the robot R-axis in unit operation when the robot X-axis is not in the initial position.
A0061	ROBOT R-AXIS ALREADY in CORR. LIMIT POS	An attempt is made in unit operation to move the robot R-axis into CW direction when it is already in the CW END position.
A0062	ROBOT R-AXIS ALREADY in REV. LIMIT POS	An attempt is made in unit operation to move the robot R-axis in CCW direction when it is already in the CCW END position.
A0063	ROBOT Z CAN'T MOVE in PRESENT T POS.	An attempt is made in unit operation to drive the robot Z-axis when the robot θ axis is not in the position to allow the Z-axis to move.
A0064	ROBOT R-AXIS CAN'T ROTATE(DUE to Z POS.)	An attempt is made in unit operation to drive the robot R-axis when the robot Z axis is not in the position to allow the R-axis to move.
A0065	ROBOT WAFER SENSOR on BEFORE FULL AUTO	The wafer sensor of the robot arm turns ON at the start of full auto operation. - If there is a wafer on the robot arm, remove it. - If no wafer is found, check the wafer sensor for any defectiveness.
A0066	ROBOT VACUUM SENSOR on BEFORE FULL AUTO	The vacuum sensor of the robot arm turns ON at the start of full auto operation. - Check the setup value of the vacuum sensor. - Check the vacuum sensor for any defectiveness.
A0067	ROBOT PICK-ARM WAFER SENSOR on	The wafer sensor of the robot arm is turned ON while the robot is initialized. - Check the wafer sensor for any defectiveness.
		- Readjust the sensitivity of the sensor.

Code	Error message	Cause/remedy
A0068	ROBOT PICK-ARM VACUUM	The vacuum sensor of the robot arm is turned ON while the
	SENSOR on	robot is initialized.
		- Check the vacuum sensor for any defectiveness.
		- Readjust the sensitivity of the sensor.
A0069	ROBOT SP COVER CLOSE	The spinner cover is closed when the robot attempts to pick up a wafer from the spinner table.
	DETECT PRE UNLOAD	- Check the cover for any obstruction in its open/close
		movement.
		- Check the spinner cover sensor for any defectiveness.
A0070	SP INITIAL UNCOMPLETED(RB	An attempt is made to operate the spinner in unit operation
	CAN'T MOVE)	without initializing it Initialize the spinner.
A0090	ROBOT INITIAL INCOMPLETE(RB	An attempt is made to operate the robot in unit operation
	STEP1)	without initializing it.
		- Initialize the robot.
A0092	Z2 GROUND WAFER is TOO	Thickness of a loaded wafer on the Z2 chuck table is larger
	THICK	than the Z2 grinding setup data for <"Original Thickness" + "Aircut">.
		- Check the grinding program data.
		- Check the loaded wafer thickness.
A0093	Z2 GROUND WAFER is TOO THIN	Thickness of a loaded wafer on the Z2 chuck table is smaller
		than the Z2 grinding setup data for "Finished Thickness".
		- Check the grinding program data.
		- Check the loaded wafer thickness.
A0100	POSITION TABLE INITIAL	An attempt is made to operate the position table in unit
	INCOMPLETE	operation without initializing it.
A0101	DOCUTION TABLE ALBEADY -+ 0	- Effect initialization of the position table.
AUTUT	POSITION TABLE ALREADY at 0-POINT POS.	An attempt is made to move (extend) the wafer-centering guide of the position table to its initial position in unit
	TORVITOD.	operation when it is already at its initial position.
A0102	POSITION TABLE ALREADY at	An attempt is made to contract the wafer-centering guide of
	CLOSED LIMIT	the position table in unit operation when it is at the
10110		CONTRACT limit position.
A0140	Z1-AXIS INITIAL INCOMPLETE	An attempt is made to operate the position table in unit operation without initializing it.
		- Effect initialization of the position table.
A0154	Z1-AXIS INITIAL INCOMPLETE	An attempt is made to drive the Z1-axis in unit operation
		without initializing it.
		- Effect initialization of the Z1-axis.
A0163	Z1 AXIS : GAGE DETECT ILLIGAL	Thickness of a wafer measured in the Z1 grinding process is
	VALUE	larger than the Z1 set up data for <"Original Thickness +
		"Aircut">. Check the grinding program data
		Check the grinding program data.Check the loaded wafer thickness.
		- Since a height gauge failure could be a cause, execute height
		gauge indication value check (chuck table zero-point check).
		- Check the wafer. It may be cracked, or have a foreign matter
		on its surface.
A0164	Z1 AXIS DETECT DOWN LIMIT	The Z1-axis reaches the DOWN limit position during full-
		auto, dressing, or self-grinding operation.
		- Check the Lower-end sensor position. (It is impossible for the Z-axis to reach the DOWN limit position when it mounts
		the wheel at its end.)
		<u>'</u>

Code	Error message	Cause/remedy
A0166	Z1 CLEAN BRUSH & Z1 SHUTTER INTERFERE	An attempt is made to move up the Z1 washing unit in unit operation when the washing unit is not turned to the escape position.
A0169	Z1 CLEAN BRUSH CAN'T ROTATE at UP-END	An attempt is made to turn the Z1 washing unit in unit operation when the washing unit is not moved down.
A0173	Z1 Z2 CLEANING BRUSH UP TIMEOVER	Moving up of the Z1 washing unit does not complete within 8 seconds. - Make operational checkout of the washing unit. - Check the sensor for any defectiveness. - Adjust the sensor position.
A0174	Z1 ASP - DISABLE SET IN MAKERMAINTNANCE	The "Z1 Set Up Method" parameter is set to <auto>, although the optional ASP function is not installed in the machine. - Set the parameter to <manual>.</manual></auto>
A0175	Z1 ASP - NOT AT RETURN POSITION	The optional ASP (auto-setup) unit arm is not returned to the escape position. - Check the status of the ASP unit.
A0176	Z1 ASP - NOT AT SET POSITION	The optional ASP (auto-setup) unit does not move to the measuring position when auto setup is performed. - Check the status of the ASP unit.
A0177	Z1 ASP - NOT SIGNAL TURN OFF	The signal of the optional ASP (auto-setup) unit sensor is not turned OFF. - Make an operational check of the sensor section.
A0178	Z1 ASP - NOT IN SAFE POSITION	An attempt is made to drive the Z1-axis when the optional ASP (auto-setup) unit is not returned to the escape position. - Turn the ASP unit to the escape position and then drive the Z1-axis.
A0179	Z1 ASP - DATA ERROR(operate INITILAIZE)	The ASP unit (optional accessory) internal data needs to be reset. - Effect initialization of the machine before proceeding with the intended operation.
A0180	Z1 ASP - DATA ERROR (range over)	When performing auto setup, the Z1-axis moves down beyond the accetable range in the first and second auto-setup actions. - Check the sensor.
A0181	Z1 ASP - MOVEMENT LIMIT OVER	When completing auto setup, the determined set up position is not within the acceptable range. - Check the sensor.
A0182	Z1 SETUP ALLOWANCE OVER	The wheel setup position is abnormal (exceeding the set up value of "Z1 Setup Allowance" parameter). - Check the parameter set up value. - Check whether the wheel setup position is correct. - Perform wheel position setup over again.
A0184	Z1 EXCESSIVE WEAR OVER	The wheel is unduly worn (exceeding the set up value of "Z1 Excessive Wear" parameter). - Check the ground wafers for any abnormality. - If the ground wafers are abnormal, check the wheel tooth and the grinding program used. - Execute dressing of the wheel.
A0184	Z1 DETECT T-arm UNSAFE POSITION	The washing unit (brush) can't move down as the T-arm is at the chuck table position.

Code	Error message	Cause/remedy
A0185	Z1 ASP - DETECT OVER LIMIT	The optional ASP (auto setup) unit moves beyond the normal operation range of the Z1-axis (the auto-setup sensor fails to work in its operation range). - Check the ASP sensor position. - Check the ASP sensor for any defectiveness.
A0186	Z1:AUTO SIZE DATA ERROR (NO DATA)	When the automatic program selection function (user-specified spec.) is used, there is no grinding program that applies to the detected wafer size and thickness.
A0189	Z1:THICK. IS THINNER THAN Off Amount G.	Thickness of a wafer loaded for Z1-axis grinding is smaller than the Z1 setup data for <"Finished Thickness" + "Off Amount Guarant.">. - Check the loaded wafer thickness. - Check the set up value of "Off Amount Guarant." parameter on the Automatia Program Set. Edit carear.
A0190	Z1:THICK. IS THINNER THAN Finish Thick.	on the Automatic Program Set, Edit screen. The minimum thickness of a wafer loaded for Z1-axis grinding is smaller than the set up finished wafer thickness value. - Check the thickness of the loaded wafer. - Check the grinding program.
A0191	Z1:THICK. IS THINNER THAN Limited Thick	Thickness of a wafer loaded for Z1-axis grinding is equal to or smaller than the Z1 setup data for <"Original Thickness" + "Specified detect level">. (Effective when "Org wafer min. check set" parameter is set to <specify> or <min +="" specify="">.)</min></specify>
A0192	Z1:Max. of THICK. IS DIF THEN SET	A wafer with its thickness variation exceeding the set up value of "C/T mode Max-Min DIF comparison value" parameter on the GRIND DATA screen is loaded on the Z1chuck table.
A0204	Z2-AXIS INITIAL INCOMPLETE	 Check the loaded wafer for any warping or grooving. An attempt is made to drive the Z2-axis in unit operation without initializing it. Effect initialization of the Z2-axis.
A0213	Z2 AXIS : GAGE DETECT ILLIGAL VALUE	Thickness of a wafer measured in the Z2 grinding process is larger than the Z2 set up data for <"Original Thickness + "Aircut">. - Check the grinding program data. - Check the loaded wafer thickness. - Since a height gauge failure could be a cause, execute height gauge indication value check (chuck table zero-point check). - Check the wafer. It may be cracked, or have a foreign matter on its surface.
A0214	Z2 AXIS DETECT DOWN LIMIT	The Z2-axis reaches the DOWN limit position during full-auto, dressing, or self-grinding operation. - Check the Lower-end sensor position. (It is impossible for the Z-axis to reach the DOWN limit position when it mounts the wheel at its end.)
A0216	Z2 CLEAN BRUSH & Z2 SHUTTER INTERFERE	An attempt is made to move up the Z2 washing unit in unit operation when the washing unit is not turned to the escape position.
A0219	Z2 CLEAN BRUSH CAN'T ROTATE at UP-END	An attempt is made to turn the Z2 washing unit in unit operation when the washing unit is not moved down.

Code	Error message	Cause/remedy
A0223	Z2 Z1 CLEANING BRUSH UP	Moving up of the Z2 washing unit does not complete within 8
	TIMEOVER	seconds.
		- Make operational checkout of the washing unit.
		- Check the sensor for any defectiveness.
10001		- Adjust the sensor position.
A0224	Z2 ASP - DISABLE SET IN MAKERMAINTNANCE	The "Z2 Set Up Method" parameter is set to <auto>, although the optional ASP function is not installed in the machine.</auto>
10005		- Set the parameter to <manual>.</manual>
A0225	Z2 ASP - NOT AT RETURN POSITION	The optional ASP (auto-setup) unit arm is not returned to the escape position.
40000		- Check the status of the ASP unit.
A0226	Z2 ASP - NOT AT SET	The optional ASP (auto-setup) unit does not move to the
	POSITION	measuring position when auto setup is performed. - Check the status of the ASP unit.
A0227	Z2 ASP - NOT SIGNAL TURN OFF	The signal of the optional ASP (auto-setup) unit sensor is not
AUZZI	ZZ ASP - NOT SIGNAL TURN OFF	turned OFF.
40000		- Make an operational check of the sensor section.
A0228	Z2 ASP - NOT IN SAFE POSITION	An attempt is made to drive the Z2-axis when the optional ASP (auto-setup) unit is not returned to the escape position.
		- Turn the ASP unit to the escape position and then drive the Z2-axis.
A0229	Z2 ASP - DATA ERROR(operate INITILAIZE)	The ASP unit (optional accessory) internal data needs to be reset.
	INTILE NELL)	- Effect initialization of the machine before proceeding with the intended operation.
A0230	Z2 ASP - DATA ERROR (range over)	When performing auto setup, the Z2-axis moves down beyond the accetable range in the first and second auto-setup actions.
		- Check the sensor.
A0231	Z2 ASP - MOVEMENT LIMIT OVER	When completing auto setup, the determined set up position is not within the acceptable range.
		- Check the sensor.
A0232	Z2 SETUP ALLOWANCE OVER	The wheel setup position is abnormal (exceeding the set up value of "Z2 Setup Allowance" parameter).
		- Check the parameter set up value.
		- Check whether the wheel setup position is correct.
		- Perform wheel position setup over again.
A0233	Z2 EXCESSIVE WEAR OVER	The wheel is unduly worn (exceeding the set up value of "Z2 Excessive Wear" parameter).
		- Check the ground wafers for any abnormality.
		- If the ground wafers are abnormal, check the wheel tooth and the grinding program used.
		- Execute dressing of the wheel.
A0234	Z2 DETECT T-arm UNSAFE POSITION	- The washing unit (brush) can't move down as the T-arm is at the chuck table position.
A0235	Z2 ASP - DETECT OVER LIMIT	The optional ASP (auto setup) unit moves beyond the normal
7.0200	22 ASI - DETECT OVER LIMIT	operation range of the Z2-axis (the auto-setup sensor fails to work in its operation range).
		- Check the ASP sensor position.
		- Check the ASP sensor for any defectiveness.
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Code	Error message	Cause/remedy
A0236	Z2:AUTO SIZE DATA ERROR (NO DATA)	When the automatic program selection function (user-specified spec.) is used, there is no grinding program that applies to the detected wafer size and thickness.
A0239	Z2 :THICK. IS THINNER THAN Off Amount G.	Thickness of a wafer loaded for Z2-axis grinding is smaller than the Z2 setup data for <"Finished Thickness" + "Off Amount Guarant.">. - Check the loaded wafer thickness. - Check the set up value of "Off Amount Guarant." parameter on the Automatic Program Set, Edit screen.
A0240	Z2:THICK. IS THINNER THAN Finish Thick.	The minimum thickness of a wafer loaded for Z2-axis grinding is smaller than the set up finished wafer thickness value. - Check the thickness of the loaded wafer. - Check the grinding program.
A0241	Z2:THICK. IS THINNER THAN Limited Thick	Thickness of a wafer loaded for Z2-axis grinding is equal to or smaller than the Z2 setup data for <"Original Thickness" + "Specified detect level">. (Effective when "Org wafer min. check set" parameter is set to <specify> or <min +="" specify="">.)</min></specify>
A0242	Z2:Max. of THICK. IS DIF THEN SET	A wafer with its thickness variation exceeding the set up value of "C/T mode Max-Min DIF comparison value" parameter on the GRIND DATA screen is loaded on the Z2 chuck table. - Check the loaded wafer for any warping or grooving.
A0250	T-ARM INITIAL INCOMPLETE	An attempt is made to move the T-arm in unit operation without initializing it. - Initialize the T-arm.
A0251	T-ARM at UP END POSITION	An attempt is made to move up the T-arm in unit operation when it is already at its UP end position.
A0252	T-ARM at DOWN END(1) MIDDLE POSITION	An attempt is made to move down the T-arm in unit operation when it is already at its DOWN position.
A0253	T-ARM at DOWN END(2) LOWEST POSITION	An attempt is made to move down the T-arm in unit operation when it is already at its DOWN limit position.
A0254	T-ARM at CCW END (SPINNER TABLE)	An attempt is made to move the T-arm in CCW direction in unit operation when it is already at its CCW end position.
A0256	T-ARM at CW END (POSITION TABLE)	An attempt is made to move the T-arm in CW direction in unit operation when it is already at its CW end position.
A0257	T-ARM not in POSITION for DOWN OPERATION	An attempt is made to move the T-arm in unit operation when the T-arm is not at its CW END, CCW END, or NEUTRAL position. - Initialize the T-arm.
A0258	T-ARM is EXTENDED	An attempt is made to extend the T-arm in unit operation when it is already extended.
A0259	T-ARM is CONTRACTED	An attempt is made to contract the T-arm in unit operation when it is already contracted.
A0260	SEPARATION SHUTTER is OPEN	An attempt is made to open the T-shutter in unit operation when it is already open.
A0261	SEPARATION SHUTTER is CLOSED	An attempt is made to close the T-shutter in unit operation when it is already closed.
A0263	SEP. SHUTTER is CLOSED, CAN'T OPERATE	An attempt is made to move the T-arm in unit operation when the T-shutter is open.
A0264	T-ARM CAN'T MOVE for it isn't at UP AREA	An attempt is made to turn or contract the T-arm in unit operation when the T-arm is not at its UP end position.

Code	Error message	Cause/remedy
A0265	T-ARM R-PAD CAN'T MOVE as not	An attempt is made to turn or contract the T-arm in unit
	CONTRACTED	operation when the R-pad is not at its contracted position.
A0266	T-ARM L-PAD CAN'T MOVE as not	An attempt is made to turn or contract the T-arm in unit
	CONTRACTED	operation when the L-pad is not at its contracted position.
A0267	T-ARM CAN'T MOVE SPINNER	An attempt is made to turn the T-arm into CCW direction in
	COVER not OPEN	unit operation when the spinner cover is not open.
A0268	T-ARM CAN'T MOVE SPINNER	An attempt is made to turn the T-arm into CCW direction in
	NOZZLE STILL in	unit operation when the spinner nozzle is not in the escape position.
A0269	T-ARM CAN'T EXTEND at THIS	An attempt is made to extend the T-arm in unit operation
710200	POSITION	when the T-arm is not at its CW end or CCW end position.
A0270	T-ARM is not in nuetral position	An attempt is made to close the T-shutter in unit operation
	1 Then is not in nactail position	when the T-arm is not at its NEUTRAL position.
A0271	T-ARM M-PAD CLEANING	An attempt is made to turn M-mad cleaning water ON in unit
	WATER is ALREADY on	operation when it is already turned ON.
A0272	T-ARM M-PAD CLEANING	An attempt is made to turn M-mad cleaning water OFF in unit
	WATER ALREADY off	operation when it is already turned OFF.
A0273	WAFER BACKSIDE CLEANING	An attempt is made to turn wafer-back-surface cleaning water
	WATER ALREADY on	ON in unit operation when it is already turned ON.
A0274	WAFER BACKSIDE CLEAN	An attempt is made to turn wafer-back-surface cleaning water
40075	WATER ALREADY off	OFF in unit operation when it is already turned OFF.
A0275	WAFER BACKSIDE DRYING AIR ALREADY on	An attempt is made to turn wafer-back-surface drying air ON
A0276		in unit operation when it is already turned ON
A0210	WAFER BACKSIDE DRYING AIR ALREADY off	An attempt is made to turn wafer-back-surface drying air OFF in unit operation when it is already turned OFF.
A0277	Z1 HEIGHT GAUGE RETRACT	An attempt is made to turn the T-arm when the Z1 height
	JAMMED for T-ARM	gauge is not moved up.
A0278	Z2 HEIGHT GAUGE RETRACT	An attempt is made to turn the T-arm when the Z2 height
	JAMMED for T-ARM	gauge is not moved up.
A0279	Z1 SPINDLE POSITION JAMMED	An attempt is made to turn the T-arm in unit operation when
	for T-ARM	the Z1 spindle is not at its UP end position.
A0280	Z2 SPINDLE POSITION JAMMED	An attempt is made to turn the T-arm in unit operation when
10001	for T-ARM	the Z2 spindle is not at its UP end position.
A0281	T-ARM INITIAL TIMEOVER(DUE	The T-arm cannot be initialized as the Z-sxis is not moved to
۸۸۵۵۵	to Z-AXIS)	its UP end position.
A0282	T-ARM R-PAD DETECT WAFER BEFORE INITIAL	A wafer is vacuum-retained by the R-pad at the start of T-arm initialization.
	DEI ONE IIVITAL	- Remove the wafer.
		- Check the set up value of the vacuum sensor.
		- Check the vacuum sensor for any defectiveness.
A0283	T-ARM M-PAD DETECT WAFER	A wafer is vacuum-retained by the M-pad at the start of T-
	BEFORE INITIAL	arm initialization.
		- Remove the wafer.
		- Check the set up value of the vacuum sensor.
		- Check the vacuum sensor for any defectiveness.
A0284	T-ARM L-PAD DETECT WAFER	A wafer is vacuum-retained by the L-pad at the start of T-arm
	BEFORE INITIAL	initialization.
		- Remove the wafer.
		- Check the set up value of the vacuum sensor.
		- Check the vacuum sensor for any defectiveness.

Code	Error message	Cause/remedy
A0300	SPINNER NOZZLE at ESCAPE POSITION	An attempt is made to turn the spinner nozzle to the escape position in unit operation when it is already at the escape position.
A0301	SPINNER NOZZLE at CLEANING POSITION	An attempt is made to turn the spinner nozzle to the wafer- washing position in unit operation when it is already at the wafer-washing position.
A0302	SPINNER TABLE is SPINNING in LOW SPEED	An attempt is made to rotate the spinner table in low speed in unit operation when it is already rotating in low speed.
A0303	SPINNER TABLE is SPINNING in HIGH SPEED	An attempt is made to rotate the spinner table in high speed in unit operation when it is already rotating in high speed.
A0304	SPINNER TABLE STOPPED	An attempt is made to stop the spinner table in unit operation when it is already stopped rotating.
A0305	SPINNER TABLE VACUUM on	An attempt is made to turn ON the vacuum system of the spinner table in unit operation when it is already turned ON.
A0306	SPINNER TABLE VACUUM off	An attempt is made to turn OFF the vacuum system of the spinner table in unit operation when it is already turned OFF.
A0307	SPINNER TABLE BLOW UP on	An attempt is made to turn ON the air blow system of the spinner table in unit operation when it is already turned ON.
A0308	SPINNER TABLE BLOW UP off	An attempt is made to turn OFF the air blow system of the spinner table in unit operation when it is already turned OFF.
A0309	SPINNER COVER OPEN	An attempt is made to open the spinner cover in unit operation when it is already open.
A0310	SPINNER COVER CLOSED	An attempt is made to close the spinner cover in unit operation when it is already closed.
A0311	SPINNER CLEANING WATER on	An attempt is made to turn ON spinner cleaning water when it is already turned ON.
A0312	SPINNER CLEANING WATER off	An attempt is made to turn OFF spinner cleaning water when it is already turned OFF.
A0313	SPINNER DRYING AIR on	An attempt is made to turn ON the wafer-drying air system of the spinner table when it is already turned ON.
A0314	SPINNER DRYING AIR off	An attempt is made to turn OFF the wafer-drying air system of the spinner table when it is already turned OFF.
A0315	SPINNER CAN'T OPERATE for T- ARM JAMMED	An attempt is made to perform spinner cover open/close or spinner nozzle IN/OUT operation in unit operation when the T-arm is at the spinner position.
A0316	SPINNER CAN'T OPERATE for ROBOT JAMMED	An attempt is made to close the spinner cover in unit operation when the robot arm is at the spinner position.
A0317	SPINNER COVER CAN'T OPEN DURING TABLE on	An attempt is made to open the spinner cover in unit operation when the spinner table is rotating.
A0318	SPINNER TABLE CAN'T on DURING COVER OPEN	An attempt is made to rotate the spinner table in unit operation when the spinner cover is open.
A0319	NO WAFER on SPINNER TABLE	There is no wafer on the spinner table when the spinner sequence operation is initiated in unit operation.
A0320	CAN'T INITIAL, WAFER DETECT on SPINNER	A wafer is found on the spinner table during initialization of the machine. - If there is a wafer on the spinner table, remove it. - Check the sensor for any defectiveness.
A0321	SPINNER INITIAL TIMEOVER(DUE to T-ARM)	Initialization of the spinner does not complete within the predefined time period (30 sec.) due to T-arm interference.
A0322	SPINNER INITIAL TIMEOVER(DUE to ROBOT)	Initialization of the spinner does not complete within the predefined time period due to robot interference.

Code	Error message	Cause/remedy
A0370	(Reserved error for communication	Errors associated with the user-specific "data communication"
105=:	spec)	function. (Contact your nearest DISCO office or DISCO
A0371	Illegal communication error number	service office for details.)
A0372	Communication initialize fault	
A0373	Bad communication parameter number error	
A0374	Communication T1 timeout error	
A0375	Communication T2 timeout error	
A0376	Communication send retry over	
A0377	Illegal length data received	
A0378	Illegal data (R-bit) received	
A0379	Illegal data (block number) received	
A0380	Communication T3 timeout error	
A0381	Communication T4 timeout error	
A0382	COMMUNICATION co-process fault	
A0383	Conversation timeout error	
A0384	Illegal data (device ID) received	
A0385	Illegal data (stream no.) received	
A0386	Illegal data (function no.) received	
A0387	Too long data of multi block	
A0388	Communication data control file error	
A0389	Section not found of control file	
A0390	Receive message file write error	
A0391	COMM-TASK error (pipe error)	
A0392	COMM-TASK error (memory error)	
A0393	COMM-TASK error (HOST error)	
A0394	COMM-TASK error (error mode)	
A0395	(Reserved error for communication	
A0200	spec)	
A0396	(Reserved error for communication spec)	
A0397	(Reserved error for communication spec)	
A0398	(Reserved error for communication spec)	
A0399	(Reserved error for communication spec)	
A2007	Insert manual key to Z1 axis side	The manual keyboard is not connected to its connector at the Z1-axis side when the unit operation (Z1) screen is called up.
A2008	Insert manual key to Z2 axis side	The manual keyboard is not connected to its connector at the Z2-axis side when the unit operation (Z2) screen is called up.
A2010	Insert manual key to front side	The manual keyboard is not connected to its connector inside the machine front conver, when the unit operation (ROBOT, SPINNER, or T-ARM) screen is called up.
A2013	Detect PCB rack's fan alarm	An alarm condition of the cooling fan occurs in the electric section.
		- Turn OFF the machine power, wait for at least 30 minutes, and then restart the machine.
		- If the error repeatedly occurs, contact your nearest DISCO office or DISCO service office.

