

## **Safety manual for those who install and set-up the tapping center**

### **Tapping Center TC-S2A**

**Please read this safety manual carefully before  
operating the tapping centre.**

**Brother Industries, Ltd. Machinery & Solution Company.**

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# Outline of the safety manual

## Read this manual

All people who use the tapping center, including those who install the tapping center at the factory, who process materials by operating the tapping center, who adjust and repair the tapping center, are requested to read this safety manual.

In this safety manual, all people who use the tapping center are expressed as the user.

## Purpose

The tapping centre consists of high voltage electric circuits, tools which rotate at high speed, and tables and ATC magazines which move with powerful force. Therefore, various hazards are associated with the machine.

The purpose of this safety manual is to protect users from these hazards.

Therefore, the safety manual explains the following:

Warnings: types of hazards

Preventive measures: ways to prevent any hazards from occurring

## Contents of Safety Manual and Relationship with Other Manuals

Each instruction manual, other than the programming manual, includes a safety manual.

Safety manuals are given to each respective personnel group.

Please read the main text of the instruction manual for machine functions and operation methods.

### 1. Operation manual for general operators

“Safety Manual for Operator”

“Safety manual for those who install and set-up the tapping center”

“Operation manual”

“Operation of the machine necessary for basic operations”

English part code : 693075001

### 2. Operation manual for advanced personnel

“Safety Manual for Operator”

“Safety manual for those who install and set-up the tapping center”

“DOOR INTERLOCK FUNCTION”

“Operation manual”

“Operation of the machine necessary for set-up and machining”

Conversational programming machine    NC language programming machine

Japanese part code : 693312001    Japanese part code : 693310001

English part code : 693307001    English part code : 693305001

### 3. Installation manual    “Safety manual for those who install and set-up the tapping center”

“Installation manual”

“Installation and assembly of the machine and its options”

Japanese part code : 693311001

English part code : 693306001

### 4. Programming manual    “Programming manual: Creating machine programs”

Conversational programming machine    NC language programming machine

Japanese part code : 693314001    Japanese part code : 693313001

English part code : 693309001    English part code : 693308001

### 5. Maintenance manual    “Safety manual for those who qualify for tapping center maintenance attached to the maintenance manual.”

“Maintenance manual: Adjustment and repair of the machine”

The maintenance manual is not distributed to customers.

## **Relationship to safety labels**

Items of particular importance that appear in this safety manual are also attached to the machine as safety labels.

An explanation of the safety labels is provided at the end of this safety manual. If any safety labels have peeled off the machine, obtain new safety labels and attach them correctly.

## **Language**

Machines shipped domestically within Japan are provided with safety manuals and safety labels written in Japanese. Machines shipped abroad from Japan are provided with safety manuals and safety labels written in four languages: English, German, French, and Chinese.

For manuals and labels in other languages, consult the dealer from which you purchased the machine.

## **Purchasing**

When the safety manuals or safety labels have been lost, obtain these items from the dealer you have purchased the machine from.

If you do not know of a dealer, consult the offices specified below.

1-1-1 Kawagishi, Mizuho-ku, Nagoya 467-8562, JAPAN  
BROTHER INDUSTRIES, LTD. Machinery & Solution Company,  
phone +81-52-824-2232  
fax +81-52-811-0469

## Handling the safety manual

Be careful not to lose the safety manuals, and keep them handy at all times.  
Also, when the machine changes hands, pass the manuals to the new owner together with the machine.

## Degree of danger

The degree of danger is classified into three categories depending upon the level of damage that may occur when instructions are not observed.

1. DANGER

**DANGER**

Damage which may result in death or severe injury to persons.

2. WARNING

**⚠ WARNING**

Damage which may lead to a serious injury.

3. CAUTION

**⚠ CAUTION**

Damage less serious than that above.

## Explanation order

The safety instructions are explained in the following order:

1. Signal words (DANGER, WARNING, CAUTION) and symbols indicating the degree of danger
2. Type of danger (Subject)
3. Type of predicted damages
4. Preventive measure

## Meaning of symbols

Symbols are used on the safety labels and in the warnings in the safety manual to intuitively explain possible dangers.

### 1. Hazard

	Slippery		Moving parts
	Stumble		Caught
	Electric shock		Electric shock
	High temperature		High temperature
	Hand pinched		Cut
	Cut		Sharp point
	Burst		Falling object
	Falling object		Fall
	Rotating object		Splash
	Splash		Fire

## 2. Preventive measures



Protect ears.



Protect hands.



Protect feet.



Remove power plug.



Connect grounding cable



Protect head.



Do not touch.



Do not disassemble.



Protect eyes.

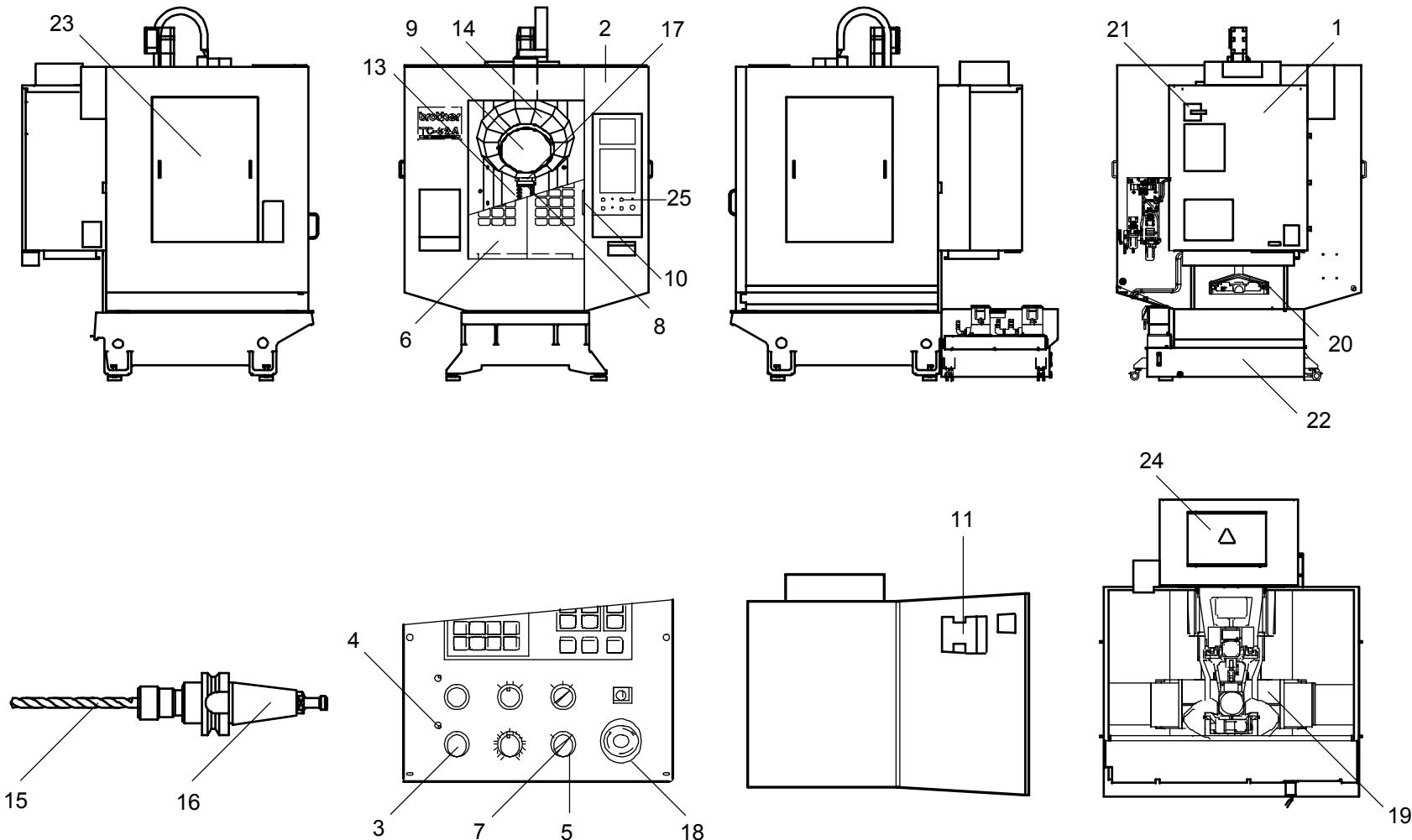
## 部品名

## Section Names

## Namen jedes Teils

## Noms de sections

## 各部件名称



TS2ASA01-1.ai

部品名	Section Names	Namen jedes Teils	Noms de sections	各部件名称
No.	各部の名称	Section names	Namen jedes Teils	Noms de sections
1.	日本語	English	Deutsch	Français
1.	制御箱	control box	Steuerschrank	armoire de commande
2.	スプラッシュガード	splash guard	Spitzblech	tôle pare-copeaux
3.	停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt
4.	停止ランプ	stop lamp	stop Lampe	lampe d'arrêt
5.	ドアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage
6.	作業扉	work door	Arbeitstür	porte de travail
7.	ドアインタロックキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage
8.	スピンドル	spindle	Spindel	broche
9.	ATC マガジン	ATC magazine	ATC Magazin	ATC magasin
10.	取手	handle	Griff	poignée
11.	制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande
12.	レベリングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine
13.	クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe
14.	グリップカバー	grip cover	Griffschutz	couverture de jambe
15.	工具	tool	Werkzeug	outil
16.	工具ホルダ	tool holder	Werkzeughalter	support à outil
17.	スピンドルヘッド	spindle head	Spindelkopf	tête de la broche
18.	非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence
19.	ケーブルカバー	cable cover	kabelschutz	couvre cable
20.	テーブル	table	Tisch	table
21.	主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale
22.	クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe
23.	スプラッシュガードサイドカバー	splash guard side cover	Spitzblechseitenschutz	couverture à côté du tôle pare-copeaux
24.	回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice
25.	操作パネル	operation panel	Betriebstafel	panneau d'opération

## Warnings and preventive measures

The numbers in ( ) such as 1, 2 correspond to the names of each part.

Danger



- SD1 Various hazards are associated with the tapping center.  
 SD1-1 Read the safety manual before operating the machine to understand these hazards and preventive measures.  
 SD1-2 All users must know the position of the emergency stop switch (18) and its operation.



- SD2 High voltage parts are present in the control box (1). Touching such parts by mistake may result in serious injury or death.  
 SD2-1 Only operators qualified for electrical work and familiar with the electric circuits of this machine are allowed to maintain and inspect the electrical components.  
 SD2-2 Turn off the main power breaker (21) before operation. Put up a signboard which says 'Under maintenance.'  
 SD2-3 When leaving the machine, close the control box door and bolt it.



- SD3 You may be caught in the machine during machining, resulting in a serious injury.  
 SD3-1 Do not enter within the splash guard (2) during operation.  
 SD3-2 Press the stop switch (3) or the reset key. Visually check that the stop lamp (4) is lit and then you can put your hands, feet, and body into the machine.  
 SD3-3 Visually check that nobody is inside the splash guard before starting machine operation.  
 SD3-4 Keep your hands, feet, and body away from moving parts during operation.  
 SD3-5 When you have to enter the machine, turn off the main power breaker and padlock it so that the main power breaker (21) cannot be turned on.

- SD4 When the door interlock switch (5) is invalid, the machine moves even when the work door (6) is open. You may cut yourself on a rotating tool (15) or be caught in the machine.  
 SD4-1 During machine maintenance, pay extreme attention to the machine motion so that you can stop the machine whenever required. After finishing maintenance and set-up, return the door interlock switch to valid. Pull out the door interlock key (7) for storage.  
 SD4-2 Do not leave the machine with the door interlock switch invalid.

- SD5 When the door interlock switch (5) is invalid, the table (19) can move even when the work door (5) is open. You may be caught by the table, resulting in injury.  
 SD5-1 During machine set-up, pay extremely attention to the machine motion so that you can stop the machine whenever required. When you have finished machine set-up, set the door interlock switch to the ON position. Remove the door interlock key (7) that the supervisor must then always keep.

Warning

**⚠ WARNING**

- SW1      Touching rotating tools (15) results in injury.  
 SW1-1    Keep away from rotating tools.



- SW2      You may be injured due to broken tools (15) or parts flung out.  
 SW2-1    Close the work door (6), and start machine operation.



- SW3      You may be caught in the rotating part, resulting in an injury.  
 SW3-1    Keep away from rotating tools (15), the spindle (8), and the ATC magazine (9).  
 SW3-2    Wear snug-fitting clothes. Put long hair up in cap. Do not wear gloves except for set-up operations carried out with the machine stopped. Do not wear any accessories. Do not hold the rotating part.



- SW4      If the safety device is modified, its function may be altered, thus you may be caught in the machine, hit your body against the machine, or get an electric shock.  
 SW4-1    Do not modify safety devices. Do not alter the safety device in such a way that it does not function.



- SW5      When chips scatter and get into the eyes, you may damage your eyeballs and lose your eyesight.  
 SW5-1    Wear safety goggles against the chips.  
 SW5-2    Do not blow the chips by air.



- SW6      If you touch chips with bare hands, you may have your hand cut or burnt.  
 SW6-1    Do not touch chips with bare hands. Do not touch sharp edges of workpieces.  
 SW6-2    Wear gloves and use a brush to remove chips.  
 SW6-3    Clean cutting chips when machine is stopped.
- SW7      If you grip the tool (15) blade, you may cut your hand.  
 SW7-1    Do not touch the edge of the tool. Always hold the shank of the tool holder (16).



SW8 Dropping a heavy object onto your foot may fracture your foot bones.  
SW8-1 When lifting heavy objects, wear safety shoes.

SW9 Lifting heavy objects may cause a hernia or vertebral disk.  
SW9-1 When lifting heavy objects, ask for help.  
SW9-2 Lift object with the strength of your legs instead of your back.



SW10 Hearing ability is reduced when ears are exposed to excessive noise for a long period of time.  
SW10-1 Use protection such as earplugs when working in a noisy environment.



SW11 You may hurt your eyes due to high pressure air bursts.  
SW11-1 People other than those qualified for high pressure air handling and who understand the piping of this machine are not allowed to install or change the high pressure air piping.  
SW11-2 To repair the high pressure air hose, disconnect the pressure source and release remaining pressure first. Put up a signboard which says "Under maintenance."



SW12 You may hit your head when standing up.  
SW12-1 Wear a helmet when working in and around the machine.



SW13 When the machine is operated while any tools are left in the machine, the tools may scatter and you may be injured.  
SW13-1 Do not leave hand tools in the machine.



- SW14 You may have your hand caught in the work door (6) if you are opening and closing while holding parts other than the handle (10).  
 SW14-1 Hold the handle when opening and closing the outer door.



- SW15 High temperature parts are present in the control box(1). Therefore, if papers protrude from the control box document holder (11), these papers may catch fire.  
 SW15-1 Do not put papers larger than A4 or letter size in the control box document case.



- SW16 If tools are placed on the control box (1) or the machine, these may fall down due to vibration.  
 SW16-1 Do not place any objects on the control box and the machine.



- SW17 You may fall down and be injured when climbing on the machine or the coolant tank (22).  
 SW17-1 Do not climb on the machine or the coolant tank.



- SW18 When putting your hand under the leveling bolts (12), you may have your hand caught, resulting in an injury.  
 SW18-1 Do not put your hands under the leveling bolt. Use tools to adjust the level.



- SW19 When the cable is hanging down or is not covered, you may stumble or slip and fall.  
 SW19-1 Remove any slack in the cable. Cover the cable when placing the cable on the floor.



- SW20 Remodeling the machine may affect the safety device, rendering all given warnings invalid.  
 SW20-1 Do not modify the machine. When modification is required, contact Brother Industries, Ltd. beforehand and ask for permission in writing.



- SW21 You may have your eyes hurt if coolant splashes into your eyes.  
 SW21-1 When adjusting the coolant nozzle (13), wear safety goggles.  
 SW21-2 When coolant has splashed into your eyes, wash your eyes with clean water, and see a doctor.



- SW22 If you put your finger in the clearance of the machine, you may have your finger caught, resulting in an injury.  
 SW22-1 Do not put fingers between grip cover (14).  
 SW22-2 Do not put the finger in the clearance between the tool (15) or the tool holder (16) and the ATC magazine.



- SW23 When coolant, oil, or chips are scattered, you may slip and fall down, or hit yourself against something, resulting in an injury.  
 SW23-1 Turn off the power of the machine, clean inside and the surroundings of the machine, and then start operation.  
 SW23-2 Wear a helmet and safety shoes during machine installation.



- SW24 When attaching and detaching tool holder (16), you may cut your hand on the edge of a tool (15) or hit your hand against the machine.  
 SW24-1 Do not hold the edge of the tool. Wear leather gloves. Hold the tool holder with both hands.



- SW25 The machine may suddenly move or tools may fall down.  
 SW25-1 When the stop lamp (4) is not lit, do not put your hands, feet, and body under the spindle head (17).  
 SW25-2 Draw the pallet toward the operator to set-up the pallet changer.  
 SW25-3 Turn off the main power breaker (21), padlock the main power breaker so that it cannot be turned on, and apply grease.



- SW26 When machining workpiece using an oil type coolant, the machined part may heat up and catch fire.
- SW26-1 When using an oil type coolant, install a fire alarm and an automatic fire extinguisher.
- SW26-2 When machining the workpiece, an operator must attend the machine.



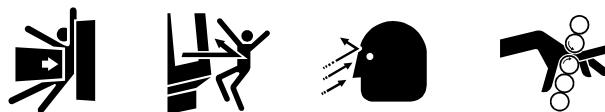
- SW27 If you lean on the machine, you may be caught or hit yourself against the machine when the machine moves, resulting in an injury.
- SW27-1 Do not lean on the machine.
- SW28 When objects are hung on the emergency stop switch (18), the emergency stop switch may not be pressed.
- SW28-1 Do not hang any objects on the emergency stop switch.



- SW30 Because the coolant tank (22) is heavy, you may suffer from a herniated vertebral disk or drop the tank on your feet when lifting the tank.
- SW30-1 Do not lift the coolant tank even when removing chips.



- SW31 When entering the machine, you may slip and fall down or be caught in the machine.
- SW31-1 When entering the machine, be sure to cut the main power breaker (21), padlock the breaker so that the breaker is not turned on, and remove any coolant and chips. Also, wear safety shoes and a helmet. Put up a signboard which says "Under maintenance" near the machine.



SW32 If the splash guard (2) side cover (23) is not attached, you may be caught in the machine or injured due to broken tools.

SW32-1 Visually check that the side cover is attached before turning on the power.



SW33 Tools (15) or tool holder (16) whose weight and size exceed the specified limit may spring out while being used.

SW33-1 Use tools holder whose weight and size are within the specified limit.

SW33-2 For the limit of the tools, see the tool label attached on the machine or the operation manual.



SW34 If you touch the regenerative resistor, you may be burned because the regenerative resistor is heated during operation.

SW34-1 Do not remove the regenerative resistor cover (24).

SW35 If you touch the motor, you may be burned because the motor is heated during operation.

SW35-1 Do not touch the motor for 30 minutes after operation is finished.



SW36 If an incorrect fuse is set, a fire may break out because the protective device does not function.

SW36-1 Replace with the same rating fuse.

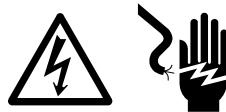
SW37 If the setting of thermal relay is changed, a fire may break out because the protective device does not function.

SW37-1 Do not change the setting of the thermal relay.



SW38 If the ATC magazine (9) rotates, tools (15) may hit machined workpieces, jigs, or the machine, and may be broken.

SW38-1 Set the tool length so that the tools do not contact machined workpieces, jigs, or the machine even if the ATC magazine rotates.



- SW39 If the control box (1) or the operation panel (25) are wet, you may get an electric shock.
- SW39-1 Do not sprinkle coolant, water, or chips on the control box and the operation panel.
- SW39-2 Do not touch the control box with wet hands.
- SW40 When the power PE line wired from outside is too short, the PE line may come off when the cable is pulled and you may get an electric shock.
- SW40-1 Make the power PE line longer than other lines (L1, L2, L3) allowing some slack.



- SW41 If the power is turned on or workpieces are machined in an explosive atmosphere, an explosion may occur due to a spark from the machine.
- SW41-1 Do not carry out maintenance in an explosive atmosphere.
- SW41-2 Do not turn on the power of the machine, or carry out machining or set-up in an explosive atmosphere.



- SW42 If you forget to mount the splash guard side cover (23), you may get caught in the machine, resulting in injury.
- SW42-1 Before turning on the power, visually check that the splash guard side cover is mounted.



- SW44 Cutting chips may catch fire or explode depending on the workpiece material (e.g. Magnesium).
- SW44-1 Remove any cutting chips immediately.
- SW44-2 Install a fire extinguisher near the machine when machining a workpiece made of such material, and never perform unmanned operation.



SW45  
SW45-1

The milling inserts may come off the tool, resulting in serious injury.  
Check that the milling inserts is secured before mounting the tool to the machine.



SW46  
SW46-1  
SW46-2

Fire may occur when a 3-wire sensor that includes an exclusive power line is used.  
Use a 2-wire sensor, instead of a 3-wire sensor.  
If it is not possible to avoid using 3-wire sensors, add a fuse (1 A or less) to the power line of each sensor.



SW47  
SW47-1

If the terminal block screws are loose after wiring, heat may be generated due to faulty contact, causing a fire.  
Make sure that there are no loose screws after wiring.



SW48  
SW48-1

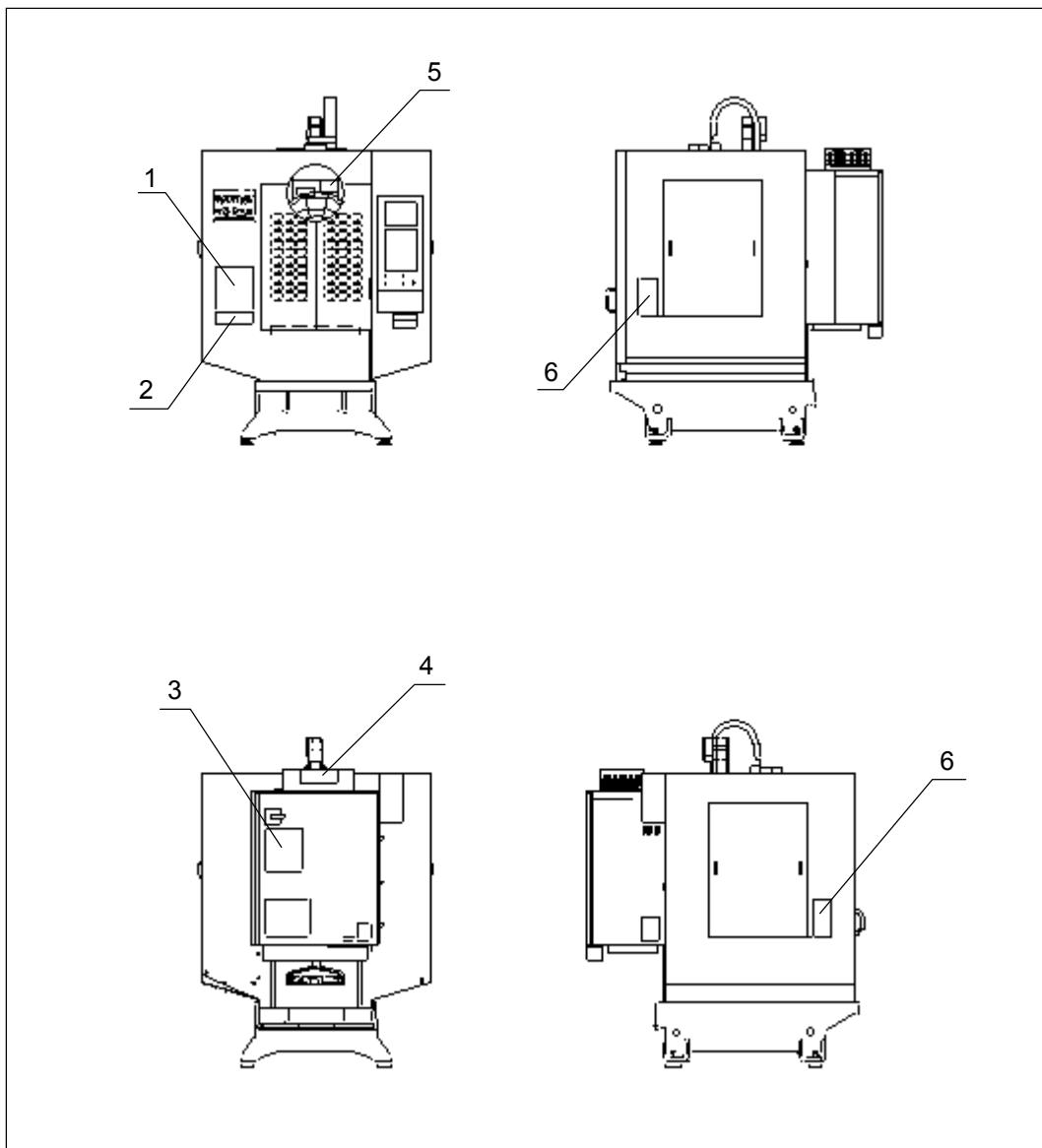
When the plant is poorly illuminated, inside the machine is dark and you may injure your hands on jigs or cutters.  
Install a machine light when the illumination inside the machine is 500 lux or below.

## Description of safety label

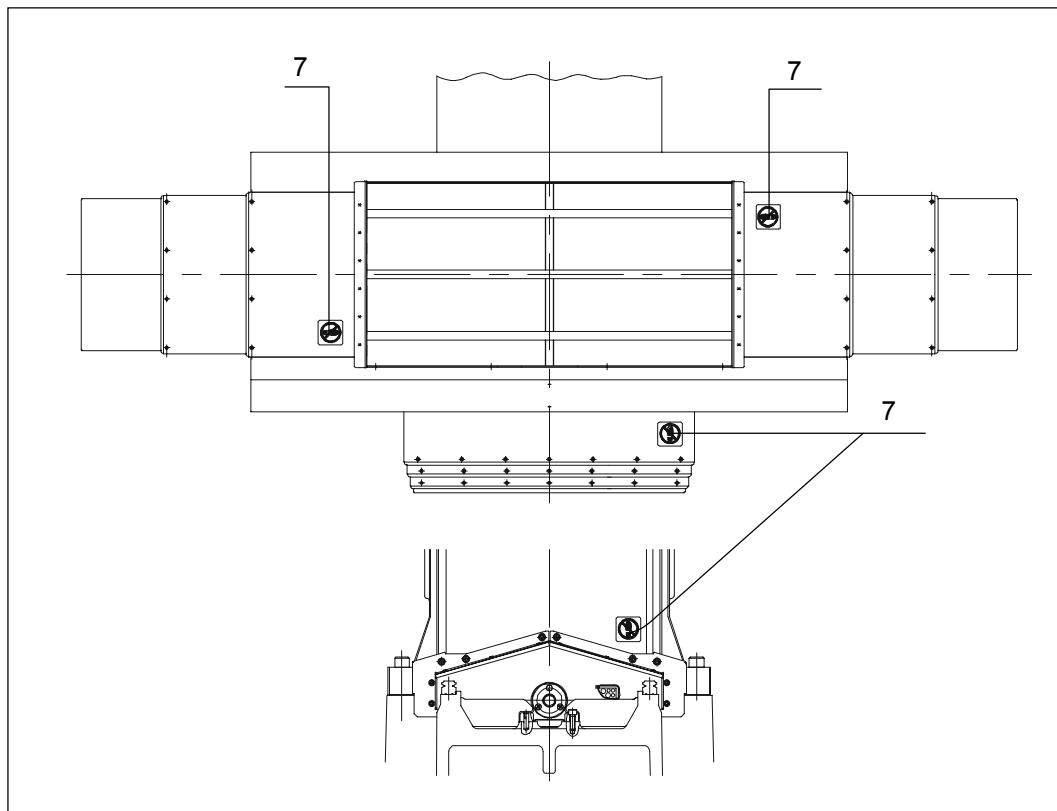
Particularly important descriptions in the safety manual are printed on a safety label, and the label is attached to the machine. Carefully read and understand the descriptions on the label before operating the machine.

The safety labels are attached to the positions shown in the illustration below. Check that the labels are not damaged. If damaged, obtain a new label for replacement.

## Position of safety label



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S2A00401.ai

## 1. Safety label , front and side

(1) Language: English, Japanese, Chinese



Part Code : 690373001  
Part Name : PS LABEL,TC FRONT JCE

(2) Language: English, German, French

**This machine has hazards.**

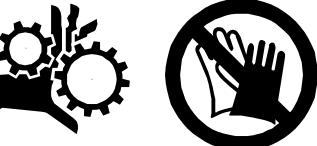
Read instruction manuals to understand hazards and avoid them before operation.

Diese Maschine birgt Gefahren.

Um Risiken zu erkennen und vermeiden, vor dem Einschalten die Betriebsanleitung lesen.

L'utilisation de cette machine comporte des risques.

Lisez les manuels d'instruction pour connaître les risques et les éviter avant d'utiliser cette machine.

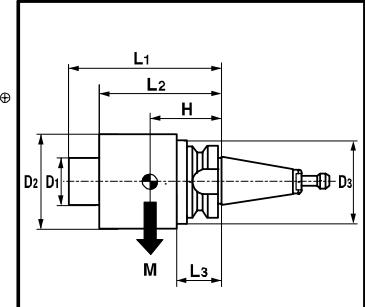
<b>DANGER</b>	<b>WARNING</b>	<b>WARNING</b>
		
Machine in operation will suddenly move and crush you. Keep away from moving parts.	Broken tool or workpiece can hit and wound you. Shut door before starting machine.	Rotating parts can catch and injure you. Keep away from rotating tool, spindle, and magazine. Never hold moving parts. Do not wear gloves while operating machine.
<b>GEFAHR</b>	<b>WARNUNG</b>	<b>WARNUNG</b>
Maschine in Betrieb kann plötzlich laufen und Sie stoßen. Beim Betrieb der Maschine von allen bewegenden Teilen sich fernhalten, um Verletzungen zu vermeiden.	Gebrochene Werkzeuge oder Werkstücke könnten Sie treffen und verletzen. Vor dem Start der Maschine Tür schließen.	Umlaufende Teile könnten Sie fassen und verletzen. Von umlaufendem Werkzeug, Spindel und Magazin sich fernhalten. Rotierende Teile nicht berühren. Während des Bedienens keine Handschuhe tragen.
<b>DANGER</b>	<b>AVERTISSEMENT</b>	<b>AVERTISSEMENT</b>
En opération, cette machine bougera soudainement et provoquera des risques d'écrasement. Ne vous approchez jamais des parties mobiles.	Les outils cassés ou les pièces usinées peuvent être projetés et risquent de vous frapper et de vous blesser. Fermez la porte avant de faire démarrer la machine.	Les parties tournantes peuvent vous accrocher et vous blesser. Ne vous approchez jamais des outils tournant, de la broche et du magasin. Ne saisissez jamais les parties en mouvement. Ne portez pas de gants pendant l'utilisation.

691042001 / 0302 (2)

Part Code : 691042001  
Part Name : PS LABEL,TC FRONT EGF

## 2. Tool label

工具、主軸回転数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。  
 If use beyond the limitation of the tool and spindle speed, machine may be broken.  
 Check the details by the operation manual before operation.



最高主軸回転速度	10000 min <sup>-1</sup> / 16000 min <sup>-1</sup>	Max Spindle Rotation Speed																
主軸テーパー	7 / 24 No.30	Spindle Taper																
ツールシャンク	MAS-BT30	Tool Shank																
フルスタッド	MAS-P30T-2 (30°)	Retention Knob																
マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)	Total in Magazine																
工具の制限	<table border="1"> <tbody> <tr> <td>D<sub>1</sub> ≤ 40 mm</td> <td>D<sub>1</sub> ≤ 40 mm</td> </tr> <tr> <td>L<sub>1</sub> ≤ 200 mm</td> <td>L<sub>1</sub> ≤ 200 mm</td> </tr> <tr> <td>D<sub>2</sub> 80 mm</td> <td>D<sub>2</sub> 55 mm</td> </tr> <tr> <td>L<sub>2</sub> ≤ 160 mm</td> <td>L<sub>2</sub> ≤ 160 mm</td> </tr> <tr> <td>D<sub>3</sub> 46 mm</td> <td>D<sub>3</sub> 46 mm</td> </tr> <tr> <td>L<sub>3</sub> 30 mm</td> <td>L<sub>3</sub> 30 mm</td> </tr> <tr> <td>M 3 kg</td> <td>M 2 kg</td> </tr> <tr> <td>MxH≤180 kgmm</td> <td>MxH≤100 kgmm</td> </tr> </tbody> </table>	D <sub>1</sub> ≤ 40 mm	D <sub>1</sub> ≤ 40 mm	L <sub>1</sub> ≤ 200 mm	L <sub>1</sub> ≤ 200 mm	D <sub>2</sub> 80 mm	D <sub>2</sub> 55 mm	L <sub>2</sub> ≤ 160 mm	L <sub>2</sub> ≤ 160 mm	D <sub>3</sub> 46 mm	D <sub>3</sub> 46 mm	L <sub>3</sub> 30 mm	L <sub>3</sub> 30 mm	M 3 kg	M 2 kg	MxH≤180 kgmm	MxH≤100 kgmm	Limitation of Tool
D <sub>1</sub> ≤ 40 mm	D <sub>1</sub> ≤ 40 mm																	
L <sub>1</sub> ≤ 200 mm	L <sub>1</sub> ≤ 200 mm																	
D <sub>2</sub> 80 mm	D <sub>2</sub> 55 mm																	
L <sub>2</sub> ≤ 160 mm	L <sub>2</sub> ≤ 160 mm																	
D <sub>3</sub> 46 mm	D <sub>3</sub> 46 mm																	
L <sub>3</sub> 30 mm	L <sub>3</sub> 30 mm																	
M 3 kg	M 2 kg																	
MxH≤180 kgmm	MxH≤100 kgmm																	
工具バランス制限	100grmm	50grmm	Limitation of Tool Balance															
主軸回転数制限	10000 min <sup>-1</sup>	16000 min <sup>-1</sup>	Limitation Spindle Rotation Speed															

653379001 / 0210 (2)

Part Code : 653379001  
 Part Name : Tool LABEL250

### 3. Safety label, rear and High pressure coolant equipment

(1) Language: English, Japanese, Chinese



690730001 / 9709 (1)

Part Code : 690730001  
Part Name : PSLABEL, TC REARJCE

(2) Language: English, German, French



Part Code : 691045001  
 Part Name : PSLABEL, TC REAR EGF

#### 4. Label, regenerative resistor

(1) Language: English, Japanese, Chinese

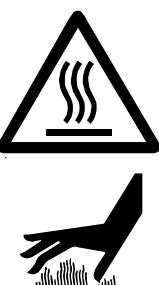
	<b>⚠ WARNING</b>	<b>⚠ 警告</b>	<b>⚠ 警告</b>
<p><b>Heated resistor can burn your hand.</b> <b>After stopping machine, wait 30 minutes and remove cover.</b></p>	<p><b>Heated resistor can burn your hand.</b> <b>After stopping machine, wait 30 minutes and remove cover.</b></p>	<p>熱い抵抗器 さわるとやけどする。 運転が終り、 30分たってから、 カバーをはずすこと。</p>	<p>热电阻 触摸会烫伤。 停止运行 30 分钟之后， 才可取下安全罩。</p>

690729001 / 9709 (1)

Part Code: 690729001

Part Name: LABEL, TC REGENERATIVE JCE

(2) Language: English, German, French

	<b>⚠ WARNING</b>	<b>⚠ WARNUNG</b>	<b>⚠ AVERTISSEMENT</b>
<p><b>Heated resistor can burn your hand.</b> <b>After stopping machine, wait 30 minutes and remove cover.</b></p>	<p><b>Heated resistor can burn your hand.</b> <b>After stopping machine, wait 30 minutes and remove cover.</b></p>	<p>Heißer Widerstand könnte Ihre Hand verbrennen. Nach dem Ausschalten der Maschine 30 Minuten warten, dann den Schutzdeckel entfernen.</p>	<p>Température de la résistance élevée, pouvant causer des brûlures. Après avoir arrêté la machine, attendez 30 minutes avant d'enlever le capot.</p>

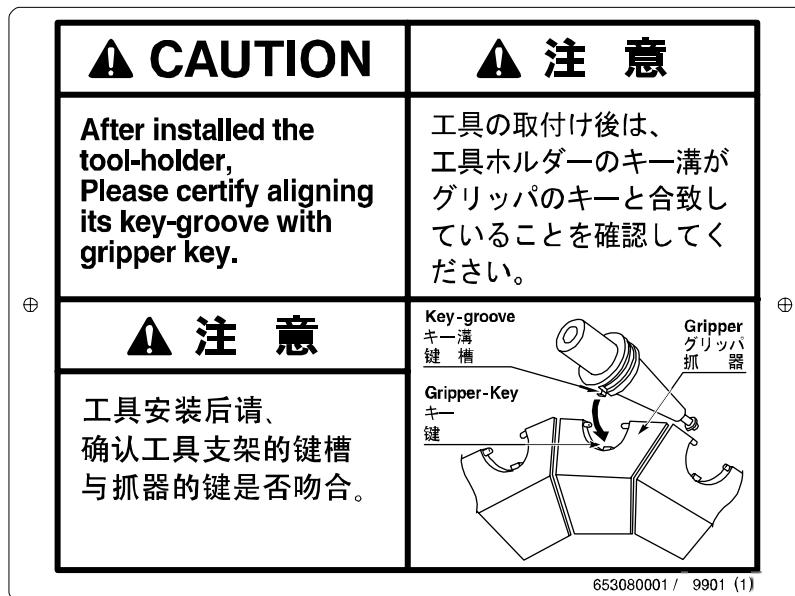
691058001 / 0302 (2)

Part Code: 691058001

Part Name: LABEL, TC REGENERATIVE EGF

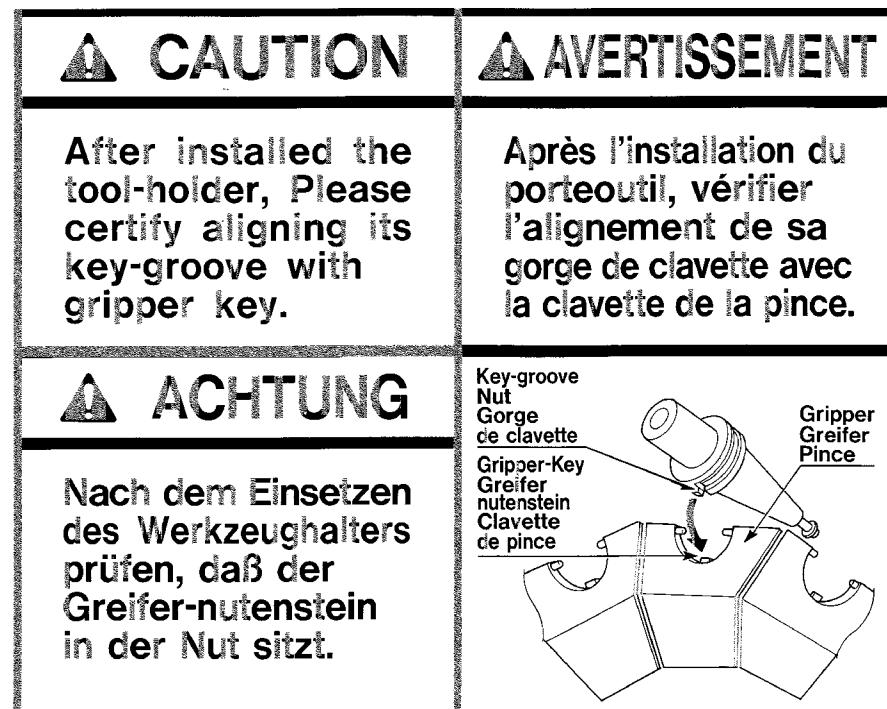
## 5. Label, removing tool

(1) Language: English, Japanese, Chinese



Part Code : 653080001  
 Part Name : LABEL, Removing Tool JCE

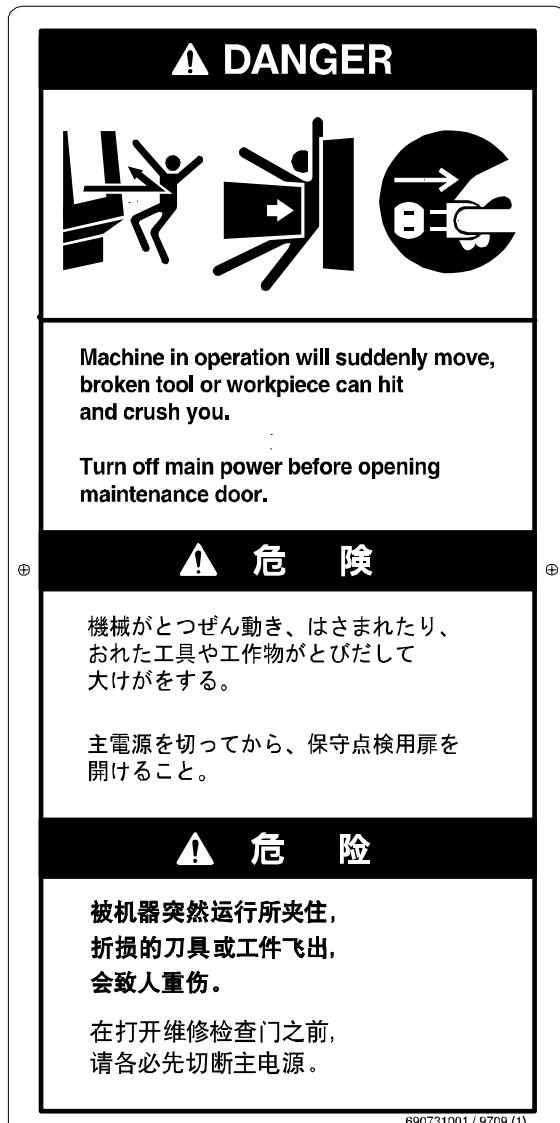
(2) Language: English, German, French



Part Code : 69104001  
 Part Name : LABEL, Removing Tool EGF

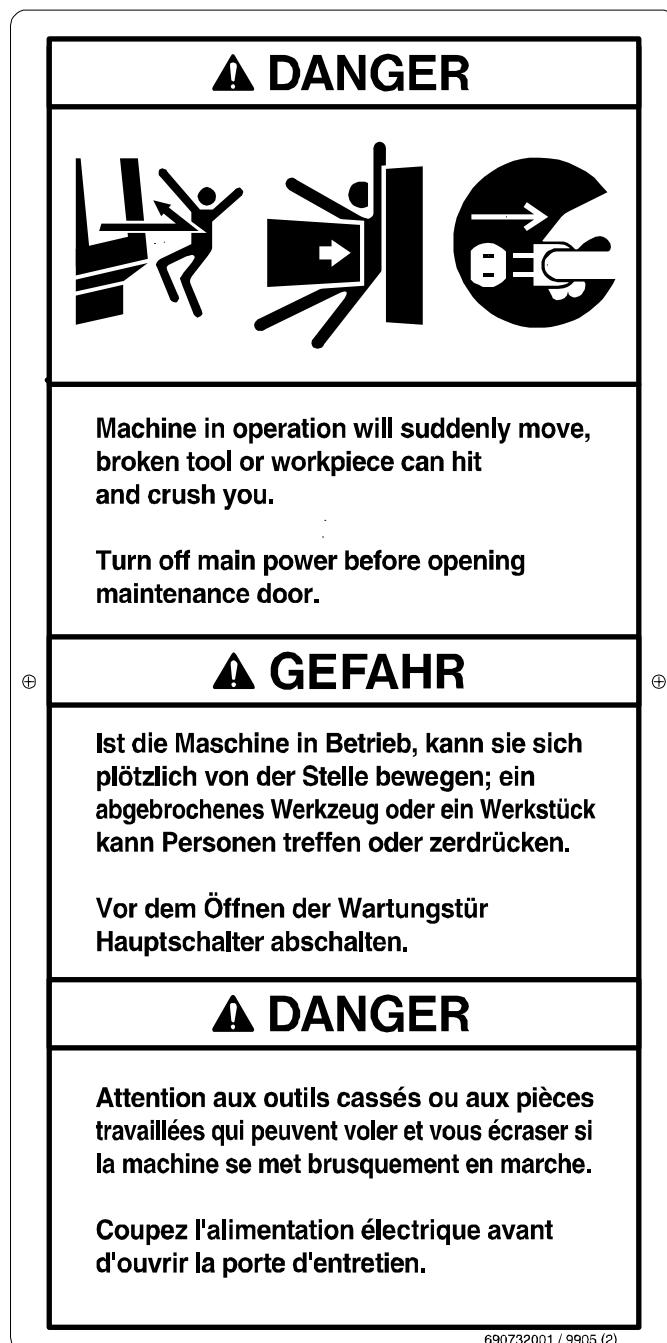
## 6. Label, side cover

- (1) Language: English, Japanese, Chinese



Part Code : 690731001  
 Part Name : LABEL, TC MAINTENANCE DOOR JCE

(2) Language: English, German, French



690732001 / 9905 (2)

Part Code : 690732001  
Part Name : LABEL, TC MAINTENANCE DOOR EGF

**7. "Keep Off" label 40**

Part code : 693178001



693178001 / 0607 (1)

693178001.ai

## **Safety Manual for Operator**

## **Tapping Center TC-S2A**

**Please read this safety manual carefully before  
operating the tapping center.**

**Brother Industries, Ltd. Machinery & Solution Company.**

## Contents

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Printed in Japan.

# Outline of the safety manual

## Read this manual

All people who use the tapping center, including those who install the tapping center at the factory, who process materials by operating the tapping center, who adjust and repair the tapping center, are requested to read this safety manual.

In this safety manual, all people who use the tapping center are expressed as the user.

## Purpose

The tapping centre consists of high voltage electric circuits, tools which rotate at high speed, and tables and ATC magazines which move with powerful force. Therefore, various hazards are associated with the machine.

The purpose of this safety manual is to protect users from these hazards.

Therefore, the safety manual explains the following:

Warnings: types of hazards

Preventive measures: ways to prevent any hazards from occurring

## Contents of Safety Manual and Relationship with Other Manuals

Each instruction manual, other than the programming manual, includes a safety manual.

Safety manuals are given to each respective personnel group.

Please read the main text of the instruction manual for machine functions and operation methods.

### 1. Operation manual for general operators

“Safety Manual for Operator”

“Safety manual for those who install and set-up the tapping center”

“Operation manual”

“Operation of the machine necessary for basic operations”

English part code : 693075001

### 2. Operation manual for advanced personnel

“Safety Manual for Operator”

“Safety manual for those who install and set-up the tapping center”

“DOOR INTERLOCK FUNCTION”

“Operation manual”

“Operation of the machine necessary for set-up and machining”

Conversational programming machine    NC language programming machine

Japanese part code : 693312001    Japanese part code : 693310001

English part code : 693307001    English part code : 693305001

### 3. Installation manual    “Safety manual for those who install and set-up the tapping center”

“Installation manual”

“Installation and assembly of the machine and its options”

Japanese part code : 693311001

English part code : 693306001

### 4. Programming manual    “Programming manual: Creating machine programs”

Conversational programming machine    NC language programming machine

Japanese part code : 693314001    Japanese part code : 693313001

English part code : 693309001    English part code : 693308001

### 5. Maintenance manual    “Safety manual for those who qualify for tapping center

maintenance attached to the maintenance manual.”

“Maintenance manual: Adjustment and repair of the machine”

The maintenance manual is not distributed to customers.

## **Relationship to safety labels**

Items of particular importance that appear in this safety manual are also attached to the machine as safety labels.

An explanation of the safety labels is provided at the end of this safety manual. If any safety labels have peeled off the machine, obtain new safety labels and attach them correctly.

## **Language**

Machines shipped domestically within Japan are provided with safety manuals and safety labels written in Japanese. Machines shipped abroad from Japan are provided with safety manuals and safety labels written in four languages: English, German, French, and Chinese.

For manuals and labels in other languages, consult the dealer from which you purchased the machine.

## **Purchasing**

When the safety manuals or safety labels have been lost, obtain these items from the dealer you have purchased the machine from.

If you do not know of a dealer, consult the offices specified below.

1-1-1 Kawagishi, Mizuho-ku, Nagoya 467-8562, JAPAN  
BROTHER INDUSTRIES, LTD. Machinery & Solution Company,  
phone +81-52-824-2232  
fax +81-52-811-0469

## Handling the safety manual

Be careful not to lose the safety manuals, and keep them handy at all times.

Also, when the machine changes hands, pass the manuals to the new owner together with the machine.

## Degree of danger

The degree of danger is classified into three categories depending upon the level of damage that may occur when instructions are not observed.

1. DANGER

**DANGER**

Damage which may result in death or severe injury to persons.

2. WARNING

**⚠ WARNING**

Damage which may lead to a serious injury.

3. CAUTION

**⚠ CAUTION**

Damage less serious than that above.

## Explanation order

The safety instructions are explained in the following order:

1. Signal words (DANGER, WARNING, CAUTION) and symbols indicating the degree of danger
2. Type of danger (Subject)
3. Type of predicted damages
4. Preventive measure

## Meaning of symbols

Symbols are used on the safety labels and in the warnings in the safety manual to intuitively explain possible dangers.

### 1. Hazard

	Slippery		Moving parts
	Stumble		Caught
	Electric shock		Electric shock
	High temperature		High temperature
	Hand pinched		Cut
	Cut		Sharp point
	Burst		Falling object
	Falling object		Fall
	Rotating object		Splash
	Splash		Fire

## 2. Preventive measures



Protect ears.



Protect hands.



Protect feet.



Remove power plug.



Connect grounding cable



Protect head.



Do not touch.



Do not disassemble.



Protect eyes.

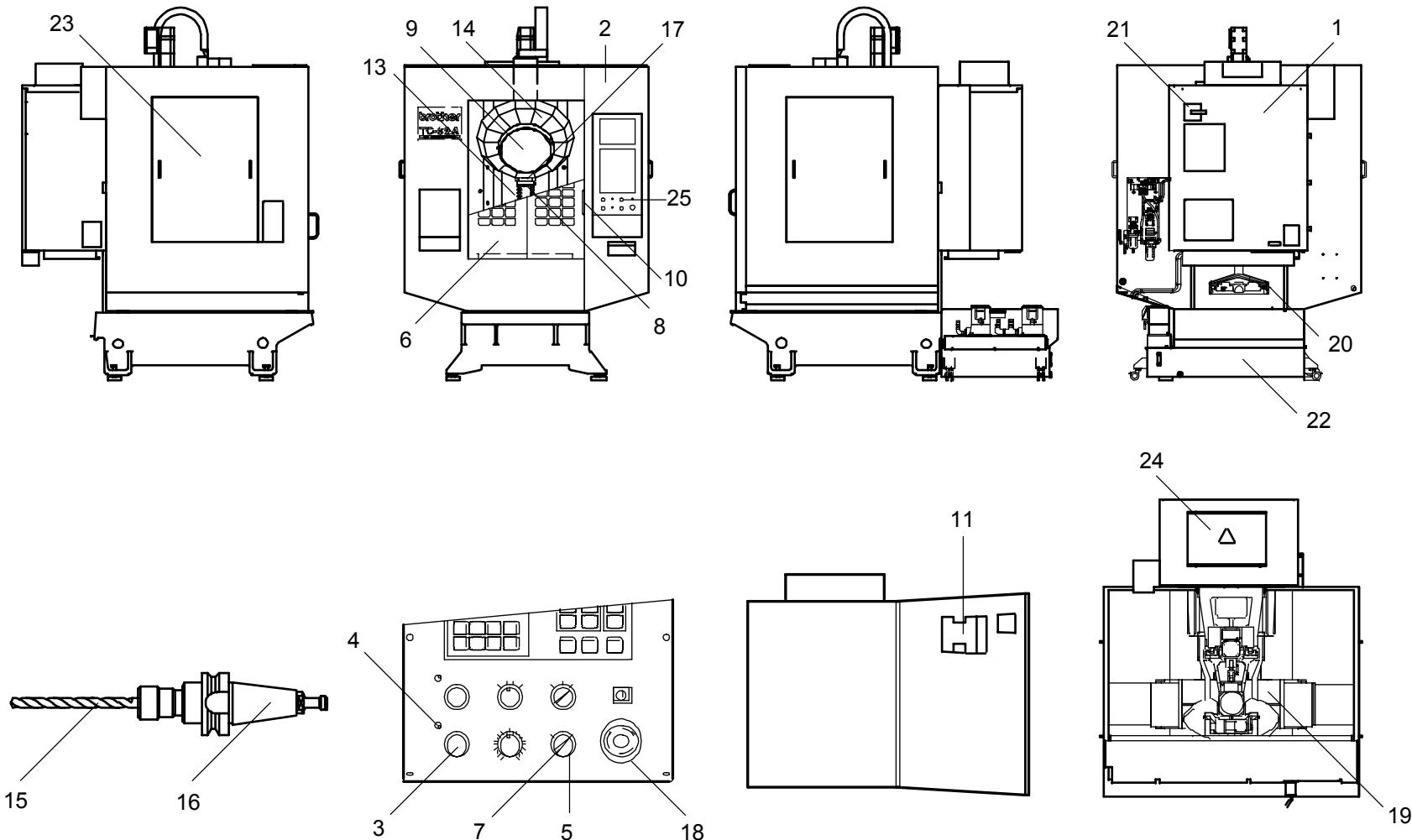
## 部品名

## Section Names

## Namen jedes Teils

## Noms de sections

## 各部件名称



TS2ASA01-1.ai

部品名	Section Names	Namen jedes Teils	Noms de sections	各部件名称
No.	各部の名称	Section names	Namen jedes Teils	Noms de sections
1.	日本語	English	Deutsch	Français
1.	制御箱	control box	Steuerschrank	armoire de commande
2.	スプラッシュガード	splash guard	Spitzblech	tôle pare-copeaux
3.	停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt
4.	停止ランプ	stop lamp	stop Lampe	lampe d'arrêt
5.	ドアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage
6.	作業扉	work door	Arbeitstür	porte de travail
7.	ドアインタロックキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage
8.	スピンドル	spindle	Spindel	broche
9.	ATC マガジン	ATC magazine	ATC Magazin	ATC magasin
10.	取手	handle	Griff	poignée
11.	制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande
12.	レベリングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine
13.	クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe
14.	グリップカバー	grip cover	Griffschutz	couverture de jambe
15.	工具	tool	Werkzeug	outil
16.	工具ホルダ	tool holder	Werkzeughalter	support à outil
17.	スピンドルヘッド	spindle head	Spindelkopf	tête de la broche
18.	非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence
19.	ケーブルカバー	cable cover	kabelschutz	couvre cable
20.	テーブル	table	Tisch	table
21.	主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale
22.	クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe
23.	スプラッシュガードサイドカバー	splash guard side cover	Spitzblechseitenschutz	couverture à côté du tôle pare-copeaux
24.	回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice
25.	操作パネル	operation panel	Betriebstafel	panneau d'opération

## Warnings and preventive measures

The numbers in ( ) such as 1, 2 correspond to the names of each part.

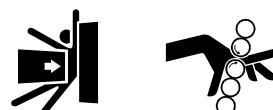
### Danger



- OD1 Various hazards are associated with the tapping centre.
- OD1-1 Read the safety manual before operating the machine to understand these hazards and preventive measures.
- OD1-2 All users must know the position of the emergency stop switch (18) and its operation.



- OD2 High voltage parts are present in the control box (1). Touching such parts by mistake may result in serious injury or death.
- OD2-1 Only those qualified for electrical work, as well as having sufficient knowledge of the electric circuits of this machine, are allowed to maintain and inspect the electrical components. Operators must not open the control box.
- OD2-2 If an alarm occurs, report it to the supervisor immediately. Operators are not allowed to repair the machine. Only qualified persons with sufficient knowledge of the machine are allowed carry out repair and installation.



- OD3 You may be caught in the machine during machining, resulting in a serious injury.
- OD3-1 Do not enter within the splash guard (2) during operation.
- OD3-2 Visually check that nobody is inside the splash guard before starting machine operation
- OD3-3 Keep your hands, feet, and body away from moving parts during operation.
- OD3-4 If an alarm occurs, report it to the supervisor immediately. Do not put your hands, feet, and body in the machine.

- OD4 When the door interlock switch (5) is invalid, the machine moves even when the work door (6) is open. You may cut yourself on a rotating tool (15) or be caught in the machine.
- OD4-1 When the door interlock switch is invalid, do not put your hands, feet, and body in the machine. The operator must report it to the supervisor. The supervisor must set the door interlock switch to ON. The supervisor must always keep the key.
- OD4-2 When the door interlock is invalid, the supervisor must not allow anybody to operate the machine.
- OD4-3 Visually check by yourself that the door interlock switch is valid before starting machine operation.
- OD4-4 If the door interlock key (7) is attached, report it to the supervisor.
- OD4-5 The supervisor must always keep the door interlock key (7).

Warning

 **WARNING**

- OW1                    Touching rotating tools (15) results in injury.  
OW1-1                Keep away from rotating tools.



- OW2                    You may be injured due to broken tools (15) or parts flung out.  
OW2-1                Close the work door (6), and start machine operation.



- OW3                    You may be caught in the rotating part, resulting in an injury.  
OW3-1                Keep away from rotating tools (15) , the spindle (8), and the ATC magazine (9).  
OW3-2                Wear snug-fitting clothes. Put long hair up in cap. Do not wear gloves except for set-up operations carried out with the machine stopped. Do not wear any accessories. Do not hold the rotating part.



- OW4                    If the safety device is modified, its function may be altered, thus you may be caught in the machine, hit your body against the machine, or get an electric shock.  
OW4-1                When the safety device is modified or fixed so that the device does not function, do not operate the machine.



- OW5                    When chips scatter and get into the eyes, you may damage your eyeballs and lose your eyesight.  
OW5-1                Wear safety goggles against the chips.  
OW5-2                Do not blow the chips by air.



- OW6 If you touch chips with bare hands, you may have your hand cut or burnt.  
 OW6-1 Do not touch chips with bare hands. Do not touch sharp edges of workpieces.  
 OW6-2 Wear gloves and use a brush to remove chips.  
 OW6-3 Clean cutting chips when machine is stopped.

- OW7 If you grip the tool (15) blade, you may cut your hand.  
 OW7-1 Do not touch the edge of the tool. Always hold the shank of the tool holder (16).



- OW8 Dropping a heavy object onto your foot may fracture your foot bones.  
 OW8-1 When lifting heavy objects, wear safety shoes.

- OW9 Lifting heavy objects may cause a hernia of vertebral disk.  
 OW9-1 When lifting heavy objects, ask for help.  
 OW9-2 Lift object with the strength of your legs feet instead of your back.



- OW10 Hearing ability is reduced when ears are exposed to excessive noise for a long period of time.  
 OW10-1 Use protection such as earplugs when working in a noisy environment.



- OW11 You may hurt your eyes due to high pressure air bursts.  
 OW11-1 People other than those qualified in high pressure air handling and who understand the piping of this machine are not allowed to install or change the high pressure air piping.



- OW12 You may hit your head when standing up.  
 OW12-1 Wear a helmet when working in and around the machine.



- OW13 When the machine is operated while any tools are left in the machine, the tools may scatter and you may be injured.  
 OW13-1 Do not operate the machine if tools are left in the machine. Report it to the supervisor.



- OW14 You may have your hand caught in the work door (6) if you are opening and closing while holding parts other than the handle (10).  
 OW14-1 Hold the handle when opening and closing the outer door.



- OW15 If tools are placed on the control box (1) or the machine, these may fall down due to vibration.  
 OW15-1 Do not place any objects on the control box and the machine.



- OW16 You may fall down and be injured when climbing on the machine or the coolant tank (22).  
 OW16-1 Do not climb on the machine or the coolant tank.



- OW17 When putting your hand under the leveling bolts (12), you may have your hand caught, resulting in an injury.  
 OW17-1 Do not adjust the leveling bolt. If the machine is not level, report it to the supervisor.  
 OW17-2 The supervisor must instruct the person in charge of installation to adjust the level.



- OW18  
 OW18-1  
 OW18-2
- When the cable is hanging down or is not covered, you may stumble or slip and fall.  
 When the cable is hanging down or is not covered, report it to the supervisor.  
 The supervisor must instruct the person in charge of installation to correct the cable wiring and cover the cable.



- OW19  
 OW19-1
- Remodeling the machine may affect the safety device, rendering all given warnings invalid.  
 If the machine has been modified, do not operate the machine. Report it to the supervisor.



- OW20  
 OW20-1  
 OW20-2
- You may have your eyes hurt if coolant splashes into your eyes.  
 When adjusting the coolant nozzle (13), wear safety goggles.  
 When coolant has splashed into your eyes, wash your eyes with clean water, and see a doctor.



- OW21  
 OW21-1  
 OW21-2
- If you put your finger in the clearance of the machine, you may have your finger caught, resulting in an injury.  
 Do not put fingers between grip cover (14).  
 Do not put the finger in the clearance between the tool (15) or the tool holder (16) and the ATC magazine.



- OW22  
 OW22-1
- If coolant, oil, or chips are scattered, you may slip, fall down, or collide somewhere, resulting in an injury.  
 Turn off the power of the machine, clean inside and the surroundings of the machine, and then start operation.



- OW23 When attaching and detaching tool holder (16), you may cut your hand on the edge of a tool (15) or hit your hand against the machine.  
 OW23-1 Do not hold the edge of the tool. Wear leather gloves.



- OW24 The machine may suddenly move or tools may fall down.  
 OW24-1 Do not put your hands, feet, and body under the spindle head (17).



- OW25 When machining workpiece using an oil type coolant, the machined part may heat up and catch fire.  
 OW25-1 Do not use oil type coolant when a fire alarm and automatic fire extinguisher are not installed.  
 OW25-2 When machining the workpiece, an operator must attend the machine.



- OW26 If you lean on the machine, you may be caught or hit yourself against the machine when the machine moves, resulting in an injury.  
 OW26-1 Do not lean on the machine.

- OW27 When objects are hung on the emergency stop switch (18), the emergency stop switch may not be pressed.  
 OW27-1 Do not hang any objects on the emergency stop switch.



- OW28 When the table (19) moves, the cable cover (20) at the rear of the machine springs out. You may collide with it, resulting in an injury.  
 OW28-1 Cut the main power breaker (21) and then remove chips.



OW29

Because the coolant tank (22) is heavy, you may suffer from a herniated vertebral disk or drop the tank on your feet when lifting the tank.

OW29-1

Do not lift the coolant tank even when removing chips.



OW30

OW30-1

When entering the machine, you may slip and hit your body against something. Do not enter the machine. When it is necessary to enter the machine, report it to the supervisor.



OW31

If the splash guard (2) side cover (23) is not attached, you may be caught in the machine or injured due to broken tools.

OW31-1

Before turning on the power, visually check that the cover is attached.

OW31-2

If the side cover is not attached, report it to the supervisor.

The supervisor must instruct the operator to attach the side cover.



OW32

Tools (15), tool holder (16) whose weight and size exceed the specified limit may spring out while being used.

OW32-1

Use tools holder whose weight and size are within the specified limit.

OW32-2

For the limit of the tools, see the tool label or the operation manual attached on the machine.



OW33

If you touch the regenerative resistor, you may be burned because the regenerative resistor is heated during operation.

OW33-1

Do not remove the regenerative resistor cover (24).

- OW34 If you touch the motor, you may be burned because the motor is heated during operation.
- OW34-1 Do not touch the motor for 30 minutes after operation is finished.



- OW35 If the ATC magazine (9) rotates, tools (15) may hit machined workpieces, jigs, or the machine, and may be broken.
- OW35-1 Set the tool length so that the tools do not contact machined workpieces, jigs, or the machine even if the ATC magazine rotates.



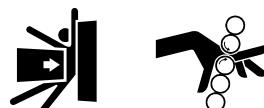
- OW36 If the control box (1) or the operation panel (25) are wet, you may get an electric shock.
- OW36-1 Do not sprinkle coolant, water, or chips on the control box and the operation panel.
- OW36-2 Do not touch the control box with wet hands.



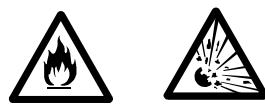
- OW37 If the power is turn on or workpieces are machined in an explosive atmosphere, an explosion may occur due to a spark from the machine.
- OW37-1 Do not turn on the power and carrtout machining in an explosive atmosphere.



- OW-38 If you operate the machine without the workpiece secured, the workpiece may spring out, resulting in injury.
- OW-38-1 Secure the workpiece.



- OW39 If you forget to mount the splash guard side cover (23), you may get caught in the machine, resulting in injury.
- OW39-1 Before turning on the power, visually check that the splash guard side cover is mounted. If not mounted, report it to the supervisor.
- OW39-2 When removing the splash guard side cover, turn off the main power breaker and padlock it so that the main power breaker cannot be turned on.
- OW39-3 The supervisor must instruct the operator to mount the maintenance cover.



- OW40 Cutting chips may catch fire or explode depending on the workpiece material (e.g. Magnesium).  
OW40-1 Remove any cutting chips immediately.  
OW40-2 Install a fire extinguisher near the machine when machining a workpiece made of such material, and never perform unmanned operation.



- OW41 The milling inserts may come off the tool, resulting in serious injury.  
OW41-1 Check that the milling inserts is secured before mounting the tool to the machine.



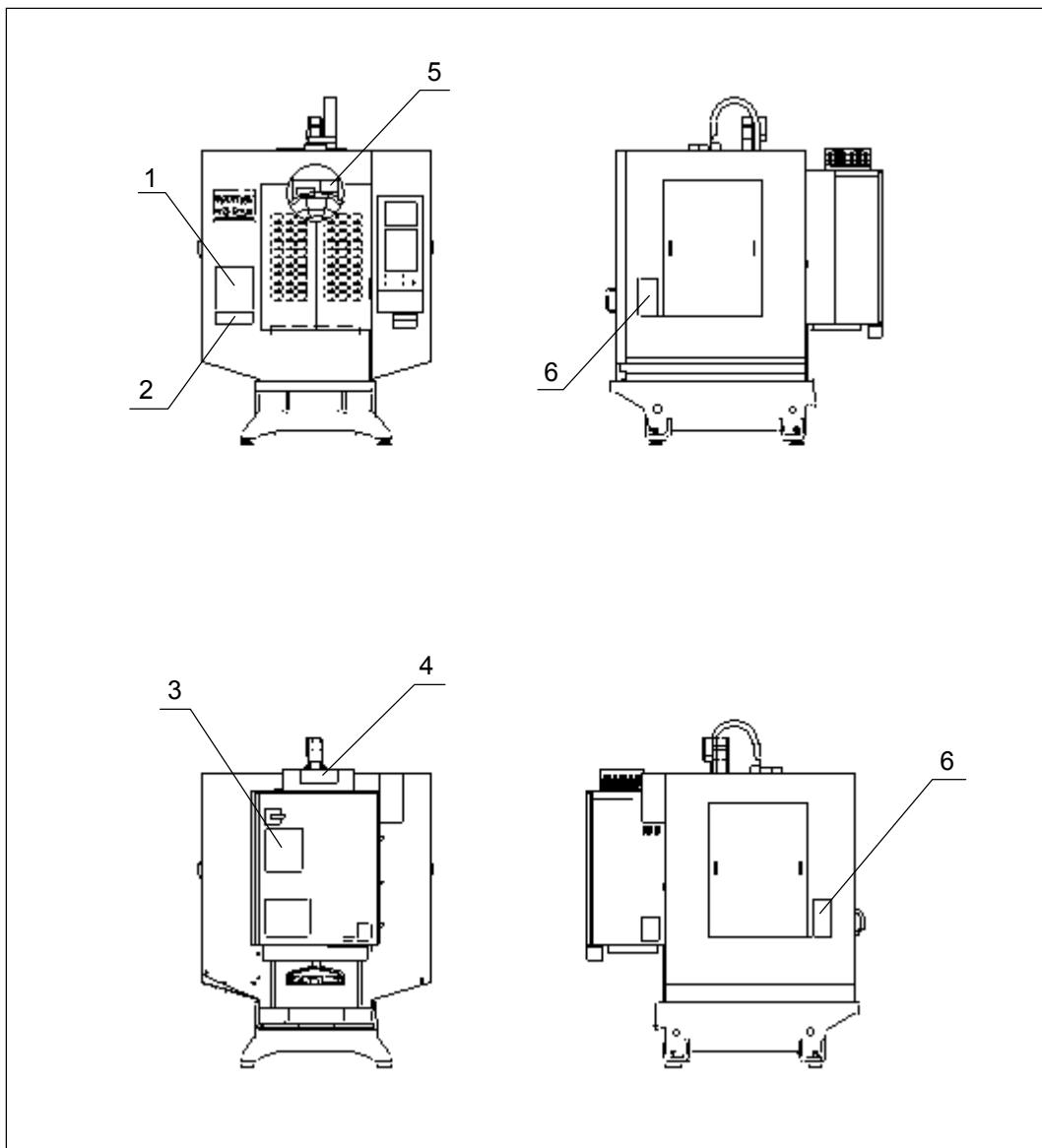
- OW42 When the plant is poorly illuminated, inside the machine is dark and you may injure your hands on jigs or cutters.  
OW42-1 Install a machine light when the illumination inside the machine is 500 lux or below.

## Description of safety label

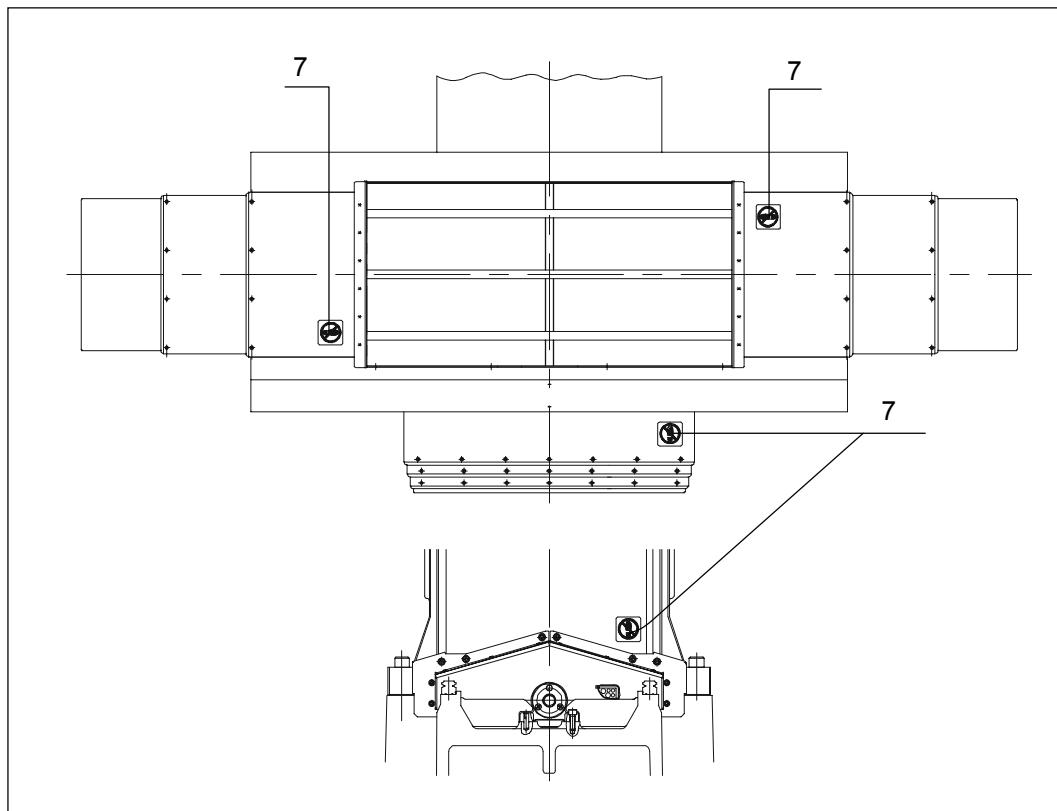
Particularly important descriptions in the safety manual are printed on a safety label, and the label is attached to the machine. Carefully read and understand the descriptions on the label before operating the machine.

The safety labels are attached to the positions shown in the illustration below. Check that the labels are not damaged. If damaged, obtain a new label for replacement.

## Position of safety label



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S2A00401.ai

## 1. Safety label , front and side

(1) Language: English, Japanese, Chinese



Part Code : 690373001  
Part Name : PS LABEL,TC FRONT JCE

(2) Language: English, German, French

**This machine has hazards.**

Read instruction manuals to understand hazards and avoid them before operation.

Diese Maschine birgt Gefahren.

Um Risiken zu erkennen und vermeiden, vor dem Einschalten die Betriebsanleitung lesen.

L'utilisation de cette machine comporte des risques.

Lisez les manuels d'instruction pour connaître les risques et les éviter avant d'utiliser cette machine.

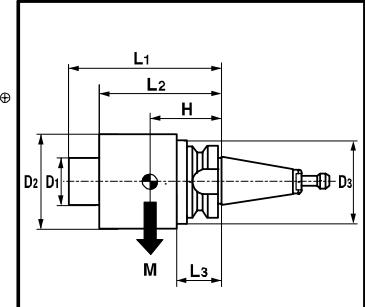
<b>DANGER</b>	<b>WARNING</b>	<b>WARNING</b>
		 
Machine in operation will suddenly move and crush you. Keep away from moving parts.	Broken tool or workpiece can hit and wound you. Shut door before starting machine.	Rotating parts can catch and injure you. Keep away from rotating tool, spindle, and magazine. Never hold moving parts. Do not wear gloves while operating machine.
<b>GEFAHR</b>	<b>WARNUNG</b>	<b>WARNUNG</b>
Maschine in Betrieb kann plötzlich laufen und Sie stoßen. Beim Betrieb der Maschine von allen bewegenden Teilen sich fernhalten, um Verletzungen zu vermeiden.	Gebrochene Werkzeuge oder Werkstücke könnten Sie treffen und verletzen. Vor dem Start der Maschine Tür schließen.	Umlaufende Teile könnten Sie fassen und verletzen. Von umlaufendem Werkzeug, Spindel und Magazin sich fernhalten. Rotierende Teile nicht berühren. Während des Bedienens keine Handschuhe tragen.
<b>DANGER</b>	<b>AVERTISSEMENT</b>	<b>AVERTISSEMENT</b>
En opération, cette machine bougera soudainement et provoquera des risques d'écrasement. Ne vous approchez jamais des parties mobiles.	Les outils cassés ou les pièces usinées peuvent être projetés et risquent de vous frapper et de vous blesser. Fermez la porte avant de faire démarrer la machine.	Les parties tournantes peuvent vous accrocher et vous blesser. Ne vous approchez jamais des outils tournant, de la broche et du magasin. Ne saisissez jamais les parties en mouvement. Ne portez pas de gants pendant l'utilisation.

691042001 / 0302 (2)

Part Code : 691042001  
Part Name : PS LABEL,TC FRONT EGF

## 2. Tool label

工具、主軸回転数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。  
If use beyond the limitation of the tool and spindle speed, machine may be broken.  
Check the details by the operation manual before operation.



最高主軸回転速度	10000 min <sup>-1</sup> / 16000 min <sup>-1</sup>	Max Spindle Rotation Speed																
主軸テーパー	7 / 24 No.30	Spindle Taper																
ツールシャンク	MAS-BT30	Tool Shank																
フルスタッド	MAS-P30T-2 (30°)	Retention Knob																
マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)	Total in Magazine																
工具の制限	<table border="1"> <tbody> <tr> <td>D<sub>1</sub> ≤ 40 mm</td> <td>D<sub>1</sub> ≤ 40 mm</td> </tr> <tr> <td>L<sub>1</sub> ≤ 200 mm</td> <td>L<sub>1</sub> ≤ 200 mm</td> </tr> <tr> <td>D<sub>2</sub> 80 mm</td> <td>D<sub>2</sub> 55 mm</td> </tr> <tr> <td>L<sub>2</sub> ≤ 160 mm</td> <td>L<sub>2</sub> ≤ 160 mm</td> </tr> <tr> <td>D<sub>3</sub> 46 mm</td> <td>D<sub>3</sub> 46 mm</td> </tr> <tr> <td>L<sub>3</sub> 30 mm</td> <td>L<sub>3</sub> 30 mm</td> </tr> <tr> <td>M 3 kg</td> <td>M 2 kg</td> </tr> <tr> <td>MxH≤180 kgmm</td> <td>MxH≤100 kgmm</td> </tr> </tbody> </table>	D <sub>1</sub> ≤ 40 mm	D <sub>1</sub> ≤ 40 mm	L <sub>1</sub> ≤ 200 mm	L <sub>1</sub> ≤ 200 mm	D <sub>2</sub> 80 mm	D <sub>2</sub> 55 mm	L <sub>2</sub> ≤ 160 mm	L <sub>2</sub> ≤ 160 mm	D <sub>3</sub> 46 mm	D <sub>3</sub> 46 mm	L <sub>3</sub> 30 mm	L <sub>3</sub> 30 mm	M 3 kg	M 2 kg	MxH≤180 kgmm	MxH≤100 kgmm	Limitation of Tool
D <sub>1</sub> ≤ 40 mm	D <sub>1</sub> ≤ 40 mm																	
L <sub>1</sub> ≤ 200 mm	L <sub>1</sub> ≤ 200 mm																	
D <sub>2</sub> 80 mm	D <sub>2</sub> 55 mm																	
L <sub>2</sub> ≤ 160 mm	L <sub>2</sub> ≤ 160 mm																	
D <sub>3</sub> 46 mm	D <sub>3</sub> 46 mm																	
L <sub>3</sub> 30 mm	L <sub>3</sub> 30 mm																	
M 3 kg	M 2 kg																	
MxH≤180 kgmm	MxH≤100 kgmm																	
工具バランス制限	100grmm	50grmm	Limitation of Tool Balance															
主軸回転数制限	10000 min <sup>-1</sup>	16000 min <sup>-1</sup>	Limitation Spindle Rotation Speed															

653379001 / 0210 (2)

Part Code : 653379001  
Part Name : Tool LABEL250

### 3. Safety label, rear and High pressure coolant equipment

(1) Language: English, Japanese, Chinese



690730001 / 9709 (1)

Part Code : 690730001  
Part Name : PSLABEL, TC REARJCE

(2) Language: English, German, French



Part Code : 691045001  
 Part Name : PSLABEL, TC REAR EGF

#### 4. Label, regenerative resistor

(1) Language: English, Japanese, Chinese

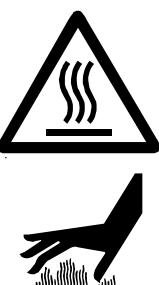
	<b>⚠ WARNING</b>	<b>⚠ 警告</b>	<b>⚠ 警告</b>
<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>熱い抵抗器 さわるとやけどする。</p> <p>運転が終り、 30分たってから、 カバーをはずすこと。</p>	<p>热电阻 触摸会烫伤。</p> <p>停止运行 30 分钟之后， 才可取下安全罩。</p>	

690729001 / 9709 (1)

Part Code: 690729001

Part Name: LABEL, TC REGENERATIVE JCE

(2) Language: English, German, French

	<b>⚠ WARNING</b>	<b>⚠ WARNUNG</b>	<b>⚠ AVERTISSEMENT</b>
<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>Heißer Widerstand könnte Ihre Hand verbrennen.</p> <p>Nach dem Ausschalten der Maschine 30 Minuten warten, dann den Schutzdeckel entfernen.</p>	<p>Température de la résistance élevée, pouvant causer des brûlures.</p> <p>Après avoir arrêté la machine, attendez 30 minutes avant d'enlever le capot.</p>	

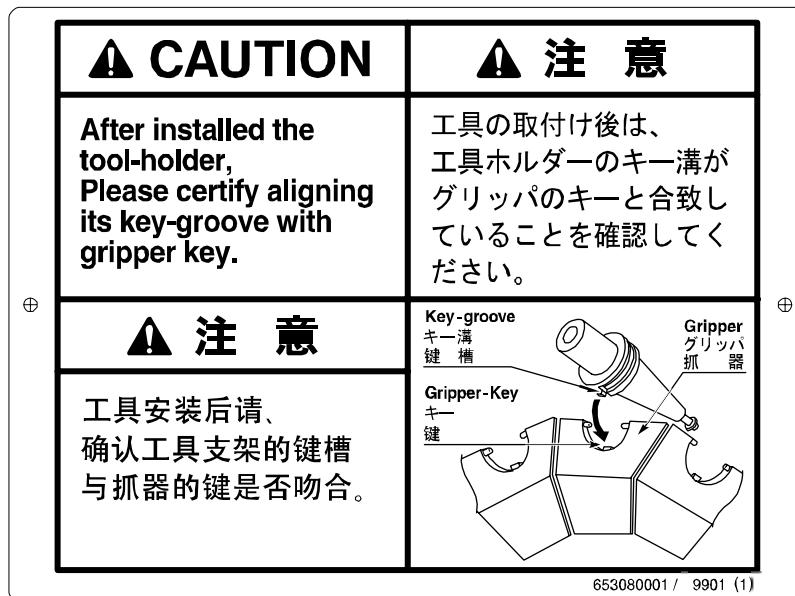
691058001 / 0302 (2)

Part Code: 691058001

Part Name: LABEL, TC REGENERATIVE EGF

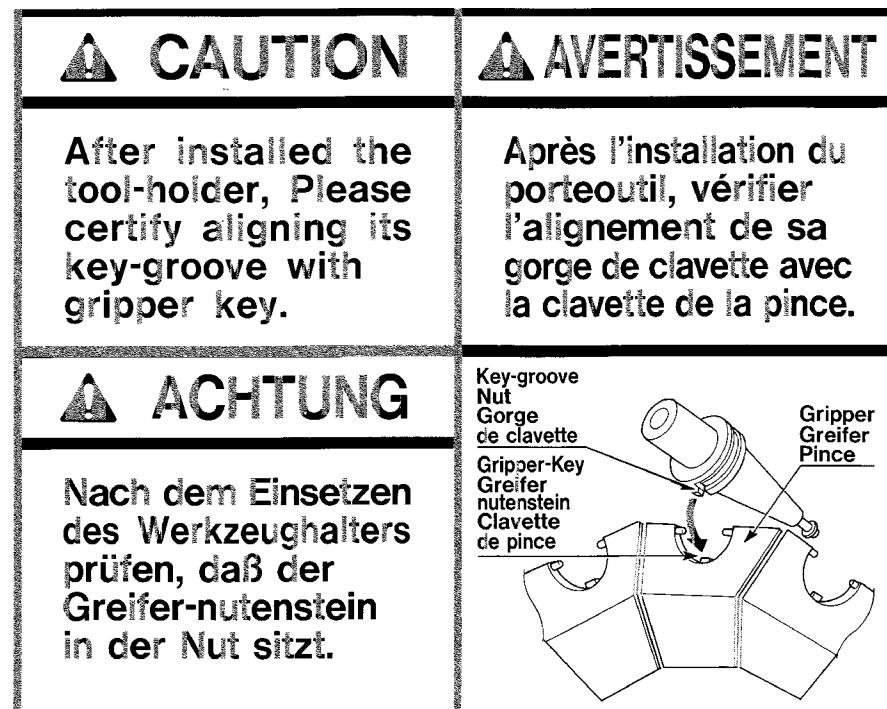
## 5. Label, removing tool

(1) Language: English, Japanese, Chinese



Part Code : 653080001  
 Part Name : LABEL, Removing Tool JCE

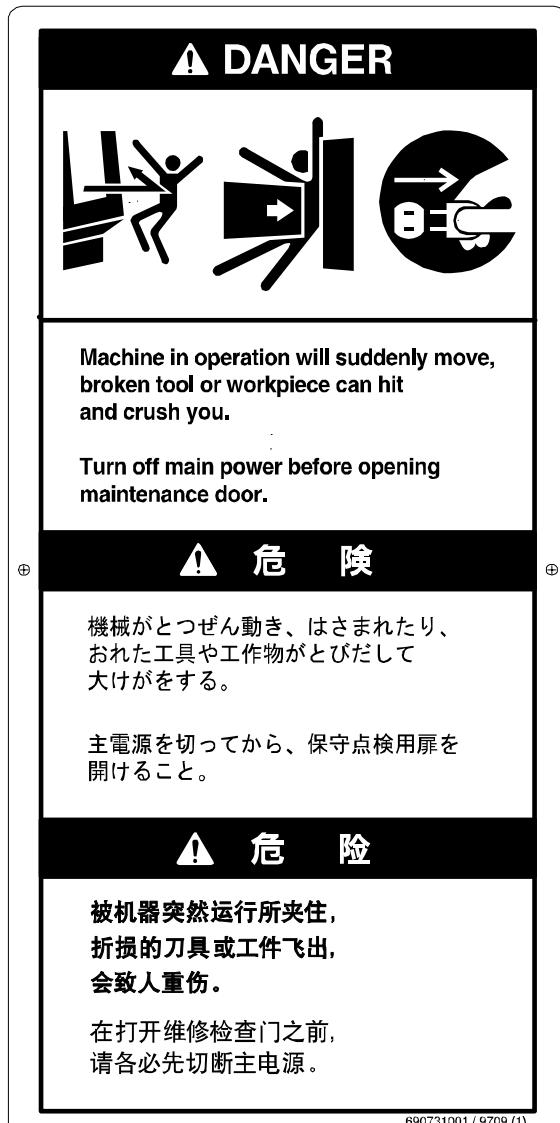
(2) Language: English, German, French



Part Code : 69104001  
 Part Name : LABEL, Removing Tool EGF

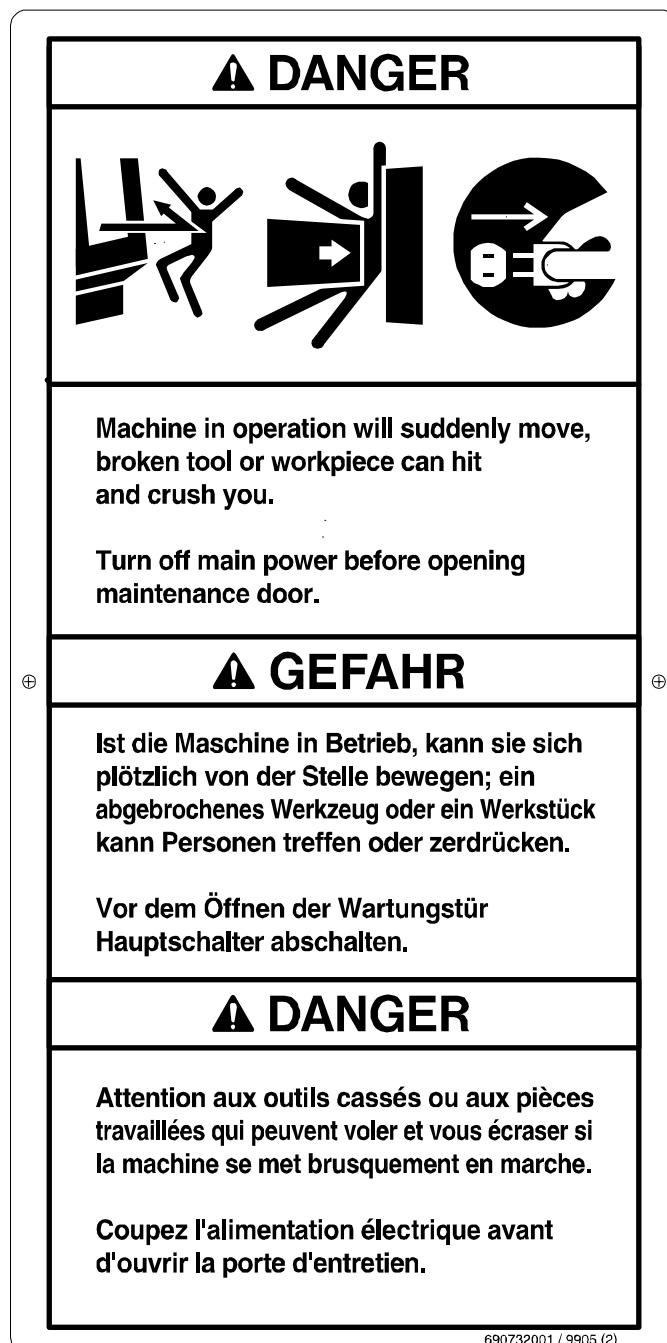
## 6. Label, side cover

- (1) Language: English, Japanese, Chinese



Part Code : 690731001  
 Part Name : LABEL, TC MAINTENANCE DOOR JCE

(2) Language: English, German, French



690732001 / 9905 (2)

Part Code : 690732001  
Part Name : LABEL, TC MAINTENANCE DOOR EGF

**7. "Keep Off" label 40**

Part code : 693178001



693178001 / 0607 (1)

693178001.ai

## **DOOR INTERLOCK FUNCTION**

- 1. General Precautions**
- 2. Overall View**
- 3. Inspection of Door Interlock**
- 4. Function Details**

# 1 General Precautions

## DANGER

**When the door interlock switch is invalid, the machine moves even when the work door is open. You may cut yourself on a rotating tool or be caught in the machine.**

**When the door interlock switch is invalid, do not put your hands, feet, and body in the machine. Report it to the supervisor.**

**When the door interlock is invalid, the supervisor must not allow anybody to operate the machine.**

**Visually check by yourself that the door interlock switch is valid before starting machine operation.**

**If the door interlock key is attached, report it to the supervisor.**

**The supervisor must always keep the door interlock key.**

## DANGER

**When the door interlock switch is turned off, the table may move. Mechanical parts inside the inner door move even if the inner door is open. You may be caught and injured on the table.**

**You may be caught in the machine.**

**When the door interlock switch is invalid, do not put your hands, feet, and body inside the outer door.**

**When the door interlock is invalid, the supervisor must not allow anybody to operate the machine.**

**If the door interlock key is attached, report it to the supervisor.**

## DANGER

**When the inner door is open, you may cut yourself on a rotating tool or have your hand caught in the machine.**

**The operator must not open the inner door.**

**When the inner door is open, do not put your hands and feet inside the machine. The supervisor must apply a padlock to the inner door. The supervisor must always keep the inner door key.**

**The supervisor should not allow the operator to use the machine when the inner door is not padlocked.**

**Visually check by yourself that the door interlock switch is valid before starting machine operation.**

**When you find that the inner door is not padlocked, you must inform your supervisor of it.**

**⚠ WARNING**

**Touching rotating tools results in injury.  
Keep away from rotating tools.**

**⚠ WARNING**

**You may be caught in the rotating part, resulting in an injury.  
Keep away from rotating tools, the spindle, and the ATC magazine.  
Wear snug-fitting clothes. Put long hair up in cap.  
Do not wear gloves except for set-up operations carried out with  
the machine stopped. Do not wear any accessories. Do not hold  
the rotating part.**

## Purpose

The door interlock function protects workers from being caught in the machine while tools are rotating and parts are moving.

## Unit Description

The interlock is activated so that the outer door is locked and the maximum speed is limited to suit the situation.

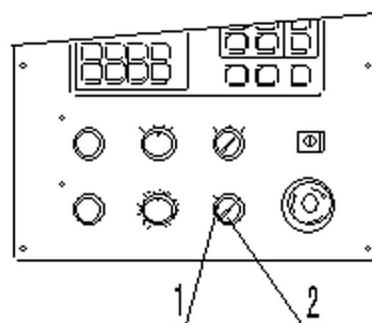
## Unit Structure

The door interlock unit is composed of the following:

1. Door limit switch
2. Door lock

### Using the Door Interlock Function

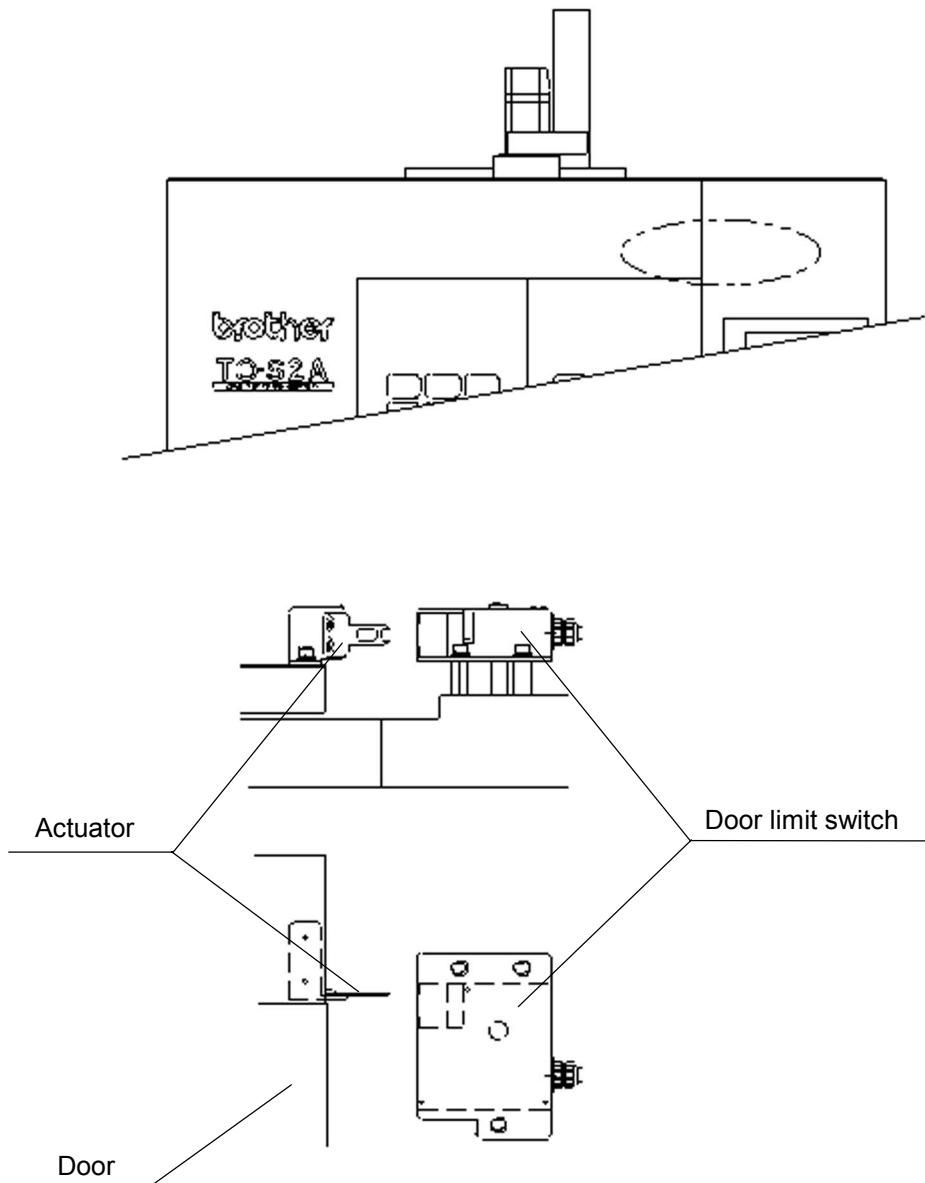
1. During daily operation  
Always keep the door interlock function switch (1) on.
2. During set-up and maintenance  
Turn the switch off only when it is necessary to release the interlock function during set-up and maintenance.  
Read the "Safety manual for those who install and set-up the tapping center" and the "Safety manual for those qualified for tapping center maintenance" before starting set-up and maintenance.  
Please observe the following when the interlock function is off.
  - When the door interlock function is off, be extremely careful not to be caught on a rotating tool or any moving parts.
  - After set-up or maintenance, turn the switch on.
  - The supervisor is responsible for keeping the key (2).



230S00C03.Doc

## 2 Overall View

TC-S2A



250S00C04.doc

# 3 Door Interlock Inspection

Before starting machine operation, be sure to inspect the door interlock.

## Inspection steps

### Inspection of operation stoppage

1. Close the door completely, then turn the power on and conduct home position return.  
Check that the door interlock switch is validated.
2. Open the outer door.
3. If the door interlock is operating correctly, the machine does not move even when the [-X] key on the operation panel is pressed.  
At this time, an alarm indicating the door is open is output.  
If the alarm is not output, the interlock function is faulty. Repair it.  
After verifying that the door interlock is operating correctly, proceed to the next step.

### Inspection of door lock

4. Close the outer door.
5. Rotate the spindle.
6. If the door lock operates correctly, the outer door is locked and cannot be opened. If the door can be opened, the door is not locked and the interlock function is faulty. Repair it.

### Emergency stop inspection

7. Rotate the spindle in manual mode.
8. If the door interlock is operating correctly, the machine stops and the [\*EMERGENCY SW ON] alarm is displayed when the emergency stop button is pressed. If the machine does not stop or no alarm message is displayed, the interlock function is faulty. Repair it.

## 4 Function Details

Door condition (*6)	Door interlock	Door lock (*6)	Machine operation
Closed	Invalid	Will not be locked.	All operations are possible.
	Valid	During machine operation (axis movement, spindle rotation, MDI operation, MEMORY operation, or when the manual pulse generator is on.) (*4)	
Open	Invalid	Will not be locked	<ul style="list-style-type: none"> <li>• Spindle rotation, magazine swivel, ATC, and tapping are impossible. (*2)</li> <li>• Axis movement, spindle stop, and spindle orientation are possible. (*1)</li> <li>• MEMORY operation is possible only in single operation mode.</li> <li>• MDI operation stops at each block end.</li> <li>• Coolant is not supplied.</li> </ul>
	Valid		<ul style="list-style-type: none"> <li>• All operations are impossible. (*2) (*5)</li> <li>• Coolant is not supplied.</li> </ul>
Closed ↓ Open	Invalid		<ul style="list-style-type: none"> <li>• All operations (including spindle rotation) stop immediately. (*3)</li> <li>• Coolant stops immediately.</li> </ul>
	Valid		<ul style="list-style-type: none"> <li>• All operations (including spindle rotation) stop immediately. (*3) (*5)</li> <li>• Coolant stops immediately.</li> </ul>
Open	Invalid ↓ Valid		

- \*1 The rapid traverse feed speed is preset by the MAX RAPID SPEED (DOOR OPEN) of machine parameter.  
The cutting feed speed is restricted to the speed preset by the MAX RAPID SPEED (DOOR OPEN) of machine parameter.  
Additional axes (A, B, C) are also restricted to the speed preset by the MAX H. SPD ROTN 4,5,6 (DOOR OPEN) of machine parameter.
  - \*2 The “NOT CLOSING DOOR” error occurs when the front door is open when operation is attempted  
The “SIDE DOOR OPEN” error occurs when the side door is open when operation is attempted.
  - \*3 Operations, including tapping, spindle orientation, ATC, or magazine swivel, stop at each block end. When the door is opened during spindle rotation, the “DR OPEN SPNDL STOP” error occurs and the spindle stops. When the door is closed and operation is resumed, the rotating condition prior to stopping is recovered.  
However, when the following operations are carried out, the “DR OPEN SPNDL STOP” error is reset. Even if the door is closed and operation is resumed, the rotating condition prior to stopping is not recovered when:
    - 1) The [RESET] key is pressed.
    - 2) Spindle operation is carried out in manual mode.
- Note**  
When the door is opened during spindle rotation after the end mill tap first motion (XY-axes movement and spindle rotation), the spindle stops but the “DR OPEN SPNDL STOP” error does not occur. Even if the door is closed and operation is resumed, the rotating condition prior to stopping is not recovered. The spindle automatically rotates when the Z-axis moves while cutting from point “R”.
- \*4 During machine operation  
The term machine operation here includes both temporary stop and block stop (it does not include when the program has finished and during program stop) for MDI operation and MEMORY operation.
  - \*5 Special specifications  
When the door is opened while the door interlock is activated, the servomotor turns off. When the door is opened before MEMORY operation or during program stop (M00), the “NOT CLOSING DOOR” error occurs and the servomotor turns OFF. Close the door or deactivate the door interlock to reset the error and turn the servo motor ON.  
When the door is opened during MEMORY operation, however, the “SERVO MOTOR STOPPED” or “DR OPEN MACHINE STOP” error occurs.  
This error cannot be reset even when the door is closed. Press the [RST] key.

# **Die Sicherheitsvorschrift für Personen, die die Maschine installieren und den Arbeitsprozeß aufstellen für Tapping Centre**

## **Tapping Centre TC-S2A**

**Lesen Sie bitte aufmerksam diese  
Sicherheitsvorschrift, bevor Sie die Tapping Centre  
benutzen.**

**Brother Industries, Ltd. Machinery & Solution Company.**

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## Was ist die Sicherheitsvorschrift?

## Bitte lesen Sie!

Alle Leute, die die Tapping Centre benutzen, einschließlich der Leute, die die Tapping Centre in einer Fabrik installieren, die mit der Tapping Centre arbeiten, und die die Tapping Centre warten oder reparieren, sind aufgefordert, diese Sicherheitsvorschrift zu lesen.

In der Sicherheitsvorschrift werden alle Leute, die die Tapping Centre benutzen, als Benutzer bezeichnet.

## Zweck

Die Tapping Centre ist eine Hochspannungsstrommaschine mit schnell umlaufenden Werkzeugen, und einem Tisch und einem ATC-Magazin, die sich mit starker Kraft bewegen. Deshalb bestehen verschiedene Gefahren bei der Benutzung dieser Maschine.

Der Zweck dieser Sicherheitsvorschrift ist es, vor Gefahren die Benutzer zu schützen.

In der Sicherheitsvorschrift wird Folgendes erklärt:

## Warnung: Welche Gefahren bestehen?

## Wartung: Welche Gefahren bestehen? Preventivmaßnahme: Wie kann man die Gefahren vermeiden?

## **Zusammenstellung der Sicherheitsvorschriften und der Zusammenhang mit anderen Manuals**

Jedem Manual (außer der Programmieranleitung) ist eine Sicherheitsvorschrift für die betreffenden Benutzer beigelegt.

Für die verschiedenen Funktionen oder das Betriebsverfahren der Maschine lesen Sie bitte das entsprechende Manual.

1. Betriebsanleitung (Für alle Benutzer)  
"Die Sicherheitsvorschrift für Operateure"  
"Die Sicherheitsvorschrift für Personen, die Maschine installieren und den Arbeitsprozeß aufstellen für Tapping Centre"  
"Betriebsanleitung"  
Notwendige für grundlegenden Betriebsverfahren für alle Benutzer.  
Deutsch Teil-Code: 693076001

2. Betriebsanleitung (Für Fachpersonal)  
"Die Sicherheitsvorschrift für Operateure"  
"Die Sicherheitsvorschrift für Personen, die Maschine installieren und den Arbeitsprozeß aufstellen für Tapping Centre"  
"TÜRVERRIEGELUNGSFUNKTION"  
"Betriebsanleitung"  
Notwendige Betriebsmaßnahmen für die Aufstellung und die Bearbeitung.  
Dialogorientierte Japanischer Teil-Code: 693312001  
Programmierung Englischer Teil-Code: 693307001  
NC-Sprache Japanischer Teil-Code: 693310001  
Englischer Teil-Code: 693305001

3. Installierungsanweisung "Die Sicherheitsvorschrift für Personen, die die Maschine installieren und den Arbeitsprozeß aufstellen  
Japanischer Teil-Code: 693311001  
Englischer Teil-Code: 693306001

4. Programmierungsanleitung  
"Programmierungsanleitung:  
Programmierung der Bearbeitung"  
Dialogorientierte Japanischer Teil-Code: 693314001  
Programmierung Englischer Teil-Code: 693309001  
NC-Sprache Japanischer Teil-Code: 693313001  
Englischer Teil-Code: 693308001

5. Wartungsvorschrift  
"Die Sicherheitsvorschrift für qualifiziertes Wartungspersonal  
Tapping Centre ist der Für Wartungsvorschrift beigelegt."  
"Wartungsvorschrift:  
Nachstellung und Reparatur der Maschine"  
Die Wartungsvorschrift wird an die Kunden nicht verteilt.

## **Beziehung mit Sicherheitsschildern**

Die wichtigsten Vorschriften der Sicherheitsvorschriften sind in Form von Sicherheitsschild an der Maschine angebracht.

Eine Erklärung für die Sicherheitsschilder gibt es am Ende der Sicherheitsvorschrift. Falls sich die Sicherheitsschilder von der Maschine lösen sollten, informieren Sie uns. Wir schicken Ihnen sofort Ersatzschilder zu.

## **Sprache**

Die Maschinen für den japanischen Markt werden mit den Sicherheitsvorschriften und den Sicherheitsschildern auf japanisch ausgestaltet. Aus Japan exportierte Maschinen sind mit Sicherheitsanweisungen und -schildern auf vier Sprachen ausgestattet: Englisch, Deutsch, Französisch und Chinesisch.

Fordern Sie deshalb die für Sie entsprechenden Vorschriften und Schilder, einschließlich dieser in anderen Sprachen, bei Ihrem Händler an.

## **Kundendienst**

Sollten die Sicherheitsvorschriften oder die Sicherheitsschilder verloren gehen, bekommen Sie diese bei Ihrem Händler.

Wenn Sie Ihren Händler nicht kennen sollten, rufen Sie beim nachfolgenden Büro an.

1-1-1 Kawagishi, Mizuho-ku, Nagoya 467-8562, JAPAN  
BROTHER INDUSTRIES, LTD. Machinery & Solution Company.  
phone +81-52-824-2232  
fax +81-52-811-0469

## **Handhabung der Sicherheitsvorschrift**

Geben Sie acht, daß Sie die Sicherheitsvorschriften nicht verlieren, und bewahren Sie diese immer griffbereit auf.

Sollte die Maschine den Besitzer wechseln, dann müssen auch die Sicherheitsvorschriften an den neuen Besitzer zusammen mit der Maschine übergeben werden.

## **Gefahrenstufe**

Die auftretenden Schäden bei Nichteinhaltung der Sicherheitsvorschriften werden in drei Stufen klassifiziert.

1. GEFAHR

### **⚠ GEFAHR**

Lebensgefahr oder leichte Körperverletzungsgefahr.

2. WARNUNG

### **⚠ WARNUNG**

Schwere Verletzungsgefahr.

3. ACHTUNG

### **⚠ ACHTUNG**

Leichte Verletzungsgefahr.

## **Reihenfolge der Erklärung**

Hier wird Folgendes erklärt:

1. Stichwörter (GEFAHR, WARNUNG, ACHTUNG), die die Gefahren anzeigen, und Bildzeichen
2. Gefahrengruppe
3. Möglicher Verletzungsgrad
4. Preventivmaßnahme

## Bedeutung der Bildzeichen

Auf den Sicherheitsschildern und in den Sicherheitsvorschriften werden die Gefahren und deren Preventivmaßnahmen mit Bildzeichen anschaulich erklärt. Hier wird ihre Bedeutung erklärt.

### 1. Gefahr



Rutschen



Laufender Teil



Stolpern



Stromschlag



Stromschlag



Hineingezogen



Hand geklemmt



Heiß



Heiß



Sich schneiden



Sich schneiden



Explosion



Sich stechen



Fallender Gegenstand



Fallender Gegenstand



Umlaufender Gegenstand



Sturz



Spritzen



Spritzen



Feuer

## 2. Preventivmaßnahmen



Ohren schützen



Hände schützen



Füße schützen



Netzstecker abziehen



Nicht berühren



Kopf schützen



Erden



Nicht zerlegen



Augen schützen

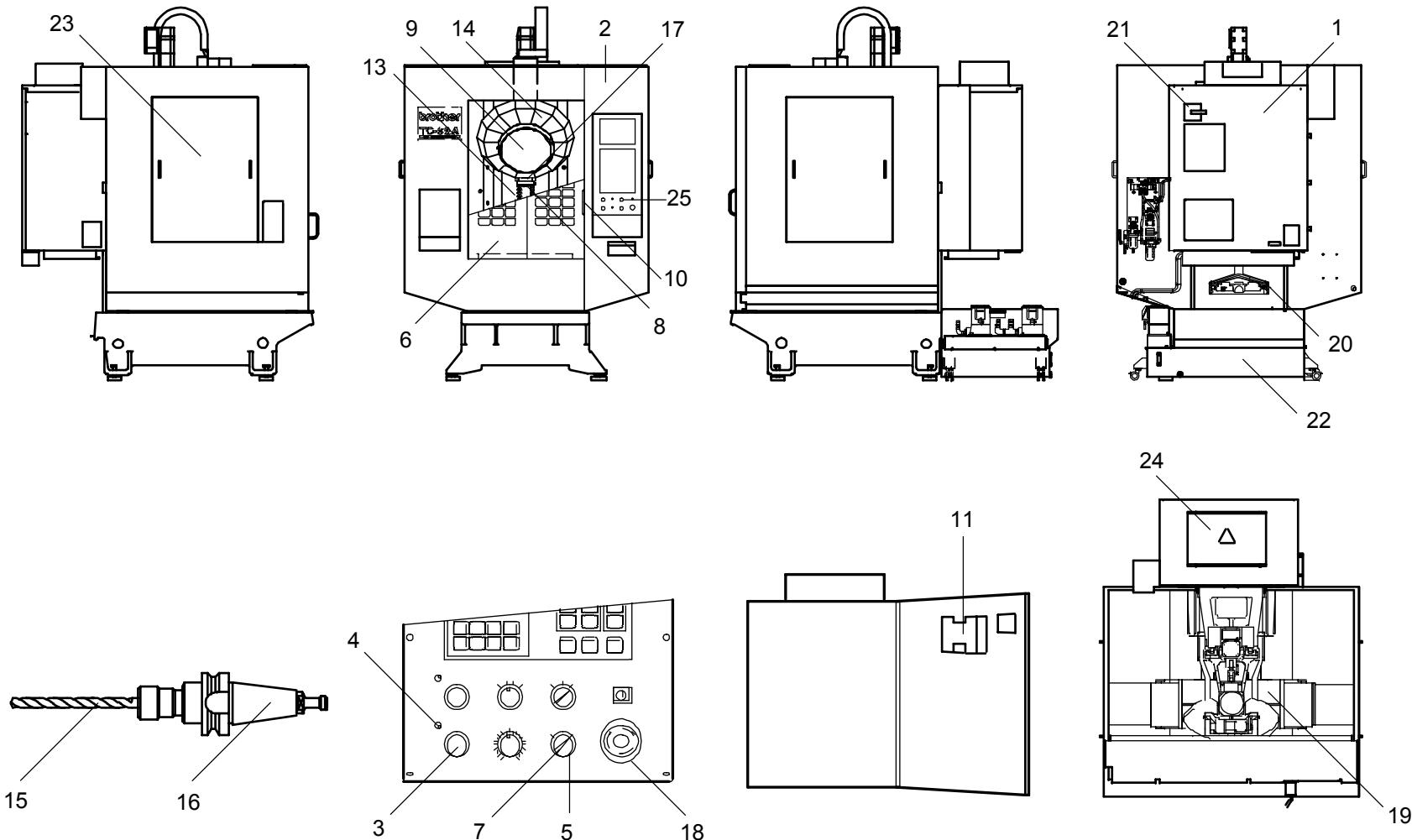
## 部品名

## Section Names

## Namen jedes Teils

## Noms de sections

## 各部件名称



TS2ASA01-1.ai

部品名	Section Names	Namen jedes Teils	Noms de sections	各部件名称
No.	各部の名称	Section names	Namen jedes Teils	Noms de sections
1.	日本語	English	Deutsch	Français
1.	制御箱	control box	Steuerschrank	armoire de commande
2.	スプラッシュガード	splash guard	Spitzblech	tôle pare-copeaux
3.	停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt
4.	停止ランプ	stop lamp	stop Lampe	lampe d'arrêt
5.	ドアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage
6.	作業扉	work door	Arbeitstür	porte de travail
7.	ドアインタロックキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage
8.	スピンドル	spindle	Spindel	broche
9.	ATC マガジン	ATC magazine	ATC Magazin	ATC magasin
10.	取手	handle	Griff	poignée
11.	制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande
12.	レベリングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine
13.	クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe
14.	グリップカバー	grip cover	Griffschutz	couverture de jambe
15.	工具	tool	Werkzeug	outil
16.	工具ホルダ	tool holder	Werkzeughalter	support à outil
17.	スピンドルヘッド	spindle head	Spindelkopf	tête de la broche
18.	非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence
19.	ケーブルカバー	cable cover	kabelschutz	couvre cable
20.	テーブル	table	Tisch	table
21.	主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale
22.	クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe
23.	スプラッシュガードサイドカバー	splash guard side cover	Spitzblechseitenschutz	couverture à côté du tôle pare-copeaux
24.	回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice
25.	操作パネル	operation panel	Betriebstafel	panneau d'opération

# Warnungen und Preventivmaßnahmen

Jede Zahl in Klammern wie (1)(2) entspricht der Nummer der Namen jedes Teils.

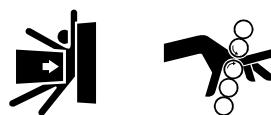
## Gefahr

### ⚠ GEFAHR

- SD1 In der Tapping Centre bestehen verschiedene Gefahren.  
 SD1-1 Vor Inbetriebnahme der Maschine die Sicherheitsvorschrift lesen, um die Risiken zu erkennen und die Preventivmaßnahmen zu verstehen.  
 SD1-2 Alle Benutzer müssen wissen, wo der Notfall-stop-Schalter(19) ist, und wie er benutzt wird.



- SD2 Im Steuerschrank (1) gibt es einen Hochspannungsteil. Bei versehntlicher Berührung besteht die Gefahr, sich schwer oder lebensgefährlich zu verletzen.  
 SD2-1 Nur hochqualifizierte Elektriker dürfen die elektrischen Teile dieser Maschine warten und reparieren.  
 SD2-2 Vor Wartung den Hauptschalter (21) ausschalten. Für Dritte kenntlich machen, daß es gearbeitet wird.  
 SD2-3 Beim Verlassen der Maschine die Tür des Steuerschranks zumachen und zuschrauben.



- SD3 Es besteht die Gefahr, von laufenden Maschinenteilen geklemmt zu werden und sich dabei schwer zu verletzen.  
 SD3-1 Während die Maschine in Betrieb ist, darf kein Körperteil in die innere Seite des Spitzblechs (2) gelangen.  
 SD3-2 Bevor man in die Maschine greift oder sich in die Maschine begibt, den stop-Einschalter (3) oder die reset-Taste drücken und sich mit eigenen Augen vergewissern, daß die stop-Lampe (4) leuchtet.  
 SD3-3 Vor Anwerfen der Maschine sich mit eigenen Augen vergewissern, daß niemand innerhalb des Spitzblechs ist.  
 SD3-4 Während die Maschine in Betrieb ist, von laufenden Teilen Hände, Füße und sonstige Körperteile fernhalten.  
 SD3-5 Wenn man in die Maschine eintreten muß, muß der Hauptschalter (21) ausgeschaltet und verschlossen werden, damit ihn niemand mehr einschalten kann.

## SD4

- Wenn die Tüverriegelung (5) deaktiviert ist, bewegt sich die Maschine sogar, wenn die Arbeitstür (6) offen ist. Es besteht deshalb die Gefahr, von einem umlaufenden Werkzeug (15) geschnitten, oder von den Maschinenteilen geklemmt und verletzt zu werden.

## SD4-1

- Während der Einstellung der Maschine auf die Bewegung der Maschine achtgeben, damit die Maschine zu jeder Zeit angehalten werden kann. Nach einer Einstellung der Maschine oder einer Aufstellung den Verriegelungsschalter wieder in Kraft setzen, den Verriegelungsschlüssel (7) abziehen und aufbewahren.

## SD4-2

- Bei nicht aktiverter Verriegelung darf die Maschine nicht verlassen werden.

- SD5 Wenn die Türverriegelung (5) nicht aktiviert ist, kann sich der Tisch (20) bewegen. Es besteht die Gefahr, vom Tisch eingeklemmt und verletzt zu werden.
- SD5-1 Während der Einstellung der Maschine auf die Bewegung der Maschine achtgeben, damit die Maschine zu jeder Zeit angehalten werden kann. Nach Beendigung der Einstellung den Verriegelungsschalter wieder aktivieren. Der Verriegelungsschlüssel (7) wird abgezogen und muss vom Betriebsleiter aufbewahrt werden.

**Warnung**  **WARNUNG**



- SW1 Wenn man umlaufende Werkzeuge (15) beührt, wird man verletzt.  
SW1-1 Von umlaufenden Werkzeugen sich fernhalten.



- SW2 Es besteht Verletzungsgefahr durch abgebrochene Werkzeuge (15) oder herauspringende Werkstücke.  
SW2-1 Arbeitstür (6) schließen.



- SW3 In umlaufenden Teil können die Finger hineingezogen und verletzt werden.  
SW3-1 Von umlaufendem Werkzeug (15), dem Spindel (8) und dem ATC-Magazin (9) sich fernhalten.  
SW3-2 Küperanliegende Bekleidung tragen. Lange Haare müssen in einem Hut aufgesteckt werden. Beim Arbeiten an der laufenden Maschine keine Handschuhe tragen. Keinen Schmuck tragen. Umlaufende Teile nicht berüren.



- SW4 Wenn die Sicherheitsvorrichtung abgeändert wird, funktioniert sie nicht mehr richtig. Es besteht die Gefahr, einen Stromschlag zu erhalten, von den Maschinenteilen geklemmt zu werden oder sich zu stoßen.  
SW4-1 Die Sicherheitsvorrichtung nicht abändern. Die Sicherheitsvorrichtung nicht unbeweglich festmachen.



- SW5 Wenn Stahlspäne in die Augen hineinspringen, werden die Augen verletzt. Es besteht die Gefahr, die Sehkraft zu verlieren.  
SW5-1 Einen Augenschutz gegen Stahlspäne tragen.  
SW5-2 Stahlspäne nicht mit einer Luftpistole wegpegen.



- SW6 Wenn man Stahlspäne mit bloßen Händen berürt, kann man sich schneiden oder verbrennen.
- SW6-1 Stahlspäne nicht mit bloßen Händen berühren. Die Spitze der Werkstücke nicht mit bloßen Händen berühren.
- SW6-2 Beim Reinigen der Schneidechips Handschuhe tragen und eine Bürste benutzen.
- SW6-3 Schneidechips nur bei angehaltener maschine reinigen.
- SW7 Wenn man die Schneide der Werkzeuge (15) berührt, wird die Hand geschnitten.
- SW7-1 Die Schneide der Werkzeuge nicht berühren. Die Werkzeuge immer am Schaft des Werkzeughalters (16) halten.



- SW8 Wenn schwere Gegenstände auf die Füße fallen, besteht die Gefahr, sich den Fuß zu brechen.
- SW8-1 Beim Heben schwerer Gegenstände Schutzschuhe tragen.
- SW9 Beim Heben schwerer Gegenstände besteht die Gefahr, sich einen Bruch zu heben.
- SW9-1 Beim Heben schwerer Gegenstände immer jemanden um Hilfe bitten.
- SW9-2 Beim Heben schwerer Gegenstände nicht die Rückenkraft sondern die Beinkraft benutzen.



- SW10 Lange Zeit dauernder oder großer Lärm ist für die Ohren schädlich.
- SW10-1 Bei der Arbeit unter Lärm einen Gehörschutz, z.B. Stöpsel, tragen.



- SW11 Hochdruckluft kann explodieren und Augen oder Ohren verletzen.
- SW11-1 Nur hochqualifizierte Fachkräfte dürfen an dieser Maschine Hochdruckluftrohrleitungen installieren oder verändern.
- SW11-2 Vor der Arbeit an den Hochdruckluftrohrleitungen die Druckquelle abtrennen und den Restdruck ablassen. Bekannt machen, daß an der Druckleitung gearbeitet wird.



- SW12 Beim Aufstehen besteht die Gefahr, sich den Kopf anzustoßen und dabei zu verletzen.
- SW12-1 Beim Arbeiten in der Maschine oder in ihrem Bereich einen Schutzhelm tragen.



- SW13 Wenn Werkzeuge in der Maschine liegenbleiben sollten und die Maschine in Betrieb genommen wird, besteht die Gefahr, daß diese Werkzeuge herumgeschleudert werden und jemanden verletzen.  
 SW13-1 In der Maschine keine Werkzeuge bleibenlassen.



- SW14 Es besteht die Gefahr, sich die Finger zu klemmen, wenn die Arbeitstür (6) nicht mit der Klinke (10) auf- und zugemacht wird.  
 SW14-1 Türgriff (11) beim Öffnen und Schließen der vorderen und der Seitentür festhalten.



- SW15 Im Steuerschrank (1) gibt es einen heißen Teil. Deshalb besteht die Gefahr, daß sich die im Dokumentenbehälter (11) im Steuerschrank nicht ordentlich aufbewahrten Papiere entzünden.  
 SW15-1 Im Dokumentenbehälter im Steuerschrank dürfen keine größere Papiere als A4 aufbewahrt werden.



- SW16 Wenn man Werkzeuge auf dem Steuerschrank (1) oder auf der Maschine liegenläßt, besteht die Gefahr, daß diese wegen der Vibration der Maschine herunterfallen.  
 SW16-1 Auf dem Steuerschrank und auf der Maschine nichts liegenlassen.