Code	Error message	Cause/remedy
A2016	A Cassette has been removed	The cassette under processing is removed during full auto
A2017	B Cassette has been removed	operation.
		- Correctly reset the removed cassette.
A2023	Please close Z1 inner cover	An attempt is made to rotate the Z1-axis spindle when the Z1 wheel cover is open.
A2024	Please close Z2 inner cover	An attempt is made to rotate the Z2-axis spindle when the Z2 wheel cover is open

B0400 CASSETTE was REMOVED DURING FULL AUTO The cassette that is under processing comes off. Check if the cassette is correctly set. The cassette cover for the cassette under processing opens. Close the cassette cover for the cassette under processing opens. Close the cassette cover. Check the cassette cover for any defectiveness. Close the cassette cover sensor for any defectiveness. Check the cassette cover (use-specified spec.) is turned ON. Turn the override switch OFF. User-specified wafer thickness gauge related error. Contact your nearest DISCO office or DISCO service office for details. Contact your nearest DISCO office or DISCO service office for details. Contact your nearest DISCO office or DISCO service office for details. Check the mass arrival that the signal cable between DFG841 and the duct unit is correctly connected and is not broken. Check the pressure switch of the duct unit for any defectiveness. Check the mass arrival that the signal cable between DFG841 and the duct unit is correctly connected and is not broken. Check the pressure switch of the duct unit for any defectiveness. Check the mass arrival that the signal cable between DFG841 and the duct unit is correctly connected and is not broken. Check the mass arrival that the signal cable between DFG841 and the duct unit is correctly connected and is not broken. Check the mass arrival	Code	Error message	Cause/remedy
B0402 CASSETTE-A COVER OPEN DURING OPERATION The cassette cover for the cassette under processing opens.	B0400		,
DURING OPERATION CASSETTE-B COVER OPEN DURING OPERATION		DURING FULL AUTO	- Check if the cassette is correctly set.
B0403 CASSETTE-B COVER OPEN DURING OPERATION Check the cassette cover sensor for any defectiveness.	B0402	CASSETTE-A COVER OPEN	The cassette cover for the cassette under processing opens.
B0406		DURING OPERATION	- Close the cassette cover.
Check if the cover is correctly installed. Check the cover sensor for any defectiveness.	B0403		- Check the cassette cover sensor for any defectiveness.
Check the cover sensor for any defectiveness.	B0406	Handling cover is removed.	The transport section cover opens or is displaced.
B0409 Override switch on !!! The override switch of the cassette cover (use-specified spec.) is turned ON.			- Check if the cover is correctly installed.
Section			- Check the cover sensor for any defectiveness.
Bo410 Thickness measuring error Bo411 Thickness measuring too Thick ALARM Bo412 Thickness measuring too Thin ALARM Bo413 Thickness measuring please set REMOTE Bo414 Thickness measuring communication error Bo415 Thickness measuring communication error Bo416 Thickness measuring :Please PC set ready Bo420 DUCT UNIT FILTER is CLOGGED Filters of the duct unit (optional accessory) are clogged Turn OFF the duct unit and then check/replace the filters Check to make sure that the signal cable between DFG841 and the duct unit is correctly connected and is not broken Check the pressure switch of the duct unit for any defectiveness. Terminate full auto operation and turn the circuit breaker of the duct unit to optional accessory) trips Terminate full auto operation and turn the circuit breaker of the duct unit to optional operation once and then restart it If the same error repeatedly occurs, contact your nearest DISCO office or DISCO service office.	B0409	Override switch on !!!	` <u> </u>
B0411 Thickness measuring too Thick ALARM			-Turn the override switch OFF.
BO412 Thickness measuring too Thin ALARM			<u>.</u>
BO413 Thickness measuring please set REMOTE	B0411	ě .	
B0414 Thickness measuring communication error	B0412	<u> </u>	
B0415 Thickness measuring command error	B0413		
B0415 Thickness measuring command error B0416 Thickness measuring :Please PC set ready B0420 DUCT UNIT FILTER is CLOGGED Filters of the duct unit (optional accessory) are clogged.	B0414	Thickness measuring communication	
B0420 DUCT UNIT FILTER is CLOGGED Filters of the duct unit (optional accessory) are clogged. Turn OFF the duct unit and then check/replace the filters. Check to make sure that the signal cable between DFG841 and the duct unit is correctly connected and is not broken. Check the pressure switch of the duct unit for any defectiveness. B0421 DUCT UNIT THERMAL TRIP The inverter of the duct unit (optional accessory) trips. Terminate full auto operation and turn the circuit breaker of the duct unit to "OFF" position once and then restart it. If the same error repeatedly occurs, contact your nearest DISCO office or DISCO service office. B0422 N2 PRESSURE is LOW The supply pressure of N2 in the optional N2 circuit decreases. Check the pressure sensor.	D0445		
B0420 DUCT UNIT FILTER is CLOGGED Filters of the duct unit (optional accessory) are clogged. - Turn OFF the duct unit and then check/replace the filters. - Check to make sure that the signal cable between DFG841 and the duct unit is correctly connected and is not broken. - Check the pressure switch of the duct unit for any defectiveness. B0421 DUCT UNIT THERMAL TRIP The inverter of the duct unit (optional accessory) trips. - Terminate full auto operation and turn the circuit breaker of the duct unit to "OFF" position once and then restart it. - If the same error repeatedly occurs, contact your nearest DISCO office or DISCO service office. B0422 N2 PRESSURE is LOW The supply pressure of N2 in the optional N2 circuit decreases. - Check the pressure sensor. B0450 ROBOT:X-AXIS OPERATION TIME UP Extension/contraction movement of the robot X-axis does not complete within 10 seconds. - Check the X-axis for any obstructed movement. B0451 ROBOT: T-AXIS OPERATION TIME UP Turning movement of the robot θ axis does not complete within 15 seconds.		The state of the s	
Turn OFF the duct unit and then check/replace the filters. Check to make sure that the signal cable between DFG841 and the duct unit is correctly connected and is not broken. Check the pressure switch of the duct unit for any defectiveness. B0421 DUCT UNIT THERMAL TRIP		•	
- Check to make sure that the signal cable between DFG841 and the duct unit is correctly connected and is not broken Check the pressure switch of the duct unit for any defectiveness. B0421 DUCT UNIT THERMAL TRIP The inverter of the duct unit (optional accessory) trips Terminate full auto operation and turn the circuit breaker of the duct unit to "OFF" position once and then restart it If the same error repeatedly occurs, contact your nearest DISCO office or DISCO service office. B0422 N2 PRESSURE is LOW The supply pressure of N2 in the optional N2 circuit decreases Check the pressure sensor. B0450 ROBOT:X-AXIS OPERATION TIME UP Extension/contraction movement of the robot X-axis does not complete within 10 seconds Check the X-axis for any obstructed movement. Turning movement of the robot θ axis does not complete within 15 seconds.	B0420	DUCT UNIT FILTER is CLOGGED	
and the duct unit is correctly connected and is not broken. - Check the pressure switch of the duct unit for any defectiveness. B0421 DUCT UNIT THERMAL TRIP The inverter of the duct unit (optional accessory) trips. - Terminate full auto operation and turn the circuit breaker of the duct unit to "OFF" position once and then restart it. - If the same error repeatedly occurs, contact your nearest DISCO office or DISCO service office. B0422 N2 PRESSURE is LOW The supply pressure of N2 in the optional N2 circuit decreases. - Check the pressure sensor. B0450 ROBOT: X-AXIS OPERATION TIME UP Extension/contraction movement of the robot X-axis does not complete within 10 seconds. - Check the X-axis for any obstructed movement. Turning movement of the robot θ axis does not complete within 15 seconds.			_
Check the pressure switch of the duct unit for any defectiveness.			
B0421 DUCT UNIT THERMAL TRIP The inverter of the duct unit (optional accessory) trips. - Terminate full auto operation and turn the circuit breaker of the duct unit to "OFF" position once and then restart it. - If the same error repeatedly occurs, contact your nearest DISCO office or DISCO service office. B0422 N2 PRESSURE is LOW The supply pressure of N2 in the optional N2 circuit decreases. - Check the pressure sensor.			-
- Terminate full auto operation and turn the circuit breaker of the duct unit to "OFF" position once and then restart it If the same error repeatedly occurs, contact your nearest DISCO office or DISCO service office. B0422 N2 PRESSURE is LOW The supply pressure of N2 in the optional N2 circuit decreases Check the pressure sensor. B0450 ROBOT:X-AXIS OPERATION TIME UP Extension/contraction movement of the robot X-axis does not complete within 10 seconds Check the X-axis for any obstructed movement. Turning movement of the robot θ axis does not complete within 15 seconds.			•
- Terminate full auto operation and turn the circuit breaker of the duct unit to "OFF" position once and then restart it. - If the same error repeatedly occurs, contact your nearest DISCO office or DISCO service office. B0422 N2 PRESSURE is LOW The supply pressure of N2 in the optional N2 circuit decreases. - Check the pressure sensor. B0450 ROBOT:X-AXIS OPERATION TIME UP Extension/contraction movement of the robot X-axis does not complete within 10 seconds. - Check the X-axis for any obstructed movement. Turning movement of the robot θ axis does not complete within 15 seconds.	B0421	DUCT UNIT THERMAL TRIP	The inverter of the duct unit (optional accessory) trips.
- If the same error repeatedly occurs, contact your nearest DISCO office or DISCO service office. B0422 N2 PRESSURE is LOW The supply pressure of N2 in the optional N2 circuit decreases. - Check the pressure sensor. Extension/contraction movement of the robot X-axis does not complete within 10 seconds. - Check the X-axis for any obstructed movement. B0451 ROBOT: T-AXIS OPERATION TIME UP Turning movement of the robot θ axis does not complete within 15 seconds.			- Terminate full auto operation and turn the circuit breaker of
decreases. - Check the pressure sensor.			- If the same error repeatedly occurs, contact your nearest
B0450 ROBOT:X-AXIS OPERATION TIME UP Extension/contraction movement of the robot X-axis does not complete within 10 seconds.	B0422	N2 PRESSURE is LOW	11 7 1
UP complete within 10 seconds. - Check the X-axis for any obstructed movement. B0451 ROBOT: T-AXIS OPERATION Turning movement of the robot θ axis does not complete within 15 seconds.			- Check the pressure sensor.
- Check the X-axis for any obstructed movement. B0451 ROBOT: T-AXIS OPERATION TIME UP Turning movement of the robot θ axis does not complete within 15 seconds.	B0450		
B0451 ROBOT: T-AXIS OPERATION TIME UP Turning movement of the robot θ axis does not complete within 15 seconds.			
TIME UP within 15 seconds.	B0451	ROBOT: T-AXIS OPERATION	-
- Check the θ -axis for any obstructed movement.		TIME UP	
			- Check the θ -axis for any obstructed movement.
B0452 ROBOT:Z-AXIS OPERATION TIME Up/down movement of the robot Z-axis does not complete within 10 seconds.	B0452		
- Check the Z-axis for any obstructed movement.			- Check the Z-axis for any obstructed movement.
B0453 ROBOT:R-AXIS OPERATION TIME Reverse movement of the robot R-axis does not complete within 10 seconds.	B0453		
- Check the R-axis for any obstructed movement.			- Check the R-axis for any obstructed movement.

Code	Error message	Cause/remedy
B0454	ROBOT:WAFER LOAD ERR	When loading a wafer from the cassette, the vacuum sensor of
	(DETECT ON; VAC:OFF)	the robot arm does not turn ON whereas the wafer sensor is turned ON.
		- Check whether the wafer is significantly warped or not.
		- Check whether the robot arm pad surface is scratched or not.
		- Check the vacuum pressure indication on the vacuum gauge.
		- Check the vacuum sensor for any defectiveness.
B0455	ROBOT:WAFER LOAD ERR (DETECT OFF; VAC:ON)	When loading a wafer from the cassette, the wafer sensor of the robot arm does not turn ON whereas the vacuum sensor is turned ON.
		- Check whether the wafer is significantly warped or not.
		- Check the sensitivity of the wafer sensor.
		- Check the wafer sensor for any defectiveness.
B0456	WFR MISS PICK UP at SPINNER(DETECT: OFF)	The robot X-axis initial position sensor is turned OFF in the operation sequence in which the Z-axis operates with the robot X-axis in the contracted position during full auto operation.
		- Perform error recovery.
B0457	WFR MISS PICK UP at SPINNER(VAC: OFF)	The vacuum sensor of the robot arm does not turn OFF although the vacuum system is turned OFF when the robot picks up a wafer from the spinner table.
		- Check whether the wafer is significantly warped or not.
		- Check whether the arm pad surface is scratched or not.
D0.450		- Check the vacuum pressure indication on the vacuum gauge.
B0458	ROBOT:WAFER UNLOAD ERR (VAC: ON)	The vacuum sensor of the robot arm does not turn OFF although the vacuum system is turned OFF upon storing a wafer into the cassette.
		- Check the vacuum sensor and vacuum valve for any defectiveness.
B0459	WAFER RELEASE ERROR to POSITION TABLE	The wafer sensor of the position table does not turn ON when a wafer is placed on the position table.
		- The wafer surface color absorbes infrared light.
		- Check the sensor for any defectiveness.
B0460	ROBOT:X-AXIS MISS-STEP DETECTED	The specified moving amount and the actual moving amount of the robot X-axis do not agree.
		Check the robot X-axis for any obstructed movement.
		- Check the stepping motor driver and sensor for any defectiveness.
B0461	ROBOT: T-AXIS MISS-STEP DETECTED	The specified moving amount and the actual moving amount of the robot θ -axis do not agree.
		Check the robot θ -axis for any obstructed movement.
		- Check the stepping motor driver and sensor for any defectiveness.
B0462	ROBOT:Z-AXIS MISS-STEP DETECTED	The specified moving amount and the actual moving amount of the robot Z-axis do not agree.
		Check the robot Z-axis for any obstructed movement.
		- Check the stepping motor driver and sensor for any defectiveness.
B0463	ROBOT:LOST CASSETTE	The cassette sensor turns OFF while the robot is in action during full auto operation.
		- Check if the cassette is displaced or not.
		- Check the sensor for any defectiveness.
		•

Code	Error message	Cause/remedy
B0464	PLEASE REMOVE WAFER from POSITION TABLE	When an attempt is made to load a wafer on the position table, the wafer sensor of the position table is already turned ON.
		If there is a wafer on the position table, remove it.Check the sensor for any defectiveness.
B0465	ROBOT:WAFER UNLOAD ERR (DETECT WAFER: ON)	The wafer sensor of the robot arm does not turn OFF although the vacuum system is turned OFF upon storing a wafer into the cassette. - Check the wafer sensor and the vacuum valve for any
		defectiveness.
D0 100		- Any electrostatic buildup on the wafer must be eliminated.
B0466	ROBOT:INCORRECT SEQUENCE	The robot X-axis initial position sensor is turned OFF in the operation sequence in which the Z-axis operates with the robot X-axis in the contracted position during full auto operation.
		- Perform error recovery.
B0467	ROBOT:WAFER PUSHER UP OPERATION TIME UP	Moving UP action of the (user-specified) wafer pusher does not complete within the predefined period of time. - Check the wafer pusher for any obstructed movement.
B0468	ROBOT:WAFER PUSHER DOWN	Moving DOWN action of the (user-specified) wafer pusher
20.00	OPERATION TIMEUP	does not complete within the predefined period of time.
		- Check the wafer pusher for any obstructed movement.
B0469	ROBOT:WAFER PUSHER PUSH OPERATION TIMEUP	Moving FORWARD action of the (user-specified) wafer pusher does not complete within the predefined period of time.
		- Check the wafer pusher for any obstructed movement.
B0470	ROBOT:WAFER PUSHER BACK OPERATION TIMEUP	Moving BACKWARD action of the (user-specified) wafer pusher does not complete within the predefined period of time.
		- Check the wafer pusher for any obstructed movement.
B0471	ROBOT:Z SERVO ALARM HAS BEEN GENERATED	The robot Z-axis servo motor trips (alarm).Turn Off the machine power, wait for at least one minute, and then restart the machine.
B0472	ROBOT ARM WAFER MISHANDLING(LOADING)	When the robot arm is reversed in the wafer loading process, the vacuum sensor turns OFF.
		Check whether vacuuming is correctly made.Check the robot pick surface and wafer surface for any abnormality.
B0473	ROBOT ARM WAFER MISHANDLING(UNLOADING)	When the robot arm is reversed in the wafer unloading process, the vacuum sensor turns OFF.
		Check whether vacuuming is correctly made.Check the robot pick surface and wafer surface for any abnormality.
B0476	Robot pick is slanted.	The step-out sensor of the robot pick detects stepping out of the robot pick. - Check the robot pick for any abnormality. - Check the step-out sensor for any defectiveness.
B0477	ROBOT:WAFER LOAD	Both the wafer sensor and vacuum sensor of the robot arm do
50477	ERR(DETECT OFF;VAC:OFF)	not turn ON when the robot attempts to receive a wafer.
	(- Check the wafer for any warpage.
		- Check if the robot is correctly positioned.
B0478	Wafer loader: Alarm was detected	The (user-specified) wafer loader related error.
	·	•

Code	Error message	Cause/remedy
B0500	POSITION TABLE OPERATION	Initialization of the position table does not complete within
	TIME UP	the predefined period of time (15 seconds).
		- Check the position table for any obstructed movement.
B0503	POSITION TABLE WAFER SIZE	When the automatic program selection function (user-
	OUT OF RANGE	specified spec.) is used, an out-of-range wafer size is found.
		- Check the loaded wafer.
505.45		- Make operation checkout of the posiiton table.
B0547	Z1 HEIGHT GAUGE WAFER	A minus wafer thickness measurement is obtained during full-
	THICKESS IS MINUS	auto operation.
		- Check whether the loaded wafer is broken or not.
B0548	71 AVIS - CALICE DETECT	- Check the height gauge for any defectiveness.
B0346	Z1 AXIS : GAUGE DETECT ILLEGAL VALUE	Thickness of a wafer measured in the Z1 grinding process is larger than the Z1 set up data for <"Original Thickness +
	ILLEGIE VILLE	"Aircut">.
		- Check the grinding program data.
		- Check the loaded wafer thickness.
		- Since a height gauge failure could be a cause, execute height
		gauge indication value check (chuck table zero-point check).
		- Check the wafer. It may be cracked, or have a foreign matter
		on its surface.
B0549	Z1 AXIS DETECT DOWN LIMIT	The Z1-axis reaches the DOWN limit during full-auto,
		dressing, or self-grinding operation.
		- Check the Lower-end sensor position. (It is impossible for the Z-axis to reach the DOWN limit position when it mounts
		the wheel at its end.)
B0550	Z1 HEIGHT GAUGE (INNER)	The chuck table zero point (inner circumference) measured
	LIMIT OVER ERROR	with the height gauge at the start of full-auto operation is
		outside the standard value range (-100 \pm 10 μ m).
		- Make sure that the machine is warmed up for at least 30 minutes.
		- Check whether the height gauge cooling water nozzle is properly positioned.
		- Adjust the height gauge amplifier.
		- Adjust the height gauge indication value.
B0551	Z1 HEIGHT GAUGE(OUTER)	The chuck table zero point (outer circumference) measured
	LIMIT OVER ERROR	with the height gauge at the start of full-auto operation is
		outside the standard value range (0 \pm 10 μ m).
		- Make sure that the machine is warmed up for at least 30 minutes.
		- Check whether the height gauge cooling water nozzle is properly positioned.
		- Adjust the height gauge amplifier.
		- Adjust the height gauge indication value.
B0552	Z1 GROUND WAFER is TOO	Thickness of a loaded wafer on the Z1 chuck table is larger
	THICK	than the Z1 setup data for <"Original Thickness" + "Aircut">.
		- Check the grinding program data.
		- Check the loaded wafer thickness.
B0553	Z1 GROUND WAFER is TOO THIN	The thickness of a loaded wafer on the Z1 chuck table is
		smaller than the Z1 setup data for "Finished Thickness".
		- Check the grinding program data.
		- Check the loaded wafer thickness.

Code	Error message	Cause/remedy
B0554	Z1 CLEAN BRUSH TIME UP ERR TURN to TABLE	Turning of the Z1 washing unit to the chuck table center position does not complete within the predefined time period (8sec.)
		- Adjust the sensor position.
50		- Check the sensor for any defectiveness.
B0555	Z1 CLEAN BRUSH TIME UP ERR TURN to ESCAP	Turning of the Z1 washing unit to the escape position does not complete within 8 seconds.
		 Check the washing unit for any obstructed turning movement.
		- Adjust the sensor position.
Bosso		- Check the sensor for any defectiveness.
B0556	Z1 CLEAN BRUSH TIME UP ERR UPWARD MOVE	Moving up of the Z1 washing unit does not complete within 8 seconds.
		 Check the washing unit for any obstructed up/down movement.
		- Adjust the sensor position.
50		- Check the sensor for any defectiveness.
B0557	Z1 CLEAN BRUSH TIME UP ERR DOWNWARD MOVE	Moving down of the Z1 washing unit does not complete within 8 seconds.
		- Check the washing unit for any obstructed up/down movement.
		- Adjust the sensor position.
		- Check the sensor for any defectiveness.
B0558	Z1 SHUTTER OPEN TIME UP ERROR	Opening action of the Z1 shutter does not complete within 6 seconds.
		- Check the shutter for any obstructed up/down movement.
		- Adjust the sensor position.
Docto		- Check the sensor for any defectiveness.
B0559	Z1 CAN'T UP & DOWN for SHUTTER CLOSEED	The Z-axis cannot move for its initialization as the Z1 shutter is closed.
		- Make operational checkout of the Z1-shutter.
Docoo		- Check the sensor for any defectiveness.
B0560	Z1 INITIAL ORG SEARCH TIME UP ERROR (DOWN)	A system error occurs in the Z1-axis in its downward movement during initialization.
DOECA	ZI DUZILI ODG GE I DGUZIDG	- Contact your nearest DISCO office or DISCO service office.
B0561	Z1 INITIAL ORG SEARCH TIME UP ERROR (UP)	A system error occurs in the Z1-axis in its upward movement during initialization.
50500		- Contact your nearest DISCO office or DISCO service office.
B0562	Z1 INITIAL Z0 MOVE TIME UP ERROR	A system error occurs in the Z1-axis in its return to the initial position during initialization.
D		- Contact your nearest DISCO office or DISCO service office.
B0563	Z1 INITIAL Z0 SERCH TIME UP ERROR	A system error occurs in the Z1-axis in its initial position serach during initialization.
		- Contact your nearest DISCO office or DISCO service office.
B0564	Z1 CAN'T USE INNER COUNTER	The Z1-axis internal counter is abnormal.
Dosos		- Contact your nearest DISCO office or DISCO service office.
B0565	Z1 UPWARD MOVE TIME UP ERROR	Moving up of the Z1-axis does not complete within the specified period of time.
D 0555		- Contact your nearest DISCO office or DISCO service office.
B0566	Z1 UPWARD MOVE COMMAND ERROR	A system error occurs in the Z1-axis. - Contact your nearest DISCO office or DISCO service office.
L		comment jour nearest Disco office of Disco service office.

Code	Error message	Cause/remedy
B0567	Z1 MOVE DIRECTION or VALUE	A system error occurs in the Z1-axis.
	ERROR	- Contact your nearest DISCO office or DISCO service office.
B0568	Z1 CHUCK TABLE HEIGHT not	A system error occurs in the Z1-axis.
	MEASURED	- Contact your nearest DISCO office or DISCO service office.
B0569	Z1 SHUTTER CLOSE TIME UP ERROR	Closing action of the Z1-shutter does not complete within 6 seconds.
		- Check the shutter for any obstructed up/down movement.
		- Check the sensor for any defectiveness.
B0570	Z1 BOTH LIMIT SENSOR on	Both of the Z1-axis Upper-end/Lower-end sensors, Z1
		washing unit Upper-end/Lower-end sensors or Z1 washing unit IN/OUT sensors are concurrently turned ON.
		- Check the cables for breakage.
		- Check the sensors for defectiveness.
B0571	Z1 BOTH LIMIT SENSOR off	Both of the Z1-axis Upper-end/Lower-end sensors, Z1 washing unit Upper-end/Lower-end sensors or Z1 washing unit IN/OUT sensors are concurrently turned OFF. (The sensor that should turn ON remains to be OFF.)
		- Check the cables for breakage.
		- Check the sensors for defectiveness.
B0572	Z1 ABNORMAL SENSOR INPUT	A system error occurs in the Z1-axis.
		- Contact your nearest DISCO office or DISCO service office.
B0573	Z1 INNER ERROR	A system error occurs in the Z1-axis.
	(INSTRUCTIONS)	- Contact your nearest DISCO office or DISCO service office.
B0574	Z1 INNER ERROR (CHANGE	A system error occurs in the Z1-axis.
	SPEED)	- Contact your nearest DISCO office or DISCO service office.
B0575	Z1 T-ARM SERCH ORG. TIME UP ERROR	The Z1-axis cannot move down during machine initialization as the T-arm is not moved to the NEUTRAL position.
B0576	Z1 : SPINDLE CURRENT is OVER PRE-SET	The Z1 spindle current value exceeds the value preset in "Spindle Current Pre-Alarm (B Code) Setting" parameter.
		- Check whether the preset parameter value is adequate.
		- Check the wheel for loss of abrasiveness.
B0577	Z1 : SPINDLE ROTATION is LOW	The rotative speed of the Z1 spindle exceeds 120% of its preset speed.
		- The X-axis stops grinding and moves up to escape.
		- Check for existence of any abnormal grinding conditions
		such as wafer surface burn and loss of wheel abrasiveness.
		 Purge wafers from the machine and check the wheel and ground wafers.
B0578	Z1 :THICK. IS THINNER THAN Off Amount G	Thickness of a loaded wafer is smaller than the Z1 setup data for <"Finished Thickness" + "Off Amount Guarant.">.
		- Check the loaded wafer thickness.
		- Check the set up value of "Off Amount Guarant." parameter on the Automatic Program Set, Edit screen.
B0579	Z1 SETUP ALLOWANCE OVER	The wheel setup position is abnormal (exceeding the set up value of "Z1 Setup Allowance" parameter).
		- Check the parameter setup value.
		- Check whether the wheel setup position is correct.
		- Perform the wheel position setup process again.

Code	Error message	Cause/remedy
B0580	Z1 EXCESSIVE WEAR OVER	The wheel is unduly worn (exceeding the set up value of "Z1 Excessive Wear" parameter).
		- Check the ground wafer for any abnormality.
		- If the ground wafer is abnormal, check the wheel tooth and the grinding program used.
		- Execute dressing of the wheel.
B0581	Z1 Min. of THICK. IS THINNER	The minimum thickness of a wafer loaded for Z1-axis
	THAN FINISH	grinding is equal to or smaller than the Z1 setup data for "Finished Thickness". (Effective when the "Org. wafer min. check set" parameter is set to <minimum> or <pass>).</pass></minimum>
B0582	Z1 Max. of THICK. IS THINNER	Thickness of a wafer loaded for Z1-axis grinding is equal to
D0002	THAN SET	or smaller than the Z1 setup data for <"Original Thickness" + "Specified detect level">. (Effective when "Org wafer min. check set" parameter is set to <specify> or <min +="" specify="">.)</min></specify>
B0583	Z1:Max. of THICK. IS DIF THEN SET	A wafer with its thickness variation exceeding the set up value of "C/T mode Max-Min DIF comparison value"
		parameter on the GRIND DATA screen is loaded on the Z1chuck table.
		- Check the loaded wafer for any warping or grooving.
B0586	Z1:C/T VACUUM is LOW DURING	When a wafer is vacuumed on the chuck table, the vacuum
	GRIND/DRESS	sensor detects insufficiency in vacuum pressure.
		- Check the vacuum sensor for any defectiveness.
		- Check the vacuum pressure of the chuck table.
		- Check the chuck table surface for any abnormal vacuuming condition.
B0597	Z2 HEIGHT GAUGE WAFER	A minus wafer thickness measurement is obtained during full-
	THICKESS IS MINUS	auto operation.
		Check whether the wafer is broken or notCheck the height gauge for any defectiveness.
B0598	Z2 AXIS : GAUGE DETECT	Thickness of a wafer measured in the grinding process is
20000	ILLEGAL VALUE	larger than the predefined value for <"Original thickness" + "Aircut">.
		- Check the grinding program data.
		- Check the loaded wafer thickness.
		- Since a height gauge failure could be a cause, execute height gauge indication value check (chuck table zero-point check).
		- Check the wafer. It may be cracked, or have a foreign matter on its surface.
B0599	Z2 AXIS DETECT DOWN LIMIT	The Z2-axis reaches the DOWN limit during full-auto, dressing, or self-grinding operation.
		- Check the Lower-end sensor position. (It is impossible for
		the Z-axis to reach the DOWN limit position when it mounts the wheel at its end.)
B0600	Z2 HEIGHT GAUGE (INNER)	The chuck table zero point (inner circumference) measured
	LIMIT OVER ERROR	with the height gauge at the start of full-auto operation is
		outside the standard value range (-100 \pm 10 μ m). - Make sure that the machine is warmed up for at least 30
		minutes.
		 Check whether the height gauge cooling water nozzle is properly positioned.
		- Adjust the height gauge amplifier.
		- Adjust the height gauge indication value.