- SW17 Wenn man auf die Maschine oder auf den Kühlmittelbehälter (22) steigt, besteht die Gefahr, zu stürzen und sich zu verletzen.  
 SW17-1 Nicht auf die Maschine und den Kühlmittelbehälter steigen.



- SW18 Wenn man unter den Nivellierbolzen (12) greift, besteht die Gefahr, sich zu klemmen und zu verletzen.  
 SW18-1 Nicht unter den Nivellierbolzen greifen. Nur mit zweckmäßigem Werkzeug den Nivellierbolzen einstellen.



SW19 Wenn das Kabel hängt oder nicht ordentlich verlegt ist, besteht die Gefahr, darüber zu stolpern.

SW19-1 Das Kabel darf nicht locker sein. Das Kabel auf dem Fußboden muß mit einem Schutz bedeckt werden.



SW20 Wenn an der Maschine Modifikationen vorgenommen werden, dann tritt die Sicherheitsvorrichtung außer Kraft, und alle angegebenen Warnungen gelten nicht mehr.

SW20-1 Die Maschine nicht modifizieren. Wenn eine Modifikation notwendig sein sollte, muß man die BROTHER INDUSTRIES.,LTD. vorher informieren und ihr schriftliches Einverständnis einholen.



SW21 Kühlmittel ist augenschädlich.

SW21-1 Bei der Einstellung der Kühlmitteldüse (14) einen Augenschutz tragen.

SW21-2 Wenn die Augen mit dem Kühlmittel in Berührung kommen, dann die Augen mit sauberem Wasser auswaschen und den Arzt konsultieren.



SW22 In jeder Spalte der Maschine besteht Klemm- und Verletzungsgefahr.

SW22-1 Nicht zwischen die zellen (27) fassen.

SW22-2 Nicht mit den Fingern zwischen das Werkzeug (16) oder den Werkzeughalter (17) und das ATC-Magazin kommen (10).



SW23 Wenn Kühlmittel, Schmierstoff oder Stahlspäne auf dem Fußboden ist, kann man rutschen und sich verletzen.

SW23-1 Vor Inbetriebnahme bei ausgeschalteter Maschine deren Innenseite und den Fußboden um die Maschine herum sauber machen.

SW23-2 Bei der Installierung einen Schutzhelm und Schutzschuhe tragen.



SW24 Beim Einsetzen und Herausnehmen des Werkzeughalters (16) besteht die Gefahr, sich zu schneiden oder sonstig zu verletzen.

SW24-1 Beim Austausch der Werkzeuge Lederhandschuhe tragen und die Schneide der Werkzeuge nicht berühren. Immer mit beiden Händen die Werkzeuge halten.



- SW25 Die Maschine kann plötzlich zum Laufen anfangen, und die Werkzeuge können aus der Haltung herausfallen.
- SW25-1 Wenn die stop-Lampe (4) nicht leuchtet, darf man mit keinem Körperteil unter den Spindelkopf (18) kommen.
- SW25-2 Bei der Aufstellung des Arbeitsprozesses den Tisch nach vorne ziehen oder die Säule ins Innere drücken.
- SW25-3 Den Hauptschalter (21) ausschalten und so verschließen, dass er nicht eingeschaltet werden kann und dann schmieren.



- SW26 Bei der Bearbeitung der Werkstücke mit ÖlKühlmittel besteht Brandgefahr.
- SW26-1 Wenn Werkstücke mit ÖlKühlmittel bearbeitet werden, müssen ein Feueralarm und eine automatische Feuerlöschanlage installiert werden.
- SW26-2 Bei der Bearbeitung muß der Operateur an der Maschine sein.



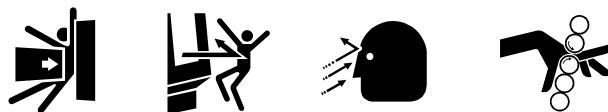
- SW27 Wenn man sich an die Maschine anlehnt, besteht die Gefahr, daß man beim Lauf der Maschine gequetscht oder gestoßen und verletzt werden kann.
- SW27-1 Sich nicht an die Maschine anlehnen.
- SW28 Wenn man etwas an den Notfall-stop-Schalter (18) hängt, besteht die Gefahr, bei Notfall den Schalter nicht drücken zu können.
- SW28-1 Nichts an den Notfall-stop-Schalter hängen.



- SW30 Der Kühlmitteltank (22) ist sehr schwer. Wenn man versucht zu heben, besteht die Gefahr, sich einen Bruch zu heben oder sich an die Füße durch Fallen des Tanks zu verletzen.
- SW30-1 Auch beim Aufräumen der Stahlspäne darf der Kühlmitteltank nicht aufgehoben werden.



- SW31 Beim Eintreten in die Maschine besteht die Gefahr, zu rutschen oder von den Maschinenteilen geklemmt zu werden.
- SW31-1 Vor dem Eintreten in die Maschine muß der Hauptschalter ausgeschaltet und verschlossen werden, damit ihn niemand mehr einschalten kann. Külmittel und Stahlspäne aufräumen. Külmittel und Stahlspäne aus dem Boden räumen. Schutzschuhe und einen Schutzhelm tragen. An der Betriebstafel der Maschine anzeigen, daß in der Maschine gearbeitet wird.



SW32 Wenn man vergißt, die Seitenabdeckung (23) des Spritzschutzes (2) aufzusetzen, besteht die Gefahr, geklemmt oder von einem gebrochenen Werkzeug verletzt zu werden.

SW32-1 Vor Einschalten der Maschine sich mit eigenen Augen vergewissern, daß der Seitenschutz aufgesteckt ist.



SW33 Wenn Werkzeuge (15) oder Werkzeughalter (16), deren Gewicht oder Größe die vorgeschriebene Beschränkung überschreitet, benutzt werden, besteht die Gefahr, daß die Werkzeuge herauspringen.

SW33-1 Die vorgeschriebene Gewicht- und Größebeschränkung der Werkzeuge und Halter einhalten.

SW33-2 Das auf den Werkzeugsschildern angegebene Vorschriften für die Beschränkung der Werkzeuge lesen, Betriebsanleitung.



SW34 Das Rückkopplungswiderstandsgerät wird während des Betriebs sehr heiß. Es besteht die Gefahr, daß man sich die Finger bei Berührung verbrennt.

SW34-1 Den Rückkopplungswiderstandsschutz (24) nicht abnehmen.

SW35 Der Motor wird während des Betriebs sehr heiß. Es besteht die Gefahr, daß man sich die Finger bei Berührung verbrennt.

SW35-1 Innerhalb von 30 Minuten nach dem Ausschalten der Maschine den Motor nicht berühren.



SW36 Bei Verwendung eines falschen Schmelzdrahts funktioniert die Schutzvorrichtung nicht. Es besteht Feuergefahr.

SW36-1 Einen zerrissenen Schmelzdraht mit einem Draht der selben Norm austauschen.

SW37 Wenn der Sollwert des Thermorelais geändert wird, funktioniert die Schutzvorrichtung nicht. Es besteht Feuergefahr.

SW37-1 Das Sollwert des Thermorelais nicht ändern.



- SW38 Beim Umlauf des ATC-Magazins (10) besteht die Gefahr, daß diese Werkzeuge (16) an das Werkstück, die Vorrichtung oder die Innenwand der Maschine anstoßen und abbrechen.
- SW38-1 Die Länge der Werkzeuge muß genau eingestellt werden, damit die Werkzeuge beim Umlauf des ATC-Magazins an das Werkstück, die Vorrichtung oder die Innenwand der Maschine nicht anstoßen.



- SW39 Wenn der Steuerschrank (1) oder die Betriebstafel (25) naß ist, besteht die Gefahr, einen Stromschlag zu erhalten.
- SW39-1 Den Steuerschrank und die Betriebstafel vor Flüssigkeit wie Kühlmittel, Wasser und Stahlspäne schützen.
- SW39-2 Mit naßen Händen den Steuerschrank nicht berühren.
- SW40 Wenn die von außen verdrahtete Kraft-PE-Linie zu kurz ist, kann sie durch einen Ruck des Kabels abreißen, und es besteht die Gefahr, einen Stromschlag zu erhalten.
- SW40-1 Die Kraft-PE-Linie länger als die anderen Linien (L1,L2,L3) halten und locker verbinden.



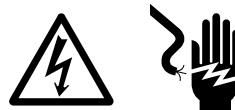
- SW41 Wenn man beim Bestehen der Explosionsgefahr den Schalter der Maschine einschaltet oder Werkstücke bearbeitet, besteht die Gefahr, daß ein überspringender Funke eine Explosion auslösen.
- SW41-1 Beim Bestehen der Explosionsgefahr nicht die Maschine installieren.
- SW41-2 Bei Explosionsgefahr in der Luft die Maschine nicht einschalten und die Bearbeitung sowie Vorbereitung nicht ausführen.



- SW42 Wird der Spritzseitenschutz (23) nicht angebracht, besteht die Gefahr, in der Maschine eingeklemmt und verletzt zu werden.
- SW42-1 Vor dem Einschalten des Schalters sich mit eigenen Augen vergewissern, daß der Spritzseitenschutz richtig aufgesetzt ist.



- SW44 Je nach Material des Werkstücks kann der Schneidesplitter Feuer fangen oder explodieren (z.B. Magnesium).
- SW44-1 Schneidesplitter sofort entfernen.
- SW44-2 Wenn mit feuergefährlichen Werkstücken gearbeitet wird, Feuerlöscher griffbereit halten. Betrieb niemals unbeobachtet lassen.



SW-45 Sollten die Frässapparate vom Werkzeug abgehen, könnten sie schwere Verletzungen verursachen.

SW45-1 Setzen Sie die Frässapparate in die Werkzeuge fest ein.

SW45-2 Vergewissern Sie sich, daß dies Fräpparate befestigt sind, bevor Sie die Werkzeuge in die Maschine fassen.



SW46 Es besteht Feuergefahr, wenn ein 3-Draht-Sensor mit einer Starkstromleitung verwendet wird.

SW46-1 Keinen 3-Draht- sondern einen 2-Draht-Sensor benutzen.

SW46-2 Falls ein 3-Draht-Sensor trotzdem notgedrungen benutzt werden muss, muss zusätzlich eine Sicherung (1 A oder geringer) an der Starkstromleitung jedes Sensors angebracht werden.



SW47 Wenn die Schrauben der Anschlussklemmleiste nach der Verdrahtung lose sind, kann durch den fehlerhaften Anschluss Hitze erzeugt werden und es besteht Feuergefahr.

SW47-1 Bei der Verdrahtung darauf achten, dass alle Schrauben fest angezogen sind.



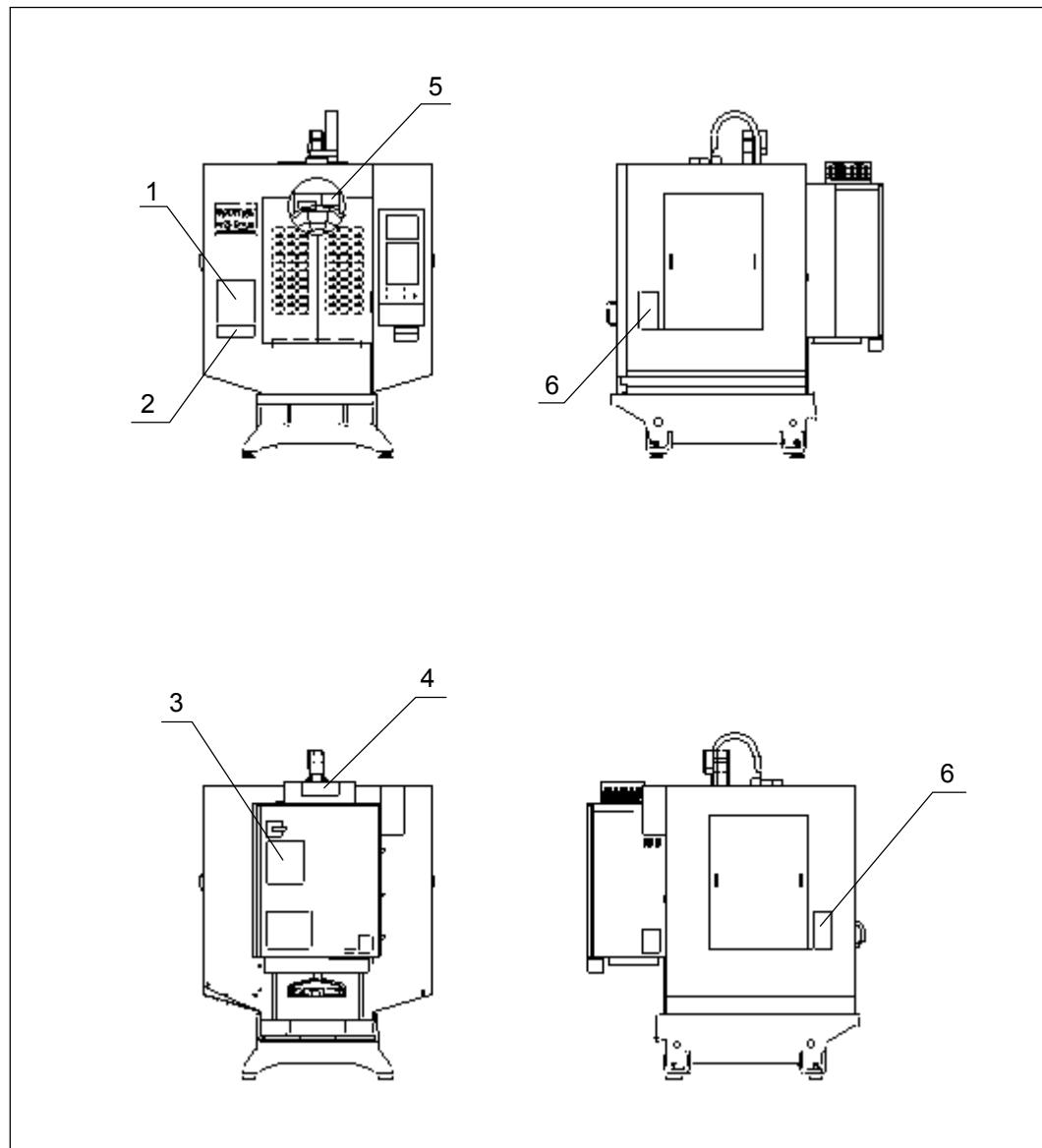
SW48 Wenn die Anlage unzureichend beleuchtet ist, ist der Innenraum der Maschine dunkel, und es besteht die Gefahr, sich die Hände an den Vorrichtungen oder Schneiden zu verletzen.

SW48-1 Eine Maschinenleuchte anbringen, wenn die innere Beleuchtungsstärke der Maschine 500 Lux oder darunter ist.

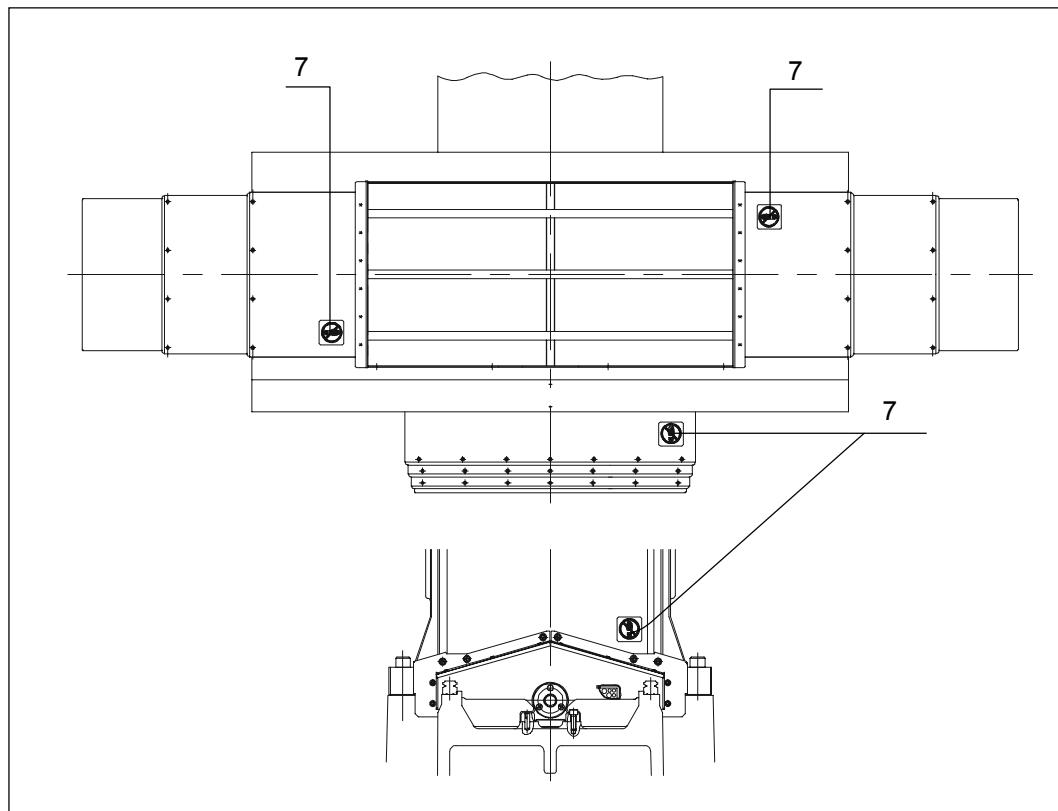
## Prüfen der Sicherheitsschilder

Die Sicherheitsschilder sind an der im Bild gezeigten Stelle der Maschine angebracht. Prüfen Sie, ob sie da fest angeklebt sind. Wenn sie sich von der Maschine lösen sollten, bekommen Sie Ersatzschilder und kleben Sie sie an die Maschine an.

## Plazierung der Sicherheitsschilder



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## 1. Sicherheitsschild, Vorderseite und Seite

- (1) Sprache: Englisch, Japanisch, Chinesisch



Teilcode : 690373001  
Teilname : PS LABEL,TC FRONT JCE

(1) Sprache: Englisch, Deutsch, Französisch

**This machine has hazards.**

Read instruction manuals to understand hazards and avoid them before operation.

Diese Maschine birgt Gefahren.

Um Risiken zu erkennen und vermeiden, vor dem Einschalten die Betriebsanleitung lesen.

L'utilisation de cette machine comporte des risques.

Lisez les manuels d'instruction pour connaître les risques et les éviter avant d'utiliser cette machine.

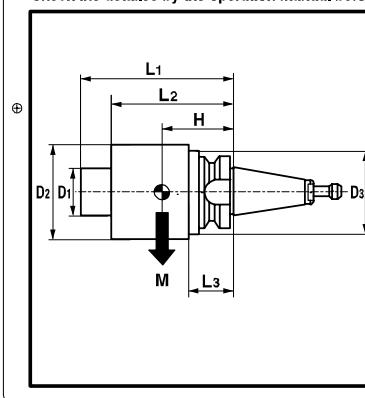
<b>DANGER</b>	<b>WARNING</b>	<b>WARNING</b>
		 
Machine in operation will suddenly move and crush you. Keep away from moving parts.	Broken tool or workpiece can hit and wound you. Shut door before starting machine.	Rotating parts can catch and injure you. Keep away from rotating tool, spindle, and magazine. Never hold moving parts. Do not wear gloves while operating machine.
<b>GEFAHR</b>	<b>WARNUNG</b>	<b>WARNUNG</b>
⊕ Maschine in Betrieb kann plötzlich laufen und Sie stoßen. Beim Betrieb der Maschine von allen bewegenden Teilen sich fernhalten, um Verletzungen zu vermeiden.	Gebrochene Werkzeuge oder Werkstücke könnten Sie treffen und verletzen. Vor dem Start der Maschine Tür schließen.	⊕ Umlaufende Teile könnten Sie fassen und verletzen. Von umlaufendem Werkzeug, Spindel und Magazin sich fernhalten. Rotierende Teile nicht berühren. Während des Bedienens keine Handschuhe tragen.
<b>DANGER</b>	<b>AVERTISSEMENT</b>	<b>AVERTISSEMENT</b>
En opération, cette machine bougera soudainement et provoquera des risques d'écrasement. Ne vous approchez jamais des parties mobiles.	Les outils cassés ou les pièces usinées peuvent être projetés et risquent de vous frapper et de vous blesser. Fermez la porte avant de faire démarrer la machine.	Les parties tournantes peuvent vous accrocher et vous blesser. Ne vous approchez jamais des outils tournant, de la broche et du magasin. Ne saisissez jamais les parties en mouvement. Ne portez pas de gants pendant l'utilisation.

691042001 / 0302 (2)

Teilcode : 691042001  
Teilname : PS LABEL,TC FRONT EGF

## 2. Werkzeugschild

工具、主軸回転数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。  
 If use beyond the limitation of the tool and spindle speed, machine may be broken.  
 Check the details by the operation manual before operation.

	最高主軸回転速度	10000 min <sup>-1</sup> / 16000 min <sup>-1</sup>	Max Spindle Rotation Speed	
	主軸テーパ	7 / 24 No.30	Spindle Taper	
	ツールシャンク	MAS-BT30	Tool Shank	
	フルスタッド	MAS-P30T-2 (30°)	Retention Knob	
	マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)	Total in Magazine	
	工具の制限	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> ≤ 80 mm L <sub>2</sub> ≤ 160 mm D <sub>3</sub> ≤ 46 mm L <sub>3</sub> ≤ 30 mm M ≤ 3 kg MxH ≤ 180 kgmm	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> ≤ 55 mm L <sub>2</sub> ≤ 160 mm D <sub>3</sub> ≤ 46 mm L <sub>3</sub> ≤ 30 mm M ≤ 2 kg MxH ≤ 100 kgmm	Limitation of Tool
	工具バランス制限	100grmm	50grmm	Limitation of Tool Balance
	主軸回転数制限	10000 min <sup>-1</sup>	16000 min <sup>-1</sup>	Limitation Spindle Rotation Speed

653379001 / 0210 (2)

Teilcode : 653379001  
 Teilname : Tool LABEL250

### 3. Sicherheitsschild, Rückseite und Hochdruckkühlmittelbehälter

#### (1) Sprache: Englisch, Japanisch, Chinesisch



690730001 / 9709 (1)

Teilcode : 690730001  
Teilname : PSLABEL, TC REARJCE

(2) Sprache: Englisch, Deutsch, Französisch



691045001 / 0302 (2)

Teilcode : 691045001  
 Teilname : PSLABEL, TC REAR EGF

#### 4. Schild, Regenerativwiderstand

(1) Sprache: Englisch, Japanisch, Chinesisch

	<b>⚠ WARNING</b>	<b>⚠ 警告</b>	<b>⚠ 警告</b>
<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>熱い抵抗器 さわるとやけどする。</p> <p>運転が終り、 30分たってから、 カバーをはずすこと。</p>	<p>热电阻 触摸会烫伤。</p> <p>停止运行 30 分钟之后， 才可取下安全罩。</p>	

690729001 / 9709 (1)

Teilcode: 690729001

Teilname: LABEL, TC REGENERATIVE JCE

(2) Sprache: Englisch, Deutsch, Französisch

	<b>⚠ WARNING</b>	<b>⚠ WARNUNG</b>	<b>⚠ AVERTISSEMENT</b>
<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>Heißer Widerstand könnte Ihre Hand verbrennen.</p> <p>Nach dem Ausschalten der Maschine 30 Minuten warten, dann den Schutzdeckel entfernen.</p>	<p>Température de la résistance élevée, pouvant causer des brûlures.</p> <p>Après avoir arrêté la machine, attendez 30 minutes avant d'enlever le capot.</p>	

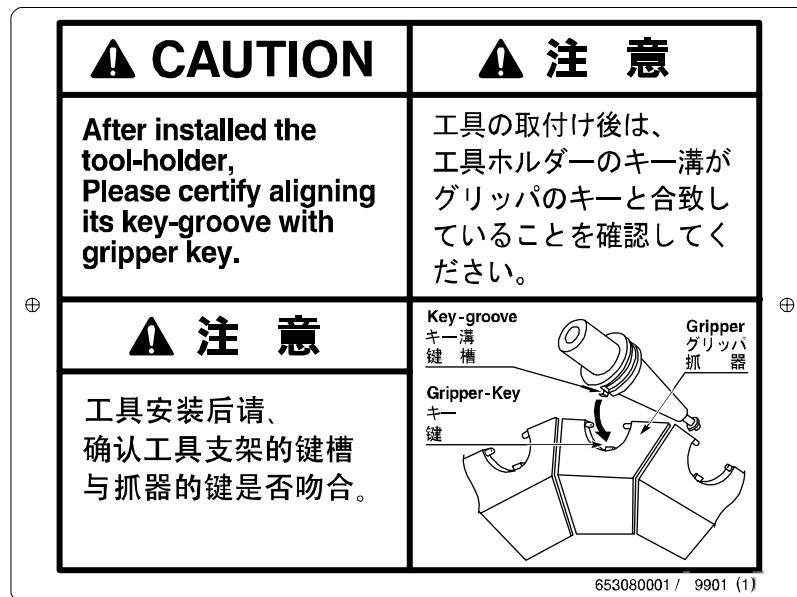
691058001 / 0302 (2)

Teilcode: 691058001

Teilname: LABEL, TC REGENERATIVE EGF

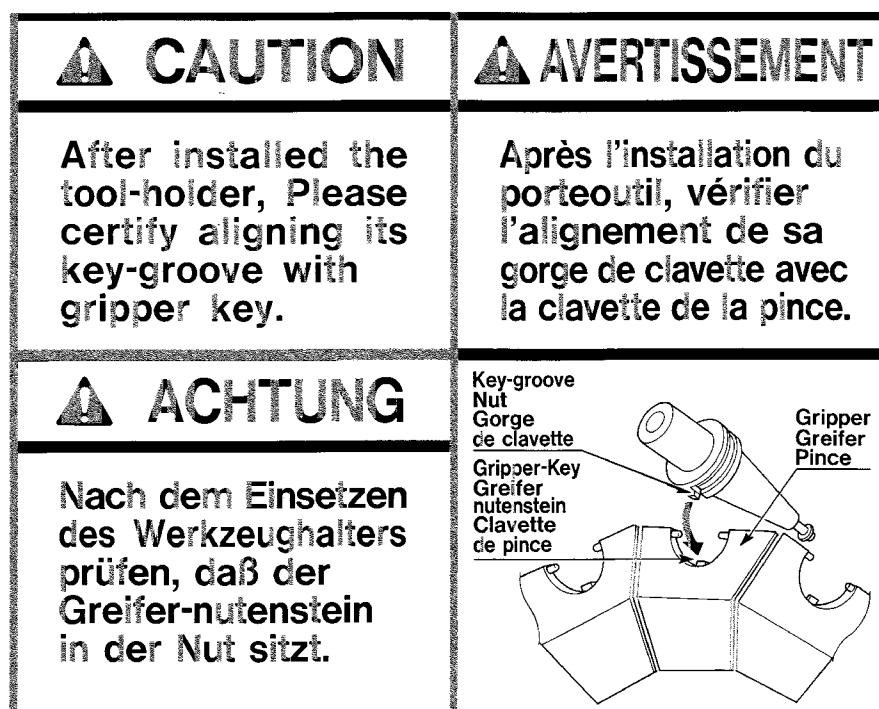
## 5. Schild, Werkzeugausbau

(1) Sprache: Englisch, Japanisch, Chinesisch



Part Code : 653080001  
 Part Name : LABEL, Removing Tool JCE

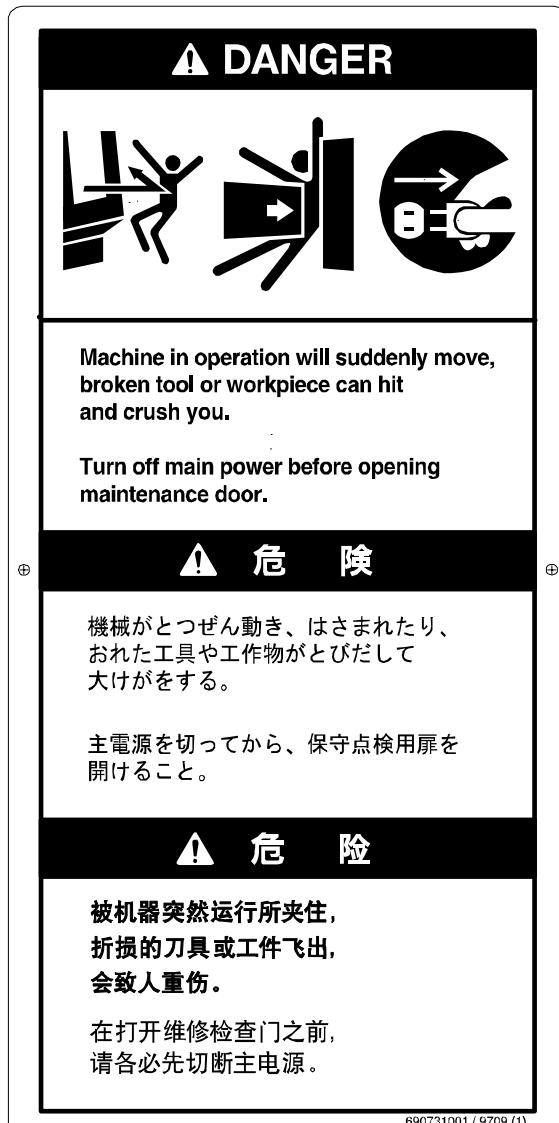
(2) Sprache: Englisch, Deutsch, Französisch



Teilcode : 69104001  
 Teilname : LABEL, Removing Tool EGF

## 6. Schild, Seitenverkleidung

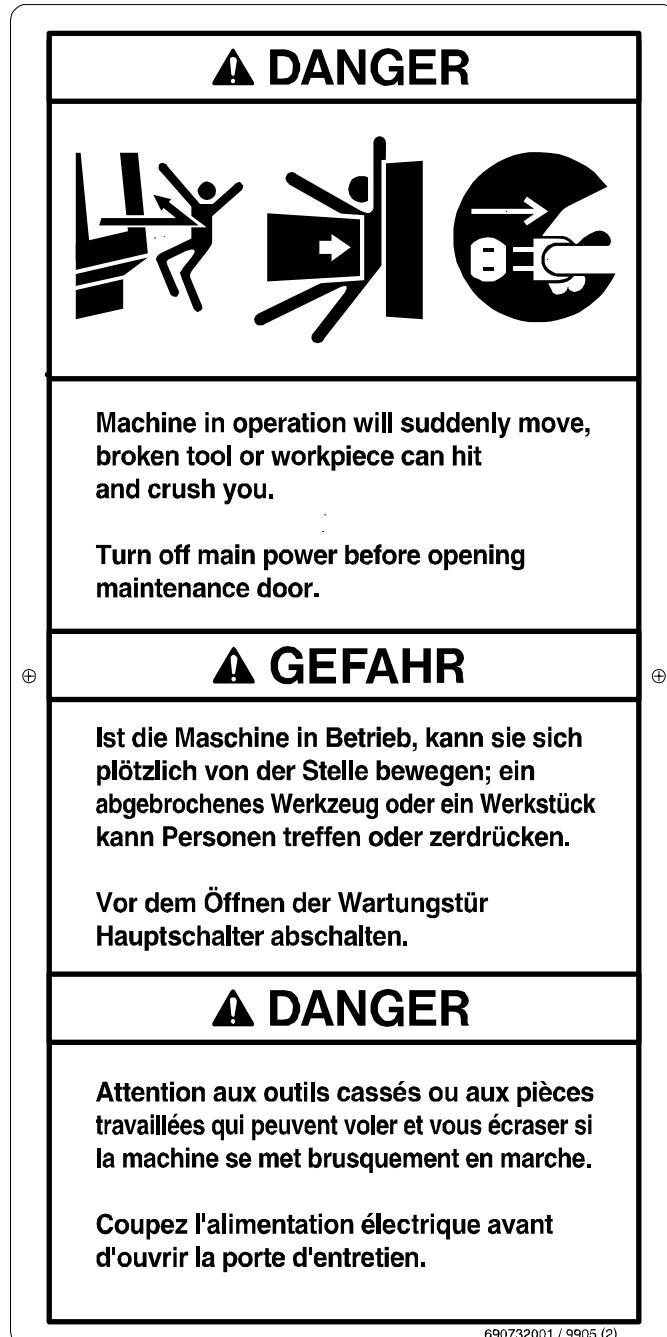
- (1) Sprache: Englisch, Japanisch, Chinesisch



Teilcode : 690731001

Teilname : LABEL, TC MAINTENANCE DOOR JCE

(2) Sprache: Englisch, Deutsch, Französisch



Teilcode : 690732001  
 Teilname : LABEL, TC MAINTENANCE DOOR EGF

**7. Betreten-verboten Schild**

Teilcode : 693178001



693178001 / 0607 (1)

693178001.ai

## **Die Sicherheitsvorschrift für Operateure**

### **Tapping Centre TC-S2A**

**Lesen Sie bitte aufmerksam diese  
Sicherheitsvorschrift, bevor Sie die Tapping Centre  
benutzen.**

**Brother Industries, Ltd. Machinery & Solution Company.**

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## Was ist die Sicherheitsvorschrift?

## Bitte lesen Sie!

Alle Leute, die die Tapping Centre benutzen, einschließlich der Leute, die die Tapping Centre in einer Fabrik installieren, die mit der Tapping Centre arbeiten, und die die Tapping Centre warten oder reparieren, sind aufgefordert, diese Sicherheitsvorschrift zu lesen.

In der Sicherheitsvorschrift werden alle Leute, die die Tapping Centre benutzen, als Benutzer bezeichnet.

## Zweck

Die Tapping Centre ist eine Hochspannungsstrommaschine mit schnell umlaufenden Werkzeugen, und einem Tisch und einem ATC-Magazin, die sich mit starker Kraft bewegen. Deshalb bestehen verschiedene Gefahren bei der Benutzung dieser Maschine.

Der Zweck dieser Sicherheitsvorschrift ist es, vor Gefahren die Benutzer zu schützen.

In der Sicherheitsvorschrift wird Folgendes erklärt:

## Warnung: Welche Gefahren bestehen?

## Wartung: Welche Gefahren bestehen? Preventivmaßnahme: Wie kann man die Gefahren vermeiden?

## **Zusammenstellung der Sicherheitsvorschriften und der Zusammenhang mit anderen Manuals**

Jedem Manual (außer der Programmieranleitung) ist eine Sicherheitsvorschrift für die betreffenden Benutzer beigelegt.

Für die verschiedenen Funktionen oder das Betriebsverfahren der Maschine lesen Sie bitte das entsprechende Manual.

1. Betriebsanleitung (Für alle Benutzer)  
"Die Sicherheitsvorschrift für Operateure"  
"Die Sicherheitsvorschrift für Personen, die Maschine installieren und den Arbeitsprozeß aufstellen für Tapping Centre"  
"Betriebsanleitung"  
Notwendige für grundlegenden Betriebsverfahren für alle Benutzer.  
Deutsch Teil-Code: 693076001

2. Betriebsanleitung (Für Fachpersonal)  
"Die Sicherheitsvorschrift für Operateure"  
"Die Sicherheitsvorschrift für Personen, die Maschine installieren und den Arbeitsprozeß aufstellen für Tapping Centre"  
"TÜRVERRIEGELUNGSFUNKTION"  
"Betriebsanleitung"  
Notwendige Betriebsmaßnahmen für die Aufstellung und die Bearbeitung.  
Dialogorientierte Japanischer Teil-Code: 693312001  
Programmierung Englischer Teil-Code: 693307001  
NC-Sprache Japanischer Teil-Code: 693310001  
Englischer Teil-Code: 693305001

3. Installierungsanweisung "Die Sicherheitsvorschrift für Personen, die die Maschine installieren und den Arbeitsprozeß aufstellen  
Japanischer Teil-Code: 693311001  
Englischer Teil-Code: 693306001

4. Programmierungsanleitung  
"Programmierungsanleitung:  
Programmierung der Bearbeitung"  
Dialogorientierte Japanischer Teil-Code: 693314001  
Programmierung Englischer Teil-Code: 693309001  
NC-Sprache Japanischer Teil-Code: 693313001  
Englischer Teil-Code: 693308001

5. Wartungsvorschrift  
"Die Sicherheitsvorschrift für qualifiziertes Wartungspersonal  
Tapping Centre ist der Für Wartungsvorschrift beigelegt."  
"Wartungsvorschrift:  
Nachstellung und Reparatur der Maschine"  
Die Wartungsvorschrift wird an die Kunden nicht verteilt.

## **Beziehung mit Sicherheitsschildern**

Die wichtigsten Vorschriften der Sicherheitsvorschriften sind in Form von Sicherheitsschild an der Maschine angebracht.

Eine Erklärung für die Sicherheitsschilder gibt es am Ende der Sicherheitsvorschrift. Falls sich die Sicherheitsschilder von der Maschine lösen sollten, informieren Sie uns. Wir schicken Ihnen sofort Ersatzschilder zu.

## **Sprache**

Die Maschinen für den japanischen Markt werden mit den Sicherheitsvorschriften und den Sicherheitsschildern auf japanisch ausgestaltet. Aus Japan exportierte Maschinen sind mit Sicherheitsanweisungen und -schildern auf vier Sprachen ausgestattet: Englisch, Deutsch, Französisch und Chinesisch.

Fordern Sie deshalb die für Sie entsprechenden Vorschriften und Schilder, einschließlich dieser in anderen Sprachen, bei Ihrem Händler an.

## **Kundendienst**

Sollten die Sicherheitsvorschriften oder die Sicherheitsschilder verloren gehen, bekommen Sie diese bei Ihrem Händler.

Wenn Sie Ihren Händler nicht kennen sollten, rufen Sie beim nachfolgenden Büro an.

1-1-1 Kawagishi, Mizuho-ku, Nagoya 467-8562, JAPAN  
BROTHER INDUSTRIES, LTD. Machinery & Solution Company.  
phone +81-52-824-2232  
fax +81-52-811-0469

## **Handhabung der Sicherheitsvorschrift**

Geben Sie acht, daß Sie die Sicherheitsvorschriften nicht verlieren, und bewahren Sie diese immer griffbereit auf.

Sollte die Maschine den Besitzer wechseln, dann müssen auch die Sicherheitsvorschriften an den neuen Besitzer zusammen mit der Maschine übergeben werden.

## **Gefahrenstufe**

Die auftretenden Schäden bei Nichteinhaltung der Sicherheitsvorschriften werden in drei Stufen klassifiziert.

1. GEFAHR

### **⚠ GEFAHR**

Lebensgefahr oder leichte Körperverletzungsgefahr.

2. WARNUNG

### **⚠ WARNUNG**

Schwere Verletzungsgefahr.

3. ACHTUNG

### **⚠ ACHTUNG**

Leichte Verletzungsgefahr.

## **Reihenfolge der Erklärung**

Hier wird Folgendes erklärt:

1. Stichwörter (GEFAHR, WARNUNG, ACHTUNG), die die Gefahren anzeigen, und Bildzeichen
2. Gefahrengruppe
3. Möglicher Verletzungsgrad
4. Preventivmaßnahme

## Bedeutung der Bildzeichen

Auf den Sicherheitsschildern und in den Sicherheitsvorschriften werden die Gefahren und deren Preventivmaßnahmen mit Bildzeichen anschaulich erklärt. Hier wird ihre Bedeutung erklärt.

### 1. Gefahr



Rutschen



Laufender Teil



Stolpern



Stromschlag



Stromschlag



Hineingezogen



Hand geklemmt



Heiß



Heiß



Sich schneiden



Sich schneiden



Explosion



Sich stechen



Fallender Gegenstand



Fallender Gegenstand



Umlaufender Gegenstand



Sturz



Spritzen



Spritzen



Feuer

## 2. Preventivmaßnahmen



Ohren schützen



Hände schützen



Füße schützen



Netzstecker abziehen



Nicht berühren



Kopf schützen



Erden



Nicht zerlegen



Augen schützen

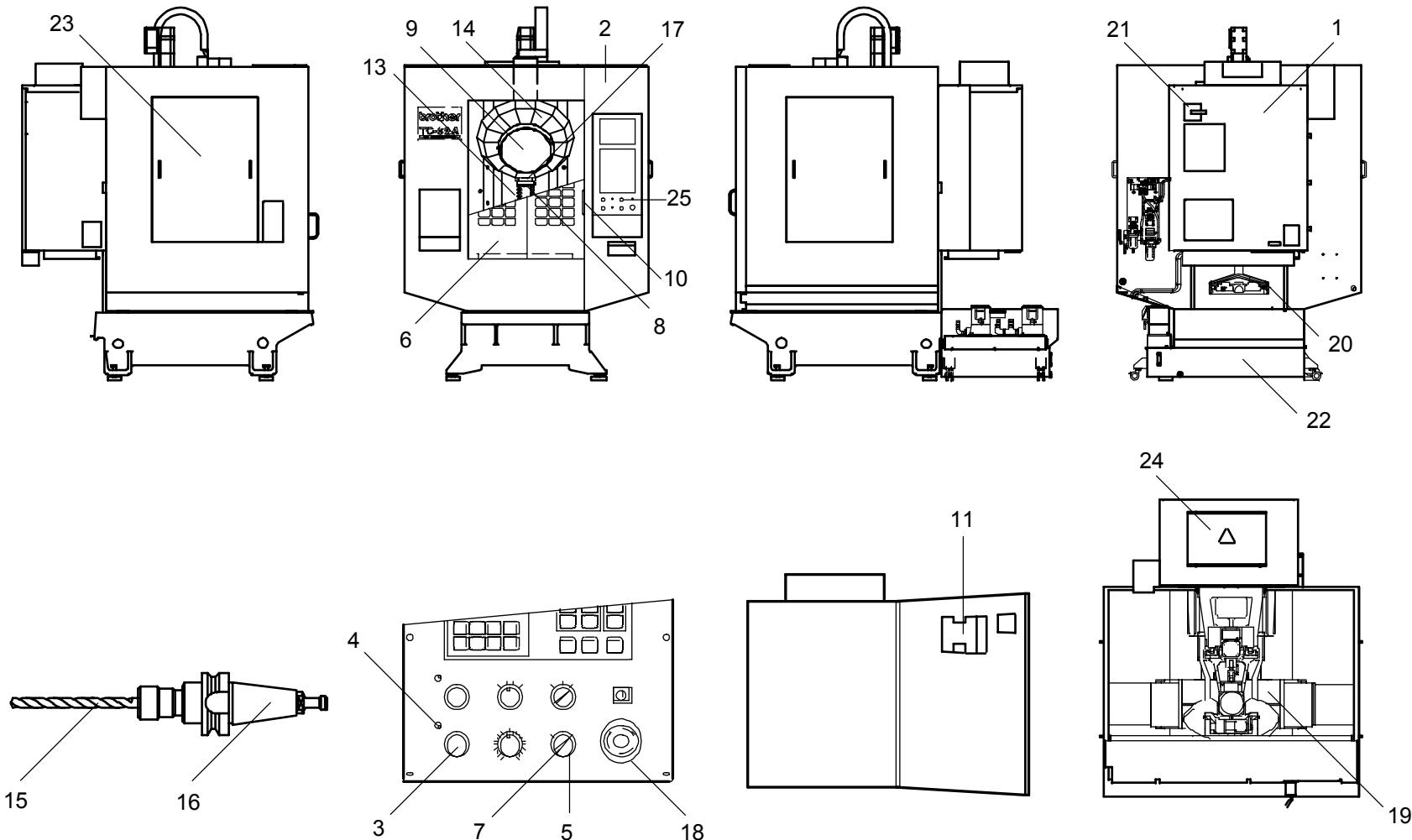
## 部品名

## Section Names

## Namen jedes Teils

## Noms de sections

## 各部件名称



TS2ASA01-1.ai

部品名	Section Names	Namen jedes Teils	Noms de sections	各部件名称
No.	各部の名称	Section names	Namen jedes Teils	Noms de sections
1.	日本語	English	Deutsch	Français
1.	制御箱	control box	Steuerschrank	armoire de commande
2.	スプラッシュガード	splash guard	Spitzblech	tôle pare-copeaux
3.	停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt
4.	停止ランプ	stop lamp	stop Lampe	lampe d'arrêt
5.	ドアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage
6.	作業扉	work door	Arbeitstür	porte de travail
7.	ドアインタロックキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage
8.	スピンドル	spindle	Spindel	broche
9.	ATC マガジン	ATC magazine	ATC Magazin	ATC magasin
10.	取手	handle	Griff	poignée
11.	制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande
12.	レベリングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine
13.	クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe
14.	グリップカバー	grip cover	Griffschutz	couverture de jambe
15.	工具	tool	Werkzeug	outil
16.	工具ホルダ	tool holder	Werkzeughalter	support à outil
17.	スピンドルヘッド	spindle head	Spindelkopf	tête de la broche
18.	非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence
19.	ケーブルカバー	cable cover	kabelschutz	couvre cable
20.	テーブル	table	Tisch	table
21.	主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale
22.	クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe
23.	スプラッシュガードサイドカバー	splash guard side cover	Spitzblechseitenschutz	couverture à côté du tôle pare-copeaux
24.	回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice
25.	操作パネル	operation panel	Betriebstafel	panneau d'opération

# Warnungen und Preventivmaßnahmen

Jede Zahl in Klammern wie (1)(2) entspricht der Nummer der Namen jedes Teils.

## Gefahr

### GEFAHR

- OD1 In der Tapping Centre bestehen verschiedene Gefahren.  
 OD1-1 Vor Inbetriebnahme der Maschine die Sicherheitsvorschrift lesen, um die Risiken zu erkennen und die Preventivmaßnahmen zu verstehen.  
 OD1-2 Alle Benutzer müssen wissen, wo der Notfall-stop-Schalter ist, (18) und wie er benutzt wird.



- OD2 Im Steuerschrank (1) gibt es einen Hochspannungsteil. Bei versehntlicher Berührung besteht die Gefahr, sich schwer oder lebensgefährlich zu verletzen.  
 OD2-1 Nur hochqualifizierte Elektriker dürfen die elektrischen Teile dieser Maschine warten und reparieren. Der Operateur darf den Steuerschrank nicht aufmachen.  
 OD2-2 Bei Alarm den Betriebsleiter sofort verständigen. Der Maschinenbediener darf die Maschine nicht reparieren. Nur qualifizierte Personen dürfen die Maschine installieren und reparieren.



- OD3 Es besteht die Gefahr, von laufenden Maschinenteilen geklemmt zu werden und sich dabei schwer zu verletzen.  
 OD3-1 Während die Maschine in Betrieb ist, darf kein Körperteil in die innere Seite des Spitzblechs (2) gelangen.  
 OD3-2 Vor Anwerfen der Maschine sich mit eigenen Augen vergewissern, daß niemand innerhalb des Spitzblechs ist.  
 OD3-3 Während die Maschine in Betrieb ist, von laufenden Teilen Hände, Füße und sonstige Körperteile fernhalten.  
 OD3-4 Bei Alarm den Betriebsleiter sofort verständigen. Nicht in die Maschine greifen.

- OD4 Wenn der Verriegelungsschalter (5) außer Kraft sein sollte, laft die Maschine trotzdem weiter, wenn die Arbeitstür (6) geöffnet wird. Es besteht deshalb die Gefahr, von den Maschinenteilen geklemmt und verletzt zu werden.  
 OD4-1 Wenn der Verriegelungsschalter außer Kraft ist, darf man mit keinem Körperteil in die Maschine kommen. Der Maschinenbediener muß den Betriebsleiter verständigen. Der Betriebsleiter muß den Verriegelungsschalter in Kraft setzen und den Schlüssel aufbewahren.  
 OD4-2 Bei außer Kraft gesetzter Verriegelung darf der Betriebsleiter niemanden die Maschine benutzen lassen.  
 OD4-3 Vor Inbetriebnahme der Maschine sich mit eigenen Augen vergewissern, daß die Verriegelung in Kraft ist.  
 OD4-4 Sollte der Verriegelungsschlüssel (7) im Schloß stecken, muß der Betriebsleiter darüber informiert werden.  
 OD4-5 Den Verriegelungsschlüssel (7) muß der Betriebsleiter aufbewahren.

Warnung  **WARNING**

- OW1                    Wenn man umlaufende Werkzeuge (15) beührt, wird man verletzt.  
 OW1-1                Von umlaufenden Werkzeugen sich fernhalten.



- OW2                    Es besteht Verletzungsgefahr durch abgebrochene Werkzeuge (16) oder herauspringende Werkstücke.  
 OW2-1                Arbeitstür (6) schließen.



- OW3                    In umlaufenden Teil können die Finger hineingezogen und verletzt werden.  
 OW3-1                Von umlaufendem Werkzeug (15), dem Spindel (8) und dem ATC-Magazin (9) sich fernhalten.  
 OW3-2                Körperanliegende Bekleidung tragen. Lange Haare müssen in einem Hut aufgesteckt werden. Beim Arbeiten an der laufenden Maschine keine Handschuhe tragen. Keinen Schmuck tragen. Umlaufende Teile nicht berühren.



- OW4                    Wenn die Sicherheitsvorrichtung abgeändert wird, funktioniert sie nicht mehr richtig.  
 Es besteht die Gefahr, einen Stromschlag zu erhalten, von den Maschinenteilen geklemmt zu werden oder sich zu stoßen.  
 OW4-1                Wenn die Sicherheitsvorrichtung abgeändert oder unbeweglich festgemacht wird, die Maschine nicht benutzen.



- OW5                    Wenn Stahlspäne in die Augen hineinspringen, werden die Augen verletzt. Es besteht die Gefahr, die Sehkraft zu verlieren.  
 OW5-1                Einen Augenschutz gegen Stahlspäne tragen.  
 OW5-2                Stahlspäne nicht mit einer Luftpistole wegpegen.



- OW6 Wenn man Stahlspäne mit bloßen Händen berürt, kann man sich schneiden oder verbrennen.
- OW6-1 Stahlspäne nicht mit bloßen Händen berühren. Die Spitze der Werkstücke nicht mit bloßen Händen berühren.
- OW6-2 Beim Reinigen der Schneidechips Handschuhe tragen und eine Bürste benutzen.
- OW6-3 Schneidechips nur bei angehaltener maschine reinigen.
- OW7 Wenn man die Schneide der Werkzeuge (15) berührt, wird die Hand geschnitten.
- OW7-1 Die Schneide der Werkzeuge nicht berühren. Die Werkzeuge immer am Schaft des Werkzeughalters (16) halten.



- OW8 Wenn schwere Gegenstände auf die Füße fallen, besteht die Gefahr, sich den Fuß zu brechen.
- OW8-1 Beim Heben schwerer Gegenstände Schutzschuhe tragen.
- OW9 Beim Heben schwerer Gegenstände besteht die Gefahr, sich einen Bruch zu heben.
- OW9-1 Beim Heben schwerer Gegenstände immer jemanden um Hilfe bitten.
- OW9-2 Beim Heben schwerer Gegenstände nicht die Rückenkraft sondern die Beinkraft benutzen.



- OW10 Lange Zeit dauernder oder großer Lärm ist für die Ohren schädlich.
- OW10-1 Bei der Arbeit unter Lärm einen Gehörschutz, z.B. Stöpsel, tragen.



- OW11 Hochdruckluft kann explodieren und Augen oder Ohren verletzen.
- OW11-1 Nur hochqualifizierte Fachkräfte dürfen an dieser Maschine Hochdruckluftrohrleitungen installieren oder verändern.



- OW12 Beim Aufstehen besteht die Gefahr, sich den Kopf anzustoßen und dabei zu verletzen.
- OW12-1 Beim Arbeiten in der Maschine oder in ihrem Bereich einen Schutzhelm tragen.



- OW13 Wenn Werkzeuge in der Maschine liegenbleiben sollten und die Maschine in Betrieb genommen wird, besteht die Gefahr, daß diese Werkzeuge herumgeschleudert werden und jemanden verletzen.
- OW13-1 Wenn Werkzeuge in der Maschine liegenbleiben, darf die Maschine nicht benutzt werden. Den Betriebsleiter verständigen.



- OW14 Es besteht die Gefahr, sich die Finger zu klemmen, wenn die Arbeitstür (6) nicht mit der Klinke (10) auf- und zugemacht wird.
- OW14-1 Türgriff (10) beim Öffnen und Schließen der Arbeitstür festhalten.



- OW15 Wenn man Werkzeuge auf dem Steuerschrank (1) oder auf der Maschine liegenläßt, besteht die Gefahr, daß diese wegen der Vibration der Maschine herunterfallen.
- OW15-1 Auf dem Steuerschrank und auf der Maschine nichts liegenlassen.



- OW16 Wenn man auf die Maschine oder auf den Kühlmittelbehälter (22) steigt, besteht die Gefahr, zu stürzen und sich zu verletzen.
- OW16-1 Nicht auf die Maschine und den Kühlmittelbehälter steigen.



- OW17 Wenn man unter den Nivellierbolzen (12) greift, besteht die Gefahr, sich zu klemmen und zu verletzen.
- OW17-1 Den Nivellierbolzen nicht einstellen. Wenn die Maschine nicht waagerecht ist, muß der Betriebsleiter verständigt werden.
- OW17-2 Der Betriebsleiter muß den verantwortlichen Installateur mit der Einstellung des Nivellierbolzens beauftragen.



- OW18 Wenn das Kabel hängt oder nicht ordentlich verlegt ist, besteht die Gefahr, darüber zu stolpern.
- OW18-1 Wenn das Kabel hängt oder nicht ordentlich verlegt ist, muß man den Betriebsleiter verständigen.
- OW18-2 Der Betriebsleiter muß den verantwortlichen Installateur damit beauftragen, das Kabel fachgerecht zu verlegen.



- OW19 Wenn an der Maschine Modifikationen vorgenommen werden, dann tritt die Sicherheitsvorrichtung außer Kraft, und alle angegebenen Warnungen gelten nicht mehr.
- OW19-1 Wenn die Maschine modifiziert wird, darf die Maschine nicht in Betrieb genommen werden, und muß man den Betriebsleiter verständigen.



- OW20 Kühlmittel ist augenschädlich.
- OW20-1 Bei der Einstellung der Kühlmitteldüse (14) einen Augenschutz tragen.
- OW20-2 Wenn die Augen mit dem Kühlmittel in Berührung kommen, dann die Augen mit sauberem Wasser auswaschen und den Arzt konsultieren.



- OW21 In jeder Spalte der Maschine besteht Klemm- und Verletzungsgefahr.
- OW21-1 Nicht zwischen die ngriffschutz (14) fassen.
- OW21-2 Nicht mit den Fingern zwischen das Werkzeug (15) oder den Werkzeughalter (16) und das ATC-Magazin kommen.



- OW22 Wenn Kühlmittel, Schmierstoff oder Stahlspäne auf dem Fußboden ist, kann man rutschen und sich verletzen.
- OW22-1 Vor Inbetriebnahme bei ausgeschalteter Maschine deren Innenseite und den Fußboden um die Maschine herum sauber machen



OW23 Beim Einsetzen und Herausnehmen des Werkzeughalters (16) besteht die Gefahr, sich zu schneiden oder sonstig zu verletzen.

OW23-1 Beim Austausch der Werkzeug Lederhandschuhe tragen und die Schneide der Werkzeuge nicht berühren.



OW24 Die Maschine kann plötzlich zum Laufen anfangen, und die Werkzeuge können aus der Haltung herausfallen.

OW24-1 Auf keinem Fall mit einem Körperteil unter den Spindelkopf (17) kommen.



OW25 Bei der Bearbeitung der Werkstücke mit ÖlKühlmittel besteht Brandgefahr.

OW25-1 Wenn kein Feueralarm und keine automatische Feuerlöschanlage installiert wird, nicht ÖlKühlmittel benutzen.

OW25-2 Bei der Bearbeitung muß der Operateur an der Maschine sein.



OW26 Wenn man sich an die Maschine anlehnt, besteht die Gefahr, daß man beim Lauf der Maschine gequetscht oder gestoßen und verletzt werden kann.

OW26-1 Sich nicht an die Maschine anlehnen.

OW27 Wenn man etwas an den Notfall-stop-Schalter (19) hängt, könnte er bei Notfall nicht gedrückt werden.

OW27-1 Nichts an den Notfall-stop-Schalter hängen.



OW28 Wenn der Tisch (19) sich bewegt, dann kann der Kabelschutz (20) auf der Rückseite der Maschine aus der Maschine herauspringen. Es besteht die Gefahr, gestoßen und verletzt zu werden.

OW28-1 Vor Aufräumen der Stahlspäne den Hauptschalter (21) ausschalten.



- OW29 Der Kühlmitteltank (22) ist sehr schwer. Wenn man versucht zu heben, besteht die Gefahr, sich einen Bruch zu heben oder sich an die Füße durch Fallen des Tanks zu verletzen.
- OW29-1 Auch beim Aufräumen der Stahlspäne darf der Kühlmitteltank nicht aufgehoben werden.



- OW30 Beim Eintreten in die Maschine besteht die Gefahr, zu rutschen oder von den Maschinenteilen geklemmt zu werden.
- OW30-1 Nicht unnötigerweise in die Maschine eintreten. Wenn man in die Maschine eintreten muß, den Betriebsleiter verständigen.



- OW31 Wenn man vergißt, die Seitenabdeckung (23) des Spritzschutzes (2) aufzusetzen, besteht die Gefahr, geklemmt oder von einem gebrochenen Werkzeug verletzt zu werden.
- OW31-1 Vor Einschalten der Maschine sich mit eigenen Augen vergewissern, daß der Seitenschutz aufgesteckt ist. Wenn er nicht aufgesteckt ist, den Betriebsleiter verständigen.
- OW31-2 Der Betriebsleiter muß den Seitenschutz aufsetzen lassen.



- OW32 Wenn Werkzeuge (16) oder Werkzeughalter (17), deren Gewicht oder Größe die vorgeschriebene Beschränkung überschreitet, benutzt werden, besteht die Gefahr, daß die Werkzeuge herausspringen.
- OW32-1 Die vorgeschriebene Gewicht- und Größebeschränkung der Werkzeuge und Halter einhalten.
- OW32-2 Das an der Maschine angebrachte Warnschild für die Beschränkung der Werkzeuge beachten, Betriebsanleitung .



- OW33 Das Rückkopplungs0widerstandsgerät wird während des Betriebs sehr heiß. Es besteht die Gefahr, daß man sich die Finger bei Berührung verbrennt.
- OW33-1 Den Rückkopplungs widerstandschutz (24) nicht abnehmen.
- OW34 Der Motor wird während des Betriebs sehr heiß. Es besteht die Gefahr, daß man sich die Finger bei Berührung verbrennt.
- OW34-1 Innerhalb von 30 Minuten nach dem Ausschalten der Maschine den Motor nicht berühren.



- OW35      Beim Umlauf des ATC-Magazins (10) besteht die Gefahr, daß diese Werkzeuge (16) an das Werkstück, die Vorrichtung oder die Innenwand der Maschine anstoßen und abbrechen.
- OW35-1     Die Länge der Werkzeuge muß genau eingestellt werden, damit die Werkzeuge beim Umlauf des ATC-Magazins an das Werkstück, die Vorrichtung oder die Innenwand der Maschine nicht anstoßen.



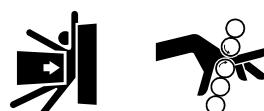
- OW36      Wenn der Steuerschrank (1) oder die Betriebstafel (25) naß ist, besteht die Gefahr, einen Stromschlag zu erhalten.
- OW36-1     Den Steuerschrank und die Betriebstafel vor Flüssigkeit wie Kühlmittel, Wasser und Stahlspäne schützen.
- OW36-2     Mit naßen Händen den Steuerschrank nicht berühren.



- OW37      Wenn man beim Bestehen der Explosionsgefahr den Schalter der Maschine einschaltet oder Werkstücke bearbeitet, besteht die Gefahr, daß ein überspringender Funke eine Explosion auslösen.
- OW37-1     Bei Explosionsgefahr in der Luft die Maschine nicht einschalten und die Bearbeitung sowie Vorbereitung nicht ausführen.



- OW-38     Beim Bedienen mit nicht befestigtem Werkstück kann das Werkstück abspringen, und deshalb besteht Verletzungsgefahr.
- OW-38-1    Das Werkstück muß befestigt werden.



- OW39      Wenn man vergißt, den Spritzseitenschutz (23) aufzusetzen, besteht Verletzungsgefahr.
- OW39-1     Vor dem Einschalten des Schalters sich mit eigenen Augen vergewissern, daß der Spritzseitenschutz richtig aufgesetzt ist. Wenn kein Deckel aufgesetzt sein sollte, muß man den Betriebsleiter davon benachrichtigen.
- OW39-2     Vor dem Entfernen des Spritzseitenschutz den Hauptschalter ausschalten und verschließen, damit ihn niemand mehr einschalten kann.
- OW39-3     Der Spritzseitenschutz muß vom Betriebsleiter aufgesetzt werden.



- OW40 Je nach Material des Werkstücks kann der Schneidesplitter Feuer fangen oder explodieren (z.B. Magnesium).
- OW40-1 Schneidesplitter sofort entfernen.
- OW40-2 Wenn mit feuergefährlichen Werkstücken gearbeitet wird, Feuerlöscher griffbereit halten. Betrieb niemals unbeobachtet lassen.



- OW41 Sollten die Frässapparate vom Werkzeug abgehen, könnten sie schwere Verletzungen verursachen.
- OW41-1 Vergewissern Sie sich, daß dies Fräpparate befestigt sind, bevor Sie die Werkzeuge in die Maschine fassen.

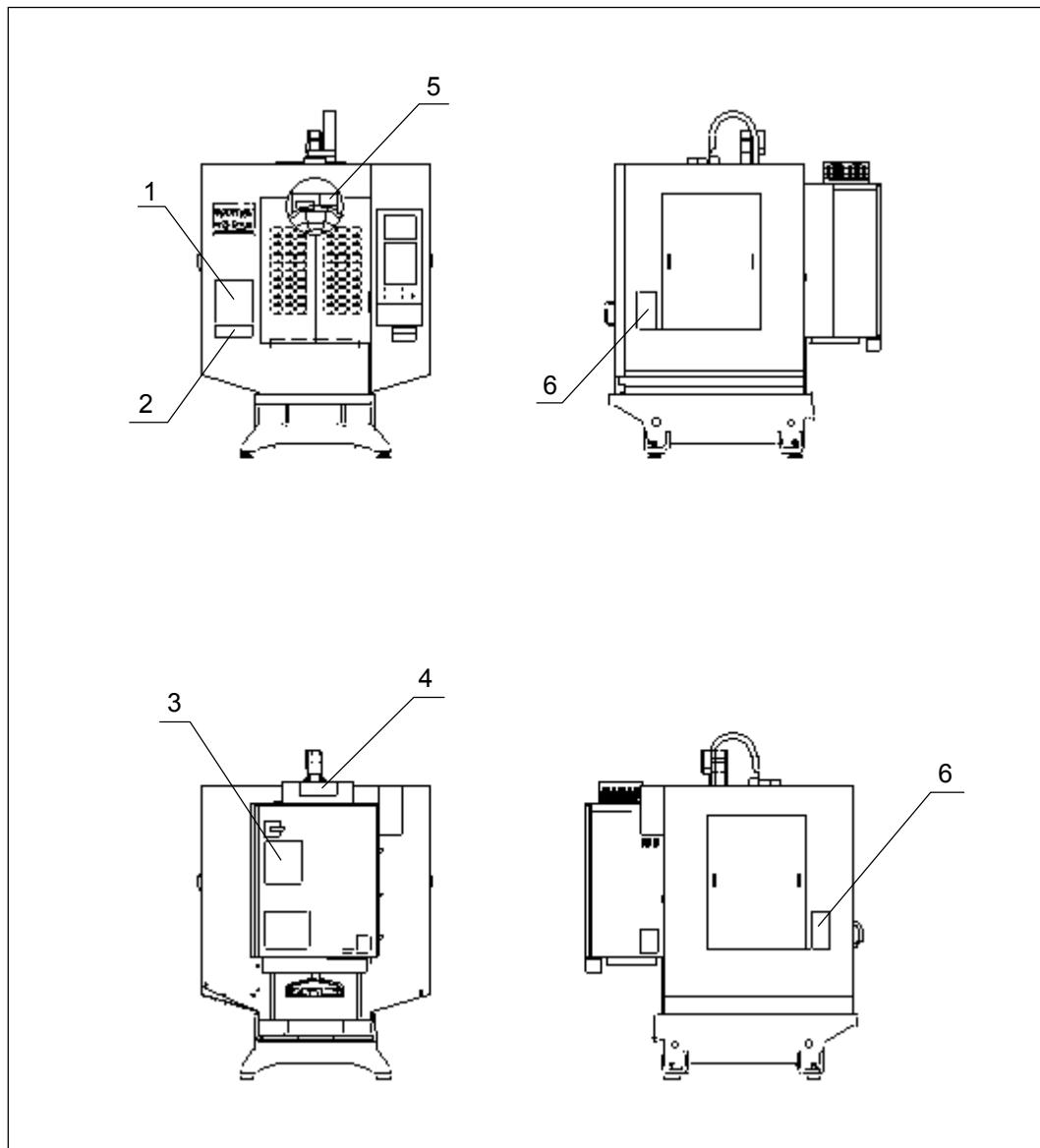


- OW42 Wenn die Anlage unzureichend beleuchtet ist, ist der Innenraum der Maschine dunkel, und es besteht die Gefahr, sich die Hände an den Vorrichtungen oder Schneiden zu verletzen.
- OW42-1 Eine Maschinenleuchte anbringen, wenn die innere Beleuchtungsstärke der Maschine 500 Lux oder darunter ist.

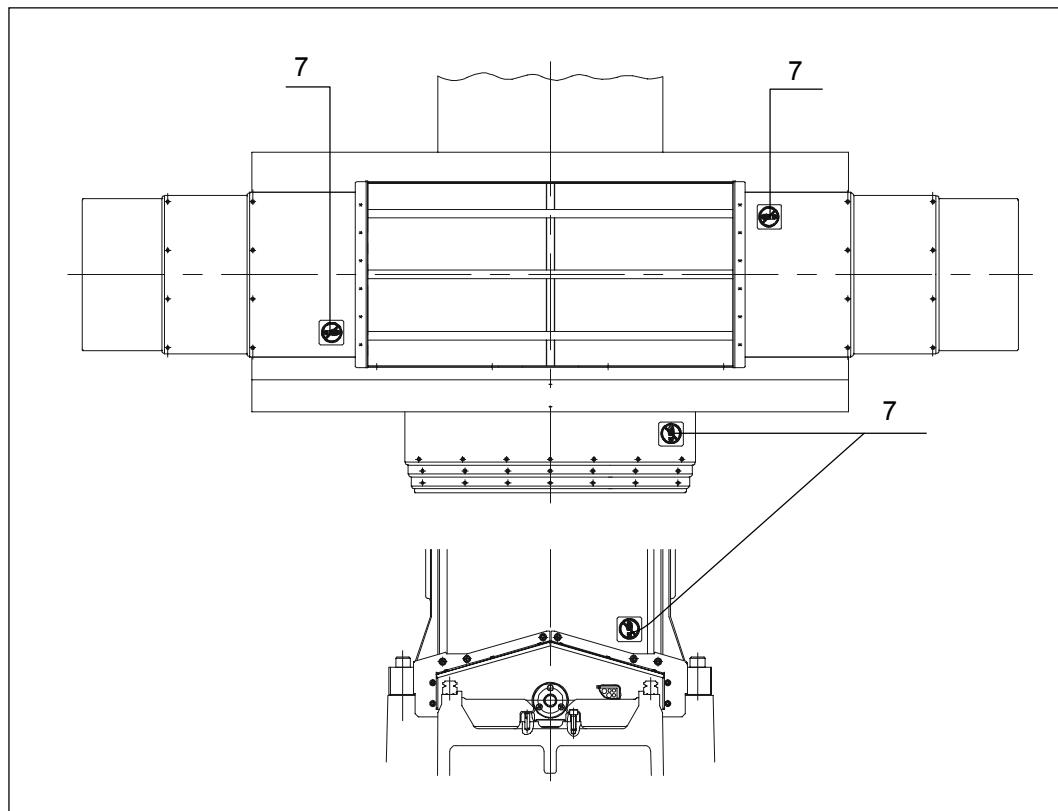
## Prüfen der Sicherheitsschilder

Die Sicherheitsschilder sind an der im Bild gezeigten Stelle der Maschine angebracht. Prüfen Sie, ob sie da fest angeklebt sind. Wenn sie sich von der Maschine lösen sollten, bekommen Sie Ersatzschilder und kleben Sie sie an die Maschine an.

## Plazierung der Sicherheitsschilder



230S00C02.doc



S2A00401.ai

## 1. Sicherheitsschild, Vorderseite und Seite

- (1) Sprache: Englisch, Japanisch, Chinesisch



Teilcode : 690373001  
Teilname : PS LABEL,TC FRONT JCE

(1) Sprache: Englisch, Deutsch, Französisch

**This machine has hazards.**

Read instruction manuals to understand hazards and avoid them before operation.

Diese Maschine birgt Gefahren.

Um Risiken zu erkennen und vermeiden, vor dem Einschalten die Betriebsanleitung lesen.

L'utilisation de cette machine comporte des risques.

Lisez les manuels d'instruction pour connaître les risques et les éviter avant d'utiliser cette machine.

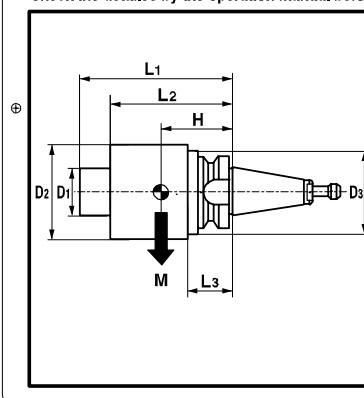
<b>DANGER</b>	<b>WARNING</b>	<b>WARNING</b>
		 
Machine in operation will suddenly move and crush you. Keep away from moving parts.	Broken tool or workpiece can hit and wound you. Shut door before starting machine.	Rotating parts can catch and injure you. Keep away from rotating tool, spindle, and magazine. Never hold moving parts. Do not wear gloves while operating machine.
<b>GEFAHR</b>	<b>WARNUNG</b>	<b>WARNUNG</b>
⊕ Maschine in Betrieb kann plötzlich laufen und Sie stoßen. Beim Betrieb der Maschine von allen bewegenden Teilen sich fernhalten, um Verletzungen zu vermeiden.	Gebrochene Werkzeuge oder Werkstücke könnten Sie treffen und verletzen. Vor dem Start der Maschine Tür schließen.	⊕ Umlaufende Teile könnten Sie fassen und verletzen. Von umlaufendem Werkzeug, Spindel und Magazin sich fernhalten. Rotierende Teile nicht berühren. Während des Bedienens keine Handschuhe tragen.
<b>DANGER</b>	<b>AVERTISSEMENT</b>	<b>AVERTISSEMENT</b>
En opération, cette machine bougera soudainement et provoquera des risques d'écrasement. Ne vous approchez jamais des parties mobiles.	Les outils cassés ou les pièces usinées peuvent être projetés et risquent de vous frapper et de vous blesser. Fermez la porte avant de faire démarrer la machine.	Les parties tournantes peuvent vous accrocher et vous blesser. Ne vous approchez jamais des outils tournant, de la broche et du magasin. Ne saisissez jamais les parties en mouvement. Ne portez pas de gants pendant l'utilisation.

691042001 / 0302 (2)

Teilcode : 691042001  
Teilname : PS LABEL,TC FRONT EGF

## 2. Werkzeugschild

工具、主軸回転数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。  
 If use beyond the limitation of the tool and spindle speed, machine may be broken.  
 Check the details by the operation manual before operation.

	最高主軸回転速度	10000 min <sup>-1</sup> / 16000 min <sup>-1</sup>	Max Spindle Rotation Speed	
	主軸テーパ	7 / 24 No.30	Spindle Taper	
	ツールシャンク	MAS-BT30	Tool Shank	
	フルスタッド	MAS-P30T-2 (30°)	Retention Knob	
	マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)	Total in Magazine	
	工具の制限	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> ≤ 80 mm L <sub>2</sub> ≤ 160 mm D <sub>3</sub> ≤ 46 mm L <sub>3</sub> ≤ 30 mm M ≤ 3 kg MxH ≤ 180 kgmm	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> ≤ 55 mm L <sub>2</sub> ≤ 160 mm D <sub>3</sub> ≤ 46 mm L <sub>3</sub> ≤ 30 mm M ≤ 2 kg MxH ≤ 100 kgmm	Limitation of Tool
	工具バランス制限	100grmm	50grmm	Limitation of Tool Balance
	主軸回転数制限	10000 min <sup>-1</sup>	16000 min <sup>-1</sup>	Limitation Spindle Rotation Speed

653379001 / 0210 (2)

Teilcode : 653379001  
 Teilname : Tool LABEL250

### 3. Sicherheitsschild, Rückseite und Hochdruckkühlmittelbehälter

#### (1) Sprache: Englisch, Japanisch, Chinesisch



690730001 / 9709 (1)

Teilcode : 690730001  
Teilname : PSLABEL, TC REARJCE

(2) Sprache: Englisch, Deutsch, Französisch



691045001 / 0302 (2)

Teilcode : 691045001  
 Teilname : PSLABEL, TC REAR EGF

#### 4. Schild, Regenerativwiderstand

(1) Sprache: Englisch, Japanisch, Chinesisch

	<b>⚠ WARNING</b>	<b>⚠ 警告</b>	<b>⚠ 警告</b>
<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>熱い抵抗器 さわるとやけどする。</p> <p>運転が終り、 30分たってから、 カバーをはずすこと。</p>	<p>热电阻 触摸会烫伤。</p> <p>停止运行 30 分钟之后， 才可取下安全罩。</p>	

690729001 / 9709 (1)

Teilcode: 690729001

Teilname: LABEL, TC REGENERATIVE JCE

(2) Sprache: Englisch, Deutsch, Französisch

	<b>⚠ WARNING</b>	<b>⚠ WARNUNG</b>	<b>⚠ AVERTISSEMENT</b>
<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>Heißer Widerstand könnte Ihre Hand verbrennen.</p> <p>Nach dem Ausschalten der Maschine 30 Minuten warten, dann den Schutzdeckel entfernen.</p>	<p>Température de la résistance élevée, pouvant causer des brûlures.</p> <p>Après avoir arrêté la machine, attendez 30 minutes avant d'enlever le capot.</p>	

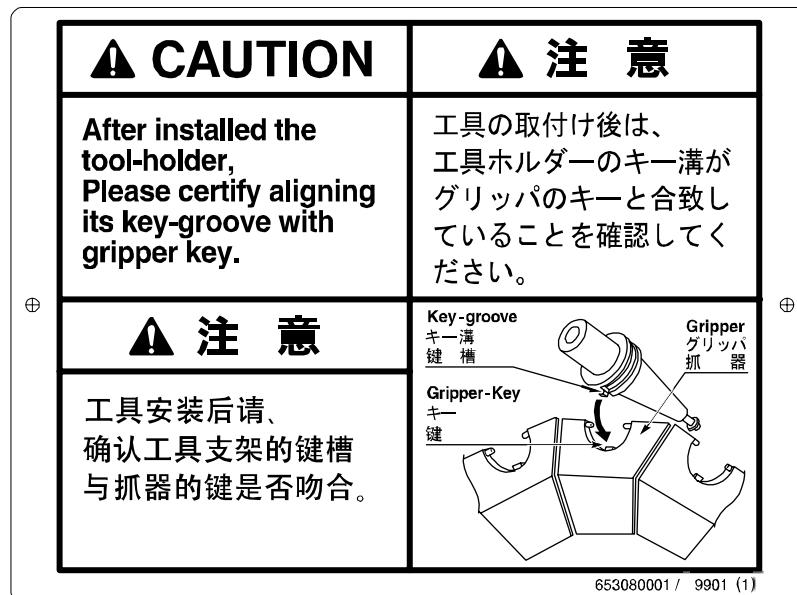
691058001 / 0302 (2)

Teilcode: 691058001

Teilname: LABEL, TC REGENERATIVE EGF

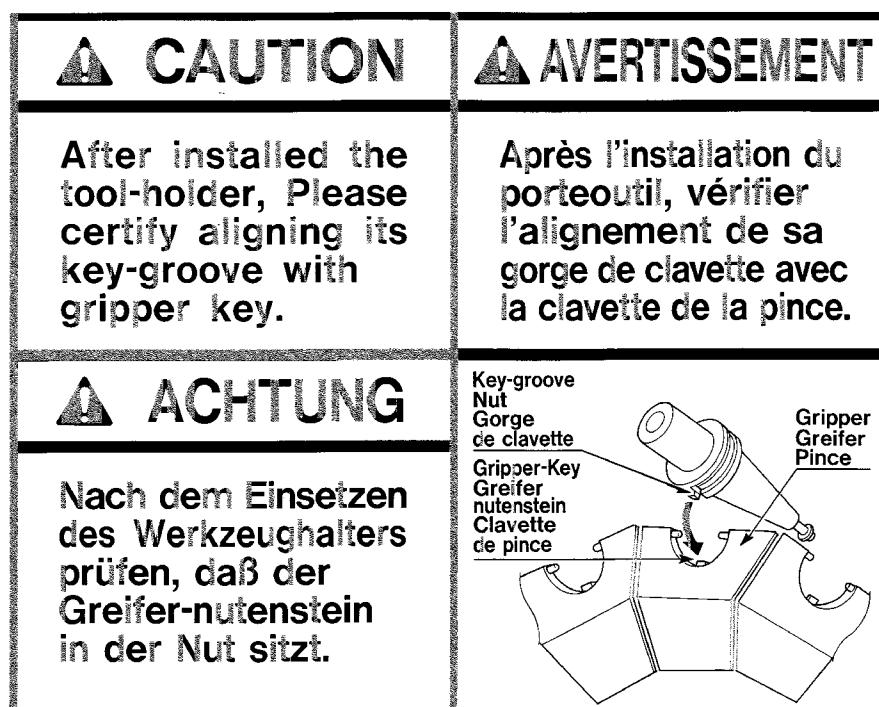
## 5. Schild, Werkzeugausbau

- (1) Sprache: Englisch, Japanisch, Chinesisch



Part Code : 653080001  
 Part Name : LABEL, Removing Tool JCE

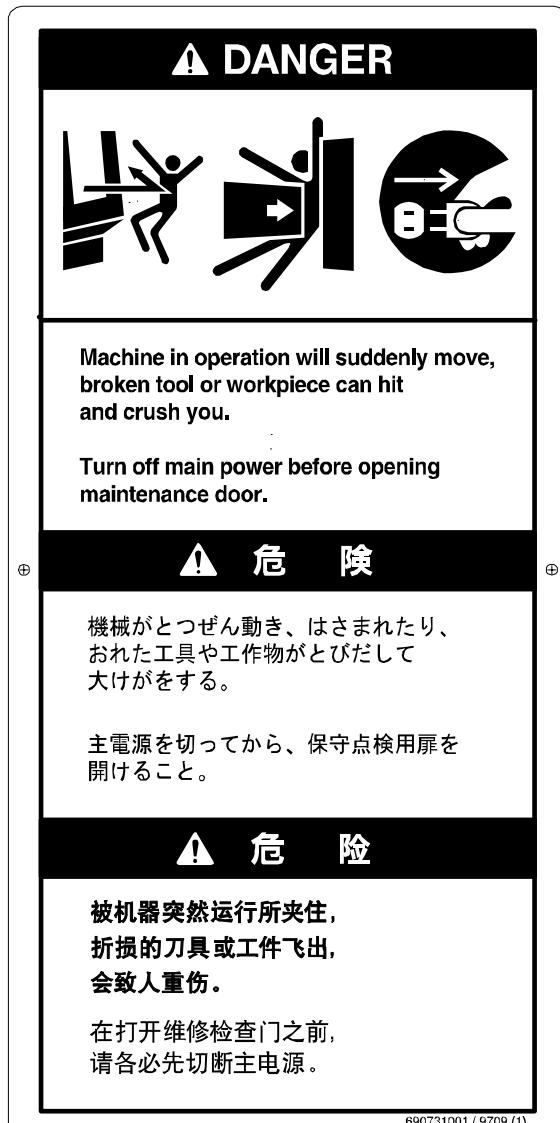
- (2) Sprache: Englisch, Deutsch, Französisch



Teilcode : 69104001  
 Teilname : LABEL, Removing Tool EGF

## 6. Schild, Seitenverkleidung

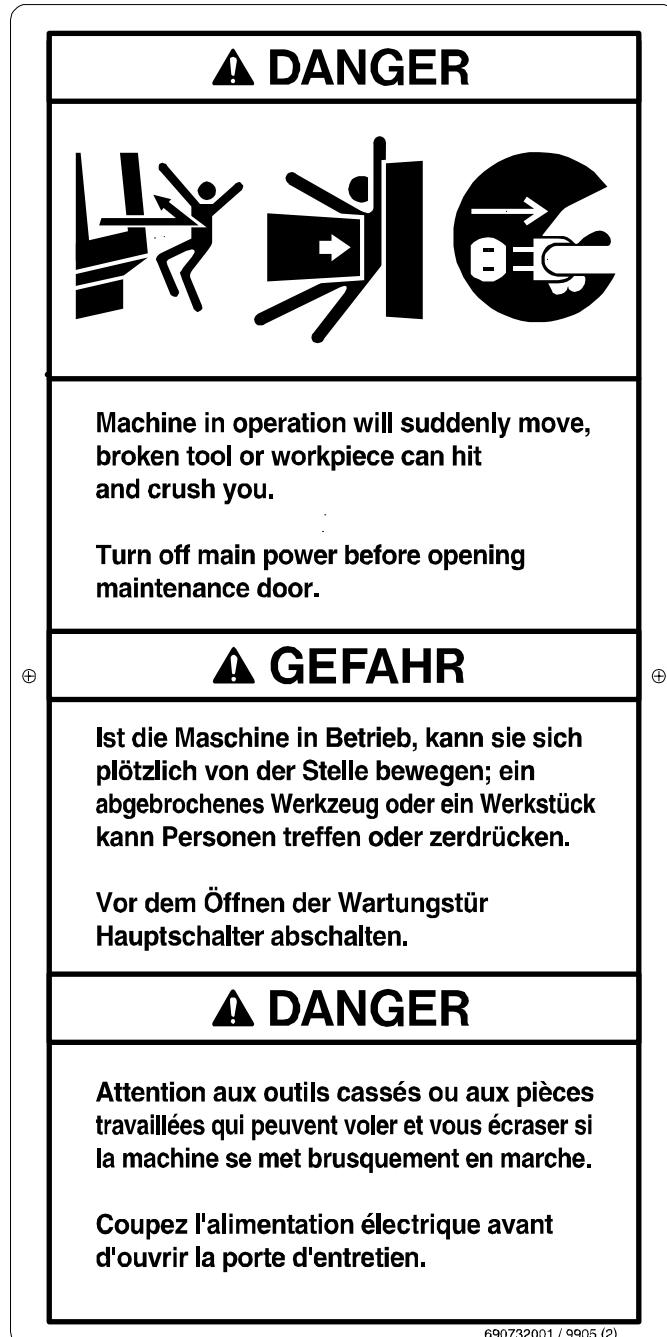
- (1) Sprache: Englisch, Japanisch, Chinesisch



Teilcode : 690731001

Teilname : LABEL, TC MAINTENANCE DOOR JCE

(2) Sprache: Englisch, Deutsch, Französisch



Teilcode : 690732001  
Teilname : LABEL, TC MAINTENANCE DOOR EGF

**7. Betreten-verboten Schild**

Teilcode : 693178001



693178001 / 0607 (1)

693178001.ai

# **TÜRVERRIEGELUNGSFUNKTION**

- 1. Allgemeine Vorsichtsmaßnahmen**
- 2. Äußere Ansicht**
- 3. Inspektion der Türverriegelung**
- 4. Einzelheiten der Funktion**

# 1 Allgemeine Vorsichtsmaßnahmen

## **⚠ GEFAHR**

**Umlaufende Werkzeuge und Laufende Teile können Sie verletzen.**  
**Wenn der Verriegelungsschalter außer Kraft ist, darf man mit keinem Körperteil in die Maschine kommen. Den Betriebsleiter verständigen.**  
**Bei außer Kraft gesetzter Verriegelung darf der Betriebsleiter niemanden die Maschine benutzen lassen.**  
**Vor Inbetriebnahme der Maschine sich mit eigenen Augen vergewissern, daß die Verriegelung in Kraft ist.**  
**Sollte der Verriegelungsschlüssel im Schloß stecken, muß der Betriebsleiter darüber informiert werden.**  
**Den Verriegelungsschlüssel muß der Betriebsleiter aufbewahren.**

## **⚠ GEFAHR**

**Bei außer Kraft gesetzter Verriegelung kann sich der Tisch bewegen. Die Innenteile der Innentür bewegen sich, auch wenn die Innentür geöffnet ist. Es besteht die Gefahr, vom Tisch oder von anderen Maschinenteilen geklemmt und verletzt zu werden.**  
**Bei außer Kraft gesetzter Verriegelung mit keinem Körperteil in die Innenseite der Außentür kommen.**  
**Bei außer Kraft gesetzter Verriegelung darf der Betriebsleiter niemanden die Maschine benutzen lassen.**  
**Sollte der Verriegelungsschlüssel im Schloß stecken, muß der Betriebsleiter darüber informiert werden.**

## **⚠ GEFAHR**

**Bei offener Innentür besteht Verletzungsgefahr an rotierendem Werkzeug und anderen Maschinenteilen.**  
**Der Maschinenbediener darf die Innentür nicht öffnen.**  
**Bei offener Innentür mit keinem Körperteil in die Maschine kommen. Der Bediener muß den Betriebsleiter davon benachrichtigen, da die Innentür offen ist. Der Betriebsleiter muß die Innentür verschließen und den Schlüssel aufbewahren.**  
**Bei nicht verschlossener Innentür darf der Betriebsleiter niemanden die Maschine bedienen lassen.**  
**Vor Inbetriebnahme der Maschine sich mit eigenen Augen vergewissern, daß die Verriegelung in Kraft ist.**  
**Wenn die Innentür nicht verschlossen sein sollte, muß der Betriebsleiter davon benachrichtigt werden.**

**⚠ WARNUNG**

**Umlaufende Werkzeuge könnten Sie verletzen.  
Von umlaufenden Werkzeugen sich fernhalten.**

**⚠ WARNING**

**Umlaufende Teile könnten Sie hineinziehen und verletzen.  
Von umlaufenden Teilen; Werkzeugen, der Spindel und dem  
ATC-Magazin, sich fernhalten.  
Körperanliegende Bekleidung tragen.  
Lange Haare müssen unter einem Hut aufgesteckt werden.  
Beim Arbeiten an der laufenden Maschine keine Handschuhe  
tragen.  
Keinen Schmuck tragen.  
Umlaufende Teile nicht berühren.**

## Zweck

Die Türverriegelungsfunktion schützt die Benutzer der Maschine vor der Gefahr, durch umlaufende Werkzeuge oder laufende Teile verletzt zu werden, oder durch umlaufende Teile in die Maschine hineingezogen zu werden.

## Einrichtungsbeschreibung

Bei in Kraft gesetzter Verriegelung wird die Außentür verriegelt, und die Höchstgeschwindigkeit entsprechend der Situation vermindert.

## Einrichtungsaufbau

Die Türverriegelungseinrichtung besteht aus folgenden:

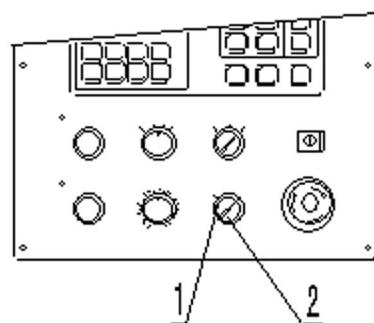
1. Türendschalter
2. Türschloß

## Benutzung der Funktion

1. Beim täglichen Betrieb muß der Verriegelungsschalter (1) immer in Kraft gesetzt sein.
2. Beim Einstellen der Arbeitsprozesse und Warten darf man den Schalter nur notwendigenfalls außer Kraft setzen.  
Lesen Sie bitte vor dem Einstellen und Warten der Maschine "Sicherheitsvorschrift für Personen, die die Maschine installieren und den Arbeitsprozeß aufstellen" und "Sicherheitsvorschrift für qualifiziertes Wartungspersonal".

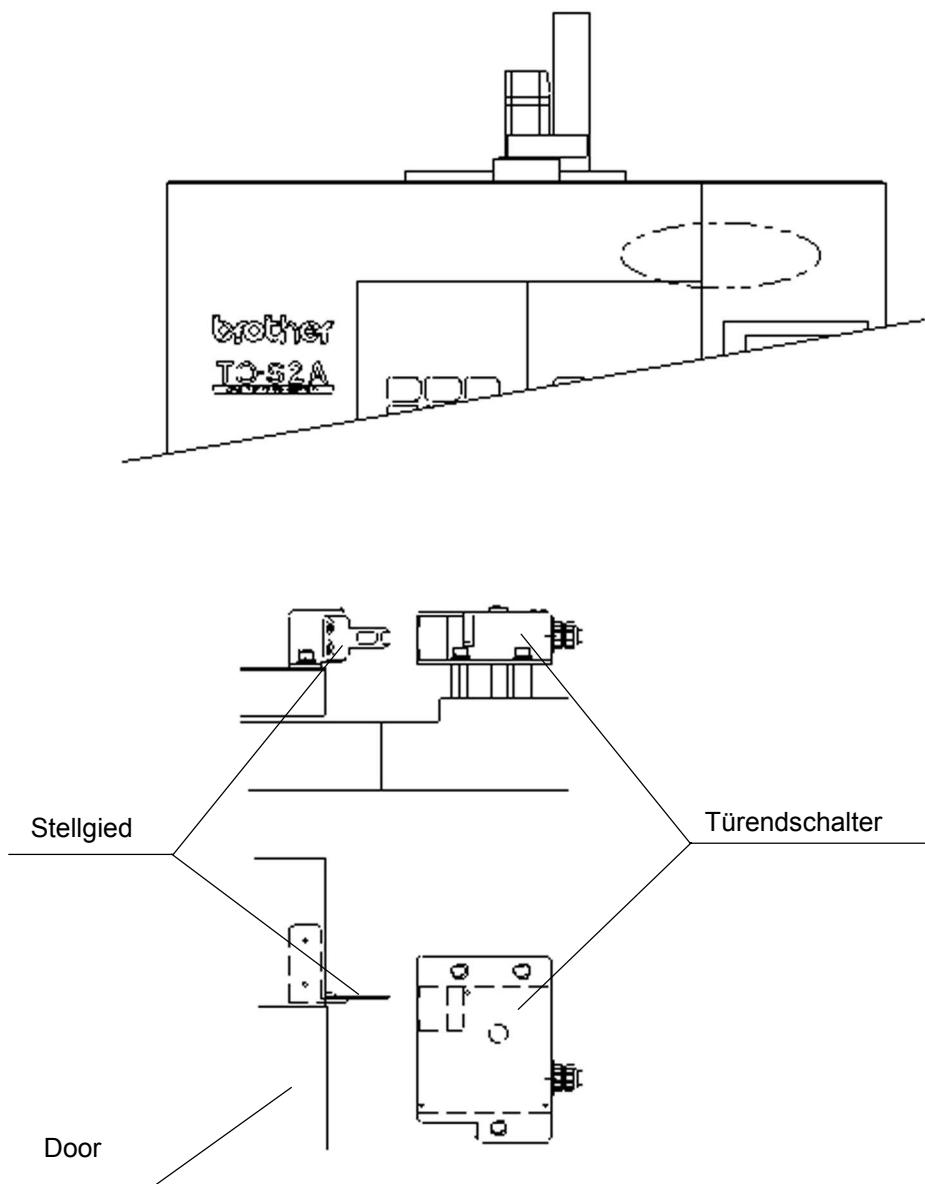
Bitte halten Sie Folgendes bei außer Kraft gesetzter Verriegelung ein.

- Umlaufende Werkzeuge und andere laufende Teile beachten.
- Nach dem Einstellen und Warten den Schalter in Kraft setzen.
- Den Schlüssel (2) muß der Betriebsleiter aufbewahren.



## 2 Äußere Ansicht

TC-S2A



# 3 Inspektion der Türverriegelung

Vor Inbetriebnahme der Maschine muß die Türverriegelungseinrichtung geprüft werden.

## Inspektionsschritte

### Inspektion von Betriebsstörungen

1. Die Tür gut schließen, den Strom anschalten und auf Nullstellung zurückführen.  
Überprüfen, dass der Türverriegelungsschalter eingeschaltet ist
2. Die Außentür öffnen.
3. Wenn die Türverriegelung richtig aktiviert ist, bewegt sich die Maschine nicht; auch nicht, wenn der [-X] Schalter auf dem Schaltbrett gedrückt ist. Wird ein Alarm gegeben, wird angezeigt, dass die Tür offen ist.  
Wird der Alarm nicht angezeigt, ist die Türverriegelung defekt. Sie muss repariert werden.

Nachdem geklärt ist, dass die Türverriegelung richtig arbeitet, zum nächsten Schritt weitergehen.

### Inspektion der Türverriegelung

4. Die Außentür schließen
5. Die Spindel rotieren lassen.
6. Wenn die Außentürverriegelung richtig arbeitet, ist die Außentür verriegelt und kann nicht geöffnet werden. Wenn die Tür geöffnet werden kann, ist die Tür nicht verriegelt und die Türverriegelung ist defekt. Sie muss repariert werden.

### Not Stopp Inspektion

7. Spindel im Handmodus rotieren.
8. Arbeitet die Türverriegelung richtig und die Maschine hält an, wobei der [\*NOT STOP EIN] Alarm angezeigt wird, ist der Not Stopp Knopf gedrückt. Wenn die Maschine nicht anhält oder keinen Alarm anzeigt, ist die Verriegelungsfunktion fehlerhaft. Sie muss repariert werden.

## 4 Einzelheiten der Funktion

Türstellung (*6)	Türverriegelung	Tüschloß(*6)	Maschinenbedienung
Zu	außer Kraft	nicht verriegelt	Jeder Betrieb ist möglich.
	in Kraft	Verriegelt während des Maschinenbetriebs (Achsenverschiebung, Spindel rotation, Tastatureingabe-und Programmierbedienung oder wenn der manuelle Impuisgeber in Kraft gesetzt ist).(*4)	
Auf	außer Kraft	nicht verriegelt	<ul style="list-style-type: none"> <li>• Spindelrotation, Magazindrehung, ATC und Gewindebohren sind nicht möglich. (*2)</li> <li>• Achsenverschiebung, Spindelhalt und Spindelausrichtung sind möglich. (*1)</li> <li>• Programmierbedienung ist nur bei Einzelbetriebsart möglich.</li> <li>• Tastatureingabebedienung hält an jedem Satzende.</li> <li>• Kühlmittel wird nicht zugeführt.</li> </ul>
	in Kraft		<ul style="list-style-type: none"> <li>• Die ganze betrieb ist un möglich. (*2)(*5)</li> <li>• Kühlmittel wird nicht zugeführt.</li> </ul>
Zu	außer Kraft		<ul style="list-style-type: none"> <li>• Der ganze Betrieb (einschließlich der Spindelrotation) hält sofort an. (*3)</li> <li>• Kühlmittel stoppt sofort.</li> </ul>
Auf	in Kraft		<ul style="list-style-type: none"> <li>• Der ganze Betrieb (einschließlich der Spindelrotation) hält sofort an. (*3) (*5)</li> <li>• Kühlmittel stoppt sofort.</li> </ul>
Auf	außer Kraft in Kraft		

- \*1. Die Eilgangsgeschwindigkeit ist bei MAX EILGANG (TÜR AUF) vom Maschinenparameter voreingestellt. Die Geschwindigkeit des Schneidevorschubs wird auf die Geschwindigkeit von MAX EILGANG (TÜR AUF) der Maschinenparameter eingeschränkt. Die Drehzahl zusätzlicher Achsen (A, B, C) ist auch auf die voreingestellte Drehzahl MAX SCHNELLDREH-5,6 (TÜR AUF) der Maschinenparameter eingeschränkt.
- \*2. Beim Versuch zu bedienen, kommt der Fehler "TÜR SCHL. NICHT", wenn die vordere Tür offen ist. Der Fehler "SEITENTÜR OFFEN" kommt, wenn die Seitentür beim Versuch zu bedienen offen ist.
- \*3. Bedienungsschritte, die Gewindebohren, Spindelausrichtung, ATC oder Magazindrehung beinhalten, halten an jedem Satzende. Wenn die Tür während der Spindelrotation geöffnet werden sollte, kommt der Fehler "TÜR OFFEN SP HALT" und die Spindel hält an. Wenn man die Tür zumacht und die Maschine wieder anlaufen lässt, steigt die Spindelzahl wieder auf den vorprogrammierten Wert. Mit folgenden Bedienungsschritten wird der Fehler "TÜR OFFEN SP HALT" ausgelöst. Auch wenn die Tür geschlossen ist und der Betrieb wieder angelaufen ist, steigt die Spindeldrehzahl nicht wieder auf den vorprogrammierten Wert.
- 1) Wenn die [RESET]-Taste gedrückt wird.
  - 2) Wenn die Spindel manuell bedient wird.
- Anmerkung  
Wenn die Tür während der Spindelrotation nach der ersten Bewegung vom Gewindebohrfräsen (XY-Achsenverschiebung und Spindelrotation) geöffnet wird, hält die Spindel an, aber der Fehler "TÜR OFFEN SP HALT" kann nicht vorkommen. Auch wenn die Tür zugemacht und der Betrieb wiederaufgenommen wird, wird der Rotationszustand von vor dem Stop nicht wiederhergestellt. Die Spindel rotiert automatisch, wenn die Z-Achse sich während des Schnittes vom Punkt "R" entfernt.
- \*4. Während des Maschinenbetriebs  
Der betreffende Maschinenbetrieb beinhaltet hier einen temporalen Stop sowie einen Blockstop (ausgenommen bei Programmende und beim Programmstop) für die Tastatureingabe und Dateibedienung.
- \*5. Besondere Spezifikationen  
Wenn die Tür geöffnet ist, während die Türverriegelung aktiviert ist, werden die Servomotoren abgeschaltet. Wenn die Tür vor der Dateibedienung oder während des Programmstopps (M00) geöffnet ist, kommt der Fehler "TÜR SCHL. NICHT" und die Servomotoren schalten ab. Dann die Tür schließen oder die Türverriegelung deaktivieren. Dann werden die Servomotoren auf AN geschaltet und der Fehler wird gelöscht. Wenn die Tür während der Dateibedienung geöffnet wird, kommt der Fehler "SERVOMOTOR ABGESTELLT" oder "TÜR OFFN MACHIN STOP". Dieser Fehler kann nicht gelöscht werden, auch wenn die Tür geschlossen wird. Dann die [RESET]-Taste drücken.

## **Manuel de sûreté pour eux qui installent et arrange le centreur tapant**

### **Centreur tapant TC-S2A**

Lisez ce manuel de sûreté soigneusement avant l'opération de le centreur tapant, s'il vous plaît.

**Brother Industries, Ltd. Machinery & Solution Company.**

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# Les grandes lignes du manuel de sûreté

## Lisez ce manuel

Tout le monde qui utilise le centreur tapant, y compris eux qui installent le centreur tapant dans l'usine, qui manient le centreur tapant et façonnent des pièces en travail, qui ajustent et réparent le centreur tapant, est requis de lire ce manuel de sûreté.

Dans ce manuel de sûreté tout le monde qui utilise le centreur tapant s'exprime comme utilisateur.

### Intension

Le centreur tapant consiste en circuits électriques de voltage haut, outils qui tournent avec une grande vitesse, et tables et ATC magasins qui se meuvent avec une force puissante. Pour cela, des hasards divers s'associent à la machine.

L'intension de ce manuel de sûreté est de protéger les utilisateurs contre ces hasards.

Le manuel de sûreté explique ci-dessous:

Avertissements: des types de hasards

Mesures préventives : des manières d'empêcher les hasards de surgir

## Le contenu de manuel de sûreté et la relation avec les autres manuels

Chaque manuel d'instruction, sauf le manuel de programmation, contient le manuel de sûreté. Les manuels de sûreté sont donnés à chaque groupe de personnel.

Lisez le texte du manuel d'instruction pour connaître des fonctions et des méthodes d'opération de la machine.

1. Manuel de fonctionnement (A l'usage des opérateurs non-spécialisés)

"Manuel de sûreté pour opérateurs"

"Manuel de sûreté pour eux qui installent et arrange le centreur tapant"

"Manuel de opération:(fonctionnements élémentaires de la machine à l'intention des opérateurs non-spécialisés")

Code de parties pour français : 693077001

2. Manuel de fonctionnement (A l'intention des opérateurs spécialisés)

"Manuel de sûreté pour opérateurs"

"Manuel de sûreté pour eux qui installent et arrange le centreur tapant"

"Fonction De L'enclenchement Avec Verrouillage De La Porte"

"Manuel de opération": (opération de la machine nécessaire pour arrangement et façonnement.)

La machine de Code de parties pour japonais : 693312001

programmation à conversation Code de parties pour anglais : 693307001

NC langage Code de parties pour japonais : 693310001

Code de parties pour anglais : 693305001

3. Manuel d'installation "Manuel de sûreté pour eux qui installent et arrange le centreur tapant"

"Manuel d'installation: Installation et assemblage de la machine et ces accessoires."

Code de parties pour japonais : 693311001

Code de parties pour anglais : 693306001

4. Manuel de programmation "Manuel de programmation:

création de programme de façonnement"

Code de parties pour japonais: 693314001

La machine de programmation à conversation Code de parties pour anglais : 693309001

NC langage Code de parties pour japonais : 693313001

Code de parties pour anglais : 693308001

5. Manuel de maintenance

"Manuel de sûreté pour eux qui sont qualifiés pour maintenance de centreur tapant maintenance."

"Manuel de maintenance:

Ajustement et réparation de la machine."

Le manuel de maintenance n'est pas distribué aux clients.

## Relation à des instructions de sûreté

Les articles d'importance particulier qui apparaissent dans ce manuel de sûreté s'attachent aussi à la machine comme instructions de sûreté.

Une explication des instructions de sûreté se prépare à la fin de ce manuel de sûreté. Si des instructions de sûreté se sont déachées de la machine, obtenez des nouvelles instructions de sûreté et les attachez correctement.

## Langage

Des machine envoyées à l'intérieur du Japon sont pourvues de manuels de sûreté et d'instructions de sûreté rits en japoinalis. Les machines exportées du Japon sont fournies avec les manuels et les étiquettes de sécurité en quatre langues : anglais, allemand, français et chinois. Obtenez les manuels et les instructions écrits en un langage que vous pouvez comprendre.

Sur manuels et instructions en autres langages, consultez le vendeur auquel vous avez acheté la machine.

## Comment d'acheter

Quand les manuels de sûreté et les instructions de sûreté ont été perdus, obtenez-les du vendeur auquel vous avez acheté la machine.

Si vous ne savez pas le vendeur, consultez les bureaux spécifiés ci-dessous.

1-1-1 Kawagishi, Mizuho-ku, Nagoya 467-8562, JAPAN  
BROTHER INDUSTRIES, LTD. Machinery & Solution Company.  
phone +81-52-824-2232

## Maniement du manuel de sûreté

Gardez-vous de perdre les manuels de sûreté et mettez-les sous la main toujours. Quand la machine change de main, passez les manuels de sûreté à la nouvelle propriétaire avec la machine.

## Degré de danger

Les degré de danger se classent en trois catégories d'après le niveau de dommage qui peut surgir quand des instructions ne sont pas observées.

1. DANGER

### **DANGER**

Dommage qui peut causer une mort ou une blessure sévère.

2. AVERTISSEMENT

### **AVERTISSEMENT**

Dommage qui peut entraîner une blessure sérieuse.

3. ATTENTION

### **ATTENTION**

Dommage moins sérieux que cela ci-dessus.

## Ordre d'explication

Les instructions de sûreté s'expliquent dans l'ordre ci-dessous.

1. Mots de signal (DANGER, AVERTISSEMENT, ATTENTION) et symboles indiquant le degré de danger
2. Type de danger (Sujet)
3. Type de dommages prévus
4. Mesure préventive

## Significations des symboles

Les symboles sont utilisés sur les instructions de sûreté et dans les avertissements du manuel de sûreté pour expliquer des dangers possibles et leurs mesures préventives.

### 1. Danger

	Glissement		Parties se mouvant
	Trébuchement		Commotionélectrique
	Commotionélectrique		Pris
	Main coincée		Température haute
	Température haute		Coupe
	Coupe		Eclatement
	Pointe aigu		Objet tombant
	Objet tombant		Objet tournant
	Tomber		Jaillissement
	Jaillissement		Feu

## 2. Mesures préventives



Protégez vos oreilles.



Protégez vos mains.



Protégez vos pieds.



Coupez la prise de courant.



Ne touchez pas.



Protégez votre tête.



Connectez le coupe-circuit.



Ne Désassemblez pas.



Protégez vos yeux.

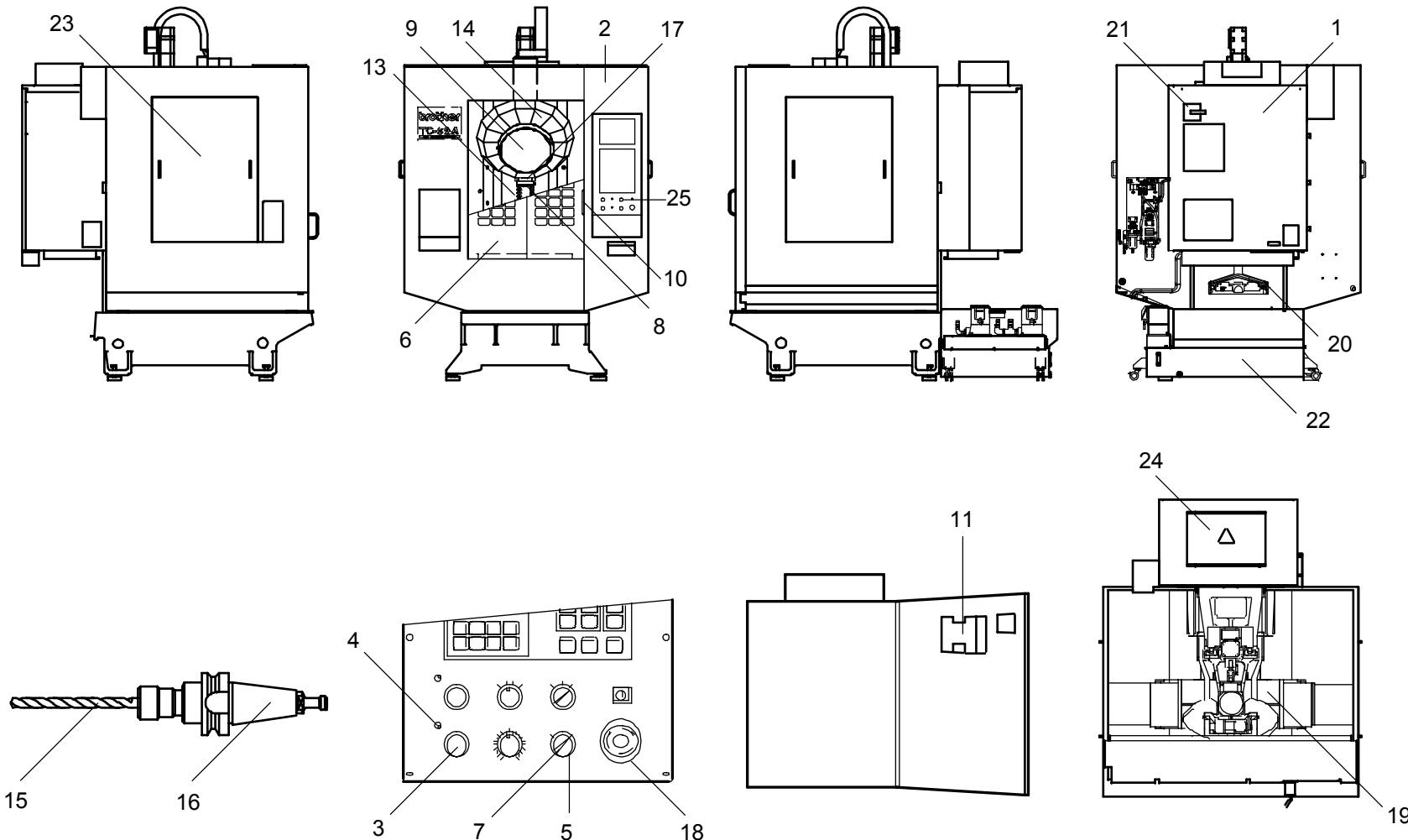
## 部品名

## Section Names

## Namen jedes Teils

## Noms de sections

## 各部件名称



TS2ASA01-1.ai

部品名	Section Names	Namen jedes Teils	Noms de sections	各部件名称
No.	各部の名称	Section names	Namen jedes Teils	Noms de sections
1.	日本語	English	Deutsch	Français
1.	制御箱	control box	Steuerschrank	armoire de commande
2.	スプラッシュガード	splash guard	Spitzblech	tôle pare-copeaux
3.	停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt
4.	停止ランプ	stop lamp	stop Lampe	lampe d'arrêt
5.	ドアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage
6.	作業扉	work door	Arbeitstür	porte de travail
7.	ドアインタロックキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage
8.	スピンドル	spindle	Spindel	broche
9.	ATC マガジン	ATC magazine	ATC Magazin	ATC magasin
10.	取手	handle	Griff	poignée
11.	制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande
12.	レベリングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine
13.	クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe
14.	グリップカバー	grip cover	Griffschutz	couverture de jambe
15.	工具	tool	Werkzeug	outil
16.	工具ホルダ	tool holder	Werkzeughalter	support à outil
17.	スピンドルヘッド	spindle head	Spindelkopf	tête de la broche
18.	非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence
19.	ケーブルカバー	cable cover	kabelschutz	couvre cable
20.	テーブル	table	Tisch	table
21.	主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale
22.	クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe
23.	スプラッシュガードサイドカバー	splash guard side cover	Spitzblechseitenschutz	couverture à côté du tôle pare-copeaux
24.	回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice
25.	操作パネル	operation panel	Betriebstafel	panneau d'opération

# Avertissements et mesures préventives

Les nombres dans ( ) tels que 1, 2 correspondent aux noms de chaque section.

**Danger**  **DANGER**

- SD1 Hasards divers s'associent au centreur tapant.  
 SD1-1 Lisez le manuel de sûreté avant l'opération de la machine pour connaître ces hasards et les mesures préventives.  
 SD1-2 Tous les utilisateurs doivent connaître la position du bouton d'arrêt d'urgence(18) et l'opération.



- SD2 Les sections de voltage haut sont présents dans l'armoire de commande(1). Si vous les touchez par erreur, vous pouvez vous blesser sérieusement ou mourir.  
 SD2-1 Personnes qui ont la connaissance suffisante sur les circuits électriques de cette machine et qualité d'elctromécanicien sont seulement admises à faire la maintenance et la révision des composants électriques.  
 SD2-2 Coupez le contacteur de l'alimentation principale (21) avant l'opération. Apposez une affiche spécifiant 'En train de maintenance.'  
 SD2-3 Quand vous quittez la machine, fermez la porte de l'armoire de commande et fixez-la avec des vis.
- SD3 Vous pouvez vous prendre dans la machine en opération et vous blesser sérieusement.  
 SD3-1 N'entrez pas dans le tôle-pare copeaux en opération.  
 SD3-2 Appuyez sur la touche d'arrêt (3) ou la touche de reproduction, assurez-vous visuellement que la lampe d'arrêt allume, et mettez-vous les mains, les pieds, et le corps dans la machine.  
 SD3-3 Assurez-vous visuellement que personne n'entre dans le tôle-pare copeaux avant de mettre la machine en marche.  
 SD3-3 Ne vous approchez pas les mains, les pieds, et le corps de sections se mouvant en opération.  
 SD3-4 Quand il est nécessaire d'entrer dans la machine, coupez le contacteur de l'alimentation principale et cadenassez-le pour que le contacteur de l'alimentation principale (21) ne soit pas mis en.
- SD4 Quand le commutateur de la porte d'embrayage(5) est désactivé la machine marche quand même la porte de travail(6) ou la porte latérale (6)est ouverte. Vous pouvez vous couper avec un outil tournant (15), ou vous prendre dans la machine.  
 SD4-1 Pendant l'installation de la machine, faites extrêmement attention au mouvement de la machine de façon à pouvoir l'arrêter à tout moment. Lorsque l'installation de la machine est terminée, mettez l'interrupteur de verrouillage de la porte sur la position ON. Retirez la clé de verrouillage de la porte (7), que le superviseur devra ensuite toujours garder.  
 SD4-2 Ne quittez pas la machine où l'interrupteur de la porte d'embrayage n'est pas valable.



- SD5 La table (20) risque de se déplacer si l'interrupteur de verrouillage de la porte (5) est réglé sur la position OFF. Vous risquez de rester coincé dans la table et de vous blesser.
- SD5-1 Pendant l'installation de la machine, faites extrêmement attention au mouvement de la machine de façon à pouvoir l'arrêter à tout moment. Lorsque l'installation de la machine est terminée, mettez l'interrupteur de verrouillage de la porte sur la position ON. Retirez la clé de verrouillage de la porte (8), que le superviseur devra ensuite toujours garder.

**Avertissement  AVERTISSEMENT**



- SW1 En touchant des outils tournant (15), vous vous blesserez.  
SW1-1 Ne vous approchez pas d'utils tournant.



- SW2 Des (15) outils cassés ou des pièces en travail frappant, vous pouvez se blesser.  
SW2-1 Fermez la porte de travail (6) et mettez la machine en marche.



- SW3 Vous pouvez être pris dans le section tournant et se blesser.  
SW3-1 Ne vous approchez pas d'outiles tournant (15), de broche (8), et de ATC magasin (9).  
SW3-2 Portez des vêtements tout justes. Mettez des cheveux longs dans un bonnet. Ne portez pas de gants sans que vous n'arrêtez la machine et ni ne fassiez l'arrangement. Ne portez pas de bijoux. Ne tenez pas le section tonrnant.



- SW4 Si le dispositif de sûreté est modifié il peut ne pas travailler précisement. Donc vous pouvez être happé par la machine, se heurter contre la machine, ou recevoir une commotion électrique.  
SW4-1 Ne modifiez pas le dispositif de sûreté. Ne fixez pas le dispositif de sûreté pour que le dispositif de sûreté ne marche pas.



- SW5 Quand des copeaux s'éarpillent vous sont mis dans les yeux, vous pouvez se blesser les globes oculaires et perdre la vue.  
 SW5-1 Portez des lunettes de protection.  
 SW5-2 Ne enlevez pas de copeaux en air.



- SW6 Si vous touchez des copeaux de la main nue, vous pouvez se couper la main ou se brûler.  
 SW6-1 Ne touchez pas de copeaux de la main nue. Ne touchez pas de sections pointues de pièces en travail.  
 SW6-2 Quand vous enlevez des copeaux, utilisez une brosse.  
 SW6-3 Nettoyez copeaux de coupe quand machine est arrêtée.
- SW7 Si vous tenez le tranchant d'outil (15), vous pouvez se couper la main.  
 SW7-1 Ne touchez pas le tranchant d'outil. Tenez le pied de la garde d'outil (16) toujours.



- SW8 En laissant tomber un objet lourd sur vos pieds, vous pouvez se fracturer les pieds.  
 SW8-1 Quand vous levez des objets lourds, portez des chaussures de protection.
- SW9 En levant des objets lourds, vous pouvez souffrir du lumbago.  
 SW9-1 Quand vous levez des objets lourds, demandez de l'aide.  
 SW9-2 Levez des objets avec la force de vos jambes au lieu de votre dos.



- SW10 En travaillant dans un bruit infernal ou pendant de longues heures, vous pouvez avoir des légers troubles de l'audition.  
 SW10-1 Quand vous travaillez dans le bruit, portez des protections telles que les protège-oreilles.



- SW11 Vous pouvez se blesser les yeux ou les oreilles dans un éclatement d'un air à haute pression.  
 SW11-1 Vous ne devez pas installer ou changer la tuyauterie d'un air à haute pression, que vous ne soyez qualifié pour manipuler l'air à haute pression et ne compreniez la tuyauterie de la machine.  
 SW11-2 Pour réparer la tuyauterie d'un air à haute pression, coupez la source de pression et enlevez la pression restante. Posez l'affiche qui dit d'en maintenance.



- SW12      Vous pouvez se frapper la tête en levant.  
 SW12-1    Portez un casque de protection quand vous travaillez dans et autour de la machine.



- SW13      Si vous faites fonctionner la machine en laissant des outils dans la machine, les outils peuvent jaillir et vous blesser.  
 SW13-1    Ne laissez pas des outils dans la machine.



- SW14      Vous pouvez avoir la main pris dans la porte travail (6), si vous la ouvrez et fermez en tenant d'autres parties de la porte travail que la poignée (10).  
 SW14-1    Tenez la poignée de la porte travail , quand vous la ouvrez et fermez.



- SW15      L'armoire de commande (1) a des sections de haute température. Pour cela, si des papiers d'epassez de la boîte à papiers (11) de l'armoire de commande, ils peuvent prendre feu.  
 SW15-1    Ne mettez pas de papiers excédant la grandeur de papiers de A4 ou de lettre.



- SW16      Si des outils sont mis sur l'armoire de commande (1) ou la machine, ils peuvent tomber à cause de la vibration de la machine.  
 SW16-1    Ne mettez pas d'objets sur l'armoire de commande ou la machine.



- SW17      Si vous montez sur la machine ou le tank d'huile de coupe (22), vous pouvez tomber et se blesser.  
 SW17-1    Ne montez pas sur la machine ou le tank d'huile de coupe.



SW18 Si vous vous mettez la main sous les boulons à régler le niveau de la machine (12), vous pouvez avoir la main pris et se blesser.

SW18-1 Ne mettez-vous pas la main sous le boulon à régler le niveau de la machine. Utilisez des outils pour ajuster le boulon à régler le niveau de la machine.



SW19 Si le câble pend ou n'est pas couvert, vous pouvez s'en prendre ou glisser et tomber.  
SW19-1 Ne donnez pas de jeu au câble. Couvrez le câble, quand il est placé sur le plancher.



SW20 La modification de la machine peut affecter le dispositif de sécurité et faire les expressions de tous les avertissements donnés inutiles.

SW20-1 Ne modifiez pas la machine. Si la modification est requise, contactez Brother Industries, Ltd. d'avance et demandez la permission par écrit.



SW21 Si de l'huile de coupe rejaillit dans vos yeux, vous pouvez se blesser les yeux.

SW21-1 Quand vous ajustez l'ajutage d'huile de coupe (13), portez les lunettes de protection.

SW21-2 Quand de l'huile de coupe rejaillit dans vos yeux, vous devez se laver les yeux à l'eau claire et consulter un médecin.



SW22 Si vous vous mettez les doigts dans un espace de la machine, vous pouvez avoir les doigts pris et se blesser.

SW22-1 Ne mettez pas les doigts entre couverture de jambe.

SW22-2 Ne vous mettez pas les doigts entre l'outil (15) ou le support à outil (16) et ATC magasin(9).



SW23 Si de l'huile de coupe, de l'huile, ou des copeaux sont dispersés, vous pouvez glisser, tomber, ou se heurter et se blesser.

SW23-1 Coupez le secteur de la machine, nettoyez dans et autour de la machine, et travaillez.

SW23-2 Portez un casque de protection et des chaussures de sûreté, pendant que vous installez la machine.



- SW24 Quand vous attachez la garde d'outil (16) à la machine ou les en détachez, vous pouvez se couper à la main en un tranchant d'outil (15) ou se heurter la main contre la machine, se heurter la main contre la machine.
- SW24-1 Ne tenez pas le bout de l'outil. Portez des gants en cuir. Tenez l'outil et le support à outil des deux mains.



- SW25 La machine peut marcher brusquement, ou des outils peuvent tomber.
- SW25-1 Quand la lampe d'arrêt (4) n'allume pas, Ne vous mettez pas les mains, les pieds, et le corps sous la tête de la broche (17).
- SW25-2 Quand vous arrangez la machine, tirez la table près de vous ou positionnez la colonne à l'écart de vous.
- SW25-3 Tirez la cale près de vous, quand vous arrangez le changeur de cale.
- SW25-4 Coupez le contacteur (21) de l'alimentation principale, cadenassez-le pour qu'il ne soit pas mis en, et appliquez graisse.



- SW26 Quand vous façonnez des pièces en travail à la machine en utilisant de l'huile de coupe, la section façonnant peut chauffer et prendre feu.
- SW26-1 En utilisant de l'huile de coupe, installez un avertisseur d'incendie et un extincteur automatique.
- SW26-2 En façonnant des pièces en travail, il faut que un opérateur se tienne prêt de la machine.



- SW27 En s'appuyant à la machine, vous pouvez se prendre dans la machine ou s'y heurter et se blesser.
- SW27-1 Ne vous appuyez pas à la machine.

- SW28 Si des objets s'accrochent au bouton d'arrêt d'urgence (18), vous pouvez ne pas appuyer le doigt sur le bouton d'arrêt d'urgence.
- SW28-1 Ne accrochez pas d'objet au bouton d'arrêt d'urgence.



- SW30 Comme le réservoir d'huile de coupe (22) est lourd, en levant le réservoir d'huile de coupe vous pouvez souffrir du lumbago ou le laisser tomber sur les pieds.
- SW30-1 Ne levez pas le réservoir d'huile de coupe, quand vous enlevez des copeaux même.



- SW31 Quand vous entrez dans la machine, vous pouvez tomber en glissant et se blesser dans la machine.
- SW31-1 Avant d'entrer dans la machine, coupez le contacteur de l'alimentation principale, cadenassez-le pour qu'il ne soit pas mis en, et enlevez l'huile de coupe et les copeaux. Portez un casque de protection et des chaussures de sécurité. Posez l'affiche qui dit d'en faire la maintenance près de la panneau d'opération.



- SW32 Si la couverture à côté (23) du tôle pare-copeaux (2) n'est pas attaché vous pouvez vous prendre dans la machine ou se blesser en jaillissant des outils cassés.
- SW32 Assurez-vous visuellement que le couvre côté du tôle pare-copeaux est attaché avant de mettre le contact.



- SW33 Si des outils (15) ou la garde d'outil (16) dont le poids et la grandeur excèdent la limite spécifiée sont utilisés, ils peuvent sauter.
- SW33-1 Utilisez des outils et la garde d'outil dont le poids et la grandeur excèdent la limite spécifiée.
- SW33-2 Pour connaître la limite d'outils, regardez l'instruction attachée à l'outil manuel de fonctionnement.

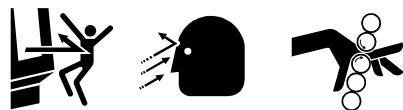


- SW34 Si vous touchez la résistance régénératrice, vous pouvez vous brûler parce que la résistance chauffe en opération.
- SW34-1 Ne enlevez pas la couverture pour la résistance régénératrice (24).

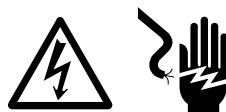
- SW35 Si vous touchez le moteur, vous pouvez vous brûler parce que le moteur chauffe en opération.
- SW35-1 Ne touchez pas le moteur dans 30 minutes après l'arrêt de la machine.



- SW36 Si un plomb de sécurité incorrect est disposé un feu peut éclater parce que le dispositif de protection ne marche pas.
- SW36-1 Remplacez un plomb épuisé par le même plomb.
- SW37 Si la disposition du relais thermique est incorrecte, un feu peut éclater parce que le dispositif de protection ne marche pas.
- SW37-1 Ne changez pas la disposition du relais thermique.



- SW38 Si le ATC magasin (10) tourne, des outils (16) peuvent heurter des pièces en travail, une gigue , ou la machine et casser.  
 SW38-1 Fixez la longueur des outils pour queles outils ne heurtent pas les pièces en travail, la gigue, ou la machine même si le ATC magasin tourne.



- SW39 Si l'armoire de commande (1) ou le panneau d'opération (25) sont mouillées, vous pouvez recevoir une commotion électrique.  
 SW39-1 Ne arrosez pas l'armoire de commande et le panneau d'opération d'huile de coupe, d'eau, et de copeaux.  
 SW39-2 Ne touchez pas l'armoire de commande de la main mouillée.
- SW40 Si le fil de force motrice, fil de PE, installé à l'exterieur est court, en cause du tirage du câble le fil de PE se décroche et vous pouvez recevoir une commotion électrique.  
 SW40-1 Utilisez le fil plus long que autres fils (L1, L2, L3) et connectez le fil en donnant le fil du jeu.



- SW41 Si vous mettez le contact de la machine ou façonnez des pièces en travail dans une atmosphère explosive, une explosion peut survenir en cause d'une étincelle de la machine.  
 SW41-1 Ne installez pas dans une atmosphère explosive.  
 SW41-2 Ne mettez pas la machine sous tension, ne demarrez pas l'usinage ou ne reglez pas la machine dans une atmosphère explosive.



- SW42 Si vous oubliez de monter le capot latéral de la tôle pare-copeaux (23), vous pouvez vous prendre dans la machine et vous blesser.  
 SW41-1 Avant une mise en alimentation, assurez-vous visuellement que le capot latéral de la tôle pare-copeaux est monté.



- SW44 Copeaux de coupe peuvent prendre feu ou exploser selon matériel de pièce travaillée (cas. magnésium).  
 SW44-1 Enlevez tous copeaux de coupe immédiatement.  
 SW44-2 Installez extincteur auprés de la machine en usinant une pièce travaillée faite de tel matériel, et ne réalisez jamais opération inhabitée.



- SW45 Si la appareil de fraisage n'est pas assurée à l'outil, elle peut se détacher de l'outil pendant rotation de broche, aboutissant à tort sérieux.  
 SW45-1 Contrôlez que la appareil de fraisage est assurée à l'outil et ensuite fixez l'outil.



- SW46 Un feu risque de se déclencher si l'on utilise un capteur à 3 fils qui comprend une ligne d'alimentation exclusive.  
 SW46-1 Utiliser un capteur à 2 fils à la place d'un capteur à 3 fils.  
 SW46-2 Si l'on ne peut éviter d'utiliser des capteurs à 3 fils, ajouter un fusible (1A ou moins) à la ligne d'alimentation de chaque capteur.



- SW47 Les mauvais contacts qui se produisent lorsque les bornes ne sont pas correctement serrées après la pose des fils électriques risquent de provoquer un incendie.  
 SW47-1 Après la pose des fils électriques, vérifier soigneusement le serrage des vis.

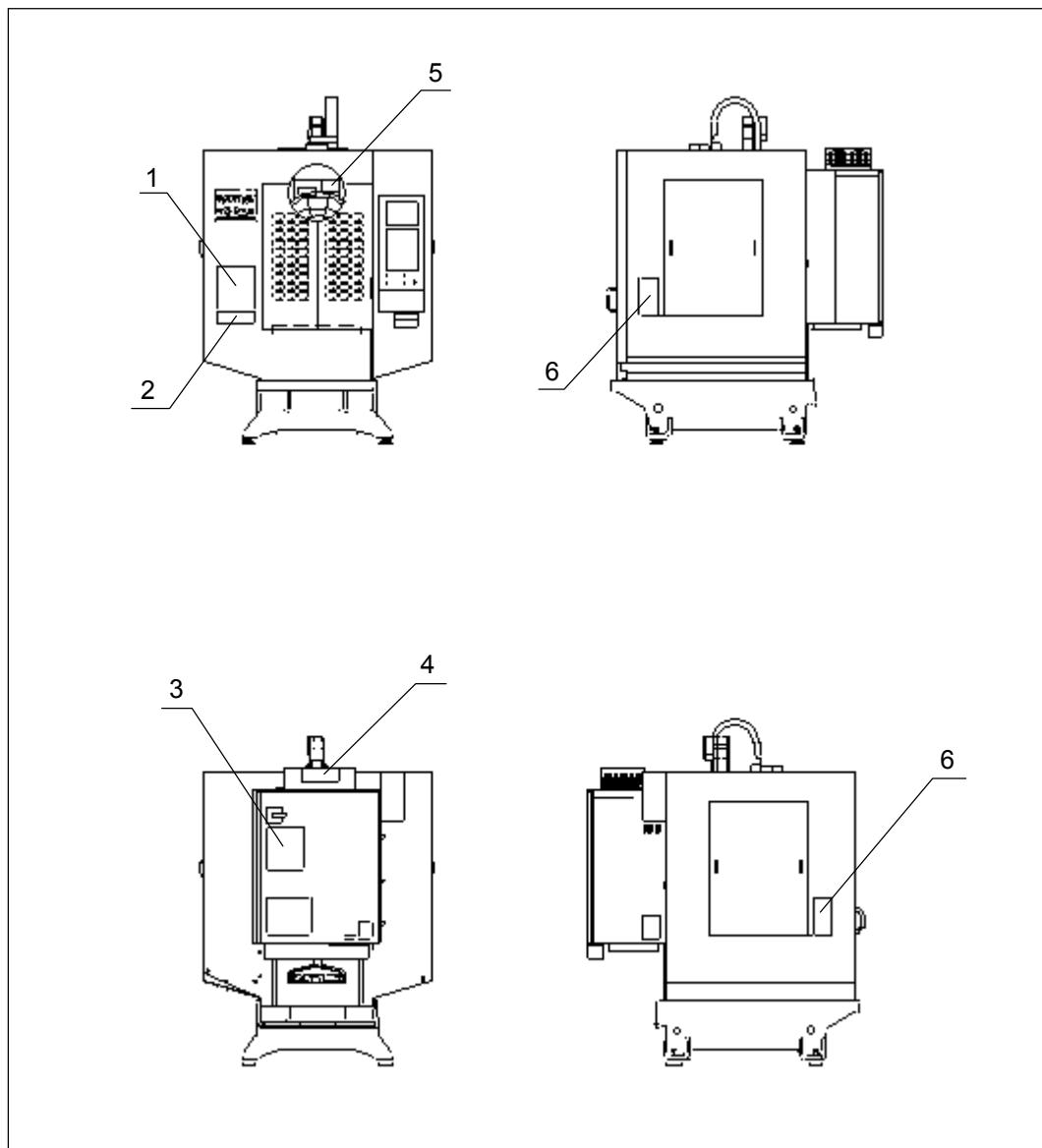


- SW48 Attention de ne pas vous blesser avec les couteaux ou les dispositifs de serrage lorsque vous entrez dans la machine et que la pièce est mal éclairée.  
 SW48-1 Prévoir une lampe dans la machine lorsque l'éclairage ne dépasse pas 500 lux.

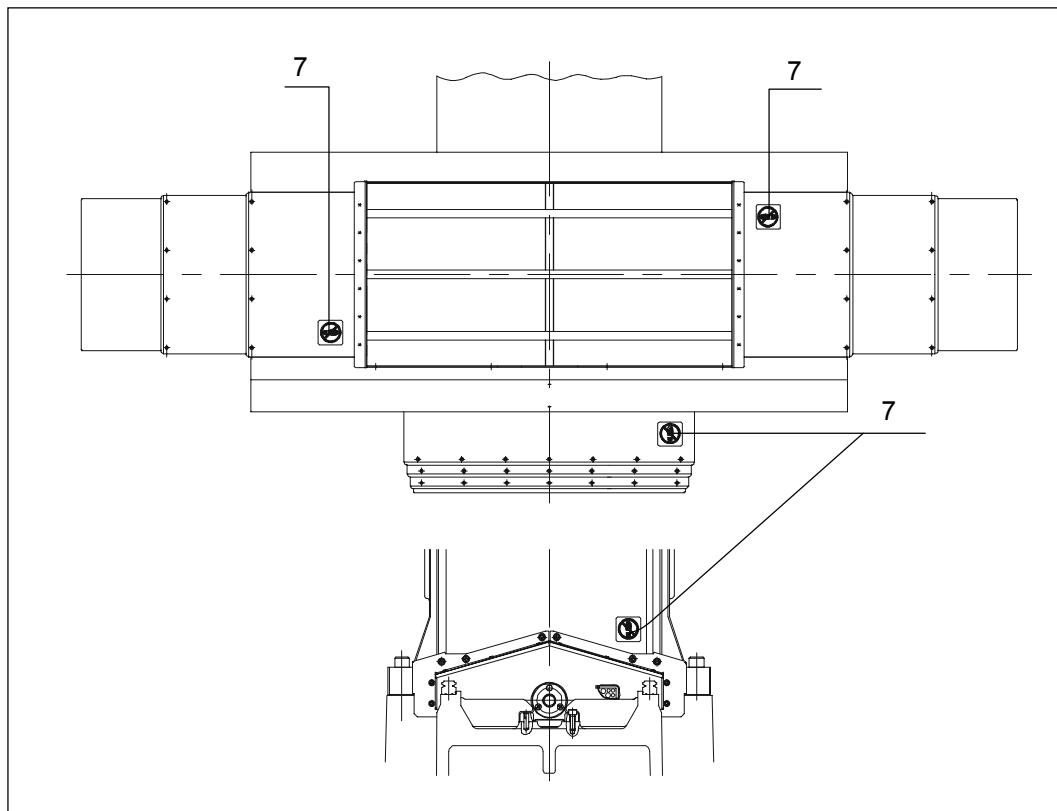
## Vérification des instructions de sûreté

Les instructions de sûreté sont attachées à la machine. Leurs positions sont indiquées dans la description ci-dessous. Contrôlez que les instructions ne sont pas endommagées. Si elles sont endommagées, obtenez une nouvelle instruction pour remplacement.

## Position des instructions de sûreté



230S00C02.doc



S2A00401.ai

## 1. Etiquette de sûreté, Avant et latéral

(1) Langue : Anglais, Japonais, Chinois



Code de partie  
Nom de partie

: 690373001  
: PS LABEL,TC FRONT JCE

(2) Langue : Anglais, Allemand, Français

**This machine has hazards.**

Read instruction manuals to understand hazards and avoid them before operation.

Diese Maschine birgt Gefahren.

Um Risiken zu erkennen und vermeiden, vor dem Einschalten die Betriebsanleitung lesen.

L'utilisation de cette machine comporte des risques.

Lisez les manuels d'instruction pour connaître les risques et les éviter avant d'utiliser cette machine.

<b>DANGER</b>	<b>WARNING</b>	<b>WARNING</b>
		 
Machine in operation will suddenly move and crush you. Keep away from moving parts.	Broken tool or workpiece can hit and wound you. Shut door before starting machine.	Rotating parts can catch and injure you. Keep away from rotating tool, spindle, and magazine. Never hold moving parts. Do not wear gloves while operating machine.
<b>GEFAHR</b>	<b>WARNUNG</b>	<b>WARNUNG</b>
Maschine in Betrieb kann plötzlich laufen und Sie stoßen. Beim Betrieb der Maschine von allen bewegenden Teilen sich fernhalten, um Verletzungen zu vermeiden.	Gebrochene Werkzeuge oder Werkstücke könnten Sie treffen und verletzen. Vor dem Start der Maschine Tür schließen.	Umlaufende Teile könnten Sie fassen und verletzen. Von umlaufendem Werkzeug, Spindel und Magazin sich fernhalten. Rotierende Teile nicht berühren. Während des Bedienens keine Handschuhe tragen.
<b>DANGER</b>	<b>AVERTISSEMENT</b>	<b>AVERTISSEMENT</b>
En opération, cette machine bougera soudainement et provoquera des risques d'écrasement. Ne vous approchez jamais des parties mobiles.	Les outils cassés ou les pièces usinées peuvent être projetés et risquent de vous frapper et de vous blesser. Fermez la porte avant de faire démarrer la machine.	Les parties tournantes peuvent vous accrocher et vous blesser. Ne vous approchez jamais des outils tournant, de la broche et du magasin. Ne saisissez jamais les parties en mouvement. Ne portez pas de gants pendant l'utilisation.

691042001 / 0302 (2)

Code de partie  
Nom de partie

: 691042001  
: PS LABEL,TC FRONT EGF

## 2. Etiquette d'outil

工具、主軸回転数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。  
 If use beyond the limitation of the tool and spindle speed, machine may be broken.  
 Check the details by the operation manual before operation.

	最高主軸回転速度	10000 min <sup>-1</sup> / 16000 min <sup>-1</sup>	Max Spindle Rotation Speed	
	主軸テーパ	7 / 24 No.30	Spindle Taper	
	ツールシャンク	MAS-BT30	Tool Shank	
	フルスタッド	MAS-P30T-2 (30°)	Retention Knob	
	マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)	Total in Magazine	
	工具の制限	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> ≤ 80 mm L <sub>2</sub> ≤ 160 mm D <sub>3</sub> ≤ 46 mm L <sub>3</sub> ≤ 30 mm M ≤ 3 kg MxH≤180 kgmm	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> ≤ 55 mm L <sub>2</sub> ≤ 160 mm D <sub>3</sub> ≤ 46 mm L <sub>3</sub> ≤ 30 mm M ≤ 2 kg MxH≤100 kgmm	Limitation of Tool
	工具バランス制限	100 grmm	50 grmm	Limitation of Tool Balance
	主軸回転数制限	10000 min <sup>-1</sup>	16000 min <sup>-1</sup>	Limitation Spindle Rotation Speed

653379001 / 0210 (2)

Code de partie : 653379001  
 Nom de partie : Tool LABEL250

### 3. Etiquette de sûreté, Arrière équipement à haute pression de liquide réfrigérant

(1) Langue : Anglais, Japonais, Chinois



690730001 / 9709 (1)

Code de partie  
Nom de partie

: 690730001  
: PSLABEL, TC REARJCE

(2) Langue : Anglais, Allemand, Français



Code de partie  
Nom de partie

: 691045001  
: PSLABEL, TC REAR EGF

#### 4. Etiquette, résistance régénératrice

(1) Langue : Anglais, Japonais, Chinois

	<b>⚠ WARNING</b>	<b>⚠ 警告</b>	<b>⚠ 警告</b>
<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>熱い抵抗器 さわるとやけどする。</p> <p>運転が終り、 30分たってから、 カバーをはずすこと。</p>	<p>热电阻 触摸会烫伤。</p> <p>停止运行 30 分钟之后， 才可取下安全罩。</p>	

690729001 / 9709 (1)

Code de partie:

690729001

Nom de partie:

LABEL, TC REGENERATIVE JCE

(2) Langue : Anglais, Allemand, Français

	<b>⚠ WARNING</b>	<b>⚠ WARNUNG</b>	<b>⚠ AVERTISSEMENT</b>
<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>Heißer Widerstand könnte Ihre Hand verbrennen.</p> <p>Nach dem Ausschalten der Maschine 30 Minuten warten, dann den Schutzdeckel entfernen.</p>	<p>Température de la résistance élevée, pouvant causer des brûlures.</p> <p>Après avoir arrêté la machine, attendez 30 minutes avant d'enlever le capot.</p>	

691058001 / 0302 (2)

Code de partie:

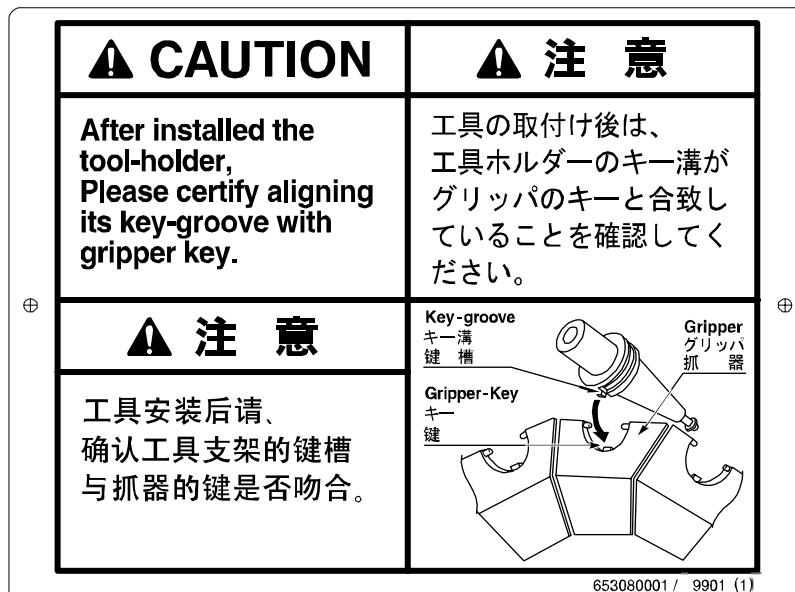
691058001

Nom de partie:

LABEL, TC REGENERATIVE EGF

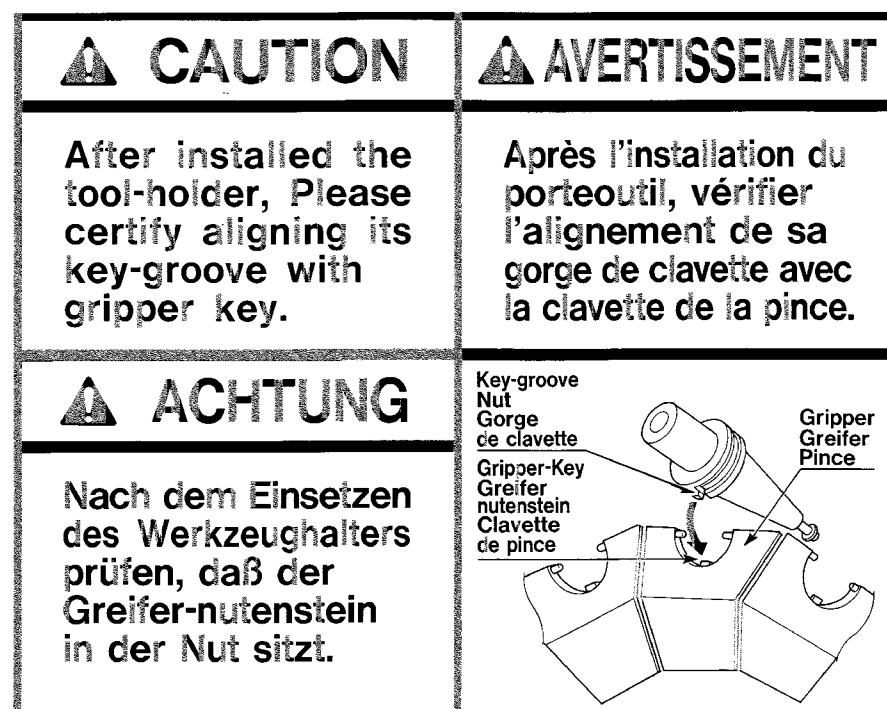
## 5. Etiquette, retrait d'outil

(1) Langue : Anglais, Japonais, Chinois



Code de partie : 653080001  
 Nom de partie : LABEL, Removing Tool JCE

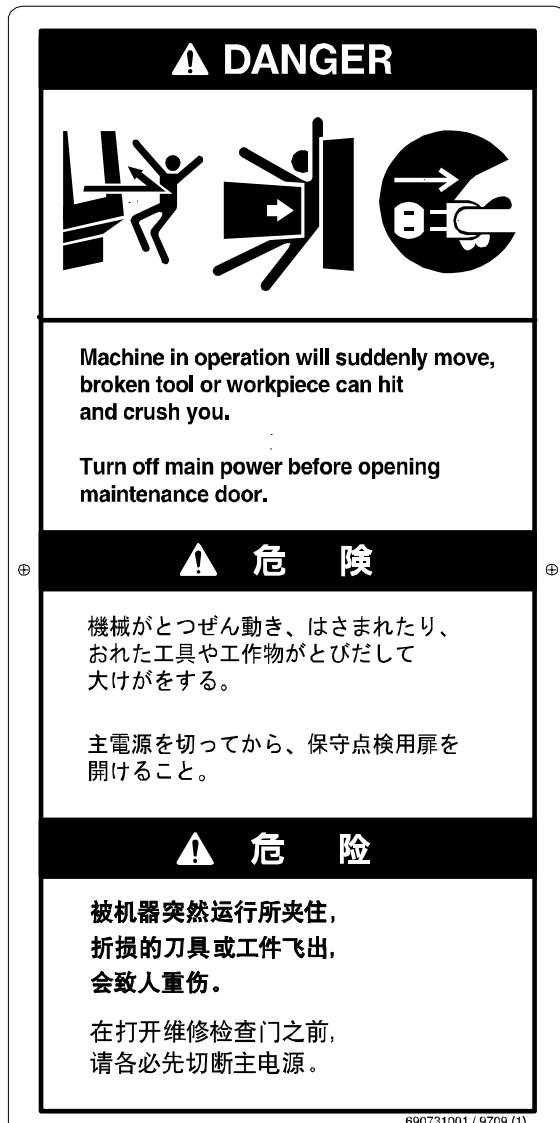
(2) Langue : Anglais, Allemand, Français



Code de partie : 69104001  
 Nom de partie : LABEL, Removing Tool EGF

## 6. Etiquette, Couverture latérale

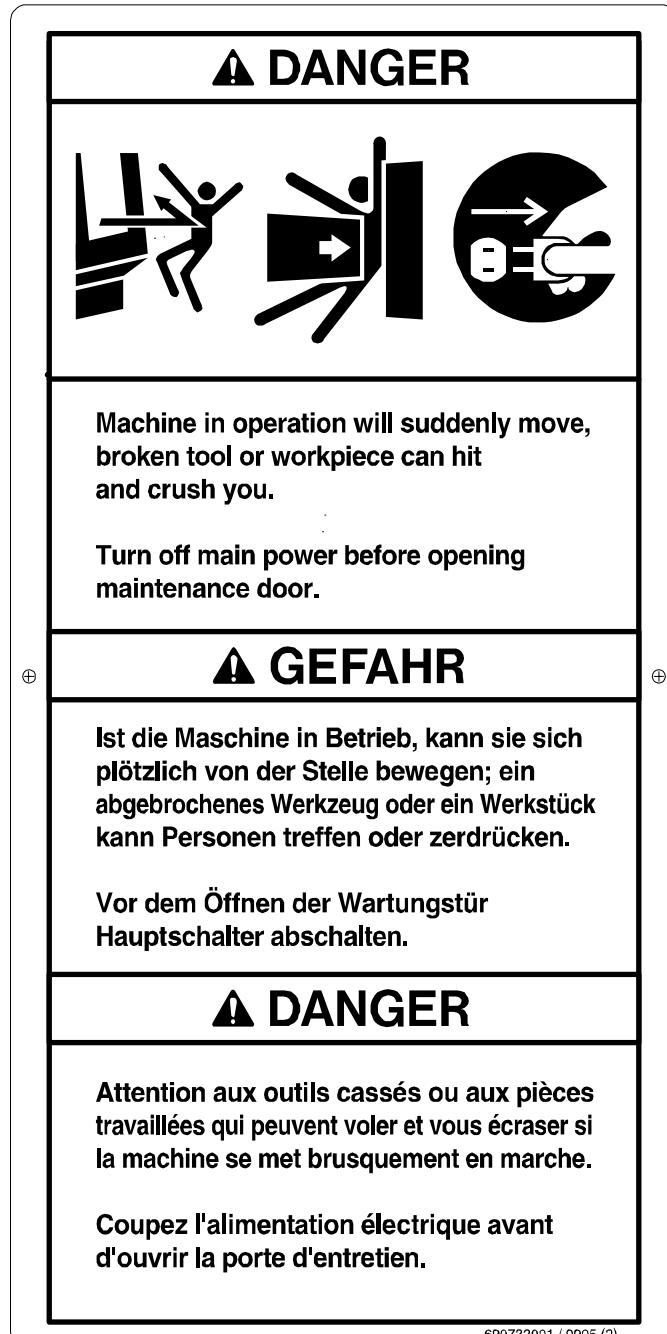
- (1) Langue : Anglais, Japonais, Chinois



Code de partie  
Nom de partie

: 690731001  
: LABEL, TC MAINTENANCE DOOR  
JCE

(2) Langue : Anglais, Allemand, Français



Code de partie  
Nom de partie

: 690732001  
: LABEL, TC MAINTENANCE DOOR  
EGF

**7. Etiquette défense de monter**

Code de partie : 693178001



693178001 / 0607 (1)

693178001.ai

## **Manuel de sûreté pour opérateurs**

### **Centreur tapant TC-S2A**

Lisez ce manuel de sûreté soigneusement avant l'opération de le centreur tapant, s'il vous plaît.

**Brother Industries, Ltd. Machinery & Solution Company.**

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# Les grandes lignes du manuel de sûreté

## Lisez ce manuel

Tout le monde qui utilise le centreur tapant, y compris eux qui installent le centreur tapant dans l'usine, qui manient le centreur tapant et façonnent des pièces en travail, qui ajustent et réparent le centreur tapant, est requis de lire ce manuel de sûreté.

Dans ce manuel de sûreté tout le monde qui utilise le centreur tapant s'exprime comme utilisateur.

### Intension

Le centreur tapant consiste en circuits électriques de voltage haut, outils qui tournent avec une grande vitesse, et tables et ATC magasins qui se meuvent avec une force puissante. Pour cela, des hasards divers s'associent à la machine.

L'intension de ce manuel de sûreté est de protéger les utilisateurs contre ces hasards.

Le manuel de sûreté explique ci-dessous:

Avertissements: des types de hasards

Mesures préventives : des manières d'empêcher les hasards de surgir

## Le contenu de manuel de sûreté et la relation avec les autres manuels

Chaque manuel d'instruction, sauf le manuel de programmation, contient le manuel de sûreté. Les manuels de sûreté sont donnés à chaque groupe de personnel.

Lisez le texte du manuel d'instruction pour connaître des fonctions et des méthodes d'opération de la machine.

1. Manuel de fonctionnement (A l'usage des opérateurs non-spécialisés)

"Manuel de sûreté pour opérateurs"

"Manuel de sûreté pour eux qui installent et arrange le centreur tapant"

"Manuel de opération:(fonctionnements élémentaires de la machine à l'intention des opérateurs non-spécialisés")

Code de parties pour français : 693077001

2. Manuel de fonctionnement (A l'intention des opérateurs spécialisés)

"Manuel de sûreté pour opérateurs"

"Manuel de sûreté pour eux qui installent et arrange le centreur tapant"

"Fonction De L'enclenchement Avec Verrouillage De La Porte"

"Manuel de opération": (opération de la machine nécessaire pour arrangement et façonnement.)

La machine de Code de parties pour japonais : 693312001

programmation à conversation Code de parties pour anglais : 693307001

NC langage Code de parties pour japonais : 693310001

Code de parties pour anglais : 693305001

3. Manuel d'installation "Manuel de sûreté pour eux qui installent et arrange le centreur tapant"

"Manuel d'installation: Installation et assemblage de la machine et ces accessoires."

Code de parties pour japonais : 693311001

Code de parties pour anglais : 693306001

4. Manuel de programmation "Manuel de programmation:

création de programme de façonnement"

Code de parties pour japonais: 693314001

La machine de programmation à conversation Code de parties pour anglais : 693309001

NC langage Code de parties pour japonais : 693313001

Code de parties pour anglais : 693308001

5. Manuel de maintenance

"Manuel de sûreté pour eux qui sont qualifiés pour maintenance de centreur tapant maintenance."

"Manuel de maintenance:

Ajustement et réparation de la machine."

Le manuel de maintenance n'est pas distribué aux clients.

## Relation à des instructions de sûreté

Les articles d'importance particulier qui apparaissent dans ce manuel de sûreté s'attachent aussi à la machine comme instructions de sûreté.

Une explication des instructions de sûreté se prépare à la fin de ce manuel de sûreté. Si des instructions de sûreté se sont déachées de la machine, obtenez des nouvelles instructions de sûreté et les attachez correctement.

## Langage

Des machine envoyées à l'intérieur du Japon sont pourvues de manuels de sûreté et d'instructions de sûreté rits en japoinalis. Les machines exportées du Japon sont fournies avec les manuels et les étiquettes de sécurité en quatre langues : anglais, allemand, français et chinois. Obtenez les manuels et les instructions écrits en un langage que vous pouvez comprendre.

Sur manuels et instructions en autres langages, consultez le vendeur auquel vous avez acheté la machine.

## Comment d'acheter

Quand les manuels de sûreté et les instructions de sûreté ont été perdus, obtenez-les du vendeur auquel vous avez acheté la machine.

Si vous ne savez pas le vendeur, consultez les bureaux spécifiés ci-dessous.

1-1-1 Kawagishi, Mizuho-ku, Nagoya 467-8562, JAPAN  
BROTHER INDUSTRIES, LTD. Machinery & Solution Company.  
phone +81-52-824-2232

## Maniement du manuel de sûreté

Gardez-vous de perdre les manuels de sûreté et mettez-les sous la main toujours. Quand la machine change de main, passez les manuels de sûreté à la nouvelle propriétaire avec la machine.

## Degré de danger

Les degré de danger se classent en trois catégories d'après le niveau de dommage qui peut surgir quand des instructions ne sont pas observées.

1. DANGER

### **DANGER**

Dommage qui peut causer une mort ou une blessure sévère.

2. AVERTISSEMENT

### **AVERTISSEMENT**

Dommage qui peut entraîner une blessure sérieuse.

3. ATTENTION

### **ATTENTION**

Dommage moins sérieux que cela ci-dessus.

## Ordre d'explication

Les instructions de sûreté s'expliquent dans l'ordre ci-dessous.

1. Mots de signal (DANGER, AVERTISSEMENT, ATTENTION) et symboles indiquant le degré de danger
2. Type de danger (Sujet)
3. Type de dommages prévus
4. Mesure préventive

## Significations des symboles

Les symboles sont utilisés sur les instructions de sûreté et dans les avertissements du manuel de sûreté pour expliquer des dangers possibles et leurs mesures préventives.

### 1. Danger

	Glissement		Parties se mouvant
	Trébuchement		Commotionélectrique
	Commotionélectrique		Pris
	Main coincée		Température haute
	Température haute		Coupe
	Coupe		Eclatement
	Pointe aigu		Objet tombant
	Objet tombant		Objet tournant
	Tomber		Jaillissement
	Jaillissement		Feu

## 2. Mesures préventives



Protégez vos oreilles.



Protégez vos mains.



Protégez vos pieds.



Coupez la prise de courant.



Ne touchez pas.



Protégez votre tête.



Connectez le coupe-circuit.



Ne Désassemblez pas.



Protégez vos yeux.

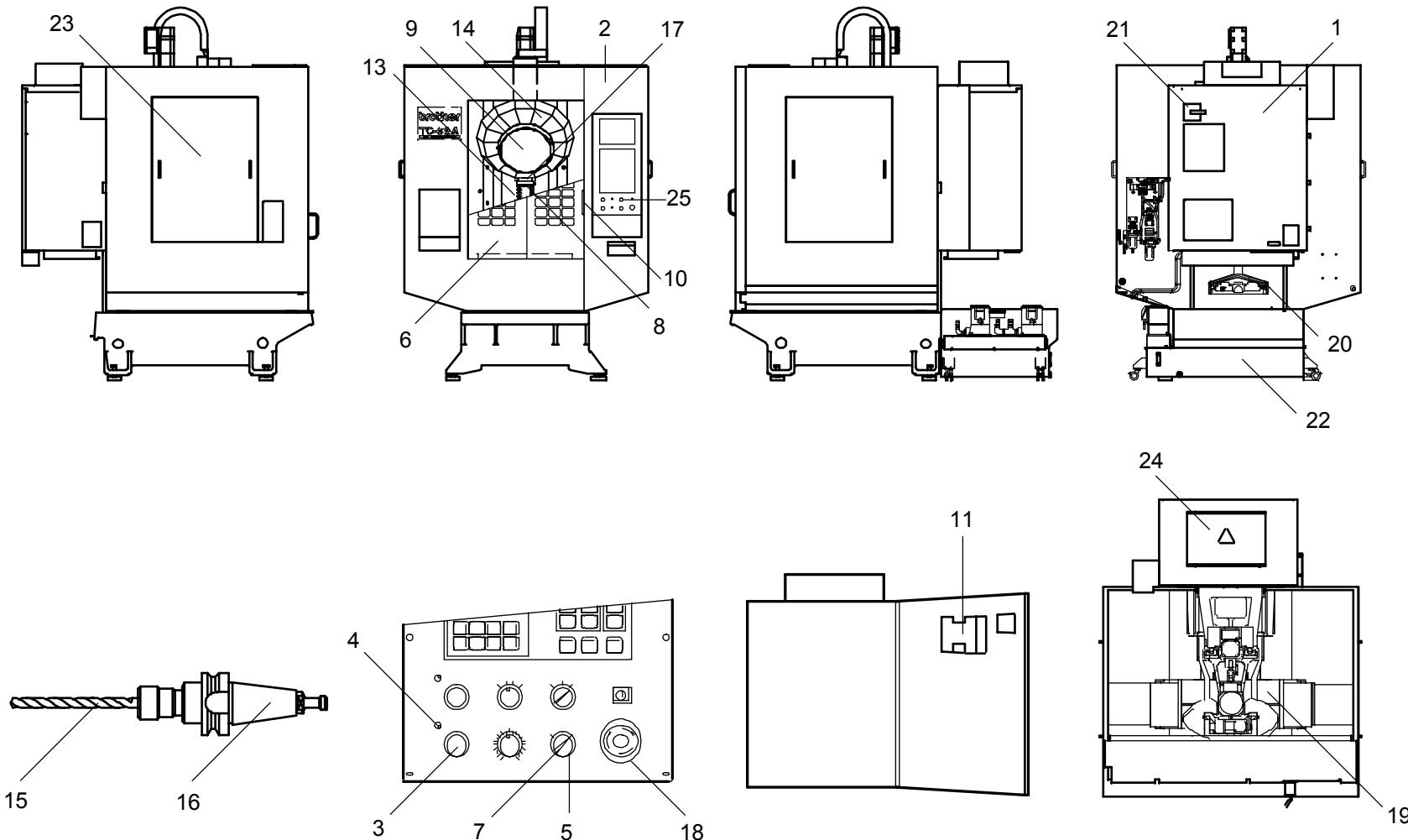
## 部品名

## Section Names

## Namen jedes Teils

## Noms de sections

## 各部件名称



TS2ASA01-1.ai

部品名	Section Names	Namen jedes Teils	Noms de sections	各部件名称
No.	各部の名称	Section names	Namen jedes Teils	Noms de sections
1.	日本語	English	Deutsch	Français
1.	制御箱	control box	Steuerschrank	armoire de commande
2.	スプラッシュガード	splash guard	Spitzblech	tôle pare-copeaux
3.	停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt
4.	停止ランプ	stop lamp	stop Lampe	lampe d'arrêt
5.	ドアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage
6.	作業扉	work door	Arbeitstür	porte de travail
7.	ドアインタロックキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage
8.	スピンドル	spindle	Spindel	broche
9.	ATC マガジン	ATC magazine	ATC Magazin	ATC magasin
10.	取手	handle	Griff	poignée
11.	制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande
12.	レベリングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine
13.	クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe
14.	グリップカバー	grip cover	Griffschutz	couverture de jambe
15.	工具	tool	Werkzeug	outil
16.	工具ホルダ	tool holder	Werkzeughalter	support à outil
17.	スピンドルヘッド	spindle head	Spindelkopf	tête de la broche
18.	非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence
19.	ケーブルカバー	cable cover	kabelschutz	couvre cable
20.	テーブル	table	Tisch	table
21.	主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale
22.	クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe
23.	スプラッシュガードサイドカバー	splash guard side cover	Spitzblechseitenschutz	couverture à côté du tôle pare-copeaux
24.	回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice
25.	操作パネル	operation panel	Betriebstafel	panneau d'opération

# Avertissements et mesures préventives

Les nombres dans ( ) tels que 1, 2 correspondent aux noms de chaque section.

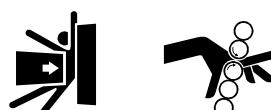
**Danger** 

**DANGER**

- OD1 Hasards divers's associent au centreur tapant.  
 OD1-1 Lisez le manuel de sûreté avant l'opération de la machine pour connaître ces hasards et les mesures préventives.  
 OD1-2 Tous les utilisateurs doivent connaître la position du bouton (19) d'arrêt d'urgence et l'opération.



- OD2 Les sections de voltage haut sont presents dans l'armoire de commande(1). Si vous les touchez par erreur, vous pouvez se blesser sérieusement ou mourrir.  
 OD2-1 Personnes qui ont la connaissance suffisante sur les circuits électriques de cette machine et qualité d'électromécanicien sont seulement admises à faire la maintenance et la révision des composants électriques.  
 OD2-2 Si une alarme est donnée, avertissez-en le superviseur immédiatement. Des opérateurs ne sont pas admis à réparer la machine. Des personnes qualifiées avec la connaissance suffisante sur la machine sont seulement admises à effectuer la réparation et l'installation.



- OD3 Vous pouvez se prendre dans la machine en opération et se blesser sérieusement.  
 OD3-1 N'entrez pas dans le tôle-pare copeaux en opération.  
 OD3-2 Assurez-vous visuellement que personne n'entre dans le tôle-pare copeaux avant de mettre la machine en marche.  
 OD3-3 Ne vous approchez pas les mains, les pieds, et le corps de sections se mouvant en opération.  
 OD3-4 Si une alarme est donnée, avertissez-en le superviseur immédiatement. Ne vous mettez pas les mains, les pieds, et le corps dans la machine.

- OD4 Quand l'interrupteur de l'enclenchement avec verrouillage de la porte(5) est invalable, la machine marche quand même la porte travail (6) ouvrirait. Vous pouvez se prendre dans la machine, aboutissant à tort.  
 OD4-1 Quand le commutateur de la porte d'embrayage est invalable, Ne vous mettez pas les mains, les pieds, et le corps dans la machine. L'opérateur doit en avertir le superviseur. Le superviseur doit mettre l'interrupteur de l'enclenchement avec verrouillage de la porte sur ON. Le superviseur doit toujours garder la clef.  
 OD4-2 Quand le commutateur de la porte d'embrayage est invalable, le superviseur ne doit pas admettre personne à travailler.  
 OD4-3 Assurez-vous visuellement que le commutateur de la porte d'embrayage est valable avant l'opération de la machine.  
 OD4-4 Si la clef de la porte d'embrayage (7) est attachée, avertissez-en le superviseur.  
 OD4-5 Le superviseur doit garder toujours la clef de la porte d'embrayage (7).

Avertissement  **AVERTISSEMENT**



- OW1 En touchant des outils tournant,vous (15) vous blesserez.  
OW1-1 Ne vous approchez pas d'outils tournant.



- OW2 Des outils cassés (15) ou des pièces en travail frappant, vous pouvez se blesser.  
OW2-1 Fermez la porte de travail (6) et mettez la machine en marche.



- OW3 Vous pouvez être pris dans le section tournant et se blesser.  
OW3-1 Ne vous approchez pas d'outils tournant (15), de broche (8), et de ATC magasin (9).  
OW3-2 Portez des vêtements tout justes. Mettez des cheveux longs dans un bonnet. Ne portez pas de gants sans que vous n'arrêtez la machine et ni ne fassiez l'arrangement. Ne portez pas de bijoux. Ne tenez pas le section tournant.



- OW4 Si le dispositif de sûreté est modifié il peut ne pas travailler précisement. Donc vous pouvez être happé par la machine, se heurter contre la machine, ou recevoir une commotion électrique.

OW4-1 Si le dispositif de sûreté est modifié ou fixé pour ne pas marcher, ne mettez pas la machine en marche.



- OW5 Quand des copeaux s'éarpillent vous sont mis dans les yeux, vous pouvez se blesser les globes oculaires et perdre la vue.

OW5-1 Portez des lunettes de protection.

OW5-2 Ne enlevez pas de copeaux en air.



- OW6 Si vous touchez des copeaux de la main nue, vous pouvez se couper la main ou se brûler.
- OW6-1 Ne touchez pas de copeaux de la main nue. Ne touchez pas de sections pointues de pièvces en travail.
- OW6-2 Mettex des gants et utilisez une brosse quand vous nettoyez coupeaux de coupe.
- OW6-3 Nettoyez copeaux de coupe quard machine est arrêtée.

- OW7 Si vous tenez le tranchant d'outil (15), vous pouvez se couper la main.
- OW7-1 Ne touchez pas le tranchant d'outil. Tenez le pied de la garde d'outil (16) toujours.



- OW8 En laissant tomber un objet lourd sur vos pieds, vous pouvez se fracturer les pieds.
- OW8-1 Quand vous levez des objets lourds, portez des chaussures de protection

- OW9 En levant des objets lourds, vous pouvez souffrir du lumbago.
- OW9-1 Quand vous levez des objets lourds, demandez de l'aide.
- OW9-2 Levez des objets avec la force de vos jambes au lieu de votre dos.



- OW10 En travaillant dans un bruit infernal ou pendant de longues heures, vous pouvez avoir des légers troubles de l'audition.
- OW10-1 Quand vous travaillez dans le bruit, portez des protections telles que les protège-oreilles.



- OW11 Vous pouvez se blesser les yeux ou les oreilles dans un éclatement d'un air à haute pression.
- OW11-1 Vous ne devez pas installer ou changer la tuyauterie d'un air à haute pression, que vous ne soyez qualifié pour manipuler l'air à haute pression et ne compreniez la tuyauterie de la machine.



- OW12      Vous pouvez se frapper la tête en levant.  
 OW12-1    Portez un casque de protection quand vous travaillez dans et autour de la machine.



- OW13      Si vous faites fonctionner la machine en laissant des outils dans la machine, les outils peuvent jaillir et vous blesser.  
 OW13-1    Si vous découvrez des outils dans la machine, vous ne devez pas faire fonctionner la machine. avertissez-en le superviseur.



- OW14      Vous pouvez avoir la main pris dans la porte travail (6), si vous la ouvrez et fermez en tenant d'autres parties de la porte travail que la poignée (10).  
 OW14-1    Tenez la poignée de la porte travail, quand vous la ouvrez et fermez.



- OW15      Si des outils sont mis sur l'armoire de commande (1) ou la machine, ils peuvent tomber à cause de la vibration de la machine.  
 OW15-1    Ne mettez pas d'objets sur l'armoire de commande ou la machine.



- OW16      Si vous montez sur la machine ou le tank d'huile de coupe (22), vous pouvez tomber et se blesser.  
 OW16-1    Ne montez pas sur la machine ou le tank d'huile de coupe.



- OW17      Si vous vous mettez la main sous les boulons à régler le niveau de la machine (12), vous pouvez avoir la main pris et se blesser.  
 OW17-1    N'ajustez pas le boulon à régler le niveau de la machine. Si la machine n'est pas de niveau, avertissez le superviseur.  
 OW17-2    Le superviseur doit faire l'homme chargé de l'installation ajuster le niveau de la machine.



- OW18 Si le câble pend ou n'est pas couvert, vous pouvez s'en prendre ou glisser et tomber.  
 OW18-1 Si le câble pend ou n'est pas couvert, avertissez-en le superviseur.  
 OW18-2 Le superviseur doit ordonner à l'homme qui a charge d'installer de corriger la pose du câble et couvrir le câble.



- OW19 La modification de la machine peut affecter le dispositif de sécurité et faire les expressions de tous les avertissements donnés inutiles.  
 OW19-1 Si la machine a été modifiée, vous ne devez pas la faire marcher. avertissez-en le superviseur.



- OW20 Si de l'huile de coupe gicle dans vos yeux, vous risquez de vous blesser les yeux.  
 OW20-1 Portez des lunettes de protection lorsque vous réglez l'ajutage d'huile de coupe (13).  
 OW20-2 Quand de l'huile de coupe rejaillit dans vos yeux, vous devez se laver les yeux à l'eau claire et consulter un médicin.



- OW21 Si vous mettez les doigts dans un espace de la machine, vous pouvez avoir les doigts pris et se blesser.  
 OW21-1 Ne mettez pas les doigts entre couverture de jambe (14).  
 OW21-2 Ne vous mettez pas les doigts entre l'outil (15) ou le support à outil (16) et ATC magasin(9).



- OW22 Si de l'huile de coupe, de l'huile, ou des copeaux sont dispersés, vous pouvez glisser, tomber, ou se heurter et se blesser.  
 OW22-1 Coupez le secteur de la machine, nettoyez dans et autour de la machine, et travaillez.



- OW23 Quand vous attachez la garde d'outil (16) à la machine ou les en détachez, vous pouvez se couper à la main en un tranchant d'outil (15) ou se heurter la main contre la machine, se heurter la main contre la machine.  
 OW23-1 Ne tenez pas le bout de l'outil. Portez des gants en cuir.



- OW24 La machine peut marcher brusquement, ou des outils peuvent tomber.  
 OW24-1 Ne vous mettez pas les mains, les pieds, et le corps sous la tête de la broche (18).



- OW25 Quand vous façonnez des pièces en travail à la machine en utilisant de l'huile de coupe, la section façonnant peut chauffer et prendre feu.  
 OW25-1 Ne utilisez pas d'huile de coupe quand un avertisseur d'incendie et un extincteur automatique ne sont pas installés.  
 OW25-2 En façonnant des pièces en travail, il faut que un opérateur se tienne prêt de la machine.



- OW26 En s'appuyant à la machine, vous pouvez se prendre dans la machine ou s'y heurter et se blesser.  
 OW26-1 Ne vous appuyez pas à la machine.

- OW27 Si des choses sont accrochées au bouton d'arrêt d'urgence(18),vous ne pouvez pas appuyer sur le bouton d'arrêt d'urgence.  
 OW27-1 Ne accrochez pas d'objet au bouton d'arrêt d'urgence.



- OW28 Le couvercle des câbles (20) à l'arrière de la machine ressort brusquement de la machine lorsque la table (19) avance. Le couvercle risque de vous heurter et de vous blesser.  
 OW28-1 Coupez le contacteur de la puissance principale (21) avant d'enlever les copeaux.



OW29

Comme le réservoir d'huile de coupe (22) est lourd, en levant le réservoir d'huile de coupe vous pouvez souffrir du lumbago ou le laisser tomber sur les pieds.

OW29-1

Ne levez pas le réservoir d'huile de coupe, quand vous enlevez des copeaux même.

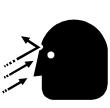


OW30

Quand vous entrez dans la machine, vous pouvez tomber en glissant et se blesser dans la machine.

OW30-1

Ne entrez pas dans la machine. Quand vous avez le besoin d'entrer dans la machine, avertissez-en le superviseur.



OW31

Si la couverture à côté (23) du tôle pare-copeaux (2) n'est pas attaché vous pouvez se prendre dans la machine ou se blesser en jaillissant des outils cassés.

OW31-1

Assurez-vous visuellement que le couvreure à côté du tôle pare-copeaux est attaché avant de mettre le contact. Si la couverture à côté du tôle pare-copeaux n'est pas attaché avertissez-en le superviseur.

OW31-2

Le superviseur doit faire l'opérateur attacher la couverture à côté du tôle pare-copeaux.



OW32

Si des outils (15) ou la garde d'outil (16) dont le poids et la grandeur excéder la limite spéifiée sont utilisés, ils peuvent sauter.

OW32-1

Utilisez des outils et la garde d'outil dont le poids et la grandeur excéder la limite spéficid'ée.

OW32-2

Pour connaître la limite des outils, regardez les instructions des outils attachées à la machine, manuel de operation.



OW33

Si vous touchez la résistance régénératrice, vous pouvez se brûler parce que la résistance chauffe en opétarion.

OW33-1

Ne enlevez pas la couverture pour a résistance régénératrice (24).

- OW34 Si vous touchez le moteur, vous pouvez se brûler parce que le moteur chauffe en opération.  
 OW34-1 Ne touchez pas le moteur dans 30 minutes après l'arrêt de la machine.



- OW35 Si le ATC magasin (9) tourne, des outils (15) peuvent heurter des pièces en travail, une gigue, ou la machine et casser.  
 OW35-1 Fixez la longueur des outils pour que les outils ne heurtent pas les pièces en travail, la gigue, ou la machine même si le ATC magasin tourne.



- OW36 Si l'armoire de commande (1) ou le panneau d'opération (25) sont mouillées, vous pouvez recevoir une commotion électrique.  
 OW36-1 Ne arrosez pas l'armoire de commande et le panneau d'opération d'huile de coupe, d'eau, et de copeaux.  
 OW36-2 Ne touchez pas l'armoire de commande de la main mouillée.



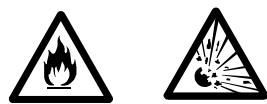
- OW37 Si vous mettez le contact de la machine ou façonnez des pièces en travail dans une atmosphère explosive, une explosion peut survenir en cause d'une étincelle de la machine.  
 OW37-1 Ne mettez le contact de la machine ou ne façonnez des pièces en travail dans une atmosphère explosive.



- OW38 Si vous mettez en marche la machine sans fixer la pièce en travail, la pièce en travail peut faire ressort; par suite, vous pouvez vous blesser.  
 OW38-1 Fixez la pièce en travail.



- OW39 Si vous oubliez de monter le capot latéral de la tôle pare-copeaux (23), vous pouvez vous prendre dans la machine et vous blesser.  
 OW39-1 Avant une mise en alimentation, assurez-vous visuellement que le capot latéral de la tôle pare-copeaux est monté. S'il n'est pas monté, avertissez-en le superviseur.  
 OW39-2 Quand vous enlevez le capot latéral de la tôle pare-copeaux, coupez le contacteur de l'alimentation principale et cadenassez-le pour que le contacteur de l'alimentation principale ne soit pas mis en.  
 OW39-3 Le superviseur doit instruire l'opérateur de monter le capot de maintenance.



- OW40      Les copeaux de coupe risquent de prendre feu ou d'exploser, selon le matériau de la pièce que vous usinez (cas. magnésium).  
 OW40-1    Enlevez immédiatement tous les copeaux de coupe.  
 OW40-2    Installez extincteur auprès de la machine en usinant une pièce travaillée faite de tel matériel, et ne réalisez jamais opération inhabitée.



- OW41      Si la appareil de fraisage n'est pas assurée à l'outil, elle peut se détacher de l'outil pendant rotation de broche, aboutissant à tort sérieux.  
 OW41-1    Contrôlez que la appareil de fraisage est assurée à l'outil et ensuite fixez l'outil.

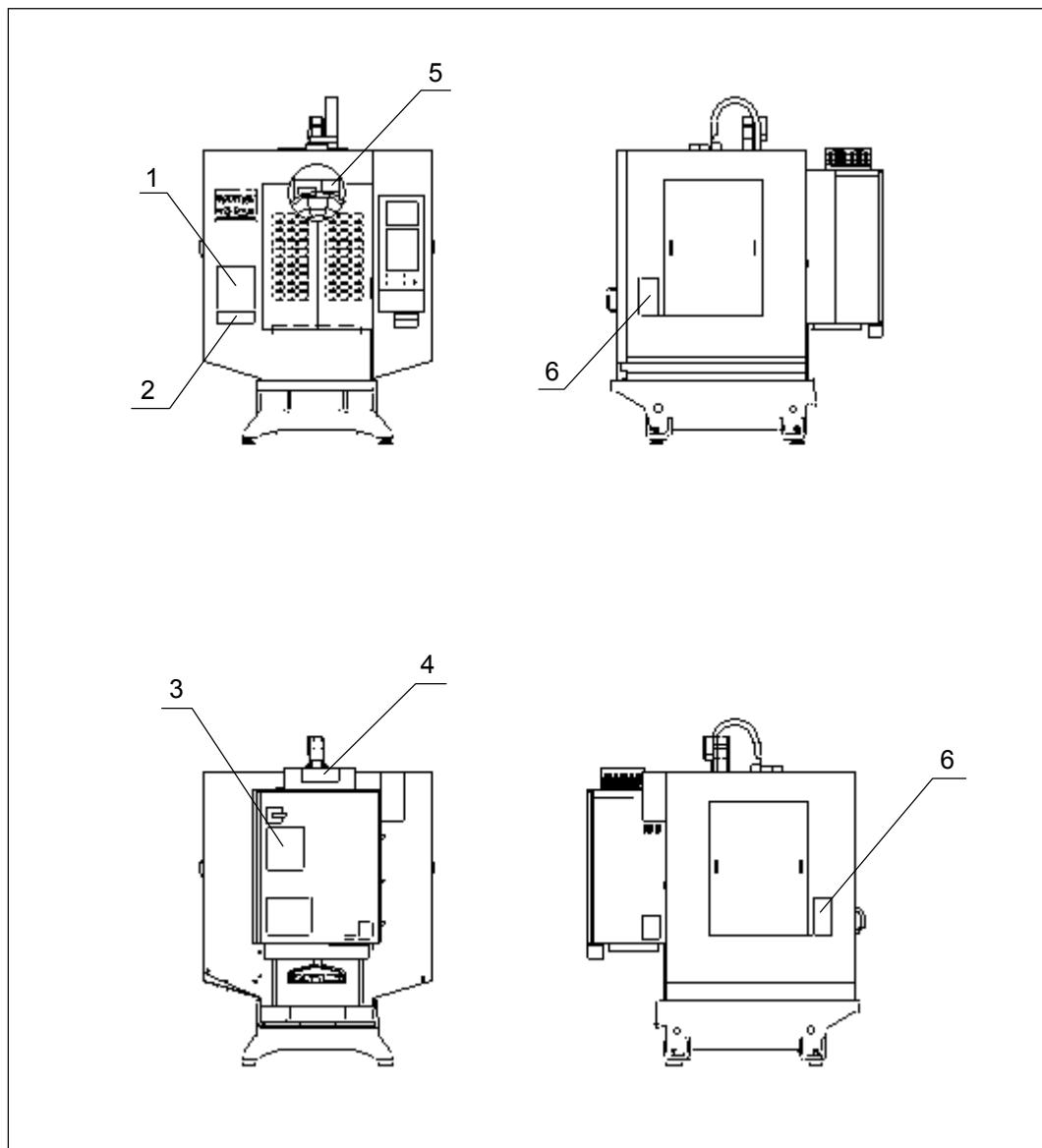


- OW42      Attention de ne pas vous blesser avec les couteaux ou les dispositifs de serrage lorsque vous entrez dans la machine et que la pièce est mal éclairée.  
 OW42-1    Prévoir une lampe dans la machine lorsque l'éclairage ne dépasse pas 500 lux.

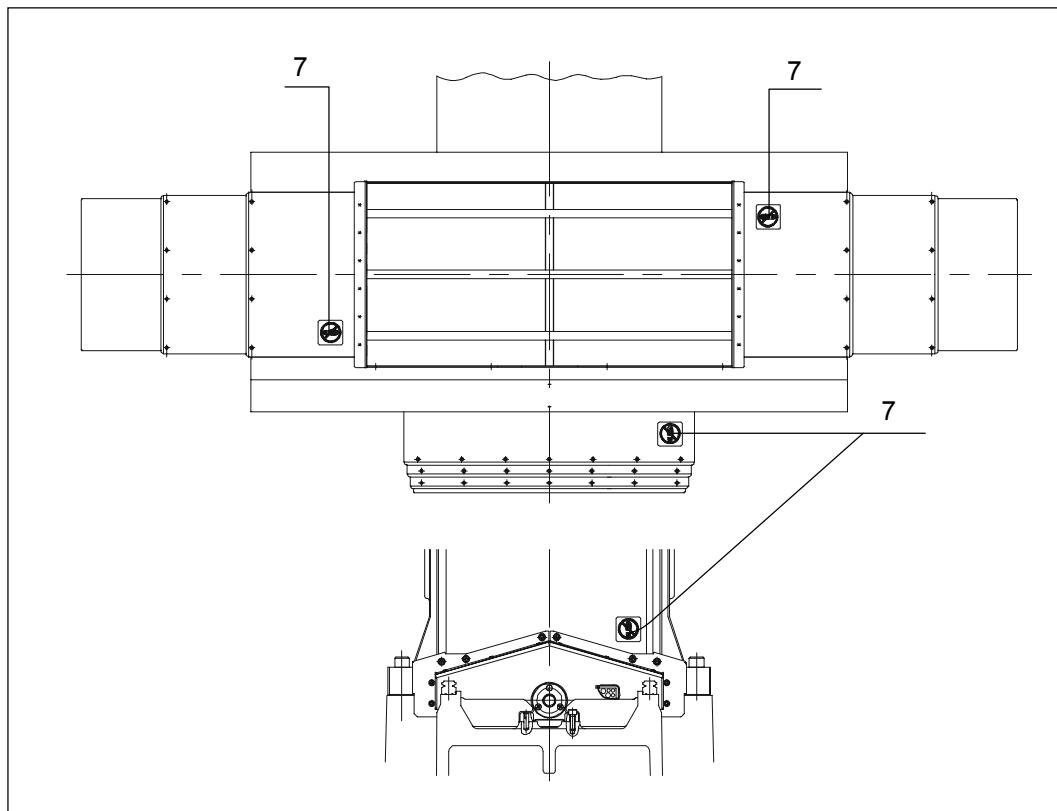
## Vérification des instructions de sûreté

Les instructions de sûreté sont attachées à la machine. Leurs positions sont indiquées dans la description ci-dessous. Contrôlez que les instructions ne sont pas endommagées. Si elles sont endommagées, obtenez une nouvelle instruction pour remplacement.

## Position des instructions de sûreté



230S00C02.doc



S2A00401.ai

## 1. Etiquette de sûreté, Avant et latéral

(1) Langue : Anglais, Japonais, Chinois



Code de partie  
Nom de partie

: 690373001  
: PS LABEL,TC FRONT JCE

(2) Langue : Anglais, Allemand, Français

**This machine has hazards.**

Read instruction manuals to understand hazards and avoid them before operation.

Diese Maschine birgt Gefahren.

Um Risiken zu erkennen und vermeiden, vor dem Einschalten die Betriebsanleitung lesen.

L'utilisation de cette machine comporte des risques.

Lisez les manuels d'instruction pour connaître les risques et les éviter avant d'utiliser cette machine.

<b>DANGER</b>	<b>WARNING</b>	<b>WARNING</b>
		 
Machine in operation will suddenly move and crush you. Keep away from moving parts.	Broken tool or workpiece can hit and wound you. Shut door before starting machine.	Rotating parts can catch and injure you. Keep away from rotating tool, spindle, and magazine. Never hold moving parts. Do not wear gloves while operating machine.
<b>GEFAHR</b>	<b>WARNUNG</b>	<b>WARNUNG</b>
Maschine in Betrieb kann plötzlich laufen und Sie stoßen. Beim Betrieb der Maschine von allen bewegenden Teilen sich fernhalten, um Verletzungen zu vermeiden.	Gebrochene Werkzeuge oder Werkstücke könnten Sie treffen und verletzen. Vor dem Start der Maschine Tür schließen.	Umlaufende Teile könnten Sie fassen und verletzen. Von umlaufendem Werkzeug, Spindel und Magazin sich fernhalten. Rotierende Teile nicht berühren. Während des Bedienens keine Handschuhe tragen.
<b>DANGER</b>	<b>AVERTISSEMENT</b>	<b>AVERTISSEMENT</b>
En opération, cette machine bougera soudainement et provoquera des risques d'écrasement. Ne vous approchez jamais des parties mobiles.	Les outils cassés ou les pièces usinées peuvent être projetés et risquent de vous frapper et de vous blesser. Fermez la porte avant de faire démarrer la machine.	Les parties tournantes peuvent vous accrocher et vous blesser. Ne vous approchez jamais des outils tournant, de la broche et du magasin. Ne saisissez jamais les parties en mouvement. Ne portez pas de gants pendant l'utilisation.

691042001 / 0302 (2)

Code de partie  
Nom de partie

: 691042001  
: PS LABEL,TC FRONT EGF

## 2. Etiquette d'outil

工具、主軸回転数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。  
 If use beyond the limitation of the tool and spindle speed, machine may be broken.  
 Check the details by the operation manual before operation.

	最高主軸回転速度	10000 min <sup>-1</sup> / 16000 min <sup>-1</sup>	Max Spindle Rotation Speed	
	主軸テーパ	7 / 24 No.30	Spindle Taper	
	ツールシャンク	MAS-BT30	Tool Shank	
	フルスタッド	MAS-P30T-2 (30°)	Retention Knob	
	マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)	Total in Magazine	
	工具の制限	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> ≤ 80 mm L <sub>2</sub> ≤ 160 mm D <sub>3</sub> ≤ 46 mm L <sub>3</sub> ≤ 30 mm M ≤ 3 kg MxH≤180 kgmm	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> ≤ 55 mm L <sub>2</sub> ≤ 160 mm D <sub>3</sub> ≤ 46 mm L <sub>3</sub> ≤ 30 mm M ≤ 2 kg MxH≤100 kgmm	Limitation of Tool
	工具バランス制限	100 grmm	50 grmm	Limitation of Tool Balance
	主軸回転数制限	10000 min <sup>-1</sup>	16000 min <sup>-1</sup>	Limitation Spindle Rotation Speed

653379001 / 0210 (2)

Code de partie : 653379001  
 Nom de partie : Tool LABEL250

### 3. Etiquette de sûreté, Arrière équipement à haute pression de liquide réfrigérant

(1) Langue : Anglais, Japonais, Chinois



690730001 / 9709 (1)

Code de partie  
Nom de partie

: 690730001  
: PSLABEL, TC REARJCE

(2) Langue : Anglais, Allemand, Français



Code de partie  
Nom de partie

: 691045001  
: PSLABEL, TC REAR EGF

#### 4. Etiquette, résistance régénératrice

(1) Langue : Anglais, Japonais, Chinois

	<b>⚠ WARNING</b>	<b>⚠ 警告</b>	<b>⚠ 警告</b>
<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>熱い抵抗器 さわるとやけどする。</p> <p>運転が終り、 30分たってから、 カバーをはずすこと。</p>	<p>热电阻 触摸会烫伤。</p> <p>停止运行 30 分钟之后， 才可取下安全罩。</p>	

690729001 / 9709 (1)

Code de partie:

690729001

Nom de partie:

LABEL, TC REGENERATIVE JCE

(2) Langue : Anglais, Allemand, Français

	<b>⚠ WARNING</b>	<b>⚠ WARNUNG</b>	<b>⚠ AVERTISSEMENT</b>
<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>Heißer Widerstand könnte Ihre Hand verbrennen.</p> <p>Nach dem Ausschalten der Maschine 30 Minuten warten, dann den Schutzdeckel entfernen.</p>	<p>Température de la résistance élevée, pouvant causer des brûlures.</p> <p>Après avoir arrêté la machine, attendez 30 minutes avant d'enlever le capot.</p>	

691058001 / 0302 (2)

Code de partie:

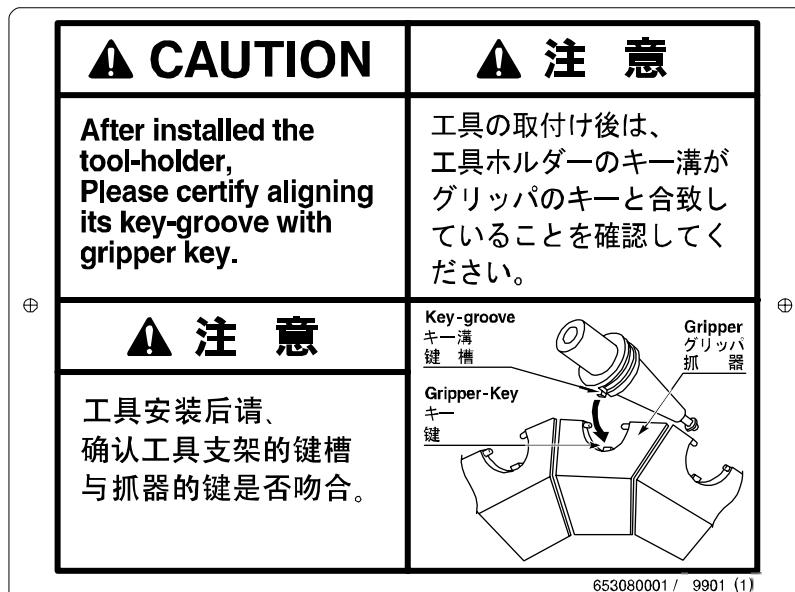
691058001

Nom de partie:

LABEL, TC REGENERATIVE EGF

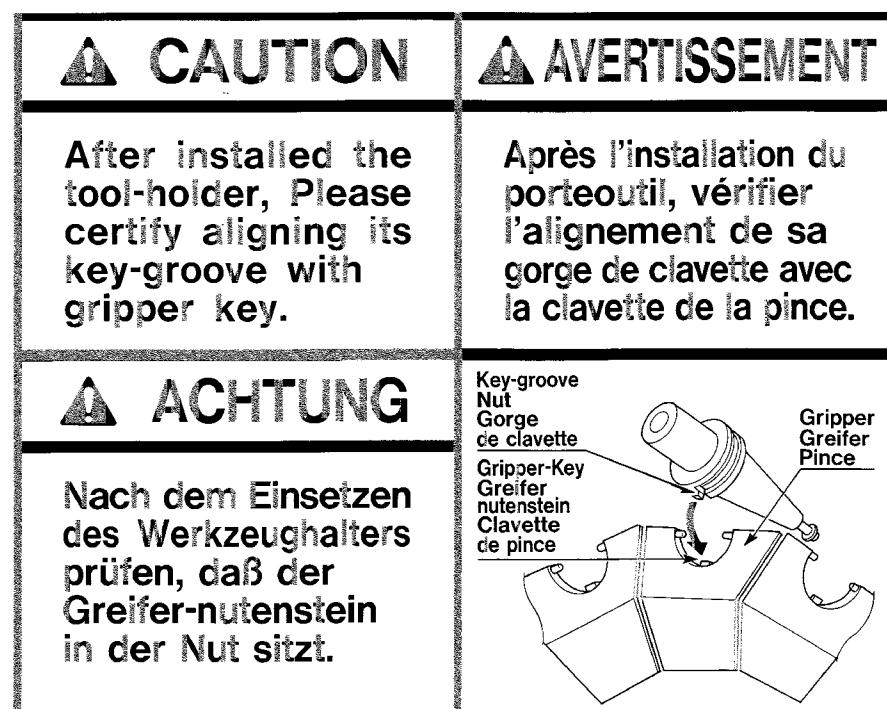
## 5. Etiquette, retrait d'outil

(1) Langue : Anglais, Japonais, Chinois



Code de partie : 653080001  
 Nom de partie : LABEL, Removing Tool JCE

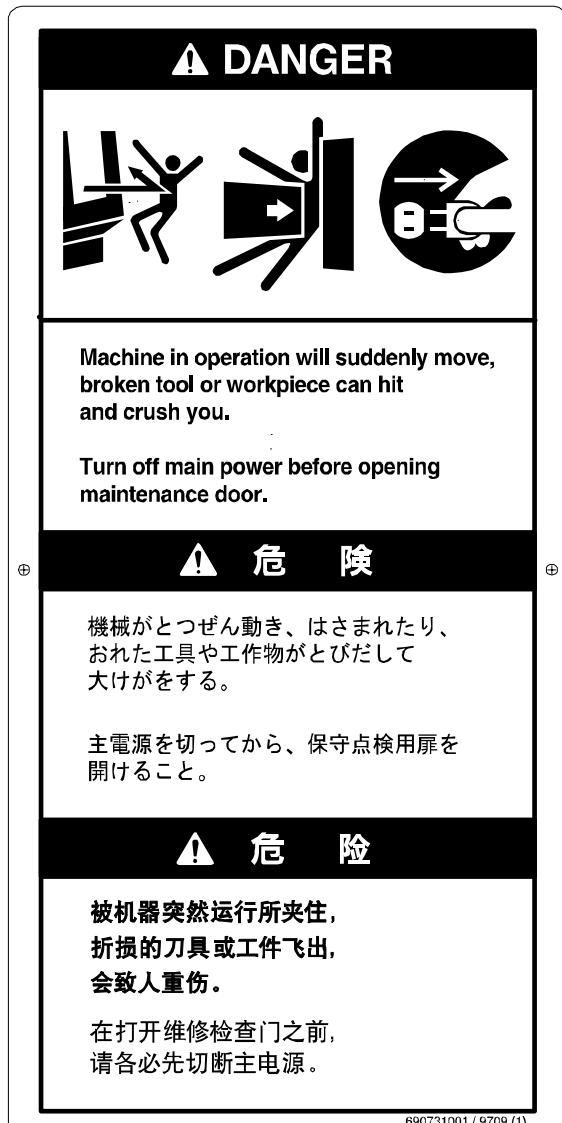
(2) Langue : Anglais, Allemand, Français



Code de partie : 69104001  
 Nom de partie : LABEL, Removing Tool EGF

## 6. Etiquette, Couverture latérale

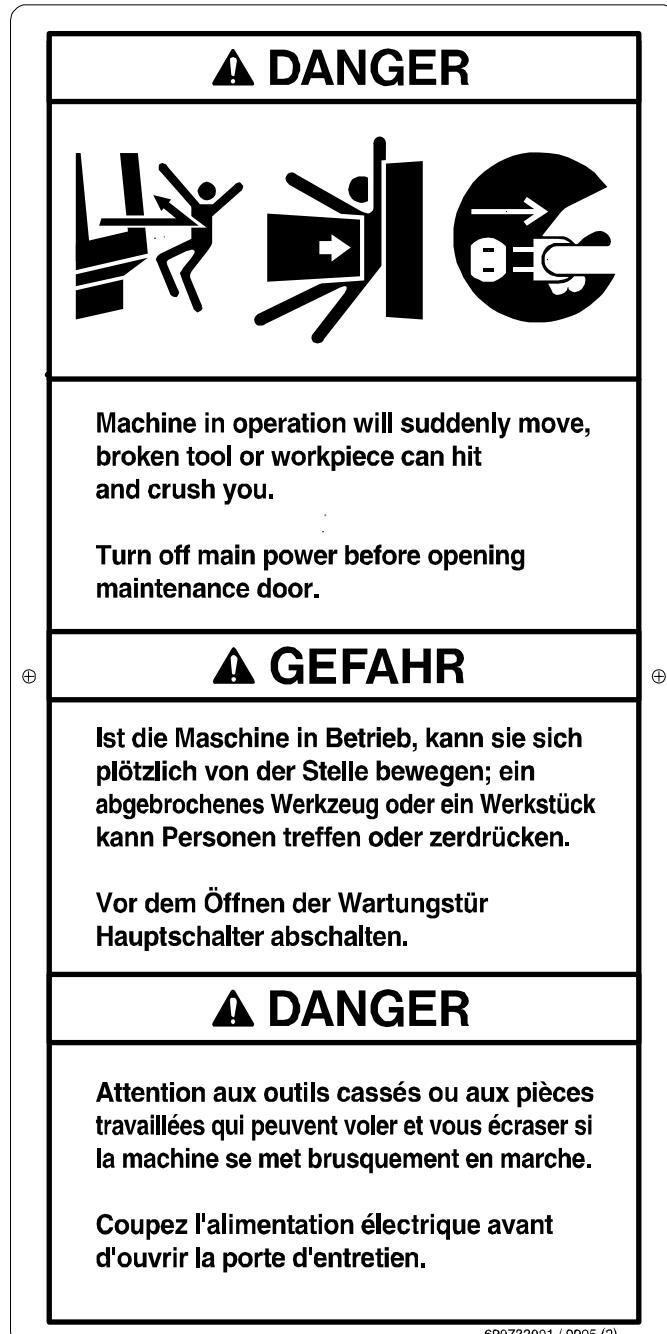
- (1) Langue : Anglais, Japonais, Chinois



Code de partie  
Nom de partie

: 690731001  
: LABEL, TC MAINTENANCE DOOR  
JCE

(2) Langue : Anglais, Allemand, Français



Code de partie  
Nom de partie

: 690732001  
: LABEL, TC MAINTENANCE DOOR  
EGF

**7. Etiquette défense de monter**

Code de partie : 693178001



693178001 / 0607 (1)

693178001.ai

## **FONCTION DE LA FERMETURE DE SÉCURITÉ DES PORTES**

- 1. Précautions générales**
- 2. Vue d'apparence**
- 3. Inspection of Door Interlock**
- 4. Function Details**

# 1 Précautions générales

## DANGER

**En touchant des outils tournant et des parties mobiles, vous vous blesserez.**

**Quand l'interrupteur de l'enclenchement avec verrouillage de la porte est invalable. Ne vous mettez pas les mains, les pieds, et le corps dans la machine. Avertissez-en le superviseur.**

**Quand l'interrupteur de l'enclenchement avec verrouillage de la porte est invalable, le superviseur ne doit pas admettre personne à travailler.**

**Assurez-vous visuellement que l'enclenchement avec verrouillage de la porte est valable avant l'opération de la machine.**

**Si la clef de l'enclenchement avec verrouillage de la porte est attachée, avertissez-en le superviseur.**

**Le superviseur doit garder toujours la clef de l'enclenchement avec verrouillage de la porte.**

## DANGER

**Quand l'interrupteur de l'enclenchement avec verrouillage de la porte est tourney sur OFF, la table peut bouger. Les parties mécaniques dans la porte intérieure bougent même si la porte intérieure est ouverte. Vous pouvez être pris à la table et vous blesser. Vous pouvez être pris dans la machine.**

**Quand l'interrupteur de l'enclenchement avec verrouillage de la porte est OFF, ne vous mettez pas les parties du corps dans la porte extérieure.**

**Quand le commutateur de la porte d'embrayage est invalable, le superviseur ne doit pas admettre personne à travailler.**

**Si la clef de la porte d'embrayage est attachée, avertissez-en le superviseur.**

**⚠ DANGER**

**Quand la porte intérieure est ouverte, vous pouvez vous couper par l'outil tournant ou vous pouvez avoir la main pris dans la machine.**

**L'opérateur ne doit pas ouvrir la porte intérieure.**

**Quand la porte intérieure est ouverte, ne vous mettez pas les mains, les pieds dans la machine. Le superviseur doit cadenasser la porte intérieure. Le superviseur doit toujours garder la clef de la porte intérieure.**

**Le superviseur ne doit pas admettre l'opérateur à utiliser la machine, quand la porte intérieure n'est pas cadenassée.**

**Assurez-vous visuellement que le commutateur de la porte d'embrayage est valable avant l'opération de la machine.**

**Quand vous vous apercevez que la porte intérieure n'est pas cadenassée, vous devez en avertir le superviseur.**

**⚠ AVERTISSEMENT**

**En touchant des outils tournant, vous vous blesserez.**

**Ne vous approchez pas d'outils tournant.**

**⚠ AVERTISSEMENT**

**Vous pouvez être pris dans la section tournant et se blesser.**

**Ne vous approchez pas d'outils tournant, de broche, et de COA magasin.**

**Portez des vêtements touts justes. Mettez des cheveux longs dans un bonnet. Ne portez pas de gants sans que vous n'arrêtez la machine et ni ne fassiez l'arrangement. Ne portez pas de bijoux. Ne tenez pas la section tonrant.**

### Intention

La Fonction de la fermeture de sécurité des portes vous évite d'être pris dans les outils tournant et les parties mobiles.

### Description de la fonction

L'enclenchement avec verrouillage de la porte fonctionne pour que la porte extérieure est verrouillée et que le maximum de vitesse est limité selon les circonstances.

### Structure de l'unit

L'enclenchement avec verrouillage de la porte est constitué par des éléments ci-dessous.

- 1.l'interrupteur de la limite de la porte
- 2.le verrou de la porte

### Comment se servir de l'enclenchement avec verrouillage de la porte

1. en opération ordinaire

L'interrupteur de la Fonction de la fermeture de sécurité des portes(1) doit toujours être placé sur "on".

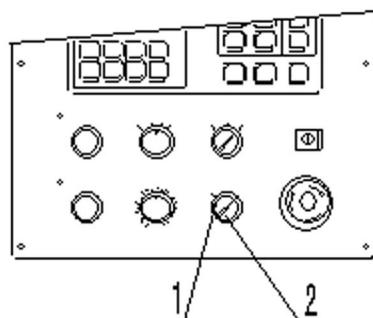
2. en réglage et maintenance

Tournez l'interrupteur sur "off" seulement en cours de réglage et maintenance. Lisez le "Manuel de sûreté pour ceux qui installent et arrangeant le centreur tapant" et le "Manuel de sûreté pour ceux qui sont qualifiés pour maintenance du centreur tapant" avant du réglage et de la maintenance.

Observez cela ci-dessous, quand la Fonction de la fermeture de sécurité des portes est OFF.

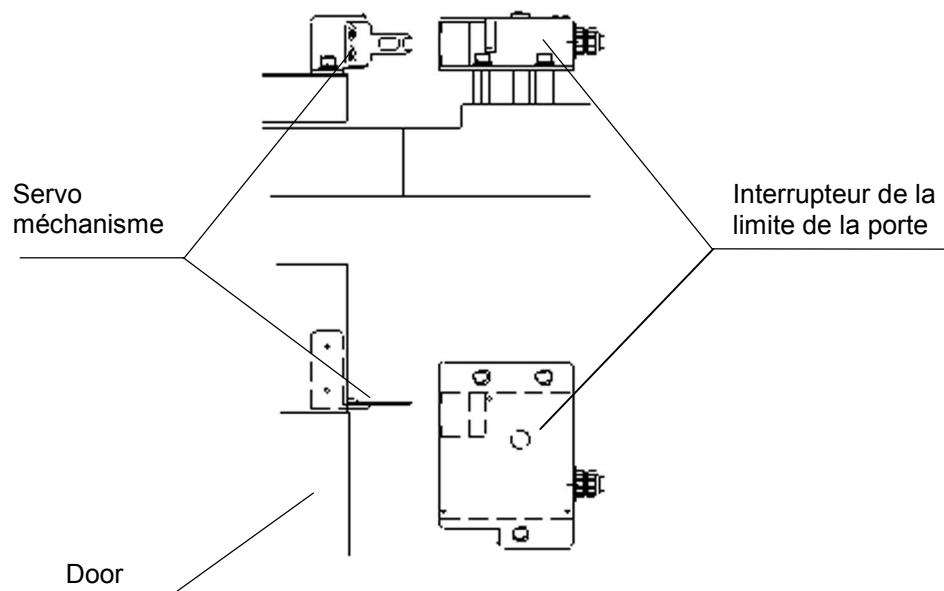
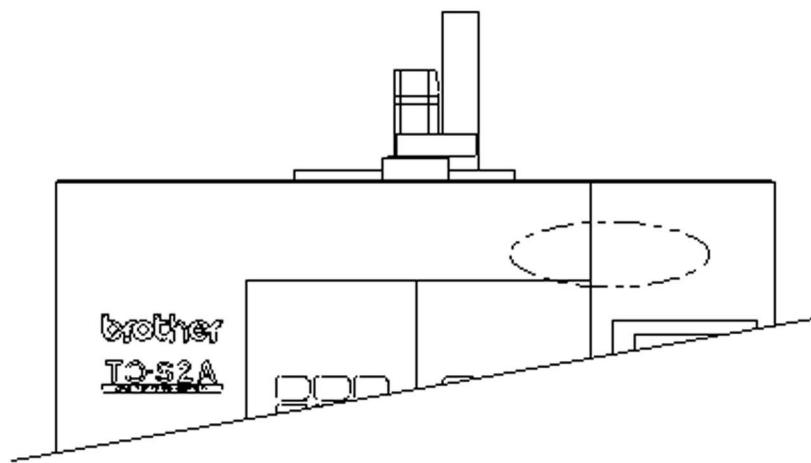
Prenez garde de ne pas être pris dans l'outil tournant ou les parties mobiles.

- Tournez l'interrupteur sur "on" après le réglage et la maintenance.
- Le superviseur doit garder la clef(2).



## 2 Vue d'apparence

TC-S2A



# 3 Contrôle

## Méthode de contrôle

### Contrôle d'arrêt de fonctionnement

1. Fermer toutes les portes. Mettre ensuite sous tension afin de rétablir la position d'origine.  
Vérifier également la bonne marche du commutateur de verrouillage des portes.
2. Ouvrir la porte extérieure.
3. Si le verrouillage de la porte fonctionne normalement la machine ne doit pas déplacer quand on appuie sur la touche [-X].  
Normalement l'avertisseur d'ouverture de porte doit se déclencher.  
Si l'alarme ne se déclenche pas cela signifie que le verrouillage de porte ne fonctionne pas normalement et doit être réparé.

Procéder aux vérifications qui suivent si aucune anomalie n'est constatée à cette étape.

### Contrôle du verrouillage de porte

4. Fermer la porte extérieure.
5. Faire tourner la broche.
6. Normalement, si le verrouillage fonctionne bien, on ne doit pas pouvoir ouvrir la porte. Si elle s'ouvre c'est que le système est défectueux et nécessite une réparation.

### Contrôle d'arrêt de secours

7. Faire tourner la broche en mode manuel.
8. Normalement si le verrouillage fonctionne bien la machine doit s'arrêter de tourner et l'avertissement [\*ARRET URGCE ACTIF] s'affiche quand on appuie sur le bouton d'arrêt de secours. Si la machine ne s'arrête pas et que le message d'avertissement ne s'affiche pas c'est que le système est défectueux et nécessite une réparation.

## 4 Détails de la fonction

Condition de la porte(*6)	Verrouillage de la porte	Verrou de la porte(*6)	Opération de la machine
Fermée	OFF	Ne sera pas verrouillé	Toutes les opérations sont possibles.
	ON	Verrouillé en cours opération de la machine quand (mouvement d'un axe, rotation de la broche, opération par IMD, opération par mémoire, ou quand l'impulseur manuel est mis sur ON).(*4)	
Ouverte	OFF	Ne sera pas verrouillé	<ul style="list-style-type: none"> <li>• Rotation de la broche, pivotement du magasin, COA, action de tarauder sont impossibles.(*2)</li> <li>• Mouvement d'un axe, arrêt de la broche, et orientation de la broche sont possibles.(*1)</li> <li>• L'opération automatique est possible seulement en mode d'opération simple.</li> <li>• L'opération par IMD arrêt à chaque fin d'un bloc.</li> <li>• Le refroidissement n'arrive pas.</li> </ul>
	ON		<ul style="list-style-type: none"> <li>• Tous les opérations sont impossibles. (*2)(*5)</li> <li>• Le refroidissement n'arrive pas.</li> </ul>
Fermée Ouverte	OFF		<ul style="list-style-type: none"> <li>• Toutes les opérations, y compris la rotation de la broche, arrêtent immédiatement. (*3)</li> <li>• Le refroidissement s'arrête instantanément.</li> </ul>
	ON		<ul style="list-style-type: none"> <li>• Toutes les opérations, y compris la rotation de la broche, arrêtent immédiatement. (*3)(*5)</li> <li>• Le refroidissement s'arrête instantanément.</li> </ul>
Ouverte	OFF ON		

- \*1. La vitesse d'avance de course rapide est rélée par "MAX AVANCE RAP(PORTE OUVRE)" du paramètre mécanique.  
La vitesse d'avance de coupe est restreinte à la vitesse réglée par "MAX AVANCE RAP(PORTE OUVRE)".  
La vitesse de rotation des axes additionnels (A,B,C) est aussi restreinte à la vitesse réglée par "MAX VITESSE 4,5,6 AXE (PORTE OUVRE)"du paramètre mécanique.
- \*2. L'essai d'opération cause "PORTE OUVERTE" erreur quand la porte de devant est ouverte.  
L'essai d'opération cause "PORTE LATERL OUVERTE" erreur quand la porte latérale est ouverte.
- \*3. Les opérations, y compris taraudage, orientation de la broche, COA, et pivotement du magasin, arrêtent à chaque fin d'un bloc. Quand la porte ouvre en cours de ratation de la broche, "OUV PTE ARRET BCHE" erreur apparaît et la broche arrête. Quand la porte ferme et l'opération est remise à la même vitesse rotation que précédent à l'arrêt de la broche, la condition de rotation précédent l'arrêt de la broche est recouvrée.  
Cependant, quand les opérations ci-dessous sont effectuées, "OUV PTE ARRET BCHE" erreur est remise à zero. Même si la porte ferme et l'opération est remise à la même vitesse de rotation que précédent à l'arrêt de la broche, la condition de rotation précédent l'arrêt de la broche n'est pas recouvrée.
  - 1) La clef [RAZ] est pressée.
  - 2) L'arrêt de la broche est effectué en mode manuelle.

NOTE  
Quand la porte ouvre en cours de rotation de la broche après le premier mouvement de fraise en bout taraud (XY-axes mouvement et rotation de la broche), la broche arrête mais "OUV PTE ARRET BCHE" erreur n'apparaît pas. Même si la porte ferme et l'opération est remise, la condition de rotation précédent l'arrêt de la broche n'est pas recouvrée.
- \*4. En cours d'opération de la machine  
L'opération de la machine mentionnée ici contient l'arrêt temporaire et l'arrêt de bloc (excluant quand le programme a fini et en cours d'arrêt du programme) pour l'opération par IMD et l'opération par mémoire.
- \*5. Caractéristiques techniques spéciales  
Quand la porte est ouverte pendant que verrouillage de la porte est active, le servomoteur est mis sur OFF.  
Quand la porte est ouverte avant l'opération par mémoire ou pendant arrêt de programme (M00), "PORTE OUVERT" erreur apparaît et le servomoteur est mis sur OFF.  
Fermez la poete ou désactivez le verrouillage de la porte, et le servomoteur sera mis sur ON et l'erreur est remise à zéro.  
Quand la porte est ouverte pendant l'opération par mémoire, cependant, "SERVO EST ARRETE", "STOP MACH. PTE/OUV". erreur apparaît. Cette erreur ne peut pas être remise à zéro quand bien même la porte est fermée. Pressez la clef [RAZ].

# 安装作业人员以及准备作业人员的 安全操作规程

攻丝中心  
**TC-S2A**

请在接触攻丝中心前仔细阅读本安全操作  
规程。

兄弟工业公司  
玛西纳丽和苏琉雄公司

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# 什么是安全操作规程

## 务必阅读本规程

凡接触攻丝中心的人员,诸如在工厂安装攻丝中心的人员、使用攻丝中心进行加工的人员和调整修理攻丝中心的人员,务必阅读本安全操作规程。

本规程把接触攻丝中心的所有人员称为「使用者」。

## 目的

攻丝中心由使用高电压的电器回路、高速旋转机具、大功率移动台和 ATC 送料装置组成。所以该机器带有许多危险因素。

制订本规章的目的是保护使用者免受攻丝中心所带危险因素的伤害。

为此本安全操作规程对下述问题进行说明。

警告: 有什么危险

回避方法: 如何回避其危险

## 安全操作规程的内容以及和其他规程的关系

安全操作规程按使用对象进行分类,附在各说明书里(程序控制缝纫机除外)。您想知道机器的功能和操作方法,请阅读说明书本篇。

1 操作说明书(面向一般操作人员) 「操作人员安全操作规程」

「安装和做准备作业人员的安全操作规程」

「操作说明书」(基本作业所需要的机械操作方法)

中文零件编码 : 693271001

2 操作说明书(面向专门操作人员) 「操作人员安全操作规程」

「安装和做准备作业人员的安全操作规程」

「机门连动机能」

「操作说明书」(准备和加工所需要的机械操作方法)

(对话) 日文零件编码 : 693312001 英文零件编码 : 693307001

(NC 语言) 日文零件编码 : 693310001 英文零件编码 : 693305001

3 安装说明书 「安装作业人员和准备作业人员的安全操作规程」

「安装说明书」(机械和配件的安装及其组装方法)

日文零件编码 : 693311001 英文零件编码 : 693306001

4 编制程序说明书 「编制程序说明书」(加工程序的制作方法)

(对话) 日文零件编码 : 693314001

英文零件编码 : 693309001

(NC 语言) 日文零件编码 : 693313001

英文零件编码 : 693308001

5 维修说明书 「受过培训的维修作业人员安全操作规程」

「维修说明书」(机械的调整和修理方法)

对顾客不发维修说明书。

## 和安全签条的关系

安全操作规程中特别重要的部分被制作成安全标签, 贴在机器上。

安全操作规程的最后部分是关于安全标签的说明。如果机器上的安全签条脱落, 请设法索取签条后重新贴上。

## 语言

日本国内销售的机器, 所贴的安全操作规程和安全签条均用日文。

销售到国外的机器, 用的是英文、德文、法文和**中文四国**文字。

请设法取得所懂语言的安全操作规程和安全签条。

关于其他国家的安全操作规程和语言签条, 请询问您所购买的机器销售店。

## 索取方法

如果安全操作规程或安全签条遗失, 请到您所购买的机器销售店索取。

如销售店无法解决, 请向下列单位咨询。

### 日本国外联系地址

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BROTHER INDUSTRIES, LTD.

phone +81-52-824-2232

fax +81-52-811-0469

## 安全操作规程的使用

安全操作规程应注意妥善保存,做到随时可以阅读。如机器更换所有人,请转交机器的新持有人。

## 危险程度

如无视警告,所引起的危险的程度按受害程度可分 3 种。

### 1. 危险

#### ▲ 危 险

招致死亡或不可复原的严重疾患的危险。

### 2. 警告

#### ▲ 警 告

招致重伤的危险。

### 3. 注意

#### ▲ 注 意

轻度危险

## 说明的顺序

按下列顺序进行说明。

1. 表示危险程度的文字标记(危险、警告、注意)和象图
2. 危险的种类
3. 伤害的预测
4. 回避方法

## 象形图的意思

安全签条和安全操作规程的警告语言使用象图,形象地说明其危险程度和回避方法。现将图像的意义说明如下。

### 1. 危险



## 2. 回避方法



保护耳朵



保护双手



保护双脚



拔掉电源



严禁触摸



保护头部



需接地线



不准分解



保护眼睛

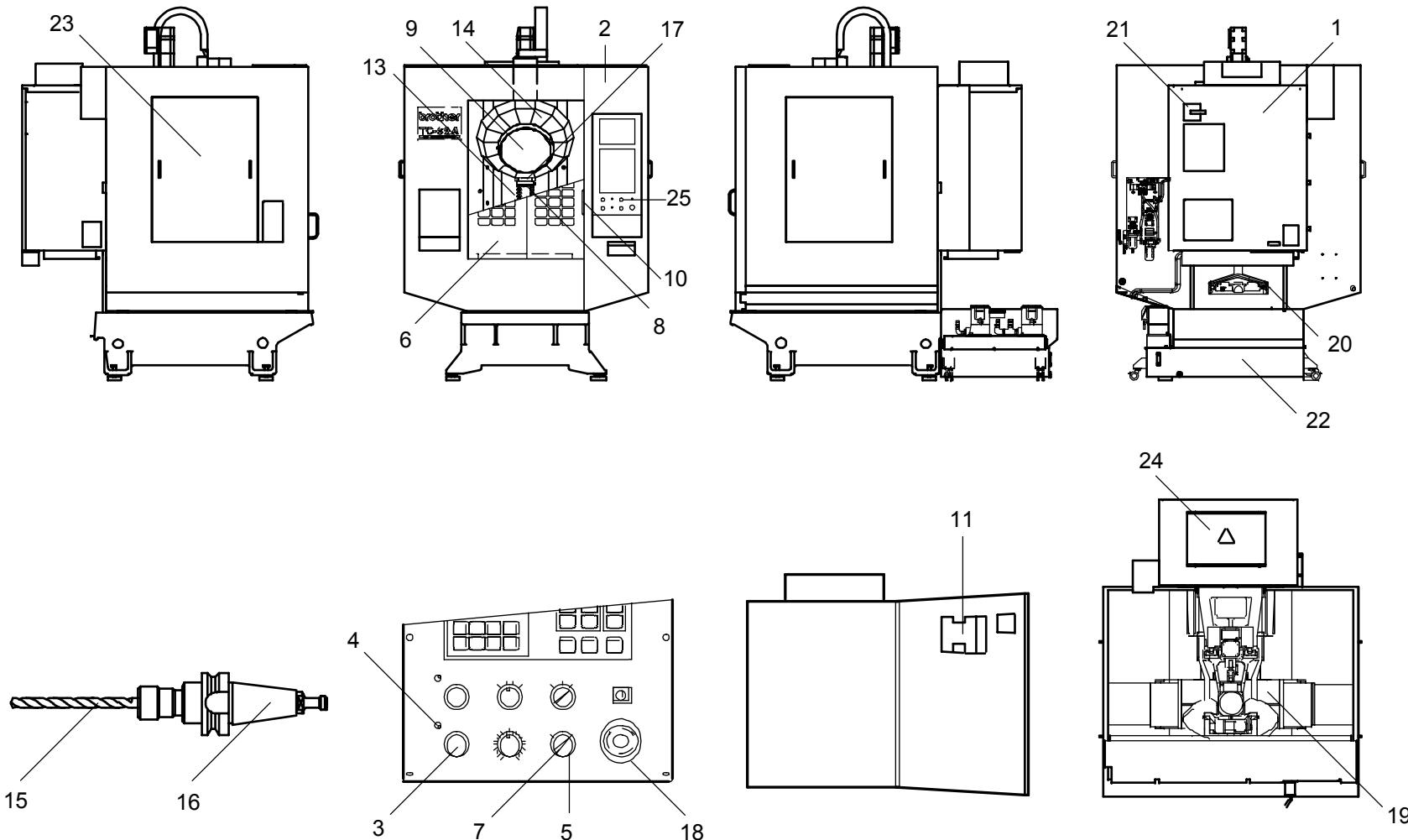
## 部品名

## Section Names

## Namen jedes Teils

## Noms de sections

## 各部件名称



TS2ASA01-1.ai

部品名	Section Names	Namen jedes Teils	Noms de sections	各部件名称
No.	各部の名称	Section names	Namen jedes Teils	Noms de sections
1.	日本語	English	Deutsch	Français
1.	制御箱	control box	Steuerschrank	armoire de commande
2.	スプラッシュガード	splash guard	Spitzblech	tôle pare-copeaux
3.	停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt
4.	停止ランプ	stop lamp	stop Lampe	lampe d'arrêt
5.	ドアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage
6.	作業扉	work door	Arbeitstür	porte de travail
7.	ドアインタロックキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage
8.	スピンドル	spindle	Spindel	broche
9.	ATC マガジン	ATC magazine	ATC Magazin	ATC magasin
10.	取手	handle	Griff	poignée
11.	制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande
12.	レベリングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine
13.	クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe
14.	グリップカバー	grip cover	Griffschutz	couverture de jambe
15.	工具	tool	Werkzeug	outil
16.	工具ホルダ	tool holder	Werkzeughalter	support à outil
17.	スピンドルヘッド	spindle head	Spindelkopf	tête de la broche
18.	非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence
19.	ケーブルカバー	cable cover	kabelschutz	couvre cable
20.	テーブル	table	Tisch	table
21.	主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale
22.	クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe
23.	スプラッシュガードサイドカバー	splash guard side cover	Spitzblechseitenschutz	couverture à côté du tôle pare-copeaux
24.	回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice
25.	操作パネル	operation panel	Betriebstafel	panneau d'opération

## 警告和回避方法

( )中的数字 1, 2 与各部分的名称号码相对应。

### 危险 危 险

- SD1 在攻丝中心里隐藏着许多危险。  
 SD1-1 为了熟知危险的内容和回避方法, 请在操作机器前阅读安全操作规程。  
 SD1-2 所有使用者均须知道紧急停止开关(19)的位置和操作方法。



- SD2 控制箱(1)中有高电压装置, 不慎触模该装置, 会引起重大伤亡事故。  
 SD2-1 电气系统的维修检查作业, 只允许具有本机械电气回路知识、持有电工执照的人员才能操作。  
 SD2-2 应关掉主电源总开关(21)后进行作业, 并设置「正在作业」的表示牌。  
 SD2-3 运转中的机器, 都有被其夹住而受重伤的危险。



- SD3 运转中的机器, 都有被其夹住而受重伤的危险。  
 SD3-1 机器在运转时, 不能将身体伸入火花防溅箱(2)中去。  
 SD3-2 只有在按了停止开关(3)或按了回零按钮并确认停止指示灯(4)已经点亮后, 才能将身体或手伸入火花防溅箱中。  
 SD3-3 亲眼确认火花防溅箱中确实无人后, 才能开动机器。  
 SD3-4 在机器运转时, 手足和身体不能靠近机器的转动部分。  
 SD3-5 在万不得已必须进入机器进行操作时, 应切断主电源控制板(21)的电源, 并加铁锁保护, 以免电源接入。



- SD4 门互锁开关(5)处于无效状态时, 即使打开作业门(6), 机械也会运行。有被机械夹伤的危险。  
 SD4-1 在准备作业中, 应留心机械的运转情况, 做到能随时停机。准备作业结束以后, 应将门互锁开关置于有效位置。并应拔去门互锁键(7), 交由监督人员保管。  
 SD4-2 不应将门互锁开关置于无效位置的状态下离开机器。



- SD5 门互锁开关(5)置于无效位置时, 工作台(20)会发生移动, 作业人员有可能被平台夹伤。  
 SD5-1 在准备作业中, 应留心机械的运转情况, 做到能随时停机。准备作业结束以后, 应将门互锁开关置于有效位置。并应拔去门互锁键(7), 交由监督人员保管。

警告



## 警 告



- SW1 触摸转动中的加工机具(15)会受伤。  
SW1-1 不准靠近转动中的加工机具。



- SW2 折断的加工机具(15)和工件弹出会造成伤害。  
SW2-1 应关闭作业门(6)后再运行机械。



- SW3 夹进转动部件而受伤。  
SW3-1 勿靠近转动部件(15)、主轴(8)和 ATC 刀库(9)  
SW3-2 应穿合身服装。长发应拢入工作帽内。除非停机作准备工作, 不能戴手套。不能戴首饰。勿摸弄转动部件。



- SW4 改装安全装置, 会带来安全装置失灵、触电、被夹和被打等危险。  
SW4-1 勿改装安全装置。勿固定安全装置, 以免安全装置失灵。



- SW5 切削碎屑飞入眼内, 会伤及眼球而失明。  
SW5-1 应戴用铁屑防护眼镜。  
SW5-2 勿用压缩空气清扫切削碎屑。



- SW6 用手触摸切削碎屑, 会造成外伤或烫伤。  
SW6-1 勿用手触摸切削碎屑。勿用手触摸加工件的尖厉部分。  
SW6-2 清理切削碎屑应戴手套, 使用刷子。  
SW6-3 应在停机后清理切削碎屑。

- SW7 勿握模刀具(16)的刀刃, 以免手被割破。  
SW7-1 勿握模刀具的刀刃。拿取刀具时应拿住刀具夹(16)部分。



SW8 重物跌落脚上, 会造成足部骨折。  
SW8-1 抬拿重物时应穿安全鞋。

SW9 抬拿重物时, 注意闪腰。  
SW9-1 抬拿重物时, 应请他人协助。  
SW9-2 抬拿重物时, 应双脚用力而非腰部用力。



SW10 长时间身处噪音之中或巨大的噪音之中, 会造成双耳失聪。  
SW10-1 在噪音中作业时, 应戴耳塞等保护器具。



SW11 高气压设备有可能爆裂而伤及眼目。  
SW11-1 没有接受过高气压设备使用方法培训 不懂该机器配管的人员, 不能安装和改装高气压设备。  
SW11-2 在进行高气压设备的配管作业时, 应切断高压电源, 放去残留高压空气后再进行作业。并设置「正在作业」的表示牌。



SW12 站起时注意碰伤头。  
SW12-1 在机器内部或周围进行作业时应戴安全帽。



SW13 开机时, 机器中有未取出的加工工具时, 加工工具有可能飞散而造成工伤。  
SW13-1 勿将加工工具遗忘在机器中。



SW14 握取把手(10)以外的部分开关作业门(6)的话, 有手被夹伤的危险。  
SW14-1 开关作业门(6)时, 应握取把手(10)。



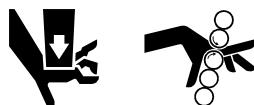
SW15 控制箱(1)中有些机具处于高温状态, 如控制箱内部的文件架(12)上的资料露出文件架, 有起火燃烧的危险。  
SW15-1 文件架上不能放置超过 A4 尺寸或信笺尺寸的资料。



SW16 在控制箱(1)和机器上放置工具时,工具会震落。  
SW16-1 在控制箱和机器上勿放置物品。



SW17 攀登机器和冷却液罐(22),须注意坠落受伤。  
SW17-1 勿攀登机器和冷却液罐。



SW18 把手伸进调平螺栓(12)的下面,须注意手被夹伤。  
SW18-1 勿将手伸进调平螺栓的下面去。调节水平调节螺栓应使用工具。



SW19 缆绳下垂或不加缆绳护罩,会发生绊滑跌倒等工伤事故。  
SW19-1 应收紧缆绳的松余部分,沿地板拖放时应加缆绳护罩。



SW20 擅自改装机器,会使安全装置失灵,安全操作规程和安全签条的警告事项将失去作用。  
SW20-1 勿改装机器。需要改装时,应事先和兄弟工业公司联系,取得兄弟工业公司的书面允许。



SW21 冷却液进入眼睛,会损伤眼睛。  
SW21-1 调整冷却液喷嘴(13)时,应配戴防护眼镜。  
SW21-2 冷却液进入眼睛后,应用清水洗眼,接受医生诊治。



SW22 手指伸入机器夹缝,应注意手被夹伤。  
SW22-1 勿将手指伸入固定具的罩子中去。  
SW22-2 勿将手指伸入刀具(15)或刀具夹(16)与ATC刀库(9)之间的空隙中去。



SW23

SW23-1

SW23-2

如冷却液、机油或切削碎屑被打翻, 会因滑脚、跌倒、碰撞而受伤。

应切断电源, 并清扫机器内部和机器周围以后, 再进行作业。

安装作业应戴安全帽和穿安全鞋。



SW24

SW24-1

拆卸刀具夹(16)时, 须注意手可能会被刀具(15)的刀刃所伤或手被机器打着。

不持拿刀具的刀刃部。持拿工具应使用皮制手套。应双手持拿刀具夹。



SW25

SW25-1

SW25-2

SW25-3

机器可能突然停机, 刀具可能突然脱落。

停止指示灯(4)不亮时, 不要将手脚、身体伸到主轴头(18)下面去。

应将工作台拉到身前再安排工作。

切断主电源开关(21), 加锁以防止总开关打开, 然后补充润滑液。



SW26

SW26-1

SW26-2

如使用油性冷却液加工, 加工部位可能受热起火。

使用油性冷却液时, 应设置火警预报器和自动灭火装置。

加工时, 操作人员不得离开机器。



SW27

SW27-1

机器开动时, 人傍靠在机器上, 会有被夹、被打致伤的危险。

勿傍靠在机器上。

SW28

SW28-1

紧急停止开关(18)上挂有物品时, 紧急停止开关会按不进去。

不得在紧急停止开关上钩挂物品。



SW29

SW29-1

工作台(19)移动, 机器后背的Y轴后罩会跳弹出来, 碰到人会造成工伤。

应切断主电源开关(21), 再清扫切削碎屑。



SW30

SW30-1

冷却液罐(22)很重, 拾拿时须注意闪腰或脚被砸伤。

清理切削铁屑时也不得拾拿冷却液罐。



- SW31 进入机器时, 须注意滑倒或被机器夹住。  
 SW31-1 进入机器前, 应先切断主电源开关(21), 加锁以防止总开关被打开。清扫冷却液和铁屑时。应穿戴安全鞋和安全帽。并在操作盘附近置放「正在作业」的标牌。



- SW32 别忘记安装火花防溅箱(2)的侧面护板(23), 以免操作人员被夹或被断裂的刀具打伤。  
 SW32-1 在打开电源前应亲自确认是否装上了侧面护板。



- SW33 如果使用超重超大的刀具(15), 刀具夹(16), 该刀具或该刀具的套柄有可能飞脱。  
 SW33-1 应使用重量和尺寸都在规定以内的刀具和套柄。  
 SW33-2 刀具的限制条件请见刀具签条和操作说明书。



- SW34 机器在运转过程中, 再生电阻会发热, 须注意触摸再生器会被烫伤。  
 SW34-1 勿拆卸再生电阻罩(24)。

- SW35 机器在运转过程中, 马达会发热, 须注意触摸马达可能会被烫伤。  
 SW35-1 在停止运转后的 30 分钟内不要触摸马达。

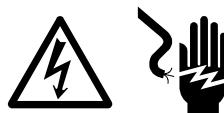


- SW36 使用规定以外的保险丝, 会使保护装置失灵, 可能酿成火灾。  
 SW36-1 调换保险丝时, 使用的保险丝规格应和刚用完的相同。

- SW37 当改变热传导器的设定时, 保护装置将失灵, 有可能发生火灾。  
 SW37-1 勿改变热传导器的设定值。



- SW38 当 ATC 刀库(9)转动时, 须注意刀具(15)有可能碰到加工物件、夹具或机器而断裂。  
 SW38-1 应妥善设定裴恶的长度, 以免在 ATC 刀库机转动时, 刀具碰到加工物件、夹具或机器。



- SW39      如控制箱(1)和操作盘(25)潮湿, 须注意有可能触电。  
 SW39-1    不能将冷却液、水、切削铁屑撒到控制箱和操作盘上。  
 SW39-2    不能用潮湿的手触摸控制箱。
- SW40      从外部引进的动力线的 PE 线过短的话, 当拉动电缆线时, PE 线有可能松脱而触电。  
 SW40-1    接续 PE 线时, 应留有余地, 长于其他电线(L1、L2、L3)。



- SW41      如果在有爆炸危险的环境下打开机器电源, 或进行加工作业, 有可能因机器的火花而引起爆炸。  
 SW41-1    不要将机器安装在有爆炸危险的环境下。  
 SW41-2    不应在有发生爆炸可能的环境中打开机器电源, 进行加工或做准备作业。  
 SW41-3    不在有爆炸危险的环境下打开机器电源, 或进行加工作业。



- SW42      如忘加火花防溅板一侧的护板(23), 将有可能被夹伤。  
 SW43      在打开电源前, 应亲自确认维修罩是否已经装好。



- SW44      有些被加工件的材料的切削碎屑有可能引火或爆炸。  
 SW44-1    切削碎屑应立即清除。  
 SW44-2    在加工上述材料时, 机器附近应放置灭火设备或进行无人作业。



- SW45      使用脱卸式固定斜楔的刀具时, 如固定斜楔安装不牢固, 主轴旋转时, 有可能飞脱砸人, 造成工伤。  
 SW45-1    务必先确认固定斜楔是否安装牢固以后再安装刀具。



- SW46      使用设有电源线专用的配线的 3 线式感应器的时候, 有引火的危险。  
 SW46-1    请不要使用 3 线式感应器, 应使用 2 线式感应器。  
 SW46-2    不得已使用 3 线式感应器的时候, 应在电源线部处追加个别保险丝(1A 以下)。



SW47 配线时，端子台的螺丝锁得不紧的话，会导致由于接触不良引起发热、起火的危险。

SW47-1 配线时，螺丝应无松缓。



SW48 如果工厂内照明光线昏暗的话，有因机械内光线变暗而导致夹具及刀具弄伤手的危险。

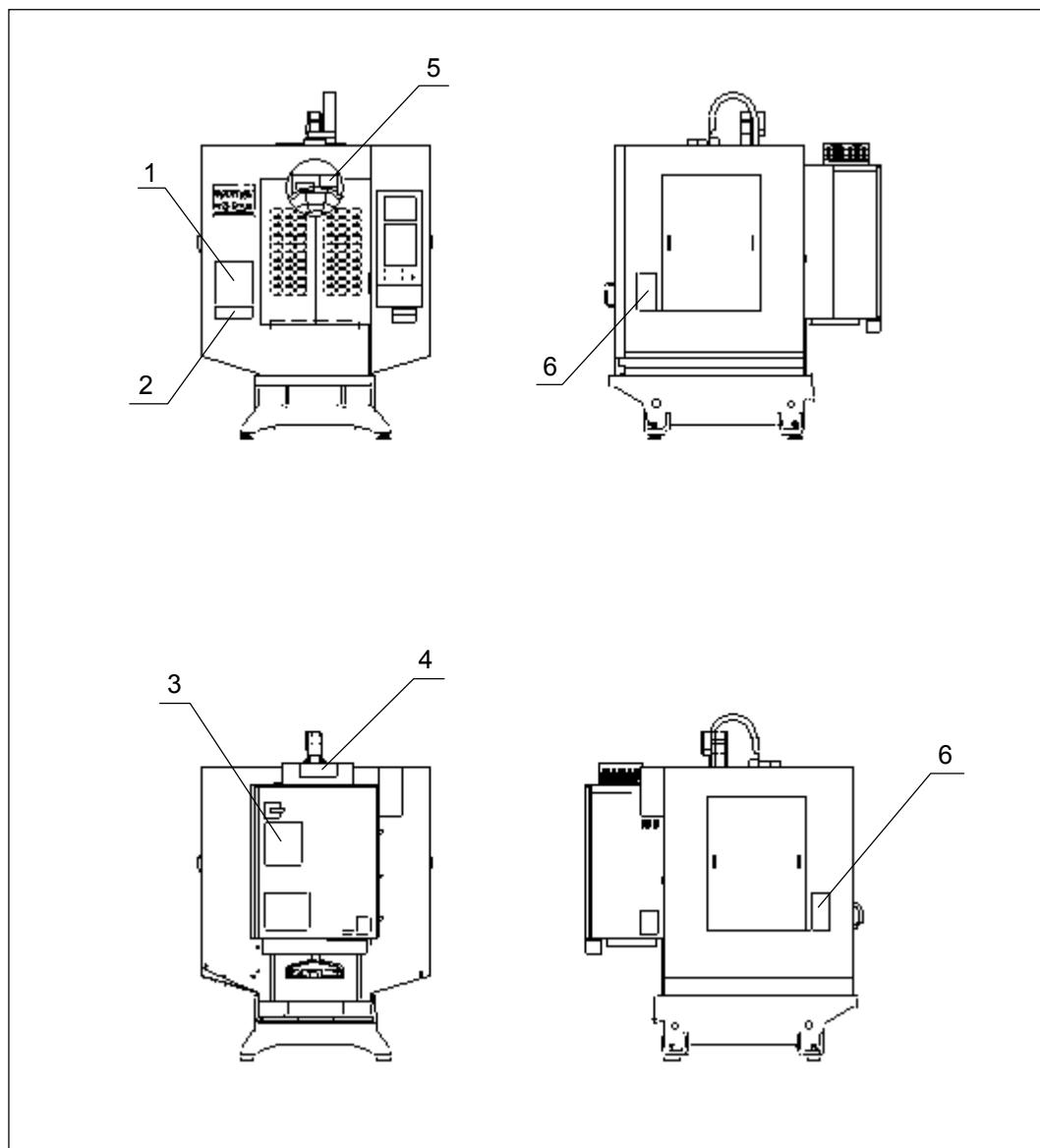
SW48-1 机械内照明度低于 500 勒克斯以下的场合，应设置照明灯。

## 安全签条的说明

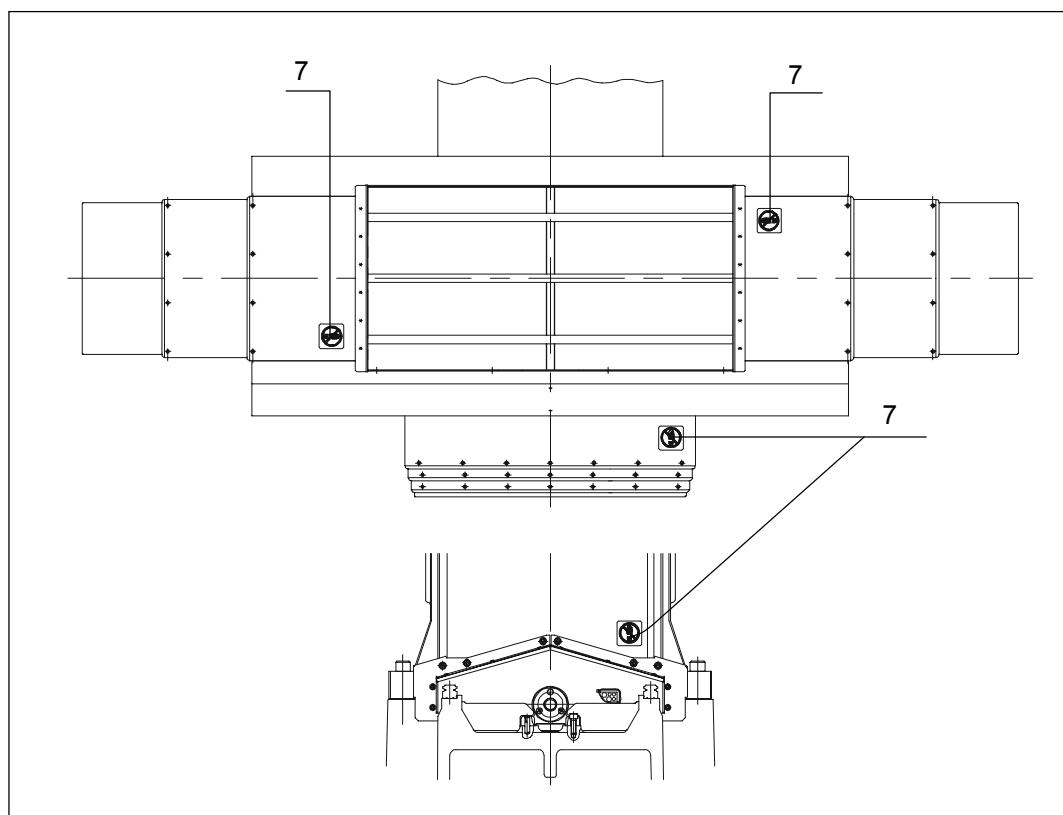
机器上贴有安全签条,安全签条是安全操作规程中特别重要的部分。

请在充分理解了安全签条的内容以后再进行机器的操作。

安全签条贴在机器的下述位置,请确认安全签条有否脱落。如有脱落,请索取后重贴。



230S00C02.doc



S2A00401.ai

## [1] 前面安全签条

语言

和中英文

零件编码

690723001

This machine has hazards.

Read instruction manuals to understand hazards and avoid them before operation.

危險の内容と回避方法を理解するため、取扱説明書を読んでから、機械を操作してください。

由于有必要了解危险的内容和避免的方法，请仔细读完使用说明书后，再操作机器。



690723001 / 9411(1)

## [2] 前面面刀具标签

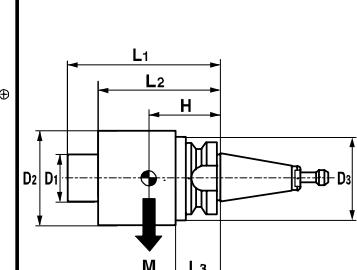
根据刀库的最大刀具收纳把数及主轴回转次数, 更改记载内容。

## 零件编码

653379001

## 刀具标签 250

工具、主軸回転数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。  
If use beyond the limitation of the tool and spindle speed, machine may be broken.  
Check the details by the operation manual before operation.