Code	Error message	Cause/remedy
B0601	Z2 HEIGHT GAUGE (OUTER)	The chuck table zero point (outer circumference) measured
	LIMIT OVER ERROR	with the height gauge at the start of full-auto operation is
		outside the standard value range (0 \pm 10 μ m).
		- Make sure that the machine is warmed up for at least 30 minutes.
		- Check whether the height gauge cooling water nozzle is properly positioned.
		- Adjust the height gauge amplifier.
		- Adjust the height gauge indication value.
B0602	Z2 GROUND WAFER is TOO THICK	Thickness of a loaded wafer on the Z2 chuck table is larger than the Z2 setup data for <"Original Thickness" + "Aircut">.
		- Check the grinding program data.
		- Check the loaded wafer thickness.
B0603	Z2 GROUND WAFER is TOO THIN	The thickness of a loaded wafer on the Z2 chuck table is smaller than the Z2 setup data for "Finished Thickness".
		- Check the grinding program data.
		- Check the loaded wafer thickness.
B0604	Z2 CLEAN BRUSH TIME UP ERR TURN to TABLE	Turning of the Z2 washing unit to the chuck table center position does not complete within the predefined time period
		(8sec.)
		- Adjust the sensor position.
Dooos		- Check the sensor for any defectiveness.
B0605	Z2 CLEAN BRUSH TIME UP ERR TURN to ESCAP	Turning of the Z2 washing unit to the escape position does not complete within 8 seconds.
		- Check the washing unit for any abstructed turning
		movement.
		- Adjust the sensor position.
B0606	Z2 CLEAN BRUSH TIME UP ERR	- Check the sensor for any defectiveness. Moving up of the Z2 washing unit does not complete within 8
D0000	UPWARD MOVE	seconds.
		 Check the washing unit for any obstructed up/down movement.
		- Adjust the sensor position.
		- Check the sensor for any defectiveness.
B0607	Z2 CLEAN BRUSH TIME UP ERR DOWNWARD MOVE	Moving down of the Z2 washing unit does not complete within 8 seconds.
		- Check the washing unit for any obstructed up/down movement.
		- Adjust the sensor position.
		- Check the sensor for any defectiveness.
B0608	Z2 SHUTTER OPEN TIME UP ERROR	Opening action of the Z2 shutter does not complete within 6 seconds.
		- Check the shutter for any obstructed up/down movement.
		- Adjust the sensor position.
		- Check the sensor for any defectiveness.
B0609	Z2 CAN'T UP & DOWN for	The Z-axis cannot move for its initialization as the Z2 shutter
	SHUTTER CLOSEED	is closed.
		- Make operational checkout of the Z2-shutter.
B0640	72 INITIAL ODG GEARGILER G	- Check the sensor for any defectiveness.
B0610	Z2 INITIAL ORG SEARCH TIME UP ERROR (DOWN)	A system error occurs in the Z2-axis in its downward movement during initialization.
		- Contact your nearest DISCO office or DISCO service office.

Code	Error message	Cause/remedy
B0611	Z2 INITIAL ORG SEARCH TIME UP ERROR (UP)	A system error occurs in the Z2-axis in its upward movement during initialization.
		- Contact your nearest DISCO office or DISCO service office.
B0612	Z2 INITIAL Z0 MOVE TIME UP ERROR	A system error occurs in the Z2-axis in its return to the initial position during initialization.
B0613	Z2 INITIAL Z0 SEARCH TIME UP	 Contact your nearest DISCO office or DISCO service office. A system error occurs in the Z2-axis in its initial position
D0013	ERROR	serach during initialization.
		- Contact your nearest DISCO office or DISCO service office.
B0614	Z2 CAN'T USE INNER COUNTER	The Z2-axis internal counter is abnormal.
		- Contact your nearest DISCO office or DISCO service office.
B0615	Z2 UPWARD MOVE TIME UP ERROR	Moving up of the Z2-axis does not complete within the specified period of time.
		- Contact your nearest DISCO office or DISCO service office.
B0616	Z2 UPWARD MOVE COMMAND	A system error occurs in the Z2-axis.
	ERROR	- Contact your nearest DISCO office or DISCO service office.
B0617	Z2 MOVE DIRECTION or VALUE	A system error occurs in the Z2-axis.
	ERROR	- Contact your nearest DISCO office or DISCO service office.
B0618	Z2 CHUCK TABLE HEIGHT not	A system error occurs in the Z2-axis.
D0040	MEASURED	- Contact your nearest DISCO office or DISCO service office.
B0619	Z2 SHUTTER CLOSE TIME UP ERROR	Closing action of the Z2-shutter does not complete within 6 seconds.
		- Check the shutter for any obstructed up/down movement.
Docoo	TA DOMEN I DAME SENSOD	- Check the sensor for any defectiveness.
B0620	Z2 BOTH LIMIT SENSOR on	Both of the Z2-axis Upper-end/Lower-end sensors, Z2 washing unit Upper-end/Lower-end sensors or Z2 washing unit IN/OUT sensors are concurrently turned ON.
		- Check the cables for breakage.
		- Check the sensors for defectiveness.
B0621	Z2 BOTH LIMIT SENSOR off	Both of the Z2-axis Upper-end/Lower-end sensors, Z2 washing unit Upper-end/Lower-end sensors or Z2 washing unit IN/OUT sensors are concurrently turned OFF. (The sensor that should turn ON remains to be OFF.)
		- Check the cables for breakage.
		- Check the sensors for defectiveness.
B0622	Z2 ABNORMAL SENSOR INPUT	A system error occurs in the Z2-axis.
Dooco		- Contact your nearest DISCO office or DISCO service office.
B0623	Z2 INNER ERROR (INSTRUCTIONS)	A system error occurs in the Z2-xis.
B0624		- Contact your nearest DISCO office or DISCO service office.
DU024	Z2 INNER ERROR (CHANGE SPEED)	A system error occurs in the Z2axis. - Contact your nearest DISCO office or DISCO service office.
B0625	Z2 T-ARM SERCH ORG. TIME UP	The Z2axis cannot move down during machine initialization
	ERROR	as the T-arm is not moved to the NEUTRAL position.
B0626	Z2 : SPINDLE CURRENT is OVER PRE-SET	The Z2spindle current value exceeds the value preset in "Spindle Current Pre-Alarm (B code) Setting" parameter.
		- Check whether the preset parameter value is adequate.
		- Check the wheel for loss of abrasiveness.

Code	Error message	Cause/remedy
B0627	Z2 : SPINDLE ROTATION is LOW	The rotative speed of the Z2 spindle exceeds 120% of its preset speed.
		- The X-axis stops grinding and moves up to escape.
		- Check for existence of any abnormal grinding conditions such as wafer surface burn and loss of wheel abrasiveness.
		- Purge wafers from the machine and check the wheel and ground wafers.
B0628	Z2 :THICK. IS THINNER THAN Off Amount G.	Thickness of a loaded wafer is smaller than the Z2setup data for <"Finished Thickness" + "Off Amount Guarant.">.
		- Check the loaded wafer thickness.
		- Check the set up value of "Off Amount Guarant." parameter on the Automatic Program Set, Edit screen.
B0629	Z2 SETUP ALLOWANCE OVER	The wheel setup position is abnormal (exceeding the set up value of "Z2 Setup Allowance" parameter).
		- Check the parameter setup value.
		- Check whether the wheel setup position is correct.
Doogo		- Perform the wheel position setup process again.
B0630	Z2 EXCESSIVE WEAR OVER	The wheel is unduly worn (exceeding the set up value of "Z2 Excessive Wear" parameter).
		- Check the ground wafer for any abnormality.
		- If the ground wafer is abnormal, check the wheel tooth and the grinding program used.
		- Execute dressing of the wheel.
B0631	Z2 Min. of THICK. IS THINNER THAN FINISH	The minimum thickness of a wafer loaded for Z2axis grinding is equal to or smaller than the Z2 setup data for "Finished Thickness". (Effective when the "Org. wafer min. check set"
		parameter is set to <minimum> or <pass>).</pass></minimum>
B0632	Z2 Max. of THICK. IS THINNER THAN SET	Thickness of a wafer loaded for Z2-axis grinding is equal to or smaller than the Z2 setup data for <"Original Thickness" + "Specified detect level">. (Effective when "Org wafer min. check set" parameter is set to <specify> or <min +="" specify="">.)</min></specify>
B0633	Z2:Max. of THICK. IS DIF THEN SET	A wafer with its thickness variation exceeding the set up value of "C/T mode Max-Min DIF comparison value" parameter on the GRIND DATA screen is loaded on the Z2 chuck table.
		- Check the loaded wafer for any warping or grooving.
B0636	Z2:C/T VACUUM is LOW DURING GRIND/DRESS	When a wafer is vacuumed on the chuck table, the vacuum sensor detects insufficiency in vacuum pressure.
		- Check the vacuum sensor for any defectiveness.
		- Check the vacuum pressure of the chuck table.
		- Check the chuck table surface for any abnormal vacuuming condition.
B0650	T-ARM EXTENSION TIME UP	Extending of the T-arm does not complete within 5 seconds.
	ERROR	- Check for occurrence of a servo driver alarm.
		- Check the T-arm for any obstructed movement.
		- Check the sensor for any defectiveness.
B0651	T-ARM CONTRACTION TIME UP	Contracting of the T-arm does not complete within 5 seconds.
	ERROR	- Check for occurrence of a servo driver alarm.
		- Check the T-arm for any obstructed movement.
		- Check the sensor for any defectiveness.

Code	Error message	Cause/remedy
B0652	T-ARM UPWARD TIME UP ERROR	Moving up of the T-arm does not complete within 5 seconds.
		- Check the T-arm for any obstruction in its up/down movement.
		- Check the sensor for any defectiveness.
B0653	T-ARM DOWNWARD TIME UP ERROR	Moving down of the T-arm does not complete within 5 seconds.
		- Check the T-arm for any obstruction in its up/down movement.
		- Check the sensor for any defectiveness.
B0654	SEPARATION SHUTTER OPEN TIME UP ERROR	Opening of the T-shuuter does not complete within 5 seconds. - Check the T-arm for any obstruction in its open/close movement.
D.0.		- Check the sensor for any defectiveness.
B0655	SEPARATION SHUTTER CLOSE TIME UP ERROR	Closing of the T-shutter does not complete within 5 seconds. - Check the T-arm for any obstruction in its open/close movement.
		- Check the sensor for any defectiveness.
B0656	T-ARM CW MOVEMENT TIME UP ERROR	CW turning of the T-arm does not complete within 10 seconds.
		- Check the piping/wiring/gear section of the T-arm for any abnormality.
		- Check the sensor for any defectiveness.
B0657	T-ARM CCW MOVEMENT TIME UP ERROR	CCW turning of the T-arm does not complete within 10 seconds.
		- Check the piping/wiring/gear section of the T-arm for any abnormality.
		- Check the sensor for any defectiveness.
B0658	R-PAD WAFER RECEIVE ERROR(REMOVE WAFER)	Although the T-arm R-pad vacuum-retains a wafer from the position table, the vacuum sensor of the R-pad does not turn ON.
		- Check the vacuum gauge reading.
		- Check the vacuum valve for any defectiveness.
		- Check the vacuum sensor for any defectiveness.
B0659	R-PAD RELEASE	[Optional accessory]
	ERROR(REMOVE WAFER)	Although the T-arm R-pad places a wafer on the Z1 chuck table, the vacuum sensor of the Z1 chuck table does not turn ON.
		- Check the vacuum gauge reading.
		- Check the vacuum valve for any defectiveness.
		- Check the vacuum sensor for any defectiveness.
B0660	M-PAD WAFER RECEIVE ERROR(REMOVE WAFER)	Although the T-arm M-pad vacuum-retains a wafer from the Z1 chuck table, the vacuum sensor of the M-pad does not turn ON.
		- Check the vacuum gauge reading.
		- Check the vacuum valve for any defectiveness.
		- Check the vacuum sensor for any defectiveness.

Code	Error message	Cause/remedy
B0661	M-PAD RELEASE	[Optional Accessory]
	ERROR(REMOVE WAFER)	Although the T-arm M-pad places a wafer on the Z2 chuck
		table, the vacuum sensor of the Z2 chuck table does not turn ON.
		- Check the vacuum gauge reading.
		- Check the vacuum valve for any defectiveness.
		- Check the vacuum sensor for any defectiveness.
B0662	L-PAD WAFER RECEIVE	Although the T-arm L-pad vacuum-retains a wafer from the
20002	ERROR(REMOVE WAFER)	Z2 chuck table, the vacuum sensor of the L-pad does not turn ON.
		- Check the vacuum gauge reading.
		- Check the vacuum valve for any defectiveness.
		- Check the vacuum sensor for any defectiveness.
B0663	L-PAD RELEASE ERROR(REMOVE	Although The T-arm L-pad places a wafer on the spinner
B0003	WAFER)	table, the vacuum sensor of the spinner table does not turn ON.
		- Check the vacuum gauge reading.
		- Check the vacuum valve for any defectiveness.
		- Check the vacuum sensor for any defectiveness.
B0664	T-ARM UPPER/LOWER SENSORS BOTH on	The Upper-end sensor and Lower-end sensor of the T-arm are both turned ON.
		- Check the sensor cable for any breakage.
		- Check the sensor for any defectiveness.
B0665	T-ARM R-PAD TELESCOPING SENSORS BOTH on	The extend-position sensor and contract-position sensor of the T-arm R-pad are both turned ON.
		- Check the sensor cable for any breakage.
		- Check the sensor for any defectiveness.
B0666	T-ARM L-PAD TELESCOPING	The extend-position sensor and contract-position sensor of the
	SENSORS BOTH on	T-arm L-pad are both turned ON.
		- Check the sensor cable for any breakage.
		- Check the sensor for any defectiveness.
B0667	SEP. SHUTTER BOTH OPEN/CLOSE SENSORS on	The OPEN sensor and CLOSE sensor of the T-shutter are both turned ON.
		- Check the sensor cable for any breakage.
		- Check the sensor for any defectiveness.
B0668	T-ARM MOVE ERROR (AREA	Moving of the T-arm from its CW end or CCW end position
	SENSOR NOT ON)	to the NEUTRAL position does not complete in 10 seconds.
		- Check the T-arm for any obstruction in its turning movement.
		- Check the sensor for any defectiveness.
B0669	T-ARM R-PAD VACUUM REMAINS on	Although the T-arm R-pad vacuum system is turned OFF, the vacuum sensor does not turn OFF.
		- Check the vacuum sensor for any defectiveness.
		- Check the vacuum valve for any defectiveness.
B0670	T-ARM M-PAD VACUUM	Although the T-arm M-pad vacuum system is turned OFF, the
	REMAINS on	vacuum sensor does not turn OFF.
		- Check the vacuum sensor for any defectiveness.
		- Check the vacuum valve for any defectiveness.
B0671	T-ARM L-PAD VACUUM REMAINS on	Although the T-arm L-pad vacuum system is turned OFF, the vacuum sensor does not turn OFF.
	NEWITH OIL	- Check the vacuum sensor for any defectiveness.
		- Check the vacuum sensor for any defectiveness. - Check the vacuum valve for any defectiveness.
		- Check the vacuum varve for any defectiveness.

Code	Error message	Cause/remedy
B0672	T-ARM MISS-STEP DETECTED (CW MOVE)	Although the T-arm is commanded to move from the NEUTRAL position to the position table, it does not reach the position table (where the CW-end sensor turns ON).
B0673	T-ARM MISS-STEP DETECTED (CCW MOVE)	Although the T-arm is commanded to move from the NEUTRAL position to the Z1 chuck table, it does not reach the Z1 chuck table position (where the CCW-end sensor turns ON).
B0674	T-ARM MISS-STEP DETECTED (UP MOVE)	Although the T-arm is commanded to move up, it does not reach its upper end position (where the Upper-end sensor turns ON).
B0675	T-ARM MISS-STEP DETECTED (DOWN MOVE)	Although the T-arm is commanded to move down, it does not reach its lower end position (where the Lower-end sensor turns ON).
B0676	T-ARM R-PAD MISHANDLIND (VACUUM OFF)	When the T-arm R-pad returns to the NEUTRAL position after picking up a wafer from the position table in full auto operation, its vacuum system is turned OFF. - Check the pad for presence of any dirt or flaw.
B0677	T-ARM M-PAD MISHANDLIND (VACUUM OFF)	When the T-arm M-pad returns to the NEUTRAL position after picking up a wafer from the Z1 chuck table in full auto operation, its vacuum system is turned OFF. - Check the pad for presence of any dirt or flaw.
B0678	T-ARM L-PAD MISHANDLIND (VACUUM OFF)	When the T-arm L-pad arrives at the NEUTRAL position after picking up a wafer from the Z2 chuck table in full auto operation, its vacuum system is turned OFF. - Check the pad for any dirt or flaw.
B0679	Z1 HEIGHT GAUGE JAMMED for T-ARM	The T-arm can't turn in full auto operation as the Z1 height gauge is in DOWN position during full auto operation. - Check the piping of the height gauge up/down movement cylinder. - Check the height gauge finger for any bending.
B0680	Z1 HEIGHT GAUGE(INNER) JAMMED for T-ARM	The T-arm can't turn in full auto operation as the Z1 (inner circ.) height gauge (optional accessory) is in DOWN position. - Check the piping of the height gauge up/down movement cylinder. - Check the height gauge finger for any bending.
B0681	Z1 HEIGHT GAUGE(OUTER) JAMMED for T-ARM	The T-arm can't turn in full auto operation as the Z1 (outer circ.) height gauge (optional accessory) is in DOWN position. - Check the piping of the height gauge up/down movement cylinder. - Check the height gauge finger for any bending.
B0682	Z2 HEIGHT GAUGE JAMMED for T-ARM	The T-arm can't turn in full auto operation as the Z2 height gauge is in DOWN position. - Check the piping of the height gauge up/down movement cylinder. - Check the height gauge finger for any bending.
B0683	Z2 HEIGHT GAUGE(INNER) JAMMED for T-ARM	The T-arm can't turn in full auto operation as the Z2 (inner circ.) height gauge (optional accessory) is in DOWN position. - Check the piping of the height gauge up/down movement cylinder. - Check the height gauge finger for any bending.

Code	Error message	Cause/remedy
B0684	Z2 HEIGHT GAUGE(OUTER) JAMMED for T-ARM	The T-arm can't turn in full auto operation as the Z2 (outer circ.) height gauge (optional accessory) is in DOWN position. - Check the piping of the height gauge up/down movement
		cylinder Check the height gauge finger for any bending.
B0685	HEIGHT GAUGE RETRACT ISN'T UP POSITION	The T-arm can't turn in full auto operation as the height gauge is in DOWN position.
		- Check the height gauge position.
		- Check the piping of the height gauge up/down movement cylinder.
B0686	T-ARM CLEANING BRUSH NOT ESCAPED	The T-arm can't turn in full auto operation as the washing unit (brush) is in DOWN position.
		- Check the brush position.
		Check the piping of the brush up/down movement cylinder.Check the brush sensor.
B0700	SPINNER NOZZLE IN/OUT MOVE TIME UP ERROR	Turning of the spinner nozzle does not complete within 5 seconds.
	TIME OF EMICON	Check the spinner nozzle for any obstructed turning movement.
		- Check the sensor for any defectiveness.
B0701	SPINNER COVER OPEN/CLOSE TIME UP ERROR	Opening/closing of the spinner cover does not complete within 5 seconds.
		- Check the spinner cover for any obstructed turning movement.
		- Check the sensor for any defectiveness.
B0704	VACUUM CHECK ERROR DURING SPINNER on	The vacuum sensor of the spinner table turns OFF while the spinner table is rotating.
		- Check the wafer on the table for any breakage or other abnormality.
		- Check the spinner table for any flaw or dirt.
		- Check the vacuum gauge reading.
		- Check the vacuum sensor for any defectiveness.
B0708	WAFER PUSHER MOVE TIME UP	Pushing action of the wafer pusher (optional accessory) of the spinner table does not complete within the predefined period of time.
		- Check if f there is any wafer obstructing the pusher to move Check the sensor.
B0709	SP COVER CAN'T CLOSE(ROBOT	The spinner cover can't be closed as the robot is in interfering
	INTERFERES)	position.
		- Check the behavior of the robot.

3-2. C/D Class Errors with Causes and Remedies

Summary of this section

This section describes the causes and remedial actions to be taken for each of the class C and D errors.

Error list (class C and D errors)

Class C and D errors are listed as follows.

Code	Error message
C0800	EM KEY HAS BEEN PRESSED
C0803	MAIN AIR PRESSURE is LOW
C0805	ABNORMAL WATER LEVEL in WATER CASE
C0806	VACUUM PUMP THERMAL TRIP
C0807	VACUUM PUMP AIR PRESSURE is LOW
C0808	VACUUM PUMP THERMAL TRIP or COOLANT OFF
C0809	ABNORMAL COOLANT TANK WATER LEVEL
C0810	COOLANT TANK THERMAL TRIP
C0812	ABNORMAL CHILLER TANK COOLANT WATER LEVEL
C0814	ABNORMAL CHILLER TANK COOLING WATER TEMP
C0815	ABNORMAL CHILLER TANK COOL. WATER LEVEL
C0817	CHILLER TANK COOLING WATER COLD TRIP
C0820	Z1 or Z2 HEIGHT GAUGE AMP. ERROR
C0821	Z1 HEIGHT GAUGE AMP. ERROR
C0822	Z2 HEIGHT GAUGE AMP. ERROR
C0823	COOLANT PRESSURE PUMP ERROR
C0824	CHILLER TANK COOLANT STOPPED
C0825	CHILLER TANK COOLING WATER STOPPED
C0828	CHILLER TANK COOLING WATER THERMAL TRIP
C0829	CHILLER TANK COOLANT THERMAL TRIP
C0830	PM DRIVER OVER-HEAT
C0831	EXHAUST CAPACITY is LOW
C0841	ROBOT -AXIS SERVO ALARM
C0842	ROBOT Z-AXIS SERVO ALARM
C0844	ROBOT X-AXIS SERVO ALARM
C0845	ROBOT R-AXIS SERVO ALARM
C0851	Z1 LOW COOLING WATER LEVEL
C0852	Z1 COOLANT LEVEL IS OUT OF RANGE
C0853	Z1 SPINDLE INVERTER HAS BEEN TRIPPED
C0854	Z1 SPINDLE INNER COVER OPEN
C0855	Z1 SERVO ALARM HAS BEEN GENERATED
C0856	Z1 CHUCK TABLE SERVO ALARM GENERATED
C0857	Z1 CHUCK TABLE CAN'T SERVO LOCK
C0858	Z1 CHUCK TABLE D/A CONVERT ERROR (ROTATE)
C0859	Z1 CHUCK TABLE D/A CONVERT ERROR (STOP)
C0860	Z1 CHUCK TABLE REVOLUTION READ ERROR
C0861	Z1 INNER ERROR (SYSTEM ERROR-1)

Code	Error message
C0862	Z1 INNER ERROR (SYSTEM ERROR-2)
C0863	Z1 INNER ERROR (SYSTEM ERROR-3)
C0864	Z1 INNER ERROR (CAN'T COUNTER CLEAR)
C0865	Z1 INNER ERROR (MOVE TO P1 WITHOUT GAUGE)
C0866	Z1 INNER ERROR (MOVE TO P2 WITHOUT GAUGE)
C0867	Z1 INNER ERROR (MOVE TO P3 WITHOUT GAUGE)
C0868	Z1 INNER ERROR (MOVE WITH GAUGE)
C0869	Z1 AXIS CAN'T SERVO LOCK
C0870	Z1 INNER ERROR (SYSTEM ERROR-4)
C0871	Z1 INNER ERROR (SYSTEM ERROR-5)
C0872	Z1 INNER ERROR (SYSTEM ERROR-6)
C0873	Z1 HEIGHT GAUGE WAFER THICKNESS IS MINUS
C0874	Z1 HEIGHT GAUGE DETECT GRIND LIMIT
C0875	Z1 INNER ERROR (SYSTEM ERROR-7)
C0876	Z1 INNER ERROR (SYSTEM ERROR-8)
C0877	Z1 INNER ERROR (SYSTEM ERROR-9)
C0878	Z1 INNER ERROR (SYSTEM ERROR-10)
C0879	Z1 INNER ERROR (SYSTEM ERROR-11)
C0880	Z1 INNER ERROR (SYSTEM ERROR-12)
C0881	Z1 INNER ERROR (SYSTEM ERROR-13)
C0882	Z1 INNER ERROR (SYSTEM ERROR-14)
C0883	Z1 INNER ERROR (SYSTEM ERROR-15)
C0884	Z1 SYS initialize error (need POWER OFF/ON)
C0885	Z1 SIDE COVER OPEN (WHILE FULL-AUTO)
C0886	Z1 SIDE COVER OPEN (WHILE INITIALIZE)
C0887	Z1:C/T VACUUM is LOW DURING GRIND/DRESS
C0888	Z1 inner error-00
C0889	Z1 inner error-01
C0890	Z1 inner error-02
C0891	Z1 inner error-03
C0892	Z1 inner error-04
C0893	Z1 inner error-05
C0894	Z1 inner error-06
C0895	Z1 inner error-07
C0896	Z1 inner error-08
C0897	Z1 inner error-09
C0898	Z1 inner error-10
C0899	Z1 inner error-11
C0901	Z2 LOW COOLING WATER LEVEL
C0902	Z2 COOLANT LEVEL IS OUT OF RANGE
C0903	Z2 SPINDLE INVERTER HAS BEEN TRIPPED
C0904	Z2 SPINDLE INNER COVER OPEN
C0905	Z2 SERVO ALARM HAS BEEN GENERATED
C0906	Z2 CHUCK TABLE SERVO ALARM GENERATED
C0907	Z2 CHUCK TABLE CAN'T SERVO LOCK
C0908	Z2 CHUCK TABLE D/A CONVERT ERROR (ROTATE)
C0909	Z2 CHUCK TABLE D/A CONVERT ERROR (STOP)

Code	Error message
C0910	Z2 CHUCK TABLE REVOLUTION READ ERROR
C0911	Z2 INNER ERROR (SYSTEM ERROR-1)
C0912	Z2 INNER ERROR (SYSTEM ERROR-2)
C0913	Z2 INNER ERROR (SYSTEM ERROR-3)
C0914	Z2 INNER ERROR (CAN'T COUNTER CLEAR)
C0915	Z2 INNER ERROR (MOVE TO P1 WITHOUT GAUGE)
C0916	Z2 INNER ERROR (MOVE TO P2 WITHOUT GAUGE)
C0917	Z2 INNER ERROR (MOVE TO P3 WITHOUT GAUGE)
C0918	Z2 INNER ERROR (MOVE WITH GAUGE)
C0919	Z2 AXIS CAN'T SERVO LOCK
C0920	Z2 INNER ERROR (SYSTEM ERROR-4)
C0921	Z2 INNER ERROR (SYSTEM ERROR-5)
C0922	Z2 INNER ERROR (SYSTEM ERROR-6)
C0923	Z2 HEIGHT GAUGE WAFER THICKNESS is MINUS
C0924	Z2 HEIGHT GAUGE DETECT GRIND LIMIT
C0925	Z2 INNER ERROR (SYSTEM ERROR-7)
C0926	Z2 INNER ERROR (SYSTEM ERROR-8)
C0927	Z2 INNER ERROR (SYSTEM ERROR-9)
C0928	Z2 INNER ERROR (SYSTEM ERROR-10)
C0929	Z2 INNER ERROR (SYSTEM ERROR-11)
C0930	Z2 INNER ERROR (SYSTEM ERROR-12)
C0931	Z2 INNER ERROR (SYSTEM ERROR-13)
C0932	Z2 INNER ERROR (SYSTEM ERROR-14)
C0933	Z2 INNER ERROR (SYSTEM ERROR-15)
C0934	Z2 SYS initilize error (need POWER OFF/ON)
C0935	Z2 SIDE COVER OPEN (WHILE FULL-AUTO)
C0936	Z2 SIDE COVER OPEN (WHILE INITIALIZE)
C0937	Z2:C/T VACUUM is LOW DURING GRIND/DRESS
C0938	Z2 inner error-00
C0939	Z2 inner error-01
C0940	Z2 inner error-02
C0941	Z2 inner error-03
C0942	Z2 inner error-04
C0943	Z2 inner error-05
C0944	Z2 inner error-06
C0945	Z2 inner error-07
C0946	Z2 inner error-08
C0947	Z2 inner error-09
C0948	Z2 inner error-10
C0949	Z2 inner error-11
C0950	T-ARM R-PAD WAFER RECEIVE ERROR(C class)
C0952	T-ARM M-PAD WAFER RECEIVE ERROR(C class)
C0954	T-ARM L-PAD WAFER RECEIVE ERROR(C class)
C0955	T-ARM L-PAD RELEASE ERROR (C class)
D0960	Z1 SPINDLE INVERTER HAS BEEN TRIPPED
D0961	Z2 SPINDLE INVERTER HAS BEEN TRIPPED
D0962	WATER LEAK HAS BEEN DETECTED (TABLE)

Error list (class C and D errors) (Continued)

Code	Error message
D0963	WATER LEAK HAS BEEN DETECTED (MAIN BODY)
D0964	SPINNER INVERTER TRIPPED
D0965	CHILLER TANK LOW COOL.WATER LEVEL 2/TRIP
D0968	DRAIN TANK UNIT OVERFLOW
D0980	BREAKER BOX OVERHEAT DETECTED
D0981	BREAKER BOX COVER is OPEN
D0982	LOW VACUUM PUMP WATER LEVEL
D0983	TRANSFORMER OVERHEAT DETECTED
D0984	BLOWN FUSE DETECTED (BREAKER BOX)
D0985	UPS DETECTED POWER FAILURE
D0986	EM-STOP BUTTON HAS BEEN PRESSED
D0987	BLOWN FUSE DETECTED (CONT ROL UNIT)
D0988	BLOWN DC FUSE 2 DETECTED
D0989	VACUUM PUMP LOW WATER LEVEL/THERMAL TRIP
D0990	SYSTEM ERROR (MAN-MACHINE)
D0991	SYSTEM ERROR (SEQUENCE MANAGER)
D0992	SYSTEM ERROR (ROBOT)
D0993	SYSTEM ERROR (T-ARM)
D0994	SYSTEM ERROR (Z1 AXIS)
D0995	SYSTEM ERROR (Z2 AXIS)
D0996	SYSTEM ERROR (SPINNER)
D0997	SYSTEM ERROR (SCAN)

Causes and remedies (class C and D errors)

Causes and countermeasures to be taken for each of the class C and D errors are described here. As for class A and B errors, refer to section 3-1 of this chapter.

Error code	C0800		
Error message	EM KEY HAS BEEN PRESSED		
Action taken upon error detection	All machine actions are immediately brought to a stop.		
Detected error description	The EM-STOP key has been pressed.		
Error cause	Pressing of the EM-STOP key		
Items to be checked	Check the EM-STOP keys (4 places) for their conditions		
Error recovery	Release the activated EM-STOP key and turn ON the machine power.		
Other problems	<abnormality></abnormality>	<remedy></remedy>	
	The error occurs even though the EM-STOP key is not pressed.	Check/replace the EM-STOP key.Check the cable for any disconnection or breakage.	
	The error does not occur even though the EM-STOP key is pressed.	Check/replace the EM-STOP key.Check the cable for any disconnection or breakage.	

Error code	C0803		
Error message	MAIN AIR PRESSURE is LOW		
Action taken upon error	All axes come to an immediate stop. (If the	e Z-axis is in the middle of the grinding	
detection	process, it moves up 200 µm before it stop	os.)	
	The machine program is rebooted.		
Detected error description	The main air pressure switch detects a dro	p in air pressure.	
Error cause	Supply air pressure decreases.		
Items to be checked	- Check the supply air pressure at the facil	ity side.	
	- Check the air piping for any bent or clog	ging.	
	- Check the air pressure switch setting (0.4	4 to 0.45 MPa).	
	- Check the air pressure sensor for any defectiveness.		
	- Check the cable of the air pressure sensor for disconnection or breakage.		
Error recovery	If the supply air pressure is found to be normal (0.5 Mpa or higher), effect initialization of the machine.		
Other problems	<abnormality></abnormality>	<remedy></remedy>	
	The error occurs although supply air pressure is normal.	- Check whether the air pressure switch setting is correct.	
		- Replace the air pressure switch.	
		 Check the cable for any disconnection or breakage. 	
	The error does not occur although	- Check whether the air pressure switch	
	supply air pressure is abnormal.	setting is correct.	
		- Replace the air pressure switch.	
		- Check the cable for any disconnection or breakage.	

Error code	C0805	C0805	
Error message	ABNORMAL WATER LEVEL in WATER CASE		
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.		
Detected error description	The float switch in the water case detects a	an abnormally high water level.	
Error cause	Water level of the water case rises (due to clogging of the water drain port with wafer debris, etc).		
Items to be checked	- Check the water drain port for any clogged wafer debris or contaminants		
	- Check whether the float switch position (height) is adequate.		
	- Check the float switch for any defectiveness or cable breakage.		
	- Check the pressure sensor for any defectiveness or cable disconnection/break		
Error recovery	Clean the water drain port (eliminate wafer debris, contaminants, etc.)		
Other problems	<abnormality></abnormality>	<remedy></remedy>	
	The error occurs although the water level is normal.	- Check the float switch position (height setting.	
		- Replace the float switch.	
		- Check the cable for any disconnection or breakage.	
	The error does not occur although the	- Replace the float switch.	
	water level is abnormal.	- Check the cable for any disconnection or breakage.	

Error code	C0806		
Error messag	VACUUM PUMP THERMAL TRIP		
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.		
Detected error description	The motor-protective thermal switch in the vacuum pump unit activates.		
Error cause	The motor is overloaded due to load increse on the vacuum pump.		
Items to be checked	 Open the cover of the vacuum pump unit to check for any smell of burn or overheating of the motor. Check if the flow rate of supply water is 5L/min. Check for any abnormal conditions at the coupling between the motor and pump such as decentering. Check if the vacuum pressure is normal (85 kPa or higher). 		
Error recovery	Turn OFF the machine power, reset the thermal switch in the vaccump pump and then turn ON the machine power.		
Other problems	<abnormality></abnormality>	<remedy></remedy>	
	The thermal switch activates again when the machine power is turned ON after resetting the thermal switch.	Contact your nearest DISCO office or DISCO service office.	

Error code	C0807		
Error message	VACUUM PUMP AIR PRESSURE is L	LOW	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.)		
Detected error description	The machine program is rebooted. The vacuum pressure switch in the vacuum pump unit detects a drop in the vacuum pressure.		
Error cause	A failure occurs in the vacuum pump or its	s piping system.	
Items to be checked	 Check if the flow rate of supply water is 5 L/min. Check if the vacuum pressure switch is correctly set up (65 kPa). Check for any disconnection or bent of hoses in the vacuum pump. Check the vacuum sensor for any defectiveness. Check the cable of the vacuum sensor for disconnection or breakeage. Check the exhaust muffler for clogging. 		
Error recovery	If the vacuum pressure is found to be normal, effect initialization of the machine.		
Other problems	<abnormality></abnormality>	<remedy></remedy>	
	The error does not occur, although the vacuum pressure is abnormal.	Check the set up value of the pressure switch.Check if the vacuum pump unit and DFG841 are correctly connected.	

Error code	C0808	
Error message	VACUUM PUMP THERMAL TRIP or COOLANT OFF	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.)	
Detected error description	The machine program is rebooted. A thermal trip or water failure occurs in the vacuum pump.	
Error cause	The vacuum pump is overloaded or water supply to the pump is disrupted.	
Items to be checked	- Check if the vacuum pump and coolant pump are properly operating.	
	- Check if water is flowing over the flowmeter of the vacuum pump.	
Error recovery	- If the vacuum pump and coolant pump are not operating, a thermal trip may have occurred. Turn OFF the machine power, reset the thermal switch and then turn ON the machine power.	
	- If water is not flowing over the flowmeter, a water failure may have occurred. Check the water supply source.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0809		
Error message	ABNORMAL COOLANT TANK WATER LEVEL		
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.		
Detected error description	The water level switch in the temperature-regulated water tank detects an abnormal water level (too high or too low).		
Error cause	The water level is not adequately regulated (malfunctioning of the ball tap / supply water shortage at the facility side).		
Items to be checked	 Open the cover of the temperature-regulated water tank to check the water level of the tank. Check if the ball tap normally functions. Check the water pressure at the facility side. (Isn't it too high (higher than 0.5 MPa)?) Check for supply water shortage at the facility side. Check if the water valve is open. 		
Error recovery	Open the drain cock to reduce water in the tank to an appropriate level and then turn ON the machine power.		
Other problems	<abnormality></abnormality>	<remedy></remedy>	
	Water in the tank ripples to cause an abnormal water level.	Water rippling occurs when water pressure at the facility side is high. In such a case, install a water pressure regulator.	

Error code	C0810	
Error message	COOLANT TANK THERMAL TRIP	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	A thermala trip occurs in the coolant pump.	
Error cause	Overloading of the coolant pump	
Items to be checked	 Open the cover of the vacuum/coolant unit to check for any smell of burn. Check if the pump motor is rotating. Check for existance of such a condition that the motor is running while water is not discharged (Normally, the motor does not run when there is no water discharge). 	
Error recovery	Turn OFF the machine power, reset the thermal switch and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0812	
Error message	ABNORMAL CHILLER TANK COOLANT WATER LEVEL	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	The float switch in the wheel coolant water tank of DVC010C (optional accessory) detects a rise or drop of the water level.	
Error cause	Oversupply/undersupply of wheel coolant water	
Items to be checked	 Open the cover of the wheel coolant water tank to check the water level of the tank. Check the supply pressure of water at the facility side. Check supply water piping for any disconnection or bent. Check the float switch for any defectiveness. 	
Error recovery	 If the water level is too high, open the drain port to decrease water in the tank to an adequate level and then turn ON wheel coolant water. If the water level is too low, turn ON wheel coolant water after confirming that water in the wheel coolant tank increases to an adequate level. 	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error occurs even though the water level is normal.	- The cable of DVC010C is broken The float switch is defective.

	•	
Error code	C0814	
Error message	ABNORMAL CHILLER TANK COOLIN	IG WATER TEMP
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	The temperature switch of spindle coolant water activates.	
Error cause	Temperature of spindle coolant water does not become thet set up level.	
Items to be checked	- Check if the exhaust air port is blocked or not.	
	- Ceck the chiller unit for any defectiveness.	
Error recovery	Turn OFF the machine power, wait for at least 1 minute, and then reboot the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0815	
Error message	ABNORMAL CHILLER TANK COOL. WATER LEVEL	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	The float switch in the spindle coolant water tank of DVC010C (optional accessory) detects a rise or drop of the water level.	
Error cause	Oversupply/undersupply of coolant water	
Items to be checked	 Open the cover of the spindle coolant water tank to check the water level of the tank. Check the supply pressure of water at the facility side. Check supply water piping for any disconnection or bent. Check the float switch for any defectiveness. 	
Error recovery	 If the water level is too high, open the drain port to decrease water in the tank to an adequate level and then turn ON spindle coolant water. If the water level is too low, turn ON spindle coolant water after confirming that water in the tank increases to an adequate level. 	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error occurs even though the water level is normal.	- The cable of DVC010C is broken The float switch is defective.

Error code	C0817	
Error message	CHILLER TANK COOLING WATER COLD TRIP	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 μ m before it stops.)	
	The machine program is rebooted.	
Detected error description	The temperature switch of spindle coolant water activates.	
Error cause	Temperature of spindle coolant water does not become thet set up level.	
Items to be checked	- Check if the exhaust air port is blocked or not.	
	- Check the chiller unit for any defectiveness.	
Error recovery	Turn OFF the machine power, wait for at least 1 minute and then reboot the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0820	
Error message	Z1 or Z2 HEIGHT GAUGE AMP. ERROR	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.)	
	The machine program is rebooted.	
Detected error description	The Z1-axis (Z2-axis) height gauge amplifier is abnormal.	
Error cause	Decrease in supply voltage (± 15 V)	
Items to be checked	- Check if the probe connector is loosened.	
	- Check if the cable of the height gauge is broken.	
Error recovery	- Correctly connect the probe connector and then turn ON the machine power.	
	- If the height gage cable is broken, replace the height gauge with new one and then reboot the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0821 (C0822)	
Error message	Z1(Z2) HEIGHT GAUGE AMP. ERROR	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	The Z1 axis (Z2 axis) height gauge amplifier is abnormal.	
Error cause	Decrease in supply voltage (± 15 V)	
Items to be checked	- Check if the probe connector is loosened.	
	- Check if the cable of the height gauge is broken.	
Error recovery	- Correctly connect the probe connector and then turn ON the machine power.	
	- If the height gage cable is broken, replace the height gauge with new one and then reboot the machine.	
Other problems	<abnormality> <remedy></remedy></abnormality>	
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0823	
Error message	COOLANT PRESSURE PUMP ERROR	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.)	
	The machine program is rebooted.	
Detected error description	A thermal trip occurs in the high-pressure pump.	
Error cause	Overloading of the high-pressure pump	
Items to be checked	- Isn't the high-pressure pump operating without pumping out water?	
Error recovery	Turn OFF the machine power, reset the thermal switch and then turn ON the machine power.	
Other problems	<abnormality> <remedy></remedy></abnormality>	
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0824	
Error message	CHILLER TANK COOLANT STOPPED	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	A thermal trip occurs in the pump of the wheel coolant water tank of DVC010C (optional accessory).	
Error cause	Overloading of the pump of the wheel coolant water tank.	
Items to be checked	Check for supply water shortage at the facility side. Check if the water valve is opened.	
Error recovery	Turn OFF the machine power, reset the thermal switch and then turn ON the machine power.	
Other problems	<abnormality> <remedy></remedy></abnormality>	
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0825	
Error message	CHILLER TANK COOLING WATER STOPPED	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.)	
	The machine program is rebooted.	
Detected error description	A thermal trip occurs in the pump of the spindle coolant water tank of DVC010C (optional accessory).	
Error cause	Overloading of the pump of the spindle coolant water tank.	
Items to be checked	Check for supply water shortage at the facility side.	
	Check if the water valve is opened.	
Error recovery	Turn OFF the machine power, reset the thermal switch and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0828	
Error message	CHILLER TANK COOLING WATER THERMAL TRIP	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	A thermal trip occurs in the pump of the spindle coolant water tank of DVC010C (optional accessory).	
Error cause	Overloading of the pump of the spindle coolant water tank	
Items to be checked	Check for supply water shortage at the facility side. Check if the water valve is opened.	
Error recovery	Turn OFF the machine power, reset the thermal switch and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0829	
Error message	CHILLER TANK COOLANT THERMAL TRIP	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	A thermal trip occurs in the pump of the wheel coolant water tank of DVC010C (optional accessory).	
Error cause	Overloading of the pump of the wheel coolant water tank.	
Items to be checked	Check for supply water shortage at the facility side. Check if the water valve is opened.	
Error recovery	Turn OFF the machine power, reset the thermal switch and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0830	
Error message	PM DRIVER OVER-HEAT	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 μ m before it stops.)	
	The machine program is rebooted.	
Detected error description	Overloading of the pulse motor driver is detected.	
Error cause	- Overloading of the pulse motor.	
	- Rise in ambient temperature of the pulse motor driver	
Items to be checked	- Check the cooling fan for any defectiveness.	
	- The pulse motor is used in the robot, T-arm and position table. Check those components for any abnormal behavior.	
Error recovery	Turn OFF the machine power and then, after the PM driver is sufficiently cooled down, turn the machine power back ON.	
Other problems	<abnormality> <remedy></remedy></abnormality>	
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0831	
Error message	EXHAUST CAPACITY is LOW	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	Exhaust capacity of the duct unit [optional accessory] decreases.	
Error cause	The exhaust capacity of the duct unit deteriorates.	
Items to be checked	- Check the filters of the duct unit for any clogging.	
	- Check the inside of the duct hose for presence of stagnant water.	
Error recovery	- Clean or replace the filters.	
	- If the duct hose is loosened, water may build up inside the hose to block the smooth passage of exhaust air. Straighten the loosened hose if it is the case.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0841	
Error message	ROBOT θ -AXIS SERVO ALARM	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	The robot θ axis servo driver trips.	
Error cause	- The robot θ axis servo motor is overloaded.	
	- The robot θ axis cannot move (due to obstruction).	
Items to be checked	Check for servo driver error indication (error description on the screen).	
Error recovery	Turn OFF the machine power once and, after at least one minute, turn it back ON.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0842	
Error message	ROBOT Z-AXIS SERVO ALARM	
Action taken upon error detection	All axes come to an immediate stop. (If the process, it moves up 200 µm before it stop.) The machine program is rebooted.	5 5
Detected error	The robot Z-axis servo driver trips.	
description	The robot 2-axis servo univer urps.	
Error cause	- The robot Z-axis servo motor is overloaded.	
	- The robot Z-axis cannot move (due to ob	estruction).
Items to be checked	Check for servo driver error indication (error description on the screen).	
Error recovery	Turn OFF the machine power once and, after at least one minute, turn it back ON.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0844	
Error message	ROBOT X-AXIS SERVO ALARM	
Action taken upon error detection	All axes come to an immediate stop. (If the process, it moves up 200 µm before it stop.) The machine program is rebooted.	0 0
Detected error description	The robot X-axis servo driver trips.	
Error cause	- The robot X-axis servo motor is overloaded.	
	- The robot X-axis cannot move (due to ob	ostruction).
Items to be checked	Check for servo driver error indication (er	ror description on the screen).
Error recovery	Turn OFF the machine power once and, after at least one minute, turn it back ON.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0845	
Error message	ROBOT R-AXIS SERVO ALARM	
Action taken upon error detection	All axes come to an immediate stop. (If the process, it moves up 200 µm before it stop.) The machine program is rebooted.	
Detected error description	The robot R-axis servo driver trips.	
Error cause	- The robot R-axis servo motor is overloaded.	
	- The robot R-axis cannot move (due to ob	estruction).
Items to be checked	Check for servo driver error indication (er	ror description on the screen).
Error recovery	Turn OFF the machine power once and, after at least one minute, turn it back ON.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0851 (C0901)	
Error message	Z1 (Z2) LOW COOLING WATER LEVEL	
Action taken upon error	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding	
detection	process, it moves up 200 μm before it stop	os.)
	The machine program is rebooted.	
Detected error	The spindle-coolant-flow alarm switch (se	t to 1 to 1.2 L/min) activates.
description		
Error cause	The flow rate of spindle coolant water is to	oo low.
Items to be checked	- Check the spindle coolant flowmeter (on the back side of the machine).	
	- Check the pressure and flow rate of supp	ly water at the facility side.
	- Check water piping for any bent or clogg	zing.
Error recovery	If the flow rate of spindle coolant water is	found to be normal, effect initialization of
	the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error occurs although the coolant	- Check the flow rate alarm switch
	flow rate is normal.	setting.
		- Check the cables for any
		disconnection, breakage, or looseness
		of connection.

Error code	C0852 (C0902)	
Error message	Z1 (Z2) COOLANT LEVEL IS OUT OF RANGE	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.)	
Detected error description	The machine program is rebooted. The wheel-coolant-flow sensor inside the machine front panel detects a low flow rate.	
Error cause	The flow regulator is not working adequate defective.	ely, or the wheel coolant pump is
Items to be checked	 Check whether the flow-regulator-valve opening is excessively reduced or not. Check whether the flow rate of water in the coolant unit is adequate (3 L/min or higher). Check whether water supply at the facility side is sufficient. Check whether the setting of the flow sensor is adequate (1.4 to 1.6 L/min). 	
Error recovery	- Adjust the wheel coolant flow rate to be - After clearing the alarm condition, effect	C
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error occurs, although the wheel coolant flow rate is normal.	Check the sensor position.Check the cable for any disconnection, breakage, or looseness of connection.

Error code	C0853 (C0903)	
Error message	Z1 SPINDLE INVERTER HAS BEEN TRIPPED	
<u>J</u>		
Action taken upon error	All axes come to an immediate stop. (If the	
detection	process, it moves up 200 µm before it stop	OS.)
	The machine program is rebooted.	
Detected error	The spindle inverter trips.	
description	-	
Error cause	The spindle inverter is overloaded.	
Items to be checked	- Check the wheel for loss of abrasiveness.	
	- Check if the grinding conditions are appr	opriate.
Error recovery	If the spindle inverter trips, the spindle may enter the free-running state.	
	In such a case, wait for at least 30 minutes	and, after confirming that the spindle is
	stopped rotating, initialize the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or
		DISCO service office.

Error code	C0854 (C0904)	
Error message	Z1 (Z2) SPINDLE INNER COVER OPEN	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	The Z1 (Z2) wheel cover open/close switc spindle is rotating.	h detects "COVER OPEN" while the
Error cause	The wheel cover opens while the spindle is rotating.	
Items to be checked	- Check whether the wheel cover is open or not.	
	- Check the wheel cover sensor for any defectiveness.	
	- Check whether the wheel cover sensor is	correctly mounted.
	- Check the sensor cable for any breakage,	disconnection, or loose connection.
Error recovery	Close the wheel cover and then effect initialization of the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0855 (C0905)	
Error message	Z1 (Z2) SERVO ALARM HAS BEEN GENERATED	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	The Z1 (Z2) servo driver trips.	
Error cause	- The Z1 (Z2) servo motor is overloaded.	
	- The wheel is clogged.	
	- The Z-axis cannot move (due to obstruct	ion).
Items to be checked	- Check the wheel for loss of abrasiveness and dress it if necessary. (If a trace of burn is observed on the ground wafer, it is possible that the wheel is clogged.)	
	- Check whether the pressure of the Z-axis	counter cylinder is adequate.
	- Check the cable of the motor and encode	r for any looseness or breakage.
Error recovery	Turn OFF the machine power once, and, after at least one minute, turn it back ON.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0856 (C0906)	
Error message	Z1 (Z2) CHUCK TABLE SERVO ALARM GENERATED	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	The chuck table servo driver trips.	
Error cause	- The chuck table servo motor is overloaded.	
	- The chuck table cannot rotate.	
Items to be checked	- Note the error description on the chuck table servo driver.	
	- Check the cable of the motor and encode	r for any looseness or breakage.
	- Turn OFF the machine power to check w hand. (If the chuck table does not rotate,	
Error recovery	Turn OFF the machine power once and, after at least one minute, turn it back ON.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0873 (C0923)	
Error message	Z1 (Z2) HEIGHT GAUGE WAFER THICKESS IS MINUS	
Action taken upon error detection	All axes come to an immediate stop. (If the process, it moves up 200 µm before it stop.) The machine program is rebooted.	
Detected error description	A minus wafer thickness measurement is o	obtained during full-auto operation.
Error cause	- A loaded wafer is abnormal (cracked, deformed)	
Items to be checked	- Check the loaded wafer for any crack or deformation.	
	- Check the height gauge contactor for any	flaw or chipping.
Error recovery	- Eliminate the error-causing wafer and ef	fect initializaiton of the machine.
	- Replace the height gauge contactor and e	effect initializaiton of the machine.
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0874 (C0924)	
Error message	Z1 (Z2) HEIGHT GAUGE DETECT GRIND LIMIT	
Action taken upon error	All axes come to an immediate stop. (If the	e Z-axis is in the middle of the grinding
detection	process, it moves up 200 µm before it stops.)	
	The machine program is rebooted.	
Detected error description	The specified thickness cannot be obtained for a wafer, although the wafer is ground to the set up grinding depth limit.	
Error cause	- A thicker-than-specified (in the grinding program) wafer is loaded for grinding.	
Items to be checked	- Check the thickness of the loaded wafer as well as the contents of the grinding	
	program.	
	- Check whether the wheel setup position	is correct.
	- Check whether the height gauge has been	n adequately adjusted.
Error recovery	Effect initialization of the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0857 to C0872、C0875 to C884
Error message	Refer to "Error list (class C and D errors)" in this section.
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 μ m before it stops.) The machine program is rebooted.
Detected error description	A system error occurs.
Error cause	-
Items to be checked	-
Error recovery	Contact your nearest DISCO office or DISCO service office.
Other problems	-

Error code	C0885 (C0935)		
Error message	Z1 (Z2) SIDE COVER OPEN (WHILE FULL-AUTO)		
Action taken upon error detection	I * `	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	The Z1 (Z2) side cover open/close switch detects "COVER OPEN" during full auto operation.		
Error cause	The Z-axis side cover opens during full auto operation.		
Items to be checked	- Check whether the Z-axis side cover is open or not.		
	- Check the side cover sensor for any defe	ctiveness.	
	- Check whether the sensor is correctly mo	ounted.	
	- Check the sensor cable for any breakage,	, disconnection, or loose connection.	
Error recovery	Close the side cover.		
Other problems	<abnormality></abnormality>	<remedy></remedy>	
	The error recurs.	Contact your nearest DISCO office or DISCO service office.	

Error code	C0886 (C0936)	
Error message	Z1 (Z2) SIDE COVER OPEN (WHILE INITIALIZE)	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.	
Detected error description	The Z1 (Z2) side cover open/close switch detects "COVER OPEN" during machine initialization.	
Error cause	The Z-axis side cover opens during machine initialization.	
Items to be checked	- Check whether the Z-axis side cover is open or not.	
	- Check the side cover sensor for any defectiveness.	
	- Check whether the sensor is correctly mounted.	
	- Check the sensor cable for any breakage,	disconnection, or loose connection.
Error recovery	Close the side cover and then effect initialization of the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0887	
Error message	Z1:C/T VACUUM is LOW DURING GRIND/DRESS	
Action taken upon error	The spindle and chuck table stop rotating and the hight gauge moves up.	
detection	The Z1-axis moves to the escape position.	
	After the Z2-axis finishes grinding, both the positions.	ne Z1 and Z2 axes move to their upper end
	The machine program is then rebooted.	
Detected error	The vacuum pressure of the chuck table drecreases during dressing or during full	
description	auto operation.	
Error cause	The vacuum pressure of the chuck table decreases.	
Items to be checked	- Check if the "5-inch frame (user-specified spec.)" is warped or not.	
	- Check the chuck table surface for any ab	normality.
Error recovery	Turn OFF the machine power, remove the wafer on the Z1 chuck tabe, wait for at	
	least one minute, and then reboot the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or
		DISCO service office.

Error code	C0888 to C0899
Error message	Refer to "Error list (class C and D errors)" in this section.
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 μ m before it stops.) The machine program is rebooted.
Detected error description	A system error occurs.
Error cause	-
Items to be checked	
Error recovery	Contact your nearest DISCO office or DISCO service office.
Other problems	

Error code	C0901
Error message	Z2 LOW COOLING WATER LEVEL
Description	Refer to C0851.