	最高主軸回転速度 10000 min <sup>-1</sup> / 16000 min <sup>-1</sup>	Max Spindle Rotation Speed	
主軸テーパ	7 / 24 No.30	Spindle Taper	
ツールシャンク	MAS-BT30	Tool Shank	
ブルスタッド	MAS-P30T-2 (30°)	Retention Knob	
マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)	Total in Magazine	
工具の制限	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> 80 mm L <sub>2</sub> 160 mm D <sub>3</sub> 46 mm L <sub>3</sub> 30 mm M 3 kg MxH≤180 kgmm	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> 55 mm L <sub>2</sub> 160 mm D <sub>3</sub> 46 mm L <sub>3</sub> 30 mm M 2 kg MxH≤100 kgmm	Limitation of Tool
工具バランス制限	100grmm	50grmm	Limitation of Tool Balance
主軸回転数制限	10000 min <sup>-1</sup>	16000 min <sup>-1</sup>	Limitation Spindle Rotation Speed

653379001 / 0210 (2)

## [3] 背面安全签条

语言

和中英文

零件编码

690730001



690730001 / 9709 (1)

## [4] 再生阻抗器罩签条

语言

和中英文

零件编码

6907290001

	<b>⚠ WARNING</b>	<b>⚠ 警 告</b>	<b>⚠ 警 告</b>
	<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>熱い抵抗器 さわるとやけどする。</p> <p>運転が終り、 30分たってから、 カバーをはずすこと。</p>	<p>热电阻 触摸会烫伤。</p> <p>停止运行 30 分钟之后， 才可取下安全罩。</p>

690729001 / 9709 (1)

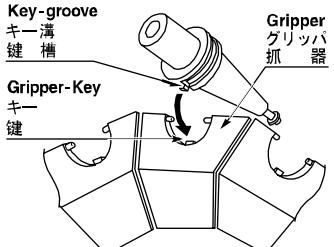
## [5] 刀具装脱签条

语言

和中英文

零件编码

65308001

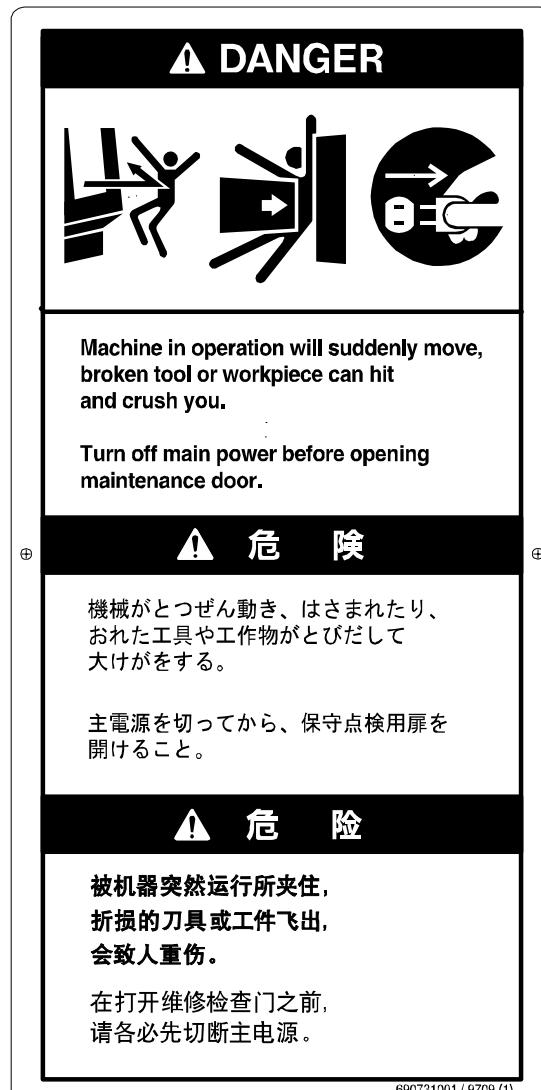
<b>⚠ CAUTION</b>	<b>⚠ 注意</b>
<p>After installed the tool-holder, Please certify aligning its key-groove with gripper key.</p>	<p>工具の取付け後は、 工具ホルダーのキー溝が グリッパのキーと合致し ていることを確認してく ださい。</p>
<p><b>⚠ 注意</b></p> <p>工具安装后请、 确认工具支架的键槽 与抓器的键是否吻合。</p>	 <p>Key-groove キー溝 键槽</p> <p>Gripper-Key キー 键</p>

653080001 / 9901 (1)

## [6] 侧面维修罩安全签条

语言  
和中英文

零件编码  
690731001



## [7] 远离勿踏标签

零件编码  
693178001



693178001 / 0607 (1)

693178001.ai

## 操作人员安全操作规程

攻丝中心  
**TC-S2A**

请在接触攻丝中心前仔细阅读本安全操作  
规程。

兄弟工业公司  
玛西纳丽和苏琉雄公司

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# 什么是安全操作规程

## 务必阅读本规程

凡接触攻丝中心的人员,诸如在工厂安装攻丝中心的人员、使用攻丝中心进行加工的人员和调整修理攻丝中心的人员,务必阅读本安全操作规程。

本规程把接触攻丝中心的所有人员称为「使用者」。

## 目的

攻丝中心由使用高电压的电器回路、高速旋转机具、大功率移动台和 ATC 送料装置组成。所以该机器带有许多危险因素。

制订本规章的目的是保护使用者免受攻丝中心所带危险因素的伤害。

为此本安全操作规程对下述问题进行说明。

警告: 有什么危险

回避方法: 如何回避其危险

## 安全操作规程的内容以及和其他规程的关系

安全操作规程按使用对象进行分类,附在各说明书里(程序控制缝纫机除外)。您想知道机器的功能和操作方法,请阅读说明书本篇。

1 操作说明书(面向一般操作人员) 「操作人员安全操作规程」

「安装和做准备作业人员的安全操作规程」

「操作说明书」(基本作业所需要的机械操作方法)

中文零件编码 : 693271001

2 操作说明书(面向专门操作人员) 「操作人员安全操作规程」

「安装和做准备作业人员的安全操作规程」

「机门连动机能」

「操作说明书」(准备和加工所需要的机械操作方法)

(对话) 日文零件编码 : 693312001 英文零件编码 : 693307001

(NC 语言) 日文零件编码 : 693310001 英文零件编码 : 693305001

3 安装说明书 「安装作业人员和准备作业人员的安全操作规程」

「安装说明书」(机械和配件的安装及其组装方法)

日文零件编码 : 693311001 英文零件编码 : 693306001

4 编制程序说明书 「编制程序说明书」(加工程序的制作方法)

(对话) 日文零件编码 : 693314001

英文零件编码 : 693309001

(NC 语言) 日文零件编码 : 693313001

英文零件编码 : 693308001

5 维修说明书 「受过培训的维修作业人员安全操作规程」

「维修说明书」(机械的调整和修理方法)

对顾客不发维修说明书。

## 和安全签条的关系

安全操作规程中特别重要的部分被制作成安全标签, 贴在机器上。

安全操作规程的最后部分是关于安全标签的说明。如果机器上的安全签条脱落, 请设法索取签条后重新贴上。

## 语言

日本国内销售的机器, 所贴的安全操作规程和安全签条均用日文。

销售到国外的机器, 用的是英文、德文、法文和**中文四国**文字。

请设法取得所懂语言的安全操作规程和安全签条。

关于其他国家的安全操作规程和语言签条, 请询问您所购买的机器销售店。

## 索取方法

如果安全操作规程或安全签条遗失, 请到您所购买的机器销售店索取。

如销售店无法解决, 请向下列单位咨询。

### 日本国外联系地址

1-1-1 Kawagishi, Mizuho-ku, Nagoya 467-8562, JAPAN

BROTHER INDUSTRIES, LTD.

phone +81-52-824-2232

fax +81-52-811-0469

## 安全操作规程的使用

安全操作规程应注意妥善保存, 做到随时可以阅读。如机器更换所有人, 请转交机器的新持有人。

## 危险程度

如无视警告, 所引起的危险的程度按受害程度可分 3 种。

### 1. 危险

#### ▲ 危 险

招致死亡或不可复原的严重疾患的危险。

### 2. 警告

#### ▲ 警 告

招致重伤的危险。

### 3. 注意

#### ▲ 注 意

轻度危险

## 说明的顺序

按下列顺序进行说明。

1. 表示危险程度的文字标记(危险、警告、注意)和象图
2. 危险的种类
3. 伤害的预测
4. 回避方法

## 象形图的意思

安全签条和安全操作规程的警告语言使用象图,形象地说明其危险程度和回避方法。现将图像的意义说明如下。

### 1. 危险



## 2. 回避方法



保护耳朵



保护双手



保护双脚



拔掉电源



严禁触摸



保护头部



需接地线



不准分解



保护眼睛

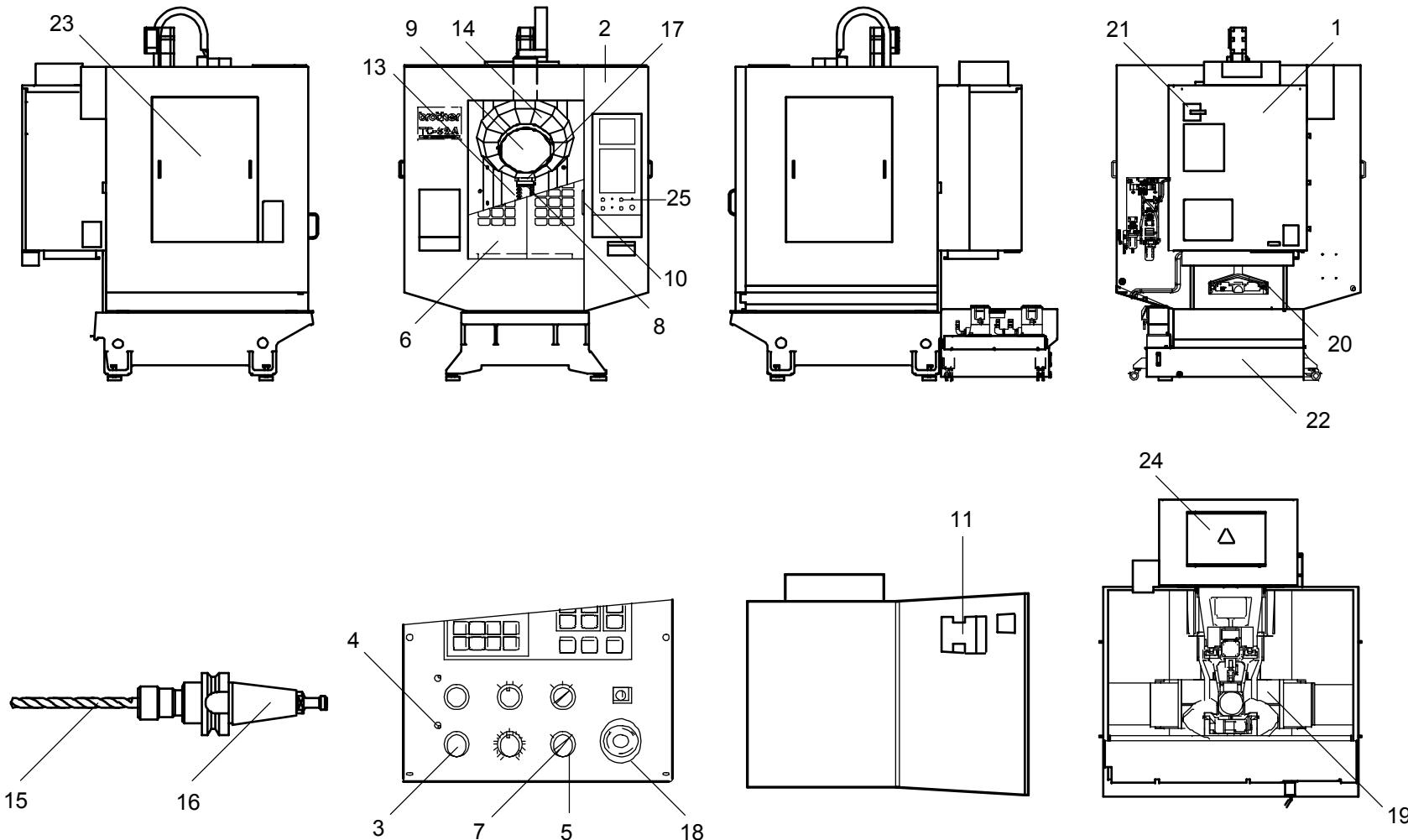
## 部品名

## Section Names

## Namen jedes Teils

## Noms de sections

## 各部件名称



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部品名	Section Names	Namen jedes Teils	Noms de sections	各部件名称
No.	各部の名称	Section names	Namen jedes Teils	Noms de sections
1.	日本語	English	Deutsch	Français
1.	制御箱	control box	Steuerschrank	armoire de commande
2.	スプラッシュガード	splash guard	Spitzblech	tôle pare-copeaux
3.	停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt
4.	停止ランプ	stop lamp	stop Lampe	lampe d'arrêt
5.	ドアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage
6.	作業扉	work door	Arbeitstür	porte de travail
7.	ドアインタロックキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage
8.	スピンドル	spindle	Spindel	broche
9.	ATC マガジン	ATC magazine	ATC Magazin	ATC magasin
10.	取手	handle	Griff	poignée
11.	制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande
12.	レベリングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine
13.	クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe
14.	グリップカバー	grip cover	Griffschutz	couverture de jambe
15.	工具	tool	Werkzeug	outil
16.	工具ホルダ	tool holder	Werkzeughalter	support à outil
17.	スピンドルヘッド	spindle head	Spindelkopf	tête de la broche
18.	非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence
19.	ケーブルカバー	cable cover	kabelschutz	couvre cable
20.	テーブル	table	Tisch	table
21.	主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale
22.	クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe
23.	スプラッシュガードサイドカバー	splash guard side cover	Spitzblechseitenschutz	couverture à côté du tôle pare-copeaux
24.	回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice
25.	操作パネル	operation panel	Betriebstafel	panneau d'opération

# 警告和回避方法

( ) 中的数字 1, 2 与各部分的名称号码相对应。

## 危险 危 险

- OD1 在攻丝中心里隐藏着许多危险。  
 OD1-1 为了熟知危险的内容和回避方法, 请在操作机器前阅读安全操作规程。  
 OD1-2 所有使用者均须知道紧急停止开关(18)的位置和操作方法。



- OD2 控制箱(1)中有高电压装置, 不慎触模该装置, 会引起重大伤亡事故。  
 OD2-1 不具该机械的电气回路知识、没有电工执照的人员不准进行电气的维修和检查作业。操作人员不准打开控制箱。  
 OD2-2 如警报器报警, 应立即向管理人员报告。操作人员不得擅自修理。修理和安装应由具备专门知识的人员进行。



- OD3 运转中的机器, 都有被其夹住而受重伤的危险。  
 OD3-1 机器在运转时, 不能将身体伸入火花防溅箱(2)中去。  
 OD3-2 亲眼确认火花防溅箱中确实无人后, 才能开动机器。  
 OD3-3 在机器运转时, 手足和身体不能靠近机器的转动部分。  
 OD3-4 如警报器报警, 应立即向管理人员报告。不准将手脚和身体伸入机械。



- OD4 门互锁开关(5)处于无效状态时, 即使打开作业门(6), 机械也会运行。  
 有被旋转的刀具(15)切伤或被机械夹伤的危险。  
 OD4-1 门互锁开关(5)处于无效状态时, 勿将手足和身体伸入机器内部。作业人员要向管理人员汇报。管理人员应将门互锁开关拨到有效位置。钥匙(8)由管理人员保管。  
 OD4-2 门互锁无效时, 管理人员不得让操作人员进行作业。  
 OD4-3 操作人员应亲自确认门互锁开关(5)确已拨到有效位置后, 才能开始作业。  
 OD4-4 如果门互锁上挂有钥匙, 应向管理人员汇报。  
 OD4-5 门互锁的钥匙由管理人员保管。

警告



警告



- OW1 触摸转动中的刀具(15)会受伤。  
OW1-1 不准靠近转动中的刀具。



- OW2 折断的刀具(15)和工件弹出会造成伤害。  
OW2-1 应关闭作业门(6)后再运行机械。



- OW3 夹进转动部件而受伤。  
OW3-1 勿靠近转动部件(15)、主轴(8)和 ATC 刀库(9)。  
OW3-2 应穿合身服装。长发应拢入工作帽内。除非停机作准备工作, 不能戴手套。不能戴首饰。勿摸弄转动部件。



- OW4 改装安全装置, 会带来安全装置失灵、触电、被夹和被打等危险。  
OW4-1 勿改装安全装置。勿固定安全装置, 以免安全装置失灵。



- OW5 切削碎屑飞入眼内, 会伤及眼球而失明。  
OW5-1 应戴用铁屑防护眼镜。  
OW5-2 勿用压缩空气清扫切削碎屑。



- OW6 用手触摸切削碎屑, 会造成外伤或烫伤。  
 OW6-1 勿用手触摸切削碎屑。勿用手触摸加工件的尖厉部分。  
 OW6-2 清理切削碎屑应戴手套, 使用刷子。  
 OW6-3 应在停机后清理切削碎屑。

- OW7 勿握模刀具(15)的刀刃, 以免手被割破。  
 OW7-1 勿握模刀具的刀刃。拿取加工机具时应拿住刀具夹(17)部分。



- OW8 重物跌落脚上, 会造成足部骨折。  
 OW8-1 抬拿重物时应穿安全鞋。

- OW9 抬拿重物时, 注意闪腰。  
 OW9-1 抬拿重物时, 应请他人协助。  
 OW9-2 应用脚力抬起而不是背上及腰间的力气。



- OW10 长时间身处噪音之中或巨大的噪音之中, 会造成双耳失聪。  
 OW10-1 在噪音中作业时, 应戴耳塞等保护器具。



- OW11 高气压设备有可能爆裂而伤及眼目。  
 OW11-1 没有接受过高气压设备使用方法培训 不懂该机器配管的人员, 不能安装和改装高气压设备。



OW12  
OW12-1

站起时注意碰伤头。  
在机器内部或周围进行作业时应戴安全帽。



OW13  
OW13-1

开机时,机器中有未取出的加工工具时,加工工具有可能飞散而造成工伤。  
如有工具遗忘在机器中,不应继续操作机器,并向监督人员报告。



OW14  
OW14-1

握取把手(10)以外的部分开关作业门(6)话,有手被夹伤的危险。  
开关作业门(6)时,应握取把手(10)。



OW15  
OW15-1

在控制箱(1)和机器上放置工具时,工具会震落。  
在控制箱和机器上勿放置物品。



OW16  
OW16-1

攀登机器和冷却液罐(22),须注意坠落受伤。  
勿攀登机器和冷却液罐。



OW17  
OW17-1  
OW17-2

把手伸进调平螺栓(12)的下面,须注意手被夹伤。  
不应将手伸入调平螺栓的下方。应使用工具调节调平螺栓。  
管理人员应让安装人员调节水平调节螺栓。



OW18  
OW18-1  
OW18-2

缆绳下垂或不加缆绳护罩,会发生绊滑跌倒等工伤事故。  
电缆线下垂或未加盖罩时,应向管理人员汇报。  
管理人员应让安装人员拉线,在电缆线上加罩。



- OW19 擅自改装机器,会使安全装置失灵,安全操作规程和安全签条的警告事项将失去作用。  
 OW19-1 不应改造机械。如有必要改造时,应事先与兄弟公司联系,获取书面上的许可。



- OW20 冷却液进入眼睛会伤及眼睛。  
 OW20-1 调整冷却液喷嘴(13)时,应戴保护眼镜。  
 OW20-2 冷却液进入眼睛以后,应用清水冲洗眼睛,请医生检查。



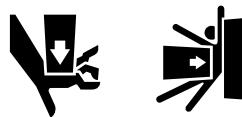
- OW21 手指伸入机器夹缝,应注意手被夹伤。  
 OW21-1 勿将手指伸入固定具的罩子(14)中去。  
 OW21-2 勿将手指伸入刀具(15)或刀具夹(16)与 ATC 刀库(9)之间的空隙中去。



- OW22 如冷却液、机油或切削碎屑被打翻,会因滑脚、跌倒、碰撞而受伤。  
 OW22-1 应切断电源,并清扫机器内部和机器周围以后,再进行作业。  
 OW22-2 安装作业应戴安全帽和穿安全鞋。



- OW23 拆卸刀具夹(16)时,须注意手可能会被刀具(15)的刀刃所伤或手被机器打着。  
 OW23-1 不得握模刀具夹的刀刃。拿刀具时应戴皮手套。应用双手持拿刀具。



OW24 机器可能突然停机, 刀具可能突然脱落。  
OW24-1 不要将手脚和身体伸进主轴头(17)下面。



OW25 如使用油性冷却液加工, 加工部位可能受热起火。  
OW25-1 使用油性润滑液时, 应设置火警预报器和自动灭火装置。  
OW25-2 加工时, 操作人员不得离开机器。



OW26 机器开动时, 人傍靠在机器上, 会有被夹、被打致伤的危险。  
OW26-1 勿傍靠在机器上。

OW27 紧急停止开关(18)上挂有物品时, 紧急停止开关会按不进去。  
OW27-1 不得在紧急开关上钩挂物品。



OW28 工作台(19)移动, 会使机器背后的电缆护罩(20)飞脱, 而砸伤作业人员。  
OW28-1 应先切断主电源闸(21), 再清扫切削碎屑。



OW 29 冷却液罐(22)很重, 抬拿时须注意闪腰或脚被砸伤。  
OW 29-1 清理切削铁屑时也不得抬拿冷却液罐。



OW30 进入机器时, 须注意滑倒或被机器夹住。  
OW30-1 不得进入机器。有必要进入机器时, 应向管理人员报告。



OW31 别忘记安装火花防溅箱(2)的侧面护罩(23),以免操作人员被夹或被断裂的刀具打伤。

OW31-1 在打开电源前应亲自确认是否装上了侧面护板。侧面护板(23)尚未安装,应向管理人员报告。

OW31-2 管理人员应令其安装好侧面护罩。



OW32 如果使用超重超大的刀具(15),刀具夹(16),该机具或该机具的套柄有可能飞脱。

OW32-1 应使用重量和尺寸都在规定以内的刀具和套柄。

OW32-2 刀具的限制条件请见刀具条和操作说明书。



OW33 机器在运转过程中,再生电阻会发热,须注意触摸再生器会被烫伤。

OW33-1 勿拆卸再生电阻罩(24)。

OW34 机器在运转过程中,马达会发热,须注意触摸马达可能会被烫伤。

OW34-1 在停止运转后的30分钟内不要触摸马达。



OW 35 当ATC刀库(9)转动时,须注意刀具(15)有可能碰到加工物件、夹具或机器而断裂。

OW 35-1 应妥善设定刀具的长度,以免在ATC刀库转动时,刀具碰到加工物件、夹具或机器。



OW36 如控制箱(1)和操作盘(25)潮湿,须注意有可能触电。

OW36-1 不能将冷却液,水,切削铁屑撒到控制箱和操作盘上。

OW36-2 不能用潮湿的手触摸控制箱。



OW37 如在有爆炸危险的环境下打开机器电源开关或进行加工作业,有可能因机器的火花引起爆炸。

OW37-1 不得在有爆炸危险的环境下打开机器电源开关或进行加工作业。



OW38 不将加工物件妥善固定便进行加工时，有可能因加工物件飞脱而使操作人员致伤。

OW38-1 应将加工物件妥善固定。



OW39 忘记安装火花防溅侧面护罩(23)的话，有被夹伤的危险。

OW39-1 在开电源以前，应亲自确认是否已经安装了护罩。

OW39-2 应先切断主电源，加上铁锁防止开关跳入，然后拆卸护罩。

OW39-3 管理人员应自己安装护罩。



OW40 有些被加工件的材料的切削碎屑有可能引火或爆炸。

OW40-1 切削碎屑应立即清除。

OW40-2 在加工上述材料时，机器附近应放置灭火设备或进行无人作业。



OW41 带有可换固定斜楔的加工机具，如斜楔未妥善固定，在固定主轴的过程中，有可能卸脱而造成伤害。

OW41-1 务必先确认固定斜楔是否妥善固定，然后再安装刀具。



OW42 如果工厂内照明光线昏暗的话，有因机械内光线变暗而导致夹具及刀具弄伤手的危险。

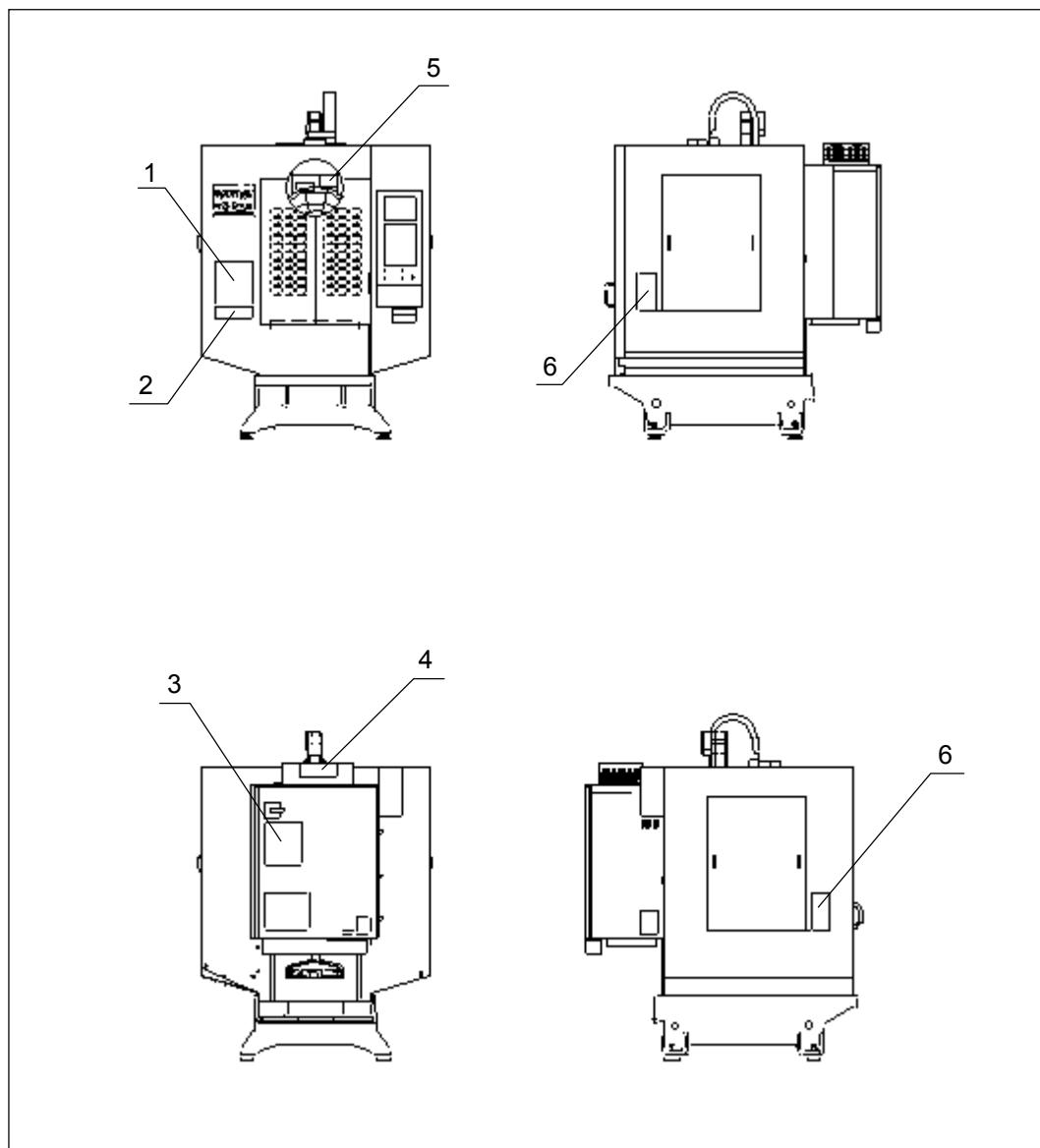
OW42-1 机械内照明度低于 500 勒克斯以下的场合，应设置照明灯。

## 安全签条的说明

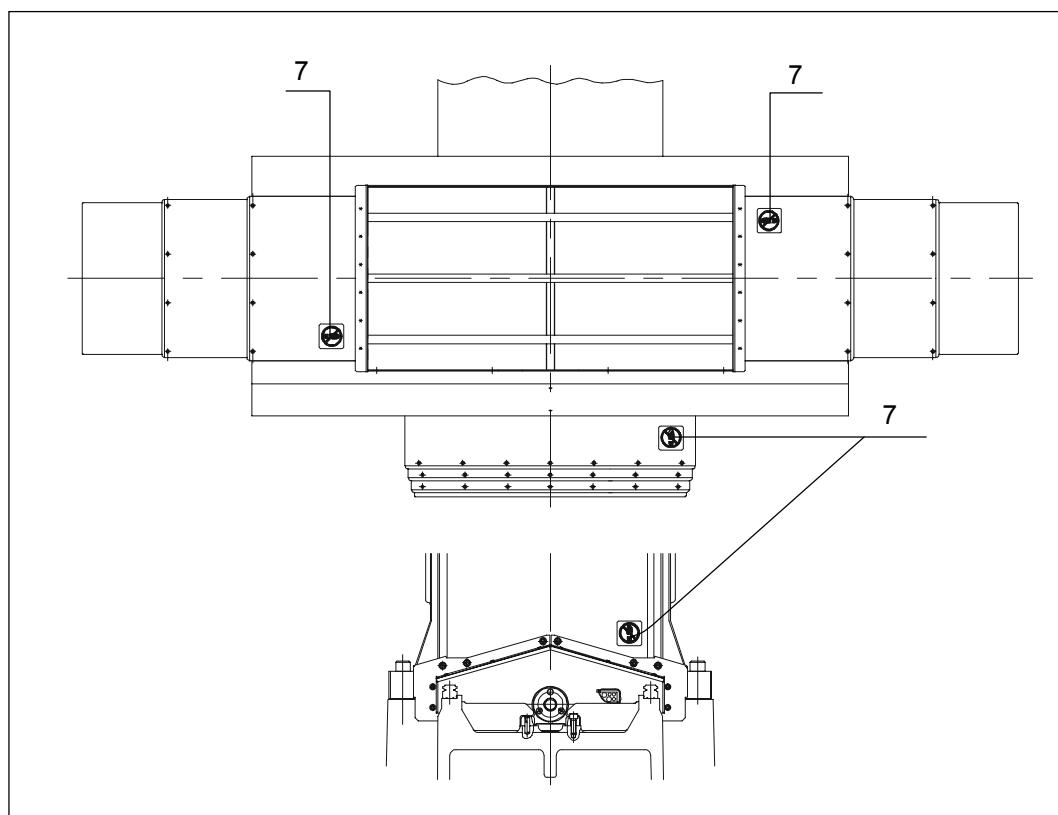
机器上贴有安全签条,安全签条是安全操作规程中特别重要的部分。

请在充分理解了安全签条的内容以后再进行机器的操作。

安全签条贴在机器的下述位置,请确认安全签条有否脱落。如有脱落,请索取后重贴。



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## [1] 前面安全签条

语言

和中英文

零件编码

690723001

This machine has hazards.

Read instruction manuals to understand hazards and avoid them before operation.

危險の内容と回避方法を理解するため、取扱説明書を読んでから、機械を操作してください。

由于有必要了解危险的内容和避免的方法，请仔细读完使用说明书后，再操作机器。



690723001 / 9411(1)

## [2] 前面面刀具标签

根据刀库的最大刀具收纳把数及主轴回转次数, 更改记载内容。

## 零件编码

653379001 刀具标签 250

工具、主轴回转数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。  
If use beyond the limitation of the tool and spindle speed, machine may be broken.  
Check the details by the operation manual before operation.

	最高主軸回転速度 10000 min <sup>-1</sup> / 16000 min <sup>-1</sup>	Max Spindle Rotation Speed	
主軸テーパ	7 / 24 No.30	Spindle Taper	
ツールシャンク	MAS-BT30	Tool Shank	
ブルスタッド	MAS-P30T-2 (30°)	Retention Knob	
マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)	Total in Magazine	
工具の制限	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> 80 mm L <sub>2</sub> 160 mm D <sub>3</sub> 46 mm L <sub>3</sub> 30 mm M 3 kg MxH≤180 kgmm	D <sub>1</sub> ≤ 40 mm L <sub>1</sub> ≤ 200 mm D <sub>2</sub> 55 mm L <sub>2</sub> 160 mm D <sub>3</sub> 46 mm L <sub>3</sub> 30 mm M 2 kg MxH≤100 kgmm	Limitation of Tool
工具バランス制限	100grmm	50grmm	Limitation of Tool Balance
主軸回転数制限	10000 min <sup>-1</sup>	16000 min <sup>-1</sup>	Limitation Spindle Rotation Speed

653379001 / 0210 (2)

## [3] 背面安全签条

语言

和中英文

零件编码

690730001



690730001 / 9709 (1)

## [4] 再生阻抗器罩签条

语言

和中英文

零件编码

6907290001

	<b>⚠ WARNING</b>	<b>⚠ 警 告</b>	<b>⚠ 警 告</b>
	<p>Heated resistor can burn your hand.</p> <p>After stopping machine, wait 30 minutes and remove cover.</p>	<p>熱い抵抗器 さわるとやけどする。</p> <p>運転が終り、 30分たってから、 カバーをはずすこと。</p>	<p>热电阻 触摸会烫伤。</p> <p>停止运行 30 分钟之后， 才可取下安全罩。</p>

690729001 / 9709 (1)

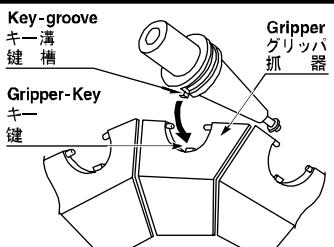
## [5] 刀具装脱签条

语言

和中英文

零件编码

65308001

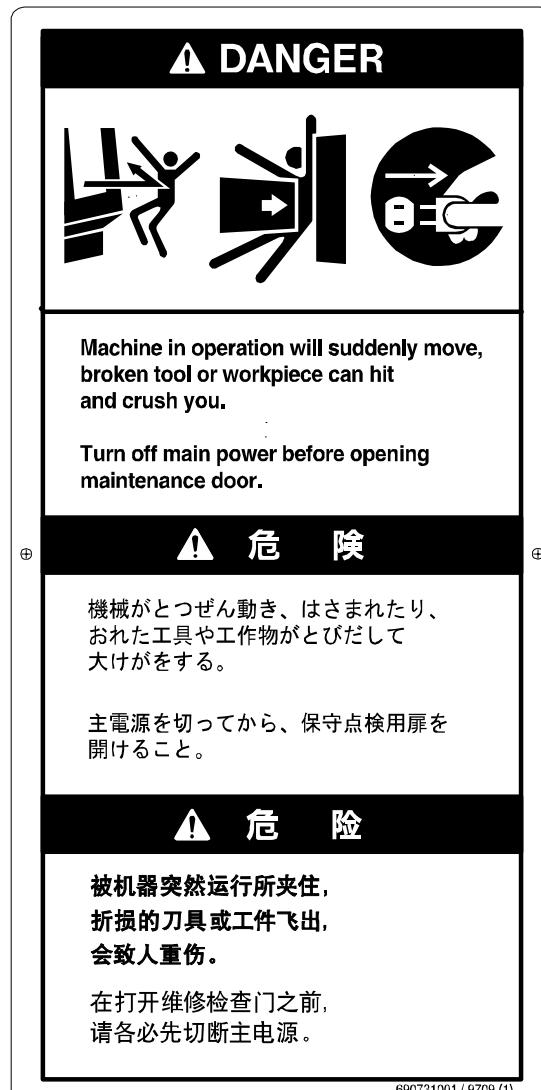
<b>⚠ CAUTION</b>	<b>⚠ 注意</b>
<p>After installed the tool-holder, Please certify aligning its key-groove with gripper key.</p>	<p>工具の取付け後は、 工具ホルダーのキー溝が グリッパのキーと合致し ていることを確認してく ださい。</p>
<p><b>⚠ 注意</b></p> <p>工具安装后请、 确认工具支架的键槽 与抓器的键是否吻合。</p>	 <p>Key-groove キー溝 键槽</p> <p>Gripper-Key キー 键</p>

653080001 / 9901 (1)

## [6] 侧面维修罩安全签条

语言  
和中英文

零件编码  
690731001



## [7] 远离勿踏标签

零件编码  
693178001



693178001 / 0607 (1)

693178001.ai

## 机门连动器机能

1. 操作注意事项
2. 外观图
3. 检查
4. 规格的详细内容

# 1 操作注意事项

## ⚠ 危险

机门连动器开关无效时，即使门呈开启状态机器依然运转。  
手可能会被旋转的机具划破、夹住和受伤。机门连动器开关无效时，手脚和身体不能伸进机器。  
应向管理员汇报情况。  
机门连动器开关无效时，管理员不能让作业人员操作机器。  
应亲眼确认机门连动器开关有效后，才能进入操作。  
发现机门连动器上挂有钥匙时，应向管理员汇报。  
机门连动器钥匙应由管理员保管。

## ⚠ 危险

机门连动器开关无效时，手脚和身体不能伸进机器。应向管理员汇报情况。  
管理员应将机门连动器开关调到有效位置。  
机门连动器无效时，管理员不能让作业人员操作机器。  
发现机门连动器上挂有钥匙时，应向管理员汇报。

## ⚠ 警告

小心转动工具伤人。  
别靠近转动工具。

## ⚠ 危险

小心卷进转动机件而受伤。  
别靠近转动中的机具、机轴和送料装置。  
服装要合身。  
长发应梳理进工作帽内。  
除非停机做准备工作，不准戴用手套。  
不戴首饰。  
不用手抓摸转动机件。

### 目的

机门连动器机能是保护作业人员，避免卷入转动的机具、可动部

### 装置说明

在外门关闭状态下能锁机或限制机器动作，但视情况不同而各异。

### 结构

机门连动器由下列部件构成。

1. 机门限位开关
2. 机门锁定装置

### 用法

#### 1. 平时

机门连动器机能开关(1) 置于有效位置。

#### 2. 准备作业和维修作业时

在做准备作业和维修作业时，如确有必要，才可把开关置于无效位置。

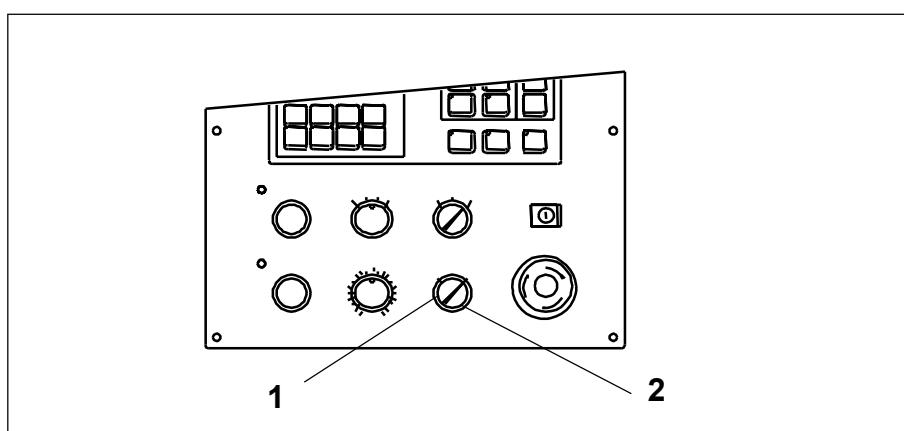
请先阅读「在安装和做准备工作时操作人员安全操作规程」「经培训后的操作人员安全操作规程」后，再进行准备工作和维修作业。

机门连动器开关无效时需遵守下列事 项。

注意别卷入转动的机具、可动部件和转动部件中去。

作业结束后应将开关回复到有效位置。

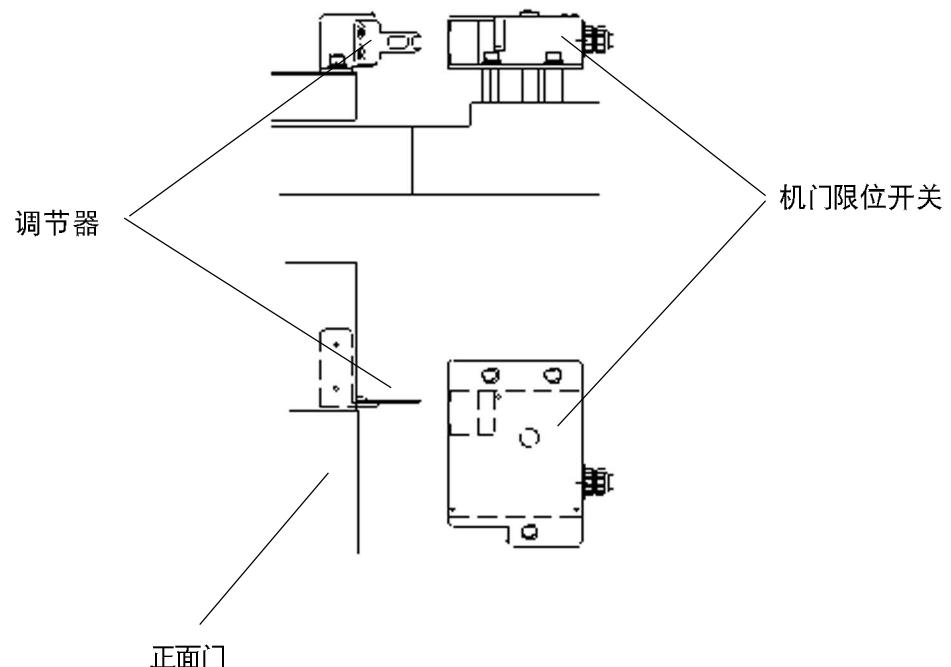
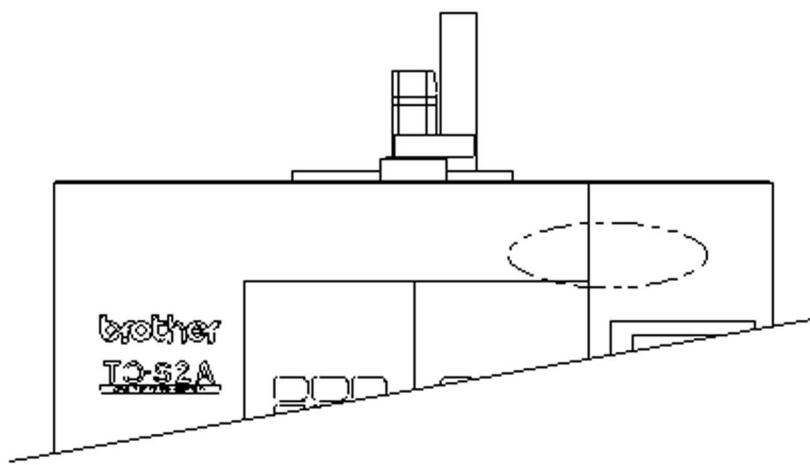
钥匙(2) 请管理员保管。



T20ADoor1-1.doc

## 2 外观图

TC-S2B



# 3 检查

开机前, 务必先检查机门连动器。

## 检查方法

### 发生停机时的检查

1. 关闭全部机门。然后打开开关, 回复原点。再确认机门连动装置开关是否有效。
2. 打开外门。
3. 如机门连动装置机能正常, 按下X轴的移动钮[—X], 机器不应该发生移动。此时如果有表示机门已经关闭的音响信号属情况正常。如情况异常, 属故障, 应予修理。  
如机门连动装置机能正常, 可继续下述检查。

### 机门闭锁检查

4. 关闭外门。
5. 让主轴转动。
6. 如机门闭锁机能正常, 因外门已经闭锁, 应无法打开。如外门没有闭锁, 还能够打开, 属故障, 应予修理。

### 紧急停止开关的点检

7. 以手动运转方式运转主轴。
8. 联锁开关如果正常的话, 一按紧急SW机器就会停止运转, 画面上出示「\*紧急停止开关关上」的警报。如果运转不停止, 或者画面上不出示警报的话, 则为出现故障, 需要修理。

## 4 规格的详细内容

门	机门连动器开关	机门锁定	动作
关闭	无效	未锁定	全部动作正常
	有效	而处于工作状态(机轴移动、主轴转动、MDI、计量器呈工作状态、手动脉冲发生器有效) (※4)	
开启	无效	未锁定	主轴旋转、送料装置转动、ATC、不能作攻丝动作。 (※1) 轴移动、主轴停止、主轴可定位。 (※2) 计量功能只有单一计量功能 MDI运转, 整个指令停止执行 不供应冷却液
	有效		所有动作停止 (※2) (※5) 不供应冷却液
关闭 ↓ 开启	无效		动作(包括主轴转动)立即停止 (※3) 立即停止供应冷却液
	有效		动作(包括主轴转动)立即停止 (※3) (※5) 立即停止供应冷却液
开启	无效 ↓ 有效		

- \*1. 快速递送的移动速度即变为机器参数的「高速移动速度(机门开启状态)」所设定的速度。

切削移动速度也受「高速移动速度(机门开启状态)」所设定的速度的限制  
(同样附加轴(A, B, C轴)的速度也受机器参数的「第4、5、6轴高速转动速度(机门开启状态)」速度的限制。

- \*2. 想使其动作时、即发生「\*门未关」故障。

- \*3. 丝锥、主轴定位、ATC、送料装置转动时，整个指令停止执行。主轴正在转动而机门开启后，发出「门开 主轴停转」故障，主轴停转。再关闭机门，重新起动后，回复主轴停止前的转动状态。

但在进行了下列操作后，「门开 主轴停转」故障消失，即使关闭机门，再次起动，仍不能回复到主轴停转前的状态。

- 1) 撤回复键
- 2) 用手动方式进行主轴操作

(注意)

在立铣刀丝锥的XY轴移动的同时主轴也在转动时，开启机门后，主轴会停止，但不会发生「门开 主轴停转」的故障。

此外，即使关闭机门再次起动，也不能回复主轴停转前的状态。  
再从R点进行切削移动时，主轴会自动转动。

- \*4. 机器工作状态

MDI、计量功能暂停、整个指令处于停止执行状态(程序结束时、不包括程序暂停)也包括在机器工作状态中。

- \*5. 机门连动器有效时，打开门，他全部机轴的随动马达。

在运转前关闭随动马达时，只须关闭机门即能复原，出现「\*机门未关」故障。

此时，如关闭机门或将机门连动器拨至无效，则随动马达开动，故障消失。

此时即使关闭机门，随动马达也不会起动，故障也不消失。(如不关闭机门或将机门连动器拨至无效，重按回复键，无法回复原状。)

但在运转中打开门出现「\*随动马达关闭」，「\*门开 主轴停转」故障(停机)。

此时即使关闭机门，随动马达也不会起动，故障也不消失。(如不关闭机门或将机门连动器拨至无效，重按回复键，无法回复原状。)

(此頁空白。)

# TC-S2A

# NC OPERATION

# MANUAL

**For Advanced Personnel**

Please read this manual carefully before starting operation.

**brother**  
®

This manual describes the NC-operation of the TC-S2A.

The tapping centre is able to perform drilling, tapping, and facing.

We shall not bear any responsibility for accidents caused by user's special handling or handling deviating from the generally recognized safe operation.

The relation between the manuals is as follows.

· **OPERATION MANUAL (For general operators)**

This manual describes the basic operations of the machine.

· **OPERATION MANUAL (For advanced personnel)**

This manual describes the advanced operations of the machine.

· **INSTALLATION MANUAL**

This manual describes the installation of the machine.

· **PROGRAMMING MANUAL**

This manual describes the programming of the machine.

Keep this manual for future reference.

Please include this manual when reselling this product.

When this manual or labels are lost or damaged, please replace them (charged) from your nearest agency.

## INTRODUCTION

Congratulations on your purchase of the Brother CNC tapping center. Correct usage of the machine is of most importance to assure the expected machine capabilities and functions as well as operators's safety. Read this Manual thoroughly before starting operation.

\* All rights reserved: No part of this manual may be reproduced, stored in a retrieval system, or transmitted in any form without prior permission of the manufacturer.

\* The contents of this Manual are subject to change without notice.

\* This manual are complied with utmost care. If you encounter any question or doubt, please contact your local dealer.

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# HOW TO USE THE MANUAL

**This Instruction Manual consists of the following elements:**

**(1) General description** ----- Is an outline of the description given in the section.

**(2) Alarm** ----- Is a alert given against a danger which may cause serious damage or death to human being or may damage the machine.

The hazards are explained in this order:

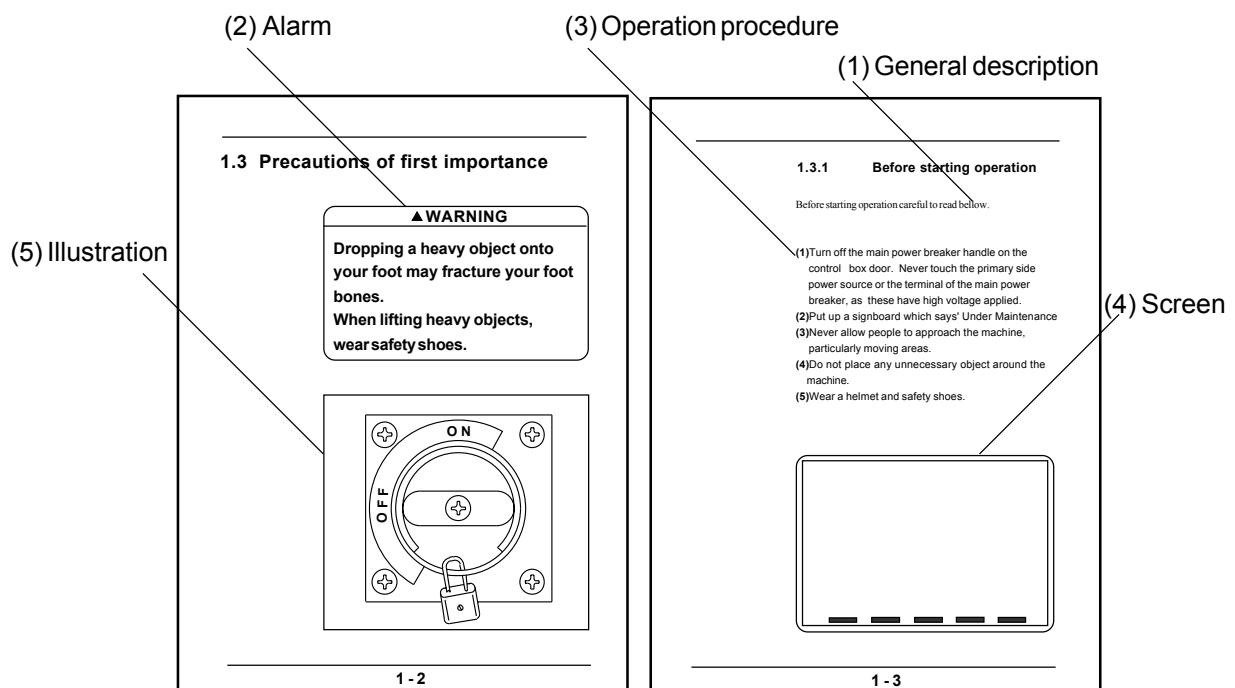
degree of danger,  
subject of danger,  
expected damage,  
preventive measure,

**(3) Operation procedure**---- Is a procedure of activating a function.

**(4) Screen** ----- Is given to describe important points of a procedure given.

NOTE: This screen is only a representation of the information displayed on the actual screen and therefore differs somewhat from the actual screen layout and screen fonts.

**(5) Illustration** ----- Is a sketch, figure, view, etc. indicating dimensions, position or zone, given in the points where it is necessary to provide complementary information to the text description.



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# CHAPTER 1

## GENERAL PRECAUTIONS

- 1.1 Precautions of First Importance**
- 1.2 Precautions on Safety**
- 1.3 Person Allowed for Operation**

## 1.1 Precautions of First Importance

### ⚠ WARNING

**Touching rotating tools results in injury.  
Keep away from rotating tools.**

### ⚠ WARNING

**You may be caught in the rotating part, resulting in an injury.  
Keep away from rotating tools, the spindle, and the ATC magazine.  
Wear snug-fitting clothes. Put long hair up in cap. Do not wear gloves except for set-up operations carried out with the machine stopped. Do not wear any accessories. Do not hold the rotating part.**

Take the following precautions in order to assure safe machine operation.

### 1.1.1 When feeding an axis

The table or spindle of the machine moves rapidly. Before starting an axis feed, make sure that there is no obstacle in the axis motion range and that there is no interference among tools, workpiece and jigs.

Never enter inside the splash guard during operation.

### 1.1.2 When indexing the magazine

The magazine rotates at a high speed.

Mount tools securely on the magazine.

Never enter inside the splash guard while the magazine rotates.

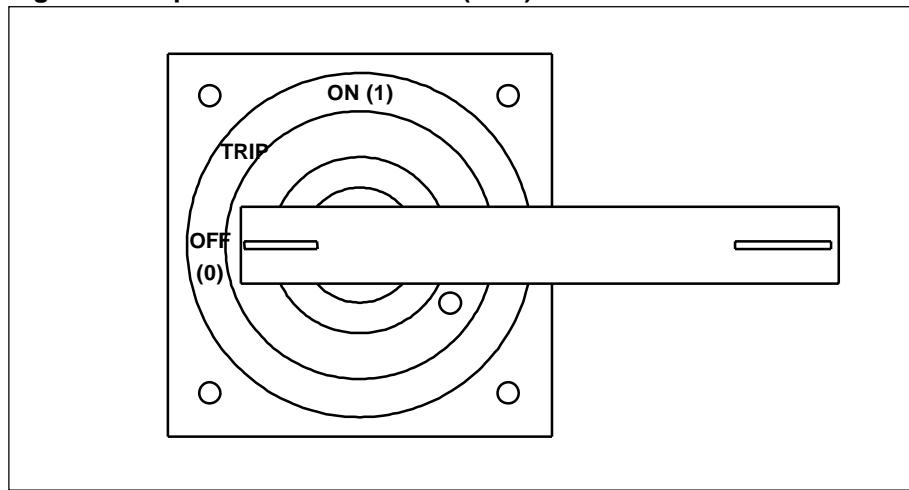
### 1.1.3 When performing an automatic operation

Before starting an operation make sure that both the control unit doors and the splash guard door are securely closed.

Never touch directly or indirectly any mobile parts during operation.

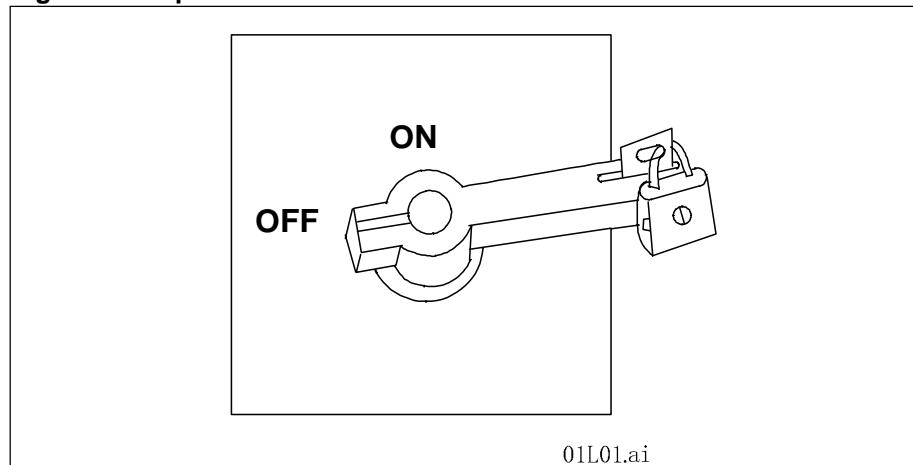
### 1.1.4 When performing a maintenance work or setup

When making an access to machine motion area, be sure to open the power supply circuitry with the handle of the main power breaker on the control panel.

**Fig.1-1 Main power breaker handle (OFF)**

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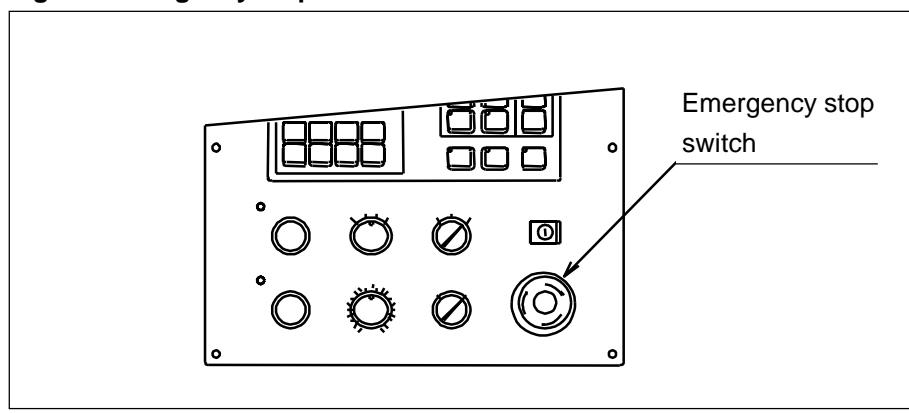
Lock the handle with a padlock.

**Fig.1-2 Main power breaker OFF lock**

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### 1.1.5 In case of machine trouble or danger

The EMERGENCY STOP switch, if pressed, stops on the spot all of machine motions. Press this pushbutton immediately when there is any indication of machine trouble or danger.

**Fig.1-3 Emergency stop switch**

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### 1.1.6 Operate the machine correctly

The machine is designed to process iron and aluminum workpieces by drilling, tapping, and facing. Operating the machine for purposes not mentioned in the manual or in a way that deviates from the general safety standards may result in an injury or machine failure. Operate the machine correctly.

## 1.2 Precautions on Safety

### ⚠ WARNING

**You may be injured due to broken tools or parts flung out.  
Close the work door and start machine operation.**

### ⚠ WARNING

**Hearing ability is reduced when ears are exposed to excessive noise for a long period of time.  
Use protection such as earplugs when working in a noisy environment.**

### ⚠ WARNING

**If you operate the machine without the workpiece secured, the workpiece may spring out, resulting injury.  
Secure the workpiece.**

### ⚠ WARNING

**You may have your eyes hurt if coolant splashes into your eyes.  
When adjusting the coolant nozzle, wear safety goggles.  
When coolant has splashed into your eyes, wash your eyes with clean water, and see a doctor.**

### ⚠ WARNING

**When machining workpiece using an oil type coolant, the machined part may heat up and catch fire.  
When using an oil type coolant, install a fire alarm and an automatic fire extinguisher.  
When machining the workpiece, an operator must attend the machine.**

**⚠ WARNING**

**When objects are hung on the emergency stop switch, the emergency stop switch may not be pressed.**

**Do not hang any objects on the emergency stop switch.**

**⚠ WARNING**

**If the splash guard side cover is not attached, you may be caught in the machine or injured due to broken tools.**

**Visually check that the side cover is attached before turning on the power. Report to the supervisor. The supervisor must instruct the operator to attach the side cover.**

**⚠ WARNING**

**If the control box or the operation panel are wet, you may get an electric shock. Do not sprinkle coolant, water, or chips on the control box and the operation panel.**

**Do not touch the control box with wet hands.**

**⚠ WARNING**

**If the power is turn on or workpieces are machined in an explosive atmosphere, an explosion may occur due to a spark from the machine.**

**Do not turn on the power of the machine, machine workpieces, or carry out set-up in an explosive atmosphere.**

These are the basic precautions to be taken to assure operation safety when handling the machine.

### 1.2.1 Before turning on the machine

- (1) Make sure that the control unit doors are closed and that no obstacle is around the machine.
- (2) Make sure that nobody is in and around the machine motion range.

### 1.2.2 Before starting an operation

- (1) Make sure that parts are sufficiently lubricated with grease (replenish grease to guideways and Ball screws every 6 monthes, and oil to Magazine chain).
- (2) Make sure that inside and around the machine are cleaned.
- (3) Make sure that no hand tool remains inside the machine.
- (4) Make sure that the tapers on spindle nose and tools are clean and without damage and that the tools are not worn.
- (5) Make sure that tools are securely set on the magazine and that pullstuds are not loosened.
- (6) Make sure that no object is hung on the EMERGENCY STOP button.
- (7) Make sure that the safety unit is mounted correctly.
- (8) Make sure that the safety unit operates correctly.
- (9) Make sure that the inner door is padlocked.

### 1.2.3 During an operation

- (1) When the door interlock function switch is off, the machine moves even if the work door is open.
- (2) Do not run the machine without splash guard and side cover and be sure to close its door when running the machine.
- (3) Move the table toward you before set-up.
- (4) After changing machine setup or when machining the first workpiece, check the machine motions with the part program to see if there is no interference between workpiece, jigs etc. and the machine.
- (5) Pay utmost attention to safety while the spindle rotates and an axis moves and while changing tools.
- (7) Do not put your hands inside the splash guard while the spindle rotates, do not put your hands on chips or workpiece and do not stop spindle rotation by hand or tool.
- (8) Wear safety shoes.
- (9) Wear ear plugs, or you may suffer from difficulties in hearing.
- (10) Do not put your hands or body under the spindle head.
- (11) Do not put your fingers between the ATC grip cover and the machine body.
- (12) Fix securely a workpiece and jig on the table.
- (13) When using oil type coolant, a fire may occur due to heat at the machining section. To conduct unmanned operation, install a fire detector and automatic extinguisher.
- (14) Coolant may splash into your eyes. Wear protective goggles.

### 1.2.4 If a machine trouble occurs during an operation

- (1) To activate an emergency stop, press the red EMERGENCY STOP switch provided on the operation panel.
- (2) Before taking measures, check and identify the cause of the trouble.
- (3) When 2 or more operators are working together, alert each other by voice.

### 1.2.5 When turning off the machine

- (1) Store the data displayed on the screen, if necessary.
- (2) Be sure to turn off the main power breaker before leaving it.

### 1.2.6 Other precautions

Do not allow the coolant to splash onto the spindle frange.

Do not allow water, oil, or chips to splash onto the control box and operation panel.

If the machine has been left idle for more than 3 days, be sure to warm it up for about 15 minutes before starting its operation.

Warming-up procedure

1. Spindle speed:

    Increase progressively

    speed: 500 rpm(min<sup>-1</sup>) → 1000 rpm(min<sup>-1</sup>) → max. speed

2. Feeding stroke:

    Full stroke on each axis

3. Perform tool change.

Stop the machine and turn off the main power breaker before cleaning the machine.

Do not use compressed air and washing gun to cleaning and removing cutting chips to the working part of a machine such as ball screws, guides, magazines, ATC, spindles, control unit and operation panel.

Do not touch switches by wet hand or soaked material.

If a tool is stuck with chips, be sure to stop the spindle first, then remove the chips.

Registered programs or data may be damaged due to hardware problems.

Record important programs and data on paper and store them.

## 1.3 Person Allowed for Operation

This manual is prepared for personnel who under take tapping centre operation.

1

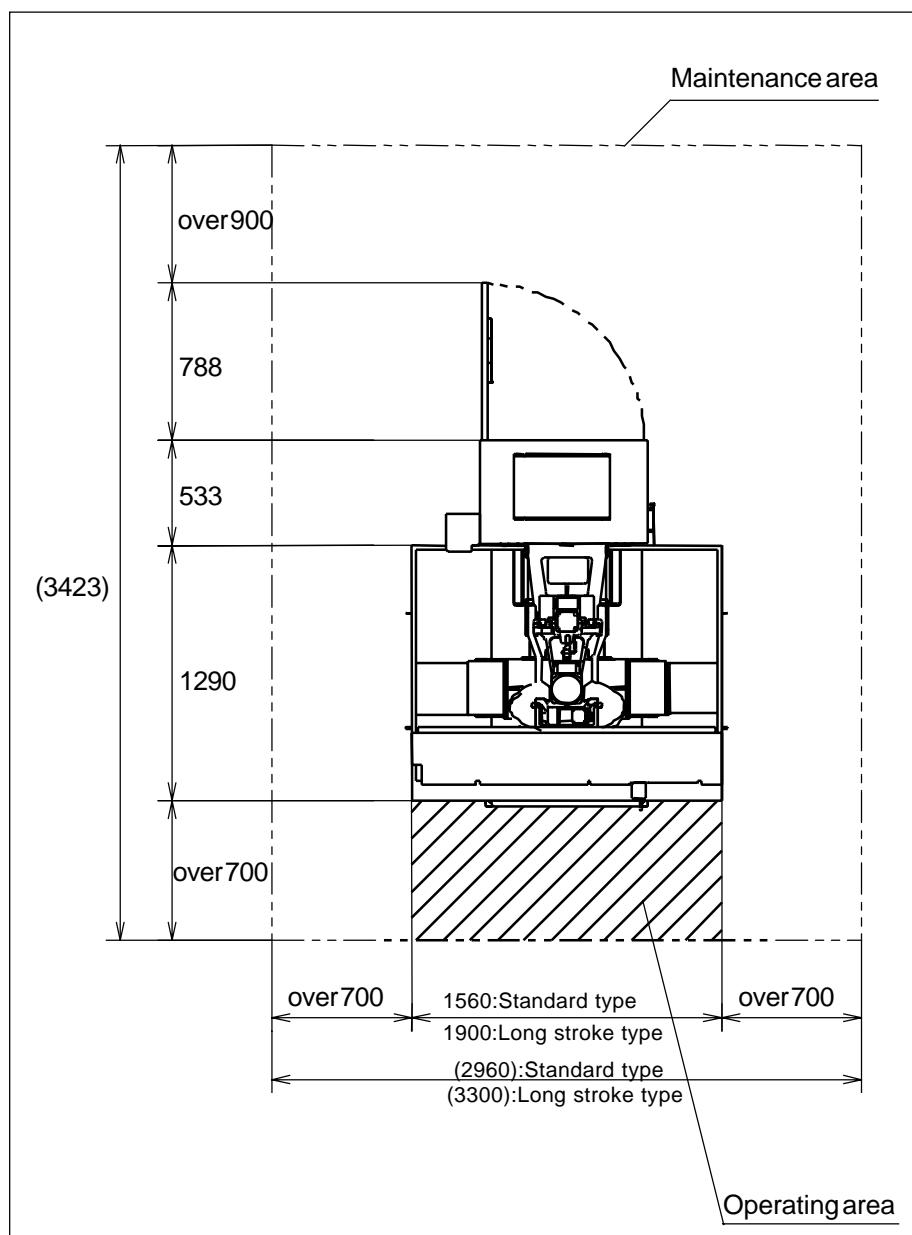
### 1.3.1 Operation Qualifications

Children cannot operate this device.

Only those who have completed compulsory training are allowed to operate the machine.

### 1.3.2 Working area

Secure the area shown in the drawing for machine operation.



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# CHAPTER 2

## GENERAL SYSTEM DESCRIPTION

- 2.1 Main Features**
- 2.2 Basic Configuration**
- 2.3 Table Size and Machining Volume**
- 2.4 CNC Unit Specifications**
- 2.5 Machining Capability**
- 2.6 Safety Devices**
- 2.7 Coolant**

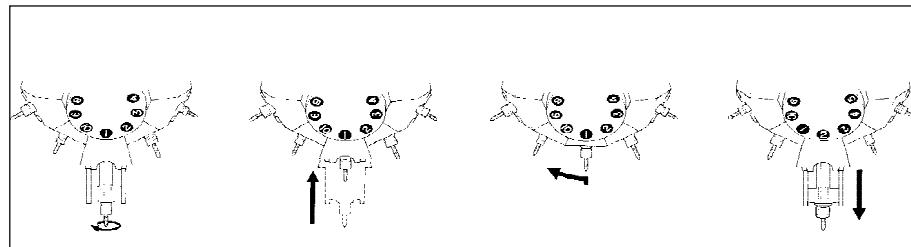
## 2.1 Main Features

2

This section describes the features of the tapping centre.

### 2.1.1 ATC (Automatic tool changer)

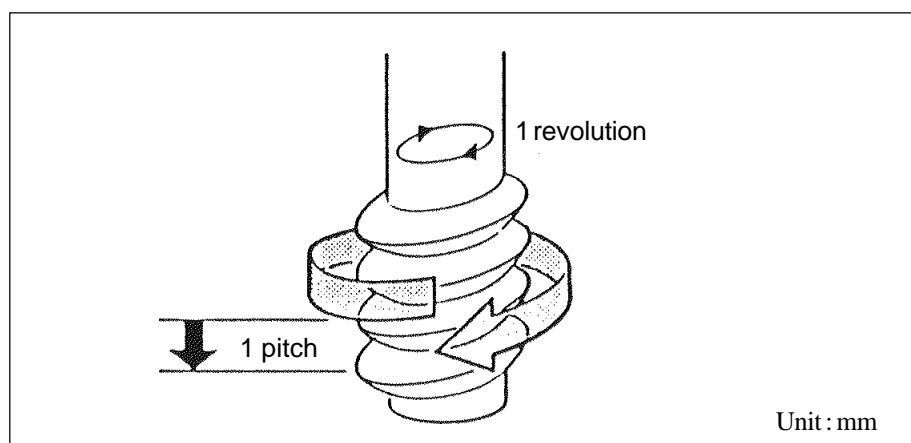
- (1) The unique armless mechanism allows simple and quick tool change, thus reducing non-cutting time.
- (2) The magazine rotates fast and takes the shorter way to reach the tool searched.
- (3) X- and Y-axis positionning, which is made while the magazine rotates, reduces non-cutting time.



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### 2.1.2 Tapping cycle

Fully synchronized control of spindle rotation and Z-axis feed makes use of a tapping holder unnecessary, therefore reduces unignorable air cut amount, that conventional tapping required, to such a level as a drilling requires.



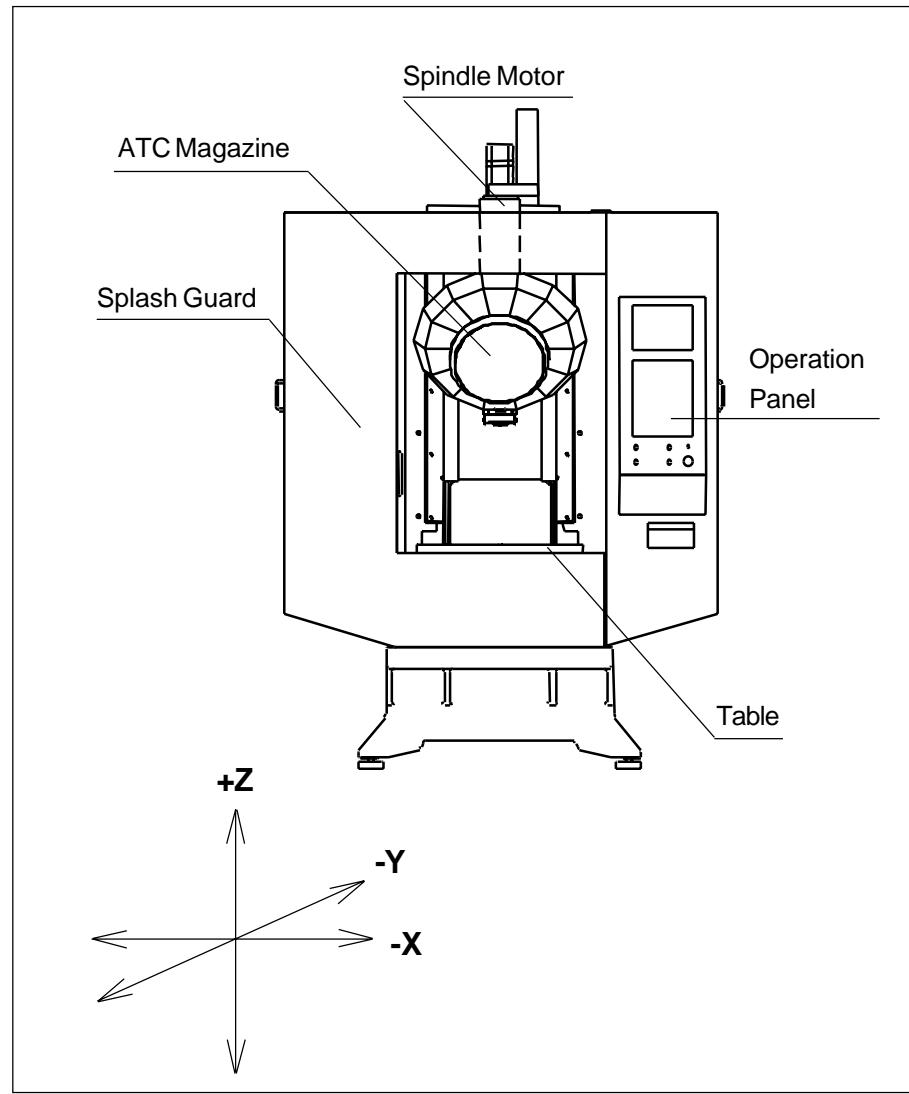
## 2.2 Basic Configuration

This section gives a description of the basic configuration of the machine.

### 2.2.1 Basic configuration

- 1 Vertical spindle head.
- 2 X and Y axes:Table traverse.
- 3 Z axis: Spindle head feed.
- 4 Shortest path random access mechanism and unique double arms ATC mechanism allowing quick tool change.
- 5 Integrated control unit on the back of the machine minimizing floor space required for installation.
- 6 X-, Y-, and Z-axis moving direction.

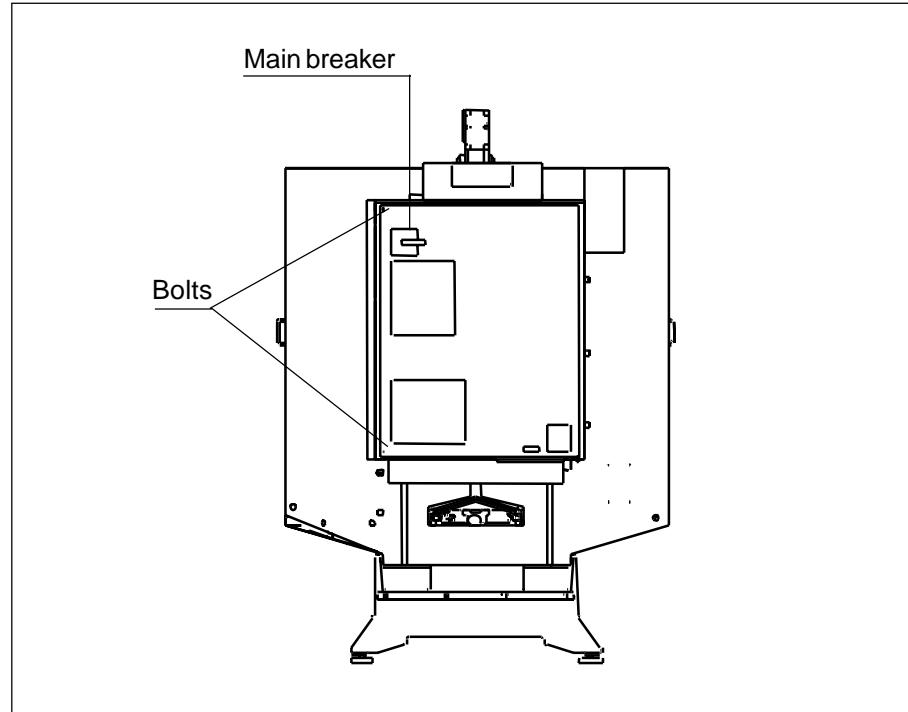
**Fig.2-3 Front view and parts of the machine**



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## 2.2.2 Machine rear

Fig.2-4 Rear view and parts of the machine

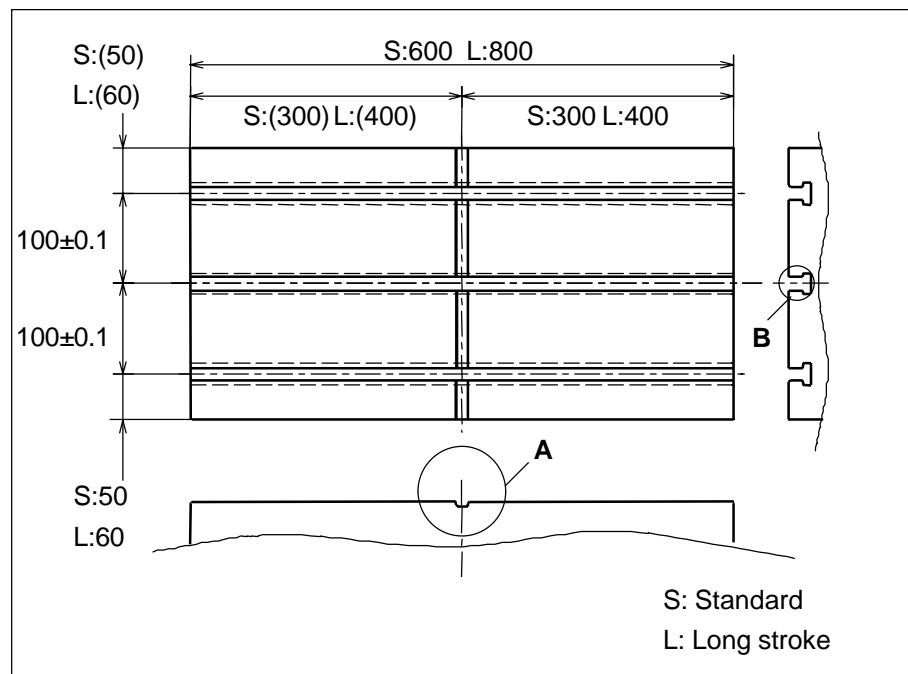


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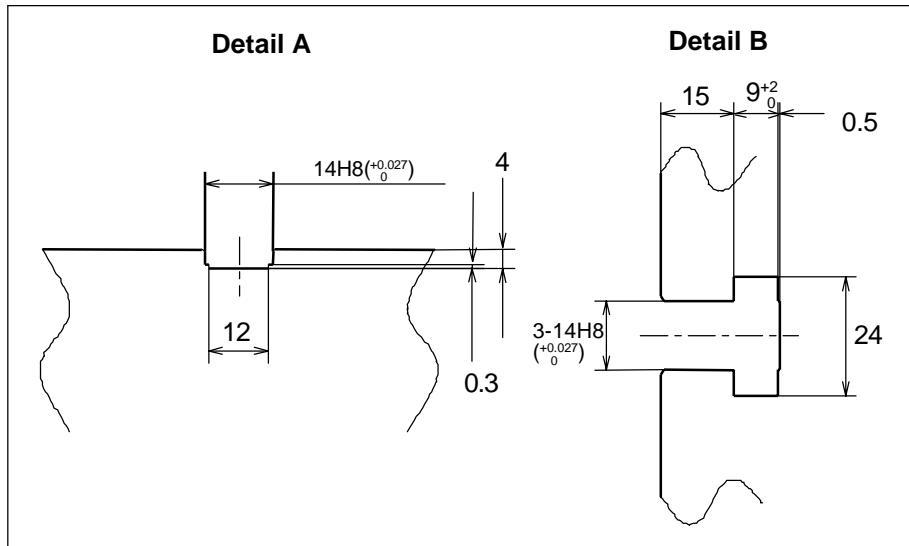
## 2.3 Table Size and Machining Volume

### 2.3.1 Table top surface dimensions

Fig.2-4 Table surface dimensions

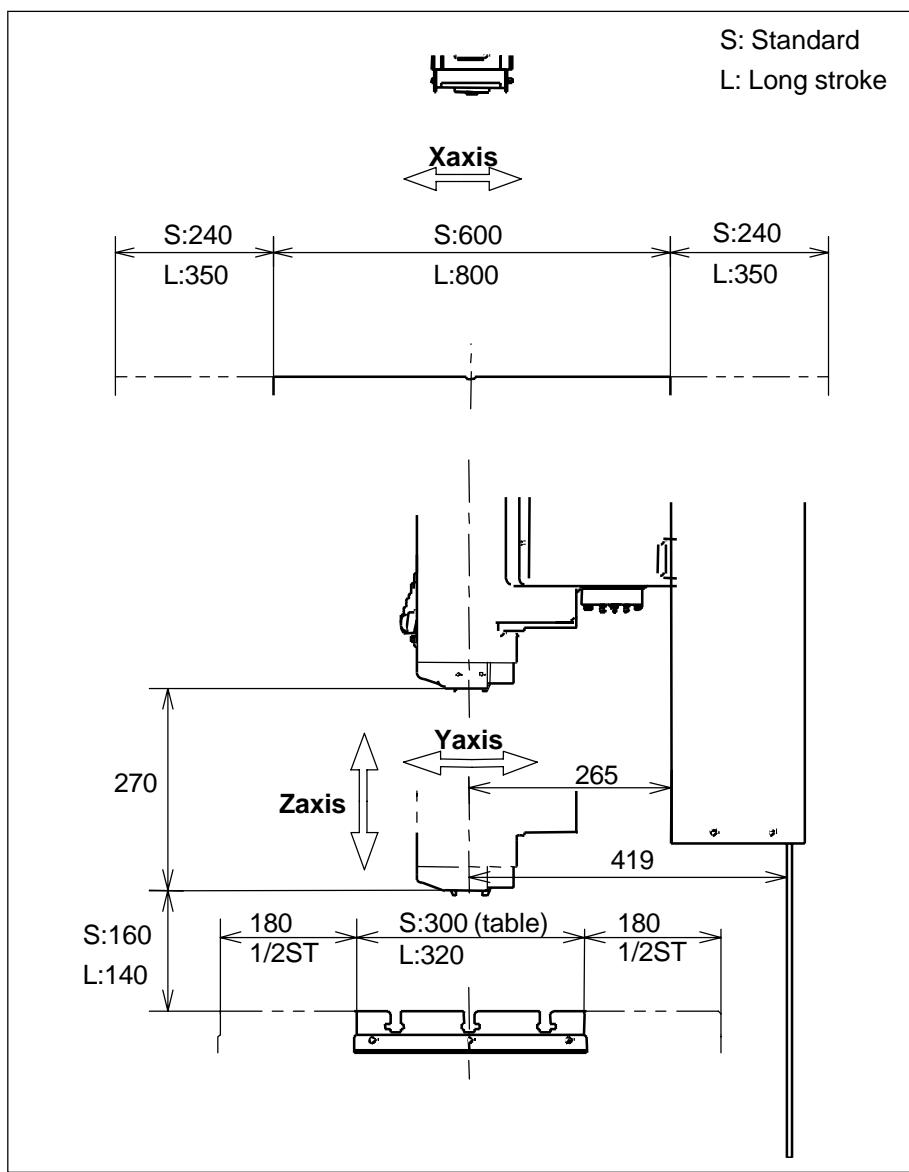


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### 2.3.2 Machining volume



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## 2.4 CNC Unit Specifications

Table 2-1 CNC unit specifications (1)

Function	Description
Controlled axes	6 axes (X, Y, Z, A, B and C axes)
Simultaneously controlled axes	X, Y, Z, A and B axes (during positionning) Positioning Linear: 3axis (X,Y,Z) For circular interpolation, simultaneous two axis (X, Y or Z) control.
Least input increment	0.001mm
Least command increment	0.001mm
Programming method	Absolute/Incremental programming (motion program)
Max. programmable value	±999.999mm
Display	10.4 inch LCD
Decimal point input	Available for data input
MDI	NC program data input via keyboard
Zero point return	Automatic zero point return by input via keyboard
Working zero point return	Automatic working zero point return by input via keyboard
Current position display	Display of current coordinates of each axis
Coordinate system setting	A coordinate system can be set in a specified position on X, Y and Z axes.
Stroke limit	Motion range can be set by parameter for each axis.
Emergency stop	All commands and machine motions are immediately stopped
Rapid traverse (In manual operation)	Axes move at 10%, 25%, 50%, 75% or 100% of the max. speed. Feedrate is clamped at 4000mm/min.
Cutting feedrate (In manual operation)	Axes move at a rate within the range from 50 to 4000mm/min.
Step feed (In manual operation)	Axes move by steps: 4 different steps within the range from 0.001mm to 1.0mm are available.
Feed hold	Axis feed is temporarily stopped. Pressing the START switch allows the stopped operation to resume.
Automatic acceleration/ deceleration	Axis motion is automatically accelerated or decelerated.
Synchronized tapping	Screw pitch is completely synchronized with 1 revolution of spindle.
Interpolation function	Linear and circular interpolations
Canned cycle	Boring, tapping and other operations are automatically executed in a fixed sequence.
Setting of machining start point	An operation can be started at a midpoint in a program.

**Table 2-2 CNC unit specifications (2)**

Function	Description
Pitch error compensation	Mechanical error resulting from screw feed on X, Y and Z axes is compensated. 50 points can be set at maximum at 20mm interval.
Dry run	Cutting feedrate is switched over rapid traverse for manual operation, allowing an easy program check.
Dwell	Memory operation is stopped for a specified time.
Backlash compensation	Lost motion caused in a mechanical system, within the range from 0 to 0.127mm, is compensated by pulses on each axis.
Tool length setting	Tool length measured on the machine is stored as tool list menu data.
Background programming	A program can be edited while a memory operation is performed.
Program number search	Any program stored in memory is called with 4-digit program number. (NC only)
Self-diagnosis alarm	CNC unit performs a various types of checks and, if a trouble is found, displays its status on the screen.
External program/data call	External program/data is transferred or deleted by External communication unit (option).
Restart	A program is repeated in memory mode.
Block skip	The block which contains slash (/) code is ignored when operation is executed. (NC only)
Optional stop	The program can be stopped at the M01 block. (NC only)
Machine lock	Program can be checked without moving the machine.
Conversational programming	Programming is made interactiveiy with menues. (conversation only )
Automatic spindle speed setting	Spindle speed is automatically determined according to workpiece material, cutting conditions and tool diameter. (conversation only )
Automatic tool selection	The tools necessary for a program given are automatically chosen from among the tools registered. (conversation only )
Scheduled program	Up to 99 programs are combined and consecutively executed. (conversation only )
Motion program	A motion sequence meeting customer's machining requirements can be registered. This sequence allows such a machining as conversational programs or data bank does not allow. (conversation only )

## 2.5 Machining Capability

**Type of tool, tool status, coolant conditions, environmental conditions and other factors largely affect the machining capability. Use therefore the following data for just your reference.**

2

**Table 2-3 Machining capability**

Machining	Condition	Unit	Material		
			Steel	Casting Iron	Aluminum
Drilling	Diameter	mm(in.)	23(0.91)	25(0.984)	25(0.984)
	Feedrate	mm/rev (in./rev)	0.1(0.004)	0.15(0.006)	0.2(0.008)
Tapping	Diameter	mm(in.)	16(0.63)	20(0.79)	24(0.944)
	Pitch	mm/rev (in./rev)	2.0(0.08)	2.5(0.098)	3(0.118)
Facing	Rate	cm <sup>3</sup> /min (in. <sup>3</sup> /min)	48(2.93)	69(4.21)	286(11.26)
	Depth of cut	mm(in.)	2.5(0.098)	3(0.118)	3.5(0.14)
	Feedrate	mm/min (in./min)	484(19.1)	573(22.6)	2040(80.3)

**Spindle 16000 min<sup>-1</sup>type**

Machining	Condition	Unit	Material		
			Steel	Casting Iron	Aluminum
Drilling	Diameter	mm(in.)	15(0.59)	16(0.63)	18(0.709)
	Feedrate	mm/rev (in./rev)	0.1(0.004)	0.15(0.006)	0.2(0.008)
Tapping	Diameter	mm(in.)	12(0.472)	14(0.551)	16(0.63)
	Pitch	mm/rev (in./rev)	1.75(0.069)	2(0.08)	2(0.08)
Facing	Rate	cm <sup>3</sup> /min (in. <sup>3</sup> /min)	39(1.535)	69(2.717)	204(8.031)
	Depth of cut	mm(in.)	2(0.08)	3(0.118)	2.5(0.098)
	Feedrate	mm/min (in./min)	485(19.1)	573(22.6)	2040(80.3)

## 2.6 Safety Devices

Tapping centre have several safety features for both operations and the machine.

2

### 2.6.1 Main safety devices

(1) Cover (splash guard)

Prevents chip splash during operation, therefore protects operators.

Do not perform machine operation with the protection cover removed.

(2) Door limit switch

Stops machine motion if the door is opened during an automatic operation and disables automatic operation while the door is open.

(3) Emergency stop switch

When pressed, stops on the spot all machine motions.

If there is an indication of machine trouble or danger, press immediately this pushbutton.

For the resetting method, refer to Feed Hold and Restart.

(4) Alarm message display

In case of machine error, the alarm message is displayed on the operation panel screen.

When multiple errors have occurred simultaneously, What is displayed here is the alarm message of first importance.

To make all alarm messages, press the [ALARM] key on the operation panel.

Up to 9 most important alarm messages are displayed.

## 2.7 Coolant

- (Caution1)** To select the proper coolant, ask the coolant dealer about the coolant's lubrication quality, corrosion prevention, bubbling prevention and safety.  
Do not use the chemical solution type coolant (synthetic type). This type has poor lubrication and will strip the machine's coating, possibly leading to machine damage.
- (Caution2)** Do not use any coolant that harden or swell the nitrile rubber (NBR) or fluorocarbon rubber.
- (Caution3)** Foul water soluble coolant causes a bad smell and environmental deterioration.  
It may also cause rusting which leads to machine damage.  
When coolant goes bad, stop using it and replace all the coolant with new coolant.

# CHAPTER 3

3

## OPERATION

- 3.1 Turning on the Power**
- 3.2 Turning off the Power**
- 3.3 Operation Panel Overview**
- 3.4 Screen Layout**
- 3.5 Switches**
- 3.6 Keys**
- 3.7 Cautions on Workpiece and Tool Setting**
- 3.8 Setting and Removing a Tool on and  
from the Magazine**

## 3.1 Turning on the Power

3

### ⚠ WARNING

**When chips scatter and get into the eyes, you may damage your eyeballs and lose your eyesight.  
Wear safety goggles against the chips.  
Do not blow the chips by air.**

### ⚠ WARNING

**If you touch chips with bare hands, you may have your hand cut or burnt.  
Do not touch chips with bare hands. Do not touch sharp edges of workpieces.  
Use a brush to remove chips.**

### ⚠ WARNING

**If coolant, oil, or chips are scattered, you may slip, fall down, or collide somewhere, resulting in an injury.  
Turn off the power of the machine, clean inside and the surroundings of the machine, and then start operation.**

### ⚠ WARNING

**If you forget to mount the maintenance cover, you may get caught in the machine, resulting in injury.  
Before turning on the power, visually check that the maintenance cover is mounted. If not mounted, report it to the supervisor.  
When removing the maintenance cover, turn off the main power breaker and padlock it so that the main power breaker cannot be turned on.  
The supervisor must instruct the operator to mount the maintenance cover.**

Following are the power-on procedure.

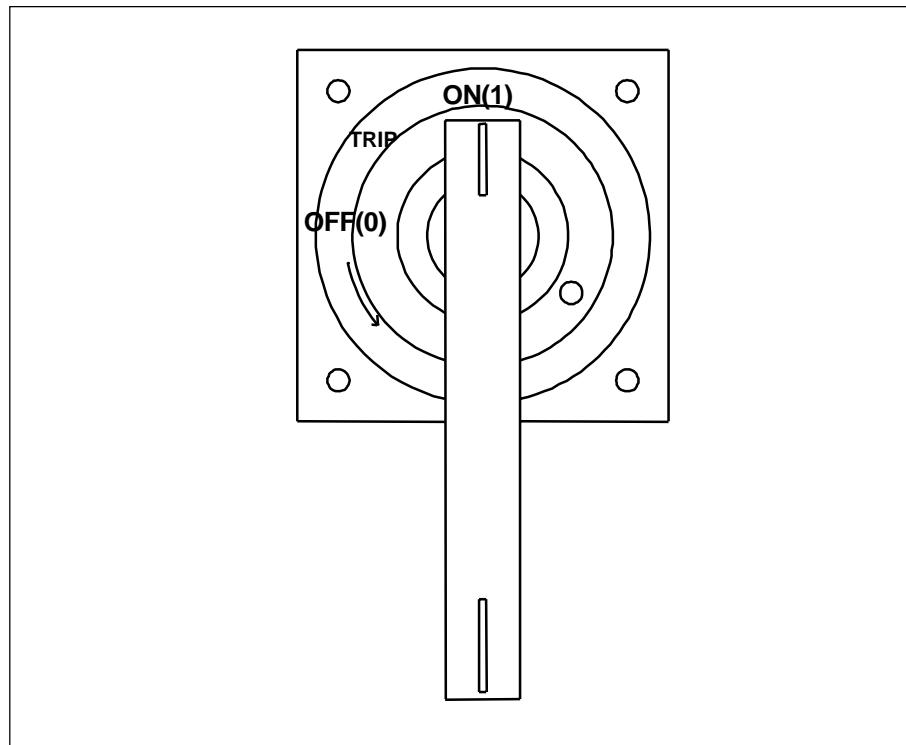
### 3.1.1 Preliminary checks

1. Check if the main power breaker handle operation panel is on OFF.
2. Check if the machine and its surroundings are free from obstacles.
3. Check if nothing is left on the table and saddle.
4. Check if the door of the CNC is firmly closed.
5. Check if the taper on the spindle nose is clean and without damaged.
6. Check if the taper of the tools are clean, without pitching and wear and if pullstud are securely tightened.
7. Check if tools are securely mounted in magazine grippers.
8. Check if no chip is left in the splash guard.
9. Check if no chip is left in the chip pan.
10. Check if oil level is with in the marks.
11. Check if coolant amount is sufficient.
12. Check if the air source for air blast unit is ready for operation.

### 3.1.2 Turning on the power

1. Plug the power supply cord firmly into the primary power supply receptacle and turn on the primary power supply.
2. Set the main breaker handle on the control unit to ON.
3. Make sure that the POWER lamp on the operation panel comes on.

**Fig. 3-1 Handle of the main power breaker set to ON position**



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- 4 Turn on the power supply to the operation panel. When the POWER switch is pressed, the green lamp comes on and the initial screen will appear on the display.  
At the same time, the fan of the CNC unit starts working and the X-, Y- and Z-axis motors are servo-locked.

When the power is once turned off, wait at least for 3 seconds before turning it on again.

When turning on the power to the CNC unit and operation panel, make sure that the fan on the CNC unit works.

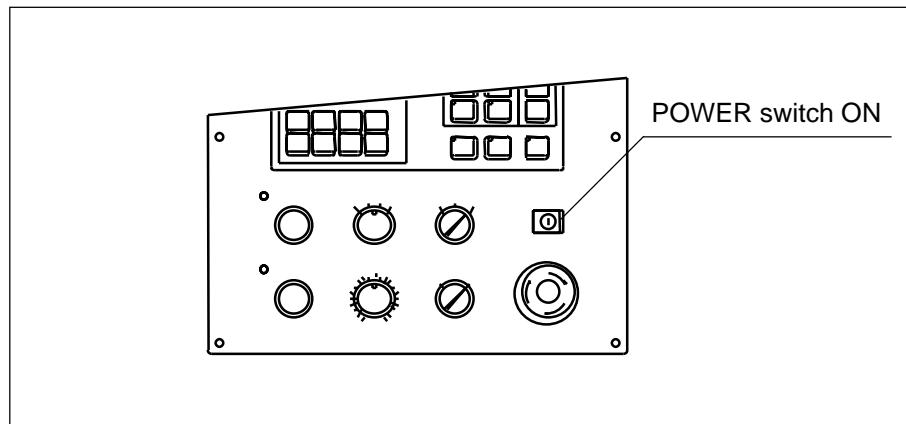
In certain cases, depending on machine status, the power-on screen may appear some 15 seconds after turning on the power. (POWER switch lamp blinks.)

3

#### Check items

- (1) If the magazine rotates smoothly and if tools are properly mounted are removed.
- (2) If the CNC unit and the cooling fan function proper.
- (3) If the spindle does not give off unusual noise.
- (4) If the spindle is properly oriented.

**Fig. 3-2 Turning on the power supply to the operation panel.**



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## 3.2 Turning off the Power

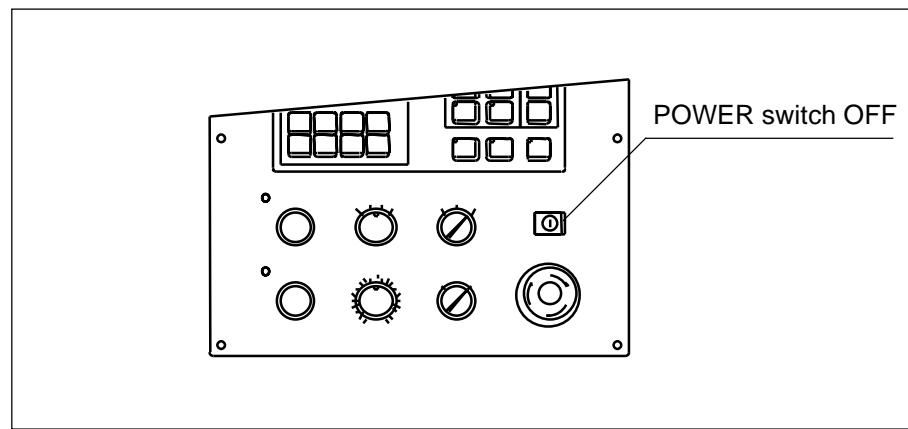
This section describes the power-off procedure.

### 3.2.1 Checks before turning off the power

- (1) Make sure that all the mobile parts are stopped.
- (2) Make sure that all the operations such as program edit, data modification, I/O from and to external equipments, have completed.

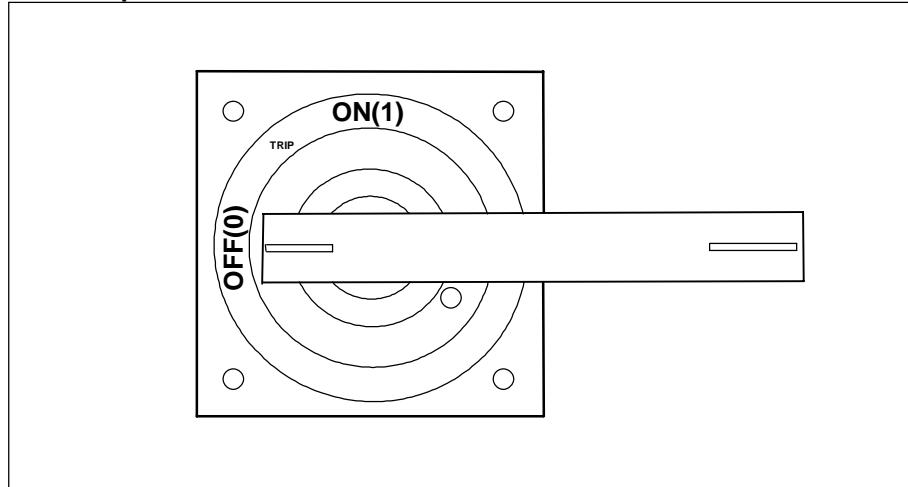
### 3.2.2 Turning off the power supply

- 1 When the POWER switch on the operation panel is pressed, the green lamp will go out and the screen on the EL display will disappear.

**Fig. 3-3 Turning off the power supply to the operation panel**

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- 2 Turn off the handle of the main power breaker on the control unit at the back of the machine.

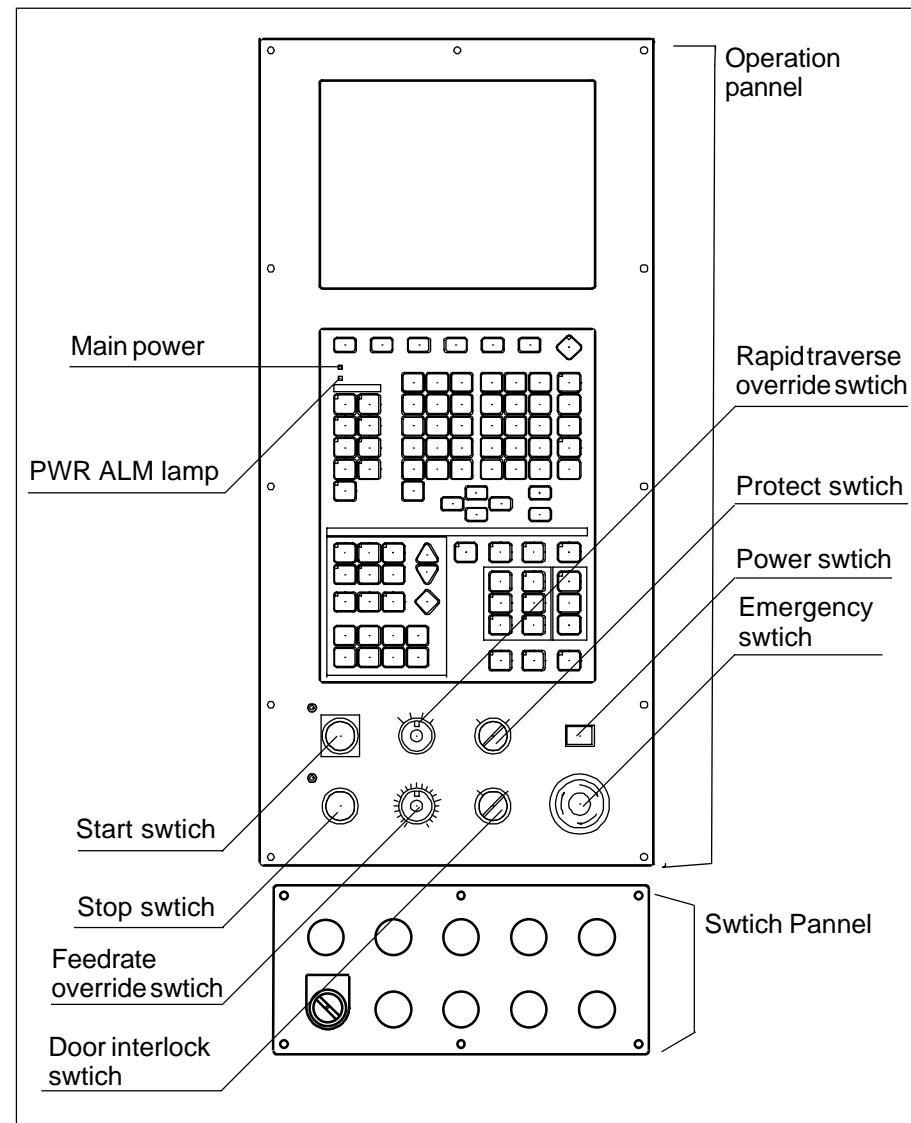
**Fig. 3-4 Handle of the main power breaker handle turned set to OFF position**

- 3 Unplug the power cord for machine from the primary power supply receptacle or turn off the switch board of the factory.  
In case the machine has stopped by a power failure, first turn off the main power breaker on the control unit and take the remedy.  
After taking the remedy, turn on again the power supply by following the procedure described in 3-1-2.

### 3.3 Operation Panel Overview

NC operation panel consists of an operation panel and model panel.

**Fig.3-5-1 Operation panel overview**

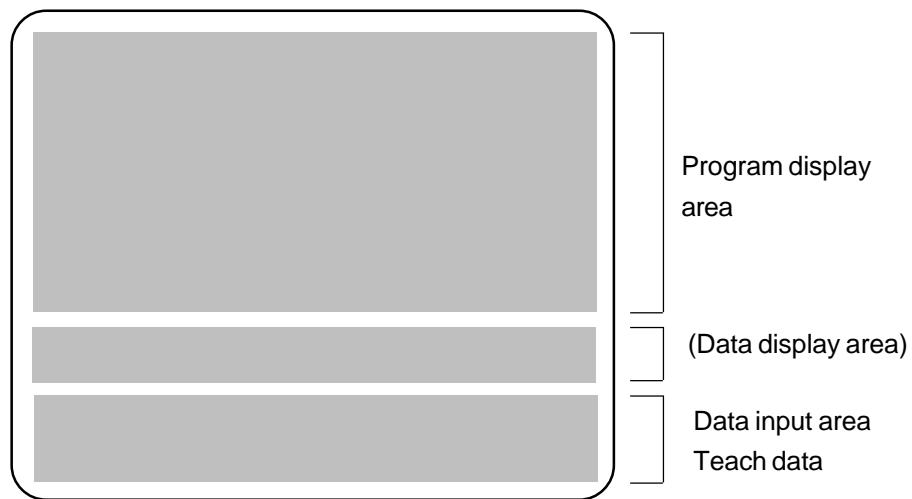


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## 3.4 Screen Layout

This section describes the screen layout and the information displayed on it.

**Fig. 3-6 Screen layout**



### Program (data) display area

Data and contents of a program, necessary for machine operation, are displayed.

### Data input area

When data is to be entered, this area will show what type of data should be entered: Enter the data required by the machine, with numerical keys or selecting an option of choice from among those displayed on the teach data area.

### Teach data area

This area shows options of choice for machine operations.

## 3.5 Switches

This section describes the function of the switches on the operation panel.

### (1) POWER switch

This switch turns on and off the machine. When the switch is pressed once, the power is turned on and its green lamp comes on. When the switch lit green is pressed, the power is turned off and the lamp goes out.

If the green lamp flashes when the power switch is pressed, this means that the continuous interval circuit for in-rush current is activated.

The interval circuit is generally activated when power is turned off and then on again within 15 seconds after power was turned on the first time, thus power may not be supplied immediately after the power switch is pressed.

**(2) START / HOLD switch****START**

This switch starts MDI operation or memory operation. Once operation is started, this lamp remains on until the operation is completed.

**HOLD**

This switch holds MDI operation or memory operation.

The lamp remains on while an operation remains stopped. This switch cannot stop spindle rotation. Also, this switch does not stop an ongoing machine operation before a tool change and tapping, if they are ongoing, are completed.

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**(3) PROTECT switch**

This switch enables and disables program input or edit, in other words, turns off and on program protection. Be sure to set this switch on OFF position unless a program is edited or memorized data undergoes modification, addition or deletion.

**PROGRAM**

MODEON... Protects memorized programs and data against alteration or deletion. Also disables mode switch (manual operation, MDI operation, memory operation and program edit).

OFF... Enables program edit and data input and modification.

PROGRAMON... Protects memorized programs and data against alteration or deletion. Enables however mode switch.

**(4) EMERGENCY switch**

This switch stops any machine motion in case of emergency or improper operation resulting from wrong data input. When pressed, it stops all the machine motions on the spot, with the message "EMERGENCY STOP" displayed on the screen. When the machine is turned on or off or in case of emergency stop, Z axis drops by about 0.5mm (this stroke depends more or less on the status of brake, guide, ball screw and machine). For resetting method, refer to Feed Hold and Restart.

**(5) DOOR INTERLOCK switch**

This switch is associated with the door interlock.

For further details, refer to the section describing the door interlock.

ON... Validates the door interlock.

OFF... Disvalidates the door interlock.

**(6) MAIN PWR lamp**

This comes on green when the main power breaker on the control unit is turned on. The lamp flashes when a voltage that may cause a POWER ALARM is being input. Immediately turn off the main power circuit breaker inside the control box.

**(7) PWR ALM lamp**

When this lamp comes on, the power supply is automatically turned off.

This lamp comes on red if the input voltage exceeds the rated voltage by more than 15%.

This lamp flashes when the voltage between the input voltage phase and ground is excessively high. Turn off the main power circuit breaker inside the control box.

**(8) RAPID TRAVERSE OVERRIDE switch**

Override is applied to the positioning speed.

Feedrate 1 to 3 can be set by User parameter (SWITCH 2).

**(9) FEEDRATE OVERRIDE switch**

Override is applied to machine feed from 0 to 200% in 21 steps of 10% increments.

**(10) NC LANG - CONV. switch**

Used to switch the program language to 'NC language' or 'Conversation.'

The selected program language is validated when power is turned off and then on again.

The desired program language cannot be validated even if the switch position is changed over when power is already on.

## 3.6 Keys

This section gives a functional description of the keys on the operation panel.

### (1) [RST] key

This key resets the control unit to its initial status:

Resets alarm status (resets any alarm with or without asterisk (\*) on the screen).

If pressed during data input, makes all the entered data invalid.

If pressed during a memory operation, stops immediately X, Y, Z, 4, 5, 6 axis motion and the spindle, except ongoing tool change or tapping, upon completion of which the switch stops the abovementioned operation.

### (2) [RELSE] key

This key releases magazine rotation error or ATC motion error.

### (3) [MANU] key

This key validates manual operation mode, which allows the following operations:

- \* Zero point return
- \* Single tool change
- \* Magazine rotation
- \* Rapid traverse
- \* Jog feedrate
- \* Step feedrate
- \* Spindle normal rotation and stop
- \* Manual pulse generator

### (4) [Z.RTN] key

This key returns X, Y, Z, 4, 5, 6 axes to the machine zero point in manual operation mode.

The machine coordinates after zero point return are as follows: X, Y, 4, 5, 6 axes: 0, Z axis: Z-axis zero point set with the Machine parameter (SYSTEM 1). 4- axis machine coordinates position is 0.000 and in this time pallet 1 is indexed to outside.

### (5) [P.IDX] key

Not use.

### (6) [ATC] key

This key executes tool change in manual operation mode.

Each time this key is pressed, Z-axis zero point return and spindle orientation, then Z-axis positioning to the ATC zero point, ATC rotation and finally positioning to Z-axis zero point are executed one by one.

### (7) [MAGZ] key

This key turn the magazine in manual operation mode.

Each time this key is pressed, the magazine rotates clockwise to the next index position.

**(8) [RPD] key**

This key feeds X, Y, Z , 4 , 5 , 6 axes either in + or - direction at rapid feedrate in manual operation mode.

The max. rapid feedrate can be overridden in the following 5 steps according to the setting of the Machine parameter (SYSTEM 1) : 10%, 25%, 50%, 75% and 100%.

The override is set at 10% when the power is turned on.

**(9) [JOG] key**

This key feeds X, Y, Z , 4 , 5 , 6 axes either in + or - direction at jog feedrate in manual operation mode.

Jog feedrate can be changed in the following 22 steps within the range from 50 to 4000mm/min.

Feedrate is set at 50mm/min when the power is turned on. C-axis is also set at 0.1 rpm.

**(10) [STEP] key**

This key feeds X, Y, Z , 4 , 5 , 6 axes either in + or - direction. Step by step (by the predetermined amount) in manual operation mode.

The increment per step of X, Y and Z axes can be changed in the following 4 steps : 0.001mm,0.01m,0.1mand1.0mm.

Increment is set at 0.001mm when the power is turned on.

The 4 , 5 , 6 axis can be turned in 11 steps ranging from 0.001° to 180.0°.

**(11) [S.CW] key**

This key turns the spindle in the normal direction.

It provides 24 steps within the range from 100 to 12000rpm(min<sup>-1</sup>).

Spindle speed is set 100rpm (min<sup>-1</sup>)for all models when the power is turned on.

Normal direction is referred to as right or clockwise viewed from the spindle top.

**(12) [S.STOP] key**

This key stops spindle rotation in manual operation mode.

**(13) [+] key**

This keys increases step by step the setting value of a rapid traverse, jog feedrate, step feed and spindle speed in manual operation mode.

**(14) [-] key**

This keys decreases step by step the setting value of a rapid traverse, jog feedrate, step feed and spindle speed in manual operation mode.

**(15) [+X], [-X], [+Y], [-Y], [+Z], [-Z], [+4], [-4] keys**

[+X] and [-X] keys are used to move the X axis ; [+Y] and [-Y] keys to move the Y axis ; [+Z] and [-Z] keys to move the Z axis ; [+4] and [-4] keys to move axes 4 , 5 and 6 in the + and - directions , respectively , in MANU (manual) mode.

**(16) [MDI] key**

This key validates MDI operation mode.

**(17) [MEM] key**

This key validates memory operation mode. Operation can be executed by calling a required program stored in the memory.

**(18) [SINGL] key**

This key runs motion by motion the program called in memory operation mode. When the lamp is off, a cycle operation is executed.

**(19) [DRY] key**

This key activates dry run for machine check.

In this mode, a rapid traverse and automatic tool change are executed as programmed, whereas cutting feed is executed at a high speed in manual operation mode.

The Z axis can operate in a higher position set by the dry run offset set by the User parameter(SWITCH 1).

**(20) [EDIT] key**

This key validates program edit mode

**(21) [E.STA] key**

This key has the following usages:

As start key for communication with external equipments during external program I/O.

This key has the following usages in conversation:

1. Automatic selection of the available tools from the tool menu during tool assignment
2. Automatic calculation of items marked with "?" during tool assignment

**(22) [POS] key**

This key provides display of current X-, Y-, Z-, 4, 5, 6, axis coordinates, remaining distance of each axis motion with respect to the target position, tool number list, tool name and tool length. Also provides display of current feedrate and spindle speed.

**(23) [MONITR] key**

This key is used to display or set the value for the product counter, communication monitor , and Z axis measurement data.

**(24) [MAGAZ] key**

This sets and displays the assignment of the magazine pot numbers for 99 tools registered on the tool menu in the data bank. This operation is available only in MDI operation mode. In other modes, only current tool name and its pot number can be displayed.

**(25) [ALARM] key**

This key provides display of all the current alarms on the screen: while only a typical alarm is displayed on the screen at once, up to 10 alarms, if any, can be displayed by pressing this key.

**(26) [PRGRM] key**

This key provides display of block operation screen in memory operation and MDI block operation for program edit.

**(27) [I/O] key**

This key provides display of machine control status during troubleshooting.

**(28) [MANU COND] key**

This key provides display of feedrate and spindle speed in manual operation mode:

Rapid traverse... 5 steps (10, 25, 50, 75 and 100%)

Cutting feedrate... 22 steps (50, 62, 77, 95, 115, 140, 170, 205, 245, 290, 340, 400, 500, 625, 700, 800, 1000, 1250, 1575, 2000, 3150 and 5000mm/min)

Step feedrate 4 steps... (0.001, 0.01, 0.1 and 1.0mm)

Spindle speed... 100, 125, 155, 190, 230, 280, 340, 410, 490, 580, 680, 800, 1000, 1250, 1400, 1600, 2000, 2500, 3150, 4000, 6000, 8000, 10000, 12000, 14000, 16000rpm(min<sup>-1</sup>)

**(29) [DATA BANK] key**

Change the screen to display the data necessary for operating the machine.

**(30) [CLEAR] key**

This key deletes the information displayed on the screen. Pressing one of the screen selection keys allows its screen to be displayed.

Screen selection keys:

- \* [POS] key
- \* [ALARM] key
- \* [PRGRM] key
- \* [I/O] key
- \* [DATA BANK] key
- \* [MANU COND] key

**(31) [CURSOR] key**

This key shifts the cursor to the previous input item.

**(32) [PAGE UP] key**

This key displays the previous page if a program or data lies on several pages.

**(33) [PAGE DOWN] key**

This key displays the next page if a program or data lies on several pages.

**(34) Numerical keys , Character keys**

Used to enter the data (numerical values).

Be sure to enter the decimal point when setting values such as length and angle.

Unless the decimal point is entered , the set value differs as below.

[1] [.] [ENT] -> 1.000

[1] [ENT] -> 0.001

**(35) [EOB/ENT] key**

This key sets the data in the data input area in the program display area.

Also used to input the end of block code (;) while inputting a program.

**(36) [CAN] key**

This key cancels the data in the data input area. The data for which the [EOB/ENT] key has been already pressed cannot be cancelled with this key.

**(37) [DEL] key**

This key deletes a data pointed by cursor in the program edit mode.

Data can be deleted through the editing function on the MDI screen.

**(38) [INS] key**

This key adds data to a program in the program edit mode.

Data can be added through the editing function on the MDI screen.

**(39) [EXTEND/SEARCH] key**

In NC language , edits programs such as copying each block , deleting , cursor jumping and searching for a character string.

In conversation , this key searches the required process number or subprogram number , etc.

**(40) [SHIFT] key**

This key changes character set , while pressing this key press another key to enter the upper character of the key top.

**(41) [F0] to [F4] keys**

Various functions keys (Contents of these keys vary according to each screen)

Details of each function are displayed on the screen when required.

**(42) [OP.STP] key (NC only)**

Stop the program when a block contains the M01 command.

**(43) [M. LCK] key**

Executes the program without operating the machine. This function is used for checking the program contents.

Also, forbids the Spindle, Tool change, and M code functions.

**(44) [B.SKp] key (NC only)**

Ignores the commands in all the blocks containing a slash (/).

**(45) [TL. LNG] key (Conversation only)**

This key allows automatic measurement and input of length of a tool mounted in the spindle while editing the data in the tool menu.

**(46) [Z. WRK] key (Conversation only)**

This key, if pressed during machining data edit, sets current X, Y, Z, A and B-axis coordinates as working zero point.

**(47) [TL. CHK] key (Conversation only)**

This key checks, if tooling is modified or changed by forced assignment, to see if the newly adopted tools allow a machining as programmed by the data.

**(48) [?] keys (Conversation only)**

This allows data input if position, length or angle is unknown in contouring or chamfering.

**(49) [CLT. P]key**

This switch turns the pump on and off.

When this switch is set on OFF, no coolant is available even if coolant supply is commanded in MDI or memory operation.

The switch may automatically turn off depending on the setting for [AUTOMATIC COOLANT OFF TIME] (user parameter - switch 1). See the data bank for details.

Press once Turns on the coolant pump and the lamp.

Press again Turns off the coolant pump and the lamp.

**(50) [ LIGHT] key (option)**

This switch is associated with the machine light (option). On a standard machine, this location is fitted with a blind plug.

For further details, refer to the section describing the machine light.

The switch may automatically turn off depending on the setting for [AUTOMATIC MACHINE LIGHT OFF TIME] (user parameter -switch 1).

See the data bank for details.

Press once The machine lamp comes on.

Press again The machine lamp goes out.

**(51) [CHP.F] key (option)**

This switch is associated with the coolant unit equipped with a chip flow (option).

Press once Delivers M400 signal, starts the chip flow motor and lights the lamp.

Press again Turns off the chip flow motor and the lamp.

## 3.7 Cautions on Workpiece and Tool Setting

### ⚠ WARNING

If you grip the tool blade, you may cut your hand.  
Do not touch the edge of the tool. Always hold the shank of the tool.

3

### ⚠ WARNING

If you operate the machine without the workpiece secured, the workpiece may spring out, resulting in injury.  
Secure the workpiece.

### ⚠ WARNING

The milling inserts may come off the tool, resulting in serious injury.  
Firmly secure the milling inserts tip on tools. Check that the milling inserts is secured before mounting the tool to the machine.

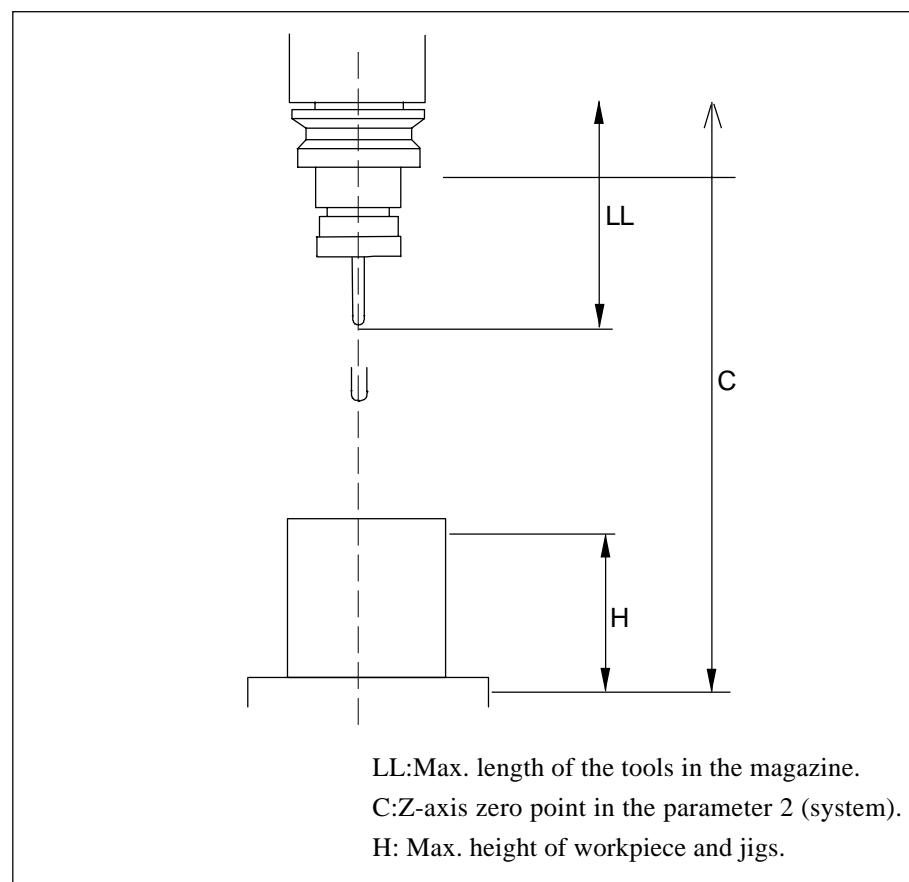
Workpieces and tools to be mounted are subject to certain dimensional limitations such as workpiece and jig height, tool length, tool holder setting.  
Check these limitations following the procedure below before setting a workpiece or tool.

### 3.7.1 Limitation on work piece and jig height and tool length

Before setting a workpiece on the machine, make sure that there is no interference between tools, workpiece and during a tool change, with the following formula.

Apply the dimensions of a workpiece to be used to LL, C and H in the figure below.

Fig.3-7 Limitation on a work piece and jig height and tool length



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IF  $H \leq C-LL-50$  mm

↓

NO interference

Mount the work piece

IF  $H > C-LL-10$  mm

↓

Interference may occur

Depending on magazine rotation direction, tool mounting position or machining order, a tool may interfere with work piece or jigs. Check the interference before mounting the workpiece.

### 3.7.2 Limitation of tool holder

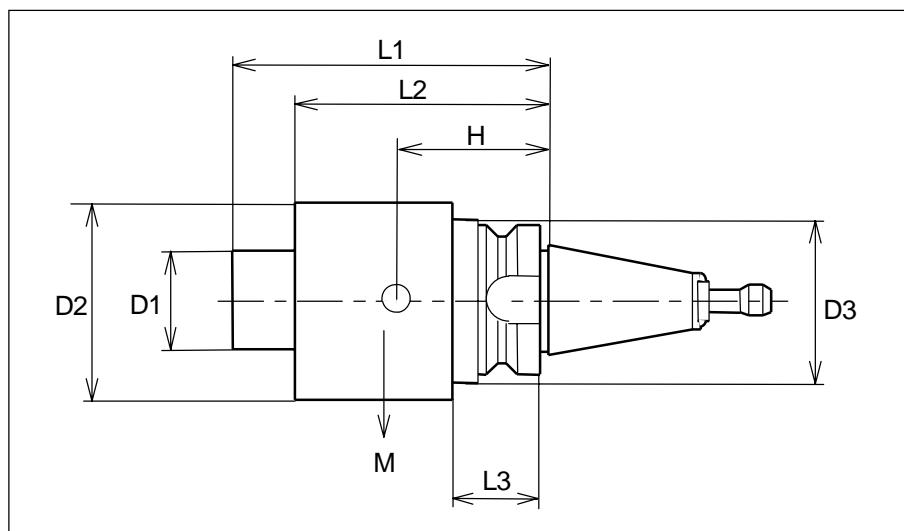
**Caution: Using a tool while exceeding the limitations of tool holder, tool balance or spindle speed may damage the machine. Incorrect selection of a standard tool and large tool will damage the machine.**

(1) Tool dimensional limitations and spindle speed

Limitations of spindle speed vary depending on the tool, as shown below. Set the tool so that the requirements are met. If not, decrease the spindle speed.