Error code	C0902
Error message	Z2 COOLANT LEVEL IS OUT OF RANGE
Description	Refer to C0852.

Error code	C0903
Error message	Z2 SPINDLE INVERTER HAS BEEN TRIPPED
Description	Refer to C0853.

Error code	C0904
Error message	Z2 SPINDLE INNER COVER OPEN
Description	Refer to C0854.

Error code	C0905
Error message	Z2 SERVO ALARM HAS BEEN GENERATED
Description	Refer to C0855.

Error code	C0906
Error message	Z2 CHUCK TABLE SERVO ALARM GENERATED
Description	Refer to C0856.

Error code	C0907 to C0922、C0925 to C934
Error message	See "Error list (class C and D errors)" in this section.
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.
Detected error description	A system error occurs.
Error cause	-
Items to be checked	-
Error recovery	Contact your nearest DISCO office or DISCO service office.
Other problems	-

Error code	C0923
Error message	Z2 HEIGHT GAUGE WAFER THICKNESS is MINUS
Description	Refer to C0873.

Error code	C0924
Error message	Z2 HEIGHT GAUGE DETECT GRIND LIMIT
Description	Refer to C0874.

Error code	C0935
Error message	Z2 SIDE COVER OPEN (WHILE FULL-AUTO)
Description	Refer to C0885.

Error code	C0936
Error message	Z2 SIDE COVER OPEN (WHILE INITIALIZE)
Description	Refer to C0886.

Error code	C0937	
Error message	Z2:C/T VACUUM is LOW DURING GRIND/DRESS	
Action taken upon error	The spindle and chuck table stop rotating and the hight gauge moves up.	
detection	The Z2-axis moves to the escape position.	
	After the Z1-axis finishes grinding, both the Z1 and Z2 axes move to their upper end positions.	
	The machine program is then rebooted.	
Detected error description	The vacuum pressure of the chuck table drecreases during dressing or during full auto operation.	
Error cause	The vacuum pressure of the chuck table decreases.	
Items to be checked	- Check if the "5-inch frame (user-specified spec.)" is warped or not.	
	- Check the chuck table surface for any abnormality.	
Error recovery	Turn OFF the machine power, remove the wafer on the Z2 chuck tabe, wait for at least one minute, and then reboot the machine.	
Other problems	<abnormality> <remedy></remedy></abnormality>	
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0938 to C949
Error message	See "Error list (class C and D errors)" in this section.
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.
Detected error description	A system error occurs.
Error cause	-
Items to be checked	-
Error recovery	Contact your nearest DISCO office or DISCO service office.
Other problems	-

Error code	C0950	
Error message	T-ARM R-PAD WAFER RECEIVE ERROR(C class)	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.)	
Detected error description	The machine program is rebooted. Even if the T-arm R-pad vacuum-retains a wafer, the vacuum sensor does not turn ON (when the R-pad is at the position table or at the NEUTRAL position).	
Error cause	The T-arm R-pad cannot pick up a wafer from the position table.The T-arm R pad drops a wafer during transportation.	
Items to be checked	 Check if the R-pad has dropped a wafer or not. Check if the transported wafer is cracked/chipped or not. Check the vaccuum pressure (R-pad). Check the vacuum valve (R-pad) for any defectiveness. Check the vacuum sensor (R-pad) for any defectiveness. 	
Error recovery	Remove the wafer from the machine and effect initialization of the machine.	
Other problems	<abnormality> <remedy></remedy></abnormality>	
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	C0952		
Error message	T-ARM M-PAD WAFER RECEIVE ERROR(C class)		
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.)		
	The machine program is rebooted.		
Detected error description	Even if the T-arm M-pad vacuum-retains a wafer, the vacuum sensor does not turn ON (when the M-pad is at the Z1 chuck table or at the NEUTRAL position).		
Error cause	- The T-arm M-pad cannot pick up a wafer from the Z1 chuck table.		
	- The T-arm M pad drops a wafer during transportation.		
Items to be checked	- Check if the M-pad has dropped a wafer or not.		
	- Check if the transported wafer is cracked/chipped or not.		
	- Check the vaccuum pressure (M-pad).		
	- Check the vacuum valve (M-pad) for any defectiveness.		
	- Check the vacuum sensor (M-pad) for any defectiveness.		
Error recovery	Remove the wafer from the machine and effect initialization of the machine.		
Other problems	<abnormality></abnormality>	<remedy></remedy>	
	The error recurs.	Contact your nearest DISCO office or DISCO service office.	

Error code	C0954		
Error message	T-ARM L-PAD WAFER RECEIVE ERROR(C class)		
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine program is rebooted.		
Detected error description	Even if the T-arm L-pad vacuum-retains a wafer, the vacuum sensor does not turn ON (when the L-pad is at the Z2 chuck table or at the NEUTRAL position).		
Error cause	- The T-arm L-pad cannot pick up a wafer from the Z2 chuck table.		
	- The T-arm L pad drops a wafer during transportation.		
Items to be checked	- Check if the L-pad has dropped a wafer or not.		
	- Check if the transported wafer is cracked/chipped or not.		
	- Check the vaccuum pressure (L-pad).		
	- Check the vacuum valve (L-pad) for any defectiveness.		
	- Check the vacuum sensor (L-pad) for any defectiveness.		
Error recovery	Remove the wafer from the machine and effect initialization of the machine.		
Other problems	<abnormality> <remedy></remedy></abnormality>		
	The error recurs.	Contact your nearest DISCO office or DISCO service office.	

Error code	C0955		
Error message	T-ARM L-PAD RELEASE ERROR (C class)		
Action taken upon error	All axes come to an immediate stop. (If the	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding	
detection	process, it moves up 200 µm before it stops.)		
	The machine program is rebooted.		
Detected error	Even if the spinner table vacuums a wafer,		
description	(when the L-pad places a wafer on the spin	nner table).	
Error cause	- The T-arm L-pad drops a wafer during transportation.		
	- The vacuum system of the spinner table fails.		
Items to be checked	- Check if the L-pad has dropped a wafer or not.		
	- Check if the transported wafer is cracked/chipped or not.		
	- Check the vaccuum pressure (L-pad).		
	- Check the vacuum valve (L-pad) for any defectiveness.		
	- Check the vacuum sensor (spinner) for any defectiveness.		
Error recovery	Remove the wafer from the machine and effect initialization of the machine.		
Other problems	<abnormality></abnormality>	<remedy></remedy>	
	The error recurs.	Contact your nearest DISCO office or	
		DISCO service office.	

Error code	D0960 (D0961)	
Error message	Z1(Z2) SPINDLE INVERTER HAS BEEN TRIPPED	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine power turns OFF.	
Detected error description	The Z1 (Z2) inverter trips (machine operation cannot be continued).	
Error cause	The spindle motor is overloaded.	
Items to be checked	 Check for any abnormal grinding conditions (loss of wheel abrasiveness, etc.) Check the spindle current value for any abnormality (occurrence of error) Check if the spindle can be lightly rotated by hand. Check for occurrence of such a condition that the spindle hits a wafer (on the chuck table) or the chuck table surface. 	
Error recovery	If the spindle inveter trips, the spindle may enter the free-running state. In such a case, wait for at least 30 minutes, make sure that spindle rotation is completely stopped, and then verify that the spindle can be smoothly rotated by hand. Then, wait for at least one minute with the power turned OFF, and turn the power back ON.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	D0962		
_			
Error message	WATER LEAK HAS BEEN DETECTE	D (TABLE)	
Action taken upon error	All axes come to an immediate stop. (If th	e Z-axis is in the middle of the grinding	
detection	process, it moves up 200 µm before it stops.)		
	The machine power turns OFF.		
Detected error	More-than-the-specified amount of water	is in the water-receiving plate at the	
description	bottom of the chuck table.		
Error cause	Water leakage from the seal unit or water case		
Items to be checked	- Check the seal unit for water leakage.		
	- Check the joints of seal unit piping for any looseness.		
	- Check for mist leakage from the water case or gaps.		
Error recovery	- Take out the water-receiving plate to drain it and then replace it.		
	- Initialize the machine.		
Other problems	<abnormality></abnormality>	<remedy></remedy>	
	The error occurs even though there is	- Adjust the sensitivity of the float sensor.	
	not much water in the water-receiving	- The float sensor is defective.	
	plate.		
	Water leakage exists.	Contact your nearest DISCO office or	
		DISCO service office.	

Error code	D0963		
Error message	WATER LEAK HAS BEEN DETECTED (MAIN BODY)		
Action taken upon error	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding		
detection	process, it moves up 200 µm before it stops.)		
	The machine power turns OFF.		
Detected error description	The water leakage sensor detects water leakage.		
Error cause	Water exists at the water leakage sensor se	ection due to water leakage.	
Items to be checked	- Check for water leakage at the bottom of the machine (floor).		
	 Check for any traces of water leakage (dried contamination or other abnormal marks). Check the joints of the hoses (water hoses/duct hoses) for looseness. 		
	Check for mist leakage from the water case or gaps.Check for any moisture condensation.		
Error recovery	- Wipe moisture off the water leakage sensor section with a dry cloth and then initialize the machine.		
Other problems	<abnormality></abnormality>	<remedy></remedy>	
	The error occurs even though there is no water leakage.	Adjust the sensitivity of the water leakage sensor.The water leakage sensor is defective.	
	Water leakage exists.	Contact your nearest DISCO office or DISCO service office.	

Error code	D0964	
Error message	SPINNER INVERTER TRIPPED	
Action taken upon error	All axes come to an immediate stop. (If the	e Z-axis is in the middle of the grinding
detection	process, it moves up 200 µm before it stop	os.)
	The machine power turns OFF.	
Detected error description	The spinner inverter trips.	
Error cause	Water exists at the water leakage sensor se	ection due to water leakage.
Items to be checked	- Check for water leakage at the bottom of	the machine (floor).
	- Check for any traces of water leakage (dried contamination or other abnormal marks).	
	- Check the joints of the hoses (water hoses/duct hoses) for looseness.	
	- Check for mist leakage from the water case or gaps.	
	- Check for any moisture condensation.	
Error recovery	- Wipe moisture off the water leakage sensor section with a dry cloth and then initialize the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error occurs even though there is no water leakage.	Adjust the sensitivity of the water leakage sensor.The water leakage sensor is defective.
	Water leakage exists.	Contact your nearest DISCO office or DISCO service office.

Error code	D0965	
Error message	CHILLER TANK LOW COOL.WATER LEVEL 2/TRIP	
Action taken upon error	All axes come to an immediate stop. (If the	e Z-axis is in the middle of the grinding
detection	process, it moves up 200 µm before it stop	os.)
	The machine power turns OFF.	
Detected error description	Water level of the coolant water tank of DVC011C is low.	
Error cause	Water level of the coolant water tank decreases; or	
	A failure occurs in the chiller unit.	
Items to be checked	- Check the water level of the coolant water tank.	
	- Check if the sensor is correctly functioning.	
Error recovery	- Regulate the water valve to obtain an adequate water level and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	D0968	
Error message	DRAIN TANK UNIT OVERFLOW	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine power turns OFF.	
Detected error description	Overflowing of the drain tank is detected.	
Error cause	Abnormal rise of the water level in the drain tank	
Items to be checked	- Check the water level of the drain tank.	
	- Check if the sensor is normally functioning.	
Error recovery	Wait until an adequate water level is obtrained and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	D0980	
Error message	BREAKER BOX OVERHEAT DETECTED	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine power turns OFF.	
Detected error description	The temperature switch (set to 45°) in the breaker box detects an overheating condition.	
Error cause	Temperature in the breaker box rises due to loosened terminals or malfunctioning of the inner parts.	
Items to be checked	 Open the breaker box cover and turn OFF the main circuit breaker. Check for any smell of burning or smoke emission Check the terminals and cables for any traces of burning. Check for existence of any overheated components (breaker, magnet contactor, cable, etc.) 	
Error recovery	Effect initialization of the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	There exists a smell of burning or a trace of burning.The error recurrs.	Contact your nearest DISCO office or DISCO service office.

Error code	D0981	
Error message	BREAKER BOX COVER is OPEN	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine power turns OFF.	
Detected error description	The breaker box cover open/close switch detects opening of the breaker box cover.	
Error cause	The breaker box cover opens while the machine power is turned ON.	
Items to be checked	 Check if the breaker box cover is open or not. Check if the breaker box cover open/close switch correctly functions (without any abnormal conditions such as loosend connection). 	
Error recovery	Close the braker box cover and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	D0982	
Error message	LOW VACUUM PUMP WATER LEVEL	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.)	
	The machine power turns OFF.	
Detected error description	Water supply to the vacuum pump of the vacuum/coolant unit stops.	
Error cause	Water is not supplied to the vacuum pump. It is impossible to produce a vacuum unless water is supplied to the vacuum pump.	
Items to be checked	Check if water is supplied to the vacuum pump.	
Error recovery	After eliminating the cause of water failure, turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	D0983	
Error message	TRANSFORMER OVERHEAT DETECTED	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine power turns OFF.	
Detected error description	The temperature switch of the transformer in the breaker box or that of the transformer at the machine (lower) rear side activates	
Error cause	Temperature in the transformer rises (45 or higher) due to increase in output load of the transformer.	
Items to be checked	 Open the breaker box, turn OFF the main circuit breaker, and then check if the transformer (T001) is overheated or not. Check if the transformer (T0002) at the machine (lower) rear side is overheated or not. 	
Error recovery	Wait until the transformer cools down (at least 30 minutes) and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	D0984	
Error message	BLOWN FUSE DETECTED (BREAKER BOX)	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine power turns OFF.	
Detected error description	A fuse in the breaker box blows out.	
Error cause	An overloading or overcurrent condition occurs in the fuse line.	
Items to be checked	Open the breaker box and locate the blown out fuse.	
Error recovery	Turn OFF the main circuit breaker, replace the flown fuse with new one, and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The same fuse blows out.	Contact your nearest DISCO office or DISCO service office.

Error code	D0985	
Error message	UPS DETECTED POWER FAILURE	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.)	
Detected error	The machine power turns OFF. The uninterruptible power supply unit (UP)	25) (Ontional accessory) datasts a nower
description	failure.	s) (Optional accessory) detects a power
Error cause	A power failure or instantaneous power outage occurs at the facility-side power source.	
Items to be checked	- Check if the power receiving lamp (machine rear side) lights.	
	- Check if the power switch at the facility side is turned OFF (the breaker is tripped) or not.	
	- Check if the main circuit breaker in the breaker box is tripped (due to detection of over-cuurent or electric leakage) or not.	
	- Check if the power lamp of the UPS is lit nor not.	
	- Check if the power switch of the UPS is turned ON or not.	
Error recovery	Restore power supply at the facility-side, turn ON the machine power and then effect initialization of the machine.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The main circuit breaker trips (detection of electric leakage) or the UPS trips although the facility-side powewr source is normal.	Contact your nearest DISCO office or DISCO service office.

Error code	D0986	
Error message	EM-STOP BUTTON HAS BEEN PRESSED	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine power turns OFF.	
Detected error description	The EM-STOP key has been pressed.	
Error cause	Pressing of the EM-STOP key	
Items to be checked	Check the error causing location.	
Error recovery	Clear activation of the EM-STOP key	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error occurs even though the EM-STOP key is not pressed.	The EMO switch is defective.
	The error does not occur even though the EM-STOP key is pressed.	The EMO circuit is defective.

Error code	D0987	
Error message	BLOWN FUSE DETECTED (CONT ROL UNIT)	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine power turns OFF.	
Detected error description	A fuse in the control unit blows out.	
Error cause	An overloading or overcurrent condition occurs in the fuse line.	
Items to be checked	Locate the blown out fuse.	
Error recovery	Turn OFF the main circuit breaker, replace the blown fuse with new one, and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The same fuse blows out.	Contact your nearest DISCO office or DISCO service office.

Error code	D0988	
Error message	BLOWN DC FUSE 2 DETECTED	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine power turns OFF.	
Detected error description	A fuse in the control unit blows out.	
Error cause	An overloading or overcurrent condition occurs in the fuse line.	
Items to be checked	Locate the blown out fuse.	
Error recovery	Turn OFF the main circuit breaker, replace the blown fuse with new one, and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The same fuse blows out.	Contact your nearest DISCO office or DISCO service office.

Error code	D0989	
Error message	VACUUM PUMP LOW WATER LEVEL/THERMAL TRIP	
Action taken upon error	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding	
detection	process, it moves up 200 μm before it stops.)	
	The machine power turns OFF.	
Detected error	Water supply to the vacuum pump of the vacuum/coolant unit stops; or	
description	A thermal trip occurs in the vacuum pump.	
Error cause	Water is not supplied to the vacuum pump. It is impossible to produce a vaccum unless water is supplied to the vacuump pump.	
Items to be checked	- Check if water is supplied to the vacuum pump.	
Error recovery	- Eliminate the cause of water failure and then turn ON the machine power.	
	- If the vacuum pump motor is not operating, turn OFF the machine power, thermal switch and then turn ON the machine power.	
Other problems	<abnormality></abnormality>	<remedy></remedy>
	The error recurs.	Contact your nearest DISCO office or DISCO service office.

Error code	D0990 to D0997	
Error message	Refer to "Error list (class C and D errors)" in this section.	
Action taken upon error detection	All axes come to an immediate stop. (If the Z-axis is in the middle of the grinding process, it moves up 200 µm before it stops.) The machine power turns OFF.	
Detected error description	A system error occurs.	
Error cause	-	
Items to be checked	-	
Error recovery	Contact your nearest DISCO office or DISCO service office.	
Other problems	-	

G. MAINTENANCE AND INSPECTION

Contents of this chapter

This chapter describes, by required time interval, about the maintenance and inspection works to be performed on the machine.

Section No.	Title	Contents
1	Screen Mode Change to Maintenance Mode	- Procedures to change the screen mode from the normal mode to the maintenance mode
2	Circuit Breaker Lever Lockout	- Procedures to lock out the circuit breaker lever
		- Procedures to open the lockout of the circuit breaker lever
3	Manual Chuck Cleaning Sequence	- Explanation of the manual chuck cleaning sequence (used to clean or visually check the chuck table)
4	Maintenance and Inspection Works to be Performed Every Day	- Maintenance/inspection works to be performed every day
5	Maintenance and Inspection Works to be Performed at 7-Day Intervals (Recommended)	- Maintenance/inspection works to be performed at 7-day intervals
6	Maintenance and Inspection Works to be Performed at 30-Day Intervals (Recommended)	- Maintenance/inspection works to be performed at 30-day intervals
7	Maintenance and Inspection Works to be Performed at 180-Day Intervals (Recommended)	- Maintenance/inspection works to be performed at 180-day intervals
8	Adjustment Works to be Performed as Needed	- Adjustment works to be performed when a problem is found in operating the machine

Availing of preventive maintenance function

The contents and time intervals of the periodic inspection items can be managed using the preventive maintenance function. Refer to Section 7, [Preventive Maintenance Function] in Chapter E for details of the preventive maintenance function.

1. Screen Mode Change to Maintenance Mode

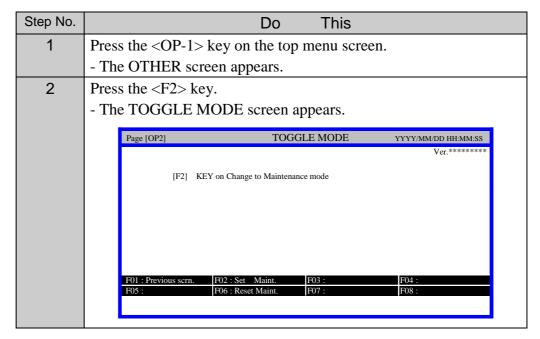
About maintenance mode

When you perform a maintenance work, you should change the screen mode from the normal mode to the maintenance mode. On entering the maintenance mode, the screen color changes from black to dark green and the [MT mode] indication is displayed in purple on the upper right of the screen.

Color change of the screen to dark green will alert you that the machine is under maintenance. Also, the date and time of maintenance mode initiation/termination are registered in the "event history" log of the machine.

Procedures to switch the screen mode to maintenance mode

The procedures to change the screen mode from the normal mode to the maintenance mode are described here.



Procedures to switch the screen mode to maintenance mode (Continued)

Step No.	Do This	
3	Press the <f2> key.</f2>	
	- The screen mode switches to the maintenance mode with the	
	screen color changed from black to dark green.	
	- The OTHER screen appears.	
4	Press the <f1> key to go back to the top menu screen.</f1>	
5	Start maintenance work.	
	 The only indicated difference of the maintenance mode screen from the normal mode screen is the screen color (dark green) and the appearance of "MT mode" message. No other indications to make distinction are available. So, make all the concerned workers thoroughly understand that the screen color changes to dark green when the machine enters the maintenance mode. 	
6	To return to the normal mode, call up the TOGGLE MODE screen and press the <f6> key. - The screen mode switches to the normal mode and the screen color returns from dark green to black.</f6>	

2. Circuit Breaker Lever Lockout

Summary of this section

The main circuit breaker on the rear of the machine is equipped with the breaker lever that enables locking out of the breaker (locking the breaker lever at the OFF position). Make sure to lock out the breaker lever with a padlock or the like before proceeding with any servicing, inspection or maintenance work.

This section describes the procedures to lock out as well as to open the lockout of the circuit breaker lever.

Section No.	Title	Contents
2-1	Procedures to Lock out	- Procedures to lock out the circuit
	the Circuit Breaker Lever	breaker lever
2-2	Procedures to Open the Lockout of the Circuit Breaker lever	- Procedures to open the lockout of the circuit breaker lever

2-1. Procedures to Lock out the Circuit Breaker Lever

Procedures to lock out the circuit breaker lever

Step No.	Do This	
1	If the machine is in operation, stop it by following the specified operation stop procedures.	
2	Open the machine front cover.	
3	Turn OFF the main switch and then pull out the switch key.	
4	Turn the circuit breaker on the rear of the machine to the OFF position.	
5	As shown in the figure below, lock out the circuit breaker lever with a padlock or the like. [Standard type] [SEMI type] ON TRIP OFF	
6	Turn OFF the facility-side power and lock it out.	

2-2. Procedures to Open the Lockout of the Circuit Breaker Lever

Procedures to open the lockout of the circuit breaker lever

Step No.	Do	This	
1	Check to be sure that there is no pe	Check to be sure that there is no person around the machine.	
2	Check to be sure that the machine	and the floor around are not wet.	
3	Open the lockout of the facility-sid	de power.	
4	Turn ON the facility-side power.	Turn ON the facility-side power.	
5	Open the lockout of the main circuit breaker lever on the rear of the machine.		
6	Turn the circuit breaker lever to the [Standard type] Standard type] Breaker lever	SEMI type] ON TRIPOFF Release Breaker lever	

3. Manual Chuck Cleaning Sequence

About manual chuck cleaning sequence

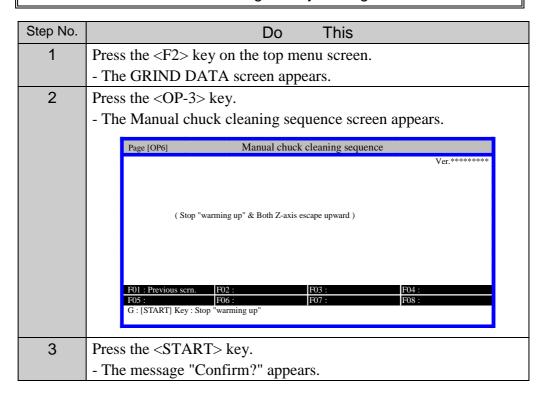
The manual chuck cleaning sequence is used to visually check the chuck table or clean the chuck table and the area around. If you initiate this sequence, the machine stops warming up and the Z-axes retreat to their upper end positions.

Procedures to perform manual chuck cleaning sequence

The procedures to perform the manual chuck cleaning sequence are described here.



- If you position your hands or fingers in the spindle-axis (wheel), chuck table, Z-axis, or T-arm drive section in action, they may be caught or cut off. Before cleaning or inspecting the machine, be sure that all axes are completely stopped.
- When you clean the machine, make sure that no other persons touch the machine. Inadvertent activation of the drive sections of the machine could cause cutting off of your fingers or hands.



Procedures to perform manual chuck cleaning sequence (Continued)

Step No.	Do This
4	Press the <enter> key.</enter>
	- The machine stops warming up.
	- The message "Escape up each Z axis?" appears.
5	Press the <enter> key.</enter>
	- The Z-axes move to their upper end positions to retreat.
	- The top menu screen appears.
6	After verifying that all axes of the machine are stopped, start
	cleaning or checking of the chuck table.

4. Maintenance and Inspection Works to be Performed Every Day

Summary of this section

This section describes the maintenance/inspection works that should be done everyday.

Section No.	Title	Contents
4-1	Maintenance/Inspection Works to be Performed before Turning ON the Facility-Side Power	- Maintenance/inspection works that should be performed before turning ON the facility-side power
4-2	Maintenance/Inspection Works to be Performed after Turning ON the Machine Power	- Maintenance/inspection works that should be performed after turning ON the machine power
4-3	Maintenance/Inspection Works to be Performed before Starting Full-auto Grinding Operation	- Maintenance/inspection works that should be performed before starting full-auto grinding operation
4-4	Maintenance/Inspection Works to be Performed upon Termination of Full- auto Grinding Operation	- Maintenance/inspection works that should be performed when full-auto grinding operation terminates

4-1. Maintenance/Inspection Works to be Performed before Turning ON the Facility-Side Power

Maintenance/inspection work items to be performed before turning ON facility-side power

The following maintenance/inspection works should be done before turning ON the facility-side power.



Before starting the works as described below, make sure to turn OFF the facility-side power and machine power and lock out their circuit breakers. If you perform such works with the power turned ON, you may get an electric shock.

Check item	Work to be done
Main air pressure	Verify that the main air pressure gauge on the rear of the machine reads 0.5 MPa.
Sub-air pressure	Verify that the sub-air [optional accessory] pressure gauge on the rear of the machine reads 0.5 MPa.
Spindle rotation	Rotate the Z1 and Z2 spindles by hand to verify that they turn smoothly.
Wheel tooth appearance	Verify that both the Z1 and Z2 wheels are not nicked or soiled.
Remaining wheel tooth length	Verify that the Z1 and Z2 wheels respectively have the remaining tooth length of 1.0 mm or longer.
Chuck table appearance	Verify that the chuck tables are not nicked or soiled on their surfaces.
Height gauge appearance	Verify that the measuring position of each height gauge probe is correct.

4-2. Maintenance/Inspection Works to be Performed after Turning ON the Machine Power

Maintenance/inspection work items to be performed after turning ON the machine power

The following maintenance/inspection works should be performed after the machine power is turned ON.

Check item	Work to be done
Vacuum pump pressure	Verify that the vacuum pump pressure gauge of the vacuum/coolant unit reads 65 kPa or higher.
Power OFF upon EMO switch activation	Verify that all power sources are shut off upon activation (pressing) of each EMO switch.
Z1/Z2 spindle coolant flow rate	Verify that the Z1/Z2 spindle coolant flowmeters respectively read 1.5 L/min or higher.
Spindle rotation	Verify that the Z1/Z2 spindle current values indicated on the WARM UP screen after starting the warm up operation are within the range of 2.0 - 4.0 A.
Coolant pump pressure	Verify that the coolant water pressure gauge of the vacuum/coolant unit reads 0.2 MPa or higher.
Z1/Z2 wheel coolant flow rate	Verify that the Z1/Z2 wheel coolant flowmeters on the panel (left side) inside the machine front cover respectively read 2.0 L/min. or higher.