M: Overall tool mass(kg)

H: Distance from gauge line to center of gravity of entire tool



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Spindle Taper	7/24 No.30	
Tool Shank	MAS - BT30	
Retention Knob	MAS - P30T-2 (30°)	
Limitation of Tool	$D_1 \leq 40\text{mm}$ $L_1 \leq 200\text{mm}$ $D_2 \leq 80\text{mm}$ $L_2 \leq 160\text{mm}$ $D_3 \leq 46\text{mm}$ $L_3 \geq 30\text{mm}$ $M \leq 3\text{kg}$ $M \times H \leq 180\text{Kgmm}$	$D_1 \leq 40\text{mm}$ $L_1 \leq 200\text{mm}$ $D_2 \leq 55\text{mm}$ $L_2 \leq 160\text{mm}$ $D_3 \leq 46\text{mm}$ $L_3 \geq 30\text{mm}$ $M \leq 2\text{kg}$ $M \times H \leq 100\text{Kgmm}$
Limitation of Tool Balance	100grmm	50grmm
Limitation of Spindle Rotation Speed	$10000\text{min}^{-1}$	$16000\text{min}^{-1}$
Total in Magazine	$M_{\text{total}} \leq 25\text{Kg}$	

## (2) Balance of tool holder

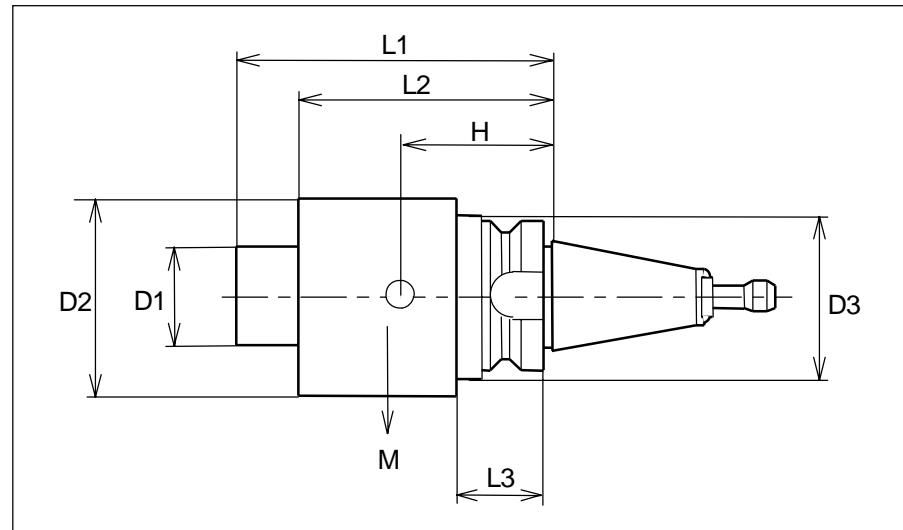
**Caution****Using poorly balanced tools may damage the spindle.****Always use well balanced tools.**

Use the tool and tool holder symmetric to the spindle rotation center.

Pay particular attention to the tool balance because the spindle rotates at high speed.

Using poorly balanced tools may damage the spindle.

3



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Consult BROTHER or the nearest dealer authorized by BROTHER for further information on tool balance.

Tool holders made by UKIWA (BT30\*-DMC\*\*-\*\*HS) are recommended as tool holders with good balance.

Refer '(1) Tool dimensional limitations and spindle' and set the tool so that the requirements are met. Using an incorrect tool holder may cause the tool holder to detach from the spindle, resulting in machine damage.

## 3.8 Setting and Removing a Tool on and From the Magazine

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### ⚠ WARNING

If you put your finger in the clearance of the machine, you may have your finger caught, resulting in an injury.  
Do not put your finger in the clearance of the grip cover.  
Do not put the finger in the clearance between the tool or the tool holder and the ATC magazine.

### ⚠ WARNING

When attaching and detaching tools, you may cut your hand on the edge of a tool or hit your hand against the machine.  
Do not hold the edge of the tool. Wear leather gloves.  
Hold the tool with both hands.

### ⚠ WARNING

Tools whose weight and size exceed the specified limit may spring out while being used.  
Use tools whose weight and size are within the specified limit.  
For the limit of the tools, see the tool label attached on the machine.

### ⚠ WARNING

If the ATC magazine rotates, tools may hit machined workpieces, jigs, or the machine, and may be broken.  
Set the tool length so that the tools do not contact machined workpieces, jigs, or the machine even if the ATC magazine rotates.

To remove the tool, use the leather gloves.

Be careful not to hold the tool blade.

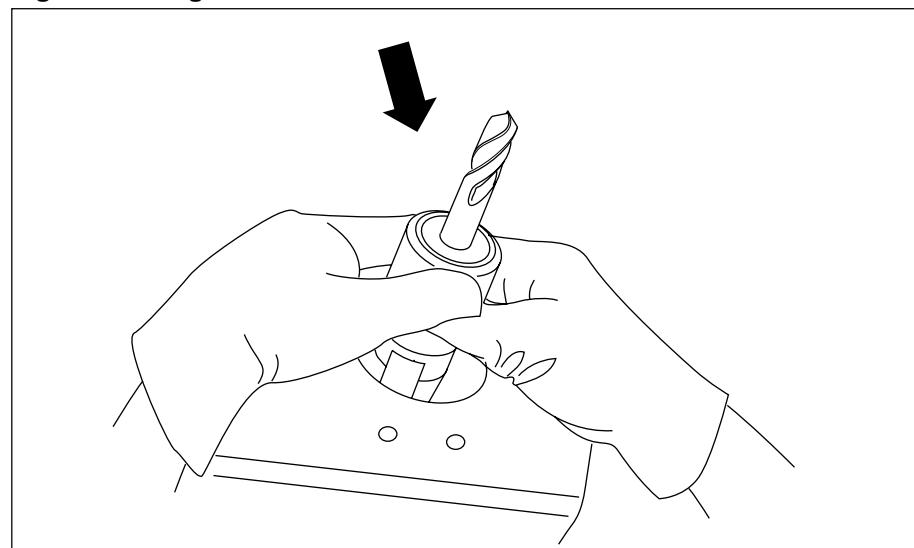
Incorrect tool attachment may cause the tool to drop or to be damaged.

### 3.8.1 Setting a tool on magazine

1. Press the [MANU] key to select manual mode.
2. Press the [SINGL MAGZ] key : Z axis moves up to the machine zero point and the spindle is oriented.
3. Press again [SINGL MAGZ] key : Z axis moves to the ATC zero point
4. Press [ATC] key : the magazine rotates.  
Replace the position.
5. Set the tool on the magazine. When mounting a tool on the magazine, fit the gripper key into the keyway of a tool holder and the gripper pin into the V groove of the tool holder, push the tool to the bottom of the gripper and clamp this tool.  
When tool mounting is completed, press [SINGL MAGZ] key to set Z axis at the machine zero point.

To allow the magazine well balanced, mount tools of roughly same weight on each facing grippers.

**Fig. 3-9 Setting a tool**

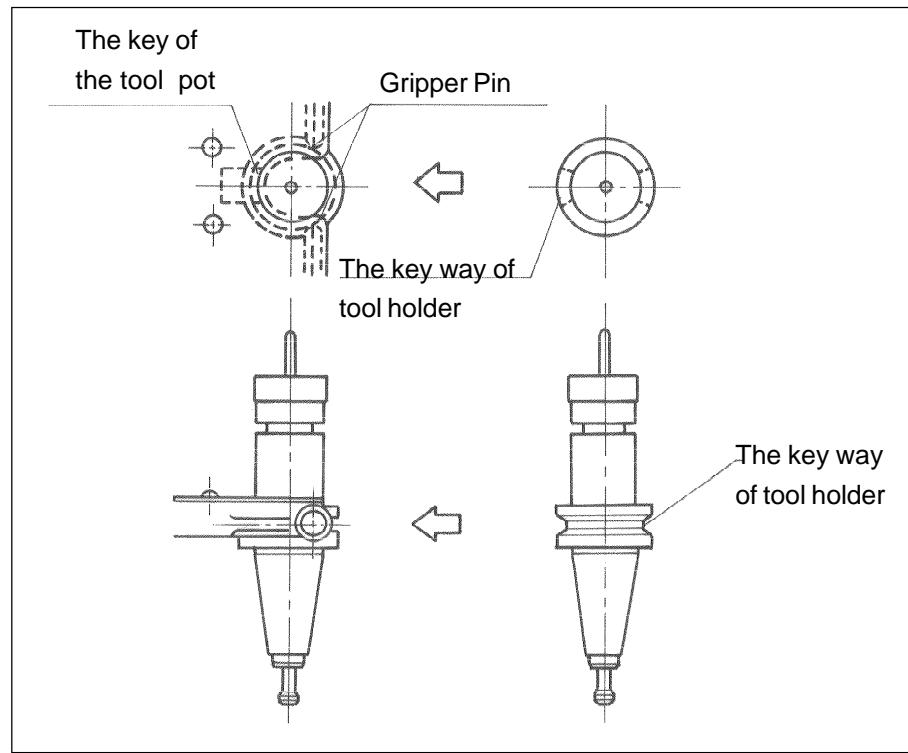


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To allow the magazine well balanced, mount tools of roughly same weight on each facing pots.

**<EXAMPLE> Tool storage capacity 14 pieces**

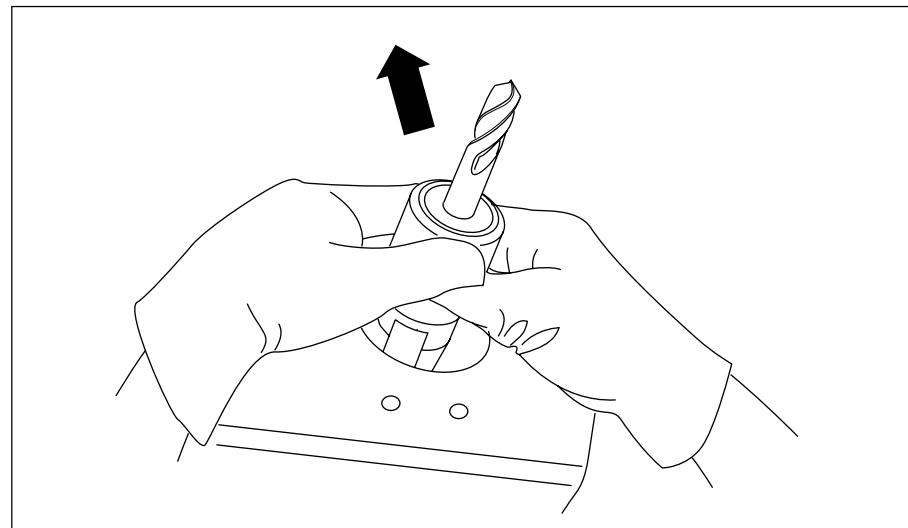
Magazine pot Number	Tool Weight	Magazine Pot Number	Tool Weight (kg)
1	3.0	8	3.0
2	3.0	9	3.0
3	2.5	10	2.5
4	1.0	11	1.0
5	1.0	12	1.0
6	0.5	13	0.5
7	1.0	14	1.0
Total			24.0

**Fig. 3-10 Pot and Tool holder**

230S00C08.doc

### 3.8.2 Removing a tool from the magazine

1. Move the magazine number to which the tool is mounted to the replacement position. For magazine rotation, refer to Setting a tool on the magazine.
2. Remove the tool from the magazine.  
To remove a tool from the machine withdraw tool holder in the direction of the arrow as shown in the figure.

**Fig. 3-11 Removing a tool**

59.pm6

# CHAPTER 4

## SCREEN DISPLAY

4

- 4.1 Position screen**
- 4.2 Program display**
- 4.3 Conditions of manual operation**
- 4.4 Magazine**
- 4.5 Alarm display**
- 4.6 Production monitor display**
- 4.7 Data bank**
- 4.8 Erasing screen**

## 4.1 Position screen

### 4.1.1 Present position screen

The present position of each axis, spindle load meter, feed rate, and spindle speed during operation can be displayed on the screen.

Pressing the [POS] key displays the present position screen as shown below:

#### Double-arm ATC display

( P R O G R A M 3 0 0 0 )		P R E S E N T P O S	
M A C H I N E	P O S	R E S I D U A L	M O V E M E N T
X	- 2 6 0 . 7 7 7	X	0 . 7 7 7
Y	- 2 7 1 . 1 9 8	Y	1 . 1 9 8
Z	2 9 8 . 0 0 0	Z	0 . 0 0 0
C	0 . 0 0 0	C	0 . 0 0 0
A 1		A 1	
B 2		B 2	
A B S O L	P O S	S P I N D L E	L O A D M E T E R
X	3 9 . 2 2 3		
Y	4 8 . 8 0 2	0 %	1 0 0 %
Z	4 8 . 0 0 0 ( H 0 1 )	M A G A Z I N E	
C	0 . 0 0 0	T O O L N O .	0 1
A 1		N E X T T O O L N O .	0 3
B 2		P O T N O .	0 2
C U T T I N G			
F E E D R . 4 7 6 m m / m i n			
S . S P E E D 1 8 3 m i n - 1			
I N N R	P L T N O . 2	P R E V I O U S P A G E	: E N L A R G E M E N T
		N E X T P A G E	: M O D A L
<input type="button" value="F0"/> <input type="button" value="F1"/> <input type="button" value="F2"/> <input type="button" value="F3"/> <input type="button" value="F4"/>			

### DISPLAY OF PROGRAM NUMBER

When the present position is displayed during memory operation, the program No. currently executed can be checked. The previous program No. is displayed after the operation is finished and before the new program is started.

### MACHINE COORDINATES

The X and Y positions are indicated based on the distance from the machine zero point. The Z position is indicated based on the distance between the table top surface and spindle nose.

### ABSOLUTE COORDINATES

The position from the workpiece zero point which is set as required. When the Z absolute coordinates is displayed in consideration of the tool length, the tool length offset No. is displayed.

### RESIDUAL MOVEMENT AMOUNT

Residual movement (which is not executed yet) of the movement command value in the memory or MDI operation is displayed.

### FEEDRATE

The feedrate executed in the memory or MDI operation is displayed. When the movement in execution is for positioning, the message "POSTNG" is displayed. The display is available only while the movement is in execution.

### SPINDLE SPEED

The spindle speed in execution in the memory, MDI or manual operation mode is displayed.

### SPINDLE LOAD METER

Displays the spindle load. (One graduation is 10 %, max.150 %).

### MAGAZINE

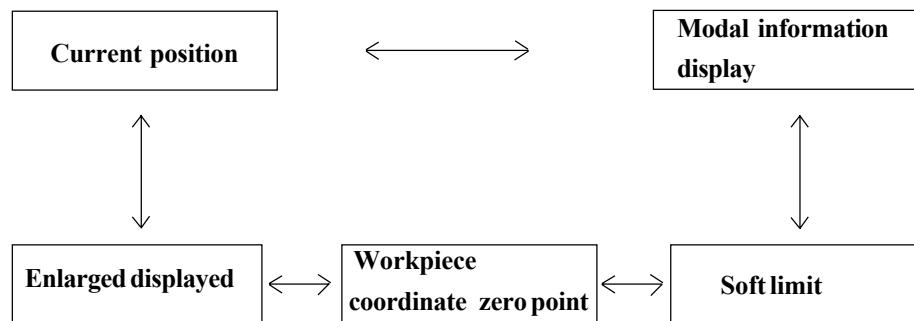
The display for [MAGAZINE] differs depending on the ATC mechanism. The display for models with a double-arm ATC (TC-31A, 22A, 32A, 20A) is shown in Screen 1, and that for other models is shown below.

M A G A Z I N E	T O O L	N O . 0 1
M A G A Z I N E		N O . 0 2

### INNER PALLET

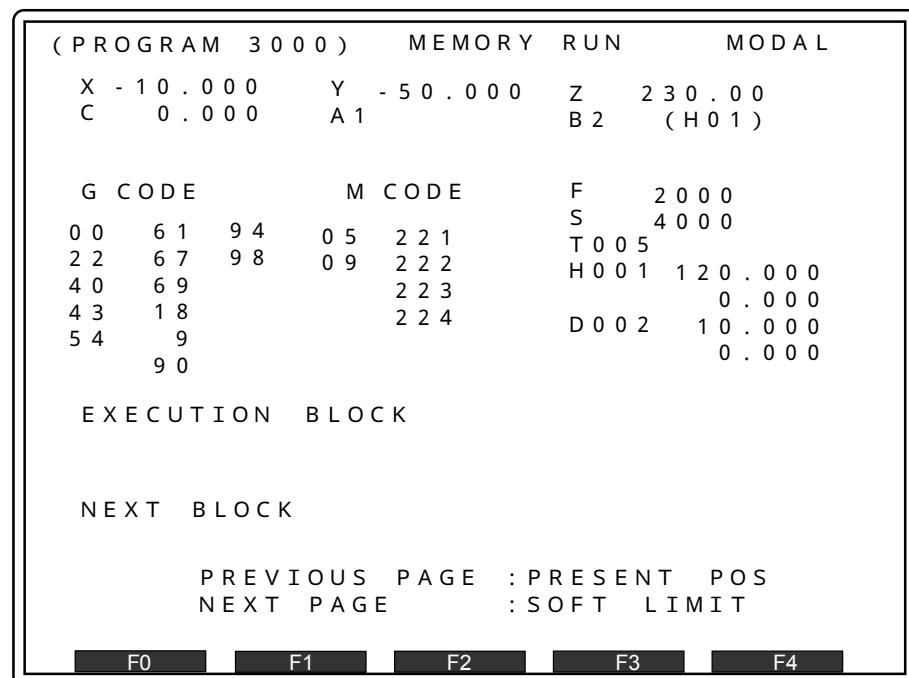
The [INNR PLT] (inner pallet) is only displayed for models equipped with a quick table. It is not displayed for other models.

The screen changes in the following sequence by pressing the page keys.



## 4

#### 4.1.2 Screen of modal information



The following items are displayed on this screen.

Abusolute coordinates X, Y, Z, 4, 5, 6.

Modal values of the G and M codes

Command values of F, S, T, H and D

Block in execution and the next block

When the Z absolute coordinates is displayed in consideration of the tool length, the tool length offset No. is displayed.

### Modal information

The block in execution and the next block are as shown below according to the NC status.

	NC status	Execution block	Next block
M D I	Reset	Nothing	MDI edit area
	Hold	Execution block	MDI edit area
	Block stop	Execution block	MDI edit area
	Operation	Execution block	MDI edit area
M E M	Reset	Nothing	Top block
	Hold	Execution block	Next block
	Block stop	Nothing	Next block
	Operation	Execution block	Next block

**(Note 1) When a block stop comes at the intermediate point of more than 1 block (G28, G100, etc.) by a one-block command, the display becomes the same as that of the hold.**

**(Note 2) The status of center alignment is displayed during the center alignment operation**

**(Note 3) When the manual operation mode is selected, the status of the memory operation is displayed.**

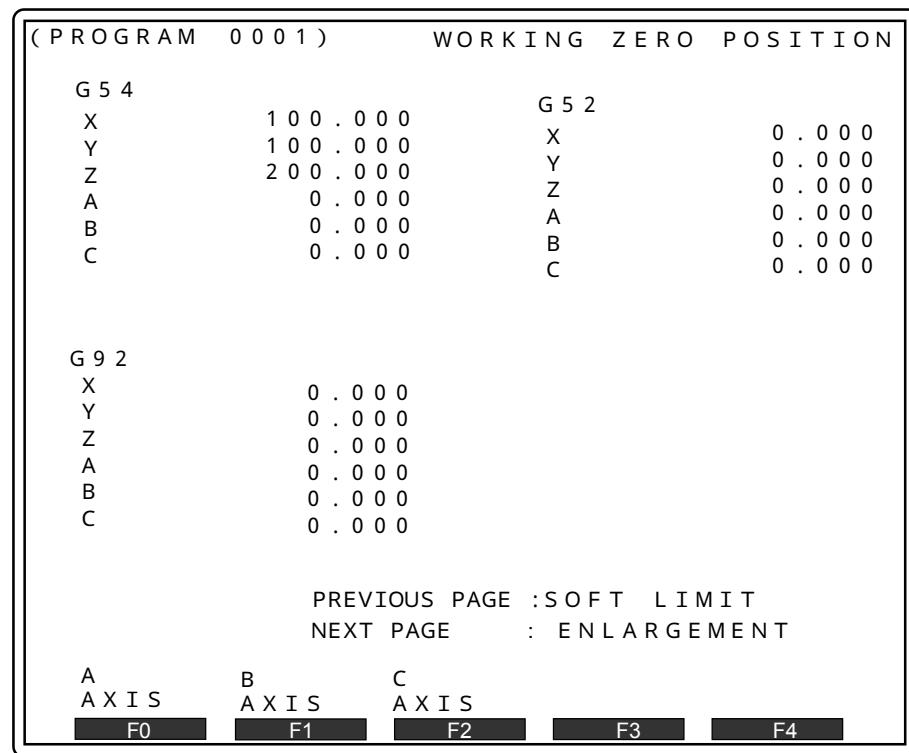
### 4.1.3 Screen of soft limit

4

(PROGRAM 0001)			SOFT LIMIT	
STROKE	LIMIT 1			
X (+)	0 . 0 0 0	( - )	- 3 5 0 . 0 0 0	
Y (+)	0 . 0 0 0	( - )	- 2 5 0 . 0 0 0	
Z (+)	5 5 0 . 0 0 0	( - )	2 0 0 . 0 0 0	
C (+)	0 . 0 0 0	( - )	- 1 8 0 . 0 0 0	
A1 (+)		( - )		
B2 (+)		( - )		
STROKE	LIMIT 2			
X (+)	0 . 0 0 0	( - )	0 . 0 0 0	
Y (+)	0 . 0 0 0	( - )	0 . 0 0 0	
Z (+)	0 . 0 0 0	( - )	0 . 0 0 0	
STROKE	1			
X (+)	0 . 0 0 0	( - )	- 3 5 0 . 0 0 0	
Y (+)	0 . 0 0 0	( - )	- 2 5 0 . 0 0 0	
Z (+)	5 5 0 . 0 0 0	( - )	2 0 0 . 0 0 0	
C (+)	0 . 0 0 0	( - )	- 1 8 0 . 0 0 0	
A1 (+)		( - )		
B2 (+)		( - )		
STROKE	2			
X (+)	0 . 0 0 0	( - )	0 . 0 0 0	
Y (+)	0 . 0 0 0	( - )	0 . 0 0 0	
Z (+)	0 . 0 0 0	( - )	0 . 0 0 0	
PREVIOUS PAGE :MODAL				
NEXT PAGE :WORKPIECE COORDINATE ZERO POINT				
F0	F1	F2	F3	F4

- \* The STROKE LIMIT 1 column displays only the effective stroke limit among those set by user parameter 2 and by G22. In the G23 mode, nothing is displayed.
- \* The STROKE LIMIT 2 column displays the stroke limit of user parameter 2. In the G23 mode, nothing is displayed.
- \* The STROKE 1 and STROKE 2 columns display the strokes of machine parameter 1 and user parameter 2.

#### 4.1.4 Workpiece coordinate zero point



4

#### G54 (G54 - G59, G54. 1 (1) - G54.1 (48))

Indicates the current workpiece coordinate zero point.

#### G92

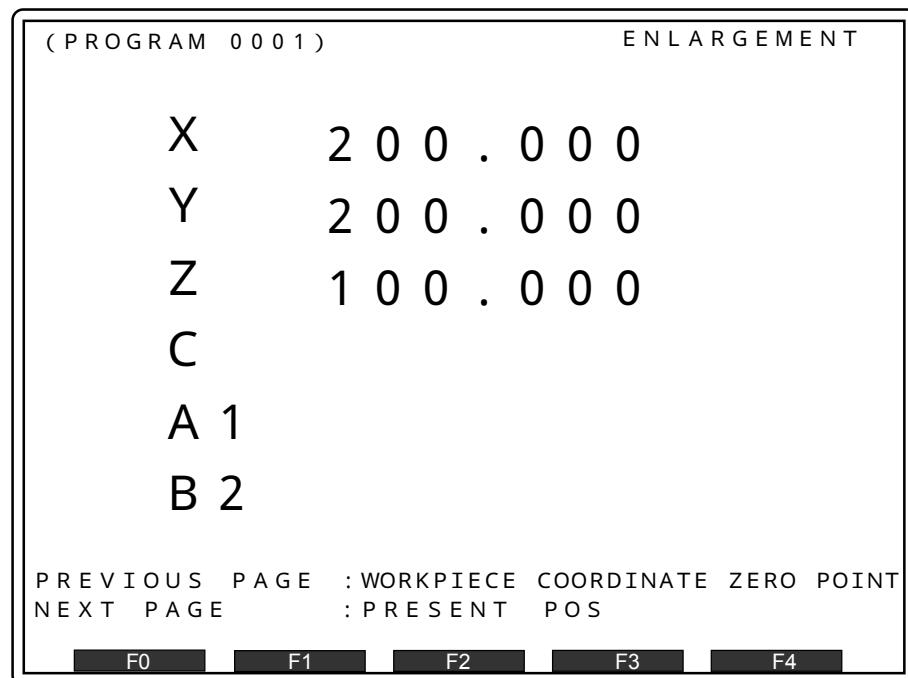
Indicates the amount of shift set by the G92 command.

#### G52

Indicates the amount of shift from the workpiece coordinate zero point set by the G52 command.

### 4.1.5 Enlarged display

The absolute coordinates on the <POSITION DISPLAY> screen can be increased.



## 4.2 Program display

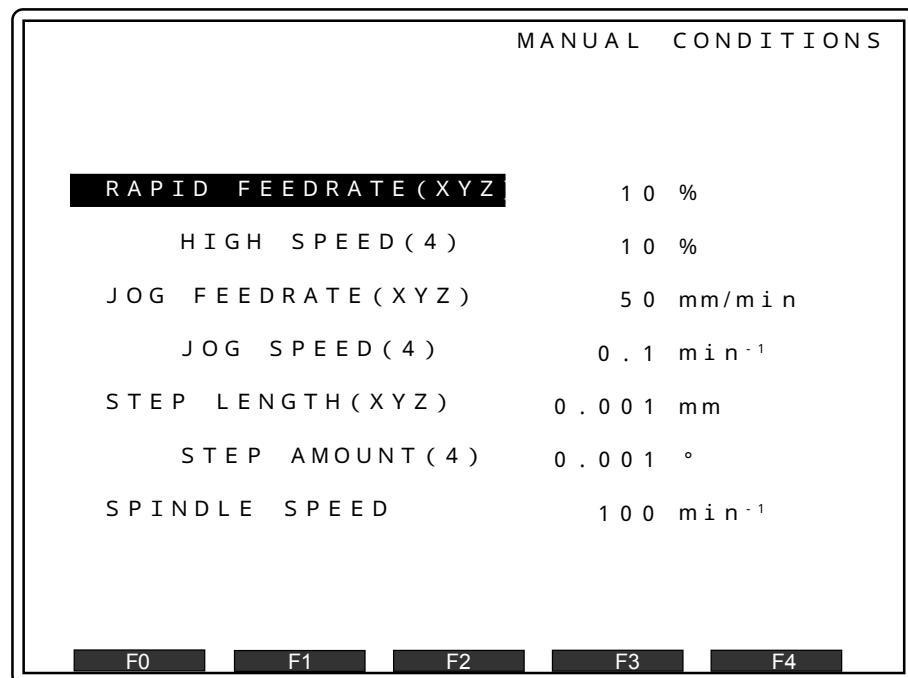
Details of display changes according to the mode selector key setting.

1. When the memory or MDI operation mode is selected, each operation program are displayed.
2. When the manual operation mode is selected, there is no display.
3. When the MDI MAN mode is entered, the <MDI MODE> screen is displayed.
4. When the EDITING mode is entered, the <PROGM EDIT MODE> screen is displayed.

4

## 4.3 Conditions of manual operation

Pressing the [MANU COND] key displays the screen for setting each feedrate and spindle speed.



**(Note) When the manual operation mode is not selected, checking of data only is available, modification is not possible.**

## 4.4 Magazine

When the [MAGAZ] key is pressed, the screen below appears for tool settings such as the position in the magazine or tool type.

### Double-arm ATC display

MAGAZN					
■ SP 01	TL LIFE	GROUP NO. 03	STANDARD	TL	
x 01 CAP	TL LIFE	GROUP NO. * *	STANDARD	TL	
02 03	TL LIFE	GROUP NO. 05	LARGE	TOOL	
x 03	TL LIFE	GROUP NO.	STANDARD	TL	
04 05	TL LIFE	GROUP NO.	STANDARD	TL	
05 09	TL LIFE	GROUP NO. 15	STANDARD	TL	
06	TL LIFE	GROUP NO.	STANDARD	TL	
TOOL NO. —					
0 : CAP SETTING					
F0	F1	F2	F3	F4	

### Armless ATC display

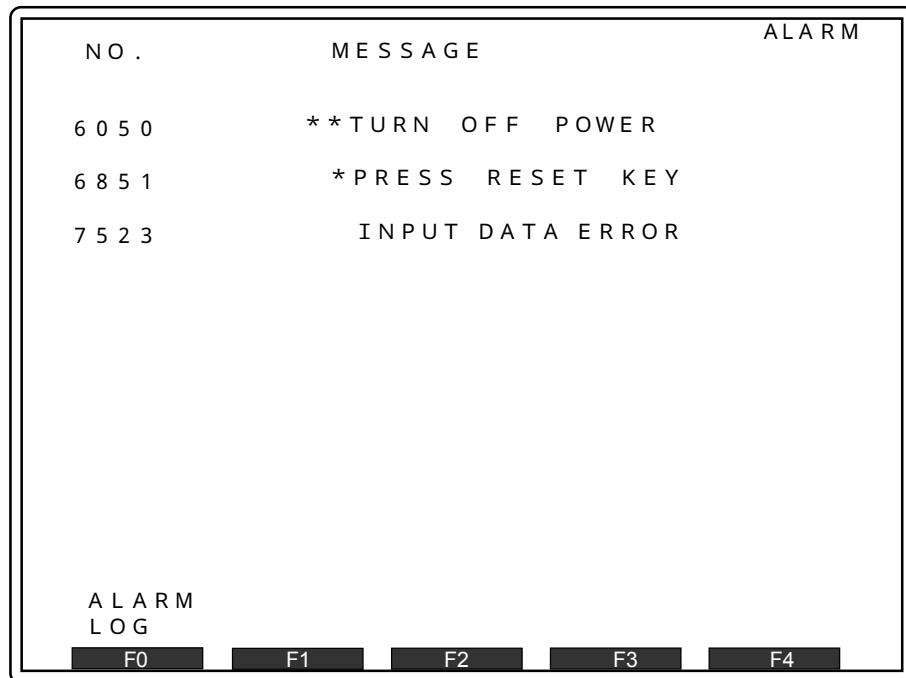
MAGAZN					
■ 01 01	TL LIFE	GROUP NO. 03	STANDARD	TL	
02 02	TL LIFE	GROUP NO. 01	STANDARD	TL	
03 03	TL LIFE	GROUP NO. 05	STANDARD	TL	
04	TL LIFE	GROUP NO.	STANDARD	TL	
05 05	TL LIFE	GROUP NO.	STANDARD	TL	
06 09	TL LIFE	GROUP NO. 15	STANDARD	TL	
07	TL LIFE	GROUP NO.	STANDARD	TL	
TOOL NO. —					
F0	F1	F2	F3	F4	

**Note: When the MDI mode is not selected, only checking of data is possible. Data modification is not possible.**

## 4.5 Alarm display

### 4.5.1 Alarm screen

Pressing the [ALARM] key displays details of alarms as shown below:



NO.	MESSAGE	ALARM
6050	* * TURN OFF POWER	
6851	* PRESS RESET KEY	
7523	INPUT DATA ERROR	

ALARM LOG

F0 F1 F2 F3 F4

4

- \* The alarm numbers and relative messages are displayed.
- \* When more than one alarm is generated, the most critical ones are displayed in order of importance.
- \* Max. 10 alarms are displayed.
- \* If an alarm is generated in other screen, the most critical alarm message blinks.

## 4.5.2 Alarm log screen

Among critical errors that have occurred, the information of up to the latest 50 errors is retained, and able to be referred to on this screen.

### 4.5.2.1 Log list screen

The error list is displayed on this screen.

Pressing the [F0] key with the <ALARM> screen displayed brings up the alarm log as below:

4

A L A R M   L O G				A L A R M
N O .	M E S S A G E	D A T E	T I M E	
8 2 0 2	* NO MACRO VARIA. DATA	0 7 / 2 8	0 8 : 0 6	
8 2 0 1	* NO TOOL DATA	0 7 / 2 8	0 8 : 0 6	
6 1 5 4	* EDIT ERROR 2	0 7 / 2 8	0 8 : 0 7	
6 0 5 0	* * TURN OFF POWER	0 7 / 2 8	0 8 : 0 7	
8 2 0 2	* NO MACRO VARIA. DATA	0 7 / 2 8	0 8 : 1 0	
6 1 5 2	* EDITING	0 7 / 2 8	0 8 : 5 4	
8 2 0 2	* NO MACRO VARIA. DATA	0 7 / 2 8	0 8 : 5 6	
6 2 7 9	* NO TOOL IN MAGAZINE	0 7 / 2 8	0 9 : 0 9	
6 2 7 9	* NO TOOL IN MAGAZINE	0 7 / 2 8	0 9 : 0 9	
6 2 7 9	* NO TOOL IN MAGAZINE	0 7 / 2 9	0 0 : 3 3	
6 2 7 9	* NO TOOL IN MAGAZINE	0 7 / 2 9	0 0 : 3 3	
6 2 7 9	* NO TOOL IN MAGAZINE	0 7 / 2 9	0 0 : 3 5	
5 5 0 0	* NO TOOL IN MAGAZINE	0 7 / 2 9	0 1 : 2 4	
5 5 0 0	* EMERGENCY SW ON	0 7 / 2 9	0 1 : 2 5	
6 1 6 5	* ORG POS ERROR Z	0 7 / 2 9	0 2 : 1 4	

DETA I L   D I S P . :   M O V E   C U R S O R   A N D   P R E S S   S E T

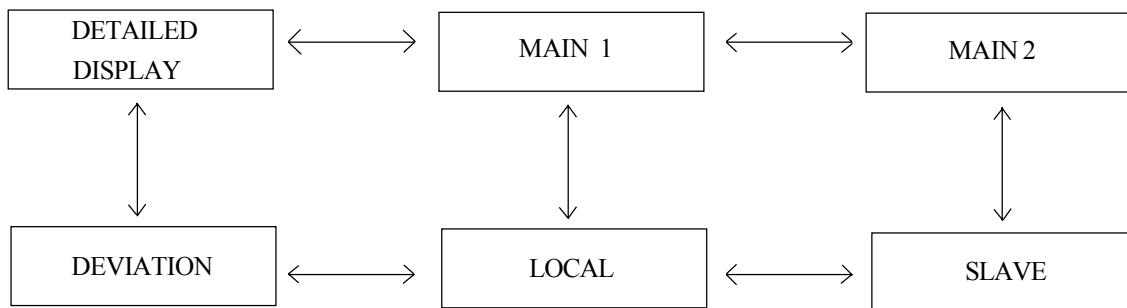
A L A R M  
D I S P L A Y

F0   F1   F2   F3   F4

#### 4.5.2.2 Detailed display screen

Use the arrow key to select the desired error on the <Log List> screen, and press the [ENT] key.

The screen changes in the following sequence by pressing the page keys.



#### Detailed display

```

D I T A I L E D   D I S P L A Y           A L A R M   L O G
5 5 0 0   * E M E R G E N C Y   S W   O N   0 7 / 2 9   0 1 : 2 5
M O D E   M E M   D I S P L A Y   P R G R M
E D I T   P R G R M   0 0 1 5   O P E   P R O G R A M   3 1 0 0
E X E C U T I O N   B L O C K
G O X - 1 0 0 . 0 0 0 F 1 0 0 0 ;
M A C H I N E   P O S   X   - 2 0 0 . 0 0
Y   0
Z   - 2 0 0 . 0 0
C   0
A 1   2 2 3 . 6 1 6
B 2   0 . 0 0 0
M A G A Z I N E   0 . 0 0 0
0 . 0 0 0
9 5 2 . 5 0 0
P R E V I O U S   P A G E   : I / O   D S P ( D E V I A T I O N )
N E X T   P A G E   : I / O   D S P ( M A I N   1 )
F0   F1   F2   F3   F4

```

## Main 1

I/O DSP (MAIN 1)		OUT	ALARM LOG	
IN				
1	F E D C B A 9 8 7 6 5 4 3 2 1 0	1	F E D C B A 9 8 7 6 5 4 3 2 1 0	
2	0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2	0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 1 1	
3	0 0 0 0 0 0 0 0 0 1 1 0 0 0 1 0 0	3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4	0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 1	
5	0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5	0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0	
6	1 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0	6	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
7	0 0 0 0 0 0 1 1 1 1 1 1 0 1 0 1	7	0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0	
8	0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0	8	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
9	1 0 1 1 1 1 1 1 0 0 0 0 1 1 0 0	9	0 0 0 0 0 0 0 1 1 0 0 1 0 0 1 0 1 1 0	
	F E D C B A 9 8 7 6 5 4 3 2 1 0		F E D C B A 9 8 7 6 5 4 3 2 1 0	
PREVIOUS PAGE : DETAILED DISPLAY				
NEXT PAGE : I/O DSP (MAIN 2)				
LIST DISP.				
F0 F1 F2 F3 F4				

4

## Main 2

I/O DSP (MAIN 2)		OUT	ALARM LOG	
IN				
1	F E D C B A 9 8 7 6 5 4 3 2 1 0	1	F E D C B A 9 8 7 6 5 4 3 2 1 0	
2	0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2	0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1	
3	0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0	3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
5	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
6	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
7	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
	F E D C B A 9 8 7 6 5 4 3 2 1 0		F E D C B A 9 8 7 6 5 4 3 2 1 0	
PREVIOUS PAGE : I/O DSP (MAIN 1)				
NEXT PAGE : I/O DSP (SLAVE)				
LIST DISP.				
F0 F1 F2 F3 F4				

**Slave**

I / O    D S P ( S L A V E )										A L A R M    L O G						
I N		O U T														
1	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1	0	0	0	1	1	0	1	0	0	0	1	0	0	0	1	0
2	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	
3	0	0	0	0	0	1	1	1	1	1	1	1	0			
4	0	0	0	0	0	0	0	0	0	0	0	0	0			
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
P R E V I O U S    P A G E    : I / O    D S P ( M A I N    2 )																
N E X T    P A G E    : I / O    D S P ( L O C A L )																
L I S T																
D I S P .																
	F0	F1	F2	F3	F4											

**Local**

I / O    D S P ( L O C A L )										A L A R M    L O G						
I N		O U T														
1	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
P R E V I O U S    P A G E    : I / O    D S P ( S L A V E )																
N E X T    P A G E    : I / O    D S P ( D E V I A T I O N )																
L I S T																
D I S P .																
	F0	F1	F2	F3	F4											

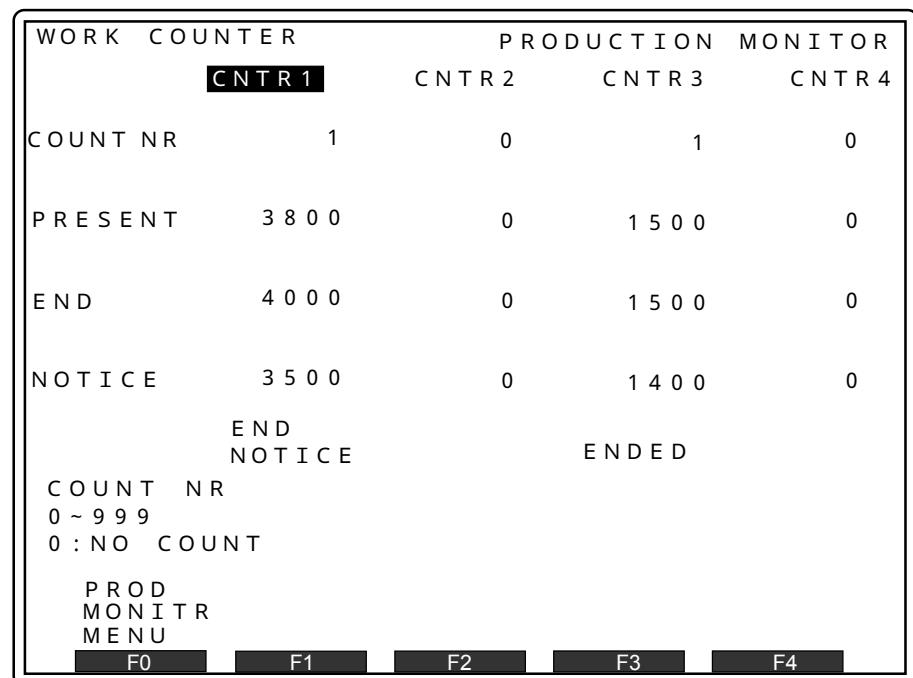
**Deviation**

I/O DSP (DEVIATION)	ALARM LOG
<b>DEVIATION</b>	
SPINDLE	- 1
X AXIS	0
Y AXIS	2 5
Z AXIS	3 0 1 0
A AXIS	- 2 1 0
B AXIS	0
C AXIS	0
MAGAZINE	4 2
PREVIOUS PAGE	: I/O DSP (LOCAL)
NEXT PAGE	: DETAILED DISPLAY
LIST	
DISP.	
F0	F1
F2	F3
F4	

## 4.6 Production monitor display

### 4.6.1 Work counter

Press the [1] and [ENT] keys at the production monitor menu screen, or shift the cursor to the No.1 and press the [ENT] key. The following items are displayed on the screen.



WORK COUNTER		PRODUCTION MONITOR			
	CNTR 1	CNTR 2	CNTR 3	CNTR 4	
COUNT NR	1	0	1	0	
PRESENT	3800	0	1500	0	
END	4000	0	1500	0	
NOTICE	3500	0	1400	0	
	END NOTICE		ENDED		
COUNT NR					
0 ~ 999					
0 : NO COUNT					
PROD MONITR MENU					

4

#### Display of input area and description of items

COUNT NR  
0 ~ 999  
0 : NO COUNT

PRESENT COUNT  
0 ~ 99999

END COUNT  
0 ~ 99999  
0 : NO END

END NOTICE COUNT  
0 ~ 99999  
0 : NO END NOTICE

**(Note) Data entry is not possible during programmed operation. Only data reference is possible.**

\* COUNTNR

Set the workpiece counter to count up at a required value with the end of program code (M30 or M02).

When 0 is specified, the counter does not count up.

\* PRESENT

When the COUNT NR setting is not 0, and the counter is set to effective by the program the counter is calculated by the end of program code (M30 or M02).

\* END

Specify the value to finish counting.

When M30 or M02 is commanded and the PRESENT value exceeds the END value, the alarm "COUNTER END 1(~4)" is generated.

The external signal (count end signal) is turned ON at this time and the message "ENDED" is displayed.

The alarm is resetted by [RST] key, but the count end signal remains ON.

When the memory operation is started, an alarm is generated again and operation is not available.

Change the PRESENT value so that it may become smaller than the END value, or change the END value so that it may be larger than the PRESENT value, or change the COUNT NR to 0. Then the alarm is resetted, and count end signal turned OFF, and restart is available.

\* NOTICE

Specify the value of end notice.

When M30 or M02 is commanded and the PRESENT value exceeds the NOTICE value, the alarm "COUNTER 1(~4) END NOTICE" is generated.

The external signal (count end notice signal) is turned ON at this time, and the message "END NOTICE" is displayed.

The alarm can be resetted by the [CAN] key, etc. but the count end notice signal remains ON.

The memory operation can be restarted even while the alarm is generated.

Change the PRESENT value so that it may become smaller than the NOTICE value, or change the NOTICE value so that it may become larger than the PRESENT value, or change COUNT NR to 0. Then the count end notice signal is turned OFF.

## 4.6.2 Time display

### 4.6.2.1 Time display

Press the [2] and [ENT] keys at the production monitor menu screen, or shift the cursor to the No.2 and press the [ENT] key. The following items are displayed on the screen.

When machine is equipped with quick table

TIME DISPLAY		PRODUCTION MONITOR	
PAL1 CYCLE TIME (1000)		0002:30:54	
CUTTING TIME		0001:26:13	
NON CUTTING TIME		0001:04:41	
CUTTING TIME/CYCLE TIME			57%
PAL2 CYCLE TIME (1200)		0002:13:00	
CUTTING TIME		0001:05:36	
NON CUTTING TIME		0001:07:24	
CUTTING TIME/CYCLE TIME			49%
OPERATION TIME		0006:13:42	
POWER ON TIME		00135:07:01	
RUNNING TIME		00054:41:35	
DATE	1997/07/10	14:20:16	
NEXT PAGE		:	OPERATION LOG
PROD			
MONITOR			
MENU			
F0	F1	F2	F3
			F4

### Descriptions

The above screen displays the cycle time of the [PAL1 CYCLE TIME(\*\*\*\*)] program.

The quick table corresponding to PAL 1 or PAL 2 is displayed.

Figures in brackets indicate the program number.

When machine is not equipped with quick table

TIME DISPLAY	PRODUCTION MONITOR
PAL1 CYCLE TIME (1000)	0002 : 30 : 54
CUTTING TIME	0001 : 26 : 13
NON CUTTING TIME	0001 : 04 : 41
CUTTING TIME / CYCLE TIME	57 %
OPERATION TIME	0006 : 13 : 42
POWER ON TIME	00135 : 07 : 01
RUNNING TIME	00054 : 41 : 35
DATE	1997/07/10 14:20:16
NEXT PAGE : OPERATION LOG	
PROD MONITOR MENU	
F0	F1
F2	F3
F4	

CUTTING TIME: Displays the time cutting is performed in the program.

NON CUTTING TIME: Displays the time cutting is not performed in the program.

CUTTING TIME/  
CYCLE TIME: Displays the ratio of cutting time to cycle time.

OPERATION TIME: Displays the accumulated operation time.

POWER ON TIME: Displays the accumulated power supply time.

RUNNING TIME: Displays the accumulated running time.

DATE: Displays the current date and time.

### 4.6.2.2 Operation log

The record of operation time and running frequency are displayed.

Press the NEXT PAGE key on the <TIME DISPLAY> screen.

OPERATION LOG		PRODUCTION MONITOR	
OPERATION TIME		NO. OF OP	
97/07/06	10:13:24	102	
97/07/07	09:15:45	96	
97/07/08	07:58:13	45	
97/07/09	08:05:23	35	
97/07/10	06:13:42	12	

PREVIOUS PAGE : TIME DISPLAY

PROD MONITOR MENU

F0 F1 F2 F3 F4

### 4.6.3 Communication status display

Press the [3] and [ENT] keys at the production monitor menu screen, or shift the cursor to the No.3 and press the [ENT] key. The following items are displayed on the screen.

COMMUNICATION DISP		PRODUCTION MONITOR	
RECEIVE MEMORY LIST			
SND MEMORY LIST		05/13	13:45
RECEIVE USER PARM2 M IN		05/13	13:46
END USER PARM2 M IN.		05/13	13:47
RECEIVE THRM MSR DT1 DEL		05/13	13:47
END THRM MSR DT1 DEL		05/14	10:25
WAITING COMMAND		05/14	10:25

SIGNAL MONITOR RS CS ER DR

PROD MONITOR MENU

F0 F1 F2 F3 F4

#### 4.6.4 Thermal measurement data

Press the [4] and [ENT] keys at the production monitor menu screen, or shift the cursor to the No.4 and press the [ENT] key. The following items are displayed on the screen.

4

THRM M ESRMENT DATA			PRODUCTION MONITOR		
PRT	POS	COMP	- 0 . 0 6 1		
PRST	NO. OF	CMND	3		
MSR	FRQ	TL OFST NO.	DISPMT	AMT	
		NO. OF CMND	TOTL	DISPMT	
*	3	0 1	0 . 0 3 0		
		3	0 . 0 6 0		
	2	0 1	0 . 0 2 0		
		2	0 . 0 3 0		
	1	0 1	0 . 0 1 0		
		1	0 . 0 1 0		

PROD  
MONITR  
MENU

F0 F1 F2 F3 F4

##### Description of items

PRT POS COMP: Displays the amount of compensation for the Z axis at the current position.

The position compensation is -0.061 on this screen.

PRST NO. OF CMND: Displays the present number of commands.  
3 is specified on this screen.

MSR FRQ: Displays the number of actual measurements.

TL OFST NO.: Represents the tool length offset number used for measurement.

DISPMT AMT: Displays the measured displacement.

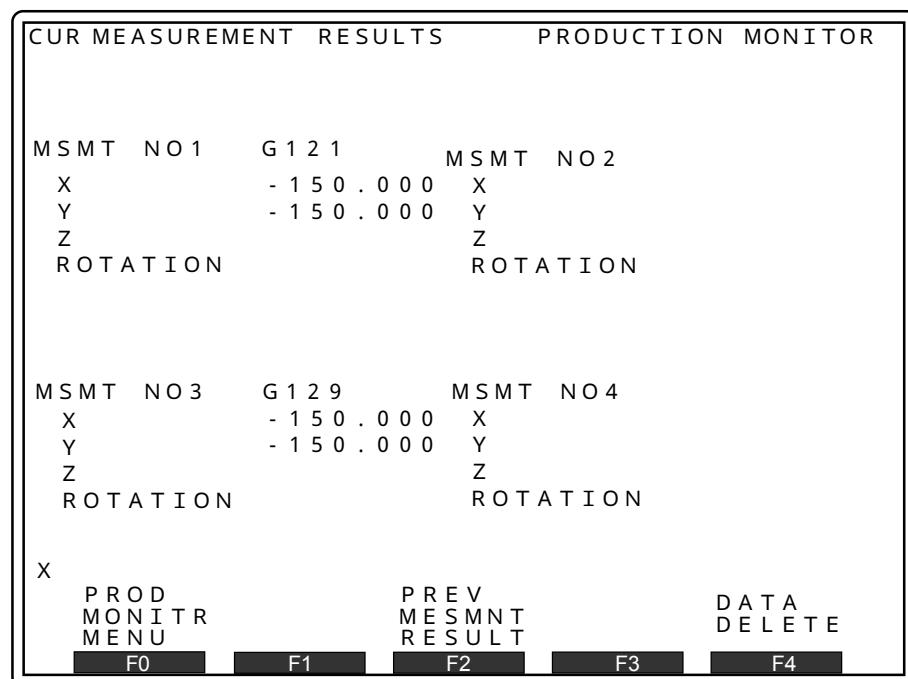
TOTL DISPMT: Displays the total displacement.

\*Measurement data is displayed.

**(Note) All data is lost when the power is turned off.**

## 4.6.5 Measurement results

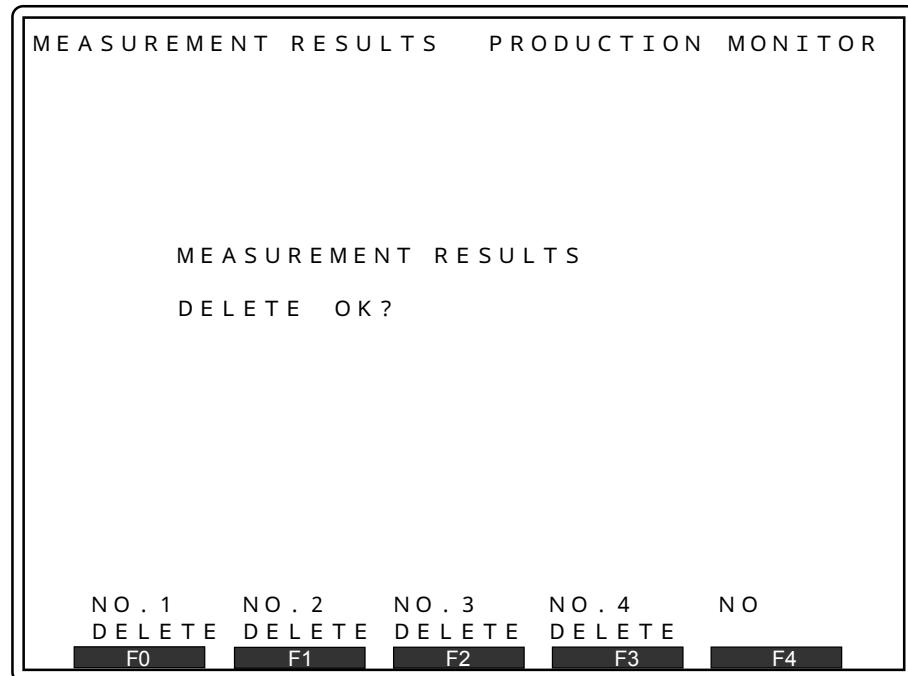
Press the [5] and [ENT] keys at the production monitor menu screen, or shift the cursor to the No.5 and press the [ENT] key. The following items are displayed on the screen. To change the value of the measurement results, select the desired item and enter a numerical value. Note that the type of the measurement cannot be changed.



#### 4.6.5.1 Deletion of measurement results

Unnecessary measurement results can be deleted.

1. Press the [F4] key on the <Measurement Results> screen, and a deletion confirmation screen appears.



2. Press the function key corresponding to the measurement results to be deleted.  
To cancel deletion, press the [F4] key.  
The relationship between the function keys and measurement results to be deleted is as follows.

[F0] key	No.1 is deleted.
[F1] key	No.2 is deleted.
[F2] key	No.3 is deleted.
[F3] key	No.4 is deleted.
[F4] key	Measurement results are not deleted.

When the function key is pressed, the corresponding measurement results are deleted (nothing is deleted when [F4] is pressed) and the display returns to the < Measurement Results > screen.

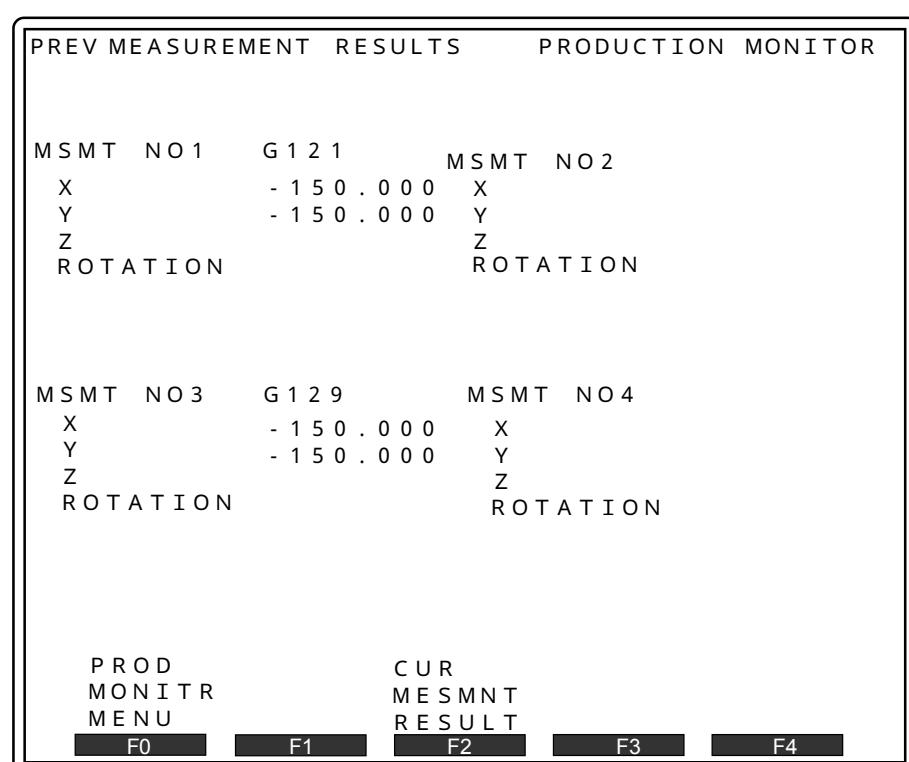
**Note: When the machine unit system of user parameter 1 (Switch1) is changed, all measurement results are deleted.**

#### 4.6.5.2 Previous measurement results

The previous measurement results are displayed.

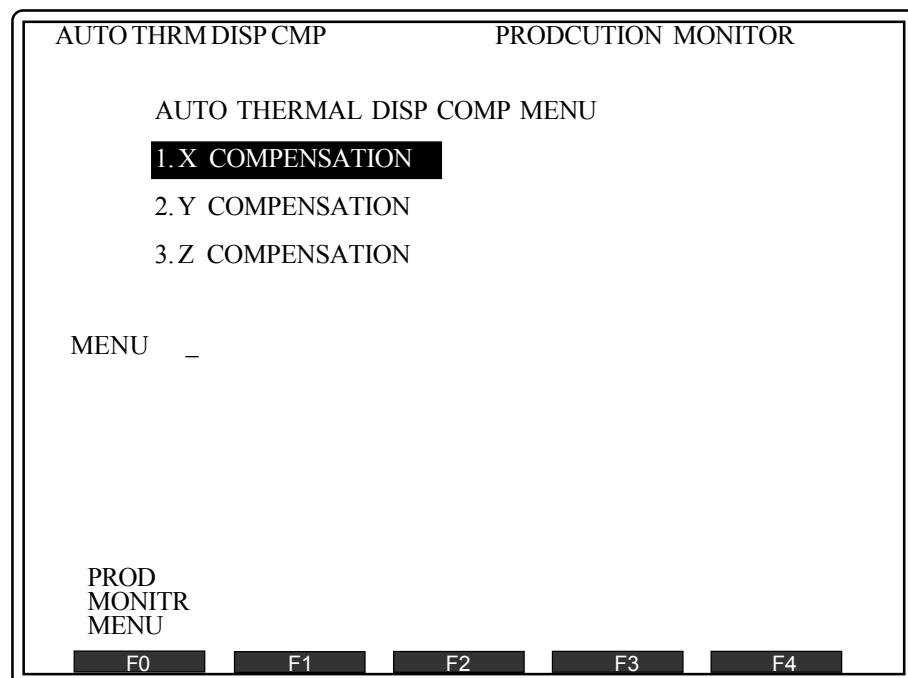
1. Press the [F2] key on the <CUR MEASMNT RESULT> screen and the <PREV MEASMNT RESULT> screen appears.  
Press the [F2] key again and the display returns to the <CUR MEASMNT RESULT> screen.

**Note: The previous measurement results cannot be changed or deleted.**



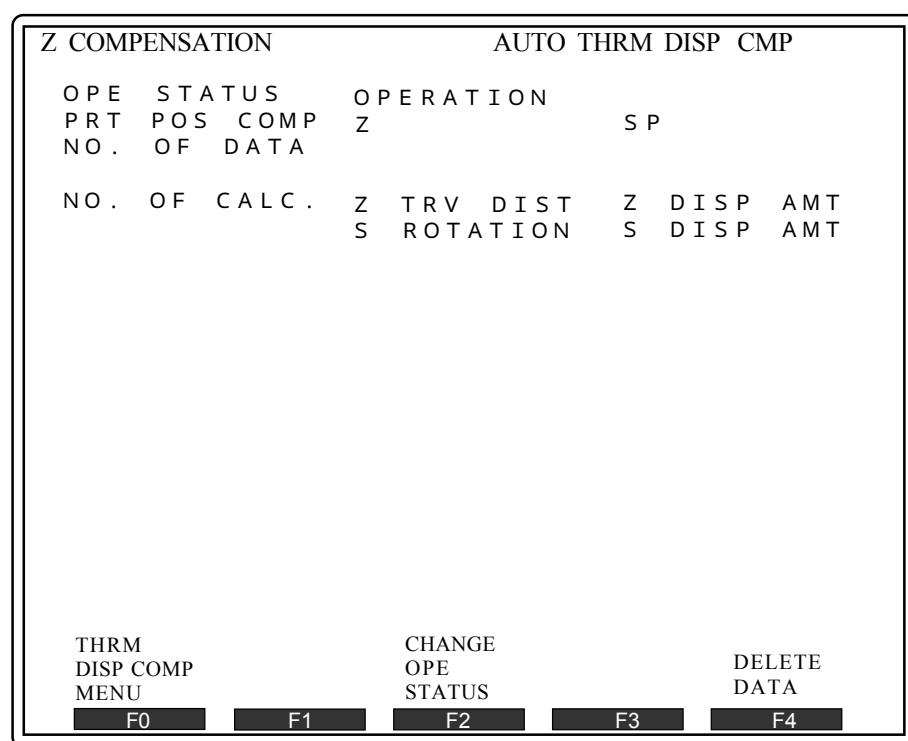
## 4.6.6 Automatic thermal displacement compensation

Press the [6] and [ENT] keys at the production monitor menu screen, or shift the cursor to the No.6 and press the [ENT] key. The following menu is displayed on the screen.



4

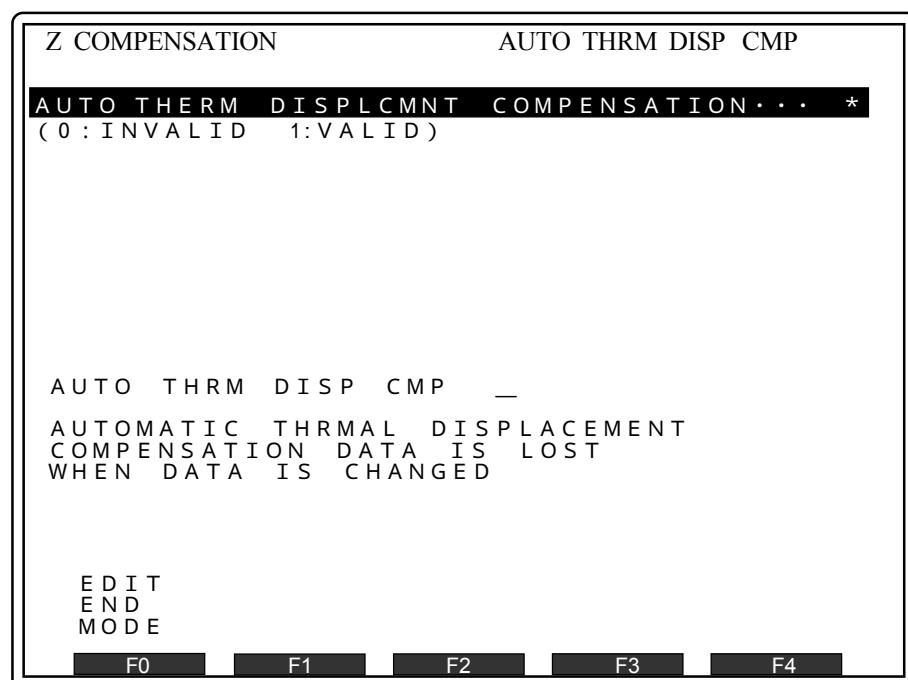
Enter the number of the desired axis on the <AUTO THRM DISP CMP> screen and press the [ENT] key, or move the cursor to the menu number and press the [ENT] key. The following items are displayed on the screen.



#### 4.6.6.1 Changing operation status

When [F2] is pressed with the < AUTO THRM DISP CMP > screen displayed, the following screen appears.

Set whether to enable or disable the automatic thermal displacement compensation function.

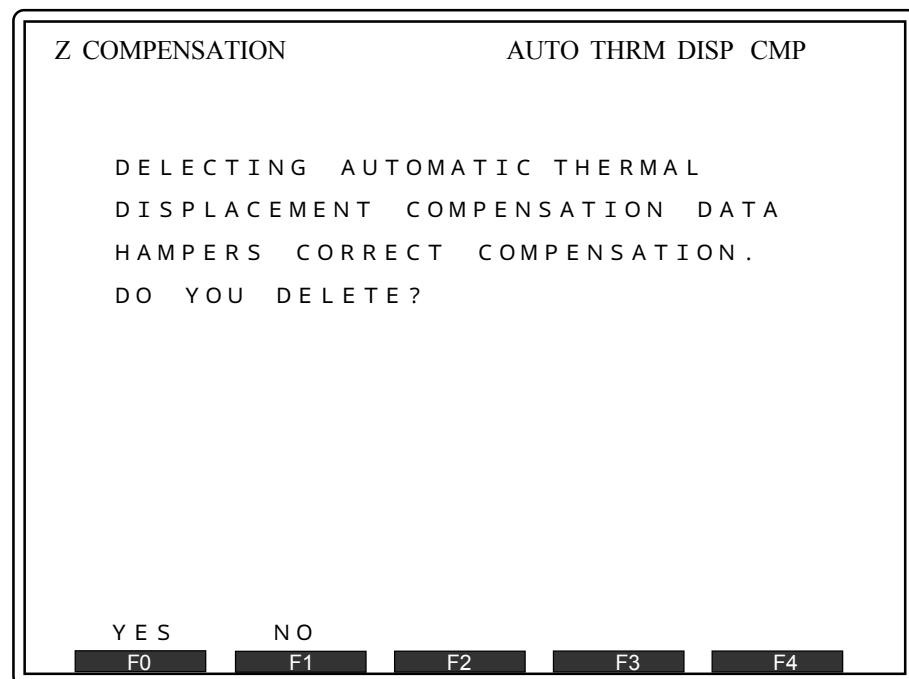


#### 4.6.6.2 Deleting automatic thermal displacement compensation data

When [ F4] is pressed with the < AUTO THRM DISP CMP > screen displayed, the following screen appears.

Press [ F0] to delete the automatic thermal displacement compensation data; press [ F1] to cancel deletion.

4



## 4.7 Data bank

The screens of data bank display have the followings:

- \* Work coordinates screen
- \* Tool data screen
- \* Macro variable screen
- \* User parameter screen
- \*Machine parameter screen

Refer to "Chapter 7 Data bank" for details.

4

## 4.8 Erasing screen

Pressing the **[CLEAR]** key erases the screen.

Press any of the display keys to display the screen again.

Further, once **[AUTO DISPLAY CLEAR TIME]** of user parameter 1 is set, the display can be automatically cleared when no operation is performed during the designated time.

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# CHAPTER 5

## MANUAL OPERATION

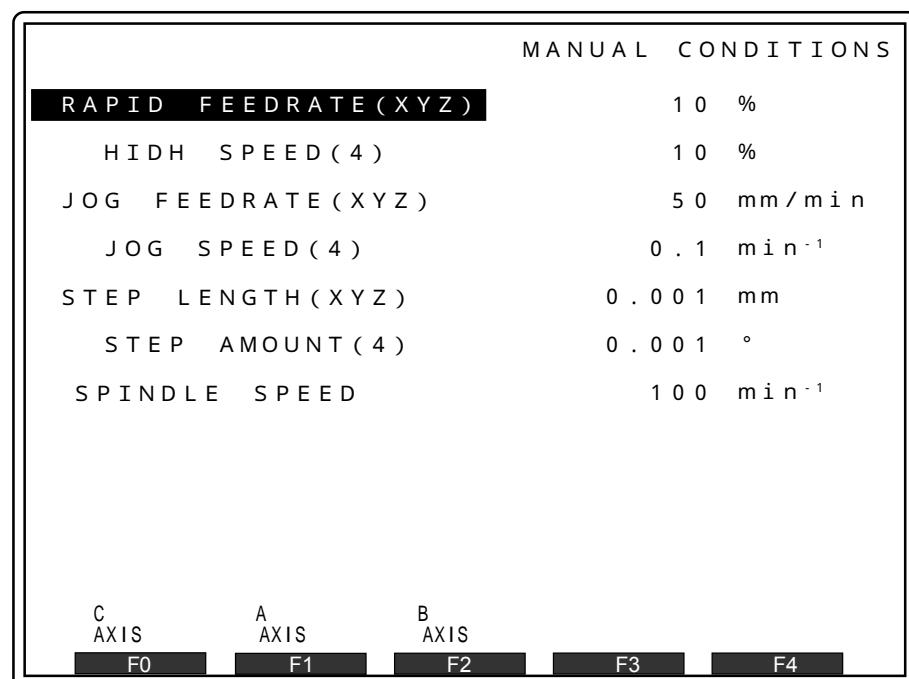
5

- 5.1 Manual Operation**
- 5.2 Zero Point Return**
- 5.3 Axis Feed**
- 5.4 Starting and stopping Spindle**
- 5.5 Tool Change**
- 5.6 Magazine Rotation**
- 5.7 Axis movement and stroke**
- 5.8 Release + zero point return**

## 5.1 Manual Operation

This section describes the manual operation for axis feed, spindle orientation, tool change and magazine rotation.

The initial screen as shown below appears on the display when power supply is turned on or when manual operation mode is active.



By pressing [RPD], [JOG], [STEP], [S.CW] or [S.STOP] key, the cursor moves to the corresponding item on the screen.

Pressing once cursor key allows also the cursor to move upward or downward by 1 item.

When optional axes are not provided, the cursor does not move to the items related to 4th axis.

## 5.2 Zero Point Return

Zero point return here is referred to as action of returning X, Y, Z, A, B and C axes to machine zero point.

The coordinates of the zero point are 0 for X, Y, Z, A, B and C axes and the value set by the machine parameter (system1) for Z axis.

**Zero point return allows a reference point of axis feed to be established.**

5

- 1 Press [MANU] key to validate manual operation mode.
- 2 Press [POS] key to make the machine position screen appear.
- 3 Press [Z.RTN] key.

First Z axis moves upward to return to zero point, then X and Y axes return simultaneously to zero point. Optional axes return to their zero points according to the order of setting parameters. Then C -axis return to its zero point. (Pallet 1 index to outside) C axis zero point return is only acted once when the power switch is turned on.

The origin return sequence of the additional axes, including the C axis, is set to machine parameter 2 (system 2).

**(Note 1)**

**Zero position return function is available. Therefore, after turning the power on, it is not necessary to move the axis for the first zero position return.**

**(Note 2) (only NC)**

**If the automatic coordinate setting is selected by the user parameter 2, the coordinates are set as specified by the user parameter 2 when the initial zero point return after the power ON is finished.**

**(Note 3) (only NC)**

**Note that “G92 X\_Y\_Z\_A\_B\_C\_” is automatically executed in the working coordinates setting is selected.**

**Refer to “Chapter 3” of the Programming manual for details of G92.**

[Reference Example of B axis] B axis stroke (user parameter 2)

The motion of the B axis zero return varies depending on the setting of STROKE \* (0: NO, 1: YES) of user parameter 2 (switch 2). (Below is the explanation assuming that \*-AXIS DOG ZERO RETURN DIRECTION and \*-AXIS DOG ZERO RTN DISPMT. of user parameter 2 (switch 2) is set to 0: + and 20.000 deg. respectively.)

### 1) When STROKE \* is set to 0: NO

The B-axis machine coordinate value varies from 0 to 359.999 degrees. Therefore, multiple B-axis machine zero points exist every 360 degrees from the B-axis dog type zero return point.

#### 1-1) Dog type zero return

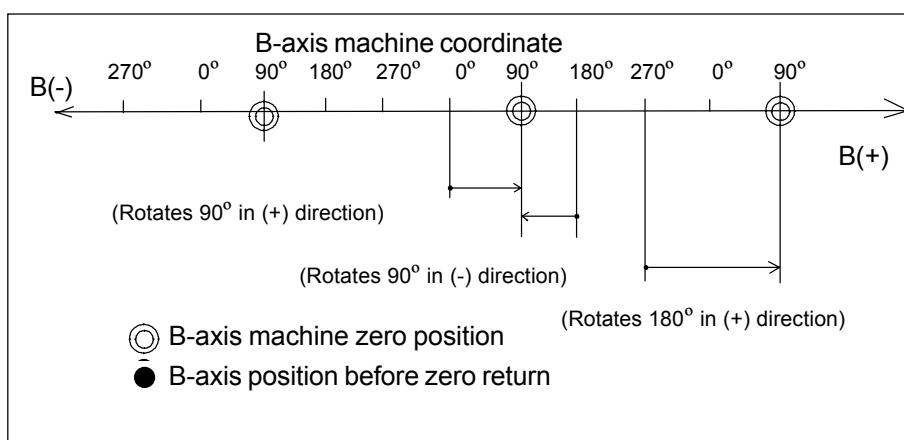
Generally, the B axis returns in the positive direction to its zero position.

However, when the B-axis machine coordinate value is between 340 and 360 degrees, the B-axis retracts 20 degrees in the negative direction and then returns in the positive direction to its zero position.

#### 1-2) Positioning type zero return

The B axis rotates and returns to its zero position in the direction closer to 0 degree of the B-axis machine coordinate value.

When the returning angle is the same in either positive or negative direction (e.g., 180°), the axis rotates toward positive.



## 2) When STROKE \* is set to 1: YES

The B-axis machine coordinate value varies from -9999.999 to 9999.999.

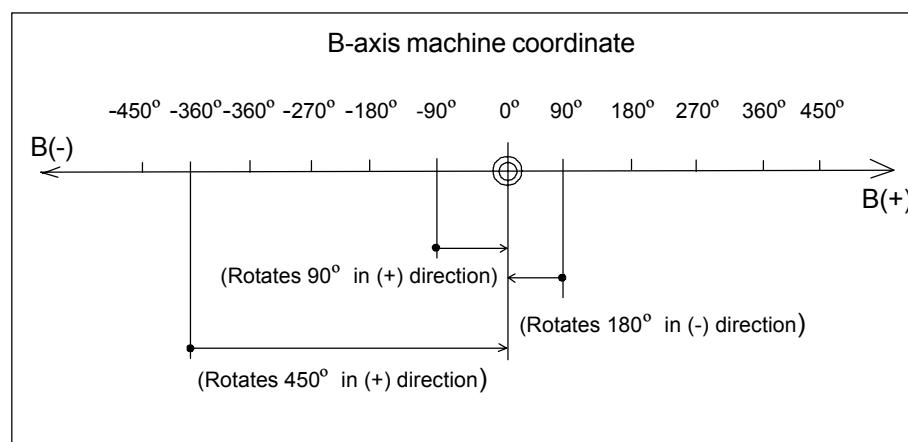
Therefore, only one B-axis machine zero point exists at zero for B-axis dog type zero return.

### 2-1) Dog type zero return

- When the B-axis machine coordinate value is larger than 0 degree, the B axis retracts to -20 degrees point in the negative direction and then returns in the positive direction to its zero position.
- When the B-axis machine coordinate value is between -20 and 0 degree, the B axis retracts 20 degrees in the negative direction and then returns in the positive direction to its zero position.
- When the B-axis machine coordinate value is smaller than -20 degrees, the B-axis moves to -20 degrees point in the positive direction and then returns in the positive direction to its zero position.

### 2-2) Positioning type zero return

The B-axis rotates toward the B-axis machine zero point (0°).



\* The same operation applies to A and C axes.

## 5.3 Axis Feed

Axis feed key allows X, Y, Z, A, B and C axis to be fed at rapid traverse or low speed, or over a predetermined stroke.

### 5.3.1 Rapid traverse

X, Y, Z, A, B and C axes move at a high speed.

The rapid feed is carried out at a speed selected from the five steps; - 10%, 25%, 50%, 75% and 100% either of the maximum hi-speed rotation set by machine parameter 2 (A, B and C axes).

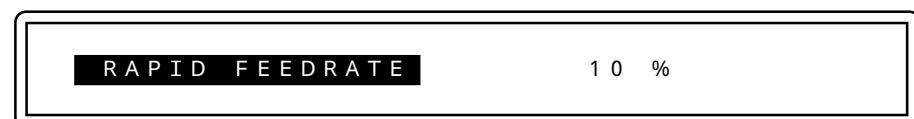
In the example below, suppose the following conditions:

Maximum manual feed speed : 4000mm/min Set by the machine parameter (system1)  
Feedrate override: 10%

5

The axis moves at 400 mm/min (4000 mm/min × 10%)

- 1 Press [MANU] key to validate manual operation mode and make the manual operation condition screen appear.
- 2 Press [RAPID] key to set the cursor on "RAPID FEEDRATE" on the screen.  
The lamp on [RAPID] key comes on. Default rapid traverse rate is 10%.



- 3 Using axis feed keys, move the X, Y, Z, A, B and C in the desired direction.

The rapid feed rate can be adjusted by pressing the [UP] or [DOWN] key.  
To adjust the rapid feedrate of the additional axis, move the cursor to RAPID FEED (4).

**(Note 1)**

**The feedrate can be changed even during the axis movement.**

### 5.3.2 Jog feedrate

X, Y, Z, A, B and C axes move at a low speed.

The jog feedrate of the X, Y and Z axes can be selected from 22 within the range of 50 to 4000 mm/min (2.0 to 157.4 inch/min).

The jog rotation speed of the additional axis can be selected from 19 steps within the range of 0.1 to 7.5 rpm.

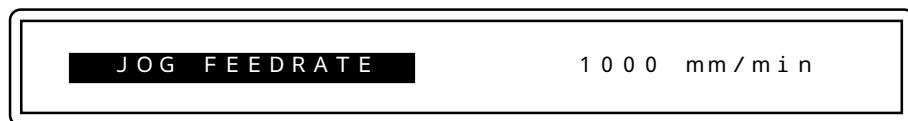
In the example below, suppose that X, Y and Z axes moves at 1000m/min.

- 1 Press [MANU] key to validate manual operation mode and make the manual operation condition screen appear.
- 2 Press [JOG] key to set the cursor on "JOG FEEDRATE" on the screen. The lamp on [JOG] key comes on.

5



- 3 Press [INC] key and select 1000m/min.



- 4 The jog feedrate can be adjusted by pressing the [UP] or [DOWN] key.  
To adjust the jog feedrate of the additional axis, move the cursor to HOG FEED (4).

**(Note)**

**The feedrate can be changed even during axis movement.**

### 5.3.3 Step feed

X, Y, Z, A, B and C axes moves in predetermined increments.

The step amount of the X, Y and Z axes can be selected from 4 steps; 0.001, 0.01, 0.1 or 1.0 mm/step (0.0001, 0.001, 0.01, 0.1 inch/step).

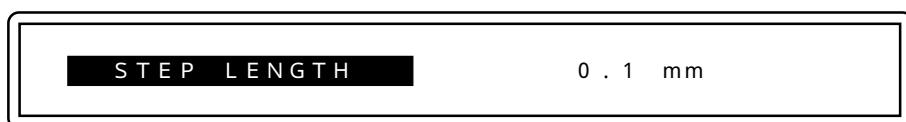
The step amount of the additional axis can be selected from 11 steps from 0.001 to 180.0 degrees.

In the example below, suppose that X, Y and Z axes are to be fed at 0.1mm/step.

- 1 Press [MANU] key to validate manual operation mode and make the manual operation condition screen appear.
- 2 Press [STEP] key to set the cursor on "STEP LENGTH" on the screen. The lamp on [STEP] key comes on.



- 3 Press [INC] key and select 0.1mm/step.



- 4 Move the X, Y, Z, A, B and C axes in the desired direction by pressing the corresponding axis feed key.

The step amount can be adjusted by pressing the [UP] or [DOWN] key.

To adjust the step amount of the additional axis, move the cursor to STEP FEED (4).

## 5.4 Starting and Stopping Spindle

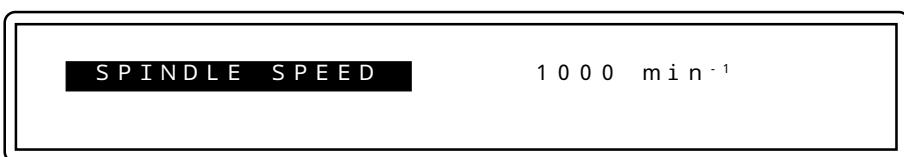
The spindle rotates CW, or is stopped. Never touch the machine while the spindle rotates.

**Speed is increased in increments of  $20 \text{ min}^{-1}$  from 100 to  $4000 \text{ min}^{-1}$ , and in increments of  $2000 \text{ min}^{-1}$  afterward.**

In the example below, suppose that the spindle is to rotate at 1000rpm ( $\text{min}^{-1}$ ).

- 1 Press [MANU] key to validate manual operation mode and make the manual operation condition screen appear.

5



- 2 Set the cursor on "SPINDLE SPEED" on the screen with cursor keys



- 3 Press [UP] key and select 1000rpm ( $\text{min}^{-1}$ ).
- 4 If [S.CW] key is pressed, the spindle rotates CW at 1000rpm( $\text{min}^{-1}$ ). The lamp on [S.CW] key comes on.  
If [S.STOP] key pressed, the spindle stops. The lamp on [S.CW] key goes out.

## 5.5 Tool Change

### CASE 22A, 31A

- 1 Press [MANU] key and select the manual operation mode.
- 2 Press [ATC] key: The Z axis will return to the ATC zero-position. The spindle will be positioned at a designated point and the pot for the next tool will rotate by 90°.
- 3 Press [ATC] key: The arm will move downward and rotate by 180°, then move upward again.
- 4 Press [ATC] key: The pot will return to the original position by 90°, and the Z axis will return to the machine zero position.

Even if the key is kept pressed, only action is executed.

Press the key when the current action is completed.

When the lamp on [ATC] key goes out, the next action can be executed.

- \* The arm will move down by 80mm when starting rotation. Therefore, change tools by pressing [MAGZ] while keeping a clearance of more than 80mm between the tool tip and workpiece at the Z-axis ATC zero position.

### CASE S2A, R2A, S2B

Tool in the spindle is changed for another set in the spindle.

- 1 Press [MANU] key to validate manual operation mode.
- 2 Press [ATC] key: Z axis moves upward to zero-point and the spindle is positioned at the predetermined position. The predetermined position is referred to as the position where the 2 keyways on the spindle become parallel with Y axis.
- 3 Press [ATC] key: Z axis moves upward and is positioned at the ATC zero point.
- 4 Press [ATC] key: The magazine is indexed to the next position. During this motion, the magazine rotates CW.
- 5 Press [ATC] key: Z axis moves downward to zero point.

### CASE 32A

- 1 Press [MANU] key and select the manual operation mode.
- 2 Press [ATC] key: The Z axis will return to the ATC position. The spindle will return to origin position (spindle orientation) and the pot for the next tool will tilt. The origin position is where the tool can be replaced.
- 3 Press the [ATC] key. The X axis will move to machine zero position. The Y axis will move to the ATC position.  
(When the axes are already at the above positions, this operation is omitted.)
- 4 Press the [ATC] key.  
The ATC shutter (magazine cover) will open, the X axis will move to the ATC position.
- 5 Press [ATC] key:  
The arm will swivel, move downward, and then upward.  
Upon completion of this cycle, the tool will have been changed.
- 6 Press [ATC] key:  
The pot to be up, and the X, Z axis will return to the machine zero position and the ATC shutter will close.

5

### CASE 20A

- 1 Press [MANU] key and select the manual operation mode.
  - 2 Press [ATC] key: The Z axis will return to the machine zero-position. The spindle will be positioned at a designated point and the pot for the next tool will rotate by 90°.
  - 3 Press [ATC] key: The arm will move downward and rotate by 180°, then move upward again.
  - 4 Press [ATC] key: The pot will return to the original position by 90°.
- \* The arm will move down by 50mm when starting rotation. Therefore, change tools by pressing [MAGZ] while keeping a clearance of more than 50mm between the tool tip and workpiece at the Z-axis ATC zero position.

Even if the key is kept pressed, only action is executed.

Press the key when the current action is completed.

When the lamp on [ATC] key goes out, the next action can be executed.

## 5.6 Magazine Rotation

Rotate the magazine for tool indexing.

### CASE 22A, 31A, 32A, 20A

- 1 Press [MANU] key and select the manual operation mode.
- 2 Press [MAGZ] key. The next tool pod raises if not yet raised. The magazine will rotate in the CW direction and indexes to the position to mount a next toll. Each time the key is pressed, the magazine rotates to the next pot.
- \* The magazine swivels for one pod even if the key is held down. Press the key each time upon completion of swiveling for one pod. When the [MAGZ] key lamp goes out, the next swiveling operation is possible.

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### CASE TC-32A

- \* The magazine can also be swiveled by pressing the [SINGLE MAGAZINE] switch on the right door instead of pressing the [MAGZ] key.

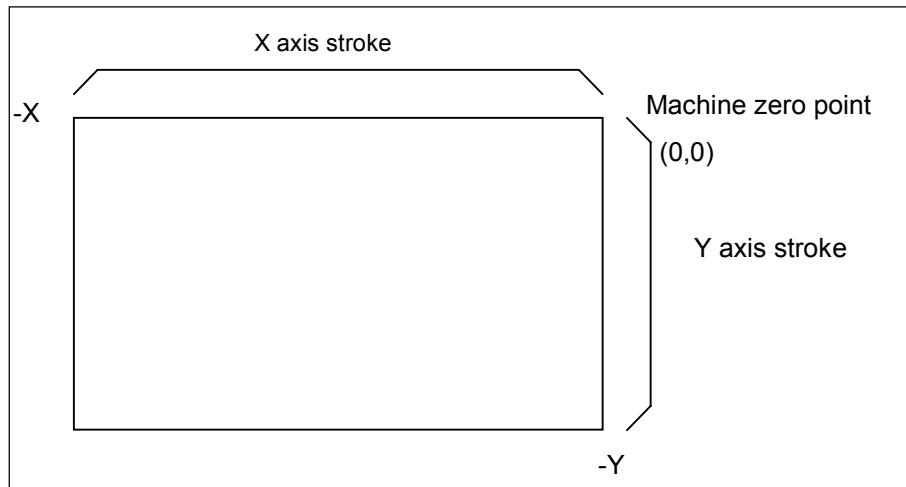
### CASE S2A, R2A, S2B

- 1 Press [MANU] key to validate manual operation mode.
- 2 Press [ATC] key: Z axis moves upward to zero-point and the spindle is
- 3 Press [ATC] key: Z axis moves upward and is positioned at the ATC zero point.
- 4 [MAGZ] key is effective only while Z axis is at ATC zero point. If the key is pressed when Z axis is not that point, the alarm 168\* MAGAZINE POSITION ERROR is displayed. Press [MAGZ] key : the magazine is indexed to the next tool. When [MAGZ] key pressed, the magazine rotates CW. Each time this key pressed, the magazine is indexed by tool. Attempt of an operation other than a magazine rotation with Z axis kept at the ATC zero point may cause an alarm.
- 5 After this series of operation, press [ATC] key to return Z axis to machine zero point.

## 5.7 Axis movement and stroke

The allowable axis movement range in the manual operation is as shown below.

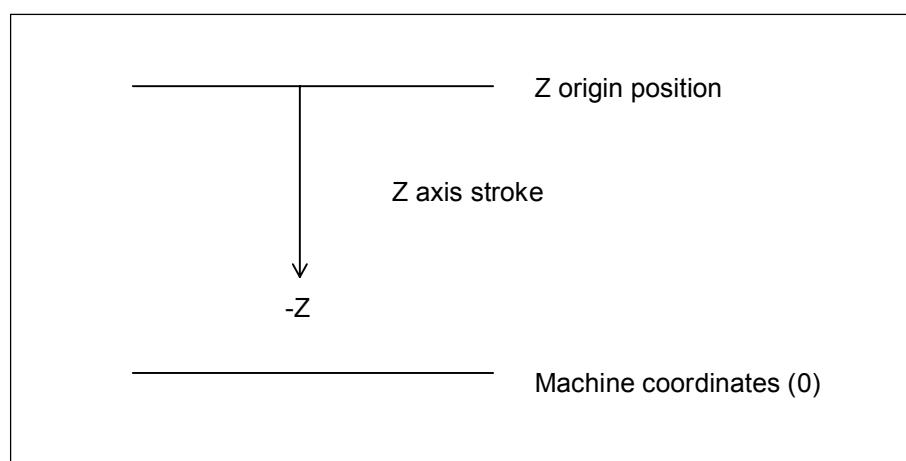
### 1. X and Y axes



5

0501.doc

### 2. Z axis

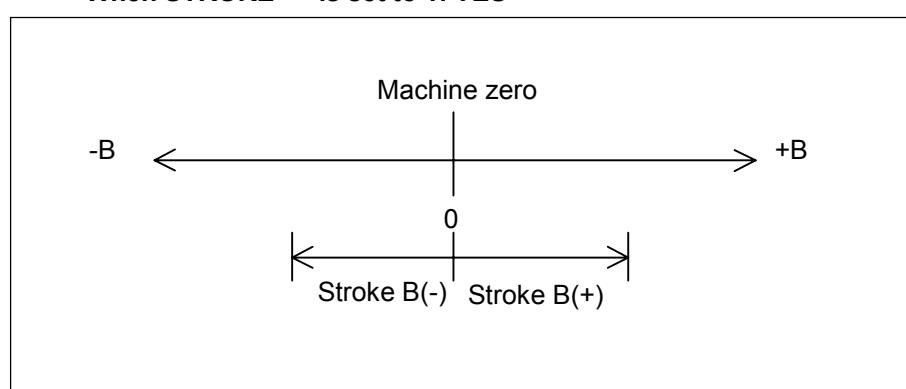


0502.doc

### 3. Optional axes

### Example : B axis

When STROKE \* is set to 1: YES



0503.doc

Even if the axis feed key is pressed to move the relative axis beyond this range, an alarm is not generated and the axis does not move.

## 5.8 Release + zero point return

The alarm lowering the servo motor level occurred from like the emergency stop during the machining.

If the power is turned off, not to reset the error, each axis of the machine coordinate position will be difference with real machine position.

When power is turned on again to operate the dog type zero return in that situation, the error such as the “STROKE OVER” occurs.

Please follow steps bellow to restore the machine.

1. Press the [MANU] key to be the manual operation mode.
2. Move A,B,C axes to the position where the zero position limit switch for each axis is turned on by the jog mode. (Refer to the alarm message, page13-50.)
3. Move X,Y,Z axes to near the stroke center by the jog mode.
4. Press the [RELEASE] and the [Z.RTN] keys.  
(Pressing the [Z.RTN] key while holding down the [RELEASE] key.)

X,Y,Z axes return to the positive direction, A,B,C axes are moved to the direction which is set by the [\* axis dog type zero return direction] of machine parameter 2 (system 2).

All axes return to the zero point in dog type.

### (Note 1)

**When push the [RELEASE] and the [Z.RTN] keys and A, B, C axes of the zero position limit switch are turned off, alarm [zero point LS is not turned on] is occur.**

### (Note 2)

**When push the [RELEASE] and the [Z.RTN] keys and X,Y,Z axes are near the zero position limit switch, the error “OVER RUN” may occur.**

### (Note 3)

**This operation is effective only when the dog type zero return is operated right after turning on the power.**

# CHAPTER 6

## AUTO OPERATION

6

- 6.1 MDI operation**
- 6.2 Setting tools for magazine**
- 6.3 Selection of main program and operation**
- 6.4 Start**
- 6.5 Halt**
- 6.6 Sequence search**
- 6.7 Restart function**
- 6.8 Manual intervention during operation  
and return**
- 6.9 Single block**
- 6.10 Optional block skip**
- 6.11 Optional stop**
- 6.12 Machine lock**
- 6.13 Dry run**
- 6.14 Lock functions and dry run**
- 6.15 Reset**
- 6.16 Emergency stop**
- 6.17 In - Process edit**
- 6.18 Tape run**

## 6.1 MDI operation

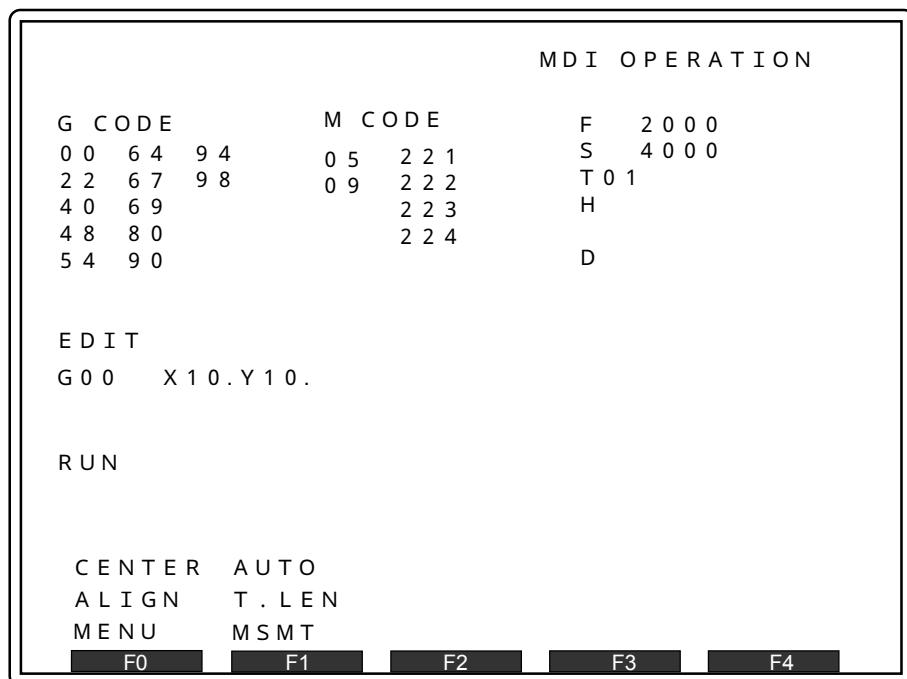
A program is written block by block through the keyboard and executed as in the automatic operation.

- 1) Press the **[MDI]** key to select the MDI operation mode.
- 2) Input the data for one block through the keyboard.  
In case of defective inputting, use the cursor keys, **[INS]** key and **[DEL]** key to modify it. Details of these keys are described in "Chapter 8 Program editing."  
If the **[CAN]** key is pressed, the editing area is cleared.
- 3) When the program is made, press the START switch. Entered program is executed accordingly. The program in execution is displayed in the operation area and disappear upon completion of execution.

The program in the editing area does not disappear unless the power is turned OFF or the **[CAN]** key is pressed.

6

### MDI operation mode screen (example)



The above screen displays the program of one block and the modal information entered in the MDI operation.

The program is edited in the editing area.

The program in execution is displayed in the operation area during operation.

**(Note1) Key inputting is effective only at the program screen.**

**(Note2) Max. 127 characters can be input in one block.**

**If all the characters cannot be entered in one line, the rest  
are entered in the next line automatically.**

**(Note3) When the memory operation is halted, the MDI operation.**

**(Note4) The following codes cannot be commanded in the MDI  
operation.**

G40, G41, G42

G65

G66, G67

G68, G69, G168

M98, M99

M00, M01, M02, M30

M471, M472, M473, M474, M475

M332

M340, M341, M342

M203

M206

M207

\*Mutual intervention of memory operation and MDI operation.

1. G28~G30
2. G36~G39
3. G80 group
4. M200
5. G100, M06

- (1) Memory operation → MDI operation

When these commands are executed in the MDI operation mode, these command are treated as if they did not exist previously.

If the G code in the same group is commanded in the MDI operation mode, an alarm "COMMAND INVALID G,M" is generated.

When the memory operation mode is selected again and operation continues after execution in the MDI mode, the command next to the finished one before the mode change is executed afterwards.

- (2) MDI operation → Memory operation

The above commands 1 and 2 are effective only when the mode is changed during execution. When commanded in the MDI mode, the set status is cancelled at the start of memory operation.

Therefore, the modal status changes as for the commands 3.

## 6.2 Setting tools for magazine

This section describes the procedures to set the tools to be inserted in the magazine.

1. Press the [MDI] key to select MDI mode.
2. Press the [MAGAZN] key to display the <MAGAZINE> screen.
3. Move the cursor to the desired magazine position number using the page and cursor keys. Enter the desired tool number or tool group number and press the [EOB/ENT] key.

**Note : The tool must definitely be inserted in the identically numbered position in the magazine as the one set on the screen. An incorrect setting may cause machine damage or an accident.**

6

### Double-arm ATC display

MAGAZN						
■ SP 0 1	TL L I F E	GRUOUP NO. 0 1	6 0 M	S T A N D A R D	T L	
■ x 0 1	C A P	GRUOUP NO. * * *	* * * * *	S T A N D A R D	T L	
0 2 1 0	T L L I F E	GRUOUP NO.	3 0 H	L A R G E	T O O L	
■ x 0 3	T L L I F E	GRUOUP NO.		S T A N D A R D	T L	
0 4 0 2	T L L I F E	GRUOUP NO. 0 1	5 M	L A R G E	T L	
0 5 1 5	T L L I F E	GRUOUP NO. 0 2	4 0 F	L A R G E	T L	
0 6 2 0	T L L I F E	GRUOUP NO. 0 3		L A R G E	T L	
T O O L N O. _						
0 : C A P S E T T I N G						
F0	F1	F2	F3	F4		

### Armless ATC display

						MAGAZIN
■ 0 1	0 1	TL	LIFE	GROUP 6 0 M	NO. 0 1	STANDARD TL
0 2	0 2	TL	LIFE	GROUP 5 M	NO. 0 2	STANDARD TL
0 3	1 0	TL	LIFE	GROUP 3 0 H	NO.	STANDARD TL
0 4		TL	LIFE	GROUP	NO.	STANDARD TL
0 5	0 2	TL	LIFE	GROUP 5 M	NO. 0 1	STANDARD TL
0 6	1 5	TL	LIFE	GROUP 4 0 F	NO. 0 2	STANDARD TL
0 7	2 0	TL	LIFE	GROUP	NO. 0 3	STANDARD TL
TOOL NO. —						
						F0 F1 F2 F3 F4

6

When the tool life has fallen below the value preset for [EXPIRING] , the corresponding tool life is highlighted.

#### 6.2.1 Setting tool number

Move the cursor to the desired magazine position number and set the tool number.

##### Notes

1. When the tool group is set , if the desired tool number is not registered in this tool group , this tool group is deleted.
2. If the same tool number is attempted to be set at two locations , an alarm will be issued.

#### 6.2.2 Setting tool group number

Move the cursor to the desired tool group for the magazine position number and set the tool number.

##### Notes

1. When the tool number is not set , an alarm will be issued.
2. Even when the tool number is set , if this tool number is not registered in the tool group , an alarm will be issued.

### 6.2.3 Setting tool type

Designate whether the tool to be registered is large (55 mm or more in diameter) or standard. When a large tool is registered, the check boxes of the adjacent pots are marked with the prohibition symbol (X) and no tool can be registered to the adjacent pots. This parameter cannot be set for the TC-S2A,R2A,20A,S2B.

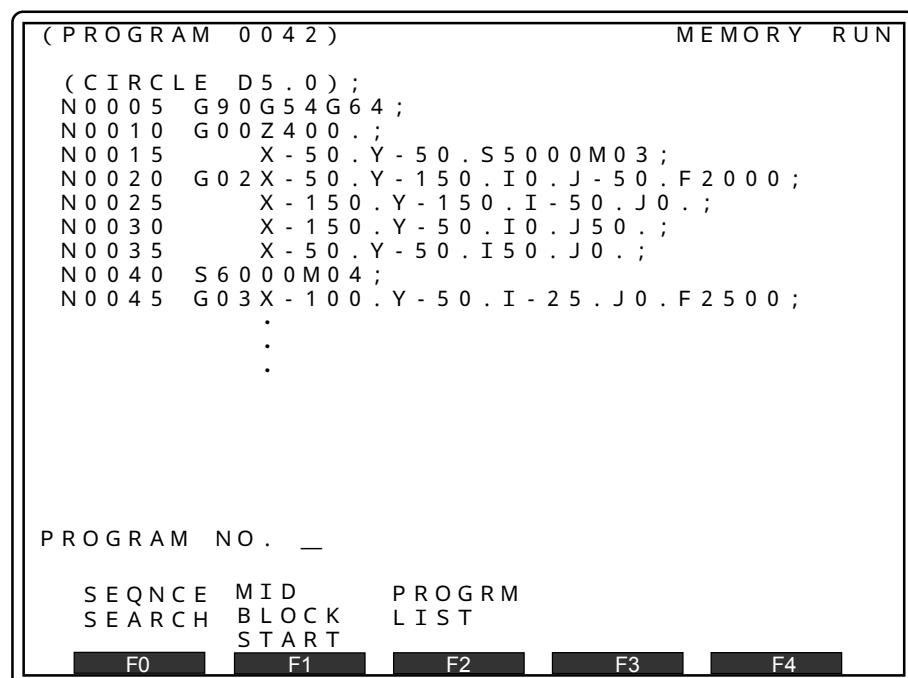
1. Press the [MDI] key to select MDI mode.
2. Press the [MAGAZN] key to display the <MAGAZINE> screen.
3. Move the cursor to the desired magazine tool type using the page and cursor keys.
4. Enter [1] (standard tool) or [2] (large tool) and press the [EOB/ENT] key.  
Standard tool : Tools with an outer diameter smaller than 55 mm.  
Large tool : Tools with an outer diameter of 55 mm or larger.

- \* When setting a large tool, check that no tool is registered to the adjacent pots.  
When changing a large tool, be careful so that this does not make contact with other tools.

### 6.3 Selection of main program and operation

When the program is executed in the memory operation mode, select the program (main program) first from those stored in memory.

- 1) Press the **[MEM]** key to select the memory operation mode.



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2. Input a required program (main program) No. through the keyboard.  
Enter the program number and press the [**EOB/ENT**] key.  
The specified program is read and the subprograms called from the main program are loaded in the NC. Then the screen displays the main program.
  
  3. Press the START switch.

**(Note 1) If the specified main program or the subprogram called from the main program is not found , an alarm is generated. The program previously selected becomes ineffective at this time.**

**(Note 2) If a program is once selected , it is effective until the next program is selected.**

**(Note 3)** The No. of programs which can be loaded into the NC is max. 256 including the main program.

**(Note 4) Setting of program No. is not available during a halt of operation , block search , sequence search and at restart.**

## Main program

```
( P R O G R A M   0 0 4 2 )           M E M O R Y   R U N

( C I R C L E   D 5 . 0 ) ;
N 0 0 0 5   G 9 0 G 5 4 G 6 4 ;
N 0 0 1 0   G 0 0 Z 4 0 0 . ;
N 0 0 1 5   X - 5 0 . Y - 5 0 . S 5 0 0 0 M 0 3 ;
N 0 0 2 0   G 0 2 X - 5 0 . Y - 1 5 0 . I 0 . J - 5 0 . F 2 0 0 0 ;
N 0 0 2 5   X - 1 5 0 . Y - 1 5 0 . I - 5 0 . J 0 . ;
N 0 0 3 0   X - 1 5 0 . Y - 5 0 . I 0 . J 5 0 . ;
N 0 0 3 5   X - 5 0 . Y - 5 0 . I 5 0 . J 0 . ;
N 0 0 4 0   S 6 0 0 0 M 0 4 ;
N 0 0 4 5   G 0 3 X - 1 0 0 . Y - 5 0 . I - 2 5 . J 0 . F 2 5 0 0 ;
.
.
.
```

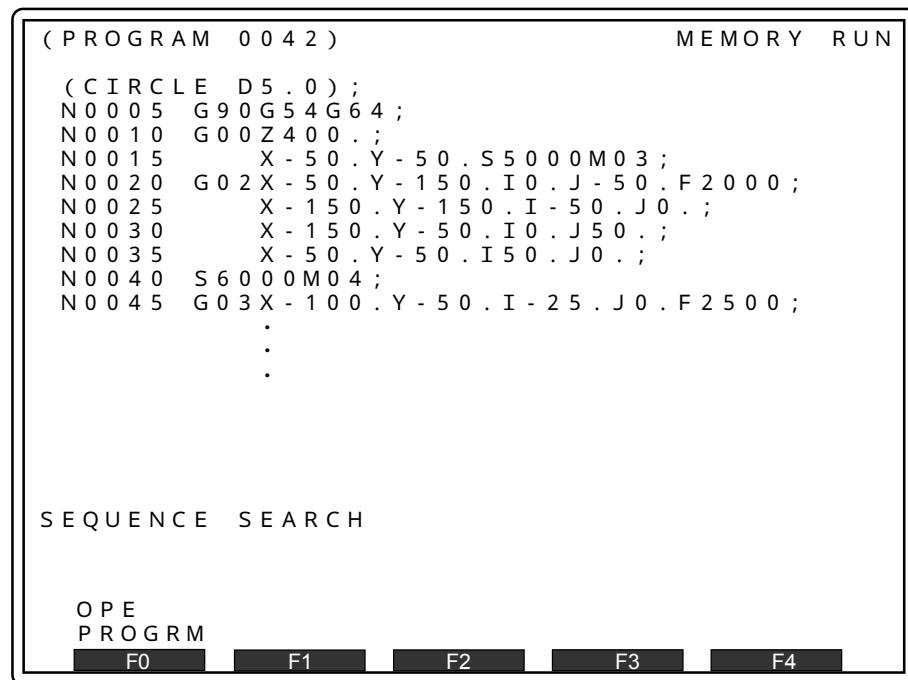
F0 F1 F2 F3 F4

Max. 17 lines can be displayed on one screen.

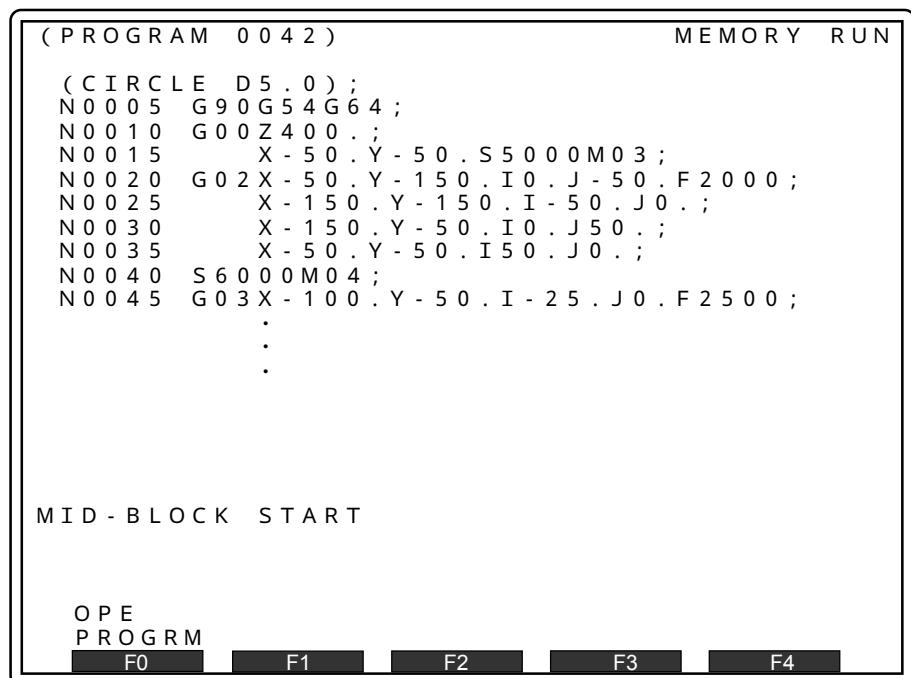
\*The following symbols are displayed on the left side of the screen.

→: Block currently in execution , or to be executed by pressing the START switch.  
↓ : Block currently in interpretation.

When the [F0] key is pressed at the operation program screen , the sequence search screen is displayed.



When the [F1] key is pressed at the operation program screen , the mid - block start screen is displayed.



When the **[F2]** key is pressed at the operation program screen , the program list screen is displayed.

When [1 : YES] is selected for DISPLAY PROGRAM LIST of user parameter 1

( P R O G R A M   0 0 4 2 )		MEMORY	RUN
0 0 4 2	1 5	( C I R C L E   5 . 0 )	
0 0 4 3	3	( S U B P R O G R A M   O F   0 0 4 2 )	
0 0 4 4	1 2	( D E M O   P R O G R A M )	
0 0 4 5	2	( S U B P R O G R A M   O F   0 0 4 4 )	
0 0 4 6	2 1	G 5 4   G 9 0   G 6 4   G 8 0   G 9 9	
.			
.			
.			
P R O G R A M   N O .			
O P E			
P R O G R M			
F0	F1	F2	F3
F4			

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When [0 : NO] is selected for DISPLAY PROGRAM LIST of user parameter 1

( P R O G R A M 0 0 4 2 )					M E M O R Y   R U N		
0 0 0 1	2	0 1 0 1	1 5	1 0 0 1	4	8 0 0 1	4
0 0 0 2	3	0 1 0 2	4	1 0 0 2	2	8 0 0 2	2
0 0 0 3	1 5	0 1 0 3	1	1 0 0 3	1 3	8 0 0 3	1 7
0 0 0 4	4	0 1 0 4	2 0	1 0 0 4	3	8 0 0 4	3
0 0 0 5	1	0 1 0 5	8	1 0 0 5	1	8 0 0 5	1 4
0 0 0 6	2 0	0 1 0 6	1 1	1 0 0 6	3	8 0 0 6	2
0 0 0 7	8	0 1 0 7	3	1 0 0 7	5	8 0 0 7	1 8
0 0 0 8	1 3	0 1 0 8	4	1 0 0 8	6	8 0 0 8	3
0 0 0 9	2	0 1 0 9	2	1 0 0 9	4	8 0 0 9	7
0 0 1 0	6	0 1 1 0	1 7	1 0 1 0	2	8 0 1 0	1
0 0 1 1	1 9	0 1 1 1	3	1 0 1 1	1 5	8 0 1 1	5
0 0 1 2	5	0 1 1 2	1 3	1 0 1 2	3	8 0 1 2	2
0 0 1 3	1 6	0 1 1 3	2	1 0 1 3	4	8 0 1 3	1 4
0 0 1 4	3	0 1 1 4	6	1 0 1 4	2	8 0 1 4	2 0
0 0 1 5	4	0 1 1 5	1 9	1 0 1 5	1 7	8 0 1 5	5
0 0 1 6	2	0 1 0 6	8	1 0 1 6	3	8 0 1 6	2
0 0 1 7	1 7	0 1 0 7	5	1 0 1 7	5	8 0 1 7	1 2
P R O G R A M   N O .							
O P E P R O G R M							
F0		F1		F2		F3	
F4							

6

The registered program number , the memory consumption , and the program contents are displayed from the currently set program first and then in order from the smaller program number.

One screen shows up to 17 lines or 68 lines. The rest of the lines can be seen by pressing the page keys.

By setting the program No. , pressing the [F0] key , or pressing the START switch , the screen changes back to the operation program.

The cursor reverse at the currently set program.

If there is no currently set program , it reverse at the program with the smallest No.

Shifting the cursor to the program to be selected at this screen , pressing the [EOB/ENT] key can also select the program.

## 6.4 Start

The memory operation is started by pressing the START switch.

**(1) Start after resetting**

This function is effective only in the memory operation or the MDI operation. The program is read and executed according to each mode.

**(2) Start after a stop such as a single block stop , program stop , etc.**

Execution starts from the next block in the memory operation mode.

**(3) Start during halt**

The machine motion starts from the halted position.

**(Note 1) The start becomes effective when the START switch is pressed and released.**

**(Note 2) The start does not become effective during the program selection or sequence search.**

**(Note 3) As long as the HOLD switch is pressed , pressing the START switch is not effective.**

**(Note 4) The LED of the START switch illuminates during operation.**

6

## 6.5 Halt

By pressing the HOLD switch during operation , the axis movement can be halted or the program execution can be stopped.

**(1) Halt during axis movement**

The axis movement stops instantaneously.

If motions such as tool change and tapping cycle are in execution at this time , the halt becomes effective upon completion of such motions.

**(2) Halt during dwell**

The halt becomes effective after a specified dwell time elapses.

**(3) Halt during auxiliary motions (S , T and M)**

The halt becomes effective upon completion of such motions.

**(Note 1) The LED of the HOLD switch illuminates and the LED of the START switch turns OFF.**

**(Note 2) The spindle rotation is not stopped by the HOLD switch.**

## 6.6 Sequence search

The sequence search is done in the following procedures to start the operation from halfway of the main program.

### (1) Search by sequence number

- 1) Press the [MEM] key to select the memory operation mode.
- 2) Press the [F0] key.
- 3) Input the sequence No. and number of repetitions through the keyboard.  
Sequence No. ([-] No. of repetitions) [EOB/ENT]  
Can be omitted  
The number of repetitions , when omitted , it is regarded 1.  
Max. number of repetitions is 9999.

6

The sequence No. is searched from the beginning of the main program.  
If the specified sequence No. is not found in the program , an alarm is generated.

**(Note)**

**The sequence No. is recognized as numerical values. Therefore , if  
“0042” is specified through the keyboard and any of N42 , N042 or  
N0042 is found , the search is finished.**

**(2) Search by cursor setting**

- 1) Press the [MEM] key to select the memory operation mode.
- 2) Shift the execution pointer using the cursor keys.

[ ↓ ] .....Feed by one block  
[ ↑ ] .....Return by one block

**(3) Search by page setting**

- 1) Press the [MEM] key to select the memory operation mode.
- 2) Shift the execution pointer using the page keys.

[ ↓ PAGE ] .....Feed by one page  
[ ↑ PAGE ] .....Return by one page

**(Note1) Both the cursor key and the page key are ineffective during the program execution.**

**(Note2) All the blocks skipped for a search become ineffective.**  
Therefore , command the necessary data (S , T , M and G codes) and execute it in the MDI operation.

**(Note3) The sequence search can be executed even when the [BLOCK SKIP] key is ON.**

## 6.7 Restart function

Operation can be restarted from the block which could not be completed due to interruption by tool breakage , etc. during the memory operation.

### (1) Return search

- 1) Press the [MEM] key to select the momory operation mode.
- 2) Press the [F0] key.
- 3) Input the sequence No. and number of repetitions through the keyboard.

Sequence No. ([-] No. of repetitions) [EOB/ENT]

Can be omitted

The number of repetitions , when omitted , it is regarded 1.

Max. number of repetitions is 9999.

6

Program can be returned from the beginning to the sequence No. before the specified one.

This restart operation is the same as the ordinary one except for the axis movement or the S , T and M commands which are not output externally.

**(Note 1) The sequence No. is recognized as numerical values.  
Therefore , if “0042” is specified through the keyboard and any of N42 , N042 or N0042 is found , the search is finished.**

**(Note 2) When the [BLOCK SKIP] key is turned ON , all the blocks containing a slash (/) are skipped.**

## (2) Restart

If there is any S , T or M code to output , finish it before restarting by pressing the [MDI] key.

A restart operation is automatically done by the parameter setting after finishing the motions 1) ~4) as shown below.

Press the START switch after a return search. A restart operation can be done in the following procedures.

### 1. Return of the final S code

The S code is unconditionally executed upon reception of the S command.

### 2. Tool change

A selected tool is replaced with the former one when the M06 or G100 code is output lastly.

### 3. Return of the final M code

The final modal statuses in the M code group regarding the spindle and the coolant are returned one by one.

### 4. Return of the final T code.

The T code is output by the T command.

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The motions up to this step are effective only when the “S.T.M RECOVERY” of the parameter 1 is set to “YES”.

### 5. The Z axis is positioned at the Z origin position at a rapid feedrate.

### 6. The X/Y axes are positioned at max. manual feedrate at the end point of a block before the block specified by the return search.

### 7. The additional axis is positioned at the max. manual feedrate to the point of a block before the block specified by the return search.

### 8. The axis is positioned at max. manual feedrate at the end point of a block before the block specified by the return search.

\* Press the START switch again.

### 9. Start the operation from the specified block consecutively.

S.T.M recovery

```
N01 G90G54;  
N02 T01G100X-100.Y-100.;  
N03 M08;  
N04 G00Z300.S6000M03;  
N05 G01Z250.F1000;  
N06 G00Z300.;  
N07 T02G100X-100.Y-50.Z300.M03;  
N08 G01Z250.;  
N09 G02X-100.Y-50.I0.J-50.F800;  
N10 G00Z400.;  
N11 X-150.Y0.M05;  
N12 M09;  
N13 M30;
```

When the “S.T.M RECOVERY” of the parameter 1 is set to “YES” , in the above program and a restart is to be done from N08 , pressing the START switch after a return search will execute the following steps.

- 1) A tool is replaced with the one at the magazine No.2.
- 2) The spindle is rotated clockwise at 6000 rpm.
- 3) The X/Y axes move to (-100 , -50.) at max. manual feedrate.
- 4) The Z axis move to 300. at max. manual feedrate.

Pressing the START switch again will start a operation from N08.

## 6.8 Manual intervention during operation and return

This function permits manual intervention at a required position during the program operation.

1. Press the HOLD switch during the memory operation , or turn the [SINGL BLOCK] key ON to stop by block.

2. Select the manual operation mode.

If the manual operation mode selecting without executing the procedures of 1., a halt becomes effective.

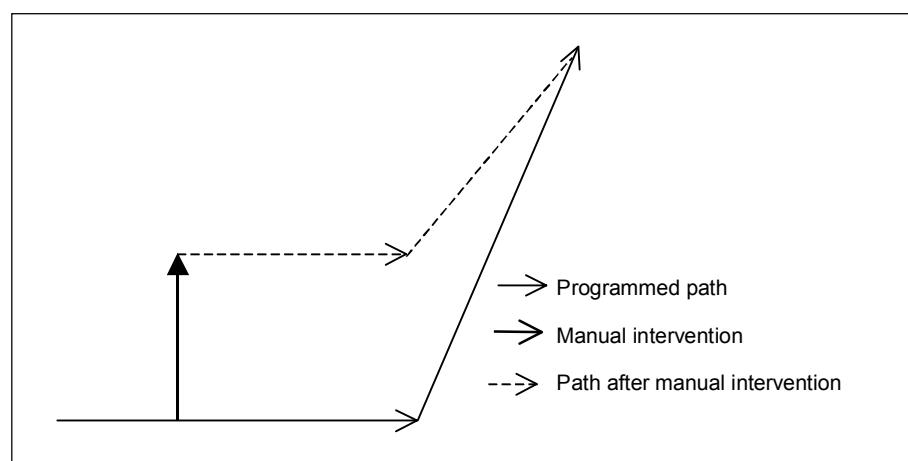
3. Operation in the manual mode is available.

4. When resetting , change back to the memory operation mode and press the START switch.

6

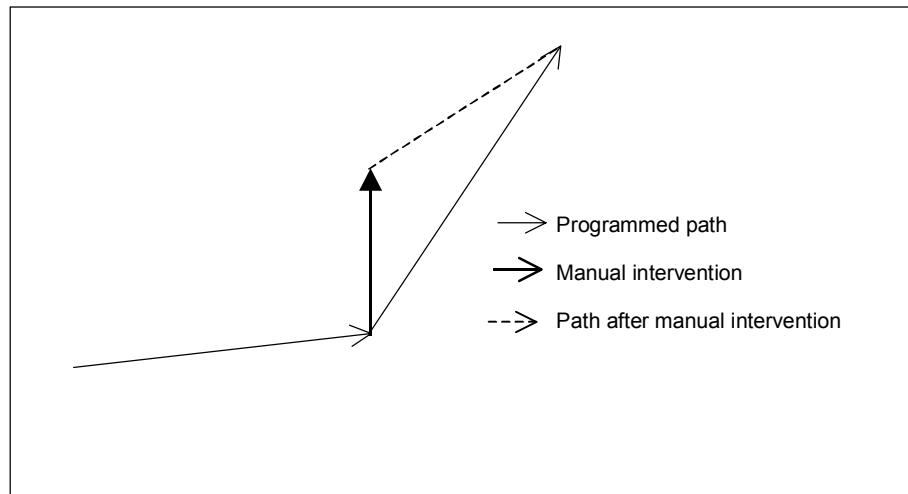
\* Motions after resetting

i) When manual intervention is executed at a halt in the G90 (absolute command) mode, the tool moves while keeping the movement amount as manually intervened up to the block before the manual intervention is finished , then move to the programmed position from the next block.



0701.doc

- ii) When a manual intervention is done at the single block stop position in G90 (absolute command) mode , the tool moves to a programmed position.

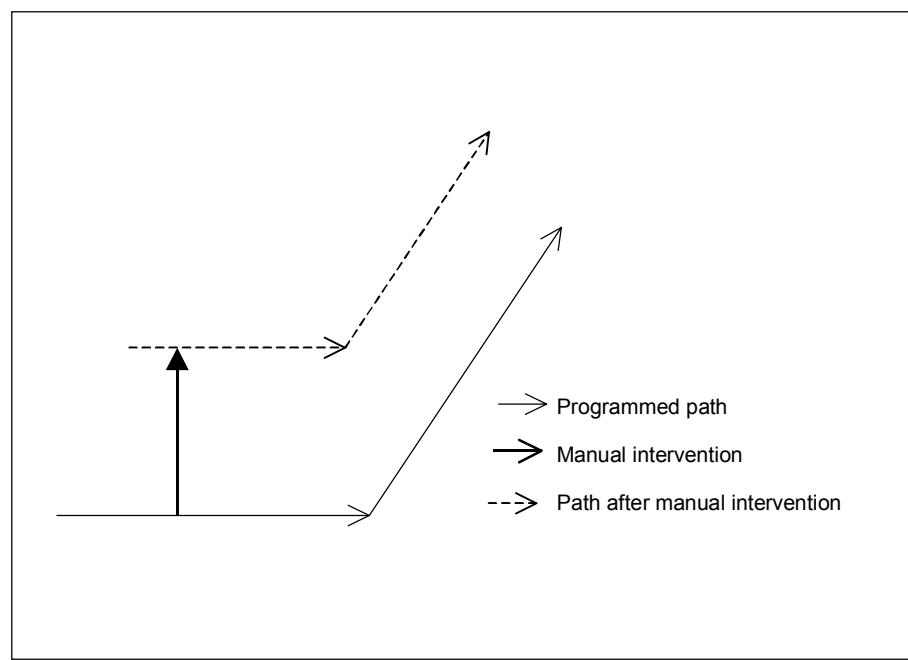


0702.doc

6

- iii) When a manual intervention is done in the G91 (incremental command) mode , the tool moves by an amount manually intervened as long as the G91 is effective.

It is the same as the case of manual intervention in the single block stop status.



0703.doc

**(Note)**

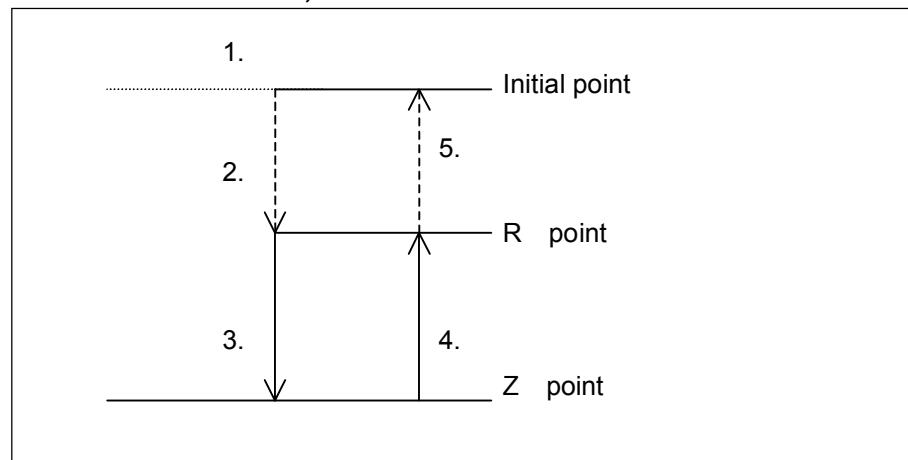
**When operations such as the zero point return , tool change , magazine rotation and pallet indexing are executed in the manual operation mode , the memory operation is reset when the mode changed to the memory operation mode.**

## 6.9 Single block

When the [SINGL BLOCK] key is turned ON, the commands may be executed one block at a time. (The LED on the key illuminates.)

**(Note 1) Operation stops each time a block is executed at the intermediate point when the G28, G29 or the G30 command is given.**

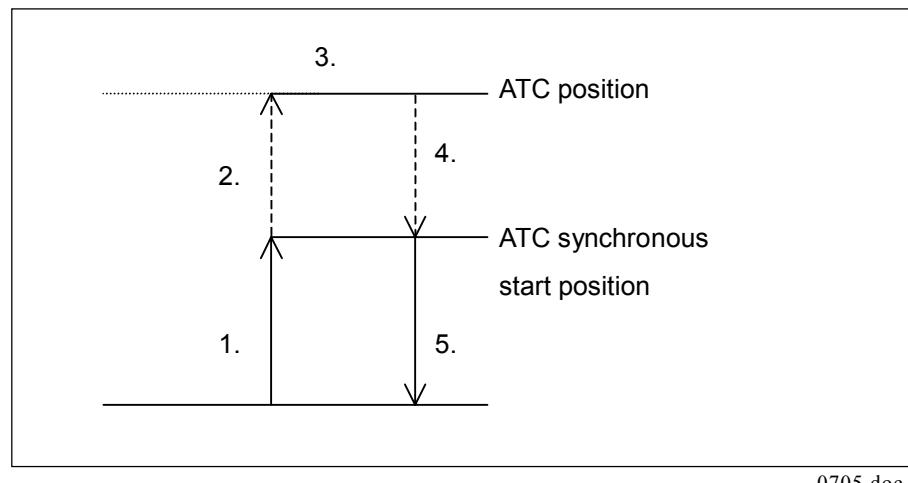
**(Note 2) A single block stop point during the canned cycle is where motions of 1., 2. and 5. are finished.**



6

0704.doc

**(Note 3) A single block stop point during the non - stop ATC motion is where motion of 4. is finished.**



0705.doc

**(Note 4) A single block stop is not available in the M98 or M99 block.**

## 6.10 Optional block skip

When the [BLOCK SKIP] key is turned ON, blocks containing a slash (/) are ignored.  
(The LED on the key illuminates.)

**(Note 1) An optional block skip is effective in the blocks already read  
when the relative switches are actuated.**

## 6.11 Optional stop

A program is stopped at a block specified by M01 in the same way as M00.

Turn the [OPT STOP] key ON. (The LED on the key illuminates.)  
Turn the [OPT STOP] key OFF, M01 is ignored.

6

**(Note 1) In case of a program stop, both the spindle and coolant stop.  
They are not automatically reset at the next start.**

**(Note 2) An optional stop is effective in the blocks already read  
when the relative switches are actuated.**

## 6.12 Machine lock

In the machine lock status, the machine does not move but the position display updates as if the machine were operating. This function can be used for checking programs.

Machine lock is effected when the [MACHINE LOCK] key is turned ON.  
(The LED on the key illuminates.)

**(Note 1) The machine coordinates on the position screen do not  
change at this time.**

**(Note 2) Operation is reset by pressing the [MACHINE LOCK] key.  
Editing or communication function is not affected.**

**(Note 3) Auxiliary function is executed.**

## 6.13 Dry run

When the [DRY RUN] key is turned ON, the feedrate specified in the program is ignored and the machine operates at a feedrate in the manual operation mode.  
(The LED on the key illuminates.)

Dry run operation	
<b>Rapid feedrate</b>	Maximum rapid feedrate
<b>Cutting feedrate</b>	Maximum manual feedrate
<b>Z axis</b>	Commanded value + Dry run offset value

6

1. Note that the dry run function is effective during tapping (G77, G78). Calculate the feedrate from the pitch or number of threads and speed, and limit it.
2. The dry run cannot be changed over during motion.
3. If the cutting feedrate becomes lower than the F command value in the program due to the dry run, use the F command value in the program.
4. If the cutting feedrate exceeds the max. cutting feedrate set by the machine parameter due to the dry run, use the latter one and limit it.

## 6.14 Lock functions and dry run

	Memory operation	MDI operation	Manual operation
<b>Machine lock</b>	○	○	○
<b>dry run</b>	○	○	×
<b>single block</b>	○	○	×

○ : effective  
× : ineffective

## 6.15 Reset

1. The execution pointer returns to the beginning of the main program.
2. The ON/OFF status of various lock functions , dry , single block , optional block skip and optional stop do not change.
3. The tool dia offset , tool length offset , canned cycle , and subprogram modal call are cancelled.
4. Modal G codes other than those in the above 3 are all effective.
5. Both the spindle and coolant stop.
6. Data specified by F , S and T do not change.
7. Specified number of subprograms and canned cycles are deleted.  
If M98 is commanded after a reset , they are executed only once unless a number is specified by L command.

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## 6.16 Emergency Stop

### (1) While Normal Operation

If you press the emergency stop button , all motion will stop immediately.  
Follow the procedure below to recover.

1. Remove the cause made you press the emergency stop button.
2. Release the button turning to the reset direction.
3. Press [RESET] key.

### (2) While Tool Change

1. Remove the cause made you press the emergency stop button.
2. Press [MANU] key to change to manual mode.
3. Press [RESET] key.

<If the tool magazine is rotating :>

4. Press [RESET] key while pressing down the [RELSE] key and do not release the [RELSE]key.
5. Press [MAGAZN] key while pressing down the [RELSE] key. The tool magazine will index to the next position.
6. Press [-Z] key while pressing down the [RELSE] key to move down the spindle head lower than the machine zero.

<If the tool magazine is not rotating :>

4. Press [-Z] key while pressing down the [RELSE] key to move down the spindle head lower than the machine zero.  
(Note) Refer to “Resetting ATC” in “Alarm message” as how to reset during ATC arm rotation.

### **(3) While Tap is Cutting in the Work**

**6**

1. Loosen the tap holder.
2. Release the emergency stop button.
3. Press [MANU] key to change to manual mode.
4. Press [RESET] key.
5. Press [+Z] key to pull out the tap from the holder.

**(Note) Measure the tool length after you set the tap again.**

**(Note) The follow - up function makes it unnecessary to operation machine zero return after the servo control comes off by the emergency stop.**

## 6.17 In-Process Edit

### 6.17.1 Program Edit or Modification during a Machine Operation

A new program can be prepared and already-prepared program can be edited during a memory operation.

- 1 Set the PROTECT switch on OFF position.
- 2 Press [EDIT] key with [MEM] key kept pressed.

If these keys are pressed individually, the memory operation stops when [EDIT] key is pressed.

Be sure therefore to press [EDIT] key with [MEM] key kept pressed.

The lamps on both [MEM] and [EDIT] keys are lit.

The program edit menu screen appears on the display.

- 3 Press a program number other than the one currently executed:  
a new program can be prepared or a program given can be reedited.
- 4 When a program preparation or edit is completed, set the PROTECT switch on ON position.

## 6.17.2 Program Reference during a Machine Operation

Program currently being executed can be edited during memory operation.

- 1 Press [EDIT] key with [MEM] key kept pressed:  
Press these 2 keys simultaneously.

When program is edited during memory operation, [PRGRM IN EXECUTION] alarm message appears. Editing operations are same as those performed in normal state.

When [F0] is pressed after editing, [OPERATING. DO YOU CHANGE?] confirmation message appears.

**(Note) When program is edited during operation, changes are reflected after current program operation has been completed.**

## 6.18 Tape run

### 6.18.1 Tape run procedure

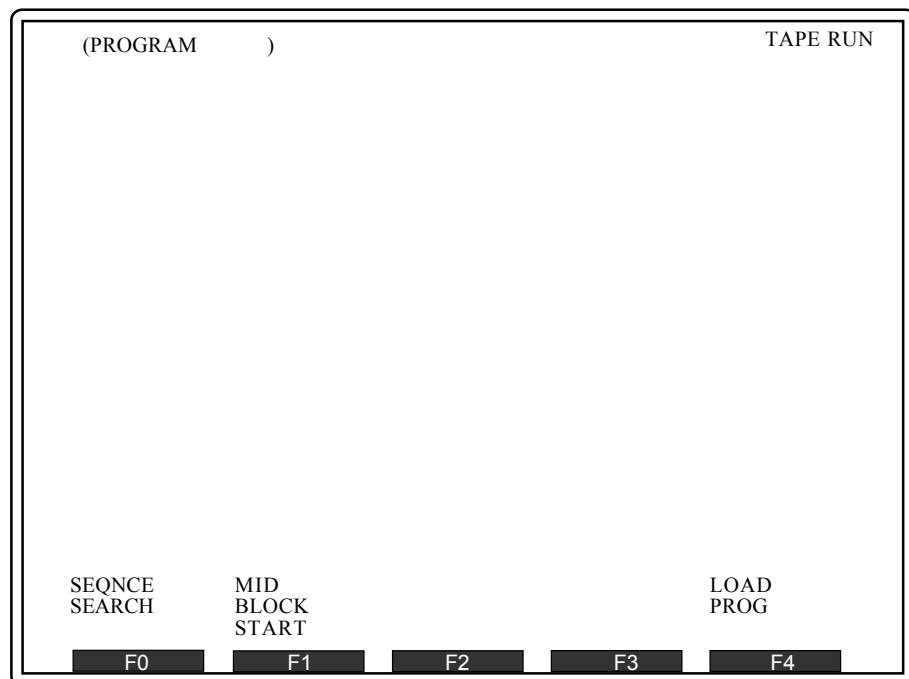
The tape run function operates the machine while reading the program from an external I/O device.

This function is used when executing a large program that cannot be stored in the NC. Set the following before performing tape run.

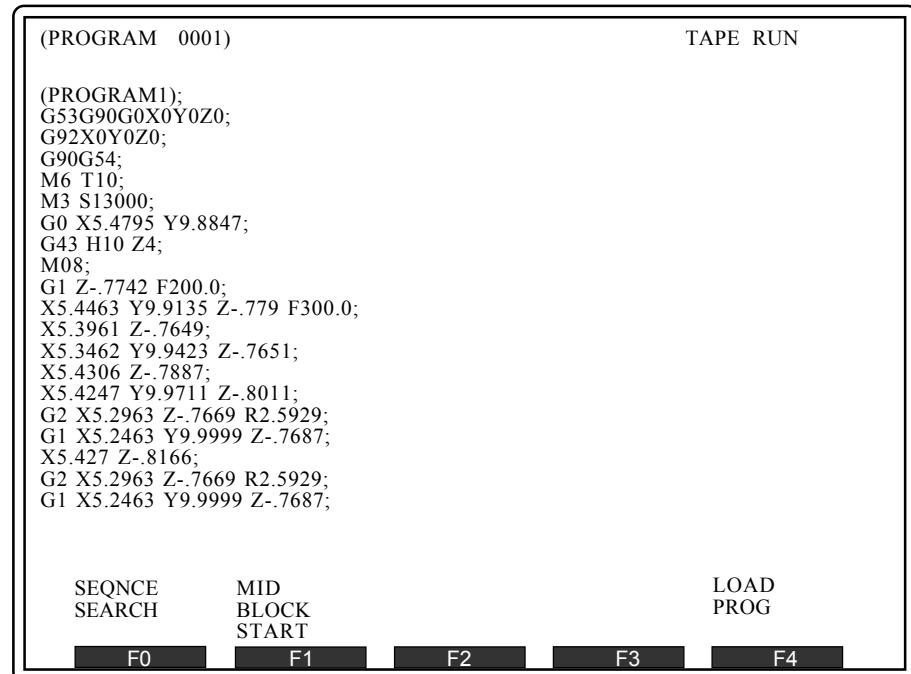
- Set [SELECT MEMORY RUN TYPE] of [USER PARAMETER (SWITCH 1)] to [1:TAPE].
- Set [COMMUNICATION OBJECT] of [USER PARAMETER (COMMUNICATION)] to [PTP/PTR].
- Check the parameters set for [USER PARAMETER (COMMUNICATION)] and those set for the external I/O device.

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When memory operation mode is selected, the <Program> screen below appears.



Press the [START] key and load the program from the external I/O device. Tape run starts.



When the program is the one you want, press the [START] key. Tape run starts. If the program is not the one you want, reset the external I/O device and then press the [F4] key to load the program from the external I/O device.

#### [SEQUENCE SEARCH]

When the [F0] key is pressed on the <Program> screen, the <Sequence Search> screen appears.

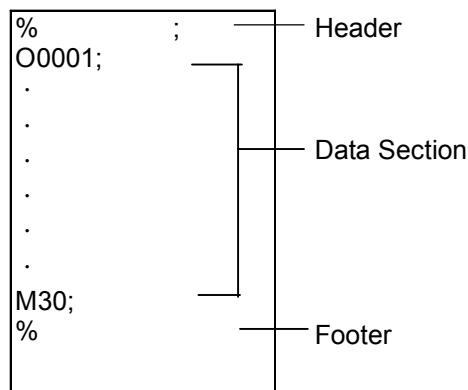
Sequence search is a function that enables a search to be performed according to the sequence number and the number of repeats. The Set Cursor and Specify Page search options are not available.

See 6.6 Sequence Search for sequence search procedure.

#### [RESTART]

When the [F1] key is pressed on the <Program> screen, the <Restart> screen appears. See 6.7 Restart Function for details of restart function.

## &lt;Program format&gt;



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- Header : The section from % to EOB is recognized as the header.  
The header is not displayed on the screen. It is only read and then discarded.
- Data section : The data section is regarded as the operation program.  
The program number is included in the first block of the data.  
The four-digit number after address O is recognized as the program number, and the program number is excluded when the program is loaded.  
When address O does not exist, the four-digit number after address N is recognized as the program number.  
When address O, address N, and : (colon) do not exist, it is considered that there is no program number.  
“O” or “N” in the second block and after the data section are not recognized as the program number.
- Footer : When % appears after the header is read, this section is regarded as the footer.

## &lt;Input program number check&gt;

An alarm occurs when the following conditions are generated:

- The data is set for [PALLET 1 PROGRAM NUMBER] and [PALLET 2 PROGRAM NUMBER] of [USER PARAMETER (QUICK TABLE)].
- The pallet select switch is set to any keys except [OFF].
- The program number set for [USER PARAMETER (QUICK TABLE)] is not the same as the pallet program number.

This is not checked when there is no data set for these parameters.

In tape run mode, the pallet is loaded when operation is started although [PALLET 1 CARRY IN MOTION] of [USER PARAMETER (QUICK TABLE)] is set to [1ST TOOLCHNG].

### **<Reserved commands>**

The following codes cannot be used for tape run.

Subprogram call (M98, G65, G66)

Tool breakage detection (M203)

Z-axis thermal displacement offset (M206, M207)

M99

Macro (WHILE DO ~ END)

6

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# CHAPTER 7

## DATA BANK

- 7.1 Setting of working coordinates zero position**
- 7.2 Setting of tool data**
- 7.3 Setting of macro variable**
- 7.4 Setting of user parameter**

# 7 Data bank

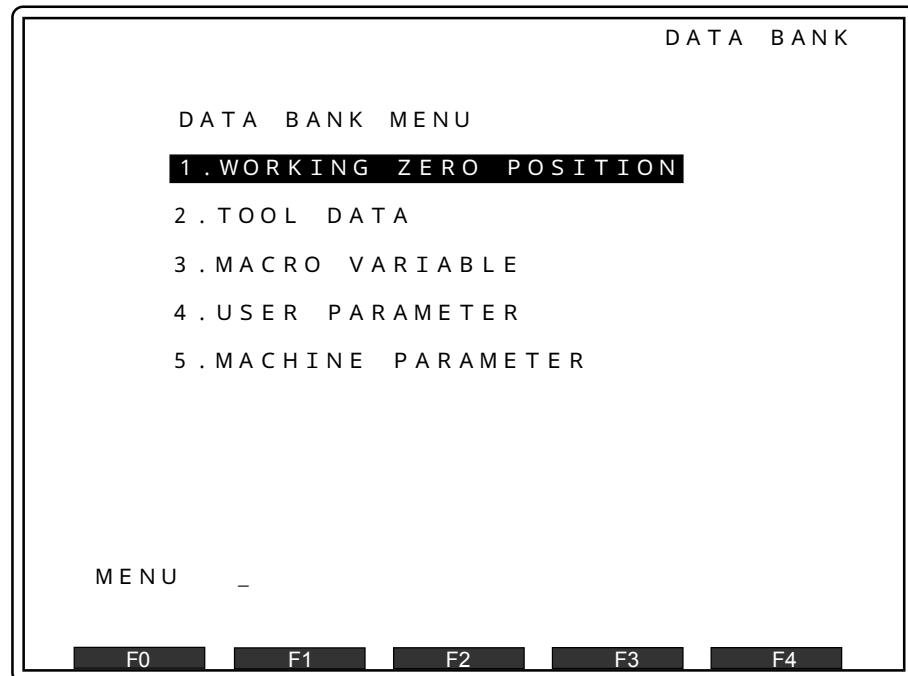
The data necessary for machine operation are composed of the following five:

1. Working coordinates zero position
2. Tool data
3. Macro variable
4. User parameter
5. Machine parameter

Setting of data is shown below.

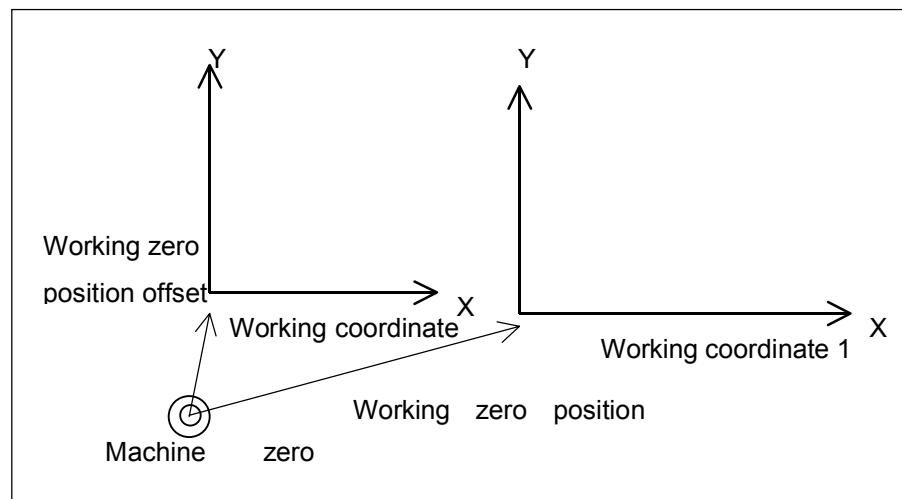
1. Press the [DATA BANK] key displays the data bank menu.
2. Press the menu No. and press [ENT] key.  
Or shift the cursor to the menu No. and press the [ENT] key.  
After this operation is finished, setting of each data is available.

**Data bank screen**



## 7.1 Setting of working coordinates zero position

Set the zero position in the working coordinate for the six codes from G54 through G59 and 48 sets from extension working coordinate from 1 through 48.



10C01.doc

Press the [1] and [ENT] keys at the data bank menu screen, or shift the cursor to the menu No.1 and press the [ENT] key. The following items are displayed on the screen.

7

WORKING ZERO POSITION			DATA BANK		
G 5 4			G 5 5		
X	■	- 1 0 0 . 0 0 0	- 1 5 0 . 0 0 0	0 . 0 0 0	
Y		- 1 0 0 . 0 0 0	- 5 0 . 0 0 0	0 . 0 0 0	
Z		5 0 . 0 0 0	1 0 0 . 0 0 0	0 . 0 0 0	
A		0 . 0 0 0	0 . 0 0 0	0 . 0 0 0	
B		0 . 0 0 0	0 . 0 0 0	0 . 0 0 0	
C		0 . 0 0 0	0 . 0 0 0	0 . 0 0 0	
G 5 7			G 5 9		
X		0 . 0 0 0	0 . 0 0 0	0 . 0 0 0	
Y		0 . 0 0 0	0 . 0 0 0	0 . 0 0 0	
Z		0 . 0 0 0	0 . 0 0 0	0 . 0 0 0	
A		0 . 0 0 0	0 . 0 0 0	0 . 0 0 0	
B		0 . 0 0 0	0 . 0 0 0	0 . 0 0 0	
C		0 . 0 0 0	0 . 0 0 0	0 . 0 0 0	
G 5 4 X —					
E D I T		E X T E N D		A U T O	
E N D		C O O R D .		S E T	
M O D E					
F0		F1		F2	
				F3	
				F4	

Press the [F2] key. The following items are displayed, and extension working coordinates from 1 through 48 can be set.

EXTENSION		WORKING	ZERO	POSITION	
	1	2	3		
X	- 1 5 0 . 0 0 0	0 . 0 0 0	0 . 0 0 0		
Y	- 1 5 0 . 0 0 0	0 . 0 0 0	0 . 0 0 0		
Z	1 0 0 . 0 0 0	0 . 0 0 0	0 . 0 0 0		
A	0 . 0 0 0	0 . 0 0 0	0 . 0 0 0		
B	0 . 0 0 0	0 . 0 0 0	0 . 0 0 0		
C	0 . 0 0 0	0 . 0 0 0	0 . 0 0 0		
	4	5	6		
X	0 . 0 0 0	- 1 5 0 . 0 0 0	0 . 0 0 0		
Y	0 . 0 0 0	- 5 0 . 0 0 0	0 . 0 0 0		
Z	0 . 0 0 0	1 0 0 . 0 0 0	0 . 0 0 0		
A	0 . 0 0 0	0 . 0 0 0	0 . 0 0 0		
B	0 . 0 0 0	0 . 0 0 0	0 . 0 0 0		
C	0 . 0 0 0	0 . 0 0 0	0 . 0 0 0		
1 X	—				
E D I T		N O R M A L	A U T O		
E N D		C O O R D .	S E T		
M O D E					
F0		F1	F2	F3	F4

## 7

### 7.1.1 Setting by the data inputting

1. Press the cursor keys and shift the cursor to the coordinate axis to specify.
2. Input the data and press [ENT] key. The data is set at the position specified by the cursor, and cursor moves to the next item.
3. After setting is finished, press the [F0] key.

The following functions are displayed.

E D I T	C A N C E L	E D I T		
E N D	E D I T	M O D E		
F0	F1	F2	F3	F4

Pressing [F0] key enters the data and finish setting.

Pressing [F2] key finishes setting, without entering the data.

Pressing [F4] key returns to the edit status.

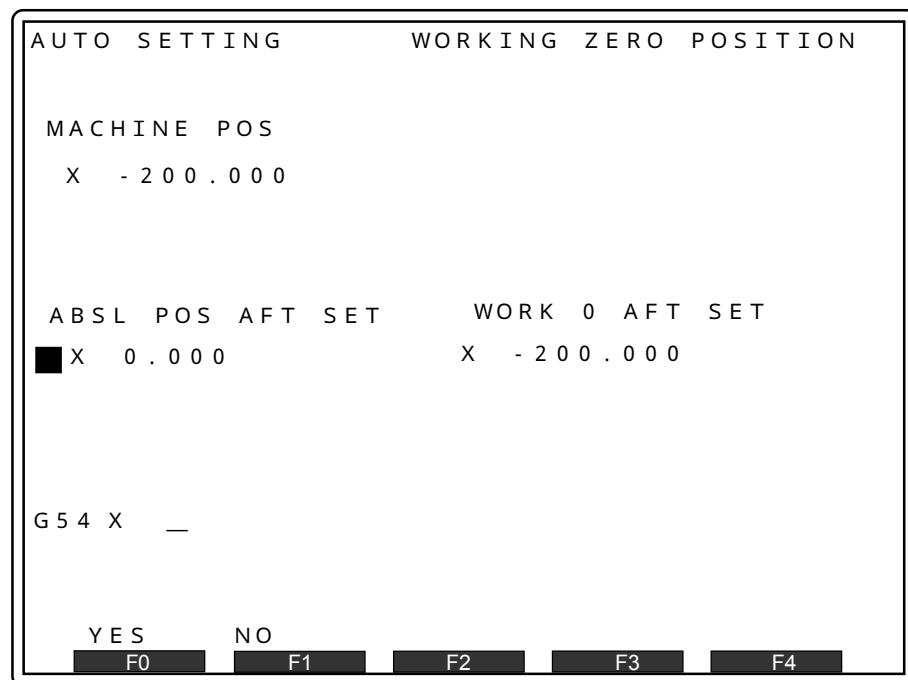
### 7.1.2 Automatic setting

When the current machine position is to be set as the new zero position, the offset amount from the machine coordinates zero position is calculated inside the machine.

1. Shift the cursor to the axis to set the new coordinates.
2. When the [F4] key is pressed, the following screen is displayed according to the axis specified by the cursor.

If this key is pressed before any zero point return is executed after the power ON, an alarm message “ZERO RTN NOT DONE” is displayed and the screen does not change to the automatic setting screen.

When the cursor is at the X or Y axis, the screen as below is displayed.



When the [DEL] key is pressed, the data on the axis specified by the cursor is deleted and the cursor moves to the next item.

7

When setting the data on the X axis, press the [F0] key after setting.

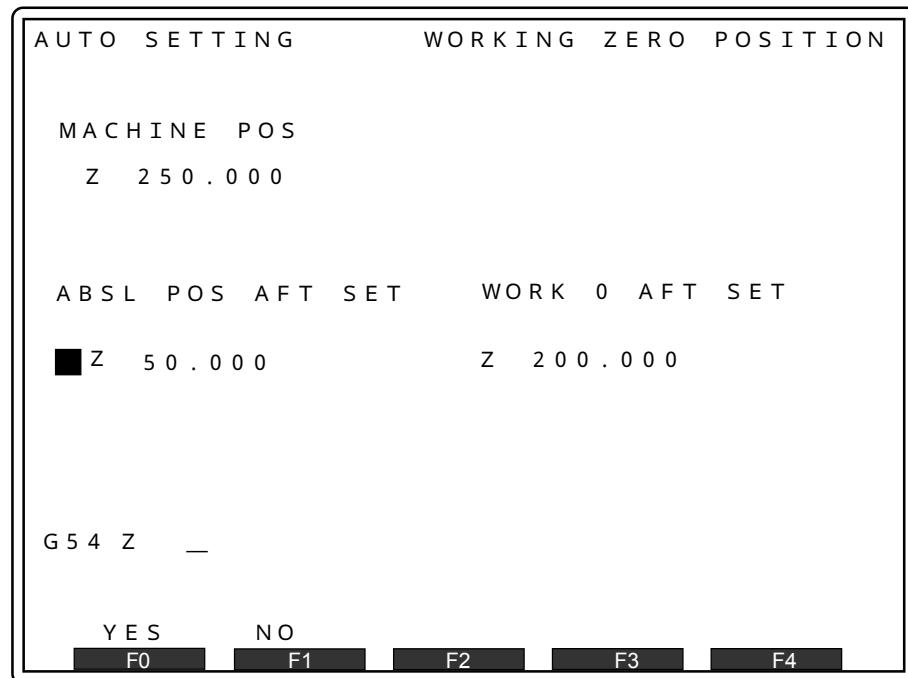
Pressing the [F0] key executes the automatic setting and displays the previous screen.

If the data is available, the axis functions as set in the data. And the axis moves back to the previous position if the data is deleted.

Pressing the [F1] key changes back to the previous screen before automatic setting is done.

When the automatic setting is done, the cursor moves to the Y axis.

When the cursor is at the Zaxis, the screen as below is displayed.



When the [DEL] key is pressed, the data specified by the cursor is deleted.

7

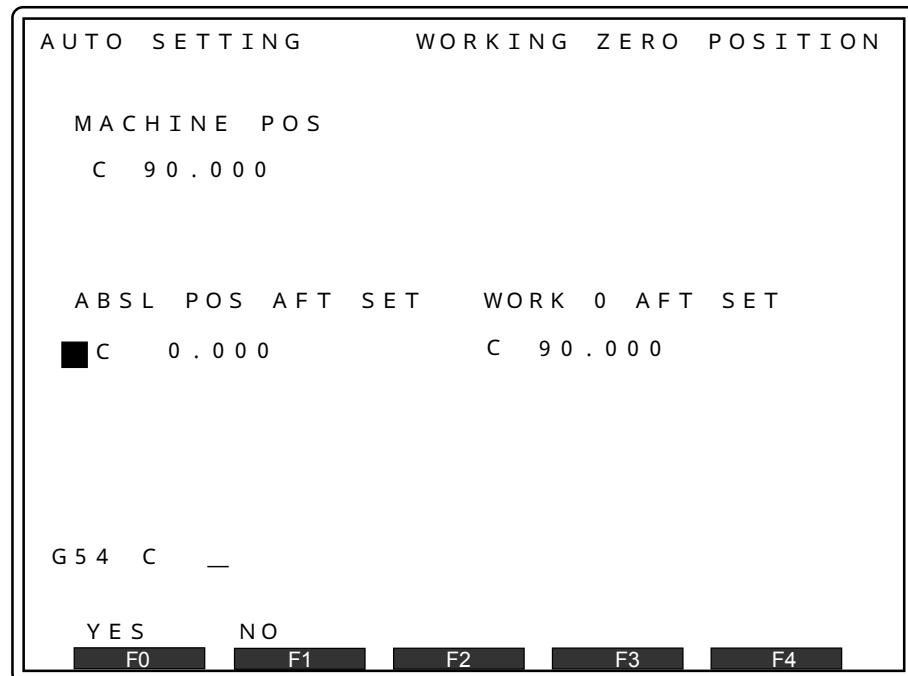
When setting the data on the Z axis, press the [F0] key after setting.

Pressing the [F0] key executes the automatic setting and displays the previous screen. If the data is available, the axis functions as set in the data. And the axis moves back to the previous position if the data is deleted.

Pressing the [F1] key changes back to the screen without executing the automatic setting.

When the automatic setting is executed, the cursor moves to the 4th axis.

When the cursor is at the 4th axis, the screen as below is displayed.



When the [DEL] key is pressed, the data specified by the cursor is deleted.

When setting the data on the 4th axis, press the [F0] key after setting.

Pressing the [F0] key executes the automatic setting and displays the previous screen. If the data is available, the axis functions as set in the data. And the axis moves back to the previous position if the data is deleted.

Pressing the [F1] key changes back to the screen without executing the automatic setting.

When automatic setting is executed, the cursor moves to the 5th axis.

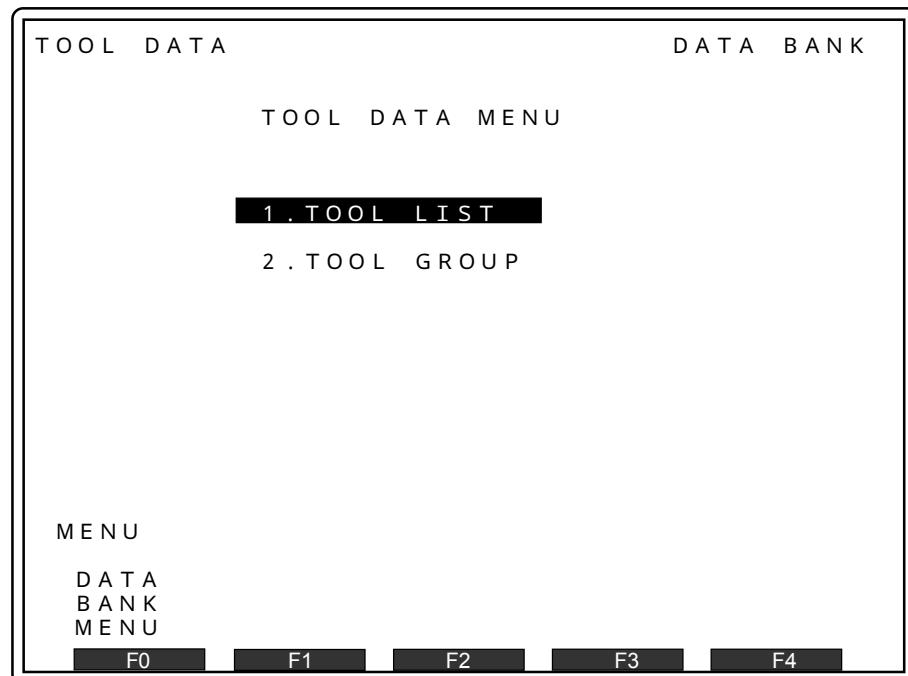
Note: When [4 OPTION] of machine parameter 2 is set to [0:NO],

[NO OPTION (4)] alarm occurs when the [F4] key is pressed.

Automatic setting for 4th axes also applies to that for 5th and 6th axes.

## 7.2 Setting of tool data

Press the [2] and [ENT] keys at the data bank menu screen, or shift the cursor to the No.2 and press [ENT] key. The following items are displayed on the screen.



### 7.2.1 Tool list setting

The tool length offset, tool diameter, and tool life differ according to the type of tools. Therefore, this data must be preset.

There are 99 sets of data.

Press the [1] and [ENT] keys at the tool data menu screen, or shift the cursor to the No. 1 and press [ENT] key. The following items are displayed on the screen.

TOOL LIST		TOOL DATA	
TOOL NO.	1	2	3
TL OFFSET	150.000		
FINE OFFST	0.000		
TL COMP	12.000		
FIN COMP	0.000		
INIT LIFE	100F		
EXPIRING	50F		
TOOL LIFE	95F		
TOOL NO.	4	5	6
TL OFFSET	160.000		
FINE OFFST	20.000		
TL COMP	2.000		
FIN COMP	0.000		
INIT LIFE	*****		
EXPIRING	*****		
TOOL LIFE	*****		
TOOL NO.	--		
EDIT		COPY	PASTE
END			AUTO
MODE			SET
	F0	F1	F2
			F3
			F4

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Press the [F4] key, and the appropriate value is automatically set to [TOOL LENGTH OFFSET].

When the cursor is placed at [TOOL NO.] on the <TOOL LIST> screen

Press the [F2] key and the selected tool data can be copied.

In addition, the tool data can be cut using the [DEL] key on the operation panel and then copied using this key.

The copied data is retained until other data is copied or power is turned off.

[F3]:PASTE

The copied data can be pasted.

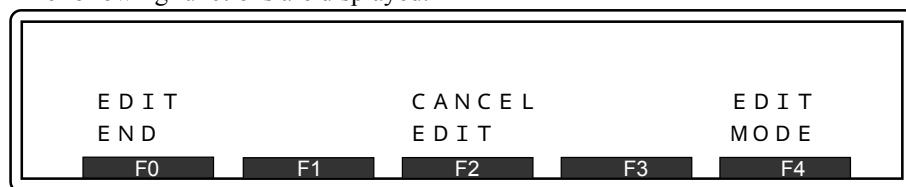
When the cursor is placed at [TL OFFSET], [FINE OFFST], [TL ø COMP], or [ø FIN COMP].

Enter the value and press [F2]. The value is added to the current setting.

## 7.2.2 Setting by the data inputting

- 1.Keep pressing the page key until the desired tool is displayed, and move the cursor to the desired data by pressing the cursor key, or move the cursor to the tool number, enter the desired tool number, and press the [ENT] key.
2. Input the data and press [ENT] key. The data is set at the position specified by the cursor, and cursor moves to the next item.
- 3 .After setting is finished, press the [F0] key.

The following functions are displayed.



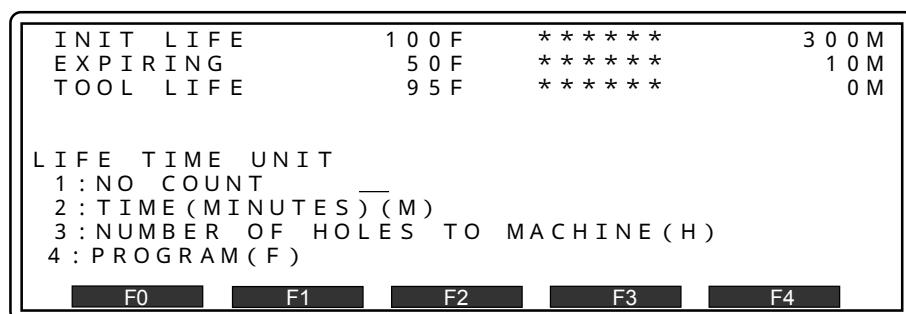
Pressing [F0] key enters the data and finish setting.

Pressing [F2] key finishes setting, without entering the data.

Pressing [F4] key returns to the edit status.

## 7.2.3 Setting tool life

Each tool can have LIFE TIME UNIT. Set LIFE TIME at first.



Select the one among four items.

### (1) NO COUNT

No tool management is needed.

(When set, [\*\*\*\*\*] is displayed to [INIT LIFE], [TOOL LIFE EXPIRING], and [TOOL LIFE].)

### (2) TIME (MINUTES)(M)

Managed by minutes

Tool life is calculated down minutes by minutes as cutting feed time going on.

### (3) NUMBER OF HOLES TO MACHINE(H) Managed by holes Machined

Tool life is reduced each time single boring is performed in the canned cycle.

### (4)PROGRAM(F)

Tool life is controlled by the frequency of program execution.

When executing M30, tool life of the tool with which cutting is performed is reduced.

After setting of LIFE TIME UNIT ,cursor moves to INTIAL LIFE

INIT LIFE	1 0 0 M	*****	3 0 0 M
EXPIRING	5 0 M	*****	1 0 M
TOOL LIFE	9 5 M	*****	0 M

INIT LIFE —

F0 F1 F2 F3 F4

Set the initial tool life value for [INIT LIFE], and the same value is automatically entered for [TOOL LIFE].

When the initial value has been set, the cursor moves to [EXPIRING].

#### [EXPIRING]

Set the estimated tool life so that operators are aware of the end of a tool's life. When the tool has been used for longer than the estimated life, [TL LF EXPIRING (0001)] alarm occurs. At this time, memory operation is still possible.

#### [TOOL LIFE]

Set the tool life.

The tool life is reduced. When the tool life has been reached,

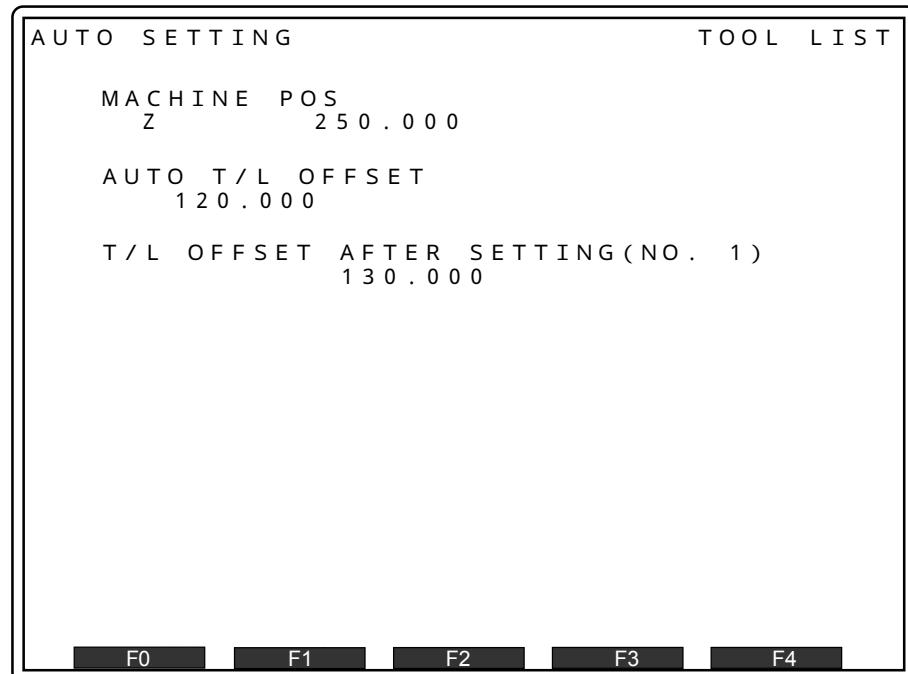
[TOOL LIFE END (0001)] alarm occurs and machine operation becomes impossible.

## 7.2.4 Automatic setting of tool length offset

Move the cursor to the desired tool and press the [F4] key.

The screen below is displayed.

If this key is pressed before any zero point return is executed after the power ON, an alarm message “ZERO RTN NOT DONE” is displayed and the screen does not change to the automatic setting screen.



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When the [F0] key is pressed, the value of “(MACHINE POS of Z)-(AUTO TOOL LENGTH OFFSET)” is set for the tool length offset and the previous screen is displayed.

When the [F1] key is pressed, the previous screen is displayed without executing the automatic setting.

When automatic setting is executed, the cursor moves to the next.

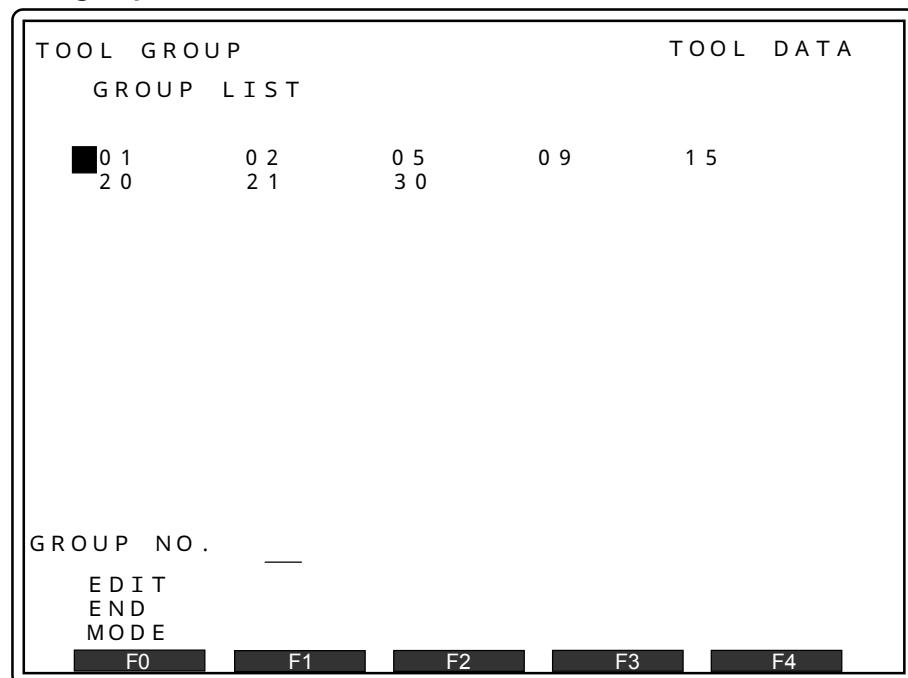
The value of AUTO TOOL LENGTH OFFSET is set by the user parameter.

### 7.2.5 Tool group setting

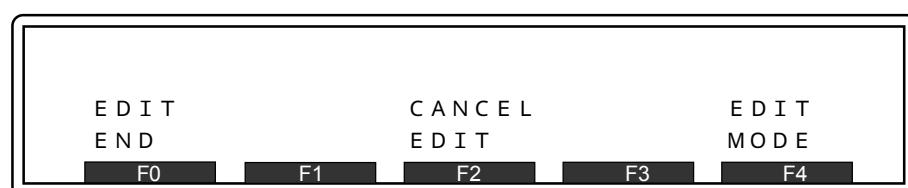
Multiple tools can be registered to one tool group so that the next tool in the same group is selected to continue machining when the life of the current tool has been reached. Tools can be set in up to 30 groups.

Press the [2] and [ENT]keys at the tool data menu screen, or shift the cursor to the No.2 and press [ENT]key. The following items are displayed on the screen.

#### Tool group list screen



Groups with no tool registered are not displayed. When setting has been completed, press the [FO] key. Functions as in the example below are displayed.



Pressing [FO] key enters the data and finish setting.

Pressing [F2] key finishes setting, without entering the data.

Pressing [F4] key returns to the edit status.

## 7.2.6 Details of tool group

Register tools to the group selected on the <Tool Group List> screen.

Up to 30 tools can be registered to one group.

Enter the desired group number on the <Tool Group List> screen and press the [ENT] key or move the cursor to the group number and press the [ENT] key.

The items as in the example below, are displayed.

### Tool group details screen

TOOL GROUP				TOOL DATA							
GROUP 05											
TL	NO.	TL	OFFSET	TL	COMP	TL	LIFE				
1	1	-	1 0 . 0 0 0	-	0 . 0 1 0	3	0 0 0 0 F				
2	3	-	5 . 0 0 0	0 . 0 0 0	0 . 0 0 0	5	0 0 0 H				
3	5	0 .	0 0 0 0	0 . 0 0 0	0 . 0 0 0	5	0 0 M				
4	9	0 .	0 0 0 0	0 . 0 0 0	0 . 0 0 0	*	*** * * *				
5											
6											
7											
8											
9											
1 0											
1 1											
1 2											
1 3											
1 4											
1 5											
TOOL NO. —											
GROUP											
LIST											
F0		F1		F2		F3					
F4											

When setting has been completed, press the [F0] key and the display returns to the <Tool Group List> screen.

## 7.3 Setting of macro variable

Press the [3] and [ENT] keys at the data bank menu screen, or shift the cursor to the No.3 and press [ENT] key.

The following items are displayed on the screen.

M A C R O		D A T A   B A N K	
V A R I A B L E	V A L U E	V A R I A B L E	V A L U E
# 1 0 0	1 0 . 0 0 0	# 1 0 1	- 1 0 . 0 0 0
# 1 0 2	0 . 0 0 0	# 1 0 3	0 . 0 0 0
# 1 0 4	0 . 0 0 0	# 1 0 5	0 . 0 0 0
# 1 0 6	0 . 0 0 0	# 1 0 7	0 . 0 0 0
# 1 0 8	1 0 0 . 0 0 0	# 1 0 9	0 . 0 0 0
# 1 1 0	0 . 0 0 0	# 1 1 1	0 . 0 0 0
# 1 1 2	0 . 0 0 0	# 1 1 3	0 . 0 0 0
# 1 1 4	0 . 0 0 0	# 1 1 5	- 3 0 0 . 0 0 0
# 1 1 6	0 . 0 0 0	# 1 1 7	0 . 0 0 0
# 1 0 0	—		
	E D I T		
	E N D		

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### 7.3.1 Setting by the data inputting

1. Keep pressing the page key until the desired macro variable appears, and move the cursor to the desired number by pressing the cursor key.
2. Input the data and press [ENT] key. The data is set at the position specified by the cursor, and cursor moves to the next item.
3. After setting is finished, press the [F0] key.

The following functions are displayed.

E D I T	C A N C E L	E D I T
E N D	E D I T	M O D E
F0	F1	F3

Pressing [F0] key enters the data and finish setting.

Pressing [F2] key finishes setting, without entering the data.

Pressing [F4] key returns to the edit status.

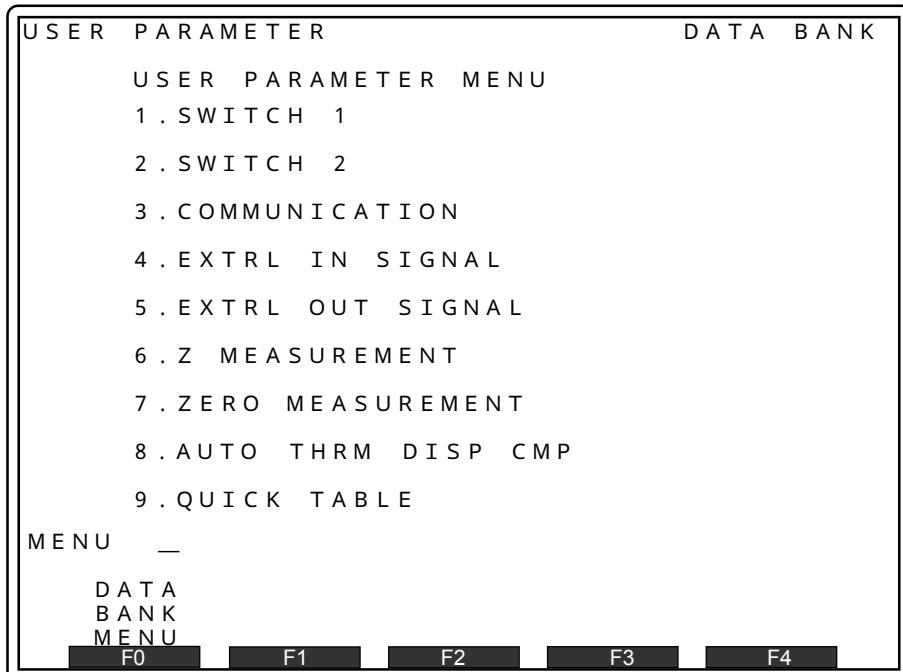
**Note 1: Macro variables from #100 to #199 are valid only when power is supplied. When power supply is shut off, the data is initialized.**

4. To delete the data, move the cursor to the variable to be deleted and press the [DEL] key.

## 7.4 Setting of user parameter

The data necessary for machine operation is previously set upon shipment in the 9 categories. Keep the parameter sheet attached to the machine carefully as it is essential for operating the machine correctly.

**User Parameter menu screen**



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### Modification of parameter

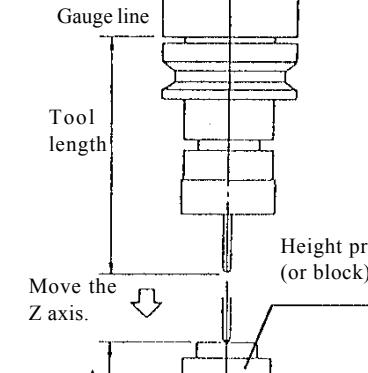
1. Set the PROTECT switch to OFF.
2. Press the [DATA BANK] key to select the data setting mode, and display the data bank menu screen.
3. Press the [4] and [EOB/ENT] keys at the data bank menu screen, or shift the cursor to the menu No. 4 and press [EOB/ENT] key and display the user parameter menu screen.
4. Input the menu No. of parameter to modify and press the [EOB/ENT] key, or shift the cursor to the menu No. and press the [EOB\ENT] key.
5. Shift the cursor to the item to modify the data using the page keys and the cursor keys. Input the necessary data and press the [EOB/ENT] key.
6. After setting the data, press the [F0] key and finish modification.
7. Set the PROTECT switch to ON.
8. Some items require resetting after entering, or power ON operation again.

### 7.4.1 User Parameter 1 (switch 1)

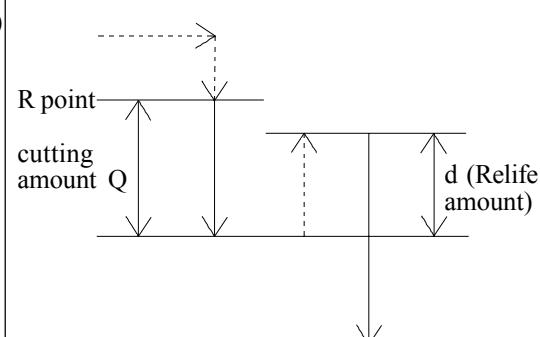
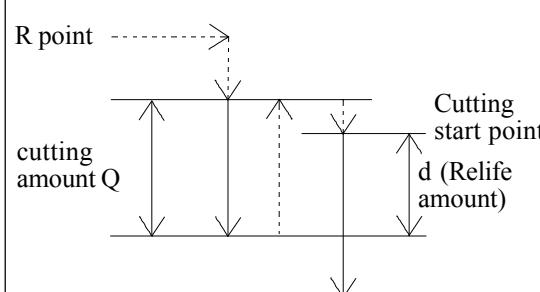
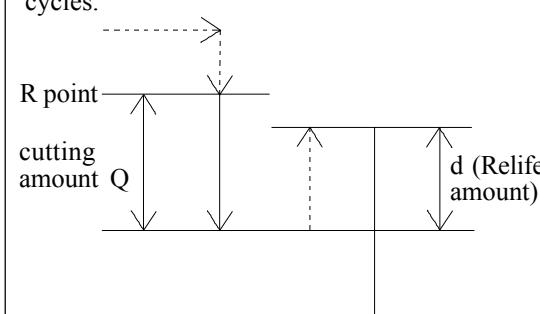
Item	Setting range	Description
MODE SELECT 0: MANUAL 1: MEMORY	0-1	Specify the mode to be established after power ON: manual operation or MDI operation
MANUAL FEED 0: RAPID 1: JOG 2: STEP	0-2	Specify the feed mode in manual operation mode after power ON.
MEMORY RUN SELECT 0: MEMORY RUN 1: TAPE RUN	0-1	Selects whether to perform memory run or tape run. Selects whether to check the life of the tool when it is used for the first time in the current program.
RESTART 0: STOP 1: RESTART	0-1	Specify whether to stop or restart the operation after a program is completed in the memory operation mode.

### User parameter 1 (switch 1)

**Value in brackets [ ] is default value.**

Item	Setting range	Description
AUTO TOOL LENGTH OFFSET	0-999.999mm (0-99.9999in.)	<p>Measure the tool length by moving Z axis as shown below, and store the data in the tool menu.</p> <p>Set the height (A) of the height presetter or block as offset amount.</p> 
MAXIMUM TIME OF EXT SIGNAL	0-9999sec.	Allowable lapse of time from an external signal output to reception of a motion completion signal from an external equipment is set in second.
DRY RUN OFFSET VALUE	0-999.999mm (0-99.9999in.)	<p>Offset amount for the Z-axis command during dry run in the memory operation is set.</p> <p>* This does not apply to the incremental command.</p>

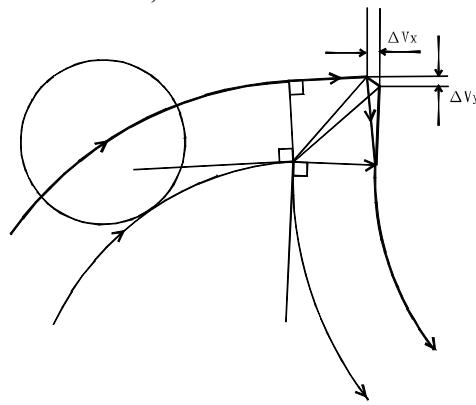
**User parameter 1 (switch 1)**

Item	Setting range	Description
PROGRAM UNIT 0: STANDARD 1: MIN	0-1	Set the position of a decimal point, when a decimal point is omitted in the program.
G73 RELIFE AMOUNT	0-99.999mm (0~9.9999inch)	<p>Set the relife amount (d) of G73 cycle.</p>  <p>Setting range: 0.000 ~ 99.999mm 0.0000~9.9999inch</p>
G83 CUTTING START POINT	0-99.999mm (0~9.9999inch)	<p>Set the cutting start point (d) in the G83 cycle.</p>  <p>Setting range: 0.000 ~ 99.999mm 0.0000~9.9999inch</p>
G77, G78 RELIFE AMOUNT	0~9.999threads	<p>Set the relife amount (d) in the G77 and G78 cycles.</p>  <p>Setting range: 0.000 ~ 9.999 (No. of threads)</p>

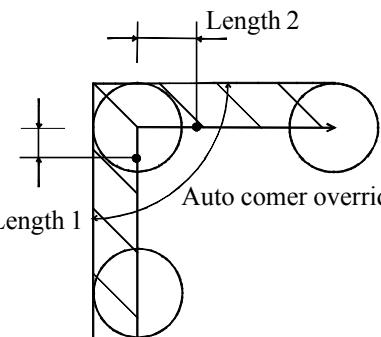
**User parameter 1 (switch 1)**

Item	Setting range	Description
G76, G87 SHIFT DIRECTION 0: +X 1: -X 2: +Y 3: -Y	0-3	Set the shifting direction after the spindle orientation in the G76 and G87 cycles.
S.T.M RECOVERY 0: NO 1: YES	0-1	Set whether to execute automatic return of the final S, T and M codes at a restart of cycles.
Z-AXIS ABSOLUTE COORDINATE 0: TYPE1 1: TYPE2 2: TYPE3	0-2	The Z absolute coordinates on the position screen are as shown below: TYPE1: Tool length offset amount is not taken. TYPE2: Tool length offset amount is taken during execution of tool length offset. TYPE3: Tool length offset amount is taken when the next motion to execute is in the tool offset mode.
START UP/CANCEL 0:TYPE1 1:TYPE2	0-1	Set TYPE 1 or TYPE 2 for tool movement method at start-up and cancellation in tool diameter offset mode in a motion program.  <i>*For details, refer to the Chapter4 Preparation function.</i>

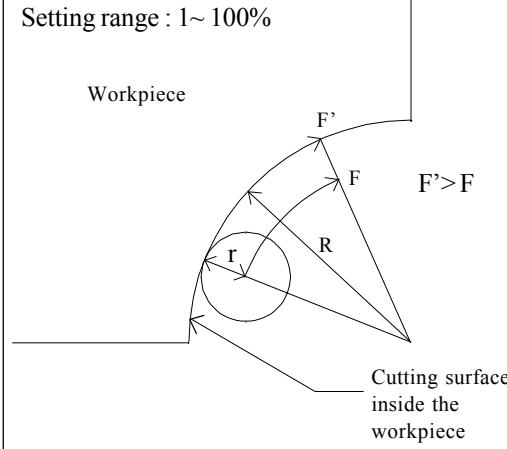
**User parameter 1 (switch 1)**

Item	Setting range	Description
MINIMUM CORNER MOVEMENT	0.000-99.999mm (0.0000-9.9999in.)	<p>When a cutting outside a corner of acute angle which is almost 90° in tool diameter offset mode, the feed, if it is shorter than the preset distance, is cancelled.</p>  <p>Cancelled if  <math>\Delta Vx \leq</math>setting value      and <math>\Delta Vy \leq</math>setting value.</p>

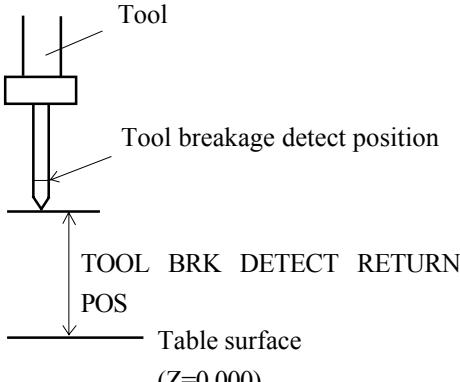
**User parameter 1 (switch 1)**

Item	Setting range	Description
AUTO. CORNER OVERRIDE ANGLE	0.000~179.999°	When a tool moves long a corner smaller than specified in tool diameter offset mode, feedrate override can be applied before and after the corner.
AUTO. CORNER OVERRIDE LEN1	0.0000~999.999mm (0.0000~99.9999inch)	
AUTO. CORNER OVERRIDE LEN2	0.0000~999.999mm (0.0000~99.9999inch)	Length 1: Deceleration stroke at corner end point Length 2: Deceleration stroke at corner start point Rate : Deceleration rate
AUTO. CORNER OVERRIDE RATIO	0~100%	

**User parameter 1 (switch 1)**

Item	Setting range	Description
OVERRIDE LMT IN INSIDE ARC	1-100%	<p>When a circular cutting is executed inside a workpiece during tool diameter offset mode, the center moves at a feedrate calculated from the cutting conditions.</p> <p>That is, the feedrate on the cutting surface inside the workpiece is faster than specified. In such a case, apply programmed radius R to the tool radius R.</p> <p>Setting range : 1~100%</p> 
CENTER ALIGN FEEDRATE1	1-5000mm/min (0.1-196.8in./min)	Rapid traverse during automatic alignment is set.
CENTER ALIGN FEEDRATE2	1-5000mm/min (0.1-196.8in./min)	Measuring feedrate during automatic alignment is set.
CENTER ALIGN RETRACT VALUE	0.000-99.999mm (0.0000-9.9999in.)	Return stroke after each detection during automatic aligning cycle is set. Correction of automatic aligning position is set.
CENTER ALIGN CORRECT VALUE	0.000-9.999mm (0.0000-0.9999in.)	Time constant for measurement feed is specified with this parameter.
INDICATION SELECT AT COUNT-UP 0: NO 1: YELLOW 2: RED	0, 1 or 2	Light or not to do so the pilot lamp when the production counter ends is specified (lamp lit: yellow or red)

## User parameter 1 (switch 1)

Item	Setting range	Description
TOOL BREAKAGE DETECT OPTION 1: TYPE 1 2: TYPE 2 3: TYPE 3	0 or 1	Sets whether an optional tool breakage detector is installed.
TOOL BRK DETECT RETURN POS	0.000~ 999.999mm (0.0000~ 99.9999inch)	Set tool end return position in machine coordinate before tool breakage detect motion.  
TOOL BRK DETECTION POS X	-9999.999~ 0.000mm 0.000~ (-999.9999~ 0.0000inch)	Set the tool breakage detection position on the machine coordinate.
TOOL BRK DETECTION POS Y		
REFERENCE TOOL LENGTH OFFSET NO.	0~99	When the program has been created using the reference tool, set the tool length data number containing the preset reference tool length. (When not using the reference tool, set "0".)
EXTERNAL ERROR 10 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0~3	Select the desired operation status from the following selections when an alarm (External Error 10) occurs when EXER10 signal is input: 0. Operation continues. 1. Operation stops upon completion of the current program. 2. Operation stops upon completion of the current block. 3. Operation stops immediately. 4. Servomotor turns off.
EXTERNAL ERROR 11 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0~3	Same as EXTERNAL ERROR 10 ALARM LEVEL.

**User parameter 1 (switch 1)**

Item	Setting range	Description
EXTERNAL ERROR 12 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
EXTERNAL ERROR 13 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
EXTERNAL ERROR 14 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
EXTERNAL ERROR 15 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
EXTERNAL ERROR 16 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.

**User parameter 1 (switch 1)**

Item	Setting range	Description
EXTERNAL ERROR 17 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
EXTERNAL ERROR 18 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
EXTERNAL ERROR 20 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
EXTERNAL ERROR 19 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
EXTERNAL ERROR 21 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.

**User parameter 1 (switch 1)**

Item	Setting range	Description
EXTERNAL ERROR 22 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
EXTERNAL ERROR 23 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
EXTERNAL ERROR 24 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
EXTERNAL ERROR 25 ALARM LEVEL 0: LEVL0 1: LEVL1 2: LEVL2 3: LEVL3 4: LEVL4	0-3	Same as EXTERNAL ERROR 10 ALARM LEVEL.
UNREGISTERED M-CODE 0: ERROR 1: OFF	0-1	This is the setting to determine whether or not to continue operation when three digit M code which is not defined for the machine is instructed in memory operation.

**User parameter 1 (switch 1)**

Item	Setting range	Description
ONE SHOT SIGNAL M450 OUTPUT TIME	0-99 × 0.1sec	This turns on for the specified time when signal output 450 or 451 is commanded.  The next motion is executed after the specified time has passed.
ONE SHOT SIGNAL M455 OUTPUT TIME	0-99 × 0.1sec	This turns on for the specified time when signal output 450 or 451 is commanded.  The next motion is executed without waiting for the specified time.

**User parameter 1 (switch 1)**

Item	Setting range	Description
AUTO DISPLAY CLEAR TIME	0-999min	Automatically clears the screen when entry operations using switches are not performed within the time preset here.
MACHINE NUMBER	0-999999	Sets a number to a machine when multiple machines are installed, to differentiate them.
AUTOMATIC DOOR 0: NO 1: YES	0-1	Sets whether an optional automatic door is provided or not.
AREA SENSOR PATTERN 0: PATTERN1 1: PATTERN2	0-1	<p>Sets the area sensor pattern to stop the automatic door immediately when the beam of area sensor is obstructed during automatic door operation.</p> <p>Pattern1: The area sensor becomes active when the door is closing. Pattern2: The area sensor becomes active when the door is opening or closing.</p>
RESETAUTOMATIC DOOR ERROR 0: EMERGENCY STOP 1: NORMAL STOP	0-1	<p>Sets whether emergency stop or normal stop should be applied when the following automatic door error is detected.</p> <p>When the time taken for opening and closing of automatic door exceeds the preset time (parameter value).</p> <p>When both open end and close end limit switches of automatic door have turned ON.</p>

**User parameter 1 (switch 1)**

Item	Setting range	Description
AUTOMATIC DOOR OPERATION TIME	0-99 sec	Sets the automatic door opening and closing times. When opening or closing has not been completed within the preset time, a <b>[DOOR ERROR]</b> occurs. When '0' is input, the machine operation does not proceed until opening or closing is completed.
DISPLAY COMMENT 0: NO 1: YES	0-1	Sets whether to display the details of the first block in the program, as well as the program number, on the program list screen.
OVERRIDE SWITCH 0: INVALID 1: VALID	0-1	Sets whether override is valid or invalid.
DISP ALARM WHEN OVERRIDE IS VALID 0: NO 1: YES	0-1	Sets whether or not to display the alarm when the override is not set to 100%.
DISPLAY ALARM WHEN DOOR IS OPEN 0: NO 1: YES	0-1	Sets whether or not to display the alarm when the door is open.

**User parameter 1 (switch 1)**

Item	Setting range	Description
MACRO COMMAND SINGLE STOP 0: NO 1: YES	0-1	Sets whether or not to make a single stop in the block with only calculation commands or control commands (GOTO, DO, END, etc.).
ATC SYNCHRONOUS START POS	0.000- 9999.999mm (0.0000~ 999.9999inch)	When 'R' command does not exist in G100 block, the machine operates using the value preset here for the 'R' command. This value is set by the machine coordinates.
ATC REFERENCE TOOL LENGTH	0.000- 9999.999mm (0.0000~ 999.9999inch)	When tool length offset command does not exist in G100 block, the machine operates using the value preset here for the tool length offset command.
M490 COOLANT BLOWING TIME	0-99.9 sec	<p>High Pressure Coolant Type This parameter sets the coolant blowing time when high pressure coolant is turned on by M490 signal output.</p> <p>CTS (Coolant Through Spindle) Type Sets the time the back washing cycle pump is activated.</p>
M491 COOLANT BLOWING TIME	0-99.9 sec	<p>Not TC-S2B This parameter sets the coolant blowing time when high pressure coolant is turned on by M491 signal output.</p> <p>TC-S2B Sets the time until the tool washing filter check starts. Setting "0" disables the filter check..</p>
M492 COOLANT BLOWING TIME	0-99.9 sec	<p>High Pressure Coolant Type This parameter sets the coolant blowing time when high pressure coolant is turned on by M492 signal output.</p> <p>CTS (Coolant Through Spindle) Type Sets the time until the CTS pump pressure check starts when CTS is off. Setting "0" disables the pressure check.</p>
M493 COOLANT BLOWING TIME	0-99.9 sec	<p>High Pressure Coolant Type This parameter sets the coolant blowing time when high pressure coolant is turned on by M493 signal output.</p> <p>CTS (Coolant Through Spindle) Type Sets the time for releasing pressure (valve "C" is on) when CTS is stopped..</p>

**User parameter 1 (switch 1)**

Item	Setting range	Description
M494 COOLANTBLOWING TIME	0-99.9 sec	<p>High Pressure Coolant Type This parameter sets the coolant blowing time when high pressure coolant is turned on by M494 signal output.</p> <p>CTS (Coolant Through Spindle) Type Sets the time after CTS pump is turned on by the M494 signal until the CTS pump pressure check starts.</p> <p>Do not change the setting since this value is unique to the pump.</p>
INITIAL TOOL LIFE CHECK 0: YES 1: NO	0-99.9 sec	<p>If a stop level 3 alarm occurs, the spindle stops when the block currently being executed is completed.</p> <p>If a stop level 4 alarm occurs, the spindle stops immediately.</p> <p>Note that the spindle does not stop even when the [STOP] key is pressed.</p>
EXT SIGNAL OUT TIME WITH MFIN OFF	0-9999 x 0.1 s	Set the time an M function (M00 - M99) is output when “Does not wait for MFIN signal input” is set for macro #3003.
CHIP SHOWER DRAIN TIME	0-99s sec	<p>Set the time that the chip shower remains ON after M401 is executed.</p> <p>The chip shower turns off when the time preset here has elapsed.</p>
AUTOMATIC COOLANT OFF TIME (0: NO AUTOMATIC OFF)	0-999min	<p>Set the time until the coolant pump turns off when the coolant pump is activated but the machine is not operated (both the start and stop LEDs are off).</p> <p>The coolant pump automatically turns on again when the machine is started by pressing the [START] button on the machine or the [START] button on the external unit.</p> <p>Since there is a time lag after the pump turns on until coolant is actually dispensed, the start of coolant dispensing is delayed for the time set for [COOLANT DELAY TIME].</p> <p>When the coolant pump is automatically turned off, the coolant pump LED flashes.</p>

**User parameter 1 (switch 1)**

Item	Setting range	Description
COOLANT DELAY TIME	0-99×0.1S	Set the time that the start of coolant dispensing is delayed when the coolant pump automatically turns on again ([START] on machine / [START] on external unit). The start LED stays lit while waiting during the preset time.
AUTOMATIC MACHINE LIGHT OFF TIME (0: NO AUTOMATIC OFF)	0 - 999 min	Set the time after the machine light turns on until it turns off. When 1 or more (minute) is set, the machine light turns off when the preset time has elapsed after the machine light turned on.
TIME UNTIL STAND BY MODE IS ENTERED (0: NO AUTOMATIC OFF)	0 - 999 min	Set the time after the servo motor is turned off until standby mode is entered when the machine is not operated. When no machine operation is performed even after the preset time has elapsed, the servo motors for all axes turn off and standby mode is entered, and the alarm message “*STANDBY MODE” is displayed. (Note that this alarm is not registered in the alarm log. In addition, an external signal alarm is not output.) Servo motors turn on again when any of the following operations are performed: · Any key operation from the operation panel · Machine operation is started ([START] button on machine, [START] button on external unit, communication remote command, etc.)
AUTOMATIC POWER OFF (0: INVALID 1: VALID)	0 - 1	Set whether [AUTOMATIC POWER OFF] is valid or invalid. When [1: VALID] is set, power automatically turns off when the time set for [AUTOMATIC POWER OFF TIME] is reached. In addition, power turns off during operation when any of the following conditions are met: · Program ends (It is regarded as “Program end” when the machine is restarted or external start is reserved). · Pause or block stop is applied.

**User parameter 1 (switch 1)**

Item	Setting range	Description
AUTO POWER OFF TIME	00:00:00 - 23:59:59	Set the time until power automatically turns off when [1:VALID] is set for [AUTOMATIC POWER OFF]. When [1:VALID] is set, [AUTO OFF IS ON] is displayed on the screen.
POT LOWERING START POSITION	-999.999 - 999.999 mm	Sets the position the pot starts tilting during ATC as a distance from the ATC return height.
CORNER DECELERATION ANGLE	0 - 179.999 deg.	(Descriptions are provided in the Machine ParameterList.) When the angle between two blocks is less than this setting, the speed decelerates in the corner zone.
CORNER DECELERATION MINIMUM RATE	1 - 100%	(Descriptions are provided in the Machine ParameterList.) This setting is used as the deceleration ratio when the ratio of the angle between two blocks against the above corner deceleration angle is less than this setting.
ALARMWHITE SCREENISDIMMED (0:ALARMSCRN 1:STAYDIMMED)	0 - 1	Set whether to display the alarm screen when an alarm occurs while the screen is dimmed. 0:ALARMSCREEN The alarm screen appears when an alarm occurs. 1:STAYSDIMMED The screen stays dimmed even when an alarm occurs.
TABLE LOADED MASS	0 - 999 kg	Used to switch the rapid traverse time constant according to the value set here. The axes affected by the rapid traverse time constant are listed below. · Models with moving tables: X- and Y-axes · Models with quick tables: 4th-axis

**User parameter 1 (switch 1)**

Item	Setting range	Description
BACK WASHING AT PROGRAM END 0:NO 1:YES	0-1	Sets whether the back washing cycle is performed when the program is completed. When [1:Yes] is selected with a CTS command included in the program, the back washing cycle is performed at the end of the program.
OPERATION TIME	0000:00:00 - 9999:59:59	Default value of automatic operation time (accumulated memory operation run time) is set.
CURRENT DATA	1996/01/01 - 2038/12/31	Sets the current date. Once set, the data is automatically updated.
CURRENT TIME	00:00:00 - 23:59:59	Set the current time. Once set, the time is automatically updated.
MACHINE UNIT SYSTEM 0: METRIC 1: INCH	0-1	Sets metric or imperial (inch) as the unit of length used for machining data.

### 7.4.2 User Parameter 2 (switch 2)

Item	Setting range	Description
STROKE 4 0: NO 1: YES	0,1	When the 4-axis stroke is set, input “1.” When it is not set, input “0.” When “1: YES” is specified, the 4-axis (-) or (+) value of stroke described in the next row is valid.
STROKE 5 0: NO 1: YES	0,1	When the 5-axis stroke is set, input “1.” When it is not set, input “0.” When “1: YES” is specified, the 5-axis (-) or (+) value of stroke described in the next row is valid.
STROKE 6 0: NO 1: YES	0,1	When the 6-axis stroke is set, input “1.” When it is not set, input “0.” When “1: YES” is specified, the 6-axis (-) or (+) value of stroke described in the next row is valid.
STROKE 4(-) 4(+)	-9999.999-0.000 0.000-9999.999	When the 4-axis stroke is “1: YES,” the stroke value is input as an angle in the machine coordinates.
STROKE 5(-) 5(+)	-9999.999-0.000 0.000-9999.999	When the 5-axis stroke is “1: YES,” the stroke value is input as an angle in the machine coordinates.
STROKE 6(-) 6(+)	-9999.999-0.000 0.000-9999.999	When the 6-axis stroke is “1: YES,” the stroke value is input as an angle in the machine coordinates.

**User parameter 2 (switch 2)**

Item	Setting range	Description
STROKE LIMIT1 X(-) Y(-) Z(-) X(+) Y(+) Z(+)	X and Y axes: -9999.999- 9999.999mm (-999.9999- 999.9999in.) Z axis: 0.000-9999.999mm (0.0000-999.9999in.)	Stroke limits of the X and Y axes are defined in terms of machine coordinates. As for Z-axis, set the lower limit of the tool end in terms of distance from the table top surface.  (-) and (+) are the setting values in the plus and minus directions, respectively.
STROKE LIMIT 4(-) 4(+)	-9999.999-0.000 0.000-9999.999	When the 4-axis stroke limit is “1: YES” the stroke limit value is input as an angle in the machine coordinates.
STROKE LIMIT 5(-) 5(+)	-9999.999-0.000 0.000-9999.999	When the 5-axis stroke limit is “1: YES” the stroke limit value is input as an angle in the machine coordinates.
STROKE LIMIT 6(-) 6(+)	-9999.999-0.000 0.000-9999.999	When the 6-axis stroke limit is “1: YES” the stroke limit value is input as an angle in the machine coordinates.

**User parameter 2 (switch 2)**

Item	Setting range	Description
STROKE LIMIT2 X(-) X(+)	-9999.999~ 9999.999mm (-999.9999~ 999.9999inch)	Sets a prohibited area within the X-axis stroke. When the negative setting is larger than the positive setting, check within the X-axis prohibited area is not performed.
STROKE LIMIT2 Y(-) Y(+)	-9999.999~ 9999.999mm (-999.9999~ 999.9999inch)	Sets a prohibited area within the Y-axis stroke. When the negative setting is larger than the positive setting, check within the Y-axis prohibited area is not performed.
STROKE LIMIT2 Z(-) Z(+)	0~ 9999.9999mm (0~ 999.9999inch)	Sets a prohibited area within the Z-axis stroke of the tool tip position. When the negative setting is larger than the positive setting, check within the Z-axis prohibited area is not performed.
X REFERENCE POINT	-9999.999-0mm (-999.9999- 0.0000inch)	Sets the position, in the machine coordinates, that the X axis should return to after G28 command.
Y REFERENCE POINT	-9999.999-0mm (-999.9999- 0.0000inch)	Sets the position, in the machine coordinates, that the Y axis should return to after G28 command.
Z REFERENCE POINT	0-9999.999mm (0.0000- 999.9999inch)	Sets the position, in the machine coordinates, that the Z axis should return to after G28 command.

**User parameter 2 (switch 2)**

Item	Setting range	Description
4 REFERENCE POINT	-9999.999~9999.999	Sets the position, in the machine coordinates, that the 4 axis should return to after G28 command.
5 REFERENCE POINT	-9999.999~9999.999	Sets the position, in the machine coordinates, that the 5 axis should return to after G28 command.
6 REFERENCE POINT	-9999.999~9999.999	Sets the position, in the machine coordinates, that the 6 axis should return to after G28 command.
NO.2 X REFERENCE POINT NO.3 X REFERENCE POINT NO.4 X REFERENCE POINT	-9999.999~0mm (-999.9999~0.0000inch)	Sets the position, in the machine coordinates, that the X axis should return to after G30 command.
NO.2 Y REFERENCE POINT NO.3 Y REFERENCE POINT NO.4 Y REFERENCE POINT	-9999.999~0mm (-999.9999~0.0000inch)	Sets the position, in the machine coordinates, that the Y axis should return to after G30 command.
NO.2 Z REFERENCE POINT NO.3 Z REFERENCE POINT NO.4 Z REFERENCE POINT	0-9999.999mm (-0.0000~999.9999inch)	Sets the position, in the machine coordinates, that the Z axis should return to after G30 command.
NO.2 4 REFERENCE POINT NO.3 4 REFERENCE POINT NO.4 4 REFERENCE POINT	-9999.999~9999.999	Sets the position, in the machine coordinates, that the 4 axis should return to after G30 command.
NO.2 5 REFERENCE POINT NO.3 5 REFERENCE POINT NO.4 5 REFERENCE POINT	-9999.999~9999.999	Sets the position, in the machine coordinates, that the 5 axis should return to after G30 command.
NO.2 6 REFERENCE POINT NO.3 6 REFERENCE POINT NO.4 6 REFERENCE POINT	-9999.999~9999.999	Sets the position, in the machine coordinates, that the 6 axis should return to after G30 command.

**User parameter 2 (switch 2)**

Item	Setting range	Description
AUTO. COORD SYSTEM SET 0: NO 1: YES	0-1	Sets whether or not to automatically set the coordinate system. When set to [1: YES], note that G92 is automatically performed so that the coordinate system G54 is adjusted to the next coordinate system during the first zero return after power is supplied. (Refer to the programming manual for details of G92.)
AUTO. COORD SYSTEM SET X	-9999.999 9999.999mm (-999.9999 999.9999inch)	Assigns the desired absolute coordinate to the machine coordinate zero point. The coordinate system is automatically set according to this value during the first zero return after power is supplied.
AUTO. COORD SYSTEM SET Y	-9999.999 9999.999mm (-999.9999 999.9999inch)	Assigns the desired absolute coordinate to the machine coordinate zero point. The coordinate system is automatically set according to this value during the first zero return after power is supplied.
AUTO. COORD SYSTEM SET Z	-9999.999 9999.999mm (-999.9999 999.9999inch)	Assigns the desired absolute coordinate to the machine coordinate zero point. The coordinate system is automatically set according to this value during the first zero return after power is supplied.
AUTO. COORD SYSTEM SET 4	-9999.999 9999.999	Assigns the desired absolute coordinate to the machine coordinate zero point. The coordinate system is automatically set according to this value during the first zero return after power is supplied.

**User parameter 2 (switch 2)**

Item	Setting range	Description
AUTO. COORD SYSTEM SET 5	-9999.999 ~ 9999.999	Assigns the desired absolute coordinate to the machine coordinate zero point. The coordinate system is automatically set according to this value during the first zero return after power is supplied.
AUTO. COORD SYSTEM SET 6	-9999.999 ~ 9999.999	Assigns the desired absolute coordinate to the machine coordinate zero point. The coordinate system is automatically set according to this value during the first zero return after power is supplied.
RAPID TRAVERSE OVERRIDE SPD.1	0~999999mm/min (0~99999.9 inch/min	Specifies the feedrate of the RAPID TRAVERSE OVERRIDE switch on the operation panel. This becomes effective only when RAPID TRAVERSE is selected.
RAPID TRAVERSE OVERRIDE SPD.2	0~999999mm/min (0~99999.9 inch/min	
RAPID TRAVERSE OVERRIDE SPD.3	0~999999mm/min (0~99999.9 inch/min	
4-AXIS OVERRIDE ROTATE SPD.1	0-99.9rpm	Sets the rotation speed when SPEED 1 of OVERDRIVE switch is selected.
4-AXIS OVERRIDE ROTATE SPD.2	0-99.9rpm	Sets the rotation speed when SPEED 2 of OVERDRIVE switch is selected.
4-AXIS OVERRIDE ROTATE SPD.3	0-99.9rpm	Sets the rotation speed when SPEED 3 of OVERDRIVE switch is selected.

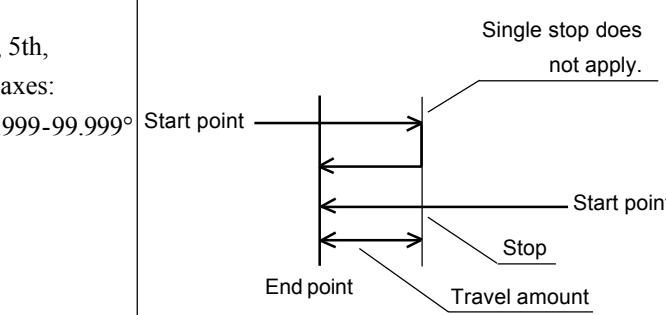
**User parameter 2 (switch 2)**

Item	Setting range	Description
5-AXIS OVERRIDE ROTATE SPD.1	0-99.9rpm	Sets the rotation speed when SPEED 1 of OVERDRIVE switch is selected.
5-AXIS OVERRIDE ROTATE SPD.2	0-99.9rpm	Sets the rotation speed when SPEED 2 of OVERDRIVE switch is selected.
5-AXIS OVERRIDE ROTATE SPD.3	0-99.9rpm	Sets the rotation speed when SPEED 3 of OVERDRIVE switch is selected.
6-AXIS OVERRIDE ROTATE SPD.1	0-99.9rpm	Sets the rotation speed when SPEED 1 of OVERDRIVE switch is selected.
6-AXIS OVERRIDE ROTATE SPD.2	0-99.9rpm	Sets the rotation speed when SPEED 2 of OVERDRIVE switch is selected.
6-AXIS OVERRIDE ROTATE SPD.3	0-99.9rpm	Sets the rotation speed when SPEED 3 of OVERDRIVE switch is selected.
X POSI SIGNAL OUTPUT (-) (+)	-9999.999~ 9999.999mm (-999.9999~ 999.9999inch)	External output signal XPOSSW turns on when the machine coordinate of the X-axis is within the range set for this parameter (including the boundary value) and turns off when it is not within the range. This signal does not turn on unless dog zero return is completed.
Y POSI SIGNAL OUTPUT (-) (+)	-9999.999~ 9999.999mm (-999.9999~ 999.9999inch)	External output signal YPOSSW turns on when the machine coordinate of the Y-axis is within the range set for this parameter (including the boundary value) and turns off when it is not within the range. This signal does not turn on unless dog zero return is completed.

**User parameter 2 (switch 2)**

Item	Setting range	Description
Z POSI SIGNAL OUTPUT (-) (+)	-9999.999~ 9999.999 mm (-999.9999~ 999.9999 inch)	External output signal ZPOSSW turns on when the machine coordinate of the Z-axis is within the range set for this parameter (including the boundary value) and turns off when it is not within the range. This signal does not turn on unless dog zero return is completed.
4 POSI SIGNAL OUTPUT (-) (+)	-9999.999~ 9999.999	External output signal 4POSSW turns on when the machine coordinate of the 4-axis is within the range set for this parameter (including the boundary value) and turns off when it is not within the range. This signal does not turn on unless dog zero return is completed.
5 POSI SIGNAL OUTPUT (-) (+)	-9999.999~ 9999.999	External output signal 5POSSW turns on when the machine coordinate of the 5-axis is within the range set for this parameter (including the boundary value) and turns off when it is not within the range. This signal does not turn on unless dog zero return is completed.
6 POSI SIGNAL OUTPUT (-) (+)	-9999.999~ 9999.999	External output signal 6POSSW turns on when the machine coordinate of the 6-axis is within the range set for this parameter (including the boundary value) and turns off when it is not within the range. This signal does not turn on unless dog zero return is completed.

**User parameter 2 (switch 2)**

Item	Setting range	Description
SINGLE DIR POS TRL X Y Z 4TH 5TH 6TH	X, Y, Z axes: -99.999-99.999 mm (-9.9999~ 9.9999inch) 4th, 5th, 6th axes: -99.999-99.999°	<p>Set the single direction positioning travel amount for each axis.</p> <p>Single stop does not apply.</p> 

### 7.4.3 User Parameter 3 (Communication)

Item	Setting range	Description
SELECT PORT 0: PORT A 1: PORT B	0-1	Selects the serial port used for communication.
CONNECTED TO 0: PTP/PTR 1: COMPUTER	0-1	Set the equipment to be communicated with.
COMP COMMUNICATN PROTOCOL (MASTER) 0: TYPE1 1: TYPE2	0-1	Select the protocol used for communication; the protocol conventionally used (compatible) or the protocol extended for remote operation.
BAUD RATE 0: 300 1: 600 2: 1200 3: 2400 4: 4800 5: 9600	0-5	Set the baud rate for data transmission.
PARITY 0: NONE 1: ODD 2: EVEN	0-2	Set the type of parity bit to be added to one-character data.
STOP BIT 0: 1 BIT 1: 1.5 BIT 2: 2 BIT	0-2	Set the distance which discriminates the end of one-character data.
CHARACTER LENGTH 0: 7 BIT 1: 8 BIT	0-2	Set the length of one-character data.
RESPONSE START TIME	0-999 sec	Allowable time interval between the receipt of the 1st character and that of the 2nd. If 0 is set, this time is infinite.

**User parameter 3 (Communication)**

Item	Setting range	Description
COMMUNICATION 0: LINE 1: CODE1 2: CODE2	0-2	<p>Select a communication method from the following 3 types:</p> <p>0: LINE (Control line system) Communication is controlled by RS/CS.</p> <p>1: CODE 2 (Control code system 1) Communication is performed by control code system on the master station and by control line system on the slave station.</p> <p>2: CODE 2 (Control code system 2) Communication is performed by control code system on both master and slave stations.</p> <p>Communication is controlled by DC1 and DC3 code.</p> <p>The head and end of the data are suffixed with DC2 and DC4, respectively.</p>
DC1 CODE DC2 CODE DC3 CODE DC4 CODE	0-255	<p>Set the control code in the code 1 and code 2 system.</p> <p>The code is set in decimal number.</p> <p>DC1:17=11H(hexadecimal) DC2:18=12H DC3:147=93H DC4:20=14H</p> <p>&lt;Meaning of the DC code&gt;</p> <p>DC1 : Start of communication or restart of the communication interrupted by DC3</p> <p>DC2 : Indication of the head of the data</p> <p>DC3 : Temporary interruption of the communication in case of buffer overflow for example</p> <p>DC4 : Indication of the end of the data.</p>

**User parameter 3 (Communication)**

Item	Setting range	Description
DR SIGNAL CHECK 0: NO 1: YES	0-1	DR signal is checked during communication when "1" is set. Communication cannot be established if DR signal is off. DR signal is not checked when 0 is set.
COMMUNICATION END DC3 CODE 0: NO 1: YES	0-1	Transmission of DC3 code at the end of a communication or waiting in receiving mode in code 1 and 2 systems  <When receiving data> On receiving all the external data, DC3 code is transmitted to external equipments.  <When transmitting data> On transmitting all the data to external equipments, the system is ready to receive DC3 code. The communication terminates upon receiving DC3 code. When 0 is set, this communication end DC3 code is not available.
INVALID DATA 0: CONV 1: ERR 2: IGNOR	0-2	Set whether to convert or not, when a unsupported data is received. When conversion is done, the data becomes "?" in the editing screen.
TRANS DATA CODE 0: ISO 1: EIA	0-1	Set the transmission data code.
END OF BLOCK 0: CR,LF 1: LF	0-1	Set the code of the end of block. (When ISO code is used.)

**User parameter 3 (Communication)**

Item	Setting range	Description
TV CHECK 0: NONE 1: ODD 2: EVEN	0-2	The type of parity bit to be added to one-block data.
HEADING OUTPUT 0: NO 1: YES	0-1	Set whether output label letters to the puncher or not.
RESET(SLAVE) 0: NO 1: YES	0-1	Alternative of stopping a communication or not with the [RESET] key when the machine is in computer mode (slave) is set. If 0 is set, the communication is not stopped even if the [RESET] key is pressed.
RESETRECOVERY TIME	0-99sec	If one of the following events takes place while the machine is in computer mode, DR and RS signals of the machine are off during the reset recovery time: 1. [RESET] key is pressed, when RESET (SLAVE) setting is effective, during communication of the machine as slave station. 2. An error occurs because of communication abend. When 0 is set, DR and RS signals are not deactivated.
DATAOVERWRITE (SLAVE) 0: NO 1: YES	0-1	Set 1 to overwrite when same program input while slave communication. Overwrite is denied, if 0 is set.

**User parameter 3 (Communication)**

Item	Setting range	Description
REMOTE OPERATION 0: INVALID 1: VALID	0-1	Sets ON or OFF for origin return via communication, memory operation start and stop by remote operation.
CHECKSUM 0: INVALID 1: VALID	0-1	Sets whether or not to detect errors using the checksum type 2 protocol communication.
EIA CHARACTER CODE(#)	0-255	Sets the EIA character code for '#' character. Sets a code that is not identical to the existing EIA code.
EIA CHARACTER CODE(*)	0-255	Sets the EIA character code for '*' character . Sets a code that is not identical to the existing EIA code.
EIA CHARACTER CODE(=)	0-255	Sets the EIA character code for '=' character . Sets a code that is not identical to the existing EIA code.
EIACHARACTER CODE([])	0-255	Sets the EIA character code for '[' character . Sets a code that is not identical to the existing EIA code.
EIACHARACTER CODE(])	0-255	Sets the EIA character code for ']' character . Sets a code that is not identical to the existing EIA code.

## 7.4.4 User Parameter 4 (Extr1 in Signal)

Item	Setting range	Description	
TERMINAL NUMBER	1 to 60 or no setting	Sets the external output signal corresponding to the terminal number. Pressing the [DEL] key can cancel the setting.	
53		1:PRO1	38:SPLOOK
54		2:PRO2	39:ATCLK
55		3:PRO4	40:XYLOCK
56		4:PRO8	41:ZLOCK
57		5:PRO16	42:4LOCK
58		6:PRO32	43:5LOCK
59		7:PRO64	44:6LOCK
60		8:EXORG	45:MDLOCK
203		9:CTURN	46:KYLOCK
204		10:EXREF	47:PRLOCK
205		11:EXREF2	48:EDLOCK
206		12:EXREF3	49:DRLOCK
207		13:EXREF4	50:EXZORG
208		14:MFIN	51:WPEDOK
209		15:OPSKIP	52:TLEDOK
210		16:OPSTOP	53:MCEDOK
213		17:EXER10	54:UPEDOK
214		18:EXER11	55:MPEDOK
215		19:EXER12	56:WCEDOK
216		20:EXER13	57:MGEDOK
217		21:EXER14	58:PRSNSR
218		22:EXER15	59:OILEMP
219		23:EXER16	60:BOXDR
220		24:EXER17	61:#1000
		25:EXER18	62:#1001
		26:EXER19	63:#1002
		27:EXER20	64:#1003
		28:EXER21	65:#1004
		29:EXER22	66:#1005
		30:EXER23	67:#1006
		31:EXER24	68:#1007
		32:EXER25	69:#1008
		33:M460	70:#1009
		34:M462	71:#1010
		35:M46	72:#1011
		36:M466	73:#1012
		37:M468	74:#1013
			75:#1014
			76:#1015

## 7.4.5 User Parameter5 (Extrl Out Signal)

Item	Setting range	Description		
TERMINAL NUMBER	1 to 99 or No setting	Sets the external output as desired in accordance with the terminal number.		
103		1:M11	41:ZPSP	81:RE5FN2
104		2:M12	42:ZP4	82:RE6FN2
105		3:M14	43:ZP5	83:RE4FN3
106		4:M18	44:ZP6	84:RE5FN3
107		5:M21	45:PFIN1	85:RE6FN3
108		6:M22	46:PFIN2	86:RE4FN4
109		7:M24	47:RSTOUT	87:RE5FN4
110		8:M28	48:MEMMOD	88:RE6FN4
303		9:M00	49:TLBRKE	89:PULOFF
304		10:M30/1	50:RUNSTP	90:QTSEL1
305		11:M30/2	51:M450	91:QTSEL2
306		12:REFIN	52:M451	92:OILPMP
307		13:REFIN2	53:M455	93:BATALM
308		14:REFIN3	54:M456	94:XPOSSW
309		15:REFIN4	55:GRN	95:YPOSSW
310		16:M08	56:YEL	96:ZPOSSW
313		17:M400	57:RED	97:4POSSW
314		18:M402	58:CNTUP	98:5POSSW
315		19:M404	59:CNTPRE	99:6POSSW
316		20:M406	60:STPOUT	100:#1100
317		21:M408	61:DROOPEN	101:#1101
318		22:M480	62:DRCLS	102:#1102
319		23:M482	63:INDRCL	103:#1103
320		24:M484	64:RDYLED	104:#1104
323		25:M486	65:STPLED	105:#1105
324		26:MF	66:DRYRUN	106:#1106
325		27:AUTO	67:SINGL	107:#1107
326		28:STL	68:RESTAT	108:#1108
327		29:MEMOK	69:RPD100	109:#1109
328		30:NCOK	70:SPN100	110:#1110
329		31:ALM	71:FED100	111:#1111
330		32:ALMLV1	72:RELEASE	112:#1112
333		33:ALMLV2	73:SAFETY	113:#1113
334		34:TOOL	74:COOLSW	114:#1114
335		35:TOLPRE	75:CHIPSW	115:#1115
336		36:ORGFIN	76:SDDRCL	
337		37:SPTURN	77:RE4FN	
338		38:ZPX	78:RE5FN	
339		39:ZPY	79:RE6FN	
340		40:ZPZ	80:RE4FN2	

## 7.4.6 User Parameter 6 (Z measurement)

Item	Setting range	Description
TOOL BREAKAGE DETECT FUNCTION 0: INVALID 1: VALID	0,1	This specifies whether or not tool breakage should be detected.
THERMAL MEASURE- MENT FUNCTION 0: INVALID 1: VALID	0,1	This specifies whether or not Z-axis thermal displacement should be offset.
THERMAL DISPLCMNT COMPEN PALLET 0: PALLET1 1: PALLET2	0,1	Specifies the pallet subject to thermal displacement compensation measurement.
PALLET1 SIDE MEASUREMENT DEVICE 0: NO 1: YES	0,1	Set to 1: PROVIDED or 0: NOT PROVIDED when thermal measurement device is provided or not provided for pallet 1 respectively.
PALLET2 SIDE MEASUREMENT DEVICE 0: NO 1: YES	0,1	Set to 1: PROVIDED or 0: NOT PROVIDED when thermal measurement device is provided or not provided for pallet 2 respectively.
XY POSITION RADIUS SHIFT DIRCTN 0: +X 1: -X 2: +Y 3: -Y	0,1,2,3	This specifies the direction of dislocation when XY position is determined, displaced from the measurement device center by the amount of the tool radius.
THERMAL MEASUREMENT MOTION COND. 0: EVERY COMMAND 1: WATCHING *	0,1	This specifies whether the thermal displacement measurement motion command should be set so that the measurement motion is performed each time the command is issued or that watching motion is performed so that the measurement motion can be canceled via watching of displacement.

**User Parameter 6 (Z measurement)**

Item	Setting range	Description
Z-AXIS MACHINING ACCURACY *	0 to 0.999mm 0 to 0.0999inch	This sets the required working precision in Z-axis direction. When measurement (displacement) exceeds the set value, *TRM DISPMT AMT OVR occurs.
THERMAL WATCH DISPLACMT AMNT	0 to 0.999mm 0 to 0.0999inch	This sets the criterion value for displacement. The frequency of watching is updated depending on judgment result.
NUMBER OF THERMAL WATCHING *	1 to 99 frequency	This sets the frequency of checking past measurement data. Watching frequency is updated to that which is set herein.
NO. OF THERMAL WATCHING CANCEL *	1 to 999 frequency	This sets the maximum of watching frequency.
INTIAL SET NO. OF THERMAL MSMT *	1 to 99 frequency	This sets the frequency of thermal displacement measurement after power is turned on. In this measurement canceling motion does not work even when the watching motion is set.
THERMAL WATCHING STOP TIME *	0 to 9999 min	This sets time in minute elapsing after operation is stopped after which time the thermal displacement watching conditions should be initialize.
THRM OFFSET AMT LIMIT VALUE	0.001 to 0.999 min 0.0001 to 0.0999inch	This sets the limit value of thermal displacement offset amount.

**User Parameter 6 (Z measurement)**

Item	Setting range	Description
RETRACT AMNT AFT MEASURE- MENT	0 to 99.999mm 0 to 9.9999inch	This sets the retract amount after rough measurement.
MSMT FEEDRATE B TOOL DIAMTR	0 to 999.999mm 0 to 99.9999inch	This sets the diameter of the tool to which measurement feedrate B applies. To tools whose diameter is greater than the set diameter, measurement feedrate B applies.
MEASUREMENT FEEDRATE 1A	1 to 5000mm/min 0.1 to 196.8inch/ min	This sets the measurement feedrate in rough measurement when the tool diameter is smaller than that of those to which measurement feedrate B applies.
MEASUREMENT FEEDRATE 1B	1 to 5000mm/min 0.1 to 196.8inch/ min	This sets the measurement feedrate in rough measurement when the tool diameter is equal to or greater than that of those to which measurement feedrate B applies.

**User Parameter 6 (Z measurement)**

Item	Setting range	Description
MEASUREMENT FEEDRATE 2A	1 to 5000mm/min 0.1 to 196.8inch/min	This sets the measurement feedrate in final measurement when the tool diameter is smaller than that of those to which measurement feedrate B applies.
MEASUREMENT FEEDRATE 2B	1 to 5000mm/min 0.1 to 196.8inch/min	This sets the measurement feedrate in final measurement when the tool diameter is equal to or greater than that of those to which measurement feedrate B applies.
PAL1 SIDE MSMT DEV POS X	-9999.999~0mm (-999.9999~0inch)	Sets the X,Y, and Z axes machine coordinate positions for the tool length measurement device mounted on pallet 1. Detection signals turn ON when axes are at these positions.
PAL1 SIDE MSMT DEV POS Y	-9999.999~0mm (-999.9999~0inch)	
PAL1 SIDE MSMT DEV POS Z	0~9999.999mm (0~999.9999inch)	
PAL2 SIDE MSMT DEV POS X	-9999.999~0mm (-999.9999~0inch)	Sets the X,Y, and Z axes machine coordinate positions for the tool length measurement device mounted on pallet 2. Detection signals turn ON when axes are at these positions.
PAL2 SIDE MSMT DEV POS Y	-9999.999~0mm (-999.9999~0inch)	
PAL2 SIDE MSMT DEV POS Z	0~9999.999mm (0~999.9999inch)	

**Monitoring operation and frequency**

Monitoring operation

The displacement due to ball screw elongation in the Z-axis direction is monitored for the Z-axis thermal displacement compensation.

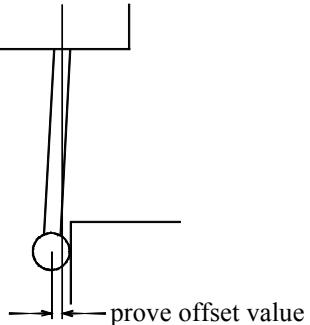
When the displacement is within the specified range, measurement is canceled as it is not necessary to perform measurement each time.

Monitoring frequency

This word has two meanings; one is measurement pitch and the other is the number of monitoring operations.

The later is set so that measurement is performed upon completion of this number.

### 7.4.7 User Parameter 7 (Zero measurement)

Item	Setting range	Description
PROBE OFFSET VALUE 1 PROBE OFFSET VALUE 2	-9.999~9.999mm (-0.9999~0.9999 inch)	<p>Sets the difference between the stylus tip ball center and the spindle when the detection signal is turned on while the touch probe is attached to the spindle.</p> <p>X component and Y component of the difference are probe offset 1 and 2 respectively.</p> <p>To set the difference, carry out 6.PROBE OFFSET of automatic centering.</p> 
PROBE OFFSET VALUE 3 PROBE OFFSET VALUE 4	-9.999~9.999mm (-0.9999~0.9999 inch)	<p>Sets the difference of the center of the circle obtained by the three-point measurement and the actual circle center.</p> <p>X component and Y component of the difference are probe offset 3 and 4 respectively.</p> <p>To set the difference, carry out 7.PROBE OFFSET of automatic centering.</p>

**User Parameter 7 (Zero measurement)**

Item	Setting range	Description
MEASURING MOTION 0: TYPE1 1: TYPE2	0~1	0:TYPE1 Measures at measuring speed 1 and 2. 1:TYPE2 Measures at measuring speed 2 only.
MEASURING SPEED 1	1~5000mm/min (0.1~196.0 inch/min)	Sets the first measuring for speed for MEASURING MOTION (TYPE1).
MEASURING SPEED 2	1~5000mm/min (0.1~196.0 inch/min)	Sets the second measuring for speed for MEASURING MOTION (TYPE1) and the measuring speed for MEASURING MOTION (TYPE2).
STOP DISTANCE BEFORE MSRNG	0.000~99.999mm (0.000~9.9999 inch)	Sets the distance between the probe end face at the measurement start point and the estimated workpiece surface. When measuring has been skipped for the values preset to STOP DISTANCE BEFORE MSRNG and MEASURING TRAVEL LMT DISTANCE, SENSOR SIGNAL OFF alarm will occur.
MEASURING TRAVEL LMT DISTANCE	0.000~99.999mm (0.000~9.9999 inch)	Sets the amount of overtravel when the measuring skip has exceeded the estimated value (program command value).
MEASUREMENT TOLERANCE 1	0.000~99.999mm (0.000~9.9999 inch)	When the difference between the measured value and the estimated value (program command value) has exceeded the preset value, MEASD VAL ERR LRG(1): will occur. When 0 is set, the value error check is not carried out.

**User Parameter 7 (Zero measurement)**

Item	Setting range	Description
MEASUREMENT TOLERANCE 2	0.000~99.999mm (0.0000~9.9999 inch)	When the difference between the measured value and the previous measured value has exceeded the preset value, MEASD VAL ERR LRG(2): will occur. When 0 is set, the value error check is not carried out.
RETURN DISTANCE AFT MEASURNG	0.000~99.999mm (0.0000~9.9999 inch)	Sets the amount that the measuring probe retracts where it has contacted the non measuring object during automatic measurement.

#### 7.4.8 User parameter 8 (Auto THRM DISP CMP)

Item	Setting range	Description
Z-AXIS COMPENSATION ADJUSTMENT	0-200%	This parameter sets the Z-axis compensation value to between 0% and 200%.
SPINDLE COMP ADJUSTMENT(Z)	0-200%	This parameter sets Z axis spindle compensation to value between 0% and 200%.
X-AXIS COMPENSATION ADJUSTMENT	0-200%	This parameter sets the X-axis compensation value to between 0% and 200%.
SPINDLE COMP ADJUSTMENT(X)	0-200%	This parameter sets the X-axis spindle compensation value to between 0% and 200%.
Y-AXIS COMPENSATION ADJUSTMENT	0-200%	This parameter sets the Y-axis compensation value to between 0% and 200%.
SPINDLE COMP ADJUSTMENT(Y)	0-200%	This parameter sets the Y-axis spindle compensation value to between 0% and 200%.

### 7.4.9 Parameter 9 (Quick Table)

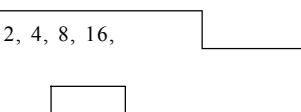
The [INNR PLT] (inner pallet) is only displayed for models equipped with a quick table.

It is not displayed for other models

Item	Setting range	Description
PALLET 1 PROGRAM NUMBER  PALLET 2 PROGRAM NUMBER	1~8999	Set the program number processed with each pallet.  When the external program selection input signal is turned on, external selection is effective.
PALLET 1 CARRY IN MOTION  PALLET 2 CARRY IN MOTION  0: WHEN START 1: 1ST TOOL CHNG	0~1	Set the time to carry in the pallet after the memory operation starts.  The pallet 1 and the pallet 2 can be separately set.  0: After a memory operation starts, carry a pallet immediately.  After the pallet carrying in, the program starts from the first process.  1: Carry in a pallet at the same time with the first tool change command.  Therefore, non-working time can be shortened. And it executes the instructions before the first tool change without carrying in the pallet.

#### 7.4.10 List of external input signals and functions

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
External program selection	PRO1						<p>If used to specify the prepared program by a peripheral. For the details on the usage, refer to "Details of external input signals".</p> <p>PRO 1, 2, 4, 8, 16, 32,64 Start</p>  <p>Program selection signal read</p>
	PRO2						
	PRO4						
	PRO8						
	PRO16						
	PRO32						
	PRO64						
M function end	MFIN						<p>The signal MFIN is set from a peripheral as an operation (in response to M-function output M00 - M99) end signal. For the details on the timing, refer to "Details of external input signals".</p>
External 1st ref. point return	EXREF						<p>The machine can be returned to the 1st, 2nd, 3rd, or 4th reference point set by the parameter, by opening and then closing the contact of the EXREF, EXREF2, EXREF3, or EXREF4.</p> <p>(Note)</p> <p>Axis movement is done at positioning feed.</p> <p>Motion order : Z axis first, X/Y (at the same time)</p> <p>Movement to the intermediate point is not executed.</p> <p>If dog-type zero point return is not done, it is done before movement to the 1st, 2nd, 3rd, or 4th reference point is executed.</p> <p>After normal completion of 1st, 2nd, 3rd or 4th reference point return, REFIN/REFIN2/REFIN3/REFIN4 signal is output.</p> <p>The signal must be input for more than 100msec.</p> <p>The signal STL is not turned ON during this return motion.</p> <p>Effective conditions</p> <ol style="list-style-type: none"> <li>1. STL signal OFF</li> <li>2. HOLD switch is not pressed.</li> <li>3. EXSTOP signal OFF</li> <li>4. Alarm (stop level 3-5) is not generated.</li> </ol>
	EXREF2						
	EXREF3						
	EXREF4						

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
External optional stop	OPSTOP						When this signal is ON, memory operation is temporary stopped at the execution of M01.
External optional skip	OPSKIP						When this signal is ON, memory operation is skipped at the block which contain slash (/) code.

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
External error 10	EXER10						When the contact of signal EXER10 or EXER 11 is closed, 'External error 10' or 'External error 11' is displayed on the screen. The alarm level can be selected from 1 to 4 below. Set this in parameter 1.
error 11	EXER11						1. Servo OFF 2. Operation stop 3. One block stop 4. One cycle stop 5. Display only
error 12	EXER12						To recover from the alarm state, open the contact and press the [RESET] key or enter EXRESET for alarm levels 1 to 3, and press the [CANCEL] key for alarm level 4.
error 13	EXER13						Signal block 100 msec. or more
error 14	EXER14						Closed
error 15	EXER15						Open
error 16	EXER16						
error 17	EXER17						
error 18	EXER18						
error 19	EXER19						
error 20	EXER20						
error 21	EXER21						
error 22	EXER22						
error 23	EXER23						
error 24	EXER24						
error 25	EXER25						
							External error
Wait single 1	M460						These are input signals used for signal output functions 460 and 462 and are used to halt the next motion during operation.
Wait single 2	M462						When the contacts of signal M460 and M462 are closed, signal output functions 460 and 462 proceed to the next motion.
	M464						When the contacts of signal M460 and M462 are open, signal output functions 461 and 463 proceed to the next motion.
	M466						
	M468						
							Closed
							Open
							Proceeds to the next motion
							Note
							Maximum waiting time is set to MAXIMUM TIME OF EXT SIGNAL in parameter 1. When '0' is set, operation is halted indefinitely.

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
Spindle operation prohibited	SPLOCK						Prohibit spindle rotation. Spindle stop and orientation are possible. When this signal is turned ON during spindle rotation, the spindle does not stop.
ATC operation prohibited	ATLOCK						Prohibits ATC operations; magazine swivel, use of [SINGL MAGAZ] key, tool replacement in MDI or memory mode, and next tool preparation.
XY axes operation prohibited	XYLOCK						Prohibits XY axes operation. When the program is created so that other axes operate simultaneously, these axes do not operate either.
Z axis operation prohibited	ZLOCK						Prohibits Z-axis operation.
4th axis operation prohibited	4LOCK						Prohibits 4th axis operation. Also prohibits clamping and unclamping operations.
5th axis operation prohibited	5LOCK						Prohibits 5th axis operation. Also prohibits clamping and unclamping operations.
6th axis operation prohibited	6LOCK						Prohibits 6th axis operation. Also prohibits clamping and unclamping operations.

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
Mode changeover prohibited	MDLOCK						Prohibits mode changeover.
Key operation prohibited	KYLOCK						Prohibits operation of keys other than the override (spindle, cutting, positioning), emergency stop, stop, external start, and reset keys.
Program edit prohibited	PRLOCK						Prohibits data change operation (insertion, deletion, setting) in edit mode (program screen). Also prohibits deletion and copy of files in the DIRECTORY OF MEMORY function.
Edit prohibited	EDLOCK						Prohibits program editing, data bank editing, and production counter and magazine tool editing.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
External zero return	EXORG						<p>The axis moves to the zero point when the contact of signal EXORG has closed and then opened again.</p> <p>[Notes]</p> <ol style="list-style-type: none"> <li>1) Axes move at the positioning speed.</li> <li>2) The movement order of axes is Z and then X and Y (simultaneous).</li> <li>3) Axes do not move to the middle point.</li> <li>4) Dog type zero return is performed if not yet already performed.</li> <li>5) When axes have returned to their origins correctly, the zero point return completion signal (ORGFIN) is output.</li> <li>6) Input signal for 100 msec. or longer.</li> <li>7) The state of Automatic Operation Ongoing signal (STL) cannot be switched to on during external zero return.</li> </ol> <p>[Effective conditions]</p> <ol style="list-style-type: none"> <li>1) Automatic operation ongoing signal (STL) is off.</li> <li>2) The <b>[STOP]</b> key is not pressed.</li> <li>3) The external stop signal (EXSTOP) is off.</li> <li>4) An alarm higher than stop level 2 has not occurred.</li> </ol>

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
External Indexing pallet	CTURN						<p>Indexing pallet is performed when the contact of signal CTRUN is closed and then opened again.</p> <p>Operation is the same as when the [P. IDX] key is pressed.</p> <p>[Effective conditions]</p> <ol style="list-style-type: none"> <li>1) Automatic operation ongoing signal (STL) is off.</li> <li>2) The [STOP] key is not pressed.</li> <li>3) The external stop signal (EXSTOP) is off.</li> <li>4) An alarm higher than stop level 2 has not occurred.</li> </ol>
Door lock	DRLOCK						<p>When the contact of signal DRLOCK is closed, the door is locked in a state where the door is closed.</p>
External Z axis zero return	EXZORG						<p>The axis moves to the zero point when the contact of signal EXZORG has closed and then opened again.</p> <p>[Notes]</p> <ol style="list-style-type: none"> <li>1) Axes move at the positioning speed.</li> <li>2) Axes do not move to the middle point.</li> <li>3) Dog type zero return is performed if not yet already performed.</li> <li>4) Input signal for 100 msec. or longer.</li> <li>5) The state of Automatic Operation Ongoing signal (STL) cannot be switched to on during external zero return.</li> </ol> <p>[Effective conditions]</p> <ol style="list-style-type: none"> <li>1) Automatic operation ongoing signal (STL) is off.</li> <li>2) The [STOP] key is not pressed.</li> <li>3) The external stop signal (EXSTOP) is off.</li> <li>4) An alarm higher than stop level 2 has not occurred.</li> </ol>

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
Editing working zero position permitted	TLEDOK						As long as this signal is on and even when [EDLOCK] is on, the working coordinate zero position can be edited.
Editing tool data permitted	TLEDOK						As long as this signal is on and even when [EDLOCK] is on, the tool data can be edited.
Editing macro data permitted	THEDOK						As long as this signal is on and even when [EDLOCK] is on, the macro data can be edited.
Editing user parameter permitted	UPEDOK						As long as this signal is on and even when [EDLOCK] is on, the user parameter can be edited.
Editing machine parameter permitted	MPEDOK						As long as this signal is on and even when [EDLOCK] is on, the machine parameter can be edited.
Editing work counter permitted	WCEDOK						As long as this signal is on and even when [EDLOCK] is on, the work counter can be edited.
Editing magazine tool permitted	MGEDOK						As long as this signal is on and even when [EDLOCK] is on, the magazine tool can be edited.
Automatic oiling pressure sensor	PRSNSR						Input signal to inform the operator that the pressure sensor of the automatic oiling unit is turned on.
Insufficient oil for automatic oiling	OILEMP						Input signal to inform the operator that the amount of oil for automatic oiling is insufficient
CNTRL BOX DOOR OPEN	BOXDR						This signal indicates that the door of the control box is open. "CNTRL BOX DOOR OPEN" is displayed on the screen. When the door is closed, the message automatically disappears.

### 7.4.11 Details of external input signals and functions

\* External program selection

Usage of external program selection signals and precautions are described below.

#### (1) Usage

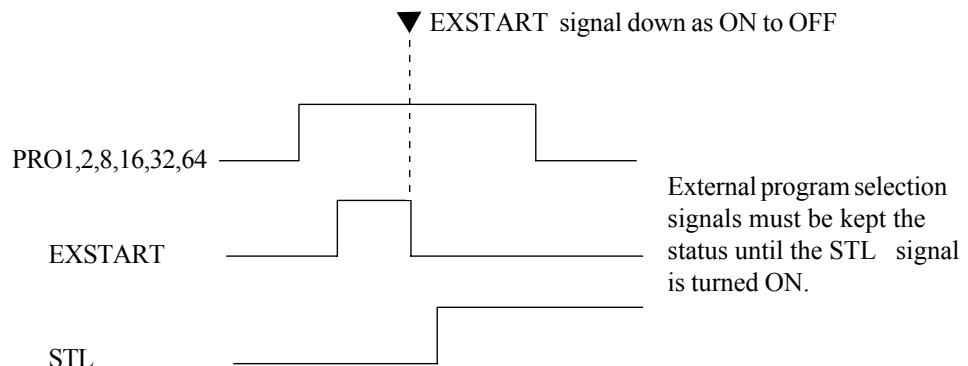
Activate the signal for PRO1,PRO2,PRO4,PRO8,PRO16,PRO32 and PRO64 in memory operation mode. In response to the start signal, the NC unit read the signal and execute the relevant program.

Program No.	PRO64	PRO32	PRO16	PRO08	PRO04	PRO02	PRO01
Last input program No.	×	×	×	×	×	×	×
0001	×	×	×	×	×	×	
0002	×	×	×	×	×		×
0003	×	×	×	×	×		
0004	×	×	×	×		×	×
0005	×	×	×	×		×	
0006	×	×	×	×			×
0007	×	×	×	×			
0008	×	×	×		×	×	×
0009	×	×	×		×	×	
0010	×	×	×		×		×
0011	×	×	×		×		
0012	×	×	×			×	×
0013	×	×	×			×	
0014	×	×	×				×
0015	×	×	×				
0016	×	×		×	×	×	×
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
0032	×		×	×	×	×	×
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
0064		×	×	×	×	×	×
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
0099			×	×	×		
0100			×	×		×	×
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
0127							

: Contact close  
× : Contact open

(2)

- 1 The signal is read in response to the start signal when the program is in the initial condition (the START switch is not pressed after turning on the power or resetting) or when its execution is completed.
- 2 When the contacts of all signals PRO1, PRO2, PRO4, PRO8, PRO16, PRO32 and PRO64 are open, the last program number entered is executed.
- 3 To execute the same program as before turning off the power, enter its number or open the contacts of all signals PRO1, PRO2, PRO4, PRO8, PRO16, PRO32 and PRO64.
- 4 External program selection signals (PRO1, PRO2, PRO4, PRO8, PRO16, PRO32, PRO64) are input to the NC according to the following timing chart:



- 5 The signal EXSTART must be input for more than 100msec.

[Effective conditions]

- 1 Memory operation is in reset status. (Except block stop and halt)

### 7.4.12 List of external output signals and functions

\*1 stands for a program edit.

Signal	Symbol	Output in motion		Effective mode				Function	
		Transistor		Manual	MDI	Memory	Edit <sup>1</sup>		
		On	Off						
M function output	M11 M12 M14 M18 M21 M22 M24 M28 MF							Sends the 2-digit decimal number BCD code to a peripheral by specifying any of signal outputs M01 to m ((during MDI or memory operation).  Refer to "Details of external output signals".	

\*1 stands for a program edit.

Signal	Symbol	Output in motion Transistor		Effective mode				Function																														
		On	Off	Manual	MDI	Memory	Edit <sup>1</sup>																															
External signal output	M400 M402 M404 M406 M408 M480 M482 M484 M486							<p>Can be turned on and off according to the program during MDI or memory operation.</p> <p>Example) Activation when M402 is commanded in the program and disactivation in response to M403.</p> <p>Unlike the case with M11 to M28, M function end signal MFIN is not activated.</p> <table border="1"> <thead> <tr> <th>Signal</th><th>On</th><th>Off</th></tr> </thead> <tbody> <tr> <td>M400</td><td>M400 commanded in the program</td><td>M401 commanded in the program</td></tr> <tr> <td>M402</td><td>M402 commanded in the program</td><td>M403 commanded in the program</td></tr> <tr> <td>M404</td><td>M404 commanded in the program</td><td>M405 commanded in the program</td></tr> <tr> <td>M406</td><td>M406 commanded in the program</td><td>M407 commanded in the program</td></tr> <tr> <td>M408</td><td>M408 commanded in the program</td><td>M409 commanded in the program</td></tr> <tr> <td>M480</td><td>M480 commanded in the program</td><td>M481 commanded in the program</td></tr> <tr> <td>M482</td><td>M482 commanded in the program</td><td>M483 commanded in the program</td></tr> <tr> <td>M484</td><td>M484 commanded in the program</td><td>M485 commanded in the program</td></tr> <tr> <td>M486</td><td>M486 commanded in the program</td><td>M487 commanded in the program</td></tr> </tbody> </table> <p>Note:</p> <ol style="list-style-type: none"> <li>1 The signal is deactivated in response to a reset signal.</li> <li>2 The signal is not deactivated if an alarm occurs.</li> <li>3 M406 is exclusively used for air blowing when the machine is equipped with an optional Z axis measurement system.</li> <li>4 M408 is exclusively used for supplying oil to oil hole. M408 cannot be used for other than this purpose.</li> </ol>	Signal	On	Off	M400	M400 commanded in the program	M401 commanded in the program	M402	M402 commanded in the program	M403 commanded in the program	M404	M404 commanded in the program	M405 commanded in the program	M406	M406 commanded in the program	M407 commanded in the program	M408	M408 commanded in the program	M409 commanded in the program	M480	M480 commanded in the program	M481 commanded in the program	M482	M482 commanded in the program	M483 commanded in the program	M484	M484 commanded in the program	M485 commanded in the program	M486	M486 commanded in the program	M487 commanded in the program
Signal	On	Off																																				
M400	M400 commanded in the program	M401 commanded in the program																																				
M402	M402 commanded in the program	M403 commanded in the program																																				
M404	M404 commanded in the program	M405 commanded in the program																																				
M406	M406 commanded in the program	M407 commanded in the program																																				
M408	M408 commanded in the program	M409 commanded in the program																																				
M480	M480 commanded in the program	M481 commanded in the program																																				
M482	M482 commanded in the program	M483 commanded in the program																																				
M484	M484 commanded in the program	M485 commanded in the program																																				
M486	M486 commanded in the program	M487 commanded in the program																																				

\*1 stands for a program edit.

Signal	Symbol	Output in motion		Effective mode				Function	
		Transistor		Manual	MDI	Memory	Edit <sup>1</sup>		
		On	Off						
Automatic operation ongoing	AUTO							During MDI or memory operation: On conditions 1st start input Off conditions 1 Reset 2 Alarm causing the servo to turn off The signal is not activated in response to external origin return signal.	
Running	STL							During MDI or memory operation: On conditions 1 During an operation 2 The SC unit (option) is in operation Off conditions 1 End of a motion 2 Single block stop 3 Stop 4 Reset 5 Alarm The signal is not activated in response to an external zero point return.	
Memory operation enabled	MEMOK							This signal is activated when the machine is ready for memory operation with the mode selected. It is not activated in the following cases: • SIGNAL or DRY key is active • During a resetting • Alarm	
Tool error output	TOOL							This signal is activated when "program end" is executed due to expiration of the tool life the memory operation of the tool life the memory operation according to the program is completed. To restart this signal and then restart the operation, follow the procedure below : (1)When the spare tool is registered: Restart is possible. The program can be executed with this spare tool. This signal remains active when the spare tool is in use. (2)When the spare tool is not registered: Restart is impossible. Set again tool life and press RESET key. The signal is deactivated for an instant if RESET KEY is pressed without setting the tool life.	