4-3. Maintenance/Inspection Works to be Performed before Starting Full-auto Grinding Operation

Maintenance/inspection work items to be performed before starting full auto grinding operation

The following maintenance/inspection works should be performed before starting full auto grinding operation.

Check item	Work to be done
Height gauge check	Check the height gauge indication values shown on the HEIGHT GAUGE TEST screen to make sure that they are in the specified value ranges. (Refer to Section 6-2, [Height Gauge Indication Value Check] in Chapter D.)

4-4. Maintenance/Inspection Works to be Performed upon Termination of Full-auto Grinding Operation

Maintenance/inspection work items to be performed after finishing full auto grinding operation

The following maintenance/inspection works should be performed when full auto operation finishes.



Wear protective gloves and goggles and use tweezers when you clean the inside of the machine to prevent the broken wafer debris from stinging your hands or getting into your eyes.

Check item	Work to be done
Cleaning of the inside of the machine	- Wash away deposited contaminants from the height gauge and chuck table sections using a hand shower.
	- Remove any broken wafers left in the grinding chamber.
T-arm pad cleaning	Wipe dirt off the pad bottom surface (suction surface) with a lint free cloth. (Contaminants on the pad suction surface may cause a wafer it vacuums to break.)
Cleaning of the robot pick	Wipe dirt off the robot pick with a lint-free cloth. If the pick or its vacuum tape is found to be faulty, it should be replaced with new one. (Refer to Section 2-3, [Robot Pick Replacement] or Section 2-4, [Robot Pick Vacuum Tape Replacement] in Chapter H).
Water leakage	Check the inside and around the machine to verify that there is no water leakage.

5. Maintenance and Inspection Works to be Performed at 7-Day Intervals (Recommended)

Summary of this section

This section describes the maintenance/inspection works that should be performed at 7-day intervals.

Section No.	Title	Contents
5-1	Maintenance/Inspection	- Maintenance/inspection works
	Works to be Performed	that should be performed before
	before the Facility-Side	turning ON the facility-side
	Power is Turned ON	power
5-2	Maintenance/Inspection	- Maintenance/inspection works
	Works to be Performed	that should be performed after
	after the Machine Power	turning ON the machine power
	is Turned ON	

5-1. Maintenance/Inspection Works to be Performed before the Facility-Side Power is Turned ON

Maintenance/inspection work items to be performed before turning ON the facility-side power

The following maintenance/inspection works should be performed every 7 days before the facility-side power is turned ON.



Before starting the works as described below, make sure to turn OFF the facility-side power and machine power and lock out their circuit breakers. If you perform such works with the power turned ON, you may get an electric shock.

Check item	Work to be done
Facility-side supply air pressure	Verify that the facility-side supply air pressure is in the range of 0.5 - 0.8 MPa.
Facility-side supply water pressure (wheel coolant)	Verify that the facility-side supply water (wheel coolant) pressure is in the range of 0.15 - 0.25 MPa.
Facility-side supply water pressure (spindle coolant)	Verify that the facility-side supply water (spindle coolant) pressure is in the range of 0.25 - 0.35 MPa.
Height gauge appearance	Visually check the height gauge for any abnormality such as oil leakage.
Ionizer electrode cleaning	Clean the ionizer electrode by reciprocating (2 to three times) the cleaning lever of the ionizer at the bottom of the monitor.

5-2. Maintenance/Inspection Works to be Performed after the Machine Power is Turned ON

Maintenance/inspection work items to be performed after the machine power is turned ON

The following maintenance/inspection works should be performed every 7 days after the machine power is turned ON.

Check item	Work to be done
Water leaks in and out of the machine	Remove all the machine outer covers to verify that there is no water leakage in and around the machine.
Vacuum pump water flow rate	Verify that the vacuum pump water flowmeter of the vacuum/coolant unit shows a value in the range of 4.5 - 5.5 L/min. (1 L/min. when water temperature is 21 °C or lower).
Chuck table water flow/air blow	Check to make sure that water and air flows/blows all over the chuck table when the chuck table water flow/air blow system is turned ON.
Mist leakage	Verify that there is no leaked mist observed in the grinding chamber (grinding section).

Maintenance and Inspection Works to be Performed at 30-Day Intervals (Recommended)

Summary of this section

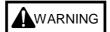
This section describes the maintenance/inspection works to be performed at 30-day intervals.

Section No.	Title	Contents
6-1	Maintenance/Inspection works to be Performed before the Facility-Side Power is Turned ON	- Maintenance/inspection works that should be performed before the facility-side power is turned ON
6-2	Maintenance/Inspection Works to be Performed after the Machine Power is Turned ON	- Maintenance/inspection works that should be performed after the machine power is turned ON

6-1. Maintenance/Inspection works to be Performed before the Facility-Side Power is Turned ON

Maintenance/inspection work items to be performed before turning ON the facility-side power

The following maintenance/inspection works should be performed every 30 days before the facility-side power is turned ON.



Before starting the works as described below, make sure to turn OFF the facility-side power and machine power and lock out their circuit breakers. If you perform such works with the power turned ON, you may get an electric shock.

Check item	Work to be done
Cleanliness of the air unit	Visually check the filters of the air unit for any oil or dirt buildup.
Clogging of the air unit	Check to be sure that the differential pressure gauge on the machine rear side indicates a value within the "green area".
Seal unit	Check to be sure that there is no water droplets observed on the hoses of the seal unit. (The seal unit has 5 drain hoses. See the top and bottom hoses to check the degree of water leakage from the seal unit.)
T-arm pad	Check to be sure that the T-arm pad is not nicked or soiled.
Robot pick	Check to be sure that the robot pick is not nicked or soiled. If the robot pick or the vacuum tape is found to be faulty, it should be replaced with new one. (Refer to Section 2-3, [Robot Pick Replacement] and Section 2-4, [Robot Pick Vacuum Tape Replacement] in Chapter H.)
Chuck table washing	Wash the chuck tables by a hand shower and oilstone.
Washing unit up/down stroke	Verify that the washing-pad mounting surface warps approximately 1 mm when the cylinder of the Z1/Z2 washing unit is moved down. (Refer to Section 8-6-1, [Ascent/Descent Stroke Adjustment] in this chapter for details.)

6-2. Maintenance/Inspection Works to be Performed after the Machine Power is Turned ON

Maintenance/inspection work items to be performed after the machine power is turned ON

The following maintenance/inspection works should be performed every 30 days after the machine power is turned ON.

Check item	Work to be done
Drain water hose clogging	Check to make sure that the drain water hose on the machine rear side is not clogged.
Duct air hose clogging	Check to make sure that the duct air hose on the machine rear side is not clogged.
Seal unit water leakage	Check the seal unit tank in the machine lateral side for any water leakage.
Robot movement	Check to be sure that the positions of the robot arm are correct at all of its wafer transportation destinations. (Refer to Section 8-1, [Position Check/Adjustment of Robot Arm] in this chapter.)
Robot pick vacuum pressure	Place a wafer on the pick's suction surface and turn ON the robot pick vacuum system in the unit operation (ROBOT) screen. Then, verify that the robot pick vacuum pressure gauge reads 53 kPa or higher.
T-arm pad (R,M,L) vacuum pressure	Place a wafer on the pad's suction surface and turn ON the pad vacuum system in the unit operation (T-ARM) screen. Then, verify that the pad vacuum pressure gauge reads 53 kPa or higher.
T-arm pad (R,M,L) air blow	Turn ON the pad air blow system in the unit operation (T-ARM) screen. Verify that, when a wafer is placed on the pad suction surface, air is blown from the wafer periphery to completely detach it from the pad.
Spinner table vacuum pressure	Place a wafer on the spinner table's suction surface and turn ON the spinner table vacuum system in the unit operation (SPINNER) screen. Then, verify that the spinner table vacuum pressure gauge reads 53 kPa or higher.
Spinner table air blow	Turn ON the spinner table air blow system in the unit operation (SPINNER) screen. Verify that, when a wafer is pressed against the suction surface of the spinner table, air is blown from the wafer periphery to completely detach it from the spinner table.

Maintenance/inspection work items to be performed after the machine power is turned ON (Continued)

Check item	Work to be done
Wafer centering (position table)	Verify correct wafer centering actions in the unit operation (POSITION TABLE) screen.
Height gauge retraction time	Visually check and verify that the retraction movement of the (Z1/Z2) height gauge takes approximately 0.2 second or longer.
Height gauge (finger length: 82 mm [inner circ.]) retraction amount	Verify that the retraction amount of the height gauge is within the range of 14.0-14.5 μm .
[Optional accessory] Height gauge (finger length : 42 mm [outer circ.]) retraction amount	Verify that the retraction amount of the height gauge is within the range of 8.5 - $9.0 \mu m$.
Height gauge accuracy	Using a wafer with known thickness, verify that the value measured with the (Z1/Z2) height gauge falls within the range of \pm 3 μ m of the actual thickness value.
Side cover interlock	Open the Z1/Z2 side cover while the spindle is rotating to verify that an error is issued.
Pilot lamp illumination	Check to make sure that each light of the pilot lamp correctly turns ON/OFF on the SIGNAL OPERATION/MONITOR screen. (Refer to Section 4, [Signal Monitoring] in Chapter E for details of the SIGNAL OPERATION/MONITOR screen.)
Z1 wafer shape accuracy	Verify that TTV (measured at 5 measuring points on a wafer) of the wafers ground at the Z1-axis side is 3 µm or less.
Z1 wafer thickness accuracy	Verify that the thickness variation (measured at 5 measuring points on a wafer) of the wafers ground at the Z1-axis side is within \pm 3 μ m of the target value.
Z2 wafer shape accuracy	Verify that TTV (measured at 5 measuring points on a wafer) of the wafers ground at the Z2-axis side is 3 µm or less.
Z2 wafer thickness accuracy	Verify that the thickness variation (measured at 5 measuring points on a wafer) of the wafers ground at the Z2-axis side is within \pm 3 μ m of the target value.

7. Maintenance and Inspection Works to be Performed at 180-Day Intervals (Recommended)

Maintenance/inspection work items to be performed at 180-day intervals

The following maintenance/inspection works should be performed every 180 days.

Check item	Work to be done
Self-grinding	Perform self-grinding and then visually check to make sure that the chuck tables are not nicked or cracked. (Refer to Section 4. [Self-grinding] in Chapter D for the procedures to perform self-grinding of the chuck tables)
Chuck table inclination check	Make inclination check of the chuck tables. (Refer to Section 7-6 [Chuck Table Inclination Check] in Chapter D for the procedures to check the inclination of the chuck tables.

8. Adjustment Works to be Performed as Needed

Summary of this section

This section describes the adjustment works that should be performed as needed (when the machine acts faultily, etc).

Section No.	Title	Contents
8-1	Position Check/Adjustment of Robot Arm	- Procedures to check/adjust the robot arm position at its operational destinations
8-2	Adjustment of Z-axis Sensor Positions	- Procedures to adjust the positions of the Z-axis up end, down end, and area sensors
8-3	Adjustment of Spinner Table	- Procedures of the spinner table related adjustments
8-4	Adjustment of Cassette Block Positions	- Procedures to adjust the cassette block positions
8-5	Adjustment of Vacuum Gauge	- Procedures to adjust the vacuum gauge
8-6	Adjustment of Washing Unit	- Procedures of the washing unit related adjustments.
8-7	Adjustment of T-shutter	- Procedures of the T-shutter related adjustments
8-8	Adjustment of Position Table	- Procedures of the position table related adjustments
8-9	Adjustment of T-arm	- Procedures of the T-arm related adjustments

8-1. Position Check/Adjustment of Robot Arm

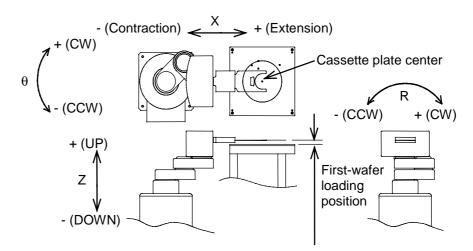
Summary of this section

The procedures to check/adjust the positions of the robot arm at its operational destinations are described here.

Section No.	Title	Contents
8-1-1	Position Check at the Cassette Section	- Procedures to check the robot arm position at the cassette section
8-1-2	Position Check at the Spinner Table	- Procedures to check the robot arm position at the spinner table
8-1-3	Position Check at the Position Table	- Procedures to check the robot arm position at the position table

Axial structure of the robot

The robot of this machine has four drive axes as shown in the figure below.



Drive axis	Movement
Z-axis	Up/down (UP: + / Down: -)
X-axis	Extension/contraction (Extension: + / Contraction: -)
R-axis	Reversal (CW direction: + / CCW direction: - as viewed from the pick end)
θ-axis	Turning (CW direction: + / CCW direction: - as viewed from the machine top side)

8-1-1. Position Check at the Cassette Section

Procedures to check robot arm position at cassette section

The procedures to check the robot arm position at the cassette section are described here. If you cannot obtain an appropriate check result, contact your nearest DISCO office for adjustment of the robot arm.

Step No.	Do This
1	Allow the robot pick to vacuum-retain an 8-inch diameter wafer.
2	Move the robot arm to the first-slot wafer loading position of the cassette A in the unit operation (ROBOT) screen.Refer to Section 2. [Unit Operation] in Chapter E for details of the unit operation.
3	Check to be sure that the clearance between the cassette plate surface and the wafer is the same at four wafer edge points (front, rear, left, and right), and is 0.5 mm or less.
	/Cassette plate
	Measuring points (4)
4	With the wafer vacuum-retained by the robot pick, move the robot arm to the first-slot wafer loading position of the cassette B through unit operation.
5	Following the same steps as used for the cassette A, check the clearance between the cassette plate surface and the wafer at the four measuring points.
6	If the values obtained at the four measuring points are not the same, adjust the inclination of the cassette plate using the screws for adjusting the inclination of the cassette plate.

8-1-2. Position Check at the Spinner Table

Procedures to check robot arm position at spinner table

The procedures to check the robot arm position at the spinner table are described here.

Step No.	Do This
1	Move the robot arm to the spinner table in the unit operation (ROBOT) screen.Refer to Section 2. [Unit Operation] in Chapter E for details of the unit operation.
2	Check to be sure that the robot arm center aligns with the spinner table center.
3	If the centers do not align, use the "SPINNER Correct X center" and "SPINNER Correct THETA STOP" parameters in the EDIT PARAMETER (CASSETTE) screen for adjustment.

8-1-3. Position Check at the Position Table

Procedures to check robot arm position at position table

The procedures to check the robot arm position at the position table are described here.

Step No.	Do This
1	Move the robot arm to the position table in the unit operation (ROBOT) screen.
	- Refer to Section 2. [Unit Operation] in Chapter E for details of the unit operation.
2	Check to be sure that the robot arm center aligns with the position table center.
3	If the centers do not align, use the "P-TABLE Correct X center" and "P-TABLE Correct THETA STOP" parameters in the EDIT PARAMETER (CASSETTE) screen for adjustment.

8-2. Adjustment of Z-axis Sensor Positions

Summary of this section

This section describes about the procedures to adjust the Z-axis upper-end, lower-end and initial/grinding area sensors.

It is, however, not necessary to adjust these sensors under the normal circumstances, since they have already been adjusted prior to machine shipment

Section No.	Title	Contents
8-2-1	Adjustment of Upper-end Sensor	- Procedures to adjust the upperend sensor
8-2-2	Adjustment of Lower-end Sensor	- Procedures to adjust the lower- end sensor
8-2-3	Adjustment of Initial Position/Grinding Area Sensor	- Procedures to adjust the initial position/grinding area sensor

Safety precautions in adjusting the Z-axis sensor positions.



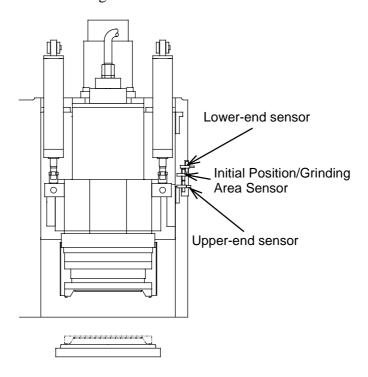
- If you place your hands or fingers in the drive section of the spindle axis (wheel), chuck table, Z-axis or T-am, they may be caught or cut off. Make sure that all axes of the machine are stopped before you adjust the Z-axis sensor positions.
- Inadvertent activation of the drive sections of the machine may cause an accident involving catching or cutting off of your hands and fingers. Make sure that no other persons touch the machine while you adjust the Z-axis sensor positions.

NOTICE

- Make sure to remove the wheels and the chuck tables from the machine when you adjust the Z-axis sensor positions. Otherwise, they may be flawed or damaged.

The Z1-axis and Z2-axis respectively have the following sensors.

- Upper-end sensor
- Lower-end sensor
- Initial Position/Grinding Area Sensor



8-2-1. Adjustment of Upper-end Sensor

Procedures to adjust the upper-end sensor position

The Z-axis upper-end sensor detects moving of the Z-axis to its upper end position. This section describes the procedures to adjust the Z-axis upper-end sensor position.

Step No.	Do This
1	Move the upper-end sensor to its upper limit position on the sensor mounting rail.
2	 In the unit operation (Z1 or Z2) screen, move the Z-axis to where the distance between the chuck table assembly surface and the wheel-mounting surface of the spindle becomes 163 mm. Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.
	Chuck table assembly surface Wheel-mounting surface 163 mm
3	Gradually move down the sensor to a position where the sensor operation indicator (red LED) goes OFF. Secure the sensor at that position.
4	Move down the Z-axis about 10 mm in unit operation (to eliminate the hysteresis effect of the sensor).
5	Move the Z-axis to its upper end position.
6	Check to make sure that the distance between the chuck table assembly surface and the wheel-mounting surface of the spindle is 163 ± 0.5 mm. - If a figure in the above range cannot be obtained, redo the adjustment procedures all over again.
7	After the adjustment is completed, move the Z-axis from end to end to make sure that there is no unusual sound or any other abnormal conditions observed.

8-2-2. Adjustment of Lower-end Sensor

Procedures to adjust the lower-end sensor position

The Z-axis lower-end sensor detects moving of the Z-axis to its lower end position. This section describes the procedures to adjust the Z-axis lower-end sensor position.

Step No.	Do This
1	Move the lower-end sensor to its lower limit position on the sensor mounting rail.
2	In the unit operation (Z1 or Z2) screen, move the Z-axis to where the distance between the chuck table assembly surface and the wheel-mounting surface of the spindle becomes 43 mm.Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.
	Chuck table assembly surface Wheel-mounting surface 43 mm
3	Gradually move up the sensor to a position where the sensor operation indicator (red LED) goes OFF. Secure the sensor at that position.
4	Move up the Z-axis about 10 mm in unit operation (to eliminate the hysteresis effect of the sensor).
5	Move the Z-axis to its lower end position.
6	Check to make sure that the distance between the chuck table assembly surface and the wheel-mounting surface of the spindle is 43 ± 0.5 mm. - If a figure in the above range cannot be obtained, redo the adjustment procedures all over again.
7	After the adjustment is completed, move the Z-axis from end to end to make sure that there is no unusual sound or any other abnormal conditions observed.

8-2-3. Adjustment of Initial Position/Grinding Area Sensor

Procedures to adjust the initial position/grinding area sensor position

The Z-axis initial position/grinding area sensor detects moving of the Z-axis to its initial position. This section describes the procedures to adjust the Z-axis initial position/grinding area sensor position.

Step No.	Do This
1	Move the initial position/grinding area sensor to its lower limit position on the sensor mounting rail.
2	In the unit operation (Z1 or Z2) screen, move the Z-axis to where the distance between the chuck table assembly surface and the wheel-mounting surface of the spindle becomes 62 mm. - Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.
	Initial position/grinding area sensor Chuck table assembly surface 62 mm
3	Gradually move up the sensor to a position where the sensor operation indicator (red LED) goes OFF. Secure the sensor at that position.
4	Move up the Z-axis about 10 mm in unit operation (to eliminate the hysteresis effect of the sensor).
5	Move down the Z-axis to a position where the sensor operation indicator (red LED) goes OFF.
6	Check to make sure that the distance between the chuck table assembly surface and the wheel-mounting surface of the spindle is 62 ± 0.5 mm. - If a figure in the above range cannot be obtained, redo the adjustment procedures all over again.
7	Initialize the machine.

Procedures to adjust the initial position/grinding area sensor position (Continued)

Step No.	Do This	
8	After initializing the machine, check to make sure that the distance between the chuck table assembly surface and the wheel-mounting surface of the spindle is 60 ± 0.5 mm (not 62 ± 0.5 mm).	
	- If a figure in the above range is obtained, the sensor position adjustment procedures complete here. If a figure in the above range is not obtained, make further adjustment referring to [Adjustment after initialization] that follows.	

Adjustment after initialization

If the distance between the chuck table assembly surface and the wheel-mounting surface of the spindle does not fall in the range of 60 ± 0.5 mm after initializing the machine, make further adjustment following the steps as described below.



Check to make sure that air is supplied to the air cylinders of the Z-axis balancers. If you loosen the coupling of the Z-axis servo motor when air is not supplied to the balancers, the spindle falls off.

Step No.	Do This	
1	Loosen the coupling of the Z-axis servo motor.	
2	Loosen the set screw and then adjust the Z-axis position by turning the ball screw. - Turning the ball screw in CW direction moves up the Z-axis (4mm/turn).	
	- Turning the ball screw in CCW direction moves down the Z-axis (4mm/turn).	
3	When you finish adjusting the Z-axis position, fasten the set screw.	
4	Initialize the machine.	
5	Check to make sure that the distance between the chuck table assembly surface and the wheel-mounting surface of the spindle is 60 ± 0.5 mm. - If a figure in the above range cannot be obtained, redo the	
	adjustment procedures all over again.	
6	After the adjustment is completed, move the Z-axis from end to end in the unit operation (Z1 or Z2) screen to make sure that there is no unusual sound or any other abnormal conditions observed.	

8-3. Adjustment of Spinner Table

Summary of this section

This section describes the spinner table related adjustments and their procedures.

Section No.	Title	Contents
8-3-1	Spinner Cover Open/Close Speed Adjustment	- Procedures to adjust the open/close speed of the spinner cover
8-3-2	Spinner Washing Water Nozzle Adjustment	- Procedures to adjust the spinner washing water nozzle
8-3-3	Wafer-drying Air Blow Adjustment	- Procedures to regulate the flow rate of air for wafer drying

8-3-1. Spinner Cover Open/Close Speed Adjustment

Procedures to adjust the open/close speed of spinner cover

The procedures to adjust the open/close (up/down) speed of the spinner cover are described here.

Step No.	Do This
1 1	Turn the speed controllers of the spinner cover open/close cylinders so that the cover-ascent time and cover-descent time respectively become approximately 0.5 seconds. - The spinner cover is operated with two cylinders. The moving speeds of the both cylinders should be adjusted to be almost the same. Descent Ascent

8-3-2. Spinner Washing Water Nozzle Adjustment

Procedures to adjust spinner washing water nozzle

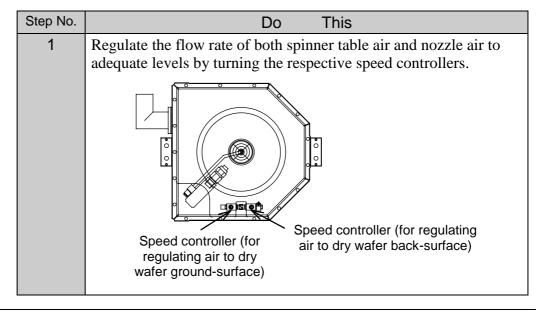
The procedures to adjust the position and turning speed of the spinner washing water nozzle are described here.

Step No.	Do This	
1	Loosen the set screws of the nozzle holder.	
2	Adjust the nozzle position so that its end aligns with the spinner table center.	
3	Fasten the loosened set screws.	
4	Turn the speed controllers attached to the rotation actuator so that nozzle moving to the table center position and to the escape position respectively take approximately 0.5 second.	
	Speed controller (for adjusting time to move to escape position)	
	Speed controller (for adjusting time to move to table center)	

8-3-3. Wafer-drying Air Blow Adjustment

Procedures to regulate air blow rate

The procedures to regulate the air blow rate for drying wafers are described here.



8-4. Adjustment of Cassette Block Positions

Procedures to adjust cassette block positions

The procedures to adjust the cassette block positions are described here.

Step No.	Do This
1	Determine the right-left clearances with reference to the rear cassette blocks for a cassette placed on the cassette plate.
2	Adjust the front-rear and right-left clearances by adjusting the front cassette block positions. - At this time, check if the cassette sensor is properly working by noting the sensor LED ON/OFF when the cassette is set or removed.
3	To switch to a cassette size that is different from the currently used one, change the front cassette block mounting positions. The cassette block mounting positions of this machine are in compliance with the SEMI standard cassettes. Clearance = 0.5 mm or less Cassette sensor (user-specified cassette size) (8-inch) (8-inch) Cassette block (front)

8-5. Adjustment of Vacuum Gauge

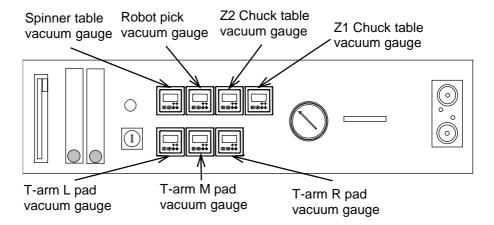
Summary of this section

This section describes about the locations of the vacuum gauges in the machine and their adjustment procedures. The configuration of the gauge is also described.

Section No.	Title	Contents
8-5-1	Vacuum Gauge Set Up Value Check	Procedures to check the set up values of the vacuum gaugeStandard set up values for the vacuum gauges of the machine
8-5-2	Vacuum Gauge Set Up Value Change	- Procedures to change the set up values of the vacuum gauge
8-5-3	Vacuum Gauge Zeropoint Adjustment	- Procedure to adjust the zero- point of the vacuum gauge

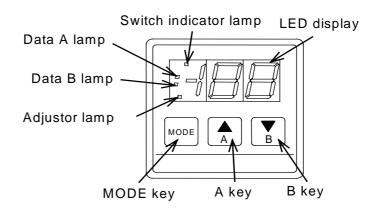
Locations of vacuum gauges

The vacuum gauges of the machine locate on the panel inside the machine front cover. The figure below shows the arrangement of those gauges on the panel.



Vacuum gauge configuration

The vacuum gauge is composed of the following parts:



8-5-1. Vacuum Gauge Set Up Value Check

Set up value check

Each vacuum gauge has two setup values, "Setup value A" and "Setup value B". You can check each value by respectively pressing A key and B key. Refer to Section 8-5-2, [Vacuum Gauge Set Up Value Change] in this chapter for the procedures to change the set up values.

The standard setup values for the vacuum gauges of the machine are as follows.

Vacuum gauge	Setup value A	Setup value B
Spinner table	-53	-50
Robot pick	-53	-50
Z1 chuck table	-40	-37
Z2 chuck table	-40	-37
T-arm L pad	-53	-50
T-arm M pad	-53	-50
T-arm R pad	-53	-50

8-5-2. Vacuum Gauge Set Up Value Change

Procedures to change setup values of vacuum gauge

The procedures to change the setup values of the vacuum gauge are described here.

Step No.	Do This
1	Press the MODE key of the vacuum gauge you are going to change its setup value for about 2 seconds. - "A2" appears flashing on the LED display.
2	Change the value for "Setup value A" of the gauge by using the A key and B key.Refer to Section 8-5-1, [Vacuum Gauge Set Up Value Check] for the standard set up values for the vacuum gauges used in the machine.
3	Press the MODE key.
4	Change the value for "Setup value B" of the gauge by using the A key and B key.
5	Press the MODE key The system returns to the normal (detection) mode.