\*1 stands for a program edit.

Signal	Symbol	Output in motion		Effective mode				Function	
		Transistor		Manual	MDI	Memory	Edit <sup>1</sup>		
		On	Off						
Spindle rotation	SPTURN							This signal is active while the spindle rotates and is inactive while it is in stop. The signal, however, is not active during an oriented spindle stop and a tapping.	
Zero point output	ZPX ZPY ZPZ ZPSP ZP4 ZP5 ZP6							ZPX, ZPY, ZPZ, ZP4, ZP5 and ZP6, for the respective axes, are activated when a zero point return is completed. Each signal is deactivated when its relevant axis is fed from the machine zero point and is activated again when the zero point is reached again. PPSP is activated when an oriented spindle stop is completed and is deactivated when the spindle starts rotating, or in response to a reset signal or to SPINDLE STOP key operation. Note: The signal is deactivated in the event, for example, of emergency stop, which causes the servo to be turned off.	
Zero point return completion	ORGFIN							This signal is activated when the first zero point return after the power is turned on is completed and remains active until the power is turned off.	
Program stop	M00							This signal is activated when a “program stop” is executed during memory operation and is deactivated in response to a start or reset signal. Note: The signal undergoes no change in case an alarm occurs.	
Program end	M30/1 M30/2							This signal is activated when a “program end” is executed during memory operation. * M30/1 : This signal is activated when the “program end” of pallet 1 is executed. * M30/2 : This signal is deactivated when the “program end” of pallet 2 is executed. This signal is deactivated in response to the a start or reset signal. [Reference] For further details on the program end, refer to “Details of external output signals”. [Note] When the PALLET SELECT switch is set to OFF, M30/1 is output regardless of the pallet.	

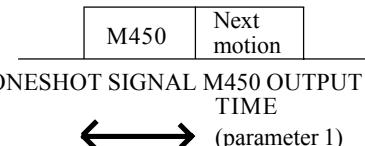
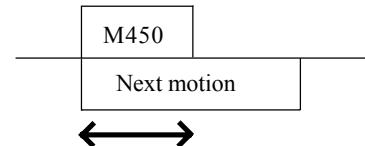
\*1 stands for a program edit.

Signal	Symbol	Output in motion		Effective mode				Function	
		Transistor		Manual	MDI	Memory	Edit <sup>1</sup>		
		On	Off						
Alarm output	ALM							These signals are output when an alarm lowering the servo motor level occurs. For recovery, remove the alarm cause, and reset. Reference: For details about alarms, see the error code list. Note that this signals are not output when the power is off.	
1st ref. point return finish	REFFIN							The signal is turned ON, when X, Y and Z axes are returned to their 1st/2nd/3rd/4th reference point by commanding G30 in MDI or memory operation or by the EXREF, EXREF2, EXREF3 or EXREF4.	
2nd ref. point return finish	REFFIN2							The signal go off under either of the following conditions. When a axis is not at the 1st, 2nd, 3rd or 4th reference point. When the servo motor is emergency stopped.	
3rd ref. point return finish	REFFIN3								
4th ref. point return finish	REFFIN4							(Note) The signal is not turned ON, even if all axes are positioned at their reference point by manual operation.	

\*1 stands for a program edit.

Signal	Symbol	Output in motion		Effective mode			Function	
		Transistor		Manual	MDI	Memory		
		On	Off					
NC preparation ok	NCOK						This signal is turned ON when the NC unit is ready for any operation such as axis movement. If alarm of stop level 5 is generated it is turned OFF.	
Pallet index finish	PFIN1 PFIN2						After the pallet home position return has been completed, these signals work as follows: PFIN1 goes on when pallet 1 is indexed outside. PFIN2 goes on when pallet 2 is indexed outside. If you move the pallet from the origin, the corresponding signal will go off. Returning the pallet to the origin will turn the signal on.  [Note] The signal will be turned off, if the servo control will be off such as an emergency stop.	
Reset output	RSTOUT						This signal is on during NC reset operation.	
Memory operation mode	MEMMOD						Goes off when you switch to memory operation mode or edit mode during operation.	

\*1 stands for a program edit.

Signal	Symbol	Output in motion		Effective mode				Function
		Transistor		Manual	MDI	Memory	Edit <sup>1</sup>	
		On	Off					
TOOL BROKEN ERROR	TLBRKE							This signal turns on when a TOOL BROKEN ERROR has occurred. When the error is reset, the signal turns off.
OPERATION STOP ERROR	RUNSTP							This signal turns on when any error that stops operation has occurred (error with asterisk*). Eliminate the error cause, reset the error, and the signal turns off.
ONESHOT SIGNAL OUTPUT M450 M451	M450 M451							<p>A signal is output by oneshot. Output time is set in parameter 1. Signal output is completed and the program proceeds to the next motion.</p>  <p>ONESHOT SIGNAL M450 OUTPUT TIME  <math>\longleftrightarrow</math> (parameter 1)</p> <p>Note 1: Turns off when the reset signal is input.  Note 2: Does not turn off unless the alarm is reset.</p>
ONESHOT SIGNAL OUTPUT M455 M456	M455 M456							<p>A signal is output by oneshot. Output time is set in parameter 1. When the signal is output, the program simultaneously proceeds to the next motion.</p>  <p>Note 1: Turns off when the reset signal is input.  Note 2: Does not turn off unless the alarm is reset.</p>
GREEN LAMP	GRN							<p>Outputs the signal with the same condition as the green lamp.</p> <ul style="list-style-type: none"> <li>ON conditions  <math>STL=ON</math> or during SC motion</li> <li>OFF conditions  Other than ON conditions</li> </ul>

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
Yellowlamp	YEL						Outputs the signal with the same condition as yellow lamp. • ON conditions 1) M30=ON 2) INDICATIONSELECTAT COUNT-UP (Parameter 1)=YEL-LOW and COUNTEREND • OFF conditions Other than ON condition
Red lamp	RED						Outputs the signal with the same condition as red lamp. • ON conditions 1) ALM=ON 2) INDICATIONSELECTAT COUNT-UP (Parameter 1)=RED and COUNTEREND • OFF conditions Other than ON condition
COUNTER END	CNTUP						• ON conditions Production counter has finished counting • OFF conditions Other than ON condition
COUNTER END NOTICE	CNTPRE						• ON conditions Production counter notices end • OFF conditions Other than ON condition

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
Stop	STPOUT						The same as for stop key input.
Door (external) open end	DROPEN						Indicates that the external door is open.
Door (external) close end	DRCLS						Indicates that the external door is closed.
Inner door close end	INDRCL						Indicates that the inner door is closed.
External start LED	RDYLED						Indicates that the machine is ready for operation.
Stop	STPLED						Indicates that the machine is stopped (same as stop LED).
Dry run	DRYRUN						Indicates that the machine is in dry run mode.
Single operation	SINGLE						Indicaes that the machine is in single operation.
Restart	RE-START						Indicates that the mathine is restarted.
Alarm Level	ALMLV1 ALMLV2						ALMLV2 ALMLV1 0 0 NO error 0 1 1 cyycle stop 1 0 Block stop 1 1 Temporary stop or higher

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode				Function
		a-contact	b-contact	Manual	MDI	Memory	Edit <sup>1</sup>	
Rapid feed override	RPD100							Indicates rapid feed override. 1:100% 0:Below 100%
Spindle override	SPN100							Indicates spindle override. 1:100% 0:Below 100%
Cutting overrule	FED100							Indicates cutting overrule. 1:100% 0:Below 100%
Estimate tool service life	TOOLPRE							Turns on if the service life of the tool used for operation is shorter than the estimated service life. ON timing is the same as for TOOL signal.

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
Coolant	M08						Indicates that the coolant is being circulated.
Relese key	RELEASE						Indicates that the [RELEASE] key has been held down.
Door interlock	SAFETY						Indicates that the door interlock is possible.
Coolant switch	COOLSW						Indicates that the coolant switch is ON.
Chip shower switch	CHIPSW						Indicates that the chip shower switch is ON.
Side door close end	SDDRCL						Indicates that the side door is closed.
4th axis 1st ref. Point return finish	RE4FN						This signal turns on when X, Y, Z, 4th, 5th, and 6th axes have all completely returned to the 1st reference point when G30 is executed in MDI or MEMORY RUN mode. [OFF conditions] 1. 4th, 5th, or 6th axis has deviated from the 1st reference point. 2. An alarm of stop level 5 has occurred. [Notes] This signal does not turn on even if 4th, 5th, or 6th axis is intentionally moved to the 1st reference point in manual mode.
5th axis 1st ref. Point return finish	RE5FN						
6th axis 1st ref. Point return finish	RE6FN						

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
4th axis 2nd ref. Point return finish	RE4FN2						<p>This signal turns on when X, Y, Z, 4th, 5th, and 6th axes have all completely returned to the 2nd reference point when G30 is executed in MDI or MEMORY RUN mode.</p> <p>[OFF conditions]</p> <p>1. 4th, 5th, or 6th axis has deviated from the 2nd reference point.</p> <p>2. An alarm of stop level 5 has occurred.</p> <p>[Notes]</p> <p>This signal does not turn on even if 4th, 5th, or 6th axis is intentionally moved to the 2nd reference point in manual mode.</p>
5th axis 2nd ref. Point return finish							
6th axis 2nd ref. Point return finish							
4th axis 3rd ref. Point return finish	RE4FN3						<p>This signal turns on when X, Y, Z, 4th, 5th, and 6th axes have all completely returned to the 3rd reference point when G30 is executed in MDI or MEMORY RUN mode.</p> <p>[OFF conditions]</p> <p>1. 4th, 5th, or 6th axis has deviated from the 3rd reference point.</p> <p>2. An alarm of stop level 5 has occurred.</p> <p>[Notes]</p> <p>This signal does not turn on even if 4th, 5th, or 6th axis is intentionally moved to the 3rd reference point in manual mode.</p>
5th axis 3rd ref. Point return finish							
6th axis 3rd ref. Point return finish							

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function															
		a-contact	b-contact	Manual	MDI	Memory																
4th axis 4th ref. Point return finish	RE4FN4						This signal turns on when X, Y, Z, 4th, 5th, and 6th axes have all completely returned to the 4th reference point when G30 is executed in MDI or MEMORYRUNmode. [OFF conditions] 1. 4th, 5th, or 6th axis has deviated from the 4th reference point. 2. An alarm of stop level 5 has occurred. [Notes] This signal does not turn on even if 4th, 5th, or 6th axis is intentionally moved to the 4th reference point in manual mode.															
5th axis 4th ref. Point return finish	RE5FN4																					
6th axis 4th ref. Point return finish	RE6FN4																					
Manual pluse enerator OFF	PULOFF						When the manual pluse generator is not mounted or the axis selection switch is set to the OFF position, this signal is turned ON. When the manual pluse generator is mounted and the axis selection switch is to X,Y,Z or 4, this signal is turned OFF.															
PALLET SELECT switch	QTSEL1 QTSEL2						Indicates: PALLET SELECT switch. <table border="1"> <tr> <th>PALLET SELECT switch</th><th>QTSEL1</th><th>QTSEL2</th></tr> <tr> <td>OFF</td><td>OFF</td><td>OFF</td></tr> <tr> <td>1</td><td>ON</td><td>OFF</td></tr> <tr> <td>2</td><td>OFF</td><td>ON</td></tr> <tr> <td>1 2</td><td>ON</td><td>ON</td></tr> </table>	PALLET SELECT switch	QTSEL1	QTSEL2	OFF	OFF	OFF	1	ON	OFF	2	OFF	ON	1 2	ON	ON
PALLET SELECT switch	QTSEL1	QTSEL2																				
OFF	OFF	OFF																				
1	ON	OFF																				
2	OFF	ON																				
1 2	ON	ON																				
Automatic oiling pump	OILPMP						Output signal to turn on the pump of the automatic oiling unit.															

\*1 stands for a program edit.

Signal	Symbol	Logic		Effective mode			Function
		a-contact	b-contact	Manual	MDI	Memory	
BATTERY ALARM	BATALM						Output of battery alarm
X POSI SIGNAL OUTPUT	XPOSSW						The signal turns on, regardless of whether the servo amplifier is on or off, when the machine coordinate of each axis is within the range set for the parameter (including the boundary value) and turns off when it is out of the range. The signal does not turn on unless dog zero return is completed.
Y POSI SIGNAL OUTPUT	YPOSSW						
Z POSI SIGNAL OUTPUT	ZPOSSW						
4 POSI SIGNAL OUTPUT	4POSSW						
5 POSI SIGNAL OUTPUT	5POSSW						
6 POSI SIGNAL OUTPUT	6POSSW						

## 7.4.13 Details of external output signals

### M function output

Usage of the M function output signals and precautions are described below.

#### (1) Usage

A 2-digit number in BCD code is sent to a peripheral by specifying any of signal output 01 to 99 in MDI or memory operation mode.

The signal MF is activated 50msec after the activation of this signal. Make the external unit read an M function output signal in response to this signal MF.

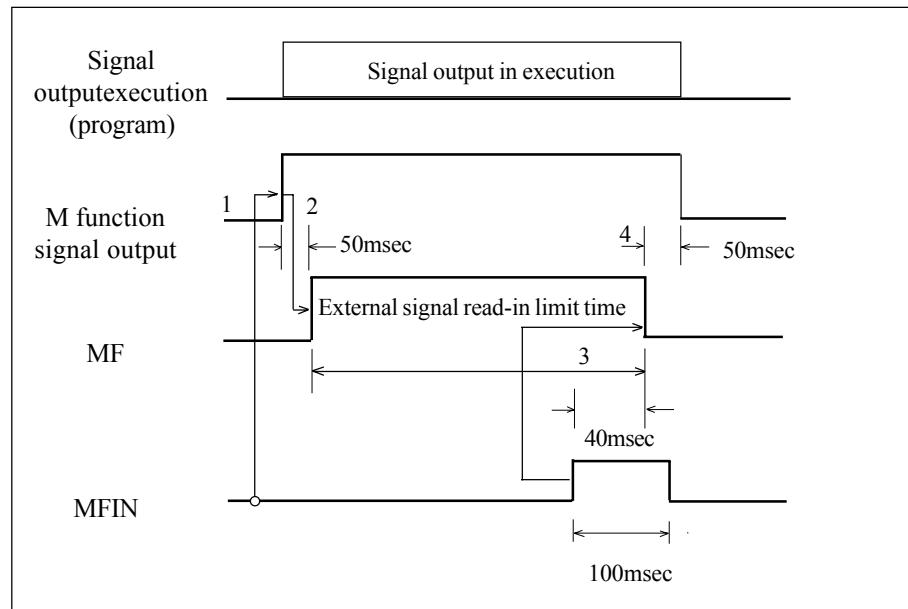
After the peripheral completes the operation according to the M function output signal, close the contact of the M function end signal MFIN for 100msec or longer.

Signal output in a program	Upper digits				Lower digits			
	Signals				Signals			
	M28	M24	M22	M21	M18	M14	M12	M11
Signal output07	×	×	×	×	×			
Signal output10	×	×	×		×	×	×	×
Signal output16	×	×	×		×			×
Signal output25	×	×	○	×	×		×	
Signal output40	×	○	×	×	×	×	×	×
Signal output53	×	○	×		×	×		
Signal output67	×	○	○	×	×			
Signal output74	×	○	○		×		×	×
Signal output89	○	×	×	×		×	×	
Signal output95	○	×	×		×		×	

○ :ON  
× :OFF

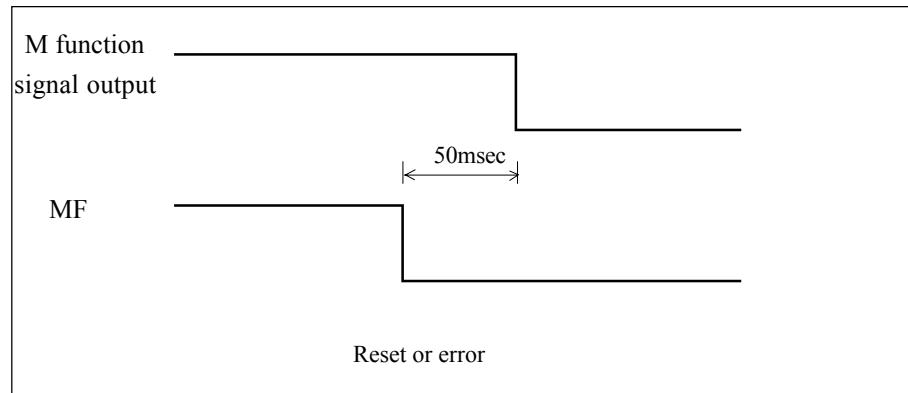
M00 to M99 can be created by combination of upper and lower digits. However, note that M00, M01, M02, M03, M04, M05, M06, M08, M09, M19, M30, M98, and M99 are codes for internal use and are not output to external devices.

**(2) Signal timing chart**



When a reset signal is activated or if the signal output time over error occurs;

7



The external signal read-in limit time is set with the parameter 1 in the data bank.  
(Refer to the description of the parameter 1.)

If MFIN is not activated within the time set with the parameter 1 after MF is activated, the signal output time over error occurs.

If the set time is 0, the NC unit waits for the signal infinitely and the error does not occur.

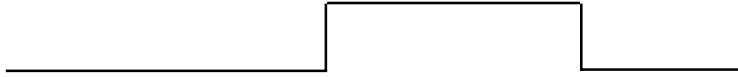
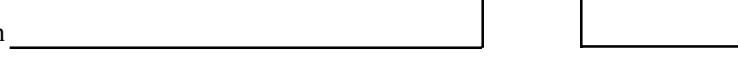
**Program end, M30**

**1. When the restart of parameter 1 is 0.**

<b>PALLET SELCT switch</b>	<b>OFF</b>	<b>1 or 2</b>	<b>1 ↔ 2</b>
<b>ON conditions</b>	M30/1 goes on irrespective of the used pallet when you execute the program end.	M30/1 or M30/2 goes on when you execute the program end and take out the pallet.	M30/1 or M30/2 goes on when you execute the program end.
<b>OFF conditions</b>	1. When the reset signal is input. 2. When a start input is accepted.	1. When the reset signal is input. 2. When an outside start input is accepted.	

**1. When Pallet SELECT switch is set to "OFF".****[without SC unit]**

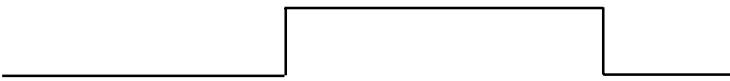
Machine operation	Program execution	M30 execution		Start	Program execution
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M30/1 STL START switch EXST **7**

(Note 1) When EXST signal is input from an external unit, check that M30 signal is ON and STL signal OFF.

**[with SC unit]**

Machine operation	Program execution	M30 execution	SC operation		Start	Program execution
-------------------	-------------------	---------------	--------------	--	-------	-------------------

M30/1 STL START switch EXST 

(NOTE 1) SC operation indicates that the optional external sequencer controller is activated.

2. When Pallet SELECT switch is set to "1 or 2".

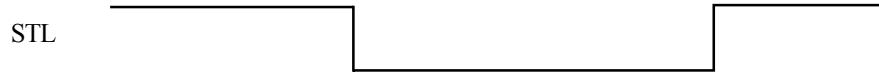
[without SC unit]

Machine operation	Pallet 1 program execution	Pallet carry-out		Outside start	Pallet carry-in	Pallet 1 program execution
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[with SC unit]

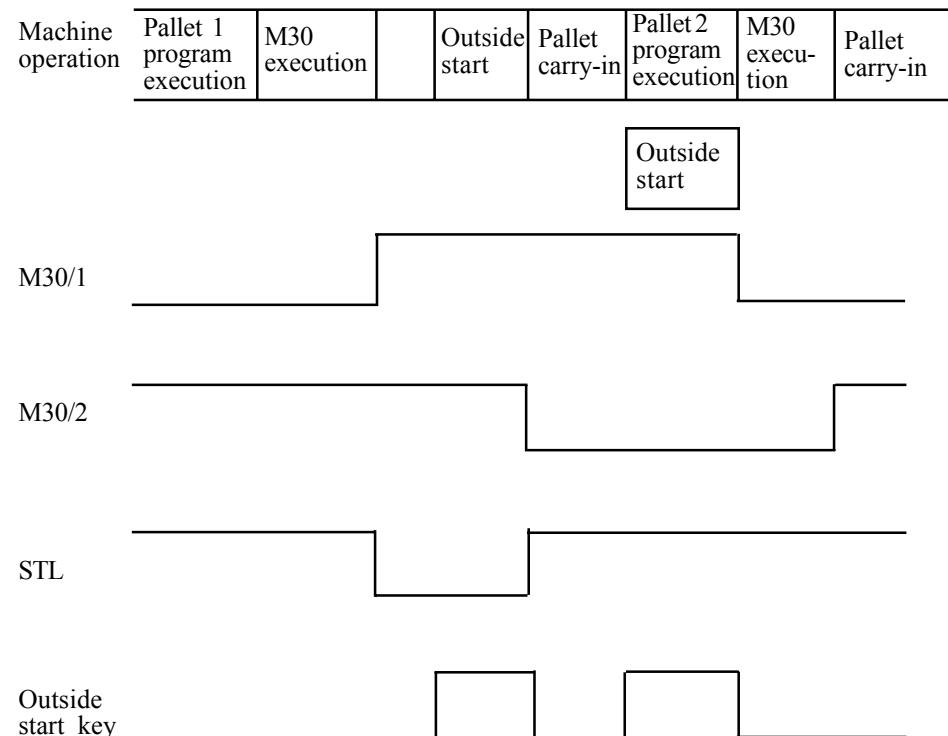
Machine operation	Pallet 1 program execution	Pallet carry-out	SC operation	Outside start	SC operation	Pallet carry-in	Pallet 1 program execution
-------------------	----------------------------	------------------	--------------	---------------	--------------	-----------------	----------------------------



(NOTE 1) SC operation indicates that the optional external sequencer controller is activated.

3. When Pallet SELECT switch is set to "1 ↔ 2".

[without SC unit]



[with SC unit]

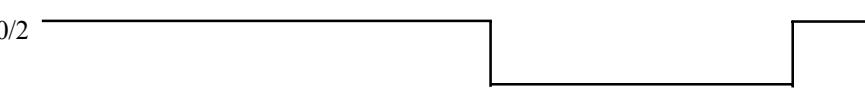
Machine operation	Pallet 1 program execution	M30 execution	Outside start	SC operation	Pallet carry-in	Pallet 2 program execution	M30 execution	Pallet carry-in
-------------------	----------------------------	---------------	---------------	--------------	-----------------	----------------------------	---------------	-----------------

Outside start	SC operation
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M30/1



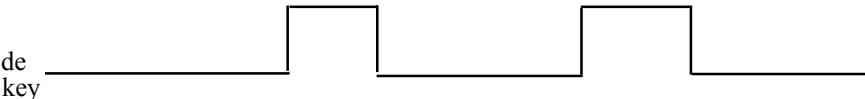
M30/2



STL



Outside start key



(NOTE 1) SC operation indicates that the optional external sequencer controller is activated.

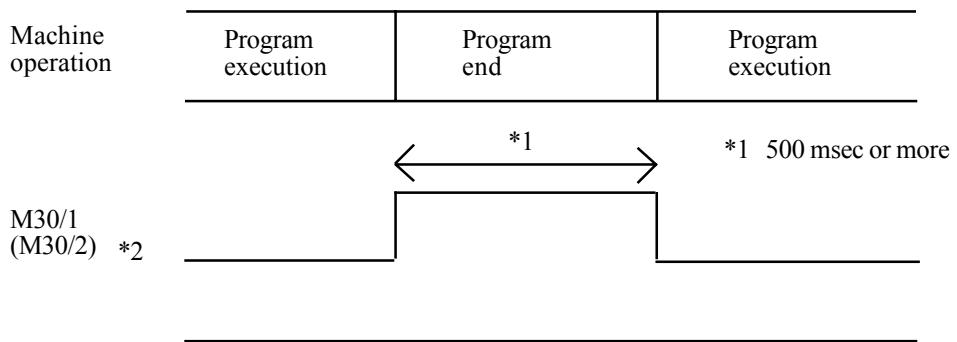
**2. When starting via start signal with the restart of parameter 1 set to 1.**

If the pallet selection switch is set to other than off, the program for pallets located inside at start will be executed again.

The signals go on when you execute the program end during memory operation.

The signals go off under either of the following conditions:

1. When you restart after the program end has been completed.
2. When you input the reset signal.



\*2 M30/2 will go on if you perform the following:

Starting when pallet 2 is located inside with the pallet selection switch set to 1↔ 2 or 2.

(Note 1) These signals will remain unchanged if an alarm occurs.

(Note 2) The automatic door (optional) works only one time at start. Thereafter it will not work.

(Note 3) STL does not go off even during M30/1 or M30/2 output.

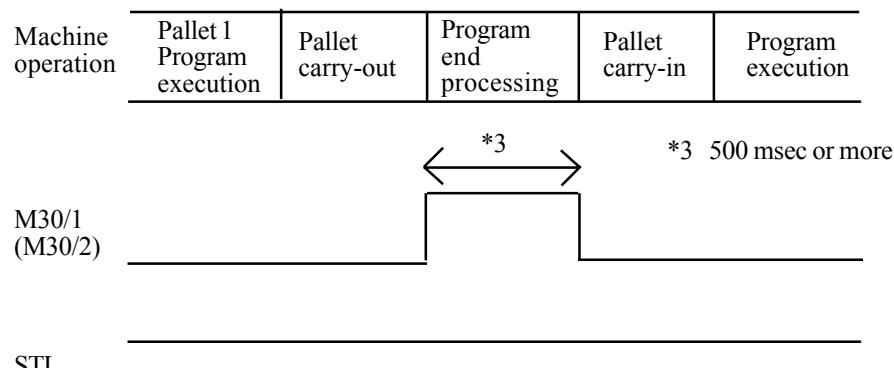
**3. When starting via outside start with the restart of parameter 1 set to 1.**

(1) When the pallet selection switch is set to off  
Out side is disabled.

(2) When the pallet selection switch is set to 1 or 2.

The signals go on when you execute the program end during memory operation and take out the pallet.

The signals go off when you restart after the program execution has been completed or when you input the reset signal.



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\*2 M30/2 will go on if you perform the following:

Starting when pallet 2 is located inside with the pallet selection switch set to 1↔ 2 or 2.

(Note 1) These signals will remain unchanged if an alarm occurs.

(Note 2) The automatic door (optional) works only one time at start.  
Thereafter it will not work.

(Note 3) STL does not go off even during M30/1 or M30/2 output.

**3. When the pallet selection switch is set to 1  $\leftrightarrow$  2.**

Go on when you execute the program end during memory operation.

Go off under either of the following conditions:

- 1) When carrying in a pallet on the opposite side starts the execution of a program.
- 2) When you input the reset signal.

Machine operation	Pallet 1 Program execution	Pallet carry-out	Pallet 2 program execution	Pallet carry-in	Pallet 1 program execution
M30/1					
M30/2					
STL					

\*2 M30/2 will go on if you perform the following:

Starting when pallet 2 is located inside with the pallet selection switch set to 1  $\leftrightarrow$  2 or 2.

(Note 1) These signals will remain unchanged if an alarm occurs.

(Note 2) The automatic door (optional) works only one time at start.

Thereafter it will not work.

(Note 3) STL does not go off even during M30/1 or M30/2 output.

### 7.4.14 Data bank (default value list)

#### User Parameter 1 (switch1)

(METRIC)

Item	31A	22A	S2A	32A	R2A	20A	S2B
MODE SELECT	0	0	0	0	0	0	0
MANUAL FEED	0	0	0	0	0	0	0
SELECT MEMORY RUN TYPE	0	0	0	0	0	0	0
RESTART	0	0	0	0	0	0	0
AUTO TOOL LENGTH OFFSET	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MAXIMUM TIME OF EXT SIGNAL	0	0	0	0	0	0	0
DRY RUN OFFSET VALUE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PROGRAM UNIT	0	0	0	0	0	0	0
G73 RELIEF AMOUNT	0.500	0.500	0.500	0.500	0.500	0.500	0.500
G83 CUTTING START POINT	0.500	0.500	0.500	0.500	0.500	0.500	0.500
G77,G78 RELIEF AMOUNT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
G76,G87 SHIFT DIRECTION	0	0	0	0	0	0	0
S.T.M RECOVERY	1	1	1	1	1	1	1
Z-AXIS ABSOLUTE COORDINATE	2	2	2	2	2	2	2
START UP/CANCEL	0	0	0	0	0	0	0
MINIMUM CORNER MOVEMENT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.CORNER OVERRIDE ANGLE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.CORNER OVERRIDE LEN1	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.CORNER OVERRIDE LEN2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.CORNER OVERRIDE RATIO	100	100	100	100	100	100	100
OVERRIDE LMT IN INSIDE ARC	100	100	100	100	100	100	100
CENTER ALIGN FEEDRATE 1	500	500	500	500	500	500	500
CENTER ALIGN FEEDRATE 2	10	10	10	10	10	10	10
CENTER ALIGN RETRACT VALUE	0.500	0.500	0.500	0.500	0.500	0.500	0.500
CENTER ALIGN CORRECT VALUE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
INDICATION SELECT AT COUNT-UP	0	0	0	0	0	0	0
TOOL BREAKAGE DETECT OPTION	0	0	0	0	0	0	0
TOOL BRK DETECT RETURN POS							
[Standard type]	550.000	610.000	430.000	610.000	450.000	370.000	430.000
[Short stroke type]							430.000
[Long stroke type]		590.000	410.000				410.000
TOOL BRK DETECTION POS X	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOOL BRK DETECTION POS Y	0.000	0.000	0.000	-140.000	0.000	0.000	0.000
REFERENCE TOOL LENGTH OFFSET NO.	0	0	0	0	0	0	0
EXT.ERROR 10 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 11 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 12 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 13 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 14 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 15 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 16 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 17 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 18 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 19 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 20 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 21 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 22 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 23 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 24 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 25 ALARM LEVEL	1	1	1	1	1	1	1
UNREGISTERD M-CODE	0	0	0	0	0	0	0
ONESHOT SIGNAL M450 OUTPUT TIME	5	5	5	5	5	5	5
ONESHOT SIGNAL M451 OUTPUT TIME	5	5	5	5	5	5	5

Item	31A	22A	S2A	32A	R2A	20A	S2B
ONESHOT SIGNAL M455 OUTPUT TIME	5	5	5	5	5	5	5
ONESHOT SIGNAL M456 OUTPUT TIME	5	5	5	5	5	5	5
AUTO DISPLAY CLEAR TIME	0	0	0	0	0	0	0
MACHINE NUMBER	0	0	0	0	0	0	0
AUTOMATIC DOOR	0	0	0	0	0	0	0
AREA SENSOR PATTERN	1	1	1	1	1	1	1
RESET AUTOMATIC DOOR ERROR	1	1	1	1	1	1	1
AUTOMATIC DOOR OPERATION TIME	5	5	5	5	5	5	10
DISPLAY PROGRAM LIST	1	1	1	1	1	1	1
OVERRIDE SWITCH	1	1	1	1	1	1	1
DISP ALARM WHEN OVERRIDE IS VALID	1	1	1	1	1	1	1
DISPLAY ALARM WHEN DOOR IS OPEN	0	0	0	0	0	0	0
MACRO COMMAND SINGLE STOP	0	0	0	0	0	0	0
ATC SYNCHRONOUS START POS							
[Standard type]	300.000	330.000	230.000	350.000	250.000	370.000	230.000
[Short stroke type]							230.000
[Long stroke type]		310.000	210.000				210.000
ATC REFERENCE TOOL LENGTH	200.000	200.000	200.000	200.000	200.000	50.000	200.000
M490 COOLANT BLOWING TIME	0.0	0.0	0.0	0.0	0.0	0.0	1.0
M491 COOLANT BLOWING TIME	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M492 COOLANT BLOWING TIME	0.0	0.0	0.0	0.0	0.0	0.0	1.0
M493 COOLANT BLOWING TIME	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M494 COOLANT BLOWING TIME	0.0	0.0	0.0	0.0	0.0	0.0	1.0
INIT TOOL LIFE CHECK	0	0	0	0	0	0	0
EXT SIGNAL OUTPUT T.(MFIN OFF)	5	5	5	5	5	5	5
CHIP SHOWER DRAIN TIME	0	0	0	0	0	0	0
AUTOMATIC COOLANT OFF TIME	0	0	0	0	0	0	0
COOLANT DELAY TIME	20	20	20	20	20	20	20
AUTOMATIC MACHINE LIGHT OFF TIME	0	0	0	0	0	0	0
TIME TILL STANDBY MODE ENTERED	0	0	0	0	0	0	0
AUTOMATIC POWER OFF	0	0	0	0	0	0	0
AUTO POWER OFF TIME	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00
POT LOWERING START POSITION	0.000	0.000	0.000	0.000	0.000	50.000	0.000
CORNER DECELERATION ANGLE	179.999	179.999	179.999	179.999	179.999	179.999	179.999
CORNER DECELERATION MINIMUM RATE	20	20	20	20	20	20	20
ALARM WHILE SCREEN IS DIMMED	0	0	0	0	0	0	0
TABLE LOADED MASS	160	200	150	160	160	70	150
BACK WASHING AT PROGRAM END	0	0	0	0	0	0	1
OPERATION TIME	-	-	-	-	-	-	-
CURRENT DATE	-	-	-	-	-	-	-
CURRENT TIME	-	-	-	-	-	-	-
MACHINE UNIT SYSTEM	0	0	0	0	0	0	0

## User Parameter 2 (switch 2)

Item	31A	22A	S2A	32A	R2A	20A	S2B
STROKE 4	1	0	0	1	1	0	0
STROKE 5	0	0	0	0	0	0	0
STROKE 6	0	0	0	0	0	0	0
STROKE 4(-)	-180.000	0.000	0.000	-180.000	-180.000	0.000	0.000
STROKE 5(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE 6(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE 4(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE 5(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE 6(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 X(-)							
[Standard type]	-350.000	-500.000	-480.000	-450.000	-420.000	-200.000	-480.000
[Short stroke type]							-300.000
[Long stroke type]		-700.000	-700.000				-700.000
STROKE LIMIT1 Y(-)	-250.000	-400.000	-360.000	-320.000	-320.000	-255.000	-360.000
STROKE LIMIT1 Z(-)							
[Standard type]	200.000	200.000	160.000	200.000	180.000	120.000	160.000
[Short stroke type]							160.000
[Long stroke type]		180.000	140.000				140.000
STROKE LIMIT1 4(-)	-180.000	0.000	0.000	-180.000	-180.000	0.000	0.000
STROKE LIMIT1 5(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 6(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 X(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 Y(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 Z(+)							
[Standard type]	550.000	610.000	430.000	610.000	450.000	370.000	430.000
[Short stroke type]							430.000
[Long stroke type]		590.000	410.000				410.000
STROKE LIMIT1 4(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 5(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 6(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT2 X(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT2 Y(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT2 Z(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT2 X(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT2 Y(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT2 Z(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Y REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Z REFERENCE POINT							
[Standard type]	550.000	610.000	430.000	610.000	450.000	370.000	430.000
[Short stroke type]							430.000
[Long stroke type]		590.000	410.000				410.000
4 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.2 X REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.2 Y REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.2 Z REFERENCE POINT							
[Standard type]	550.000	610.000	430.000	610.000	450.000	370.000	430.000
[Short stroke type]							430.000
[Long stroke type]		590.000	410.000				410.000
NO.2 4 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.2 5 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.2 6 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.3 X REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.3 Y REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.3 Z REFERENCE POINT							
[Standard type]	550.000	610.000	430.000	610.000	450.000	370.000	430.000

Item	31A	22A	S2A	32A	R2A	20A	S2B
[Short stroke type]							430.000
[Long stroke type]		590.000	410.000				410.000
NO.3 4 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.3 5 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.3 6 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.4 X REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.4 Y REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.4 Z REFERENCE POINT							
[Standard type]	550.000	610.000	430.000	610.000	450.000	370.000	430.000
[Short stroke type]							430.000
[Long stroke type]		590.000	410.000				410.000
NO.4 4 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.4 5 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.4 6 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.COORD SYSTEM SET	0	0	0	0	0	0	0
AUTO.COORD SYSTEM SET X	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.COORD SYSTEM SET Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.COORD SYSTEM SET Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.COORD SYSTEM SET 4	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.COORD SYSTEM SET 5	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.COORD SYSTEM SET 6	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RAPID TRAVERSE OVERRIDE SPD1	0	0	0	0	0	0	0
RAPID TRAVERSE OVERRIDE SPD2	500	500	500	500	500	500	500
RAPID TRAVERSE OVERRIDE SPD3	5000	5000	5000	5000	5000	5000	5000
4-AXIS OVERRIDE ROTATE SPD.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-AXIS OVERRIDE ROTATE SPD.2	0.3	0.5	0.5	0.3	0.3	0.5	0.5
4-AXIS OVERRIDE ROTATE SPD.3	2.5	5.0	5.0	2.5	2.5	5.0	5.0
5-AXIS OVERRIDE ROTATE SPD.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-AXIS OVERRIDE ROTATE SPD.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5
5-AXIS OVERRIDE ROTATE SPD.3	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6-AXIS OVERRIDE ROTATE SPD.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6-AXIS OVERRIDE ROTATE SPD.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5
6-AXIS OVERRIDE ROTATE SPD.3	5.0	5.0	5.0	5.0	5.0	5.0	5.0
X POSI SIGNAL OUTPUT(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X POSI SIGNAL OUTPUT(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Y POSI SIGNAL OUTPUT(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Y POSI SIGNAL OUTPUT(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Z POSI SIGNAL OUTPUT(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Z POSI SIGNAL OUTPUT(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4 POSI SIGNAL OUTPUT(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4 POSI SIGNAL OUTPUT(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5 POSI SIGNAL OUTPUT(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5 POSI SIGNAL OUTPUT(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6 POSI SIGNAL OUTPUT(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6 POSI SIGNAL OUTPUT(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SINGLE DIR POS TRVL X	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SINGLE DIR POS TRVL Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SINGLE DIR POS TRVL Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SINGLE DIR POS TRVL 4TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SINGLE DIR POS TRVL 5TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SINGLE DIR POS TRVL 6TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000

**User Parameter 3 (Communication)**

Item	31A	22A	S2A	32A	R2A	20A	S2B
SELECT PORT	0	0	0	0	0	0	0
CONNECTION OBJECT	1	1	1	1	1	1	1
COMP COMMUNICATN PROTOCOL(MASTER)	0	0	0	0	0	0	0
BAUD RATE	5	5	5	5	5	5	5
PARITY	0	0	0	0	0	0	0
STOP BIT	0	0	0	0	0	0	0
CHARACTER	0	0	0	0	0	0	0
RESPONSE MONITORING TIME	60	60	60	60	60	60	60
COMMUNICATION TYPE	0	0	0	0	0	0	0
DC1 CODE	17	17	17	17	17	17	17
DC2 CODE	18	18	18	18	18	18	18
DC3 CODE	147	147	147	147	147	147	147
DC4 CODE	20	20	20	20	20	20	20
DR SIGNAL CHECK	1	1	1	1	1	1	1
ENDING DC3 CODE	0	0	0	0	0	0	0
INVALID DATA	1	1	1	1	1	1	1
TRANS DATA CODE	0	0	0	0	0	0	0
END OF BLOCK	0	0	0	0	0	0	0
TV CHECK	0	0	0	0	0	0	0
HEADING OUTPUT	0	0	0	0	0	0	0
RESET IN SLAVE COMMUNICATION	1	1	1	1	1	1	1
RECOVERY TIME OF RESET	1	1	1	1	1	1	1
DATA OVERWRITE(SLAVE)	0	0	0	0	0	0	0
REMOTE OPERATION	0	0	0	0	0	0	0
CHECKSUM	0	0	0	0	0	0	0
EIA CHARACTER CODE(#)	173	173	173	173	173	173	173
EIA CHARACTER CODE(*)	186	186	186	186	186	186	186
EIA CHARACTER CODE(=)	194	194	194	194	194	194	194
EIA CHARACTER CODE(1)	161	161	161	161	161	161	161
EIA CHARACTER CODE(0)	162	162	162	162	162	162	162

**User Parameter 4 (Extr in Signal)**

Item	31A	22A	S2A	32A	R2A	20A	S2B
No.53	58 PRSNSR						
No.54	59 OILEMP						
No.55	60 BOXDR						
No.56	1 PRO1						
No.57	2 PRO2						
No.58	30 EXER23						
No.59	31 EXER24						
No.60	32 EXER25						
No.203							
No.204							
No.205	3 PRO4						
No.206	4 PRO8						
No.207							
No.208	11 EXREF2						
No.209	12 EXREF3						
No.210							
No.213	15 OPSKIP						
No.214	16 OPSTOP						
No.215	28 EXER21						
No.216	29 EXER22						
No.217	9 CTURN			9 CTURN	9 CTURN		
No.218	42 4LOCK						
No.219	43 5LOCK						
No.220	44 6LOCK						

## User Parameter 5 (Extrl out Signal)

Item	31A	22A	S2A	32A	R2A	20A	S2B
No.103	92 OILPMP						
No.104	31 ALM						
No.105	10 M30/1						
No.106	20 M406						
No.107	26 MF						
No.108	6 M22						
No.109	7 M24						
No.110	8 M28						
No.303	1 M11						
No.304	2 M12						
No.305	3 M14						
No.306	4 M18						
No.307	5 M21						
No.308	6 M22						
No.309	7 M24						
No.310	8 M28						
No.313	9 M00						
No.314	10 M30/1						
No.315	13 REFIN2						
No.316	14 REFIN3						
No.317	18 M402						
No.318	19 M404						
No.319							
No.320	11 M30/2			11 M30/2	11 M30/2		
No.323	26 MF						
No.324	27 AUTO						
No.325	28 STL						
No.326	29 MEMOK						
No.327	30 NCOK						
No.328	31 ALM						
No.329	34 TOOL						
No.330	36 ORGFIN						
No.333	37 SPTURN						
No.334	38 ZPX						
No.335	39 ZPY						
No.336	40 ZPZ						
No.337	41 ZPSP						
No.338	45 PFIN1			45 PFIN1	45 PFIN1		
No.339	46 PFIN2			46 PFIN2	46 PFIN2		
No.340							

**User Parameter 6 (Z measurement)**

Item	31A	22A	S2A	32A	R2A	20A	S2B
TOOL BREAKAGE DETECT FUNCTION	0	0	0	0	0	0	0
THERMAL MEASUREMENT FUNCTION	0	0	0	0	0	0	0
THERMAL DISPLCMNT COMPEN PALLET	0	-	-	0	0	-	-
PALLET1 SIDE MEASUREMENT DEVICE	-	-	0	0	-	-	0
PALLET2 SIDE MEASUREMENT DEVICE	0	-	-	0	0	-	-
XY POSITION RADIUS SHIFT DIRCTN	0	0	0	0	0	0	0
THERMAL MEASUREMENT MOTION COND.	0	0	0	0	0	0	0
Z-AXIS MACHINING ACCURACY	0.020	0.020	0.020	0.020	0.020	0.020	0.020
THERMAL WATCH DISPLACMT AMNT	0.010	0.010	0.010	0.010	0.010	0.010	0.010
NUMBER OF THERMAL WATCHING	2	2	2	2	2	2	2
NO.OF THERMAL WATCHING CANCEL	10	10	10	10	10	10	10
INITIAL SET NO. OF THERMAL MSMT	10	10	10	10	10	10	10
THERMAL WATCHING STOP TIME	2	2	2	2	2	2	2
THR M OFFSET AMT LIMIT VALUE	0.200	0.200	0.200	0.200	0.200	0.200	0.200
RETRACT AMNT AFT MEASUREMNT	0.500	0.500	0.500	0.500	0.500	0.500	0.500
MSMT FEEDRATE B TOOL DIAMTR	1.000	1.000	1.000	1.000	1.000	1.000	1.000
MEASUREMENT FEEDRATE 1A	500	500	500	500	500	500	500
MEASUREMENT FEEDRATE 1B	2000	2000	2000	2000	2000	2000	2000
MEASUREMENT FEEDRATE 2A	50	50	50	50	50	50	50
MEASUREMENT FEEDRATE 2B	50	50	50	50	50	50	50
PAL1 SIDE MSMT DEV POS X	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PAL1 SIDE MSMT DEV POS Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PAL1 SIDE MSMT DEV POS Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PAL2 SIDE MSMT DEV POS X	0.000	-	-	0.000	0.000	-	-
PAL2 SIDE MSMT DEV POS Y	0.000	-	-	0.000	0.000	-	-
PAL2 SIDE MSMT DEV POS Z	0.000	-	0.000	0.000	-	-	-

**User Parameter 7 (Zero measurement)**

Item	31A	22A	S2A	32A	R2A	20A	S2B
PROBE OFFSET VALUE 1	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PROBE OFFSET VALUE 2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PROBE OFFSET VALUE 3	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PROBE OFFSET VALUE 4	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MEASURING MOTION	0	0	0	0	0	0	0
MEASURING SPEED 1	500	500	500	500	500	500	500
MEASURING SPEED 2	100	100	100	100	100	100	100
STOP DISTANCE BEFORE MSRNG	5.000	5.000	5.000	5.000	5.000	5.000	5.000
MEASURNG TRAVEL LMT DISTANCE	2.000	2.000	2.000	2.000	2.000	2.000	2.000
MEASUREMENT TOLERANCE 1	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MEASUREMENT TOLERANCE 2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RETURN DISTANCE AFT MEASURNG	1.000	1.000	1.000	1.000	1.000	1.000	1.000

**User Parameter 8 (Auto THR M DISP CMP )**

Item	31A	22A	S2A	32A	R2A	20A	S2B
Z-AXIS COMPENSATION ADJUSTMENT	100	100	100	100	100	100	100
SPINDLE COMP ADJUSTMENT(Z)	100	100	100	100	100	100	100
X-AXIS COMPENSATION ADJUSTMENT	100	100	100	100	100	100	100
SPINDLE COMP ADJUSTMENT(X)	100	100	100	100	100	100	100
Y-AXIS COMPENSATION ADJUSTMENT	100	100	100	100	100	100	100
SPINDLE COMP ADJUSTMENT(Y)	100	100	100	100	100	100	100

**User Parameter 9 (Quick Table)**

Item	31A
PALLET 1 PROGRAM NUMBER	-
PALLET 2 PROGRAM NUMBER	-
PALLET 1 CARRY IN MOTION	0
PALLET 2 CARRY IN MOTION	0

32A	R2A
-	-
-	-
0	0
0	0

**User Parameter1 (switch 1) (INCH)**

Item	31A	22A	S2A	32A	R2A	20A	S2B
MODE SELECT	0	0	0	0	0	0	0
MANUAL FEED	0	0	0	0	0	0	0
SELECT MEMORY RUN TYPE	0	0	0	0	0	0	0
RESTART	0	0	0	0	0	0	0
AUTO TOOL LENGTH OFFSET	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MAXIMUM TIME OF EXT SIGNAL	0	0	0	0	0	0	0
DRY RUN OFFSET VALUE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROGRAM UNIT	0	0	0	0	0	0	0
G73 RELIEF AMOUNT	0.0196	0.0196	0.0196	0.0196	0.0196	0.0196	0.0196
G83 CUTTING START POINT	0.0196	0.0196	0.0196	0.0196	0.0196	0.0196	0.0196
G77,G78 RELIEF AMOUNT	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400	0.0400
G76,G87 SHIFT DIRECTION	0	0	0	0	0	0	0
S.T.M RECOVERY	1	1	1	1	1	1	1
Z-AXIS ABSOLUTE COORDINATE	2	2	2	2	2	2	2
START UP/CANCEL	0	0	0	0	0	0	0
MINIMUM CORNER MOVEMENT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUTO.CORNER OVERRIDE ANGLE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.CORNER OVERRIDE LEN1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUTO.CORNER OVERRIDE LEN2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUTO.CORNER OVERRIDE RATIO	100	100	100	100	100	100	100
OVERRIDE LMT IN INSIDE ARC	100	100	100	100	100	100	100
CENTER ALIGN FEEDRATE 1	19.6	19.6	19.6	19.6	19.6	19.6	19.6
CENTER ALIGN FEEDRATE 2	0.3	0.3	0.3	0.3	0.3	0.3	0.3
CENTER ALIGN RETRACT VALUE	0.0196	0.0196	0.0196	0.0196	0.0196	0.0196	0.0196
CENTER ALIGN CORRECT VALUE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
INDICATION SELECT AT COUNT-UP	0	0	0	0	0	0	0
TOOL BREAKAGE DETECT OPTION	0	0	0	0	0	0	0
TOOL BRK DETECT RETURN POS							
[Standard type]	21.6535	24.0157	16.9291	24.0157	17.7175	14.5669	16.9291
[Short stroke type]							16.9291
[Long stroke type]		23.2283	16.1417				16.1417
TOOL BRK DETECTION POS X	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOOL BRK DETECTION POS Y	0.0000	0.0000	0.0000	-5.5118	0.0000	0.0000	0.0000
REFERENCE TOOL LENGTH OFFSET NO.	0	0	0	0	0	0	0
EXT.ERROR 10 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 11 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 12 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 13 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 14 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 15 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 16 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 17 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 18 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 19 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 20 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 21 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 22 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 23 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 24 ALARM LEVEL	1	1	1	1	1	1	1
EXT.ERROR 25 ALARM LEVEL	1	1	1	1	1	1	1
UNREGISTERD M-CODE	0	0	0	0	0	0	0
ONESHOT SIGNAL M450 OUTPUT TIME	5	5	5	5	5	5	5
ONESHOT SIGNAL M451 OUTPUT TIME	5	5	5	5	5	5	5
ONESHOT SIGNAL M455 OUTPUT TIME	5	5	5	5	5	5	5
ONESHOT SIGNAL M456 OUTPUT	5	5	5	5	5	5	5

Item	31A	22A	S2A	32A	R2A	20A	S2B
TIME							
AUTO DISPLAY CLEAR TIME	0	0	0	0	0	0	0
MACHINE NUMBER	0	0	0	0	0	0	0
AUTOMATIC DOOR	0	0	0	0	0	0	0
AREA SENSOR PATTERN	1	1	1	1	1	1	1
RESET AUTOMATIC DOOR ERROR	1	1	1	1	1	1	1
AUTOMATIC DOOR OPERATION TIME	5	5	5	5	5	5	10
DISPLAY PROGRAM LIST	1	1	1	1	1	1	1
OVERRIDE SWITCH	1	1	1	1	1	1	1
DISP ALARM WHEN OVERRIDE IS VALID	1	1	1	1	1	1	1
DISPLAY ALARM WHEN DOOR IS OPEN	0	0	0	0	0	0	0
MACRO COMMAND SINGLE STOP	0	0	0	0	0	0	0
ATC SYNCHRONOUS START POS							
[Standard type]	11.8110	12.9921	9.0551	13.7795	9.8425	14.5669	9.0551
[Short stroke type]							9.0551
[Long stroke type]		12.2047	8.2677				8.2677
ATC REFERENCE TOOL LENGTH	7.8740	7.8740	7.8740	7.8740	7.8740	1.9685	7.8740
M490 COOLANT BLOWING TIME	0.0	0.0	0.0	0.0	0.0	0.0	1.0
M491 COOLANT BLOWING TIME	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M492 COOLANT BLOWING TIME	0.0	0.0	0.0	0.0	0.0	0.0	1.0
M493 COOLANT BLOWING TIME	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M494 COOLANT BLOWING TIME	0.0	0.0	0.0	0.0	0.0	0.0	1.0
INIT TOOL LIFE CHECK	0	0	0	0	0	0	0
EXT SIGNAL OUTPUT T.(MFIN OFF)	5	5	5	5	5	5	5
CHIP SHOWER DRAIN TIME	0	0	0	0	0	0	0
AUTOMATIC COOLANT OFF TIME	0	0	0	0	0	0	0
COOLANT DELAY TIME	20	20	20	20	20	20	20
AUTOMATIC MACHINE LIGHT OFF TIME	0	0	0	0	0	0	0
TIME TILL STANDBY MODE ENTERED	0	0	0	0	0	0	0
AUTOMATIC POWER OFF	0	0	0	0	0	0	0
AUTO POWER OFF TIME	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00
POT LOWERING START POSITION	0.000	0.000	0.000	0.000	0.000	1.9685	0.000
CORNER DECELERATION ANGLE	179.999	179.999	179.999	179.999	179.999	179.999	179.999
CORNER DECELERATION MINIMUM RATE	20	20	20	20	20	20	20
ALARM WHILE SCREEN IS DIMMED	0	0	0	0	0	0	0
TABLE LOADED MASS	160	200	150	160	160	70	150
BACK WASHING AT PROGRAM END	1	1	1	1	1	1	1
OPERATION TIME	-	-	-	-	-	-	-
CURRENT DATE	-	-	-	-	-	-	-
CURRENT TIME	-	-	-	-	-	-	-
MACHINE UNIT SYSTEM	1	1	1	1	1	1	1

**User Parameter 2 (switch 2)**

Item	31A	22A	S2A	32A	R2A	20A	S2B
STROKE 4	1	0	0	1	1	0	1
STROKE 5	0	0	0	0	0	0	0
STROKE 6	0	0	0	0	0	0	0
STROKE 4(-)	-180.000	0.000	0.000	-180.000	-180.000	0.000	0.000
STROKE 5(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE 6(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE 4(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE 5(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE 6(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 X(-)							
[Standard type]	-13.7795	-19.6850	-18.8976	-17.7165	-16.5354	-7.8740	-18.8976
[Short stroke type]							-11.8110
[Long stroke type]		-27.5591	-27.5591				-27.5591
STROKE LIMIT1 Y(-)	-9.8425	-15.7480	-14.1732	-12.5984	-12.5984	-10.0394	-14.1732
STROKE LIMIT1 Z(-)							
[Standard type]	7.8740	7.8740	6.2992	7.8740	7.0866	4.7244	6.2992
[Short stroke type]							6.2992
[Long stroke type]		7.0866	5.5118				5.5118
STROKE LIMIT1 4(-)	-180.000	0.000	0.000	-180.000	-180.000	0.000	0.000
STROKE LIMIT1 5(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 6(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 X(+)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STROKE LIMIT1 Y(+)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STROKE LIMIT1 Z(+)							
[Standard type]	21.6535	24.0157	16.9291	24.0157	17.7175	14.5669	16.9291
[Short stroke type]							16.9291
[Long stroke type]		23.2283	16.1417				16.1417
STROKE LIMIT1 4(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 5(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT1 6(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STROKE LIMIT2 X(-)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STROKE LIMIT2 Y(-)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STROKE LIMIT2 Z(-)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STROKE LIMIT2 X(+)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STROKE LIMIT2 Y(+)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STROKE LIMIT2 Z(+)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
X REFERENCE POINT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y REFERENCE POINT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Z REFERENCE POINT							
[Standard type]	21.6535	24.0157	16.9291	24.0157	17.7175	14.5669	16.9291
[Short stroke type]							16.9291
[Long stroke type]		23.2283	16.1417				16.1417
4 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.2 X REFERENCE POINT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NO.2 Y REFERENCE POINT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NO.2 Z REFERENCE POINT							
[Standard type]	21.6535	24.0157	16.9291	24.0157	17.7175	14.5669	16.9291
[Short stroke type]							16.9291
[Long stroke type]		23.2283	16.1417				16.1417
NO.2 4 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.2 5 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.2 6 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.3 X REFERENCE POINT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NO.3 Y REFERENCE POINT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NO.3 Z REFERENCE POINT							

Item	31A	22A	S2A	32A	R2A	20A	S2B
[Standard type]	21.6535	24.0157	16.9291	24.0157	17.7175	14.5669	16.9291
[Short stroke type]							16.9291
[Long stroke type]		23.2283	16.1417				16.1417
NO.3 4 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.3 5 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.3 6 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.4 X REFERENCE POINT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NO.4 Y REFERENCE POINT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NO.4 Z REFERENCE POINT							
[Standard type]	21.6535	24.0157	16.9291	24.0157	17.7175	14.5669	16.9291
[Short stroke type]							16.9291
[Long stroke type]		23.2283	16.1417				16.1417
NO.4 4 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.4 5 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NO.4 6 REFERENCE POINT	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.COORD SYSTEM SET	0	0	0	0	0	0	0
AUTO.COORD SYSTEM SET X	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUTO.COORD SYSTEM SET Y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUTO.COORD SYSTEM SET Z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AUTO.COORD SYSTEM SET 4	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.COORD SYSTEM SET 5	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AUTO.COORD SYSTEM SET 6	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RAPID TRAVERSE OVERRIDE SPD1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RAPID TRAVERSE OVERRIDE SPD2	19.6	19.6	19.6	19.6	19.6	19.6	19.6
RAPID TRAVERSE OVERRIDE SPD3	196.8	196.8	196.8	196.8	196.8	196.8	196.8
4-AXIS OVERRIDE ROTATE SPD.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-AXIS OVERRIDE ROTATE SPD.2	0.3	0.5	0.5	0.3	0.3	0.5	0.5
4-AXIS OVERRIDE ROTATE SPD.3	2.5	5.0	5.0	2.5	2.5	5.0	5.0
5-AXIS OVERRIDE ROTATE SPD.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-AXIS OVERRIDE ROTATE SPD.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5
5-AXIS OVERRIDE ROTATE SPD.3	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6-AXIS OVERRIDE ROTATE SPD.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6-AXIS OVERRIDE ROTATE SPD.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5
6-AXIS OVERRIDE ROTATE SPD.3	5.0	5.0	5.0	5.0	5.0	5.0	5.0
X POSI SIGNAL OUTPUT(+)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
X POSI SIGNAL OUTPUT(-)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y POSI SIGNAL OUTPUT(+)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y POSI SIGNAL OUTPUT(-)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Z POSI SIGNAL OUTPUT(+)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Z POSI SIGNAL OUTPUT(-)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4 POSI SIGNAL OUTPUT(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4 POSI SIGNAL OUTPUT(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5 POSI SIGNAL OUTPUT(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5 POSI SIGNAL OUTPUT(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6 POSI SIGNAL OUTPUT(+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6 POSI SIGNAL OUTPUT(-)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SINGLE DIR POS TRVL X	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE DIR POS TRVL Y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE DIR POS TRVL Z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SINGLE DIR POS TRVL 4TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SINGLE DIR POS TRVL 5TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SINGLE DIR POS TRVL 6TH	0.000	0.000	0.000	0.000	0.000	0.000	0.000

**User Parameter 3 (Communication)**

Item	31A	22A	S2A	32A	R2A	20A	S2B
SELECT PORT	0	0	0	0	0	0	0
CONNECTION OBJECT	1	1	1	1	1	1	1
COMP COMMUNICATN PROTOCOL(MASTER)	0	0	0	0	0	0	0
BAUD RATE	5	5	5	5	5	5	5
PARITY	0	0	0	0	0	0	0
STOP BIT	0	0	0	0	0	0	0
CHARACTER	0	0	0	0	0	0	0
RESPONSE MONITORING TIME	60	60	60	60	60	60	60
COMMUNICATION TYPE	0	0	0	0	0	0	0
DC1 CODE	17	17	17	17	17	17	17
DC2 CODE	18	18	18	18	18	18	18
DC3 CODE	147	147	147	147	147	147	147
DC4 CODE	20	20	20	20	20	20	20
DR SIGNAL CHECK	1	1	1	1	1	1	1
ENDING DC3 CODE	0	0	0	0	0	0	0
INVALID DATA	1	1	1	1	1	1	1
TRANS DATA CODE	0	0	0	0	0	0	0
END OF BLOCK	0	0	0	0	0	0	0
TV CHECK	0	0	0	0	0	0	0
HEADING OUTPUT	0	0	0	0	0	0	0
RESET IN SLAVE COMMUNICATION	1	1	1	1	1	1	1
RECOVERY TIME OF RESET	1	1	1	1	1	1	1
DATA OVERWRITE(SLAVE)	0	0	0	0	0	0	0
REMOTE OPERATION	0	0	0	0	0	0	0
CHECKSUM	0	0	0	0	0	0	0
EIA CHARACTER CODE(#)	173	173	173	173	173	173	173
EIA CHARACTER CODE(*)	186	186	186	186	186	186	186
EIA CHARACTER CODE(=)	194	194	194	194	194	194	194
EIA CHARACTER CODE(())	161	161	161	161	161	161	161
EIA CHARACTER CODE(())	162	162	162	162	162	162	162

**User Parameter 4 (Extr in Signal)**

Item	31A	22A	S2A	32A	R2A	20A	S2B
No.53	58 PRNSNR						
No.54	59 OILEMP						
No.55	60 BOXDR						
No.56	1 PRO1						
No.57	2 PRO2						
No.58	30 EXER23						
No.59	31 EXER24						
No.60	32 EXER25						
No.203							
No.204							
No.205	3 PRO4						
No.206	4 PRO8						
No.207							
No.208	11 EXREF2						
No.209	12 EXREF3						
No.210							
No.213	15 OPSKIP						
No.214	16 OPSTOP						
No.215	28 EXER21						
No.216	29 EXER22						
No.217	9 CTURN			9 CTURN	9 CTURN		
No.218	42 4LOCK						
No.219	43 5LOCK						
No.220	44 6LOCK						

## User Parameter 5 (Extr out Signal)

Item	31A	22A	S2A	32A	R2A	20A	S2B
No.103	92 OILPMP						
No.104	31 ALM						
No.105	10 M30/1						
No.106	20 M406						
No.107	26 MF						
No.108	6 M22						
No.109	7 M24						
No.110	8 M28						
No.303	1 M11						
No.304	2 M12						
No.305	3 M14						
No.306	4 M18						
No.307	5 M21						
No.308	6 M22						
No.309	7 M24						
No.310	8 M28						
No.313	9 M00						
No.314	10 M30/1						
No.315	13 REFIN2						
No.316	14 REFIN3						
No.317	18 M402						
No.318	19 M404						
No.319							
No.320	11 M30/2			11 M30/2	11 M30/2		
No.323	26 MF						
No.324	27 AUTO						
No.325	28 STL						
No.326	29 MEMOK						
No.327	30 NCOK						
No.328	31 ALM						
No.329	34 TOOL						
No.330	36 ORGFIN						
No.333	37 SPTURN						
No.334	38 ZPX						
No.335	39 ZPY						
No.336	40 ZPZ						
No.337	41 ZPSP						
No.338	45 PFIN1			45 PFIN1	45 PFIN1		
No.339	46 PFIN2			46 PFIN2	46 PFIN2		
No.340							

## User Parameter 6 (Z measurement)

Item	31A	22A	S2A	32A	R2A	20A	S2B
TOOL BREAKAGE DETECT FUNCTION	0	0	0	0	0	0	0
THERMAL MEASUREMENT FUNCTION	0	0	0	0	0	0	0
THERMAL DISPLCMNT COMPEN PALLET	0	-	-	0	0	-	-
PALLET1 SIDE MEASUREMENT DEVICE	0	-	-	0	0	-	-
PALLET2 SIDE MEASUREMENT DEVICE	0	-	-	0	0	-	-
XY POSITION RADIUS SHIFT DIRCTN	0	0	0	0	0	0	0
THERMAL MEASUREMENT MOTION COND.	0	0	0	0	0	0	0
Z-AXIS MACHINING ACCURACY	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
THERMAL WATCH DISPLACMT AMNT	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
NUMBER OF THERMAL WATCHING	2	2	2	2	2	2	2
NO.OF THERMAL WATCHING CANCEL	10	10	10	10	10	10	10
INITIAL SET NO. OF THERMAL MSMT	10	10	10	10	10	10	10
THERMAL WATCHING STOP TIME	2	2	2	2	2	2	2
THR M OFFSET AMT LIMIT VALUE	0.0078	0.0078	0.0078	0.0078	0.0078	0.0078	0.0078
RETRACT AMNT AFT MEASUREMNT	0.0196	0.0196	0.0196	0.0196	0.0196	0.0196	0.0196
MSMT FEEDRATE B TOOL DIAMTR	0.0393	0.0393	0.0393	0.0393	0.0393	0.0393	0.0393
MEASUREMENT FEEDRATE 1A	19.6	19.6	19.6	19.6	19.6	19.6	19.6
MEASUREMENT FEEDRATE 1B	78.7	78.7	78.7	78.7	78.7	78.7	78.7
MEASUREMENT FEEDRATE 2A	1.9	1.9	1.9	1.9	1.9	1.9	1.9
MEASUREMENT FEEDRATE 2B	1.9	1.9	1.9	1.9	1.9	1.9	1.9
PAL1 SIDE MSMT DEV POS X	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PAL1 SIDE MSMT DEV POS Y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PAL1 SIDE MSMT DEV POS Z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PAL2 SIDE MSMT DEV POS X	0.000	-	-	0.000	0.000	-	-
PAL2 SIDE MSMT DEV POS Y	0.000	-	-	0.000	0.000	-	-
PAL2 SIDE MSMT DEV POS Z	0.000	-	-	0.000	0.000	-	-

**User Parameter 7 (Zero measurement)**

Item	31A	22A	S2A	32A	R2A	20A	S2B
PROBE OFFSET VALUE 1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROBE OFFSET VALUE 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROBE OFFSET VALUE 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROBE OFFSET VALUE 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MEASURING MOTION	0	0	0	0	0	0	0
MEASURING SPEED 1	19.6	19.6	19.6	19.6	19.6	19.6	19.6
MEASURING SPEED 2	3.9	3.9	3.9	3.9	3.9	3.9	3.9
STOP DISTANCE BEFORE MSRNG	0.1968	0.1968	0.1968	0.1968	0.1968	0.1968	0.1968
MEASURNG TRAVEL LMT DISTANCE	0.0787	0.0787	0.0787	0.0787	0.0787	0.0787	0.0787
MEASUREMENT TOLERANCE 1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MEASUREMENT TOLERANCE 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RETURN DISTANCE AFT MEASURNG	0.0393	0.0393	0.0393	0.0393	0.0393	0.0393	0.0393

**User Parameter 8 (Auto THRM DISP CMP )**

Item	31A	22A	S2A	32A	R2A	20A	S2B
Z-AXIS COMPENSATION ADJUSTMENT	100	100	100	100	100	100	100
SPINDLE COMP ADJUSTMENT(Z)	100	100	100	100	100	100	100
X-AXIS COMPENSATION ADJUSTMENT	100	100	100	100	100	100	100
SPINDLE COMP ADJUSTMENT(X)	100	100	100	100	100	100	100
Y-AXIS COMPENSATION ADJUSTMENT	100	100	100	100	100	100	100
SPINDLE COMP ADJUSTMENT(Y)	100	100	100	100	100	100	100

**User Parameter 9 (Quick Table)**

Item	31A
PALLET 1 PROGRAM NUMBER	-
PALLET 2 PROGRAM NUMBER	-
PALLET 1 CARRY IN MOTION	0
PALLET 2 CARRY IN MOTION	0

32A	R2A
-	-
-	-
0	0
0	0

# CHAPTER 8

## ALARM MESSAGE

- 8.1 Display of alarm messages**
- 8.2 Battery Fault alarm**
- 8.3 Alarm stop level and reset level**
- 8.4 Axis display**
- 8.5 Alarm message**
- 8.6 Servo error message**
- 8.7 Resetting ATC**
- 8.8 Resetting procedure for tool clamp error**

## 8.1 Display of alarm messages

Each message is displayed with \* mark at the beginning according to the reset level.

(Ex.)

Reset level 3 = \*\*

1000 \*\*TURN OFF POWER

Reset level 2 = \*

1040 \*EMMERGENCY SW ON

Reset level 1 = No \* mark

1280 MEMORY RUNNING

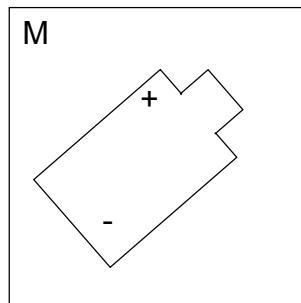
## 8.2 Battery Fault alarm

In tapping center, the data in the memory is retained by batteries.

If the batteries are dead , the battery alarm mark as shown below appears on the right bottom of the screen. If this mark appears, replace the batteries.

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**Fig.8-1 Battery alarm**



## 8.3 Alarm stop level and reset level

### 8.3.1 Alarm stop level

According to the stop level, the NC functions to stop as shown below.

#### (1) Stop level 5

The servo system stops.

#### (2) Stop level 4

The motion currently in execution stop instantaneously and no more motions are available afterwards.

#### (3) Stop level 3 (block stop)

The operation continues until the currently executed block is completed.

The blocks afterwards are not available. The START switch becomes ineffective and the NC program cannot be executed any longer.

#### (4) Stop level 2 (stop by M02 or M30)

The operation continues until the currently executed program is completed.

The START switch becomes ineffective and the NC program cannot be executed any longer.

When single block is ON, the stop level 3 and 2 become the same.

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#### (5) Stop level 1

Only a warning is given but machine motions are not affected.

**If a stop level 3 alarm occurs, the spindle stops when the block currently being executed is completed.**

**If a stop level 4 alarm occurs, the spindle stops immediately.**

**Note that the spindle does not stop even when the [STOP] key is pressed.**

### 8.3.2 Alarm reset level

According to the rest level, reset each alarm shown as below:

**(1) Reset level 3 (\*\*)**

Turn OFF the power. (An alarm cannot be reset otherwise.)

**(2) Reset level 2 (\*)**

Press the [RST] key.

**(3) Reset level 1 (No \* mark)**

Press any key.

The stop level and the reset level are independent from each other. Therefore, they can be combined in different ways as shown below.

(Ex.) Stop level 5 and Reset level 2  
Stop level 1 and Reset level 2

## 8.4 Axis display

All about “ \* axis “ description will be fixed, related to the machine parameter (system 2) setting in the manual , shown as below:

5-axis instsileation position ( 0: indipendent 1: table 1 2: table 2)

6-axis instsileation position ( 0: indipendent 1: table 1 2: table 2)

4-axisaddress ( 0: A 1: B 2: C)

5-axisaddress ( 0: A 1: B 2: C)

6-axisaddress ( 0: A 1: B 2: C)

		Instsileation position		
		0: indipendent	1: table 1	2: table 2
Address	0: A	A	A 1	A 2
	1: B	B	B 1	B 2
	2: C	C	C 1	C 2

## 8.5 Alarm message

The list includes alarms that may occur only in the specified models or in models with optional specifications.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5000	5	3	WATCH DOG (MAIN)	An error has occurred in main CPU.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5001	5	3	WATCH DOG (SLAVE)	An error has occurred in slave CPU.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5002	5	3	WATCH DOG (LOCAL)	An error has occurred in local CPU.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5003	5	3	RAM ERROR (MAIN)	Reading and writing using main RAM is not possible.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5004	5	3	ROM ERROR (MAIN)	The check sum of main ROM does not match.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5005	5	3	RAM ERROR (SLAVE)	Reading and writing using slave RAM is not possible.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5006	5	3	ROM ERROR (SLAVE)	The check sum of slave ROM does not match.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5007	5	3	RAM ERROR (LOCAL)	Reading and writing using local RAM is not possible.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5008	5	3	ROM ERROR (LOCAL)	The check sum of local ROM does not match.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5009	5	3	RAM ERROR (MAIN-LOC1)	Reading and writing using RAM common for main-loc1 is not possible.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5010	5	3	RAM ERROR (MAIN-LOC2)	Reading and writing using RAM common for main-loc2 is not possible.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5011	5	3	RAM ERROR (MAIN-SLV)	Reading and writing using RAM common for main-slv is not possible.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5012	5	3	TIMER ERROR (SLAVE)	An error has occurred in slave CPU.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5014	5	3	CALC ERROR (MAIN)	Improper calculation is executed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5015	5	3	CALC ERROR (SLAVE)	Improper calculation is executed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5016	5	3	CALC ERROR (LOCAL)	Improper calculation is executed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5017	5	3	MAIN INITIAL IMPSBLE	Main CPU has not started.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5018	5	3	SLV INITIAL IMPSBLE	Slave CPU has not started.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5019	5	3	AC POWER SUPPLY DROP	AC power supply voltage dropped by more than 30%.	Check the power supply voltage, change the tap of the transformer or check power supply capacity.
5020	5	3	DC POWER ERROR(24V)	24 vdc supply for control has dropped.	Check if a short circuit has occurred or the power supply is overloaded.
5021	5	3	SPECIAL INTIAL(*)	Power is turned on by special operations.	Perform required operations and turn power off and then on again.
5022	5	3	THERMAL (TRANS)	The thermal relay of transformer 1 has tripped. 1) Transformer is over loaded. 2) Machining condition has exceeded capacity.	1) Check if a load more than acceptable is connected. 2) Check machining conditions and operation patterns. Eliminate the causes and turn off power for at least 30 minutes before turning it on again.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5023	5	3	THERMAL (CNTL BX)	The thermal relay at the center of the control panel has tripped. 1) Temperature is too high. 2) Machining condition has exceeded capacity.	1) Check that temperature is 40 degrees or more. 2) Review the machining conditions and operation patterns.
5024	5	3	AIR PRESSURE LOW	Air pressure has dropped.	1) Check air piping and pressure. 2) Check that the pressure switch is set correctly.
5025	5	3	DATA ERR (M/C PARAM)	Data structure of machine parameter is destroyed.	Press [RST] key, and delete the destroyed data by memory display in edit mode and create new data again.
5026	5	3	NO M/C PARAM DATA	There is no machine parameter data.	Create the machine parameter and turn power off and then on again.
5027	5	3	100V POWER SUPPLY ER	The circuit protector of the 100v power supply circuit has tripped. 1) overloaded 2) short-circuited.	Eliminate the cause and turn on the circuit protector of transformer 2.
5028	5	3	POWER TURNED OFF	Power OFF activated or external power OFF signal activated.	The message, through displayed on turning off the power, is not an error. If this error occurs in a case other than the above. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5029	5	3	POS DETECT ERR	The difference between the absolute position data inside the magazine amplifier and relative position data inside the NC unit has exceeded the allowable range.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5030	5	3	I/O CRC ERROR 1	CRC error has occurred during communication between the keyboard and NC unit. 1) External noise. 2) The faulty keyboard or cable connection.	Turn power off and then on again. If the error still occurs. 1) Eliminate the cause of external noise caused by the likes of welders. 2) The faulty keyboard or cable needs replacement. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5031	5	3	I/O TIMEOVER 1	Framing error has occurred during communication between the keyboard and NC unit. 1) External noise. 2) The faulty keyboard or cable connection.	Turn power off and then on again. If the error still occurs. 1) Eliminate the cause of external noise caused by the likes of welders. 2) The faulty keyboard or cable needs replacement. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5032	5	3	I/O CRC ERROR 2	CRC error has occurred during communication between the keyboard and NC unit. 1) External noise. 2) The faulty keyboard or cable connection.	Turn power off and then on again. If the error still occurs. 1) Eliminate the cause of external noise caused by the likes of welders. 2) The faulty keyboard or cable needs replacement. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5033	5	3	I/O TIMEOVER 2	Framing error has occurred during communication between the keyboard and NC unit. 1) External noise. 2) The faulty keyboard or cable connection.	Turn power off and then on again. If the error still occurs. 1) Eliminate the cause of external noise caused by the likes of welders. 2) The faulty keyboard or cable needs replacement. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5034	5	3	I/O CRC ERROR 3	A CRC error has occurred during communication between I/O board and NC unit. 1) External noise 2) Faulty I/O board or cable.	Turn power off and then on again. If the error still occurs. 1) Eliminate the cause of external noise caused by the likes of welders. 2) The faulty keyboard or cable needs replacement. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.

Chapter 8 Alarm message

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5035	5	3	I/O TIMEOVER 3	Framing error has occurred during communication between the I/O board and NC unit. 1) External noise. 2) The faulty I/O board or cable connection.	Turn power off and then on again. If the error still occurs. 1) Eliminate the cause of external noise caused by the likes of welders. 2) The faulty keyboard or cable needs replacement. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5036	5	3	I/O CRC ERROR 4	A CRC error has occurred during communication between I/O board and NC unit. 1) External noise 2) Faulty I/O board or cable.	Turn power off and then on again. If the error still occurs. 1) Eliminate the cause of external noise caused by the likes of welders. 2) The faulty keyboard or cable needs replacement. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5037	5	3	I/O TIMEOVER 4	Framing error has occurred during communication between the I/O board and NC unit. 1) External noise. 2) The faulty I/O board or cable connection.	Turn power off and then on again. If the error still occurs. 1) Eliminate the cause of external noise caused by the likes of welders. 2) The faulty keyboard or cable needs replacement. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5038	5	3	I/O CRC ERROR 5	A CRC error has occurred during communication between EXIO board and NC unit. 1) External noise. 2) Faulty EXIO board or cable.	Turn power off and then on again. If the error still occurs. 1) Eliminate the cause of external noise caused by the likes of welders. 2) The faulty keyboard or cable needs replacement. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5039	5	3	I/O TIMEOVER 5	A CRC error has occurred during communication between the EXIO board and NC unit. 1) External noise. 2) The faulty EXIO board or cable connection.	Turn power off and then on again. If the error still occurs. 1) Eliminate the cause of external noise caused by the likes of welders. 2) The faulty keyboard or cable needs replacement. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5046	5	3	THERMAL (CHIP SHOWER)	The thermal relay for the chip shower protection circuit has tripped. 1) Motor is overloaded. 2) Motor capacity is exceeded. 3) Thermal relay setting value is incorrect. 4) There is an open motor phase.	For 1), turn off power for 15 to 20 minutes and eliminate the cause. For causes other than simply eliminate the cause and turn power off and then on again
5047	5	3	THERMAL (OIL HOLE)	The thermal relay for the oil hole protection circuit has tripped. 1) Motor is overloaded. 2) Motor capacity is exceeded. 3) Thermal relay setting value is incorrect. 4) There is an open motor phase.	For 1), turn off power for 15 to 20 minutes and eliminate the cause. For causes other than simply eliminate the cause and turn power off and then on again.
5048	5	3	THERMAL (SP MOTOR)	The thermal relay inside the spindle motor has tripped. 1) Motor is overloaded or locked. 2) Machining condition has exceeded motor's capacity.	1) Manually turn the spindle to check if the spindle load is great. 2) Review the machining conditions and operation patterns. Eliminate the causes and leave the motor with power on for 30 minutes before resuming operation

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5049	5	3	THERMAL (COOLANT)	The thermal relay for coolant protection circuit has tripped. 1) Motor is overloaded. 2) Motor capacity is exceeded. 3) Thermal relay setting value is incorrect. 4) There is an open motor phase.	For 1), turn off power for 15 to 20 minutes and eliminate the cause. For causes other than simply eliminate the cause and turn power off and then on again.
5050	5	3	THERMAL (SP THROUGH)	An alarm has occurred in the high pressure pump. 1) Pump is overloaded. 2) Filter is clogged.	1) Eliminate the cause and turn on power again. 2) Replace the filter.
5051	5	3	ABSOLUTE CLEAR ERR	Clearing start point data was attempted but the data was not cleared within the specified time.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5052	5	3	COMMAND ERROR	Main CPU is not synchronized with slave CPU.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5053	5	3	THERMAL (ATC MOTOR)	The thermal switch inside the ATC motor has tripped 1) Motor is overloaded and locked. 2) ATC operation condition has exceeded motor's capacity.	Turn off power for thirty minutes and eliminate the cause before resuming operation.
5054	5	3	TOOL CLAMP ERROR	Tool clamp sensor turned on.	Resetting procedure for tool clamp error.
5055	5	3	RAM ERROR (MAIN-LOC3)	Reading and writing using RAM common for main-loc3 is not possible.	This error may occur due to machine failure and the like. If this error still occurs, contact the nearest BROTHER approved service dealer.
5056	5	3	SERVO RELAY1 ERROR	The state of servo power supply relay 1 is as below. 1) The relay is already on. 2) The relay turned off midway.	Turn power off and then on again. This error may occur due to the machine failure and the like. If this error still occurs. contact the nearest BROTHER approved service dealer.
5057	5	3	SERVO RELAY2 ERROR	The state of servo power supply relay2 is as below. 1) The relay is already on. 2) The relay turned off midway.	This error may occur due to the machine failure and the like. If this error still occurs, contact the nearest BROTHER approved service dealer.
5058	5	3	SP SERVO (***)	A servo error has occurred for the spindle the cause differs depending on (***) Refer to the servo error list.	
5059	5	3	X SERVO (***)	A servo error has occurred for the X-axis. the cause differs depending on (***) Refer to the servo error list.	
5060	5	3	Y SERVO (***)	A servo error has occurred for the Y-axis. the cause differs depending on (***) Refer to the servo error list.	
5061	5	3	Z SERVO (***)	A servo error has occurred for the Z-axis. the cause differs depending on (***) Refer to the servo error list.	
5062	5	3	*SERVO (***)	A servo error has occurred for the 4 axis. the cause differs depending on (***) Refer to the servo error list.	
5063	5	3	* SERVO (***)	A servo error has occurred for the 5 axis. the cause differs depending on (***) Refer to the servo error list.	
5064	5	3	* SERVO (***)	A servo error has occurred for the 6 axis. the cause differs depending on (***) Refer to the servo error list.	
5066	5	3	M SERVO (***)	A servo error has occurred for the M axis. The cause differs depending on (***) Refer to the servo error list.	
5068	5	3	ROM ERROR (SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5069	5	3	RAM ERROR (SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5070	5	3	SOFT TRAP(SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5070	5	3	SOFT TRAP(SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5071	5	3	WATCH DOG (SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5072	5	3	ADRS ERROR (SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5073	5	3	CALC ERROR (SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5074	5	3	SEQ INTIAL IMPSBLE	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5075	5	3	SEQ RAM OPE ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5076	5	3	COMPILE ERROR 1	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5077	5	3	COMPILE ERROR 2	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5078	5	3	CONVERT ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5079	5	3	VERIFY ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5080	5	3	STEP OVER ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5081	5	3	MEMORY PROTECT ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5082	5	3	DOUBLE COIL ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5083	5	3	USER WDT-UP	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5084	5	3	USERRAM ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5085	5	3	USER PROGRAM ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5086	5	3	MEMORY CASSETTE ERR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5087	5	3	CALCULATION EXE ERR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5088	5	3	NO EXTENSION UNIT	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5089	5	3	STATION NO. SET ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5090	5	3	RETAINING DATA ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5091	5	3	M EXCPT INTRPT(*)	Main CPU has detected incorrect interruption. The figure in brackets () indicates interruption no.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5093	5	3	L EXCPT INTRPT(*)	Local CPU has detected incorrect interruption. The figure in brackets () indicates interruption no.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5094	5	3	PULSE ERROR (SPINDLE)	Pulse signal sent from the spindle motor could not be read correctly.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5095	5	3	PULSE ERROR (X-AXIS)	Pulse signal sent from the X-axis motor could not be read correctly.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5096	5	3	PULSE ERROR (Y-AXIS)	Pulse signal sent from the Y-axis motor could not be read correctly.	Inform of circumstances when the trouble occurred.
5097	5	3	PULSE ERROR (Z-AXIS)	Pulse signal sent from the Z-axis motor could not be read correctly.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5098	5	3	PULSE ERROR (* AXIS)	Pulse signal sent from the 4 axis motor could not be read correctly.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5099	5	3	PULSE ERROR (* AXIS)	Pulse signal sent from the 5 axis motor could not be read correctly.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5100	5	3	PULSE ERROR (* AXIS)	Pulse signal sent from the 6 axis motor could not be read correctly.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5102	5	3	PULSE ERROR (M AXIS)	Pulse signal sent from the M axis motor could not be read correctly.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5103	5	3	ATC BOARD ERR (POWER)	AC power increased over 15%.	Check the power voltage, change the trance's tap.
5104	5	3	FORMAT TYPE IS WRONG	Memory has been formatted incorrectly for the NC language.	Format the memory correctly.
5105	5	3	FORMAT CAPA DIFFERS	The capacity of the formatted memory does not match the current machine state.	Format the memory correctly.
5106	5	3	RAM ERROR (MAIN-LOC4)	Reading and writing of the RAM commonly used for main/local 5 was not possible.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5107	5	3	RAM ERROR (MAIN-LOC5)	Reading and writing of the RAM commonly used for main/local 4 was not possible.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5108	5	3	NO MEMORY FORMAT	The memory was not cleared at all, the data is damaged, or the memory has exceeded its capacity.	Output all data to the external device and format the memory.
5109	5	3	3-PHASE POWER ERROR	The three-phase power supply's phases are reversed.	Turn the primary power supply off, and then reverse the positions of the U-phase cord and the V-phase cord.
5110	5	3	MACHINE SETTING ERR	The model identification signal could not be read correctly.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5500	5	2	EMERGENCY SW ON	1 Emergency switch is pushed. 2 External emergency stop contact is open. 3 EMERGENCY switch on signal was sent by the communication command.	1 Remove the cause of trouble and press [RST] key. 2 Contact point of EXIO board terminal is to be closed again. 3 Send emergency switch off signal by the communication command.
5501	5	2	SYSTEM ERROR (MAIN)	Error signal is detected but no relative error is found.	Press [RST] key and clear the alarm. This error may occur due to the machine failure and the like. If this error still occurs, contact the nearest BROTHER approved service dealer.
5502	5	2	NOT CLOSING DOOR	The door was opened while door interlock was valid.	Invalidate door interlock or close the door.
5503	5	2	SERVO MOTOR STOPPED	The door was opened during operation while door interlock was valid.	Invalidate door interlock or close the door and press the [RST] key.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5504	5	2	POSITION ERROR SP	For models with a double-arm ATC The ATC arm was not at zero point during spindle rotation.  For models with an armless ATC while spindle servo is turn on (except spindle orient(0)), up the Z axis to Z axis zero position.	For models with a double-arm ATC Press the [RST] key. Press the [ATC] key with the [RELSE] key held down in manual mode to move the ATC arm to zero position.  For models with an armless ATC Press the [RST] key to reset the error.
5505	5	2	OVERRUN (+X)	The axis has overrun in the direction indicated by the alarm.	Switch to manual operation mode and press the [RST] key while holding down the [relse] key.
5506	5	2	OVERRUN (-X)	The axis has overrun in the direction indicated by the alarm.	Then move the axis in the opposite direction while holding down the [relse] key until the axis moves out of the overrun area.
5507	5	2	OVERRUN (+Y)	The axis has overrun in the direction indicated by the alarm.	
5508	5	2	OVERRUN (-Y)	The axis has overrun in the direction indicated by the alarm.	
5509	5	2	OVERRUN (+Z)	The axis has overrun in the direction indicated by the alarm.	
5510	5	2	OVERRUN (-Z)	The axis has overrun in the direction indicated by the alarm.	
5511	5	2	DEVIATION ERROR1 SP	The amount of spindle motor deviation has exceeded the value set to [maximum deviation spindle] of machine parameters system.	1) Check the value set to [maximum deviation spindle] of machine parameters system. 2) Check that machining condition is within motor's capacity. 3) Press the [rls] key to reset the error.
5512	5	2	DEVIATION ERROR1 X	The amount of the X-axis motor deviation has exceeded the value set to [maximum deviation x].	1) Check the value set to [maximum deviation x] of machine parameters system. 2) Check that machining condition is within motor's capacity. 3) Press the [rls] key to reset the error.
5513	5	2	DEVIATION ERROR1 Y	The amount of the Y-axis motor deviation has exceeded the value set to [maximum deviation y].	1) Check the value set to [maximum deviation y] of machine parameters system. 2) Check that machining condition is within motor's capacity. 3) Press the [rls] key to reset the error.
5514	5	2	DEVIATION ERROR1 Z	The amount of the Z-axis motor deviation has exceeded the value set to [maximum deviation z].	1) Check the value set to [maximum deviation z] of machine parameters system. 2) Check that machining condition is within motor's capacity press the [rls] key to reset the error.
5515	5	2	DEVIATION ERROR1 *	The amount of the 4 axis motor deviation has exceeded the value set to [maximum deviation 4].	1) Check the value set to [maximum deviation 4] of machine parameters system. 2) Check that machining condition is within motor's capacity press the [rls] key to reset the error.
5516	5	2	DEVIATION ERROR1 *	The amount of the 5 axis motor deviation has exceeded the value set to [maximum deviation 5].	1) Check the value set to [maximum deviation 5] of machine parameters system. 2) Check that machining condition is within motor's capacity press the [rls] key to reset the error.
5517	5	2	DEVIATION ERROR1 *	The amount of the 6 axis motor deviation has exceeded the value set to [maximum deviation 6].	1) Check the value set to [maximum deviation 6] of machine parameters system. 2) Check that machining condition is within motor's capacity press the [rls] key to reset the error.
5519	5	2	DEVIATION ERROR1 M	The amount of the M axis motor deviation has exceeded the value set to [maximum deviation magazine].	1) Check the value set to [maximum deviation m] of machine parameters system. 2) Check that machining condition is within motor's capacity press the [rls] key to reset the error.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5520	5	2	INVERTER ERR(ATC)	1) Overloaded ATC motor 2) Voltage error	1) Check if tool weight is within the specified range. 2) Check if the power supply voltage is within the specified range.
5521	5	2	DEVIATION ERROR2 SP	The amount of spindle motor deviation has exceeded the value set to [spindle posi deviation magnif] or the on set to [minimum sp position deviation] (motor is overloaded.)	1) Check the value set to [spindle posi deviation magnif] of machine parameter (system 1). 2) Check the value set to minimum sp position deviation of machine parameters system. 3) Check that machining condition is within motor's capacity. Press the [rls] key to reset the error.
5522	5	2	DEVIATION ERROR2 X	The amount of the X motor deviation has exceeded the value set to [X posi deviation magnif] or the on set to [minimum X position deviation] (motor is overloaded.)	1) Check the value set to [X posi deviation magnif] of machine parameters (system 1). 2) Check the value set to minimum X position deviation of machine parameters system. 3) Check that machining condition is within motor's capacity. Press the [rls] key to reset the error.
5523	5	2	DEVIATION ERROR2 Y	The amount of the Y motor deviation has exceeded the value set to [Y posi deviation magnif] or the on set to [minimum Y position deviation] (motor is overloaded.)	1) Check the value set to [Y posi deviation magnif] of machine parameters (system 1). 2) Check the value set to minimum Y position deviation of machine parameters system. 3) Check that machining condition is within motor's capacity. Press the [rls] key to reset the error.
5524	5	2	DEVIATION ERROR2 Z	The amount of the Z motor deviation has exceeded the value set to [Z posi deviation magnif] or the on set to [minimum Z position deviation] (motor is overloaded.)	1) Check the value set to [Z posi deviation magnif] of machine parameters (system 1). 2) Check the value set to minimum Z position deviation of machine parameters system. 3) Check that machining condition is within motor's capacity. Press the [rls] key to reset the error.
5525	5	2	DEVIATION ERROR2 *	The amount of the 4 motor deviation has exceeded the value set to [4 posi deviation magnif] or the on set to [minimum 4 position deviation] (motor is overloaded.)	1) Check the value set to [4 posi deviation magnif] of machine parameters (system 2). 2) Check the value set to minimum 4 position deviation of machine parameters system. 3) Check that machining condition is within motor's capacity. Press the [rls] key to reset the error.
5526	5	2	DEVIATION ERROR2 *	The amount of the 5 motor deviation has exceeded the value set to [5 posi deviation magnif] or the on set to [minimum 5 position deviation] (motor is overloaded.)	1) Check the value set to [5 posi deviation magnif] of machine parameters (system 2). 2) Check the value set to minimum 5 position deviation of machine parameters system. 3) Check that machining condition is within motor's capacity. Press the [rls] key to reset the error.
5527	5	2	DEVIATION ERROR2 *	The amount of the 6 motor deviation has exceeded the value set to [6 posi deviation magnif] or the on set to [minimum 6 position deviation] (motor is overloaded.)	1) Check the value set to [6 posi deviation magnif] of machine parameters (system 2). 2) Check the value set to minimum 6 position deviation of machine parameters system. 3) Check that machining condition is within motor's capacity. Press the [rls] key to reset the error.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5529	5	2	DEVIATION ERROR2 M	The amount of the M motor deviation has exceeded the value set to [magazine posi deviation magnif] or the on set to [min magazine position deviation] (motor is overloaded.)	1) Check the value set to [magazine posi deviation magnif] of machine parameters (system 3). 2) Check the value set to minimum magazine position deviation of machine parameters system. 3) Check that machining condition is within motor's capacity. Press the [rls] key to reset the error.
0530	5	2	MASTER OFF	1 Emergency switch is pushed. 2 External emergency stop contact is open. 3 EMERGENCY switch on signal was sent by the communication command.	1 Remove the cause of trouble and press [RST] key. 2 Contact point of EXIO board terminal is to be closed again. 3 Send emergency switch off signal by the communication command.
5531	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT pulse for position alrm]. If the value set to [in-position width 4] is larger than the value set to [LMT pulse for position alrm], however this error occurs when the axis has shifted more than the value set to [in-position width 4]. (these parameters are set on the <machine parameter (system 2)>screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT pulse for 4 position alrm] is not too small. When this error occurs during memory operation reduce the cutting depth.
5532	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT pulse for position alrm]. If the value set to [in-position width 5] is larger than the value set to [LMT pulse for position alrm], however this error occurs when the axis has shifted more than the value set to [in-position width 5]. (these parameters are set on the <machine parameter (system 2)>screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT pulse for 5 position alrm] is not too small. When this error occurs during memory operation reduce the cutting depth.
5533	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT pulse for position alrm]. If the value set to [in-position width 6] is larger than the value set to [LMT pulse for position alrm], however this error occurs when the axis has shifted more than the value set to [in-position width 6]. (these parameters are set on the <machine parameter (system 2)>screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT pulse for 6 position alrm] is not too small. When this error occurs during memory operation reduce the cutting depth.
5534	5	2	SP IN-POS CHCK TMOUT	The amount of deviation did not become smaller than the value set to in-position width spindle even after the time set to [spindle inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width spindle] and [spindle inposi check timeout] of machine parameters (system 1). Press the [RST] key to reset the error.
5535	5	2	X IN-POS CHECK TMOUT	The amount of deviation did not become smaller than the value set to in-position width x even after the time set to [X inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width x] and [X inposi check timeout] of machine parameters (system 1). Press the [RST] key to reset the error.
5536	5	2	Y IN-POS CHECK TMOUT	The amount of deviation did not become smaller than the value set to in-position width y even after the time set to [Y inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width y] and [Y inposi check timeout] of machine parameters (system 1). Press the [RST] key to reset the error.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5537	5	2	Z IN-POS CHECK TMOUT	The amount of deviation did not become smaller than the value set to in-position width z even after the time set to [Z inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width z] and [Z inposi check timeout] of machine parameters (system 1). Press the [RST] key to reset the error.
5538	5	2	* IN-POS CHCK TMOUT	The amount of deviation did not become smaller than the value set to in-position width 4 even after the time set to [4 inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width 4] and [4 inposi check timeout] of machine parameters (system 2). Press the [RST] key to reset the error.
5539	5	2	* IN-POS CHCK TMOUT	The amount of deviation did not become smaller than the value set to in-position width 5 even after the time set to [5 inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width 5] and [5 inposi check timeout] of machine parameters (system 2). Press the [RST] key to reset the error.
5540	5	2	* IN-POS CHCK TMOUT	The amount of deviation did not become smaller than the value set to in-position width 6 even after the time set to [6 inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width 6] and [6 inposi check timeout] of machine parameters (system 2). Press the [RST] key to reset the error.
5542	5	2	M IN-POS CHCK TMOUT	The amount of deviation did not become smaller than the value set to in-position width magazine even after the time set to [magazine inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width magazine] and [magazine inposi check timeout] of machine parameters (system 3). Press the [RST] key to reset the error.
5543	5	2	MAGAZINE SERVO OFF	The servo was turned off while the magazine was swiveling or swiveling of the magazine was attempted while the servo was off.	Press the [RST] key to reset the error. This error may occur due to machine failure and the like. If the error still occurs, contact the nearest BROTHER approved service dealer.
5544	5	2	EXTERNAL ERROR 1	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
5545	5	2	EXTERNAL ERROR 2	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
5546	5	2	EXTERNAL ERROR 3	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
5547	5	2	EXTERNAL ERROR 4	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
5548	5	2	EXTERNAL ERROR 5	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
5549	5	2	EXTERNAL ERROR 6	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
5550	5	2	EXTERNAL ERROR 7	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
5551	5	2	EXTERNAL ERROR 10	EXER10 signal comes on.	Turn off the EXER10 and push [RST] key.
5552	5	2	EXTERNAL ERROR 11	EXER11 signal comes on.	Turn off the EXER11 and push [RST] key.
5553	5	2	EXTERNAL ERROR 12	EXER12 signal comes on.	Turn off the EXER12 and push [RST] key.
5554	5	2	EXTERNAL ERROR 13	EXER13 signal comes on.	Turn off the EXER13 and push [RST] key.
5555	5	2	EXTERNAL ERROR 14	EXER14 signal comes on.	Turn off the EXER14 and push [RST] key.
5556	5	2	EXTERNAL ERROR 15	EXER15 signal comes on.	Turn off the EXER15 and push [RST] key.
5557	5	2	EXTERNAL ERROR 16	EXER16 signal comes on.	Turn off the EXER16 and push [RST] key.
5558	5	2	EXTERNAL ERROR 17	EXER17 signal comes on.	Turn off the EXER17 and push [RST] key.

Chapter 8 Alarm message

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5559	5	2	EXTERNAL ERROR 18	EXER18 signal comes on.	Turn off the EXER18 and push [RST] key.
5560	5	2	EXTERNAL ERROR 19	EXER19 signal comes on.	Turn off the EXER19 and push [RST] key.
5561	5	2	EXTERNAL ERROR 20	EXER20 signal comes on.	Turn off the EXER20 and push [RST] key.
5562	5	2	EXTERNAL ERROR 21	EXER21 signal comes on.	Turn off the EXER21 and push [RST] key.
5563	5	2	EXTERNAL ERROR 22	EXER22 signal comes on.	Turn off the EXER22 and push [RST] key.
5564	5	2	EXTERNAL ERROR 23	1) EXER23 signal comes on. 2) (For 22A,31A,S2A, and S2B) Shortage of lubricant when optional Automatic intermittent lubricating unit is equipped.	1) Turn off the EXER23 and push [RST] key. 2) Replenish lubricant and push [RST] key.
5565	5	2	EXTERNAL ERROR 24	EXER24 signal comes on.	Turn off the EXER24 and push [RST] key.
5566	5	2	EXTERNAL ERROR 25	EXER25 signal comes on.	Turn off the EXER25 and push [RST] key.
5567	5	2	DOOR ERROR	1) The automatic door limit switch has turned on both at door closing and opening ends. 2) It took x seconds (parameter value) for automatic door closing. 3) It took x seconds (parameter value) for automatic door opening.	Eliminate the error cause and press the [RST] key to reset the error.
5577	5	2	MJR FAILURE RLY ON	An error has occurred in the SEQ unit connected to NC board connector SEQ.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
5578	5	2	OVERRUN	OVERRUN error signal was received, but the error of the corresponding axis cannot be identified.	Eliminate the error cause and press the [RST] key to reset the error.
5579	5	2	OVERRUN (+*)	The axis has overrun in the direction indicated by the alarm. (An asterisk (*) indicates axis 5)	Switch to manual operation mode and press the [RST] key while holding down the [relse] key. Then move the axis in the opposite direction while holding down the [relse] key until the axis moves out of the overrun area.
5580	5	2	OVERRUN (-*)	The axis has overrun in the direction indicated by the alarm. (An asterisk (*) indicates axis 5)	Switch to manual operation mode and press the [RST] key while holding down the [relse] key. Then move the axis in the opposite direction while holding down the [relse] key until the axis moves out of the overrun area.
5581	5	2	OVERRUN (+*)	The axis has overrun in the direction indicated by the alarm. (An asterisk (*) indicates axis 6)	Switch to manual operation mode and press the [RST] key while holding down the [relse] key. Then move the axis in the opposite direction while holding down the [relse] key until the axis moves out of the overrun area.
5582	5	2	OVERRUN (-*)	The axis has overrun in the direction indicated by the alarm. (An asterisk (*) indicates axis 6)	Switch to manual operation mode and press the [RST] key while holding down the [relse] key. Then move the axis in the opposite direction while holding down the [relse] key until the axis moves out of the overrun area.
5586	5	2	*SERVO MOTOR OFF	When door interlock is valid for machines conforming to CE specifications, the door was opened while the axis "*" (axis 4) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A, and S2B.	Press the [RST] key.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5587	5	2	*SERVO MOTOR OFF	When door interlock is valid for machines conforming to CE specifications, the door was opened while the axis “*” (axis 5) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A, and S2B.	Press the [RST] key.
5588	5	2	*SERVO MOTOR OFF	When door interlock is valid for machines conforming to CE specifications, the door was opened while the axis “*” (axis 6) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A, and S2B.	Press the [RST] key.
5589	5	2	C INDEX TIMEOVER	The C-axis did not contact the stopper when traveling toward the stopper at low speed, although the time set for the parameter has elapsed.	Check the setting for MACHINE PARAMETER (SYSTEM 2).
5590	5	2	C-AXIS CURRENT ERROR	The current command value when the C-axis contacts the stopper is not within the range set for the parameter.	Check the setting for MACHINE PARAMETER (SYSTEM 2).
5591	5	2	IN-POS CHCK TMOUT	In-position check time has exceeded five seconds.	Press the [RST] key and clear the alarm.
5592	5	2	MAGAZINE POS SHIFTED	The magazine position was shifted more than the value set for [LMT PULSE FOR MZ POSITION ALRM] in machine parameter3 while the magazine was stopped (when the pot was fully lowered.)	Check the machine parameter. When the error occurs repeatedly, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5593	5	2	ORG POS ERROR SP	When the first orientation is performed after power is turned on, PHASE C signal cannot be received even after spindle motor has rotated one turn.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5594	5	2	COMMAND ERROR(SP)	Main CPU is not synchronized with slave CPU.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
5595	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 4 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 4] is larger than the value set to [LMT PULSE FOR POSITION ALRM], however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 4]. (these parameters are set on the <machine parameter (system 2)>screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 4 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth.
5596	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 5 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 5] is larger than the value set to [LMT PULSE FOR 5 POSITION ALRM], however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 5]. (these parameters are set on the <machine parameter (system 2)>screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 5 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
5597	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 6 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 6] is larger than the value set to [LMT PULSE FOR 6 POSITION ALRM], however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 6]. (these parameters are set on the <machine parameter (system 2)>screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 6 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth.
5598	4	2	END MILL TAPPING	The spindle command was ordered by intervention operate during the spindle rotation of the end mill tap is command.	Reset the alarm to press [RST] key.
5599	5	2	SPINDLE ROTATING	The end mill tap command was ordered during the spindle rotation	Reset the alarm to press [RST] key.
5600	5	2	DR OPEN MACHINE STOP	The door was opened during operation while door interlock was valid.	Invalidate door interlock or close the door and press the [RST] key.
5601	5	2	SYSTEM ERROR(SLV)	Slave CPU error signal was received, but the corresponding error cannot be identified.	Press the [RST] key to reset the error. If the error still occurs, this error may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6050	4	3	TURN OFF POWER	Change the important parameter.	Turn off the power and turn on.
6051	4	3	START POINT DATA1 ER	When turn on the machine, start data 1 is less than 0 or larger than machine measurement of circuit magazine	Change to ATC maintenance mode. Adjust the magazine position.
6053	4	3	M/C PARAM ERR 2(SYS2)	Setting of machine parameter 2 (system 2) is defective.	Check the setting of machine parameter 2 (system 2).
6055	4	3	ATC ARM POS ERR 2	ATC arm position is not origin point.	Turn off the power. Refer to ATC resetting.
6056	4	3	ATC OFF POSITION ERR	ATC rotation arm is stoped middle operation and not reset by the key.	Change to ATC maintenance mode. Adjust the magazine position.
6057	4	3	DATA ERR (USER PARM)	Broken the straction of the user parameter.	Press the [RST] key, erase the data in the edit mode of memory display. After it, make new data.
6058	4	3	USER PARAM ERR (SW2)	Setting of machine parameter 2 (switch 2) is defective.	Check the setting of user parameter 2 (switch 2).
6059	4	3	USER PARAM ERR (SW1)	Setting of machine parameter 2 (switch 1) is defective.	Check the setting of user parameter 1 (switch 1).
6150	4	2	SYSTEM ERROR (SLV)	Slave CPU error signal was received, but the corresponding error cannot be identified.	Press the [RST] key to reset the error. If the error still occurs, this error may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6151	4	2	NO MEMORY FORMAT	Memory never cleared or data destroyed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6152	4	2	EDITING	The same data are to be edited at the same time.	Check that communication mark has disappeared. Then press [RST] key and clear the alarm.
6153	4	2	EDIT ERROR 1	During editing, data is destroyed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6154	4	2	EDIT ERROR 2	During editing, data is destroyed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6155	4	2	EDIT ERROR 3	During editing, data is destroyed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6156	4	2	LONG RTRN DISTANCE	Recovery distance when turning on the servo is too long. (Door interlock is effective.)	Press the [RST] key.
6157	4	2	NO USER PARAM DATA	There is no user parameter data.	Create the user parameter and turn power off and then on again.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6158	4	2	PARITY ER (USER PARA)	Data structure of user parameter is destroyed.	Press [RST] key, and delete the destroyed data by memory screen in edit mode and create new data again.
6159	4	2	PARITY ER (M/C PARAM)	Data structure of machine parameter is destroyed.	Press [RST] key, and delete the destroyed data by memory screen in edit mode and create new data again.
6160	4	2	PARITY ERR (PRGRM)	Program is structure is destroyed.	Press [RST] key, and delete the destroyed data by memory screen in edit mode and create new data again.
6161	4	2	CHECK THE MAGAZINE POS	When the power is on, the servo motor is on, or while the magazine is swiveling, the difference between START POINT DATA 2 and the absolute position data in the magazine amplifier has exceeded the value for one revolution of the magazine.	Check the pot number displayed on the present position screen and the pot number actually indexed. If these differ, switch to ATC maintenance mode and adjust the magazine position.
6162	4	2	MAGAZINE POS SHIFTED	The magazine position was shifted more than the value set for [LMT PULSE FOR MZ POSITION ALRM] in machine parameter 3 while the magazine was stopped (when the pot was fully lowered).	Check the setting of machine parameter. This error may occur due to machine failure and the like. If the error still occurs, contact the nearest BROTHER approved service dealer.
6163	4	2	ORG POS ERROR X	Zero dog signal was not confirmed while dog zero return was being performed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6164	4	2	ORG POS ERROR Y	Zero dog signal was not confirmed while dog zero return was being performed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6165	4	2	ORG POS ERROR Z	Zero dog signal was not confirmed while dog zero return was being performed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6166	4	2	ORG POS ERROR SP	When the first orientation is performed after power is turned on, PHASE C signal cannot be received even after spindle motor has rotated one turn.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6167	4	2	ORG POS ERROR *	Zero dog signal was not confirmed while dog zero return was being performed. (the asterisk (*) indicates axis 4.)	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6168	4	2	ORG POS ERROR *	Zero dog signal was not confirmed while dog zero return was being performed. (the asterisk (*) indicates axis 5.)	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6169	4	2	ORG POS ERROR *	Zero dog signal was not confirmed while dog zero return was being performed. (the asterisk (*) indicates axis 6.)	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6170	4	2	ORG POS ERROR *	Zero dog signal was not confirmed while dog zero return was being performed. (the asterisk (*) indicates axis 7.)	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6171	4	2	ORG POS ERROR *	Zero dog signal was not confirmed while dog zero return was being performed. (the asterisk (*) indicates axis 8.)	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6172	4	2	COMMAND ERROR(SP)	Main CPU is not synchronized with slave CPU.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6173	4	2	CAN NOT CLAMP *	Clamping axis was attempted but failed. (the asterisk (*) indicates axis 4.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter.
6174	4	2	CAN NOT UNCLAMP *	Unclamping axis was attempted but failed. (the asterisk (*) indicates axis 4.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter.
6175	4	2	* CLAMP	While * axis (4 axis) is rotating, * axis is clamped.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6176	4	2	* UNCLAMP	While * axis (4 axis) is holding, * axis is unclamped.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6177	4	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 4 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 4] is larger than the value set to [LMT PULSE FOR POSITION ALRM], however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 4]. (these parameters are set on the <machine parameter (system 2)>screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 4 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth.
6178	4	2	CAN NOT CLAMP *	Clamping axis was attempted but failed. (the asterisk (*) indicates axis 5.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter.
6179	4	2	CAN NOT UNCLAMP *	Unclamping axis was attempted but failed. (The asterisk (*) indicates axis 5.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter.
6180	4	2	* CLAMP	While * axis (5 axis) is rotating, * axis is clamped.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6181	4	2	* UNCLAMP	While * axis (5 axis) is holding, * axis is unclamped.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6182	4	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 5 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 5] is larger than the value set to [LMT PULSE FOR 5 POSITION ALRM], however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 5]. (these parameters are set on the <machine parameter (system 2)>screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 5 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth.
6183	4	2	CAN NOT CLAMP *	Clamping axis was attempted but failed. (the asterisk (*) indicates axis 6.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter.
6184	4	2	CAN NOT UNCLAMP *	Unclamping axis was attempted but failed. (The asterisk (*) indicates axis 6.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter.
6185	4	2	* CLAMP	While * axis (6 axis) is rotating, * axis is clamped.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6186	4	2	* UNCLAMP	While * axis (6 axis) is holding, * axis is unclamped.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6187	4	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 6 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 6] is larger than the value set to [LMT PULSE FOR 6 POSITION ALRM], however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 6]. (these parameters are set on the <machine parameter (system 2)>screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 6 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6188	4	2	POSITION ERROR Z	For models with a double-arm ATC Z-axis was commanded when the Z-axis was above the ATC zero point.  For models with an armless ATC Z-axis was commanded when the Z-axis was above the Z axis zero point.(ATC sensor was turned on)	Press the [RST] key. Move the Z-axis until it is below the Z-axis zero point while holding down the [RELSE] key.
6189	4	2	POSITION ERROR SP	For models with a double-arm ATC Spindle was commanded while the ATC arm was not at zero position.  For models with an armless ATC Spindle was commanded when the Z-axis was above the Z axis zero point.(ATC sensor was turned on)	For models with a double-arm ATC Press the [RST] key. Press the [ATC] key with the [RELSE] key held down in manual mode to move the ATC arm to zero position.  For models with an armless ATC Press the [RST] key. Move the Z-axis until it is below the Z-axis zero point while holding down the [RELSE] key.
6191	4	2	COMMAND ERROR(SPEED)	The commanded speed is zero or larger than the maximum speed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6192	4	2	ARC SPEED ERROR	For arc cutting when the last point is not on the arc, the speed of the single axis is larger than the maximum speed.	Check start point and end point of program as well as circular arc center point.
6193	4	2	ATC TIMEOVER ERROR	The ATC arm swivel is not completed within the time set for [ATC ARM SWIVEL TIME OUT 1-4]	Press the [RST] key to reset the error.
6194	4	2	MAGAZINE NO. ERROR	For models with a double-arm ATC The [emergency stop] key was pressed while the magazine was swiveling and the magazine stopped midway.  For models with an armless ATC After rotate the magazine, not index the commanded magazine. Encoder signal is 0 or more than the number of magazine tools.	Press the [RST] key with the [RELSE] key held down in manual mode. After the alarm indication has disappeared, press the [MAGZ] key with the [RELSE] key held down.
6195	4	2	MAGAZINE INDEX ERROR	When magazine indexed incorrectly (ATC CAM sensor is turned off.), rotate the magazine or command the Z axis.	Press the [RST] key with the [RELSE] key held down in manual mode. After the alarm indication has disappeared, press the [MAGZ] key with the [RELSE] key held down.
6196	4	2	MGZN POS ERROR	When Z axis position was not in the ATC zero point, the magazine is rotate.	Press the [RST] key to reset the alarm.
6197	4	2	COMMAND ERROR(ATC)	A number exceeding the number of tools set in the magazine was required by ATC command.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6198	4	2	POT POSITION ERROR	Pot position is incorrect.	Switch to manual operation mode press the [RST] key with the [RELSE] key held down. Then, press the [ATC] key with the [RELSE] key held down to move the magazine pot to the correct position.
6199	4	2	MAGAZINE TIME OVER	Magazine was not indexed in 5 seconds per a pitch or the thermal in the magazine motor functioned.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6200	4	2	POT TIME OVER	Raising and lowering of the pot was not completed within the specified time.	Turn off power and eliminate the cause.
6201	4	2	POT SENSOR ERROR	Pot sensor is faulty.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6202	4	2	ATC ARM POS ERR 1	ATC arm is not at home.	Press the [RST] key with the [RELSE] key held down in manual mode. See 13.6 Resetting ATC.
6203	4	2	STROKE OVER (+X)	The X-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)

## Chapter 8 Alarm message

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6204	4	2	STROKE OVER (-X)	The X-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
6205	4	2	STROKE OVER (+Y)	The Y-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
6206	4	2	STROKE OVER (-Y)	The Y-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
6207	4	2	STROKE OVER (+Z)	The Z-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
6208	4	2	STROKE OVER (-Z)	The Z-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
6209	4	2	STROKE OVER (+*)	The 4 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6210	4	2	STROKE OVER (-*)	The 4 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6211	4	2	STROKE OVER (+*)	The 5 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6212	4	2	STROKE OVER (-*)	The 5 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6213	4	2	STROKE OVER (+*)	The 6 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6214	4	2	STROKE OVER (-*)	The 6 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6215	4	2	LIMIT OVER (+X)	The X-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6216	4	2	LIMIT OVER (-X)	The X-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6217	4	2	LIMIT OVER (+Y)	The Y-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6218	4	2	LIMIT OVER (-Y)	The Y-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6219	4	2	LIMIT OVER (+Z)	The Z-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6220	4	2	LIMIT OVER (-Z)	The Z-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6221	4	2	LIMIT OVER (+*)	The 4 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6222	4	2	LIMIT OVER (-*)	The 4 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6223	4	2	LIMIT OVER (+*)	The 5 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6224	4	2	LIMIT OVER (-*)	The 5 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6225	4	2	LIMIT OVER (+*)	The 6 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6226	4	2	LIMIT OVER (-*)	The 6 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
6227	4	2	STROKE OVER 2	The axis was attempted to be moved into the prohibited stroke zone.	Press the [RST] key and correct the program. (check the machine parameters (system1).)

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6228	4	2	LIMIT OVER 2	The axis was attempted to be moved into the prohibited stroke limit zone.	Press the [RST] key and correct the program. (check the machine parameters (switch 2.))
6232	4	2	COUNTER1 END	Each workpiece counter has attained the preset value.	Press the [RST] key and correct the program. (check the machine parameters (switch 2.))
6233	4	2	COUNTER2 END	Each workpiece counter has attained the preset value.	
6234	4	2	COUNTER3 END	Each workpiece counter has attained the preset value.	
6235	4	2	COUNTER4 END	Each workpiece counter has attained the preset value.	
6236	4	2	SENSOR SIGNAL OFF	Detection signal was not turned on during measurement.	Press the [RST] key and check the measurement position.
6237	4	2	SENSOR SIGNAL ON	Detection signal was not turned off during measurement.	Press the [RST] key and check the measurement position.
6238	4	2	THRED CUT FEED ERR	The Z axis feedrate is not obtained from the X/Y axis feedrate during the thread cutting.	Press the [RST] key and check the end point, center point and feedrate in the thread cutting.
6239	4	2	NO THREAD CUTTING	There is no optimal thread cutting function.	Purchase a thread cutting option.
6240	4	2	SIGNAL TIME OVER	After external signal is given, completion signal can not be detected even when external signal reading limit time is over. M46* signals are not detected even after the time preset to MAXIMUM TIME OF EXIT SIGNAL has passed after motions of signal output functions 46* have been completed.	Press [RST] key and set external reading completion signal within the limit time, or change parameter value.
6241	4	2	CALCULATION ERROR	The graphic calculation is not available any longer.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6242	4	2	TOOL BROKEN ERROR	A signal was output from the tool detection sensor.	Check the service life of the broken tool on the <magazine tool> screen, and then press the [RST] key. If a suitable spare tool is registered, operation can be resumed. If no suitable spare tool is registered, replace the tool, set the tool length and tool life, and then resume operation. Note: when the [RST] key is pressed, the tool life indication value is automatically cleared. Note: if the tool is not broken, the tool breakage detection device needs adjustment. Refer to option - tool breakage detection device -> 4.adjustment.
6243	4	2	TOOL LIFE END (*)	The tool life of the tool in use or the one to be used has reached zero. The figure in brackets ( ) indicates the tool number.	Replace tools and set tool life according after pressing [RST] key.
6244	4	2	MEASD VAL ERR LRG(1)	The result of zero point measurement has exceeded the tolerance set by the user parameter (zero point measurement).	Press the [RST] key and check the measurement position in the program.
6245	4	2	NO MEASURING DATA	Positioning to the measuring point was attempted (G120) although measuring data does not exist.	Press the [RST] key and check the program.
6246	4	2	TRM DISPMT AMT OVR	Displacement measured in Z-axis thermal displacement offset mode exceeded parameter Z-AXIS MACHINING ACCURACY.	See "parameter setting and change Z-axis thermal displacement offset switching motion to appropriate conditions.
6247	4	2	THR COMP POS ERR	Thermal displacement compensation was attempted for areas other than Z-axis machine zero position.	Do not move the axis in manual mode.
6248	4	2	THR COMP AMT OVER	Offset at stroke end exceeded THR COMP AMT LIMIT VALUE in Z-axis thermal displacement offset mode.	Check if parameter measuring device installation position Z and tool length menu are correct. Check the measuring section of the tool length measuring device for chip adhesion.