8-5-3. Vacuum Gauge Zero-point Adjustment

Adjustment of vacuum gauge zero-point

This section describes about he procedures to adjust the zero-point of the vacuum gauge when the indicated pressure value of the gauge as it is not pressurized (pressure is relieved into the atmosphere) is not "0". Normally, this adjustment should be made when the indicated value of the gauge as it is not pressurized is -5 or lower.

Step No.	Do This	
1	Relieve pressure (into the atmosphere) from the vacuum gauge.	
2	Press the A key and B key on the vacuum gauge simultaneously for about 6 seconds.	
	- The LED indication becomes "0".	
	- The adjustor lamp comes on.	

8-6. Adjustment of Washing Unit

Summary of this section

This section describes about the washing unit related adjustments and their procedures.



Air cylinders of the machine may suddenly move when the air system is turned from OFF to ON. Never position your hands or fingers in the air cylinder drive sections, as they could be severely injured by contacting the cylinder or being caught between the cylinder and other machine part.

It can also happen that the air cylinder bump against a machine part to cause damage to the machine. When adjusting the washing unit, make sure that the cylinders do not contact any machine part.

Section No.	Title	Contents
8-6-1	Ascent/Descent Stroke Adjustment	- Procedures to adjust the ascent/descent strokes of the washing unit
8-6-2	Ascent/Descent Speed Adjustment	- Procedures to adjust the ascent/descent speeds of the washing unit
8-6-3	In/Out Stroke Adjustment	- Procedures to adjust the in/out strokes of the washing unit
8-6-4	In/Out Speed Adjustment	- Procedures to adjust the in/out speeds of the washing unit

8-6-1. Ascent/Descent Stroke Adjustment

Procedures to adjust ascent/descent strokes of washing unit

The procedures to adjust the ascent/descent strokes of the washing unit are described here.

Step No.	Do This	
1	Move down the pad section of the washing unit to be adjusted in the unit operation (Z1 or Z2) screen.Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.	
2	Turn the pad section to the chuck table through unit operation.	
3	Loosen the two retaining screws of the pad section.	
4	Lightly press the pad against the chuck table surface and secure the pad section at where its upper surface warps about 1 mm. Washing pad section upper surface (Surface warpage: retaining screw approx. 1 mm)	
	Vashing pad section Washing pad section retaining screw Front view>	
5	Check to be sure that the washing pad section rotates in tune with chuck table rotation when the chuck table is rotated in the unit operation (Z1 or Z2) screen. - If the pad section does not rotate, repeat the adjustment process over again.	
6	Turn the washing unit to the escape position in unit operation and then move up its pad section.	

8-6-2. Ascent/Descent Speed Adjustment

Procedures to adjust ascent/descent speeds of washing unit

The procedures to adjust the ascent/descent speeds of the washing unit are described here.

Step No.	Do This		
1	The ascent and descent speeds of the washing unit (Z1 side and Z2 side) should be adjusted using the speed controllers as shown in the figure below.		
	- Turning the speed controller to the CW direction lowers the speed, and to the CCW direction increases the speed.		
	- Make adjustment so that ascending/descending of the washing unit takes as described below.		
	Ascent time: Approx. 0.8 ± 0.1 sec. (Use the speed controller (2) for adjustment)		
	Descent time: Approx. 0.6 ± 0.1 sec. (Use the speed controller (1) for adjustment)		
	Speed controller (1) (for descent speed adjustment)		
	Speed controller (2) (for ascent speed adjustment)		

8-6-3. In/Out Stroke Adjustment

Procedures to adjust the in/out strokes of the washing unit

The procedures to adjust the in/out strokes of the washing unit are described here. The "in" and "out" strokes can be adjusted in the cylinder-IN and cylinder-OUT conditions respectively.

Step No.	Do This
1	The in/out stroke is adjusted by changing the stopper position as indicated in the figure below. <when cylinder="" in="" is="" the=""> - The Z1-side stroke is adjusted using the stopper (2). - The Z2-side stroke is adjusted using the stopper (4). <when cylinder="" is="" out="" the=""> - The Z1-side stroke is adjusted using the stopper (1). - The Z2-side stroke is adjusted using the stopper (3).</when></when>
	Oilstone Stopper (3) Cylinder-IN Stopper (4) Z2-side Z1-side Stopper (2)

8-6-4. In/Out Speed Adjustment

Procedures to adjust the in/out speeds of the washing unit

The procedures to adjust the moving in/out speeds of the washing unit are described here.

Step No.	Do This		
1	The moving IN and OUT speeds of the washing unit should be adjusted by turning the speed controllers as shown in the figure below.		
	- Turning the speed controller in the CW direction decreases the speed, and in the CCW direction increases the speed.		
	- Make adjustment so that both the moving IN/OUT actions take approximately 0.6 ± 0.1 sec. respectively.		
	<moving out="" speed=""> - The Z1-side speed is adjusted using the speed controller (2) The Z2-side speed is adjusted using the speed controller (4).</moving>		
	- The Z2-side speed is adjusted using the speed controller (4) The Z1-side speed is adjusted using the speed controller (1) The Z2-side speed is adjusted using the speed controller (3).		
	Oilstone /		
	Speed controller (1) Cylinder-IN		
	Cylinder-OUT Cylinder OUT Cylin		
	Speed Z2-side Z1-side Speed controller (4)		

8-7. Adjustment of T-shutter

Summary of this section

This section describes about the T-shutter related adjustments and their procedures.

Section No.	Title	Contents
8-7-1	Open/Close Speed Adjustment	- Procedures to adjust the open/close speeds of the T-shutter
8-7-2	Open/Close Stroke Adjustment	- Procedures to adjust the open/close strokes of the T-shutter

8-7-1. Open/Close Speed Adjustment

Procedures to adjust the open/close speeds of the T-shutter

The procedures to adjust the open/close speeds of the T-shutter are described here.

Step No.	Do This		
1	The open/close speeds of the T-shutter should be adjusted by turning the speed controllers as shown in the figure below.		
	- Turning the speed controller in CW direction decreases the speed, and in CCW direction increases the speed.		
	- The T-shutter is opened/closed with two cylinders. The moving speeds of the both cylinders should be adjusted to be almost the same.		
	Speed controller		
	T-shutter		

8-7-2. Open/Close Stroke Adjustment

Procedures to adjust the open/close strokes of the T-shutter

The procedures to adjust the open/close strokes of the T-shutter are described here.

Step No.	Do This
1	Remove the cover of the shock absorber section of the T-shutter.
2	Close the T-shutter in the unit operation (T-ARM) screen Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.
3	Adjust the shock absorber lower end position to obtain the maximum vertical stroke distance.
4	Open the T-shutter in the unit operation (T-ARM) screen.
5	Adjust the shock absorber upper end position to obtain the maximum vertical stroke distance. speed controllers Cover T shutter
6	Install the cover of the shock absorber section.

8-8. Adjustment of Position Table

Summary of this section

This section describes about the position table related adjustments and their procedures.

Section No.	Title	Contents
8-8-1	Height and Inclination Adjustment	- Procedures to check and adjust the height and inclination of the position table
8-8-2	Initial-Position Sensor Adjustment	- Procedure to adjust the position table initial-position sensor
8-8-3	Operation Check	- Procedures to make operation check of the position table

8-8-1. Height and Inclination Adjustment

Procedures to check the height and inclination of the position table

The procedures to check and adjust the height and inclination of the position table are described here.

Step No.	Do This	
1	Check to make sure that the height of the T-arm pad and the chuck table has been adequately adjusted.	
2	Turn the T-arm to the position table in the unit operation (T-ARM) screen.Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.	
3	Adjust the height of the position table so that the clearance between the T-arm R-pad surface and the position table surface becomes $3.0 \pm 0.5 \text{mm}$. - Make adjustment by loosening the two retaining screws of the position table shaft holder. Adjustor screw Shaft holder	
4	Move down the pad to make sure that the pad surface and the position table surface are in parallel. - If they are not in parallel, adjust the inclination of the position table using the adjustor screws (4) shown in the figure above.	
5	Perform the wafer delivery sequence to make sure that wafers are transported without any problem.	

8-8-2. Initial-Position Sensor Adjustment

Procedures to adjust the initial-position sensor

The procedures to adjust the position table initial-position sensor are described here.

Step No.	Do This
1	With the position table arm at its extended position (the wafer centering guide is at OPEN position), adjust the position of the "initial position dog" so that it is in the detection area of the initial-position sensor. - Loosen the four retaining screws of the bracket shown in the figure below before you move the "initial position dog" for adjustment.
	Wafer centering guide pin
	Holder (bracket)

8-8-3. Operation Check

Procedures to make operation check of the position table

The procedures to make the operation check of the position table are described here.

Step No.	Do This	
1	Call up the unit operation (T-ARM) screen.	
	- Refer to Section 2, [Unit operation] in Chapter E for details of the unit operation.	
2	Perform operation check of the position table (wafer centering action) for the required wafer sizes (4 to 8") using the manual keyboard.	
3	Check to make sure that wafers are properly centered on the position table. If they are not, adjust the initial-position sensor again. If proper centering of wafers still cannot be made after readjusting the initial-position sensor, contact your nearest DISCO office or DISCO service office. - Refer to Section 8-9-2, [Initial-Position Sensor Adjustment] in this section for the procedures to adjust the initial-position sensor.	

8-9. Adjustment of T-arm

Summary of this section

This section describes about the procedures to adjust the T-arm.

Section No.	Title	Contents
8-9-1	Pad Cleaning	- Procedures to clean the T-arm pads
8-9-2	Pad Vacuum Pressure Check	- Procedures to check the vacuum pressure of the T-arm pads
8-9-3	Pad Air Blow Check	- Procedures to check air blow of the T-arm pads
8-9-4	Arm Extension Cylinder Adjustment	- Procedures to adjust the T-arm extension cylinders
8-9-5	T-Arm Position Check/Adjustment	- Procedures to check/adjust the T-arm position with reference to its wafer transporting destinations

8-9-1. Pad Cleaning

Procedures to clean the T-arm pads

The procedures to clean the T-arm pads are described here.

Step No.	Do This
1	Rub the T-arm pad (L/M/R) bottom surface (suction surface) with oilstone and then wash it with shower water. - If dirt or contaminants deposit on the pad suction surface, it will cause a wafer the pad vacuum-retains to break.

8-9-2. Pad Vacuum Pressure Check

Procedures to check the vacuum pressure of the T-arm pads

The procedures to check the vacuum pressure of the T-arm pads are described here.

Step No.	Do This
1	 With a wafer applied to the suction surface of the T-arm pad (L/M/R), turn ON the pad vacuum system in the unit operation (T-ARM) screen. Check to make sure that the vacuum pressure gauge indicates a value of 53 kPa or higher. Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.

8-9-3. Pad Air Blow Check

Procedures to check air blow of the T-arm pads

The procedures to check air flow of the T-arm pads are described here.

Step No.	Do This
1	Turn on the air blow system of the T-arm pad (L/M/R) in the unit operation (T-ARM) screen.Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.
2	Check to make sure that when you apply a wafer to the suction surface of the pad, air blows out of its periphery to completely detach it. - The flow rate of air can be regulated with the associated speed controller.

8-9-4. Arm Extension Cylinder Adjustment

Summary of this section

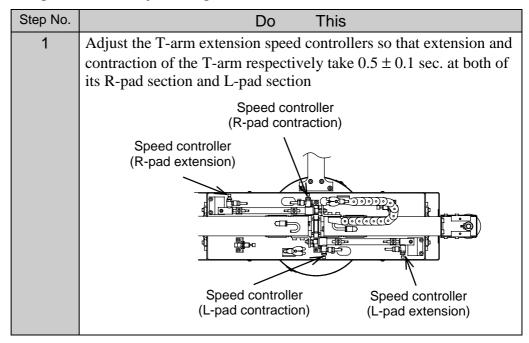
The T-arm (R-pad and L-pad sections) extends and contracts. This section describes the procedures to adjust the extension/contraction of the

Section No.	Title	Contents	
8-9-4-1	Extension speed	- Procedures to adjust the speed of T-arm extension	
8-9-4-2	Extension Stroke	- Procedures to adjust the stroke of T-arm extension	

8-9-4-1. Extension Speed

Procedures to adjust the speed of T-arm extension

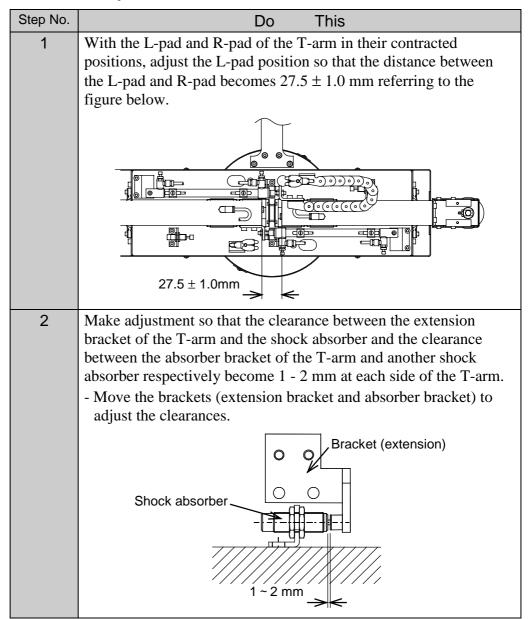
The procedures to adjust the speed of T-arm extension are described here.



8-9-4-2. Extension Stroke

Procedures to adjust the stroke of T-arm extension

Procedures to adjust the stroke of T-arm extension are described here.



8-9-5. T-Arm Position Check/Adjustment

Summary of this section

This section describes about the procedures to check/adjust the position of the T-arm with reference to its wafer transporting destinations.

Adjustment of the T-arm position with reference to the chuck table should be made by moving the T-arm, since the chuck table cannot be moved.

Section No.	Title	Contents	
8-9-5-1	Check of Chuck Table Rotative Center	- Procedures to check the rotative center of the chuck table	
8-9-5-2	Check of T-arm Position in its Move from Z1 Chuck Table to Z2 Chuck Table	- Procedures to check/adjust the T-arm position in its move from the Z1 chuck table to the Z2 chuck table	
8-9-5-3	Check of T-arm Position in its Move from Position Table to Z1 Chuck Table	- Procedures to check/adjust the T-arm position in its move from the position table to the Z1 chuck table	
8-9-5-4	Check of T-arm Position in its Move from Z2 Chuck Table to Spinner Table	- Procedures to check/adjust the T-arm position in its move from the Z2 chuck table to the spinner table	

8-9-5-1. Check of Chuck Table Rotative Center

Procedures to determine the rotative center of the chuck table

The procedures to determine the rotative center of the chuck table (Z1/Z2) are described here.

Step No.	Do This				
1	Attach a piece of paper (tape) near the chuck table center.				
2	Rotate the chuck table in the unit operation (Z1 / Z2) screen at 100 rpm to determine the rotative center of the chuck table. - Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.				
3	Make a center mark on the chuck table (on the tape) with a felt-tip				
	pen.				

8-9-5-2. Check of T-arm Position in its Move from Z1 Chuck Table to Z2 Chuck Table

Procedures to check/adjust the T-arm position in its move from the Z1 chuck table to the Z2 chuck table

The procedures to check/adjust the T-arm position in its move from the Z1 chuck table to the Z2 chuck table are described here.

Step No.	Do This			
1	Place a transparent plastic disc (having a center mark on it) on the center of the Z1 chuck table.			
2	Transport the plastic disc from the Z1 chuck table to the Z2 chuck table in the unit operation (T-ARM) screen.			
	- Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.			
3	Check as to how much the center position of the transported plastic disc deviates from the center position of the Z2-axis chuck table. The acceptable range of deviation is \pm 0.5mm. If the deviation is outside the acceptable range, go to step 4.			
4	Loosen the mounting screws of the T-arm and move the T-arm to adjust its position and then repeat the procedures from the step 1 over again. - When you move the T-arm, pay attention to its turning path.			

8-9-5-3. Check of T-arm Position in its Move from Position Table to Z1 Chuck Table

Procedures to check/adjust the T-arm position in its move from the position table to the Z1 chuck table

The procedures to check/adjust the T-arm position in its move from the position table to the Z1 chuck table are described here.

Step No.	Do This
1	Place a transparent plastic disc (having a center mark on it) on the position table.
2	Center the plastic disk in the unit operation (POSITION TABLE) screen.Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.
3	Transport the plastic disc from the position table to the Z1 chuck table in the unit operation (T-ARM) screen. - Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.
4	Check as to how much the center position of the transported plastic disc deviates from the center position of the Z1 chuck table. The acceptable range of deviation is \pm 0.5mm. - If the deviation is outside the acceptable range, go to step 5.
5	Loosen the mounting screws of the position table and move the position table to adjust its position and then repeat the procedures from the step 1 over again. - Align the robot arm center and the position table center on the position table referring to Section 8-1-3 [Position Check at the Position Table] in this chapter.

8-9-5-4. Check of T-arm Position in its Move from Z2 Chuck Table to Spinner Table

Procedures to check/adjust the T-arm position in its move from the Z2 chuck table to the spinner table

The procedures to check the T-arm position in its move from the Z2 chuck table to the spinner table are described here.

Step No.	Do This			
1	Place a transparent plastic disc (having a center mark on it) on the center of the Z2 chuck table.			
2	Transport the plastic disc from the Z2 chuck table to the spinner table in the unit operation (T-ARM) screen.Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.			
3	Check as to how much the center position of the transported plastic disc deviates from the center position of the spinner table. The acceptable range of deviation is \pm 0.5mm. If the deviation is outside the acceptable range, go to step 4.			
4	Loosen the mounting screws of the spinner table and move the spinner table to adjust its position and then repeat the procedures from the step 1 over again. - Align the robot arm center and the spinner table center on the spinner table referring to Section 8-1-2 [Position Check at the Spinner Table] in this chapter.			

H. CONSUMABLE PART REPLACEMENT

Contents of this chapter

This chapter lists up the consumable parts used in the machine and describes the procedures to replace them.

Section No.	Title	Contents
1	Consumable Part List	- List of the consumable parts used in the machine.
2	Consumable Part	- Filter element replacement
	Replacement	- Fuse replacement
		- Robot pick replacement
		- Robot pick vacuum tape replacement
		- Spinner seal replacement
		-Oilstone replacement
		- Chuck table seal replacement

1. Consumable Part List

Consumable part list

The following table lists the consumable parts used for this machine.

Part name	Part No.	Qty.	Interval
Fuse (alarm)	APP405H-0.5A	2	Whenever any
	APP413H-1.3A	2	fuse blows out.
	APP420H-2.0A	1	
	APP430H-3.0A	1	
	APP475H-7.5A	2	
	APSP410L-1A	1	
	APSP415L1.5A	1	
	APSP435L3.5A	1	
	AP217001-1A	1	
	AP218005	3	
	AP218008	2	
	AP21806.3	3	
Oilstone	MOENHE69	2	
Seal	MOENHO18	2	6 - 12 months
Pad	MOENT206A	1	
Pad	MOENT209	1	
Rubber pad	MOGAL268B	2	
Bushing	MOHWH021	2	
Filter element	MOELH11351	1	1 year
	MOELH11352	1	•
	MOELH11353A	1	
Cylinder	MOENHB51B	2	
Cylinder	MOENHE71	2	
Bearing	MOENH019	4	
Oil seal	MOENH168	2	
Wiper	MOENH416A	1	
Chuck table (for 4 - 8" wafers)	MOENR005E	2	
Seal (1)	MOENS024	1	
Seal (2)	MOENS025	1	
Seal (3)	MOENS026	1	
Seal (4)	MOENS027	3	
Seal tape	MOENS028	1	
Bearing	MOENTA28	6	
Bearing	MOENT052	3	
Wiper	MOENT072A	4	
Grommet	MOENZ032	2	
Cylinder	MOHWH020	2	

Consumable part list (Continued)

Part name	Part No.	Qty.	Interval
Cassette block	MOENL042A	2	2 years
Cassette block	MOENL043A	2	
Cassette block	MOENL077	2	
Cassette block	MOENL078	2	
Joint	MOENR088D	2	

2. Consumable Part Replacement

Summary of this section

This section describes the consumable part replacement works and their procedures.

Section No.	Title	Contents	
2-1	Filter Element Replacement	- Filter element replacement procedures	
2-2	Fuse Replacement	- Fuse replacement procedures	
2-3	Robot Pick Replacement	- Robot pick replacement procedures	
2-4	Robot Pick Vacuum Tape Replacement	- Robot pick vacuum tape replacement procedures	
2-5	Spinner Seal Replacement	- Spinner seal replacement procedures	
2-6	Oilstone Replacement	- Oilstone replacement procedures	
2-7	Chuck Table Seal Unit Replacement	- Chuck table seal unit replacement procedures	

2-1. Filter Element Replacement

Procedures to replace filter element

Step No.	Do This		
1	Detach the bowl guard from the air unit.		
	- Push the claw (marked "PUSH) and pull the bowl guard off while		
	turning it to the left.		
2	Rotate the bowl until it comes off.		
	- When removing the bowl, use care so that the gasket does not come off together.		
3	Replace the filter elements with new ones.		
	0 U.T.2 mmm		
	OUT1		
	Sludge filter , Branch block		
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		
	Mist cleaner		
	Air integrator		
	All Integrator		
	Pressure gauge		
	* *		
	<u> </u>		
	Bowl		
	Bowl guard		
	* Filter element		
4	Install the bowl.		
5	Install the bowl guard.		

2-2. Fuse Replacement

Procedures to replace fuse

When a fuse blows out, the machine power automatically turns OFF, issuing a class-D error. The blown out fuse must be replaced with new one before the machine is restarted.

The procedures to replace a fuse are described here.



- If you attempt to replace a fuse with the power turned ON, you may get an electric shock that could result in severe injury or death.
 Before replacing a fuse, make sure that the machine power and the facility-side power are turned OFF.
- If you attempt to replace a fuse with your hands wet, you may get an electric shock that could result in severe injury or death. When replacing a fuse, make sure that your hands are not wet.

Step No.	Do This		
1	Check the fuses through their windows and locate the blown fuse.		
	- The fuses of the machine are in the breaker box at the machine rear side and in the control unit at the machine lower-front side.		
	- Meanings of the fuse indicator colors:		
	Black The fuse is normal.		
	White The fuse is blown.		
2	Remove the blown fuse.		
3	Install a new fuse after checking the cause of the fuse blowout.		
	- Make sure to replace the blown fuse with another one of the same		
	rating.		

2-3. Robot Pick Replacement

Procedures to replace robot pick

If a robot pick is found to be faulty, it must be replaced with new one. The procedures to replace a robot pick are described here.

Step No.	Do This
1	Remove the pick cover retaining screws (4) and then remove the pick cover on the back of the pick holder.
2	Remove the four pick retaining screws (4) and then remove the pick.
3	Wipe a new pick and the installing surface of the pick holder with a lint-free cloth moistened with alcohol.
4	Install the new pick and secure it with the retaining screws (4 pcs).When installing the pick, make sure that the wafer sensor is properly positioned and is not catching the sensor cable.
5	Install the cover and secure it with the cover retaining screws (4 pcs). Pick retaining screw (4) Pick cover retaining screw (4) Pick Telaining screw (4) Pick Pick Cover Wafer sensor

2-4. Robot Pick Vacuum Tape Replacement

Procedures to replace robot pick vacuum tape

If a vacuum tape on the pick surface is nicked or curled, it may cause a vacuum error during wafer transportation. So, make periodical inspection and if you find a defective tape, replace it with new one.

Step No.	Do This		
1	Peel the old tape off the pick surface.		
2	With a lint-free cloth, wipe any remaining adhesive away.		
3	Cut a new tape to the size as shown in the figure below, and then attach it to the pick.		
4	Cut off any excess portion of the tape along the outer boundary of the pick. - Use care not to leave any burrs on the tape cut surface.		
5	Apply the cutting gauge to the pick as shown in the figure below and cut off the portion of the tape shown in the figure. Cut off this portion Gauge		
6	Turn the cutting gauge by 180 degrees and then cut a vacuum hole on the tape.		
7	Allow the robot pick to vacuum-retain a wafer and check the indication of its vacuum gauge. - The vacuum pressure is normal if the gauge indicates a value of -53 kPa or higher.		

2-5. Spinner Seal Replacement

Procedures to replace spinner seal

The procedures to replace a spinner seal are described here.

Step No.	Do This
1	Remove the spinner cover.
2	Remove the net shown in the figure below.
3	Remove the seal housing. - This can be easily accomplished by removing the plug at the bottom of the seal housing and inserting the M5-screw instead to push the housing.
4	Remove the flange retaining screws (4 pcs) and lift up the flange. - The flange comes off together with the motor shaft to which the motor and seal are mounted.
5	Loosen the set screws (2 pcs) of the coupling that connects the seal and motor shaft to detach the seal from the shaft. Cover Seal housing Seal Plug Coupling
6	Replace the seal with new one and follow the above steps in reverse order to complete the replacement work.

2-6. Oilstone Replacement

Procedures to replace oilstone

The procedures to replace an oilstone are described here.



Air cylinders of the machine may suddenly move when the air system is turned from OFF to ON. Never position your hands or fingers in the air cylinder drive sections, as they could be severely injured by contacting the cylinder or being caught between the cylinder and other machine part.

It can also happen that the air cylinder bump against a machine part to cause damage to the machine. When performing the adjustment work described in this section, make sure that the cylinders do not contact any machine part.

Step No.	Do This		
1	Move down the washing unit (oilstone) in the unit operation (Z1 or Z2) screen.Refer to Section 2, [Unit Operation] in Chapter E for details of the unit operation.		
2	Turn the washing unit to the washing position in the unit operation		
2	(Z1 or Z2) screen.		
3	Turn the valve shown in the figure below.		
	- This will allow the washing unit to move vertically.		
4	Joint Retaining screw (2 pcs)		
4	Loosen the retaining screws (2 pcs) of the oilstone.		
5	Remove the plate and oilstone.		

Procedures to replace the oilstone (Continued)

Step No.	Do This			
6	Install a new oilstone and the plate removed in the step 5.			
	- The oilstone should be firmly pressed against the joint.			
7	Fasten the loosened retaining screws of the oilstone (2 pcs).			
	- Make sure to firmly fasten the screws here so that the oilstone			
	does not come off.			
8	Turn the valve to open.			
	- The air cylinder moves down. Be careful so that your hands or			
	tools are not caught by the cylinder.			
9	Move up the washing unit in the unit operation (Z1 or Z2) screen.			
10	Turn the washing unit to the escape position in the unit operation			
	(Z1 or Z2) screen.			

2-7. Chuck table seal unit replacement

Procedures to replace chuck table seal unit

The procedures to replace a chuck table seal unit are described here.

Step No.	Do This
1	Disconnect the hoses from the chuck table seal unit. - Water comes out of the hoses. Keep the vacuum system of the chuck table turned ON for a while and then turn OFF the machine power.
2	Remove the retaining screws (4) of the seal unit. - Utilize the notch section of the seal unit to remove the retaining screws as there is not enough space for removing them. - Turn the chuck table to align the notch and each screw. - When you finish removing the retaining screws, the seal unit is liberated. O-ring groove Retaining screw Detent
3	Remove the alignment pin. - Move down the seal unit to remove the alignment pin.
4	Remove the seal unit - There are 5 O-rings on the O-ring surface. Check to make sure that there is not any missing O-ring. - The removed seal unit should be sent to your nearest DISCO office or DISCO service office for repair. If you carelessly disassemble it, springs or O-rings may pop out of it to cause an accident.
5	Check to make sure that each O-ring is properly lodged in its groove (5 places).
6	Have on hand a new seal unit. - Make sure that the seal unit is clean. If it is soiled, wash it with water.

Step No.	Do	This		
7	Before installing the seal unit, install two of the four seal unit retaining screws into their screw holes (seal unit side) in advance. - Install one into the screw hole adjacent to the alignment pin and the other into the screw hole diagonal to the first one. - The screws should not be fully tightened here. (The distance between the screw heads and the installation surface should be about 15mm.)			
8	Install the seal unit.The seal unit can be easily installed if you align the alignment pin hole (chuck table side) and the alignment pin (seal unit side) beforehand.			
9	Install the remaining seal unit retaining screws (2) and then tighten all the retaining screws (4) here. - Be careful not to drop the O-rings. - Each screw should be tightened at the notch section of the seal unit. Make sure that all the screws are evenly tightened. - If the screws are not evenly tightened, it may cause uneven contacting of the O-rings and resultant water leakage from the seal unit.			
10	Connect the hoses to the seal unit. - Make sure to connect each hose to its connection port correctly. - Insert each hose to its joint as far as it goes and firmly secure it with a nut.			
	Seal unit connection port	Z1	Z2	
	For water leakage check 1	101	201	
	For water leakage check 2	102	202	
	A	1A	2A	
	В	1B	2B	
	C 1C 2C			

I. Manual Grinding

Summary of this chapter

This chapter describes about the procedures to perform manual grinding.

About manual grinding

This function allows grinding of exceptional wafers such as cracked wafers and specially-shaped wafers that cannot be processed to the chuck table by the machine's transport system. These wafers are manually placed on the chuck table and then ground in the manual grinding sequence.

Manual grinding is performed using either Z1-axis or Z2-axis.

Operation flow

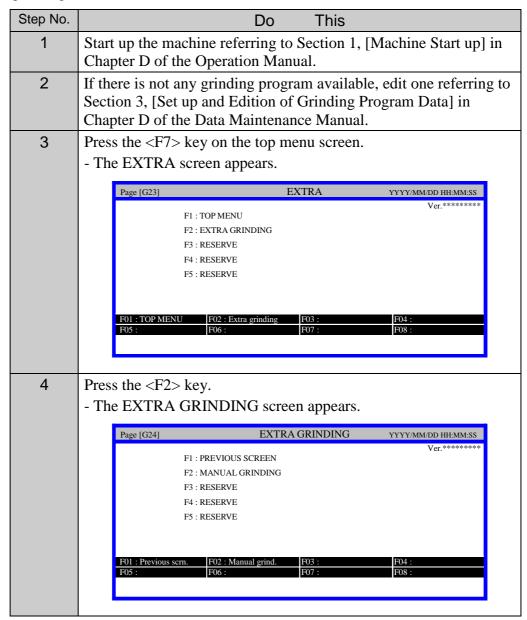
Manual grinding (grinding wafers in the manual grinding sequence) should proceed following the operation steps as described below.

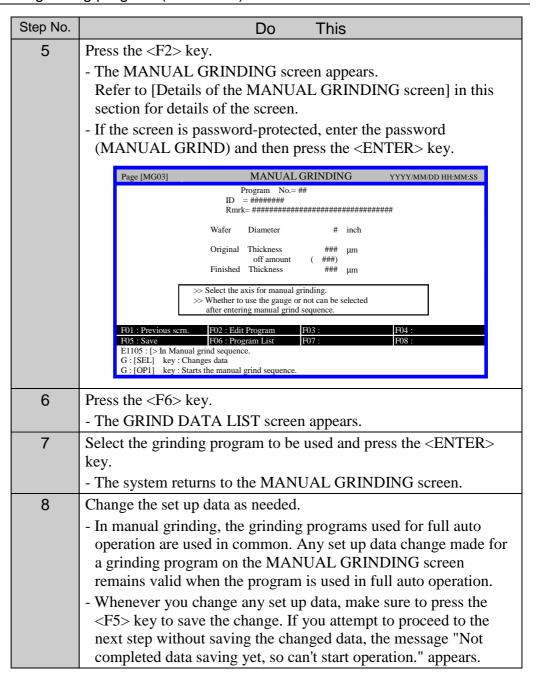
1	Grinding Program Selection
2	Grinding Condition Setting
3	Height Gauge Adjustment
	(Only when the height gauge is used)
4	Wafer Set up
5	Height Gauge Availability Check (Only when the height gauge is used)
6	Performance of Grinding
7	Wafer Retrieval

1. Grinding Program Selection

Procedures to select grinding program

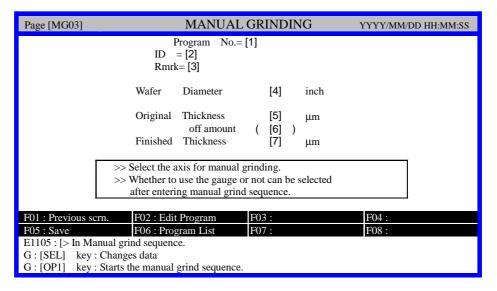
The procedures to select the grinding program that is used to perform manual grinding are described here.





Continued to the next section.

[Screen]



[Setting Item]

* In manual grinding, the grinding programs used for full auto operation are used in common. Any setup data change made for a grinding program on the MANUAL GRINDING screen remains valid when the program is used in full auto operation.

Item No.	Descriptions
[1]	The selected program number is shown. To select another program number, press the <f6> key to call up the GRIND DATA LIST screen.</f6>
[2]	Program ID (up to 8 characters) is shown. If you move the cursor to this data item and press the <enter> key, the EDIT ID/Comment screen for editing the ID appears.</enter>
[3]	Comment for the program (up to 35 characters) is shown. If you move the cursor to this data item and press the <enter> key, the EDIT ID/Comment screen for editing the comment appears.</enter>
[4]	Grinding wafer size (4", 5", 6", 8", or X") is selectable by the <sel> key.</sel>
[5]	Original (loaded) wafer thickness is set up. - Acceptable input range: 0 to 2500 (μm) - Increments: 1 (μm)
[6]	Grinding amount (Original Thickness - Finished Thickness) is shown.
[7]	Finished wafer thickness is set up. - Acceptable input range: -1000 to 2500 (μm) - Increments: 0.1 (μm)

Details of the MANUAL GRINDING screen (Continued)

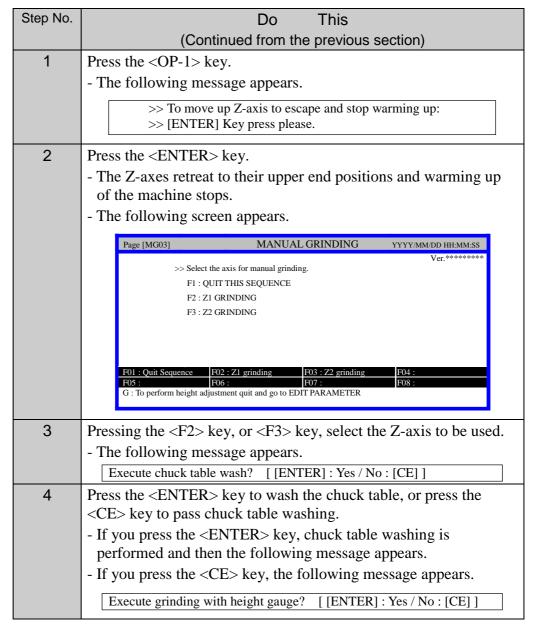
[Function Key]

Press	То
F1	Return to the top menu screen.
F2	Call up the Edit Program screen.
	- Data on the Edit Program screen, Automatic Program Set screen, and SPECIAL FUNCTION screen cannot be changed from here. To change those data, first return to the top menu screen and then call the respective screens from the GRIND DATA screen.
F3	(Not used)
F4	(Not used)
F5	Save the changed data. Whenever you change any set up data, make sure to press this key before moving to another screen.
F6	Call up the GRIND DATA LIST screen.
F7	(Not used)
F8	(Not used)

2. Grinding Condition Setting

Procedures to set up grinding conditions

The procedures to start up the manual grinding sequence and set up the grinding conditions are described here.



Procedures to set up grinding conditions (Continued)

Step No.	Do This
5	Press the <enter> key to perform grinding with height gauge measuring, or press the <ce> key to perform grinding without height gauge measuring. - To grind wafers that cannot be measured by the height gauge such as the cracked wafers (wafers for which height gauge availability check ends in failure), press the <ce> key to disable height gauge measuring. In that case, the grinding amount is controlled with the Z-axis feed rate (pulse).</ce></ce></enter>
	If you press the <enter> key: The HEIGHT GAUGE TEST screen appears. Proceed to the next section, [Height Gauge Adjustment]. If you press the <ce> key: Since the height gauge is not used, the gauge related adjustments are not necessary. Proceed to Section 4, [Wafer Set up].</ce></enter>

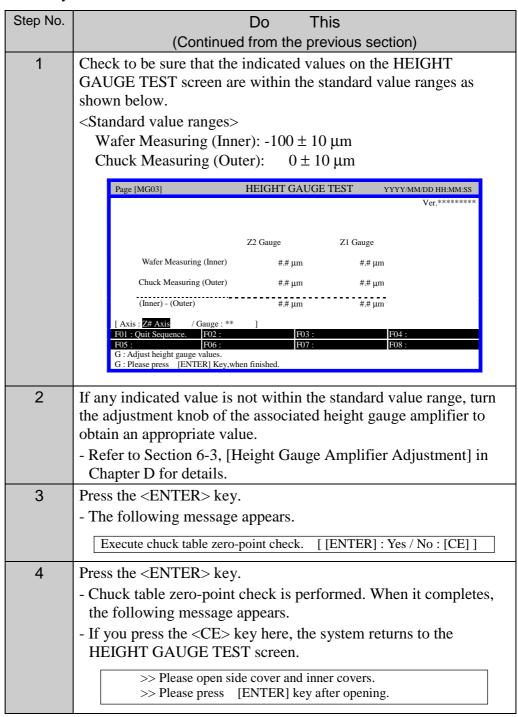
Continued to the next section or Section 4.

3. Height Gauge Adjustment

Height gauge adjustment

The procedures to adjust the height gauge that is used for wafer thickness control in manual grinding are described here.

If you perform grinding without height gauge thickness control, proceed to Section 4, [Wafer Set up] as the process descried in this section is not necessary.



Continued to the next section.

4. Wafer Set up

Wafer setup procedures

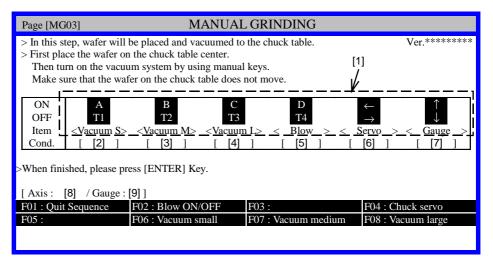
In manual grinding, a wafer is manually placed on the chuck table and then secured to the table. The procedure to set up a wafer on the chuck table is described here.

Step No.	Do This							
	(Continued from the previous section or Section 2)							
1	Check to be sure that the following message is shown on the creen. >> Please open side cover and inner covers. >> Please press [ENTER] key after opening.							
2	Open the side cover and the water case cover at the Z-axis side where grinding will take place.							
3	Press the <enter> key.</enter>							
	- The wafer setup screen appears.							
	- Refer to [Details of the wafer setup screen] in this section for							
	details of the screen.							
	Page [MG03] EDIT PARAMETER (GRIND)							
	> In this step, wafer will be placed and vacuumed to the C/T. Ver.******* Ver.******** Ver.************************************							
	Then turn on the vacuum system by using manual keys. Make sure that the wafer on the chuck table does not move.							
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$							
4	Connect the manual keyboard to its connector at the Z-axis side where grinding will take place.							
5	Place a wafer on the center of the chuck table locating under the Z-							
	axis that performs grinding.							
6	Pressing one of the following keys on the manual keyboard, turn							
	ON the chuck table vacuum system.							
	- There are three vacuum sizes (small/medium/large) available according to the diameter of the wafer placed on the chuck table.							
	Choose the vacuum size suitable for the wafer to be ground.							
	[A] key Turns the (small) vacuum system ON.							
	[B] key Turns the (medium) vacuum system ON.							
	[C] key Turns the (large) vacuum system ON.							

Step No.	Do This							
7	Make sure that the set up wafer is on the center of the chuck table. - To correct the wafer position on the table, follow the steps described below.							
	<pre><procedure correct="" position="" the="" to="" wafer=""> 1: Press the [D] key on the manual keyboard to turn ON the chuck table water flow/air blow system.</procedure></pre>							
	2: Correct the wafer position.3: Press the [T4] key on the manual keyboard to turn OFF the chuck table water flow/air blow system.							
8	4: Return to the step 6 above and secure the wafer on the table. Press the <enter> key If the height gauge is used: The following message appears. Proceed to the next section (Section 5), [Height Gauge Availability Check].</enter>							
	To check whether the height gauge falls off the wafer, the gauge moves down and the C/T rotates in low speed. If gauge falls off, it cannot be used. [ENTER] key: Start							
	If the height gauge is not used: The following message appears. Height gauge availability check is not performed. Proceed to Section 6, [Performance of Grinding].							
	>> Please close inner cover and side cover. >> Please press [ENTER] key after closing side covers.							

Continued to the next section or Section 6.

[Screen]



[Setting Item]

Item No.	Descriptions							
[1]		The operable items and the corresponding keys on the manual keyboard allocated for their operations are shown.						
[2] [3]	Status of the chuck table vacuum system (small/medium/large) is shown.							
[4]	ON	The vacuum system is turned ON.						
	OFF	The vacuum system is turned OFF.						
[5]	Status of	the chuck table water flow/air blow system is shown.						
	ON	The chuck table water flow/air blow system is turned ON.						
	OFF	The chuck table water flow/air blow system is turned OFF.						
[6]	Chuck table servo lock status is shown.							
	ON	Chuck table servo lock is ON.						
	OFF	Chuck table servo lock is OFF.						
		- When chuck table servo lock is OFF, the chuck table can be manually rotated.						
[7]	The height gauge position is shown.							
	ON	The height gauge is in DOWN position (measuring position).						
	OFF	The height gauge is in UP position.						
[8]	The axis used for grinding is shown.							
	Z1 axis	Z1-axis grinding only is performed.						
	Z2 axis	Z2-axis grinding only is performed.						
	Z1→Z2	>Z2 Z1→Z2 grinding is performed.						

[Setting Item]

Item No.	Descriptions					
[9]	Height ga	Height gauge use/disuse is shown.				
	Use	The height gauge is used.				
	Pass	The height gauge is not used.				

[Key allocation (manual keyboard)]

Manual grinding operation is performed with the manual keyboard connected to its connector at the Z-axis side where grinding will take place.

Key	Function
[A]	Turns ON the chuck table vacuum system (small).
[B]	Turns ON the chuck table vacuum system (medium).
[C]	Turns ON the chuck table vacuum system (large).
[D]	Turns ON the chuck table water flow/air blow system.
[T1]	Turns OFF the chuck table vacuum system (small).
[T2]	Turns OFF the chuck table vacuum system (medium).
[T3]	Turns OFF the chuck table vacuum system (large).
[T4]	Turns OFF the chuck table water flow/air blow system.
[←]	Turns chuck table servo lock ON.
[→]	Turns chuck table servo lock OFF.
	- When chuck table servo lock is OFF, the chuck table can be
	manually rotated.
[↑]	Moves up the height gauge.
[1	Moves down the height gauge.

Details of the wafer setup screen (Continued)

[Function Key]

Press	То
F1	Stop the manual grinding sequence.
F2	Switch chuck table water flow/air blow ON/OFF.
F3	(Not used)
F4	Switch chuck table servo lock ON/OFF.
F5	(Not used)
F6	Switch chuck table vacuum system (small) ON/OFF.
F7	Switch chuck table vacuum system (medium) ON/OFF.
F8	Switch chuck table vacuum system (large) ON/OFF.

5. Height Gauge Availability Check

About height gauge availability check

This function determines, in the manual grinding sequence in which the height gauge is used, whether or not a wafer set up on the chuck table is suitable for height gauge measurement.

Depending on the conditions of the wafers (such as specially shaped wafers/cracked wafers), the height gauge availability check may end up in failure. If height gauge availability check for a wafer ends in failure, the height gauge measuring function is disabled for grinding that wafer.

Machine action in height gauge availability check

The movement of the Machine during the height gauge availability check is as follows.

The height gauge descends (to the measuring position).



The chuck table on which a wafer to be measured is placed rotates in low speed.



Thickness values of the wafer measured by the height gauge as the wafer rotates are monitored and shown on the screen.



<Height gauge availability check normally ends.>

The machine judges that the height gauge can be used for grinding the wafer.



<Height gauge availability check ends in failure.>

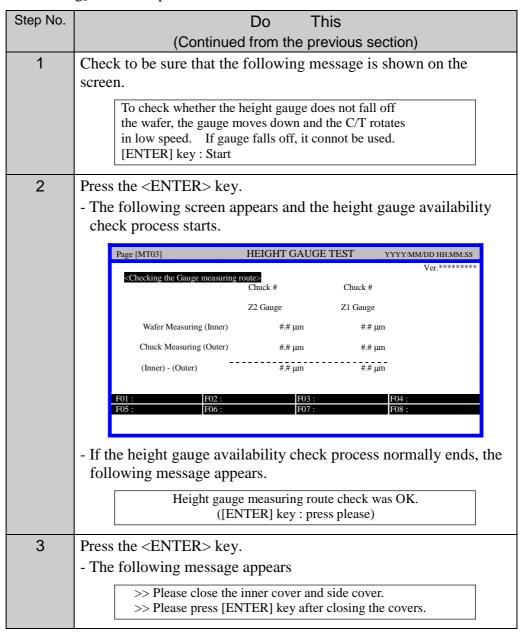
If there is a point in the wafer where the measurement value sharply changes (such a case as the height gauge contactor drops off a wafer onto the chuck table surface), the machine judges that the height gauge cannot be used for grinding the wafer.



Return to the wafer setup screen.

The procedures to perform height gauge availability check are described here.

In manual grinding in which the height gauge is not used, height gauge availability check is not performed. In that case, go to Section 6, [Performance of Grinding] in this chapter.

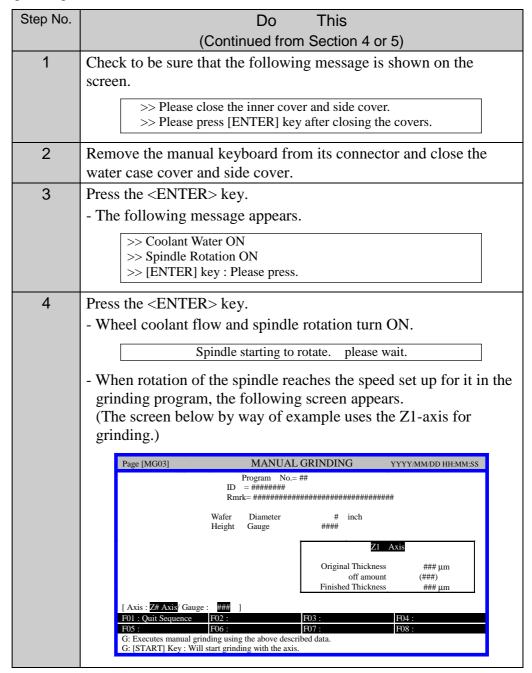


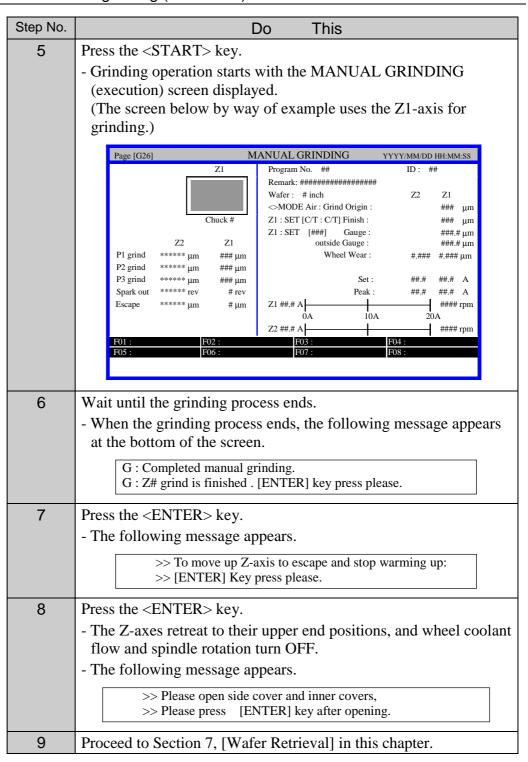
Continued to the next section.

6. Performance of Grinding

Procedures to perform manual grinding

The procedures to perform Z1-axis manual grinding or Z2-axis manual grinding are described here.





Continued to Section 7.

7. Wafer Retrieval

Procedures of wafer retrieval

The procedures to pick up a ground wafer from the machine are described here.

Step No.	Do This							
1	Check to be sure that the following message is shown on the screen. >> Please open side cover and inner covers, >> Please press [ENTER] key after opening.							
2	Open the side cover and water case cover at the Z-axis side where grinding has been performed and connect the manual keyboard to its connector at that side.							
3	Press the <enter> key. - The screen for picking up a ground wafer appears. Page [G26] MANUAL GRINDING Ver.******** >> Please remove the wafer by using manual keys to turn off vacuum and blow. [ENTER] key pressed, manual grinding sequence finishes. ON A B C D C D C C D C C C C C C C C C C C C</enter>							
4	Press the [D] key on the manual keyboard. - The chuck table water flow/air blow system turns ON.							
5	Pick up the ground wafer from the chuck table.							
6	Press the <enter> key. - The following message appears. Close the inner and side covers. [ENTER] key pressed, manual grinding sequence finishes.</enter>							
7	Disconnect the manual keyboard and then close the water case cover and side cover.							
8	Press the <enter> key - The manual grinding sequence ends The EXTRA GRINDING screen appears.</enter>							

CHECK SHEET 1 - MAINTENANCE AND PERIODIC INSPECTION

Check sheet for maintenance and periodic inspection

Use the following form for maintenance and periodic inspection control.

*) Fill in the dates for maintenance/periodic inspection for each item, after determining the interval of maintenance/inspection based on your machine usage conditions.

Interval	Refer to	Inspection/Maintenance Item	Inspection/Maintenance Date					
Every Day	Section 4 in	Main air pressure	/	/	/ /	/ /	/ /	/ /
	Chapter G	Sub-air pressure	/	/	/ /	/ /	/ /	/ /
		Spindle rotation	/	/	/ /	/ /	/ /	/ /
		Wheel tooth appearance	/	/	/ /	/ /	/ /	/ /
		Remaining wheel tooth length	/	/	/ /	/ /	/ /	/ /
		Chuck table appearance	/	/	/ /	/ /	/ /	/ /
		Height gauge appearance	/	/	/ /	/ /	/ /	/ /
		Vacuum pump pressure	/	/	/ /	/ /	/ /	/ /
		Power OFF upon EMO switch activation	/	/	/ /	/ /	/ /	/ /
		Spindle coolant flow rate	/	/	/ /	/ /	/ /	/ /
		Spindle rotation	/	/	/ /	/ /	/ /	/ /
		Coolant pump pressure	/	/	/ /	/ /	/ /	/ /
		Z1/Z2 wheel coolant flow rate	/	/	/ /	/ /	/ /	/ /
		Height gauge check	/	/	/ /	/ /	/ /	/ /
		Cleaning of the inside of the machine	/	/	/ /	/ /	/ /	/ /
		T-arm pad cleaning	/	/	/ /	/ /	/ /	/ /
		Cleaning of the robot pick	/	/	/ /	/ /	/ /	/ /
		Water leakage	/	/	/ /	/ /	/ /	/ /

Check sheet for maintenance and periodic inspection (Continued)

Interval	Refer to	Inspection/Maintenance Item			Inspection	on/Maintenan	ice Date	
7-Day	Section 5 in	Facility-side supply air pressure	/	/	/ /	/ /	/ /	/ /
Intervals	Chapter G	Facility-side supply water pressure (wheel coolant)	/	/	/ /	/ /	/ /	/ /
		Facility-side supply water pressure (spindle coolant)	/	/	/ /	/ /	/ /	/ /
		Height gauge appearance	/	/	/ /	/ /	/ /	/ /
		Ionizer electrode cleaning	/	/	/ /	/ /	/ /	/ /
		Water leaks in and out of the machine	/	/	/ /	/ /	/ /	/ /
		Vacuum pump water flow rate	/	/	/ /	/ /	/ /	/ /
		Chuck table water flow/air blow	/	/	/ /	/ /	/ /	/ /
		Mist leakage	/	/	/ /	/ /	/ /	/ /
30-Day	Section 6 in	Cleanliness of the air unit	/	/	/ /	/ /	/ /	/ /
Intervals	Chapter G	Clogging of the air unit	/	/	/ /	/ /	/ /	/ /
		Seal unit	/	/	/ /	/ /	/ /	/ /
		T-arm pad	/	/	/ /	/ /	/ /	/ /
		Robot pick	/	/	/ /	/ /	/ /	/ /
		Chuck table washing	/	/	/ /	/ /	/ /	/ /
		Washing unit up/down stroke	/	/	/ /	/ /	/ /	/ /
		Drain water hose clogging	/	/	/ /	/ /	/ /	/ /
		Duct air hose clogging	/	/	/ /	/ /	/ /	/ /
		Seal unit water leakage	/	/	/ /	/ /	/ /	/ /
		Robot movement	/	/	/ /	/ /	/ /	/ /
		Robot pick vacuum pressure	/	/	/ /	/ /	/ /	/ /
		T-arm pad (R,M,L) vacuum pressure	/	/	/ /	/ /	/ /	/ /
		T-arm pad (R,M,L) air blow	/	/	/ /	/ /	/ /	/ /
		Spinner table vacuum pressure	/	/	/ /	/ /	/ /	/ /
		Spinner table air blow	/	/	/ /	/ /	/ /	/ /

Check sheet for maintenance and periodic inspection (Continued)

Interval	Refer to	Inspection/Maintenance Item	Inspection/Maintenance Date					
30-Day	Section 6 in	Wafer centering (position table)	/	/	/ /	/ /	/ /	/ /
Intervals	Chapter G	Height gauge retraction speed	/	/	/ /	/ /	/ /	/ /
(Continued)		Height gauge (finger length: 82 mm	/	/	/ /	/ /	/ /	/ /
		[inner circ.]) retraction amount						
		Height gauge (finger length: 42 mm	/	/	/ /	/ /	/ /	/ /
		[outer circ.]) retraction amount [option]						
		Height gauge accuracy	/	/	/ /	/ /	/ /	/ /
		Side cover interlock	/	/	/ /	/ /	/ /	/ /
		Signal tower lamp illumination	/	/	/ /	/ /	/ /	/ /
		Z1 wafer shape accuracy	/	/	/ /	/ /	/ /	/ /
		Z1 wafer thickness accuracy	/	/	/ /	/ /	/ /	/ /
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		Adjustment of Cassette Block Positions	/	/	/ /	/ /	/ /	/ /
		Adjustment of Vacuum Gauge	/	/	/ /	/ /	/ /	/ /
		Adjustment of Washing Unit	/	/	/ /	/ /	/ /	/ /
		Adjustment of T-shutter	/	/	/ /	/ /	/ /	/ /
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