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NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6249	4	2	COVER DOES' T OPEN	When COVER OPEN CHECKING is executed, cover opening cannot be confirmed within 10 seconds.	Check tool length measuring device cover.
6250	4	2	NO Z-AX MEASUREMEN T	Tool breakage detection command or thermal measurement command was attempted to be executed for machines without optional Z-axis measurement system.	Change program.
6252	4	2	PROGRAM PROTECT	An attempt is made to modify the data while the PROTECT SW is ON.	Set the PROTECT switch to OFF, and modify the data.
6253	4	2	NO SEQ. CONTROLLER	A signal output 8XX is executed without sequence controller (option).	Change the signal output into a signal output XX.
6254	4	2	NO EXT ERROR CODE	An error signal was received from the external PLC. At this time, no bit of internal auxiliary contact 20 signal (8-bit data) is on.	Check the conditions when the external PLC alarm occurs, eliminate the cause, and press the [RST] key.
6255	4	2	EXTERNAL ERROR 1	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
6256	4	2	EXTERNAL ERROR 2	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
6257	4	2	EXTERNAL ERROR 3	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
6258	4	2	EXTERNAL ERROR 4	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
6259	4	2	EXTERNAL ERROR 5	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
6260	4	2	EXTERNAL ERROR 6	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
6261	4	2	EXTERNAL ERROR 7	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
6262	4	2	EXTERNAL ERROR 10	EXER10 signal comes on.	Turn off the EXER10 and push [RST] key.
6263	4	2	EXTERNAL ERROR 11	EXER11 signal comes on.	Turn off the EXER11 and push [RST] key.
6264	4	2	EXTERNAL ERROR 12	EXER12 signal comes on.	Turn off the EXER12 and push [RST] key.
6265	4	2	EXTERNAL ERROR 13	EXER13 signal comes on.	Turn off the EXER13 and push [RST] key.
6266	4	2	EXTERNAL ERROR 14	EXER14 signal comes on.	Turn off the EXER14 and push [RST] key.
6267	4	2	EXTERNAL ERROR 15	EXER15 signal comes on.	Turn off the EXER125 and push [RST] key.
6268	4	2	EXTERNAL ERROR 16	EXER16 signal comes on.	Turn off the EXER16 and push [RST] key.
6269	4	2	EXTERNAL ERROR 17	EXER17 signal comes on.	Turn off the EXER17 and push [RST] key.
6270	4	2	EXTERNAL ERROR 18	EXER18 signal comes on.	Turn off the EXER18 and push [RST] key.
6271	4	2	EXTERNAL ERROR 19	EXER19 signal comes on.	Turn off the EXER19 and push [RST] key.
6272	4	2	EXTERNAL ERROR 20	EXER20 signal comes on.	Turn off the EXER20 and push [RST] key.
6273	4	2	EXTERNAL ERROR 21	EXER21 signal comes on.	Turn off the EXER21 and push [RST] key.
6274	4	2	EXTERNAL ERROR 22	EXER22 signal comes on.	Turn off the EXER22 and push [RST] key.
6275	4	2	EXTERNAL ERROR 23	1) EXER23 signal comes on. 2) (For 22A,31A,S2A, and S2B) Shortage of lubricant when optional Automatic intermittent lubricating unit is equipped.	1) Turn off the EXER23 and push [RST] key. 2) Replenish lubricant and push [RST] key.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6276	4	2	EXTERNAL ERROR 24	EXER24 signal comes on.	Turn off the EXER24 and push [RST] key.
6277	4	2	EXTERNAL ERROR 25	EXER25 signal comes on.	Turn off the EXER25 and push [RST] key.
6278	4	2	DOOR ERROR	1) The automatic door limit switch has turned on both at door closing and opening ends. 2) It took x seconds (parameter value) for automatic door closing. 3) It took x seconds (parameter value) for automatic door opening.	Eliminate the error cause and press the [RST] key to reset the error.
6279	4	2	NO TOOL IN MAGAZINE	Tool required for operation is not set in the magazine.	Press the [RST] key, and set the tool on the <magazine tool> screen correctly.
6280	4	2	SYSTEM ERROR (MC)	An error was received but the corresponding error cannot be identified.	Press the [RST] key and clear the alarm. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6281	4	2	SYSTEM ERROR (ATC)	An error was received but the corresponding error cannot be identified.	Press the [RST] key and clear the alarm. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6282	4	2	PROHIBITED POT	The tool was attempted to be replaced with a prohibited pot.	
6283	4	2	CAPPED	The tool was attempted to be replaced with a pot with the cap specified.	
6284	4	2	NO OPTION (A)	An "a" axis program was attempted to be executed although an optional "a" axis is not provided.	Purchase an optional "a" axis. When already provided, set [a option] to [1. Yes].
6285	4	2	NO OPTION (B)	A "b" axis program was attempted to be executed although an optional "b" axis is not provided.	Purchase an optional "b" axis. When already provided, set [b option] to [1. Yes].
6286	4	2	NO OPTION (C)	A "c" axis program was attempted to be executed although an optional "c" axis is not provided.	Purchase an optional "c" axis. When already provided, set [c option] to [1. Yes].
6287	4	2	SHORT POTMOTION TIM	Raising or lowering of the pot has been completed earlier than the specified time.	Turn off power and eliminate the cause.
6288	4	2	NO EMPTY POT	No pot was available when changing from standard to large tool or vice versa.	Prepare an empty pot.
6289	4	2	CAN'T SET TOOL LEN	The [protect] switch was turned on as soon as [tool length set] was executed in automatic tool length measurement mode or [tool length set] could not be executed for some reason.	Multiple errors have occurred concurrently. Check the causes on the <alarm> screen and eliminate them.
6291	4	2	NO MEASURING DEVICE	The Z-axis measurement system was attempted to be operated using the pallet without a measurement device.	Operate the system using the pallet with a measurement device.
6292	4	2	PALLET POS ERROR	The Z-axis measurement system was attempted to be operated although the pallet was not indexed.	Index the pallet and operate the system.
6293	4	2	MAGAZN TOOL SET ERR	Tools are not set in the magazine correctly.	Set the tools in the magazine correctly.
6294	4	2	ADDRESS SETTING ERR	The address of the additional axis is not set correctly.	Set the address correctly.
6295	4	2	OUT PLT NOT COMMDED	The additional axis of the pallet opposite the pallet in operation was attempted to be moved.	Press the [RST] key and check the program.
6296	4	2	NO ZERO MEASUREMEN T	Zero position measurement was attempted although zero position measurement option is not provided.	Purchase this option or change the program.

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NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6297	4	2	TOOL BRK SNSOR ERR	Tool breakage detecting sensor input is illegal.	When a tool breakage detection option is not provided, set [tool breakage detect option] to [0: no]. When provided, check to see if chips are stuck to the detection arm, if so, remove them. This error may occur due to machine failure and the like. If error still occurs, contact the nearest BROTHER approved service dealer.
6298	4	2	TOOL BRK TIME OVER	Tool breakage detecting motion (extend or fold the detecting arm) time exceeds 5 sec.	Push [RST] key and check the air pressure (3-5kg/cm <sup>2</sup> ). If the air is OK, contact the nearest BROTHER approved service dealer.
6299	4	2	PARITY (SOFT SWITCH)	Software switch data was damaged.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6300	4	2	S OVRRD NO CONNECTED	The spindle override connector is not connected.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6304	4	2	NO AUTO THRM COMP(Z)	Automatic Z-axis thermal displacement compensation was attempted although that optional function is not provided.	Purchase this option or change the program.
6305	4	2	* SERVO MOTOR OFF	When door interlock is valid for machines conforming to specifications, the door was opened while the axis “*” (axis 4) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A, and S2B.	Press the [RST] key.
6306	4	2	* SERVO MOTOR OFF	When door interlock is valid for machines conforming to specifications, the door was opened while the axis “*” (axis 5) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A, and S2B.	Press the [RST] key.
6307	4	2	* SERVO MOTOR OFF	When door interlock is valid for machines conforming to specifications, the door was opened while the axis “*” (axis 6) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A, and S2B.	Press the [RST] key.
6308	4	2	COOLANT BLOWING ON	The spindle was attempted to be rotated while the coolant blowing function was ON.	Turn the coolant blowing function OFF and then rotate the spindle.
6309	4	2	SPINDLE ROTATING	The coolant blowing function was attempted to be turned ON while the spindle was rotating.	Stop the spindle and then turn the coolant blowing function ON.
6310	4	2	NOT CLOSING DOOR	The door was open when swiveling the ATC arm was attempted.	Close the door and press the [RST] key.
6311	4	2	H PRE COOLANT ERR 1	Either the high pressure or filter pump is overloaded.	Eliminate the cause of the overload.
6312	4	2	H PRE COOLANT ERR 3	The line filter is clogged.	Check that the element in the line filter and pipe are not damaged, and clean the element.
6313	4	2	END MILL TAP SPD ERR	The end mill tap commanded, Zaxis speed of the end mill is faster than tapping section.	Check the program after pressing [RST] key.
6314	4	2	NO CONSTANT SPD : EM	Don't have the Zaxis fixed speed area of the end mill when the end mill tap was commanded.	Check the program after pressing [RST] key.
6315	4	2	NO CONSTANT SPD : TAP	Don't have the tapping section of Zaxis fixed speed area when the end mill tap was commanded.	Check the program after pressing [RST] key.
6316	4	2	END MILL TAPPING	The spindle command was ordered by intervention operate during the spindle rotation of the end mill tap is command.	Reset the alarm to press [RST] key.

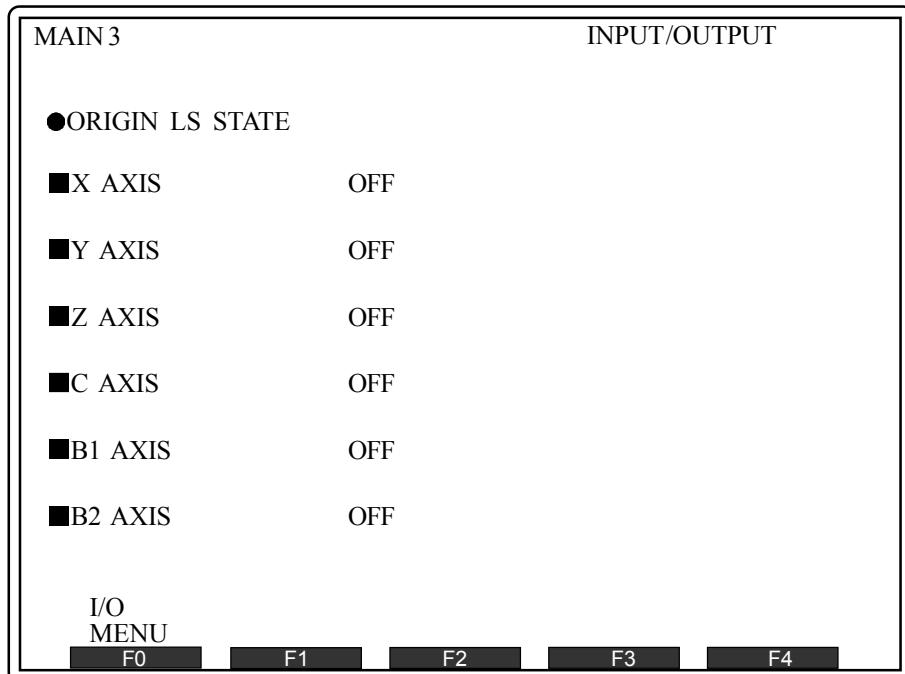
NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6317	4	2	MGZN COVER TIMEOVER	The cover did not complete opening and closing within five seconds after opening and closing operation was commenced.	Press the [RST] key and clear the alarm. This error may occur due to machine failure and the like. If the error still occurs, contact the nearest BROTHER approved service dealer.
6318	4	2	MGZN COVER NOT OPEN	The magazine cover was not fully open when the arm started swiveling.	Reset the alarm to press [RST] key. This error may occur due to machine failure and the like. If the error still occurs, contact the nearest BROTHER approved service dealer.
6319	4	2	MGZN CVR SENSOR ERR	The sensors to detect the magazine cover opening and closing ends were on when the power was turned on and the [RST] key pressed.	This error may occur due to machine failure and the like. If the error still occurs, contact the nearest BROTHER approved service dealer.
6320	4	2	POSITION ERROR XY	The X and Y axes were beyond their stroke limits when the [ATC] key was pressed.	Press the [RST] key to reset the alarm and return the X and Y axes to within their stroke limits.
6321	4	2	POSITION ERROR X	The machine was attempted to be operated when the X axis was within the ATC operation range or the ATC operation limit switch was on, or the ATC operation limit switch was turned off before the ATC arm was attempted to be swiveled.	Press the [RST] key to reset the alarm and return the X axis to within their stroke limits. This error may occur due to machine failure and the like. If this error occurs, contact the nearest BROTHER approved service dealer.
6323	4	2	C ZERO RTRN POS ERR	Zero position return was attempted when the C-axis (pallet) had not been indexed.	Press the [RST] key to reset the alarm. Index the C axis to 0 degrees or -180 degrees and then conduct zero position return.
6324	4	2	ORIGN LS OFF(*)	The zero point limit switch for axis No. 4 was not on when zero position return was attempted by pressing the [RELSE] and [Z.RTN] keys.	Press the [RST] key to reset the alarm. Move the axis No. 4 to the position where the zero position limit switch for the axis No. 4 turns on, and press the [RELSE] and [Z.RTN] keys. ->Refer to the attached sheet.
6325	4	2	ORIGN LS OFF (*)	The zero point limit switch for axis No. 5 was not on when zero position return was attempted by pressing the [RELSE] and [Z.RTN] keys.	Press the [RST] key to reset the alarm. Move the axis No. 5 to the position where the zero position limit switch for the axis No. 5 turns on, and press the [RELSE] and [Z.RTN] keys. ->Refer to the attached sheet.
6326	4	2	ORIGN LS OFF (*)	The zero point limit switch for axis No. 6 was not on when zero position return was attempted by pressing the [RELSE] and [Z.RTN] keys.	Press the [RST] key to reset the alarm. Move the axis No. 6 to the position where the zero position limit switch for the axis No. 6 turns on, and press the [RELSE] and [Z.RTN] keys. ->Refer to the attached sheet.
6327	4	2	NO MEM (XY THRM COMP)	There is no memory area for automatic X and Y axes thermal displacement compensation data.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6328	4	2	NO AUTO THRM COMP (X)	Automatic X-axis thermal displacement compensation was attempted although that optional function is not provided.	Please amend a program.
6329	4	2	NO AUTO THRM COMP (Y)	Automatic Y-axis thermal displacement compensation was attempted although that optional function is not provided.	Please amend a program.
6330	4	2	DIAMETER CORRECTING	The diameter is being corrected during XZ and YZ circular interpolation.	Please amend a program.
6331	4	2	COORDINATE ROTATING	The coordinates are being rotated during XZ and YZ circular interpolation.	Please amend a program
6332	4	2	MEASD VAL ERR LRG(2)	The difference between the current zero measurement result and the previous zero measurement result has exceeded measurement tolerance 2 of USER PARM (ZERO MEASUREMENT).	Press the [RST] key and check the measurement position in the program/

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6334	4	2	TOOL LENGTH ERROR	Tool length setting for [TOOL BREAKAGE DETECT OPTION (TYPE 3)] is incorrect. This error occurs when the length of the tool subject to breakage detection corresponds to any of the following: 1.(Tool length - Tool breakage detector return position) < 60 mm 2.(Tool length - Tool breakage detector return position) > (Tool breakage detection motor stroke + 60 mm)	Check the settings for [TOOL BREAKAGE DETECT OPTION] and [TOOL BRK DETECT RETURN POS] (user parameters), and [TOOL LENGTH] on the tool list screen.
6335	4	2	TOOL BREAKAGE POS.ER1	IO board, TB board, or tool breakage detector is faulty.	Press the [RST] key to reset the error. If the error still occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6336	4	2	TOOL BREAKAGE POS.ER2	Tool breakage detection motor did not move to the specified position.	Press the [RST] key to reset the error. If the error still occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6337	4	2	T.BRK POS.DRIVER ER	The tool breakage detector is faulty.	Press the [RST] key to reset the error. If the error still occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6338	4	2	CTS ON	M496 command is used while CTS is on.	Press the [RST] key and clear the alarm. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6339	4	2	THERM ERR (CTS PUMP)	The CTS pump thermal signal was input.	Press the [RST] key and clear the alarm. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
6340	4	2	CTS ERROR	There is a problem in the CTS pump. 1) Coolant level low 2) Coolant leakage 3) Valve damage 4) Pump damage 5) Sensor failure	This error occurs if the CTS command is used during back washing. Change the program. For other cases, 1) Check that there is no problem in the pipe. 2) When the error occurs while coolant is being discharged, check the level of coolant in the tank and replenish if necessary. If the level is correct, check the user parameter (switch 1) [M494 COOLANT BLOWING TIME]. 3) When the error occurs while coolant is not being discharged, check the valve for any damage. 4) If the error still occurs, causes 4) and 5) may be the reason. Contact your nearest BROTHER approved service dealer.
6341	4	2	TOOL CLAMP ERROR	Spindle operation was attempted without turning the arm.	Press the [ATC] key to turn the arm.

### When alarm No. 6324 ~ 6326 “ORIGIN LS OFF (\*)” occurs

This alarm occurs when the [RELSE] and [Z.RTN] keys are pressed when the zero position limit switch is not on. Thus, follow the steps below to move the axis using jog operation to the position where the zero position limit switch turns on.

1. Press the [RST] key to reset the alarm.
2. Select the desired additional axis on the <MANU COND> screen or the <POS> screen.  
axis No. 4: [F0] key  
axis No. 5: [F1] key  
axis No. 6: [F2] key
3. Press the [I/O] key and the <I/O> screen appears.  
Select [1] and press the [ENT] key.
4. Press the [DOWN PAGE] key to display the screen below.



5. While observing the screen, move the additional axis by pressing the [+4] or [-4] key to move in the direction that the cables connected to the additional axis are not entangled. When the manual pulse generator is provided, use it.
6. Release your finger from the key when the zero position limit switch of the additional axis being operated turns on.  
When the axis has stopped at its stroke end, you can move the axis to a position out beyond the stroke limit by pressing the [+4] or [-4] key while holding down the [RELSE] key.
7. Press the [RELSE] and [Z.RTN] keys.

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NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6850	3	2	MARK NOT FOUND	Delimiter of data in program is lost.	Delete the program and reedit it after pressing [RST] key.
6851	3	2	PRESS RESET KEY	Important parameter is modified.	Press [RST] key.
6852	3	2	EXTERNAL ERROR 10	EXER 10 signal comes on.	Turn off the EXER 10 and push [RST] key.
6853	3	2	EXTERNAL ERROR 11	EXER 11 signal comes on.	Turn off the EXER 11 and push [RST] key.
6854	3	2	EXTERNAL ERROR 12	EXER 12 signal comes on.	Turn off the EXER 12 and push [RST] key.
6855	3	2	EXTERNAL ERROR 13	EXER 13 signal comes on.	Turn off the EXER 13 and push [RST] key.
6856	3	2	EXTERNAL ERROR 14	EXER 14 signal comes on.	Turn off the EXER 14 and push [RST] key.
6857	3	2	EXTERNAL ERROR 15	EXER 15 signal comes on.	Turn off the EXER 15 and push [RST] key.
6858	3	2	EXTERNAL ERROR 16	EXER 16 signal comes on.	Turn off the EXER 16 and push [RST] key.
6859	3	2	EXTERNAL ERROR 17	EXER 17 signal comes on.	Turn off the EXER 17 and push [RST] key.
6860	3	2	EXTERNAL ERROR 18	EXER 18 signal comes on.	Turn off the EXER 18 and push [RST] key.
6861	3	2	EXTERNAL ERROR 19	EXER 19 signal comes on.	Turn off the EXER 19 and push [RST] key.
6862	3	2	EXTERNAL ERROR 20	EXER 20 signal comes on.	Turn off the EXER 20 and push [RST] key.
6863	3	2	EXTERNAL ERROR 21	EXER 21 signal comes on.	Turn off the EXER 21 and push [RST] key.
6864	3	2	EXTERNAL ERROR 22	EXER 22 signal comes on.	Turn off the EXER 22 and push [RST] key.
6865	3	2	EXTERNAL ERROR 23	1) EXER23 signal comes on. 2) (For 22A,31A,S2A, and S2B) Shortage of lubricant when optional Automatic intermittent lubricating unit is equipped.	1) Turn off the EXER23 and push [RST] key. 2) Replenish lubricant and push [RST] key.
6866	3	2	EXTERNAL ERROR 24	EXER 24 signal comes on.	Turn off the EXER 24 and push [RST] key.
6867	3	2	EXTERNAL ERROR 25	EXER 25 signal comes on.	Turn off the EXER 25 and push [RST] key.
6868	3	2	CHG TOOL DG WK	Data on used tools are modified during operation.	Press [RST] key and restart operation.
6869	3	2	CHECK MAGAZINE TOOL	Resetting ATC arm was attempted by pressing the [relse] and [ATC] keys.	Check the magazine tool and press the [RST] key.
6870	3	2	SPINDLE RPM ERROR	The S command is not given during the spindle rotation, or the commanded value exceeds the allowable range.	Press the [RST] key and check the program.
6871	3	2	USER PARA ER (Z MESR)	Setting of user parameters 6 (Z measurement) is faulty.	Check the setting of user parameters 6 (Z measurement).
6872	3	2	H PRE COOLANT ERR 2	cause 1) The filter is clogged. 2) The coolant in the clean tank has fallen below the minimum required level.	1) Replace the filter. 2) Check the coolant level of the 200 L tank and replenish coolant if necessary.
6873	3	2	LOADED MASS SET ERR	For table movement type, the mass loaded on the table exceeds [TABLE LOADED MASS] + mass error tolerance. For column movement type, the current value of the C-axis (quick table) command exceeds the tolerance.	Check that the mass loaded on the table is the same as the setting for [TABLE LOADED MASS] (user parameter).
6874	3	2	FILTER ERR	Tool washing filter is clogged.	Press the [RST] key to reset the error. When the machine is the armless ATC type and the Z-axis position is above the machine zero point, press the [RST] key with the [RELSE] key held down. Then lower the axis below the machine zero point in manual mode. If the error occurs repeatedly, contact your nearest BROTHER approved service dealer.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
6875	3	2	LINE FILTER ERROR	1) The line filter's coolant through spindle differential pressure switch turned on while CTS is on. 2) The back washing filter is clogged while CTS is on.	Press the [RST] key to reset the error. Use M496 to perform back washing. If the error occurs repeatedly, contact your nearest BROTHER approved service dealer.
7104	2	2	EXTERNAL ERROR 10	EXER 10 signal comes on.	Turn off the EXER 10 and push [RST] key.
7105	2	2	EXTERNAL ERROR 11	EXER 11 signal comes on.	Turn off the EXER 11 and push [RST] key.
7106	2	2	EXTERNAL ERROR 12	EXER 12 signal comes on.	Turn off the EXER 12 and push [RST] key.
7107	2	2	EXTERNAL ERROR 13	EXER 13 signal comes on.	Turn off the EXER 13 and push [RST] key.
7108	2	2	EXTERNAL ERROR 14	EXER 14 signal comes on.	Turn off the EXER 14 and push [RST] key.
7109	2	2	EXTERNAL ERROR 15	EXER 15 signal comes on.	Turn off the EXER 15 and push [RST] key.
7110	2	2	EXTERNAL ERROR 16	EXER 16 signal comes on.	Turn off the EXER 16 and push [RST] key.
7111	2	2	EXTERNAL ERROR 17	EXER 17 signal comes on.	Turn off the EXER 17 and push [RST] key.
7112	2	2	EXTERNAL ERROR 18	EXER 18 signal comes on.	Turn off the EXER 18 and push [RST] key.
7113	2	2	EXTERNAL ERROR 19	EXER 19 signal comes on.	Turn off the EXER 19 and push [RST] key.
7114	2	2	EXTERNAL ERROR 20	EXER 20 signal comes on.	Turn off the EXER 20 and push [RST] key.
7115	2	2	EXTERNAL ERROR 21	EXER 21 signal comes on.	Turn off the EXER 21 and push [RST] key.
7116	2	2	EXTERNAL ERROR 22	EXER 22 signal comes on.	Turn off the EXER 22 and push [RST] key.
7117	2	2	EXTERNAL ERROR 23	1) EXER23 signal comes on. 2) (For 22A,31A,S2A, and S2B) Shortage of lubricant when optional Automatic intermittent lubricating unit is equipped.	1) Turn off the EXER23 and push [RST] key. 2) Replenish lubricant and push [RST] key.
7118	2	2	EXTERNAL ERROR 24	EXER 24 signal comes on.	Turn off the EXER 24 and push [RST] key.
7119	2	2	EXTERNAL ERROR 25	EXER 25 signal comes on.	Turn off the EXER 25 and push [RST] key.
7120	2	2	MNR FAILURE RLY ON	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
7121	2	2	PRESS. HIGH (AUTO OIL)	The pressure sensor was not off when oil supply was attempted.	Press the [RST] key. This error may occur due to machine failure and the like. If the error still occurs, contact the nearest BROTHER approved service dealer.
7122	2	2	PRESS. LOW (AUTO OIL)	The pressure sensor did not turn on within the time set for [AUTOMATIC OILING MONITORING TIME] in the machine parameter (system 1) after the oiling pump was turned on.	Press the [RST] key. This error may occur due to machine failure and the like. If the error still occurs, contact the nearest BROTHER approved service dealer.
7123	2	2	LEVEL DROP (AUTO OIL)	Insufficient oil input signal was turned on.	Supply oil.
7400	1	2	MEMORY OVERFLOW	Areas for directories and data are insufficient.	If you are editing, reduce the current program capacity before storing it or delete other programs to create greater free memory area and edit the program again.
7401	1	2	M/C PARA NOT DELETED	When formatting or deleting all data banks, [PARAMETER CHANGE] was set to [NO].	When deleting machine parameters, set [PARAMETER CHANGE] to [YES] on the [I/O] screen.
7402	1	2	* SERVO MOTOR OFF	The outer door was opened while the door interlock was valid for the CE specification machine. (*-axis (4 axis) servomotor power was turned off.)	Turn off power and see 13.6 Resetting ATC.

## Chapter 8 Alarm message

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
7403	1	2	* SERVO MOTOR OFF	The outer door was opened while the door interlock was valid for the CE specification machine. (*-axis (5 axis) servomotor power was turned off.)	Turn off power and see 13.6 Resetting ATC.
7404	1	2	* SERVO MOTOR OFF	The outer door was opened while the door interlock was valid for the CE specification machine. (*-axis (6 axis) servomotor power was turned off.)	Turn off power and see 13.6 Resetting ATC.
7500	1	1	MEMORY RUNNING	An attempt is made to start the MDI operation during the halt of memory operation. The magazine tool data was attempted to be set during memory operation. Copying, detection, formatting, or changing data number was attempted on the <MEMORY> screen during memory operation. Editing data bank was attempted during memory operation.	Execute the MDI operation after the memory operation is finished. Complete memory operation and then set the data. Complete memory operation and then perform the desired operation.
7501	1	1	IN MDI OPERATION	An attempt is made to start the memory operation during the halt of MDI operation. The magazine tool data was attempted to be set during MDI operation. Editing data bank was attempted during MDI operation.	Execute the memory operation after the MDI operation is finished. Complete MDI operation and then set the data. Complete MDI operation and then edit the data bank.
7502	1	1	HANDLE MODE	Manual mode operation is performed during manual pulse generator mode.	Set to OFF axis selector switch of manual pulse generator.
7503	1	1	COUNTER1 END NOTICE	The workpiece counter has attained the end notice number.	
7504	1	1	COUNTER2 END NOTICE	The workpiece counter has attained the end notice number.	
7505	1	1	COUNTER3 END NOTICE	The workpiece counter has attained the end notice number.	
7506	1	1	COUNTER4 END NOTICE	The workpiece counter has attained the end notice number.	
7507	1	1	NOT CLOSING DOOR	Attempt of running the machine while the door is open and the interlock unit is ON.	Close the door or set the interlock unit to OFF.
7508	1	1	IN AUTO ALIGNMENT	The mode is changed during center alignment.	Finish the center alignment operation.
7509	1	1	RELEASE MACHINE LOCK	An attempt is made to execute the center alignment in the machine lock.	Turn OFF the respective lock status before executing the center alignment.
7510	1	1	ZERO RTN COMMAND ERR	An attempt is made to return to M.Z. point during the machine lock.	Release the machine lock before executing the zero point return.
7511	1	1	DR OPEN SPNDL STOP	The door was opened during spindle rotation (the door interlock is effective).	Close the door and restart the operation. The spindle starts rotating from the position when the operation was stopped.
7512	1	1	TOO SMALL TM CONST	Tap time constant set by M code was smaller than the minimum tap time constant operable for tap rotation.	Set the time constant by M code appropriately for tap rotation.
7513	1	1	PALLET POS ERROR	A memory operation is commanded while the pallet is not indexed.	Change to the manual mode and index pallet with [C INDEX] key.
7514	1	1	INNER DOOR OPEN	The inner door is opened in the operation.	Close the inner door and push [CAN] key.
7515	1	1	OUTER DOOR OPEN	The C axis is going to rotate while the safety switch is ON and the outer door is open. Or machine is going to be operated while the pallet is not indexed.	Close the outer door, or turn off the safety switch.
7516	1	1	PRESSPALLET START	The inner pallet is going to carry out before take off the outer pallet work.	Take off the outer pallet work and press [PALLET START] key.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
7517	1	1	DIFFER FROM PLT PRG	The program different from the one set to user parameter (quick table) was selected in memory operation mode.	Check the pallet program number set to user parameter (quick table). Check the parameter.
7518	1	1	STROKE OVER (C)	When the pallet beyond its stroke, the [z. rtn] or [p. idx] key was pressed.	Press the [+c] or [-c] key to move the C-axis between -180.000 degrees and 0.000 degrees, and retry operation.
7519	1	1	SPARE TOOL USING	Life of tool used in machining is over.	
7520	1	1	MEASUREMEN T ON	Switching the mode was attempted during zero position measurement.	Complete zero position measurement.
7521	1	1	M406 IS ON	M406 signal was on when memory operation was executed.	Output m407 signal in MDI operation mode (block operation) to turn m406 signal off.
7522	1	1	TL LF EXPIRING(*)	Tool life has reached the preset value. The figure in brackets ( ) indicates the tool number.	
7523	1	1	INPUT DATA ERROR	Data beyond the specified range is set.	Set the data within the specified range.
7524	1	1	ZERO RTN NOT DONE	An attempt is made to start operation or automatic setting without executing M.Z. return.	Execute the zero point return.
7525	1	1	PROGRAM NO. ERROR	An attempt is made to set the program No. which is not allowed.	Set the program No. correctly.
7526	1	1	NO COPY SOURCE DATA	The program or data bank to be copied does not exist.	Check the program no. or data bank no.
7527	1	1	DST DATA ALRDY EXST	A program or data bank with an identical no. to those to be copied already exists.	Copy to a different no. or delete the existing program or the data bank.
7528	1	1	PROGRAM PROTECT	An attempt is made to modify the data while the PROTECT SW is ON.	Set the PROTECT switch to OFF, and modify the data.
7529	1	1	CHARACTER NO. OVER	Number of characters exceeds 128.	Reduce a number of characters.
7530	1	1	PRGRM IN EXECUTION	An attempt is made to edit or delete the file concerning the program in operation.	Execute it after finishing the operation.
7531	1	1	SELECT AXIS	The additional axis select switch was not set after power was turned on.	Set the switch correctly.
7532	1	1	COMMUNICATI NG	When the program or data is to be modified, the same data is in communication.	Execute it after finishing the communication.
7533	1	1	REQD DATA NOT FOUND	There is no specified program or data.	Check the program No. or data No.
7534	1	1	OPERATING COMMU DATA	The data desired for communication is currently being used.	Stop operation and start communication.
7535	1	1	EDITING COMMUNI DATA	The data desired for communication is currently being edited.	Complete editing and start communication.
7536	1	1	COMMUNI PARAM ERROR	[7 bit] is set to [character] and era is set to [trans data code] for communication parameter.	Check the parameter.
7537	1	1	DR SIGNAL OFF	DR signal was turned off during communication. (Only when DR SIGNAL CHECK in parameter 4 is effective.)	Check the parameter.
7538	1	1	CS SIGNAL OFF	CS signal was off during output of DC1 and DC3 codes.	Check the parameter.
7539	1	1	RC BUFFER OVERFLOW	Receiving buffer has overflowed (256 bytes).	Check the parameter.
7540	1	1	PARITY ERROR(COM)	PARITY error has occurred during data entry.	Check the parameter.
7541	1	1	OVERRUN ERROR(COM)	Overrun error (data skip) has occurred during data entry.	Check the parameter.
7542	1	1	FRAMING ERROR(COM)	Framing error (stop bit was not detected) occurred during data entry.	Check the parameter.
7543	1	1	TIMEOVER (COM)	Data could not be received or transmitted during the time preset to RESPONSE MONITORING TIME of the parameter.	

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NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
7544	1	1	FORMAT ERROR(COM)	The header, data portion, or footer cannot be recognized.	Check the communication parameter or data.
7545	1	1	LOAD HEADER ERROR	The format of the received header is not correct.	Check the format.
7546	1	1	LOAD DATA NAME ERROR	The data name of the received header is not correct.	Check the data name.
7547	1	1	RCV RSPONCE HEAD ERR	The received response header is not correct for the command requested through communication.	Check the response header.
7548	1	1	LOAD RESPNCE ERR END	The response of error end was received for the command that has been sent.	Check any cause originating in the connected communication equipment.
7549	1	1	CHECK ERROR	The contents of the machine data differ from those of input data.	
7550	1	1	IGNORE LOAD (SYMBOL)	Invalid symbol was detected in the received data, thus the corresponding record was ignored.	Check the symbol in the data.
7551	1	1	IGNORE LOAD (ASCEND)	The symbol in the received data is not in chronological order, thus the corresponding record was ignored.	Check the order of symbols in the data.
7552	1	1	CONV. LOAD (ITEM QTY)	The number of items in one record of the received data is not correct. Excessive items are ignored. Nothing is set for missing items.	Check the record format.
7553	1	1	CONV. LOAD (ITM RANGE)	The range of the item of the received data is not correct, thus changed. Nothing is set for the changed portion.	Check the value of each item.
7554	1	1	COMMUNI DATA EDIT ER	Edit error has occurred during processing of communication data.	
7555	1	1	SAVE DATA ERROR	The saved data format is not correct.	Edit the corresponding data again.
7556	1	1	EXCESSIVE LOAD DIR.	The number of loaded directories has exceeded 256.	The number of directories to be loaded should be up to a maximum of 256.
7557	1	1	COMMUNI TV CHECK ERR	The number of data in one block is incorrect.	Check the communication protocol.
7558	1	1	RECEIVED DATA INVALID	The data that cannot be converted was received.	Check the communication protocol.
7560	1	1	OVERWRITE PROTECT	Overwriting is prohibited for communication with slave station.	Check the communication parameter.
7561	1	1	SEND(*)	The program indicated in brackets ( ) was sent to an external device.	
7562	1	1	SEND(*)	The data indicated in brackets ( ) was sent to an external device.	
7564	1	1	RECV(*)	The program indicated in brackets ( ) was received from an external device.	
7565	1	1	RECV(*)	The data indicated in brackets ( ) was received from an external device.	
7566	1	1	COMMUNI CHECKSUM ERR	The checksum of receiving response is not correct.	Set the checksum value correctly or set the checksum of user parameter (Communication) to [0: INVALID].
7567	1	1	EXTERNAL ERROR 8	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause.
7568	1	1	EXTERNAL ERROR 9	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause.
7569	1	1	EXTERNAL ERROR 10	EXER10 signal comes on.	Turn off the EXER10 and push [RST] key.
7570	1	1	EXTERNAL ERROR 11	EXER11 signal comes on.	Turn off the EXER11 and push [RST] key.
7571	1	1	EXTERNAL ERROR 12	EXER12 signal comes on.	Turn off the EXER12 and push [RST] key.
7572	1	1	EXTERNAL ERROR 13	EXER13 signal comes on.	Turn off the EXER13 and push [RST] key.
7573	1	1	EXTERNAL ERROR 14	EXER14 signal comes on.	Turn off the EXER14 and push [RST] key.
7574	1	1	EXTERNAL ERROR 15	EXER15 signal comes on.	Turn off the EXER15 and push [RST] key.
7575	1	1	EXTERNAL ERROR 16	EXER16 signal comes on.	Turn off the EXER16 and push [RST] key.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
7576	1	1	EXTERNAL ERROR 17	EXER17 signal comes on.	Turn off the EXER17 and push [RST] key.
7577	1	1	EXTERNAL ERROR 18	EXER18 signal comes on.	Turn off the EXER18 and push [RST] key.
7578	1	1	EXTERNAL ERROR 19	EXER19 signal comes on.	Turn off the EXER19 and push [RST] key.
7579	1	1	EXTERNAL ERROR 20	EXER20 signal comes on.	Turn off the EXER20 and push [RST] key.
7580	1	1	EXTERNAL ERROR 21	EXER21 signal comes on.	Turn off the EXER21 and push [RST] key.
7581	1	1	EXTERNAL ERROR 22	EXER22 signal comes on.	Turn off the EXER22 and push [RST] key.
7582	1	1	EXTERNAL ERROR 23	1) EXER23 signal comes on. 2) (For 22A,31A,S2A, and S2B) Shortage of lubricant when optional Automatic intermittent lubricating unit is equipped.	1) Turn off the EXER23 and push [RST] key. 2) Replenish lubricant.
7583	1	1	EXTERNAL ERROR 24	EXER24 signal comes on.	Turn off the EXER24 and push [RST] key.
7584	1	1	EXTERNAL ERROR 25	EXER25 signal comes on.	Turn off the EXER25 and push [RST] key.
7586	1	1	EDITING AREA OVER	Editing contents have exceeded the editing capacity (64 Kbytes).	The memory area cannot be increased during editing, thus divide the program. When this error occurs when starting editing, this means the program is too large to edit.
7587	1	1	SP LOCK SIGNAL ON	The spindle lock signal is on.	Turn it off.
7588	1	1	ATC LOCK SIGNAL ON	The ATC lock signal is on.	Turn it off.
7589	1	1	XY LOCK SIGNAL ON	The XY-axis lock signal is on.	Turn it off.
7590	1	1	Z LOCK SIGNAL ON	The Z-axis lock signal is on.	Turn it off.
7591	1	1	* LOCK SIGNAL ON	The axis 4 lock signal is on.	Turn it off.
7592	1	1	* LOCK SIGNAL ON	The axis 5 lock signal is on.	Turn it off.
7593	1	1	* LOCK SIGNAL ON	The axis 6 lock signal is on.	Turn it off.
7594	1	1	SPINDLE OVERRIDE ON	The spindle override is set to the value other than 100%.	Set the spindle override to 100%.
7595	1	1	CUT FEED OVERRIDE ON	Cutting feed override is set to a value other than 100%.	Set the cutting feed override to 100%.
7596	1	1	RPD TRVS OVERRIDE ON	Rapid feed override is set to a value other than 100%.	Set the rapid feed override to 100%.
7597	1	1	MODE CHANGE PROHIBIT	Mode changeover prohibition signal is on.	Turn the signal off.
7598	1	1	DOOR LOCKED	The door OPEN/CLOSE switch was pressed while the door was locked.	
7599	1	1	AREA SNSR OBSTRUCTED	The beam of the area sensor was obstructed while the door was opening or closing.	
7600	1	1	TOOL ALRDY REGISTRD	The tool attempted to be set to [magazine tool] is already set for another pot.	Delete the current tool and set a new one.
7601	1	1	NO TOOL IN MAGAZINE	The tool necessary for operation is not set in the magazine.	Set the correct tool on the <magazine tool> screen.
7602	1	1	EDITING	Deleting and copying the data bank or changing the data bank number was attempted on the <directory of memory> screen during data bank editing.	Complete the data bank currently being edited.
7603	1	1	INCORRECT TOOL TYPE	Replacement with a tool of incorrect type was attempted in manual operation mode.	
7604	1	1	PROHIBITED POT	1. Setting other than "attachment of cap" was attempted for a prohibited pot on the <magazine tool> screen. 2. The tool was attempted to be changed with a prohibited pot.	1. Only "attachment of cap" can be set for a prohibited pot.

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NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
7605	1	1	CAPPED	The tool was attempted to be replaced with a pot with the cap specified.	
7606	1	1	EXCESSIVE TOOLS	Setting more than 30 tools per tool group was attempted.	Up to 30 tools can be set for one group.
7607	1	1	TOOL SET TONEXT POT	Although a tool is set in the adjacent pot, a large tool was attempted to be set.	Delete the tool set to the adjacent pot or set the large tool in another location.
7608	1	1	DELETE POS ERROR	Deletion was attempted at an incorrect position.	Move the cursor to the correct position.
7609	1	1	NO MEASURING DATA	Automatic setting (parameter) was attempted although the measurement data does not exist.	Perform measurement using automatic centering function.
7611	1	1	TOOL LEN SETTING ON	1. Changing mode was attempted during automatic tool length measurement. 2. The [m. lck] key was pressed.	Complete automatic tool length measurement.
7612	1	1	OPERATING MANUALLY	Start data was attempted to be set during jog movement in ATC maintenance mode.	Stop jog movement and set the data.
7615	1	1	NO OPTION (4)	Although an optional axis 4 is not provided, axis 4 operation was attempted to be performed.	Purchase an optional axis 4. When already provided, set [4 option] to [1: yes].
7616	1	1	NO OPTION (5)	Although an optional axis 5 is not provided, axis 5 operation was attempted to be performed.	Purchase an optional axis 5. When already provided, set [5 option] to [1: yes].
7617	1	1	NO OPTION (6)	Although an optional axis 6 is not provided, axis 6 operation was attempted to be performed.	Purchase an optional axis 6. When already provided, set [6 option] to [1: yes].
7618	1	1	KEY OPE PROHIBITED	Key entry cannot be accepted because key operation prohibition signal is on.	Turn the signal off and then perform key entry.
7619	1	1	PRGM EDIT PROHIBITED	Changing data was attempted while the program edit signal was on.	Turn the signal off and then change the data.
7620	1	1	EDIT PROHIBITED	Changing data was attempted while the edit prohibition signal was on.	Turn the signal off and then change the data.
7621	1	1	USER PARAM ERR (COM)	Setting of user parameter 3 (communication) is incorrect.	Check the setting.
7622	1	1	SIDE DOOR OPEN	The machine was attempted to be operated while the side door was open.	Close the door and then operate the machine.
7623	1	1	DATA ERR (DATA BANK)	Data structure of the non-selected data banks is damaged.	Delete the damaged data on the <directory of memory> screen in edit mode, and create new data.
7624	1	1	SET POS ERROR	Setting data was attempted for a location where data cannot be set.	Set the data in other locations.
7625	1	1	RCV COM ER END(*)	The command received during communication with the TC slave resulted in an error.	Check the cause and send the command again.
7626	1	1	COMMUNICATI ON I/F ER	An error occurred in the interface with communication device.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
7627	1	1	COMMUNI VER. CHECK ER	The version of the data attempted to be transmitted differs from that of system data version.	Edit the data again.
7628	1	1	COMMU COMD END(*)	Communication command indicated in brackets () was ended.	
7629	1	1	DELETE(*)	The data indicated in brackets () was deleted during communication.	
7630	1	1	DELETE(*)	The data indicated in brackets () was deleted during communication.	
7634	1	1	M PARAM CHNG DISABLE	Although input of machine parameter was attempted through communication, [parameter change] was set to [no].	When inputting the machining parameter, select [1. input/output] on the <I/O> screen, and set [parameter change] to [yes].
7635	1	1	POT NOT FULLY RAISED	The pot is not at the upper end.	Press the [ATC] key to move the pot to the upper end.
7636	1	1	DURING ATC	Changing to another mode was attempted during tool change.	The mode cannot be changed during tool change.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
7637	1	1	NO A/T THRM DISP COM	The <COMPENSATION DATA> screen was attempted to be opened although the automatic thermal displacement compensation function is not provided.	
7638	1	1	MACHINE OPERATING	The C-axis is operating when the C-axis start point data is cleared.	Clear the data after the C-axis has stopped.
7639	1	1	CNTRL BOX DOOR OPEN	The door of the control box is open.	Close the door of the control box.
7996	5	3	KERNEL ERROR (MAIN)	An error has occurred in the main CPU operating system.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
7997	5	3	KERNEL ERROR(SLAVE)	An error has occurred in the slave CPU operating system.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
7998	5	3	KERNEL ERROR(LOCAL)	An error has occurred in the local CPU operating system.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
7999	5	2	NO ERROR NO.		This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
8200	4	2	NO WORK ZERO DATA	There is no data of working zero position.	Create the data on working zero position in the data setting mode or input it externally.
8201	4	2	NO TOOL DATA	There is no tool data.	Create the tool data in the data setting mode, or input it externally.
8202	4	2	NO MACRO VARIA. DATA	There is no macro parameter data.	Create a macro parameter data or input it externally.
8203	4	2	PARITY (WORK ZERO)	Working coordinate zero position data was damaged.	Press [RST] key, and data by memory screen new data again.
8204	4	2	PARITY (TOOL DATA)	Tool data was damaged.	Press [RST] key, and data by memory screen new data again.
8205	4	2	PARIT (MACRO VARIA)	Macro parameter data was damaged.	Press [RST] key, and data by memory screen new data again.
8206	4	2	DATA ERR (WORK ZERO)	The structure of the working coordinate zero position data was damaged.	Press [RST] key, and data by memory screen new data again.
8207	4	2	DATA ERR (TOOL DATA)	The structure of the tool data was damaged.	Press [RST] key, and data by memory screen new data again.
8208	4	2	DATA ERR (MACROVAR.)	The structure of the macro parameter data was damaged.	Press [RST] key, and data by memory screen new data again.
8209	4	2	R.COMP ERROR	1) The tool dia offset start-up or cancel motions are by the circular arc command. 2) A command that cannot be used in tool diameter offset mode was used.	Press the [RST] key and change this motions according to the linear command. Check the program.
8210	4	2	TOO LARGE R. COMP	The programmed radius is smaller than the dia offset amount during the inner circular arc cutting.	Press the [RST] key and change the program- med radius to be more
8211	4	2	NO R/Z COMMAND	The R or Z point is not commanded in the canned cycle.	Press the [RST] key and command the R and Z points.
8212	4	2	NO PITCH DATA	The tapping pitch is set to 0 or not set.	Press the [RST] key and set the pitch data.
8213	4	2	RESTART ERROR	The specified sequence No. is not found.	Press the [RST] key and check the specified sequence No.
8214	4	2	TOO MANY TOOLS ASGD	The number of tools used for the program is larger than the number of tool pots.	Press the [RST] key and check the program.
8215	4	2	FIXED CYCLE ADRS ERR	Necessary address is not found in canned cycle, or unnecessary address was specified.	Press the [RST] key and check the program.
8216	4	2	ZEROMESR ADRS ERR	Necessary address is not found in zero position measurement command or unnecessary address was specified.	Press the [RST] key and check the program.
8217	4	2	Z MESRMENT COMD ER	Thermal measurement command or tool breakage detection command format is incorrect.	Press the [RST] key and check the program.
8218	4	2	MACRO COMMAND ERROR	The format specified by the macro command is incorrect.	Press the [RST] key and check the program.

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NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
8219	4	2	THR COMP IMPOSSIBLE"	Thermal compensation was attempted although thermal measurement was not performed.	Refer to the reference program for thermal measurement.
8220	4	2	T-CODE RANGE ERROR	The "T" command is out of the specified range.	Check the program.
8221	4	2	LARGE OPE PROGRAM	Program size is larger than buffer capacity	Press the [RST] key and correct the program.
8223	4	2	NO TAPE RUN FUNCTION	Tape run was attempted although the machine is not equipped with tape run option.	Purchase the tape run option.
8700	3	2	COMMAND INVALID(G)	3-digit G code which is not available is specified.	Press the [RESET] key and check the program.
8701	3	2	INVALID COMMAND	The G and M codes are commanded in the same block, though it is not allowable.	Press the [RST] key and check the program.
8702	3	2	COMMAND INVALID(M)	3-digit M code which is not available is specified.	Press the [RST] key and check the program.
8703	3	2	INVALID CH COMMAND	Characters not accepted are commanded.	Press the [RST] key and check the program.
8704	3	2	SAME CODE INVALID	More than one M code is commanded in a block.	Press the [RST] key and check the program.
8705	3	2	INVALID VALUE DATA	The command format is not correct.	Press the [RST] key and check the program.
8706	3	2	DATA RANGE ERROR	Commanded value exceeds address range.	Press the [RST] key and check the program.
8707	3	2	CH/BLOCK OVER	No. of characters in one block exceeds 128.	Press the [RST] key and check the program.
8708	3	2	COMMAND INVALID G,M	The G and M codes which cannot be intervened mutually in the MDI mode are commanded in the memory operation.	Press the [RST] key and check the program.
8709	3	2	NO PROG END CODE	There is no M02 or M30 command.	Press the [RST] key and check the program.
8710	3	2	ARC COMMAND ERROR	Wrong command is given in the circular arc command.	Press the [RESET] key and check the program.
8711	3	2	SUB PROG CALL ERROR	The subprogram nesting exceeds 8 loops.	Press the [RST] key and check the program.
8712	3	2	SUB PROG NO. ERROR	The subprogram which can not be called is called.	Press the [RST] key and check the program.
8713	3	2	MODAL SUBPRG RTN ERR	G66 was commanded in mode other than macro modal call mode or tool dia offset was not canceled when returning from the sub program.	Press the [RST] key and check the program.
8714	3	2	FEEDRATE ERROR	The F command is not given during the cutting feed, or the commanded value exceeds the limit.	Press the [RST] key and check the program.
8715	3	2	DR SIGNAL OFF	The DR signal turned off during communication.	Check the communication parameter or the connection object.
8716	3	2	NO INTERSECTION	The cross point is not obtained during the inner cutting of tool dia offset.	Press the [RST] key and check the program.
8717	3	2	WORK CAL ADDRESS ERR	Necessary address is not found when the coordinate calculation is commanded, or the value exceeding the allowable range is commanded.	Press the [RST] key and check the program.
8718	3	2	IN ARC MODE	The coordinate calculation is commanded in the circular arc mode.	Press the [RST] key and check the program.
8719	3	2	COMMENT ERROR	The control OUT/IN codes are not in the same block.	Press the [RESET] key and check the program.
8720	3	2	NO T-CODE COMMAND	The T command is not given while G100 or M06 is in execution.	Press the [RST] key and check the program.
8721	3	2	SUB PROGM RETURN ERR	The return number was specified by the program return command while the number of repeats was specified for sub program call.	Press the [RST] key and check the program.
8722	3	2	MACRO PROGM CALL ERR	The macro program call nesting exceeds 4 loops.	Press the [RST] key and check the program.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
8723	3	2	NO APPLICABLE SEQ	The sequence No. specified by the sub program return command or that specified by the macro command (GOTO) was not found.	Press the [RST] key and check the program.
8724	3	2	WRONG CONNECT OBJECT	Tape run was attempted when [CONNECTION OBJECT] of [USER PARAMETER (COMMUNICATION)] was set to [COMPUTER].	Set [CONNECTION OBJECT] to [PTP/PTR].
8725	3	2	TURN EXTPRG SGNL OFF	Tape run was attempted when the external program signal was on.	Turn the external program signal off.
8726	3	2	RESET AFTER RESTORED	Communication was attempted while the communication port was recovering from an error.	Wait until the communication recovery time elapses, and press the [RST] key.
8727	3	2	TIMEOVER (COM)	Non-response time exceeded response monitor time during communication.	Check the communication parameter or the connection object.
8728	3	2	RECEIVED DATA INVALID	The TC received invalid data when the invalid data conversion function was off.	Check the communication parameter or the data.
8729	3	2	FORMAT ERROR (COM)	Communication header, data section, or footer not recognized.	Check the communication parameter or the data.
8730	3	2	COMMUNI TV CHECK ERR	The number of characters in one block is not correct when receiving the program.	Check the communication parameter or the data.
8731	3	2	CS SIGNAL OFF	The CS signal was off when sending flow control DC1 and DC3 codes.	Check the communication parameter or the communication object.
8732	3	2	RC BUFFER OVERFLOW	Capacity of the receiving buffer is exceeded	Check the communication parameter or the communication object.
8733	3	2	FRAMING ERROR (COM)	The stop bit of the receiving character could not be detected.	Check the communication parameter or the data.
8734	3	2	PARITY ERROR (COM)	Parity error occurred in the receiving characters.	Check the communication parameter or the data.
8735	3	2	OVERRUN ERROR (COM)	The next characters came in although the TC was not ready to receive them.	Check the communication parameter or the data.
8736	3	2	COMMUNICATING	Tape run was attempted in master station communication mode.	Exit the external I/O menu, and then perform tape run.
8737	3	2	DIFFER FROM PLT PRG	A program different from the one set for [USER PARAMETER (QUICK TABLE)] was set for tape run.	Check the program number of each pallet set for [USER PARAMETER (QUICK TABLE)] or the program number to be operated.
9450	1	1	NO PROGRAM(*)	Specified program is not found. Figures in ( ) indicate the program No.	Check the program No.
9451	1	1	NO SUBPROGRAM (*)	Specified subprogram is not found. Figures in ( ) indicate the subprogram No.	Set the subprogram, or delete the subprogram call cycle.
9452	1	1	NO APPLICABLE SEQ	Specified sequence No. is not found.	Check the specified sequence No.
9453	1	1	SEQ NO. ERROR	The sequence No. in the program is not correct.	Check the sequence No. in the program.
9454	1	1	SUB PROG NO. ERROR	The subprogram No. in the program is not correct.	Check the subprogram No. in the program.
9455	1	1	NO DIRECTION DATA	Measuring direction is not set.	Set measuring direction.
9456	1	1	DATA IMCOMPLETE	The data other than numerical values are set to [CENTER ALIGNMENT] or [AUTOMATIC TOOL LENGTH MEASUREMENT].	Set the data correctly.
9457	1	1	TOOL NO. IS NOT SET.	The group number was attempted to be set although the tool number was not set to [Magazine Tool].	Set the tool number and then group number.
9458	1	1	IN COORD. ROTTN. MODE	MDI operation was attempted to be executed during memory operation.	Cancel the coordinate rotation and execute MDI operation.
9459	1	1	PALLET SELECT SW OFF	Restart or sequence search was attempted while the pallet select switch is on.	Turn off the pallet select switch and retry.

## Chapter 8 Alarm message

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
9460	1	1	CORNER C/R IS ON	The MDI was operated while memory operation of the corner C/R was operating.	Start the MDI operation when the corner C/R operation was finished.
9461	1	1	BLOCK NUMBER OVER	The number of blocks to be loaded or deleted is too large.	Delete the number of such blocks.
9462	1	1	NO DATA FOUND	The character string to be searched for or replaced was not found.	Change the character string to be searched for or replaced.
9463	1	1	IN OPERATION	Deleting or copying the data bank was attempted during memory operation.	Complete the memory operation first and then delete or copy the data bank.
9464	1	1	RESTARTING	Changing the data or executing MDI operation was attempted while restarting.	Execute it after finishing the restart motions.
9465	1	1	TAPE OPERATING	Master station communication was attempted during tape run.	Try communication after tape run is completed.
9466	1	1	MEMORY OVERFLOW	If you are editing, reduce the current program capacity before storing it or delete other programs to create greater free memory area, and edit the program again.	Reduce the program capacity and store it during editing. Or delete other programs to make a free area and edit it again.
9467	1	1	NO REGISTERED TOOL	A tool is not set to the group that was attempted to be set to [Magazine Tool].	Check the tool group setting.
9468	1	1	OPERATION END	Tape run is completed.	
9469	1	1	RESTARTING DISABLE	Tape run was attempted when [RESTART] of [USER PARAMETER (SWITCH 1)] was set to [RESTART].	Set [RESTART] of [USER PARAMETER (SWITCH 1)] to [STOP].

## 8.6 Servo error message

DISPLAY	No	CAUSE	SOLUTION
OC	1	Overcurrent.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
AOH	2	Register DB in the amplifier is overheating.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
EOH	3	The external regenerative register is overheating.	Turn off the power supply. After 15 to 20 minutes, check the condition. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer
OV	5	Ovvoltage.	Check power supply voltage, capacity, momentary service interruption, and correct them as necessary. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer
CPE	6	Controller power supply has decreased.	Check power supply voltage, capacity, momentary service interruption, and correct them as necessary. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer
DE1	7	Encoder signal line is broken.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
DE2	8	Serial broken wire.	Main power supply voltage drop.
OL	9	Overloaded.	Turn off the power supply. After 15 to 20 minutes, check the condition. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer
OS	10	Overspeed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
MPE	11	Main power error.	Check power supply voltage, capacity, momentary service interruption, and correct them as necessary. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
FP	12	Main circuit open phase.	Check power supply voltage, capacity, momentary service interruption, and correct them as necessary. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
RGE	13	Regenerative register is overloaded.	Turn off the power supply. After 15 to 20 minutes, check the condition. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
DSPE	14	DSP error	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
ROME	15	Memory error	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
PARE	16	Servo parameter error.	Check the following servo parameter settings. ·Motor type (*13) ·Limit of current while preventing drop due to dead load (*18)
BATT DROP	17	Battery voltage drop.	Replace alkaline battery for absolute encoder backup.
CSE	18	Encoder error in initial state.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
MOC	19	Motor overcurrent.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
DTO	20	Command monitor timer has expired. (No command has been received from the amplifier within 4 msec)	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
STO	21	Response monitor timer has expired. (No command has been received from the amplifier within 4 msec)	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
SYS1	22	Servo error signal was input but alarm number was not notified.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
SYS2	23	Servo error signal was input but undefined alarm number was issued.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.

Chapter 8 Alarm message

DISPLAY	No	CAUSE	SOLUTION
INI	24	Communication between the NC and amplifier was impossible when the power was turned on.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
SS	25	Already transmitting when the data was attempted to be transferred to the amplifier.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
SR	26	Already receiving when the data was attempted to be transferred to the amplifier.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
CRCE	27	CRC error.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
FRME	28	Framming error.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
VERE1	29	Output data to the amplifier was incorrect. (Data bank of servo amplifier 3, 4, 5)	This error occurs when power is turned on for the first time after replacing the servo amplifier. Turn the power off and then on again. If the error still occurs, check the following servo parameter settings: If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
ATO	30	Amplifier timeout error.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
RSTM	31	Amplifier RST input has decreased during servo on.	Check power supply voltage, capacity, momentary service interruption, and correct them as necessary. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
SCE	32	CRC error for synchronized frame.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
RECD	33	Encoder signal reading impossible error.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
VERI	34	The motor type, encoder pulse, and encoder type previously set do not coincide with those set this time. This error will occur only to the PV amplifier and PY2C amplifier.	Set the following servo parameters correctly, and turn the power off and then on again. Upon this operation, the [SERVO (VERI)] message will appear again. Just turn the power off and then on again. Motor type (*13) Encoder pulse (*14) Encoder type (*15)
SRE	35	Serial receiving error	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
PSE	36	Encoder initial receiving error	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
VERE2	37	Output data to the amplifier was incorrect. (Data bank of servo amplifier 6, 7)	Check the servo parameter settings. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
DE11	38	The encoder signal was recovered while the DE1 alarm is current.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.

## 8.7 Resetting ATC

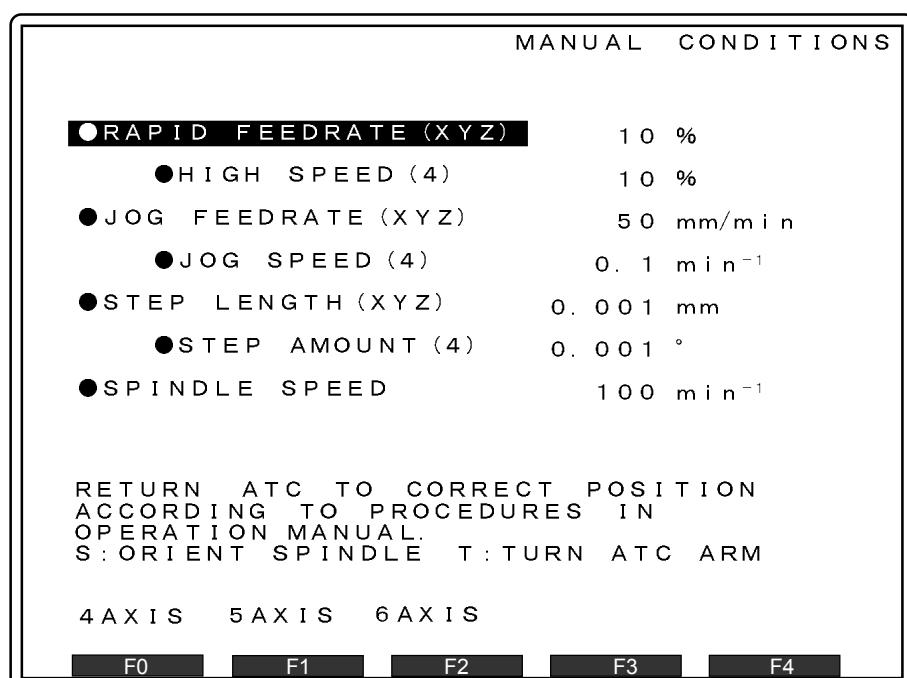
### (Case TC-31A)

When an error has occurred in the ATC during its operation or the ATC arm has stopped midway due to shutdown of power, the ATC arm must be reset.

When power is shutdown, turn on power and the system is booted with the screen below appearing.

When an error has occurred in the ATC, turn the power off and then on again.

When the ATC or ATC arm has stopped due to an emergency stop, reset the emergency stop switch and turn on the power.



When the screen above appears, perform the following procedures:

1. Press the [RST] key while the [RELSE] key is depressed to clear the error.
2. Press the [E. STA] key and the [E. STA] LED will light.
3. Check the machine state.
  - 3-1 Arm is stopped, during the movement from the waiting point to the clamping point. But the arm is not lowered.  
Two arms positioned at the spindle and the magazine is called “clamping point”.
    - 3-1-1 Tool holder is attached to spindle  
(1)The finger key is correctly inserted into the key groove in the tool holder.  
— Perform from step 5.
    - (2)The finger key is not correctly inserted into the key groove in the tool holder.  
— Please inform BROTHER of circumstances when an error occurs.
  - 3-2 Tool holder is not attached to spindle  
— Perform from step 4.
- 3-2 Arm is lowered  
— Perform from step 4.

4. Press the [S] key while the [RELSE] key is depressed to execute spindle orientation.
5. Press the [T] key while the [RELSE] key is depressed, and the ATC arm will swivel to the correct position.
6. Press the [E. STA] key and the [E. STA] LED will go out.
7. Press the [RST] key. Unless [ATC ARM POS ERR 1] occurs, the ATC arm has been reset.  
If [ATC ARM POS ERR 1] immediately reoccurs, inform BROTHER of circumstances when the error occurred.

- (Note 1) Mode selection and other operations to move the spindle are not possible.**
- (Note 2) Perform normal key entry operation with the [E. STA] LED unlit.**

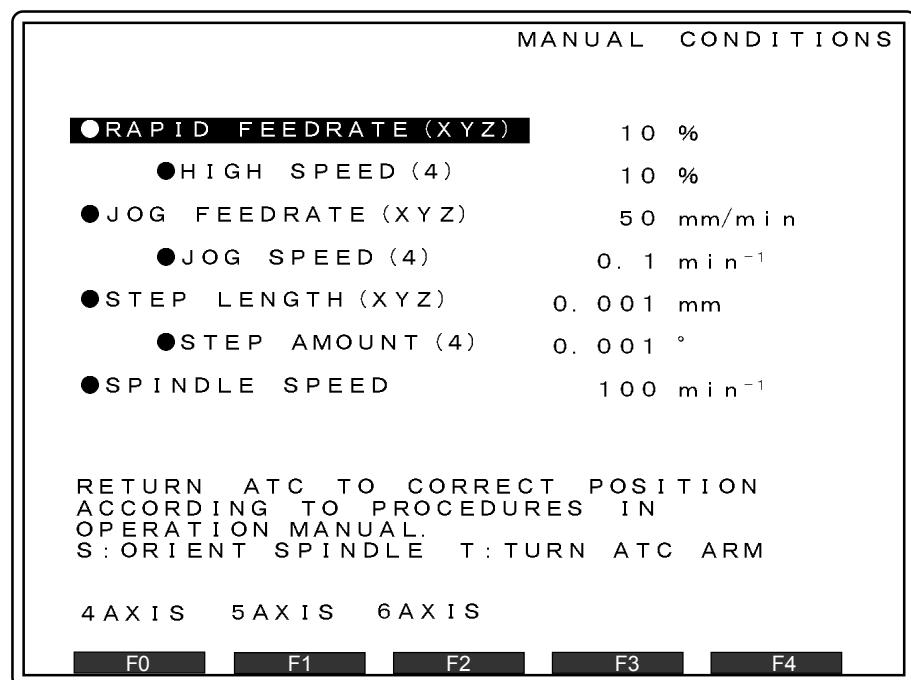
**(Case TC-22A)**

When an error has occurred in the ATC during its operation or the ATC arm has stopped midway due to shutdown of power, the ATC arm must be reset.

When power is shutdown, turn on power and the system is booted with the screen below appearing.

When an error has occurred in the ATC, turn the power off and then on again.

When the ATC or ATC arm has stopped due to an emergency stop, reset the emergency stop switch and turn on the power.



When the screen above appears, perform the following procedures:

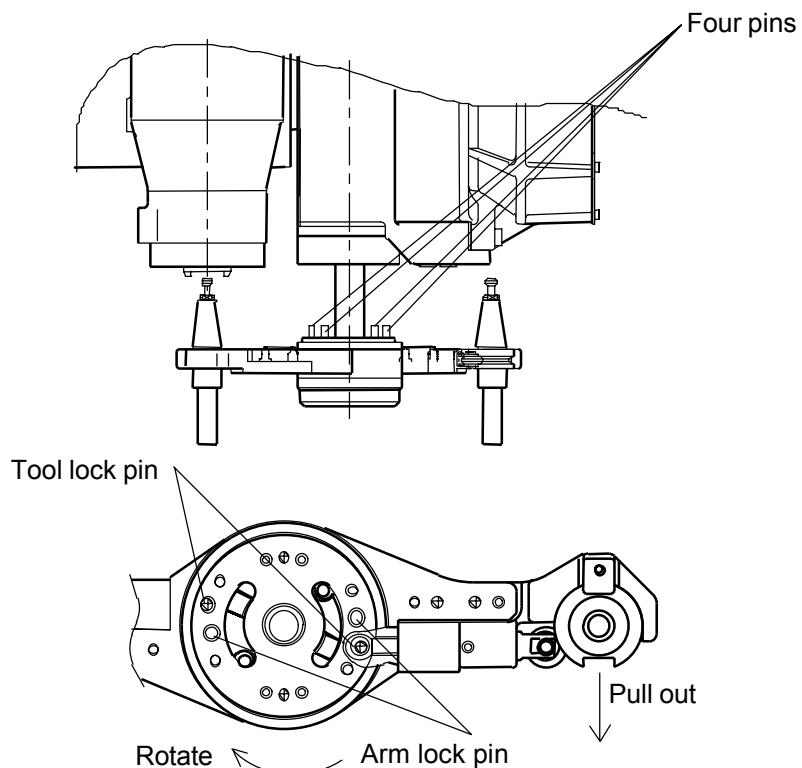
1. Press the [RST] key while the [RELSE] key is depressed to clear the error.
  2. Press the [E. STA] key and the [E. STA] LED will light.
  3. Check the machine state.
- 3-1 Arm is stopped, during the movement from the waiting point to the clamping point. But the arm is not lowered.  
 Two arms positioned at the spindle and the magazine is called “clamping point”.
- 3-1-1 Tool holder is attached to spindle
- (1) The finger key is correctly inserted into the key groove in the tool holder.  
 —— Perform from step 5.
  - (2) The finger key is not correctly inserted into the key groove in the tool holder.  
 —— Please inform BROTHER of circumstances when an error occurs.
- 3-1-2 Tool holder is not attached to spindle  
 —— Perform from step 4.

- 3-2 Arm is lowered.
- Compared with four pin's height on the rotation arm surface.  
(regular pin height is around 12mm.)
  - \*Rotate the rotation arms to clock wise from the upper viewing, when the arm lock pin's height is low in the four pins.
  - Reposition the arm lock pin to the regular height 12mm.
  - \*When rotation arm has a tool, it must remove the tool.
  - There are two pins that diameter 6mm on the rotation arm surface (four pins of all).
  - Push the nearest pin (tool lock pin) from the removal tool.
  - This action, to push the pin needs power, keep careful to do it.
  - (Wear leather gloves to prevent your hands being cut by the tools.)
- Press the [S] key while the [RELEASE] key is depressed to execute spindle orientation.
  - Press the [T] key while the [RELEASE] key is depressed, and the ATC arm will swivel to the correct position.
  - Press the [E. STA] key and the [E. STA] LED will go out.
  - Press the [RST] key. Unless [ATC ARM POS ERR 1] occurs, the ATC arm has been reset.
- If [ATC ARM POS ERR 1] immediately reoccurs, inform BROTHER of circumstances when the error occurred.

**(Note 1) Mode selection and other operations to move the spindle are not possible.**

**(Note 2) Perform normal key entry operation with the [E. STA] LED unlit.**

**Fig.1**



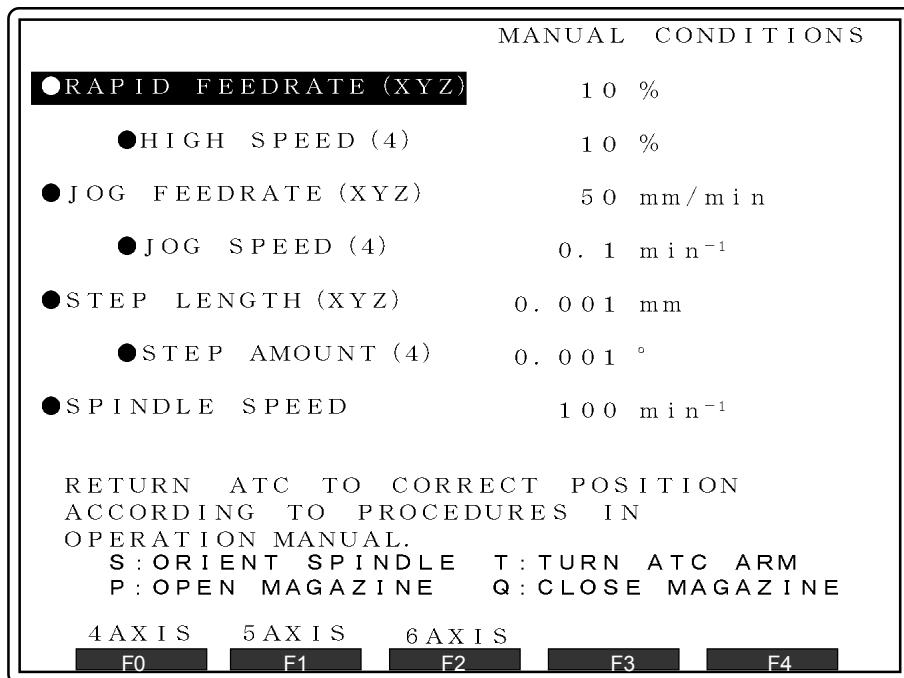
### (Case TC-32A)

When an error has occurred in the ATC during its operation or the ATC arm has stopped midway due to shutdown of the power or an emergency stop, the ATC arm must be restored by the following process.

Tools may fall when resetting. Take the utmost care.

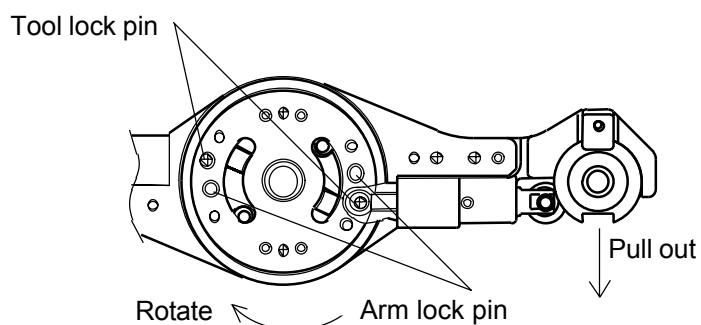
Before the operation, push the power switch to check the power is turned off.

1. Check the machine state.
  - 1.1 When the arm is not completely lowered.
    - 1.1.1 When the tool holder is not unstable from the spindle, perform from step 2.
    - 1.1.2 When the tool holder is not on the spindle, perform from step 4.
    - 1.1.3 When the tool holder is a little unstable from the spindle, perform from step 5.
  - 1.2 When the arm is completely lowered, perform from step 6.
2.
  - 2.1 When the arm and the tool holder clamped to the spindle are touched, set the hex wrench in the hole in the upper section of the cam motor and turn the wrench clockwise or counter clockwise until detached it.  
Perform from step 5.
  - 2.2 When the arm and the tool holder clamped to the spindle are detached, turn the arm to the left by hand.
3. Remove the tool holder indexed to the ATC from the magazine.  
Perform from step 7.
4. When the arm and the tool holder clamped to the ATC position are touched, set the hex wrench in the hole in the upper section of the cam motor and turn the wrench clockwise or counter clockwise until detached it.  
Perform from step 3.
5. Remove the Y axis apron cover, set the hex wrench in the hole (M10) on the face of the Y axis BS.  
Turn the wrench counter clockwise until the arm is lowered.  
(column is move to the + Y axis) Perform from step 6.
6. Remove two tool holders from the ATC arm while pressing the tool lock pin.  
(Wear leather gloves to prevent your hands being cut by the tools.)
7. Turn the power on.  
When the power is shutdown, turn the power on and the system is booted up with the screen below appearing.  
When an error has occurred in the ATC, turn the power off and then on again.  
When the ATC or ATC arm has stopped due to an emergency stop, reset the emergency stop switch and turn the power on.



When the screen above appears, perform the following procedure:

8. Press the [RST] key with the [RELSE] key held down to clear the error.
  9. Select MANUAL mode. Press the [-X] key with the [RST] key held down to move the X-axis in the negative direction 150 mm or more.
  10. Press the [-Z] key with the [RST] key held down to move the Z-axis in the negative direction 2 mm or more.
  11. Press the [E.STA] key and the [E.STA] LED will light.
  12. Press the [T] key with the [RELSE] key held down, and the ATC arm will swivel to the correct position.
- Press the [E.STA] key and the [E.STA] LED will go out.
- Press the [RST] key. Unless [ATC ARM POS ERR 1] occurs, the ATC arm has been reset. Turn the power off and then on again.



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**(Case TC-20A)**

A. When the ATC arm has stopped due to an emergency stop, reset the emergency stop switch and press the [RST] key.

1. Press the [RST] key while the [RELSE] key is depressed to clear the error.
2. Press the [ATC] key while the [RELSE] key is depressed.

- Check that the spindle drive key is parallel to the Y-axis.  
If it is not parallel, adjust it manually before operation.

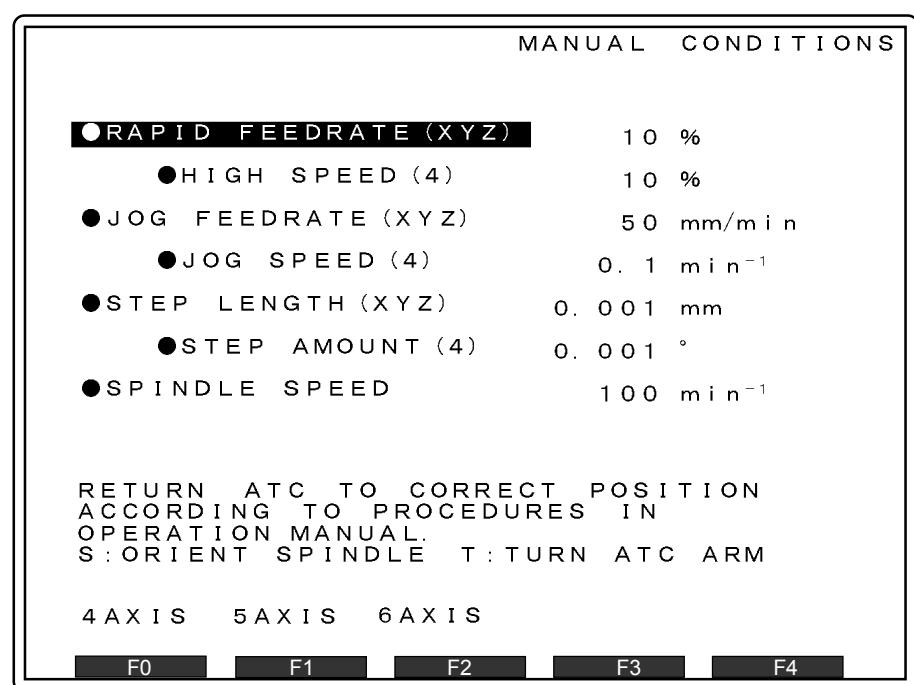
B. When an error has occurred in the ATC during its operation or the ATC arm has stopped midway due to shutdown of power, the ATC arm must be reset.

When power is shutdown, turn on power and the system is booted with the screen below appearing.

When an error has occurred in the ATC, turn the power off and then on again.

When the ATC or ATC arm has stopped due to an emergency stop, reset the emergency stop switch and turn on the power.

1. Press the [RST] key while the [RELSE] key is depressed to clear the error.
2. Press the [E. STA] key and the [E. STA] LED will light.



When the screen above appears, perform the following procedures:

- 3-1 When finger is closed and arm is not lowered.
- 3-1-1 Tool holder is attached to spindle  
(1)The finger key is correctly inserted into the key groove in the tool holder.  
→ Perform from step 4.  
(2)The finger key is not correctly inserted into the key groove in the tool holder.  
→ Please inform BROTHER of circumstances when an error occurs.
- 3-1-2 Tool holder is not attached to spindle  
(1)When spindle drive key is parallel to Y-axis  
→ Perform from step 4.  
(2)When spindle drive key is not parallel to Y-axis  
→ Please inform BROTHER of circumstances when an error occurs.
- 3-2 Arm is lowered
- When the tool is attached to the ATC arm, remove the tool by opening the finger manually. (Wear leather gloves to protect your hands.)
- 4.Press the [T] key while the [RELEASE] key is depressed, and the ATC arm will swivel to the correct position.
- 5.Press the [E. STA] key and the [E. STA] LED will go out.
- 6.Press the [RST] key. Unless [ATC ARM POS ERR 1] occurs, the ATC arm has been reset.  
If [ATC ARM POS ERR 1] immediately reoccurs, inform BROTHER of circumstances when the error occurred.

**Note 1: Mode selection and other operations to move the spindle are not possible.**

**Note 2: Perform normal key entry operation with the [E. STA] LED unlit.**

## 8.8 Resetting procedure for tool clamp error.

### (Case TC-32A)

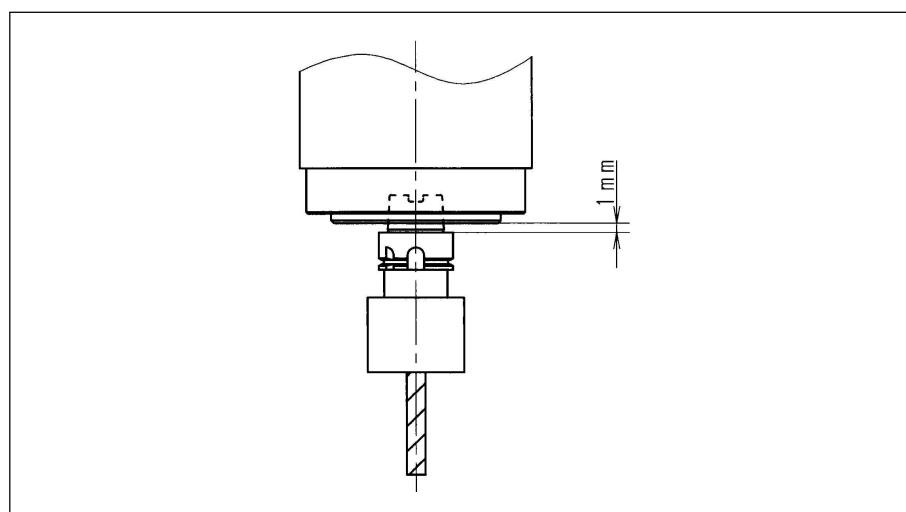
[0054 \*\* TOOL CLAMP ERROR] occurs when the tool holder (hereafter simply referred to as the holder) is not clamped by the spindle correctly after automatic tool change.

Cause	Solution
The holder is set to the pot incorrectly.	Re-attach the holder to the pot, paying attention to the direction of the holder.
Tool holder is incorrect.	Use a holder that conforms to the standards.
Cutting chips are stuck to the tapered section of the holder.	Check the end face washing filter.
Spindle clamp collet operation is incorrect.	Apply Gleitmetall spray to the collet.
ATC mechanism is faulty.	Repair is necessary. Please contact BROTHER.

8

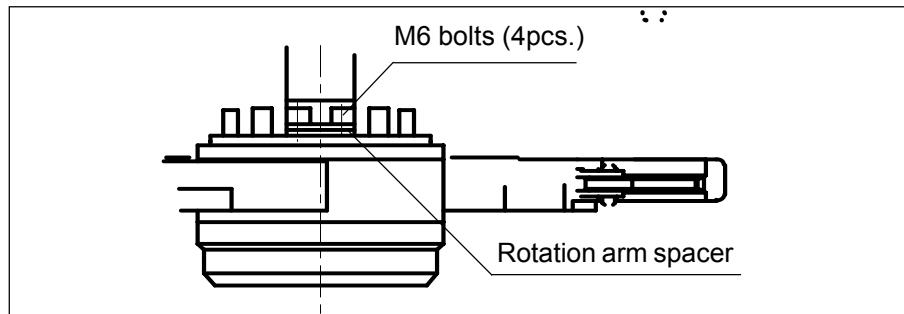
#### Resetting procedure

1. Check the holder clamping condition.
  - 1-1 When the distance between the end face of the spindle and the end face of the holder is 1 mm or less, go to step 2.
  - 1-2 When the distance between the end face of the spindle and the end face of the holder is more than 1 mm, jump to step 3.



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2. Resetting procedure for condition 1-1 above
  - 2-1 Press [I/O]. Select [1. I/O] and display the version screen. Move the cursor to [MAINT. INPUT], and press [1] and [ENT].
  - 2-2 Press the [POWER] button (off) and then press it again (on).  
Conduct origin return. Press [ATC] to perform automatic tool change and check the following:
    - No cutting chips are stuck to the end face of the holder, end face of the spindle, and the tapered section.
    - No flaw or dent is found on the tapered section.
3. Resetting procedure for condition 1-2 above
  - 3-1 Press [I/O]. Select [1. I/O] and display the version screen. Move the cursor to [MAINT. INPUT], and press [1] and [ENT].
  - 3-2 Press the [POWER] button (off) and press it again (on).  
Press [-X] key while [RST] key is held down to move the column at least 300 mm in the negative X direction from the origin.  
Press the [POWER] button (off).
  - 3-3 Remove the holder from the indexed pot. Insert a hex wrench to the hole in the upper section of the cam motor and turn the wrench counterclockwise until the ATC arm is fully lowered.
  - 3-4 Remove the M6 bolts (4 pcs.) from the top face of the ATC arm, and then remove the ATC arm and the rotation arm spacer.



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- 3-5 Press the [POWER] button (on). (The screen shown in section “11.9 Resetting ATC” appears.)  
Press [RST] while [RELSE] is held down to reset the error.  
Press [E.STA] and the LED on the key lights.  
Press [T] while [RELSE] is held down. The ATC arm axis rises.
- 3-6 Press the [POWER] button (off) and then press it again (on).  
Conduct origin return. Press [ATC] to perform automatic tool change.  
The tool is released from the spindle and drops, so place a box or cushion below the spindle to prevent the tool being damaged.
- 3-7 Move the column at least 300 mm in the negative X direction from the origin. Press the [POWER] button (off).
- 3-8 Insert a hex wrench to the hole in the upper section of the cam motor and turn the wrench counterclockwise until the ATC arm is fully lowered.
- 3-9 Attach the ATC arm and rotation arm spacer.

- 3-10 Press the [POWER] button (on).  
Press [RST] while [RELSE] is held down to reset the error.  
Press [E.STA] and the LED on the key lights.  
Press [T] while [RELSE] is held down. The ATC arm rises.
- 3-11 Check the following:
  - No cutting chips are stuck to the end face of the holder, end face of the spindle, and the tapered section.
  - No flaw or dent is found on the tapered section.

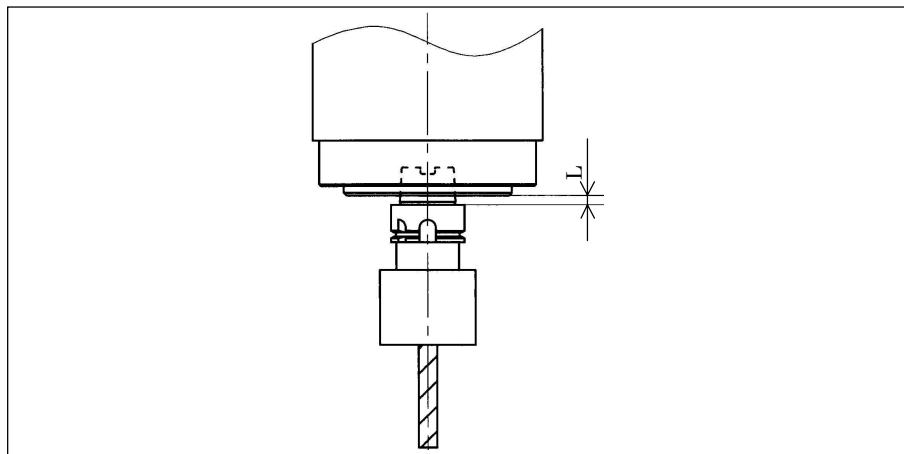
**(Case TC-22A)**

[0054 \*\* TOOL CLAMP ERROR] occurs when the tool holder (hereafter simply referred to as the holder) is not clamped by the spindle correctly after automatic tool change.

Cause	Solution
The holder is set to the pot incorrectly.	Re-attach the holder to the pot, paying attention to the direction of the holder.
Tool holder is incorrect.	Use a holder that conforms to the standards.
Cutting chips are stuck to the tapered section of the holder.	Check the end face washing filter.
Spindle clamp collet operation is incorrect.	Apply Gleitmetall spray to the collet.
ATC mechanism is faulty.	Repair is necessary. Please contact BROTHER.

## Resetting procedure

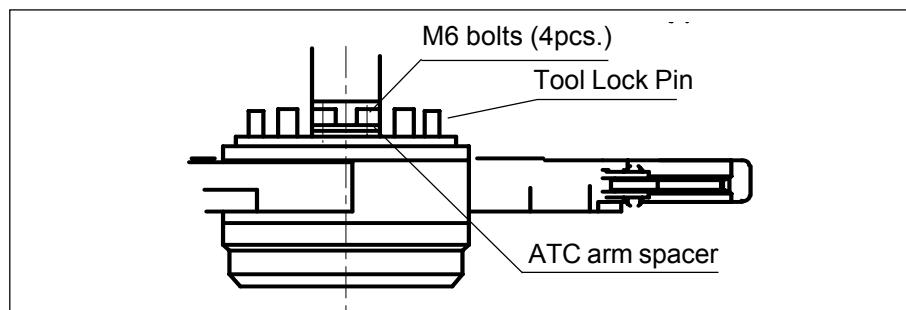
1. Check the holder clamping condition.  
A clearance between the end face of the spindle and the end face of the holder is made "L".
  - 1-1 In case of  $L \leq 1$  mm.  $\Rightarrow$  Go to section 2.
  - 1-2 In case of  $L > 1$  mm.  $\Rightarrow$  Go to section 3.



Tool clamp T22AE.doc

2. Resetting procedure for condition 1-1 above
  - 2-1 Press [I/O]. Select [1. I/O] and display the version screen.  
Move the cursor to [MAINTEN. INPUT], and press [1] and [ENT].
  - 2-2 Press the [POWER] button (off) and then press it again (on).  
Conduct origin return. Press [ATC] to perform automatic tool change and check the following:
    - No cutting chips are stuck to the end face of the holder, end face of the spindle, and the tapered section.
    - No flaw or dent is found on the tapered section.
  - 2-3 Restoration is completed.

3. Resetting procedure for condition 1-2 above
  - 3-1 Press **[I/O]**. Select **[1. I/O]** and display the version screen.  
Move the cursor to **[MAINT. INPUT]**, and press **[1]** and **[ENT]**.
  - 3-2 Press the **[POWER]** button (off) and then press it again (on).  
Check that the arm does not contact the spindle head when the Z-axis moves.
  - 3-3 Press **[ATC]** to return the Z-axis to its origin.
  - 3-4 Press **[ATC]**. The spindle up and down, the pot rises.
  - 3-5 Press **[ATC]**. The pot lowers and the spindle rises to the ATC position.
  - 3-6 Press **[POS]**. The present position screen appears.
  - 3-7 Press **[RELEASE]** and **[+Z]** to raise the spindle head the distance measured in section 1 above (L: between the end face of the spindle and the end face of the holder), and then check the following:
    - If the spindle head rises the distance defined above.  
⇒ Go to step 3-8.
    - If the **[5509 \* OVERRUN (+Z)]** error occurs and the spindle head stops.  
⇒ Go to section 4.
  - 3-8 Insert a hex wrench to the hole in the upper section of the cam motor and turn the wrench counterclockwise until the ATC arm is fully lowered.
  - 3-9 Remove the arm from the tool while pushing the tool lock pin down.



8

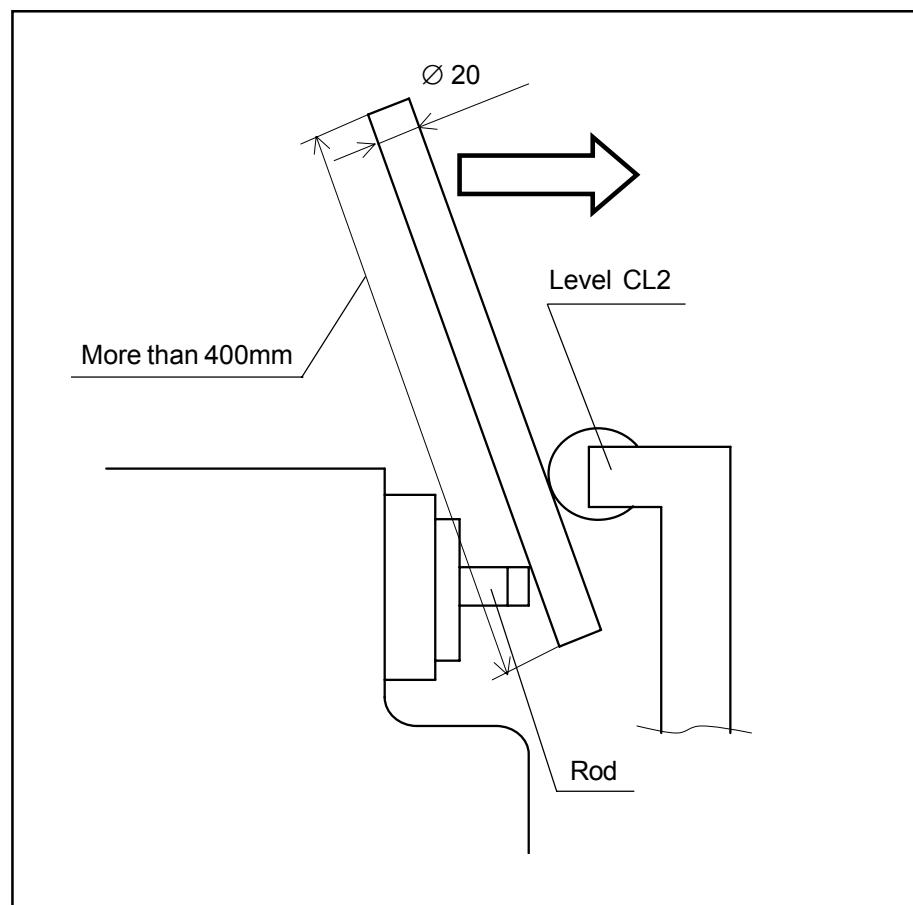
08C83.doc

- 3-10 Press **[I/O]**. Select **[1. I/O]** and display the version screen.  
Move the cursor to **[ATC MAINT. MD]**, and press **[1]** and **[ENT]**.
- 3-11 Press the **[POWER]** button (off) and then press it again (on).
- 3-12 Press **[RST]** while **[RELEASE]** is held down to reset the error.
- 3-13 Press **[E.STA]** and the LED on the key lights.
- 3-14 Press **[T]** while **[RELEASE]** is held down. The ATC arm rises.
- 3-15 Press **[E.STA]** to reset the edit start mode.
- 3-16 Press **[I/O]**. Select **[1. I/O]** and display the version screen.  
Move the cursor to **[ATC MAINT. MD]**, and press **[0]** and **[ENT]**.
- 3-17 Press the **[POWER]** button (off) and then press it again (on).  
Conduct origin return. Check the following:
  - No cutting chips are stuck to the end face of the holder, end face of the spindle, and the tapered section.
  - No flaw or dent is found on the tapered section.
- 3-18 Restoration is completed.

4.

- 4-1 Check the following:
  - In case of “L-(Machine Pos(Z)-610-ATC Zero Distance)≤ 1 mm”.
    - ⇒ Return to step 3-8.
  - In case of “L-(Machine Pos(Z)-610-ATC Zero Distance)>1 mm”.
    - ⇒ Go to step 4-2.
- 4-2 Hold [RST] down and press [RELEASE] to reset the error.  
Hold [RELEASE] down and press [-Z] to lower the spindle head approximately 20mm.
- 4-3 The tool is released from the spindle and drops. Place a box below the tool to prevent the tool being damaged.
- 4-4 Press [POS]. The present position screen appears.
- 4-5 Press [-Z] until the Machine Pos(Z) reaches 540 mm.
- 4-6 Insert a metal bar of 20 mm diameter and at least 400 mm long between the CL2 lever and the rod, and push the bar in the direction of the arrow until the tool is released.
- 4-7 Check the following:
  - No cutting chips are stuck to the end face of the holder, end face of the spindle, and the tapered section.
  - No flaw or dent is found on the tapered section.
- 4-8 Restoration is completed.

8



08C88.doc

# CHAPTER 9

## PROGRAM EDITION

- 9.1 Program editing
- 9.2 Extended mode
- 9.3 Character string operation
- 9.4 Jump of cursor
- 9.5 Copy of program by block
- 9.6 Deletion of program by block
- 9.7 Paste function in extended mode
- 9.8 Editing completion
- 9.9 Memory status display
- 9.10 Format of memory
- 9.11 Program memory display
- 9.12 Data bank memory display

# 9 Program editing

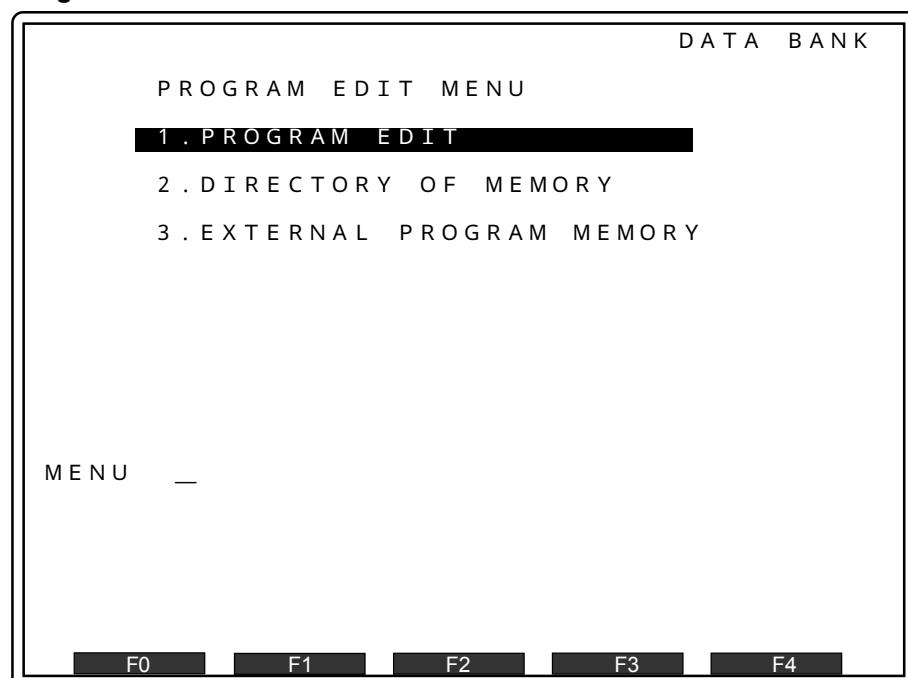
The program editing mode includes the followings functions.

- (i) Creation and modification of programs
- (ii) Display of entered program No., deletion copy and check of the programs.
- (iii) Input/output of programs and data to/from external unit

## Operation

1. Press the [EDIT] key.
2. Press the menu No. and the [EOB/ENT] key, or shift the cursor to the menu No. and press the [EOB/ENT] key. Each operation screen is displayed afterwards.

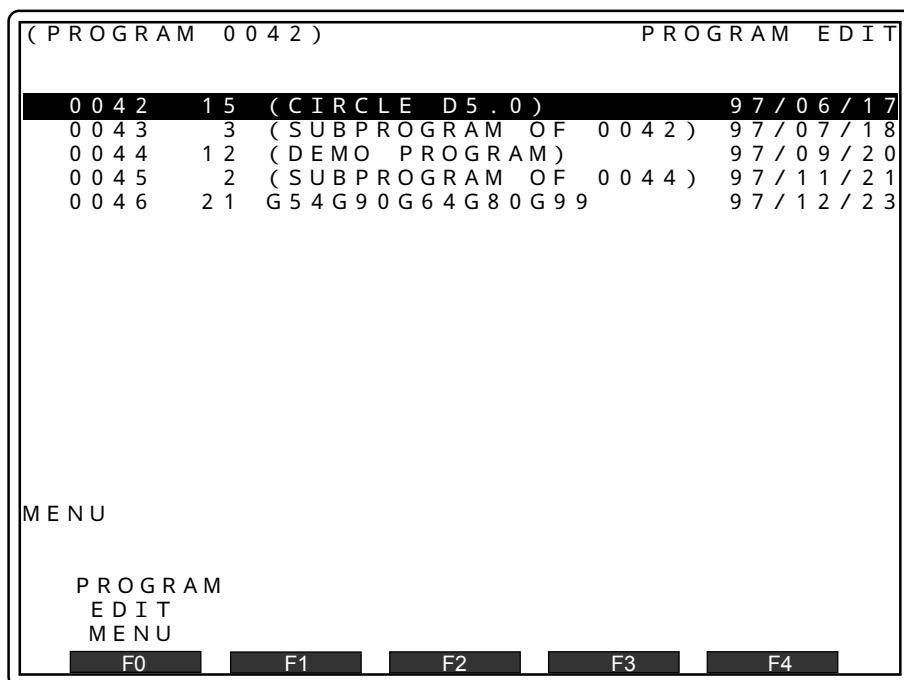
### Program edit menu screen



## 9.1 Program editing

Program creation and modification are available.

Press the [1] and [EOB/ENT] keys at the program edit menu screen, or shift the cursor to the menu No. 1 and press the [EOB/ENT] key.

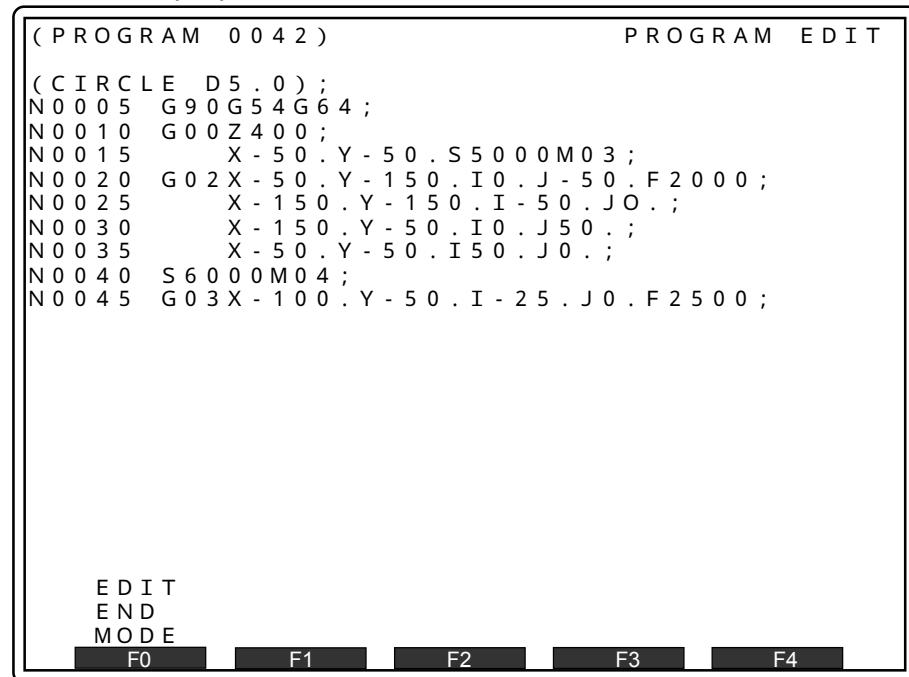


The registered program number, the memory consumption, and the program contents are displayed from the currently set program first and then in the order from the smaller program number.

One screen can display max. 17 lines. The rest can be displayed on the previous and following pages by pressing the page keys.

The program No. , or shift the cursor to the program No. to edit, and press the [EOB/ENT]key.

- (Note 1)** The program No. 9000~9999 are not available.
- (Note 2)** The first block of the program is displayed on the <PROGRAM DIRECTORY> screen.  
It is advised that comments should be added using the control out and control in codes ("(","")") so that you can understand the outline of the program without opening it. However, the contents are displayed on the <PROGRAM DIRECTORY> screen using up to 20 characters.

**Edit screen (Ex.)**


```
(PROGRAM 0042)
(CIRCLE D5.0);
N0005 G90G54G64;
N0010 G00Z400;
N0015 X-50.Y-50.S5000M03;
N0020 G02X-50.Y-150.I0.J-50.F2000;
N0025 X-150.Y-150.I-50.J0. ;
N0030 X-150.Y-50.I0.J50. ;
N0035 X-50.Y-50.I50.J0. ;
N0040 S6000M04;
N0045 G03X-100.Y-50.I-25.J0.F2500;
```

EDIT  
END  
MODE

F0 F1 F2 F3 F4

- \* Editing can be executed in the screen mode (which displays the editing programs to modify directly)
- \* The end of block code (EOB) is indicated as “;”.
- \* The cursor points the position to start editing.
- \* One screen can contain max. 18 lines.

**9****(1) Deletion of character**

Press the [DEL] key. The character pointed by the cursor is deleted by one. The rest of the block after the cursor is shifted to the left by one character.

**(2) Insertion of character**

Insertion is available as long as the LED of the [INS] key is illuminated. When any of the alphabetical keys, numerical keys or symbol keys are pressed at this time, the character specified by the pressed keys are inserted before the character pointed by the cursor. The cursor and the rest of the characters move to the right by one character.

**(3) Overwriting of character**

Press the [INS] key and turn OFF the LED. Overwriting mode is available as long as the LED is OFF.

When any of the alphabetical keys, numerical keys or symbol keys are pressed, the character pointed by the cursor are replaced with a new character.

When the cursor is at “;”, the characters specified by the pressed key are inserted before this symbol as in the insertion mode.

After overwriting is finished, press the [INS] key again. The LED illuminates and the insertion mode becomes effective.

#### (4) Cursorshift

The cursor is shifted by pressing the [ $\uparrow$ ], [ $\downarrow$ ], [ $\leftarrow$ ] and [ $\rightarrow$ ] keys.

The cursor cannot be shifted where there is no character. When the [ $\leftarrow$ ] key is pressed at the beginning of a block, the cursor moves over the “;” of the previous block.

When the cursor is at the bottom line of the screen, pressing the [ $\downarrow$ ] key scrolls the screen and moves the cursor to the next line or the next block.

Pressing the [ $\uparrow$ ] key at the top line, the screen scrolls down.

#### (5) Page change

Pressing the [ $\downarrow$  PAGE] or [ $\uparrow$  PAGE] key changes the screen by one page.

After changing the page, the cursor moves to the first character of the newly displayed page.

Pressing the [ $\downarrow$  PAGE] key displays the last line of the previous page on the top.

Pressing the [ $\uparrow$  PAGE] key displays the first line of the previous page on the bottom.

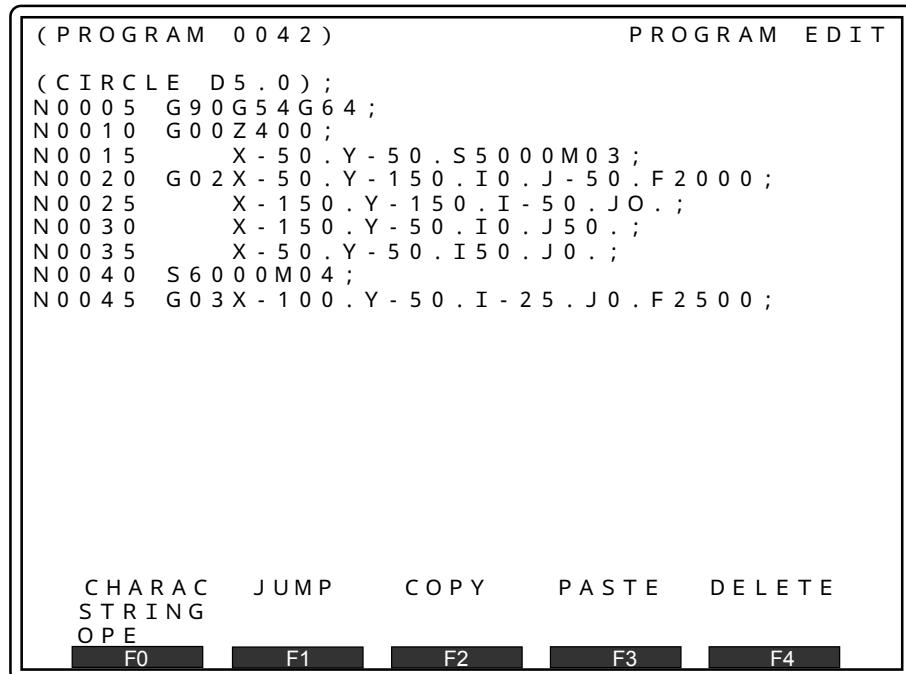
## 9.2 Extended mode

When the [EXTEND/SEARCH] key is pressed, the extended mode is selected.

In this mode, the following functions are available.

- \* Character string operation
  - \* Jump of cursor
  - \* Copy of program by block
  - \* Deletion of program by block

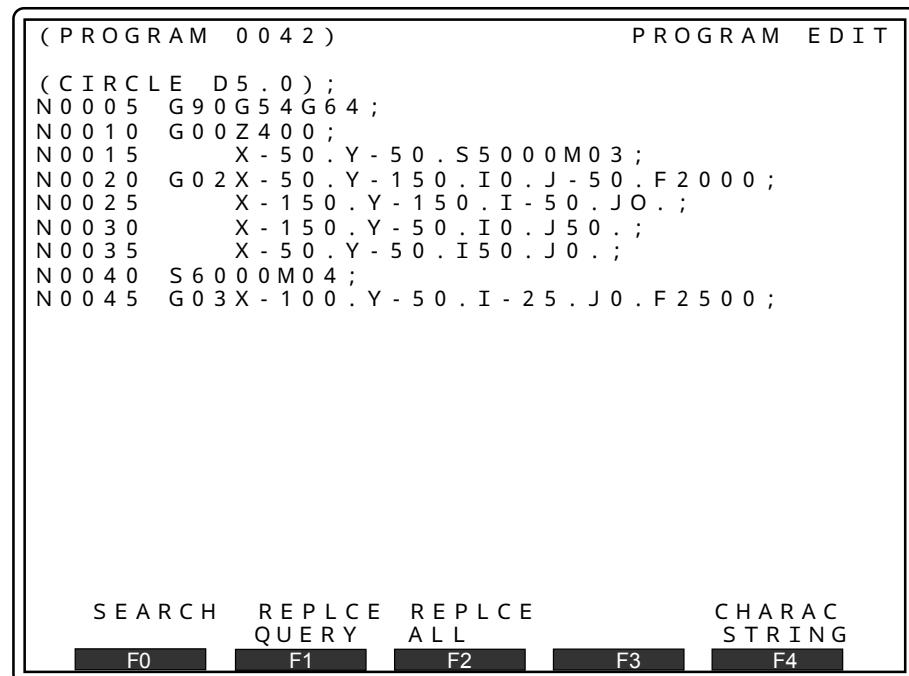
### Screen in extended mode (Ex.)



Pressing the [EXTEND/SEARCH] key again changes to the ordinary edit mode.

## 9.3 Character string operation

When the [F0] (CHARAC STRING OPE) key is pressed on the <EXTENDED MODE> screen, the below appears.



- [F0] Switches the mode to character string search.
- [F1] Switches the mode to character string replacement (REPLACE QUERY).
- [F2] Switches the mode to character string replacement (REPLACE ALL).
- [F3] Returns to the <EXTENDED MODE> screen.

### 9.3.1 Search for character string

A character string of less than 10 characters can be searched from the position specified by the cursor.

[F0] [character string][↑] ..... Search forward

[F0] [character string][↓] ..... Search backward

The cursor moves to the beginning of the character string to search for.

If the specified character string is not found, an alarm message is displayed and the cursor does not move.

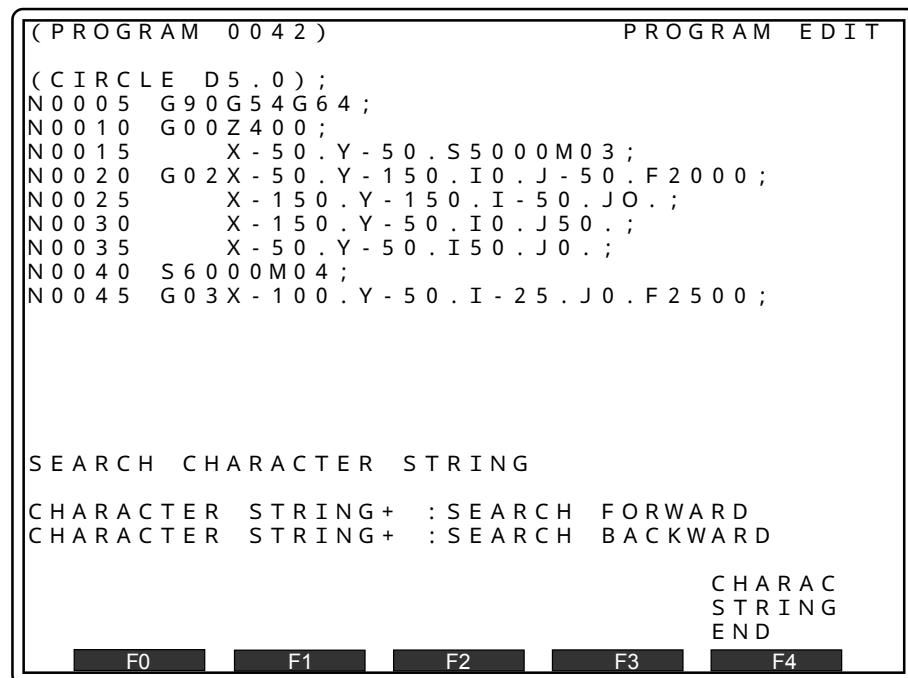
A character string cannot contain the end of block code “;”.

Once a character string search is executed, the specified character string can be stored until modification or editing is finished. If the same character string search is continuously required, omit the character string and press the following keys instead.

[F1][↑]

[F1][↓]

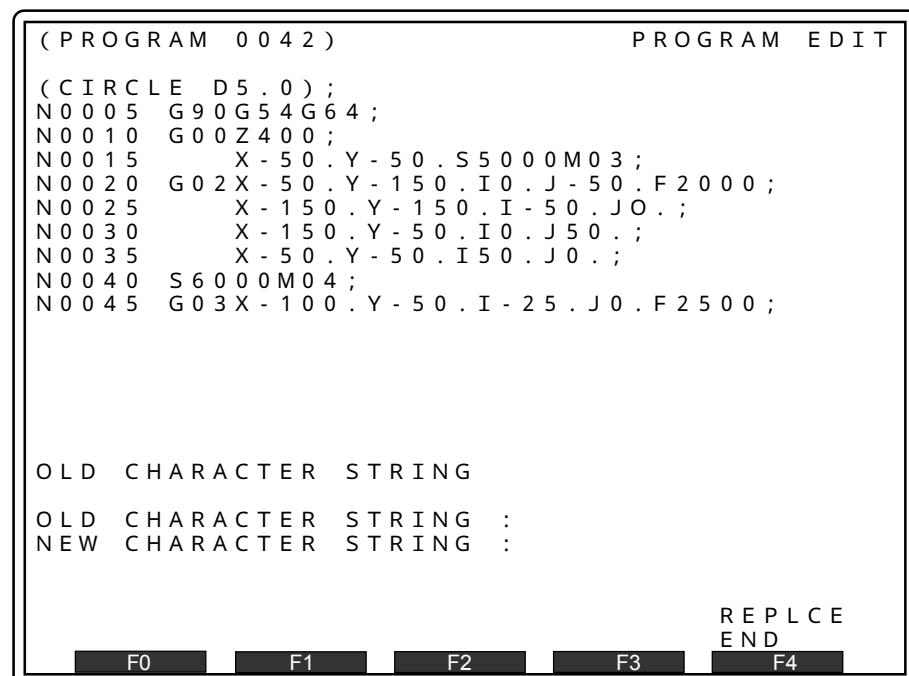
#### Screen in character string search (Ex.)



### 9.3.2 Character string replacement (REPLACE QUERY)

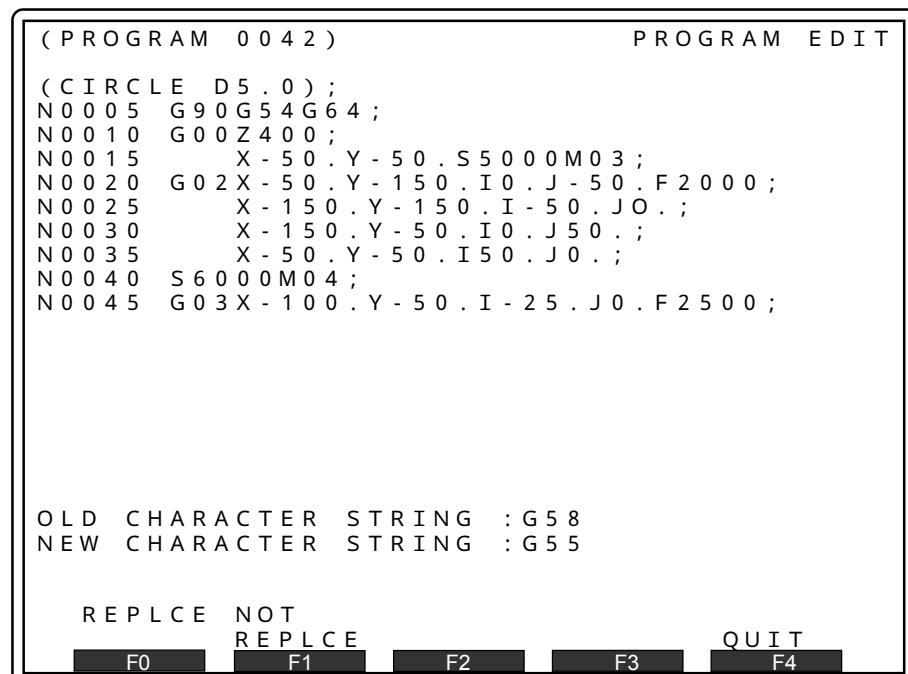
Character strings made of ten characters or less existing after the line where the cursor is placed with other characters strings made of ten characters or less.  
Confirmation as to whether to replace or not is made each time when replacement is attempted.

[F1] [old character string] [EOB/ENT] [new character string] [EOB/ENT]



The cursor moves to the beginning of the character string to be replaced.  
 When the [F0] key is pressed, the character string is replaced. When the [F1] key is pressed, replacement is not performed and the cursor moves to the beginning of the next character string.  
 When there is no character string to be replaced, the display returns to the <CHARACTER STRING OPERATION> screen.  
 The current character string (character string to be replaced) and the new character string are stored until these are changed next or editing is completed.

[F1][EOB/ENT][EOB/ENT]



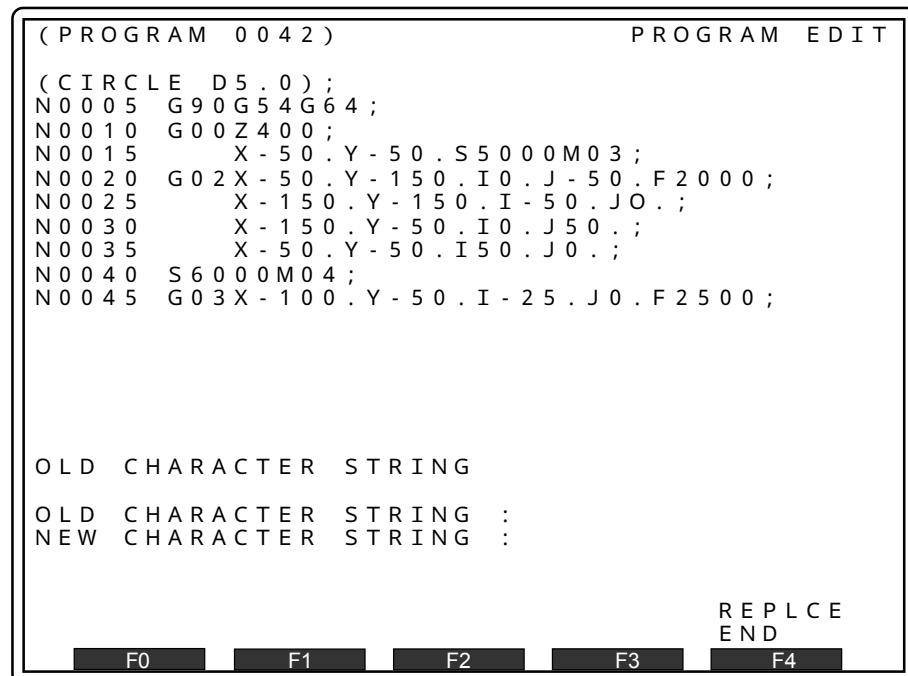
### 9.3.3 Character string replacement (REPLACE ALL)

Character strings made of ten characters or less existing after the line where the cursor is placed are replaced with other characters strings made of ten characters or less. All character strings subject to replacement are replaced at one time. Confirmation as to whether to replace or not is not made.

[F2] [old character string] [EOB/END] [new character string] [EOB/ENT]

Once replacement is performed, the designated character string is stored until changes are made or editing is completed.

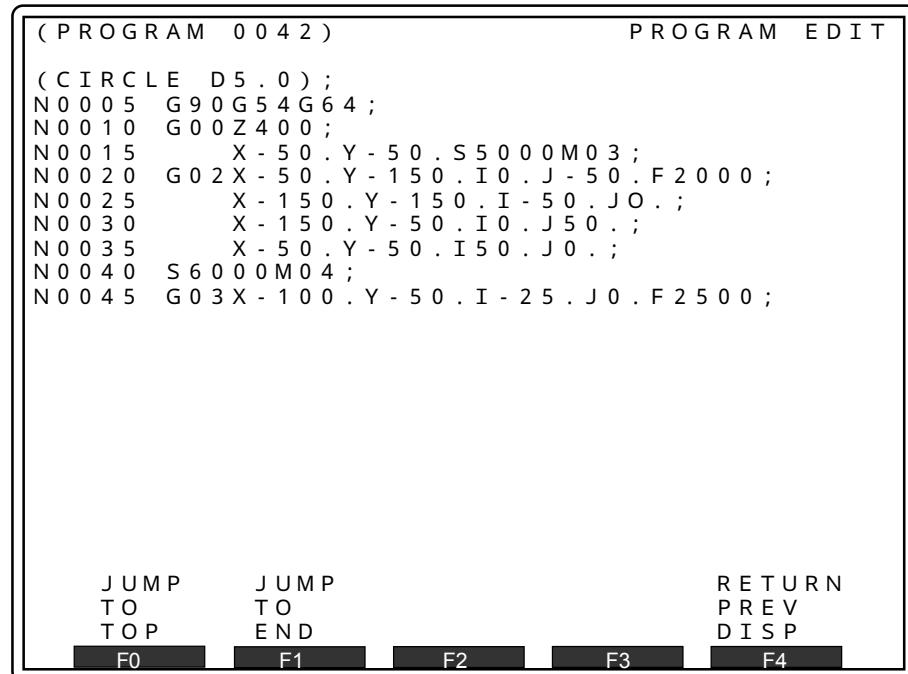
[F2][EOB/ENT][EOB/ENT]



## 9.4 Jump of cursor

When the [F0] key is pressed, the cursor jumps to the program beginning. When the [F1] key is pressed, the cursor jumps to the program end.

- [F0] Jumps to the program beginning.
- [F1] Jumps to the program end.



## 9.5 Copy of program by block

A program can be partially copied by the unit of a block and shifted to another position.

1. Shift the cursor to the first block to copy.
2. Press the **[F2]** key. The screen displays “COPY”.
3. Shift the cursor to the block following the last block to copy.  
The total blocks to copy are reversely displayed.
4. Press the **[F0]** key. The display of “COPY” disappears and the reversely-displayed blocks are taken in memory.
5. Shift the cursor to the section to copy.
6. Press the **[F3]** key.  
The taken blocks are inserted in the previous block of the block specified by the cursor.

(Note) Max. number of characters to copy at one time is 1024.

If it exceeds the max. number, an alarm message is displayed.

9

### Screen in block copy (Ex.)

( P R O G R A M 0 0 4 2 )  
C O P Y  
( C I R C L E D 5 . 0 ) ;  
N 0 0 0 5 G 9 0 G 5 4 G 6 4 ;  
N 0 0 1 0 G 0 0 Z 4 0 0 ;  
N 0 0 1 5 X - 5 0 . Y - 5 0 . S 5 0 0 0 M 0 3 ;  
N 0 0 2 0 G 0 2 X - 5 0 . Y - 1 5 0 . I 0 . J - 5 0 . F 2 0 0 0 ;  
N 0 0 2 5 X - 1 5 0 . Y - 1 5 0 . I - 5 0 . J 0 . ;  
N 0 0 3 0 X - 1 5 0 . Y - 5 0 . I 0 . J 5 0 . ;  
N 0 0 3 5 X - 5 0 . Y - 5 0 . I 5 0 . J 0 . ;  
N 0 0 4 0 S 6 0 0 0 M 0 4 ;  
N 0 0 4 5 G 0 3 X - 1 0 0 . Y - 5 0 . I - 2 5 . J 0 . F 2 5 0 0 ;

MOVE CURSOR + F0 : D E L E T E + C O P Y  
( F3 : P A S T E O F C O P Y D A T A )

C O P Y      C A N C E L  
F0      F1      F2      F3      F4

Press the **[F2]** key once (a), and shift the cursor to the block following the block to take in (b).

Pressing the **[F0]** key again changes the reverse display back to the normal display. The display of “COPY” disappears and the blocks are taken in.

## 9.6 Deletion of program by block

A program can be partially deleted block to delete.

1. Shift the cursor to the first block to delete.
2. Press the **[F4]** key. The screen displays “DELETION”.
3. Shift the cursor to the block following the last block to delete.  
The total blocks to delete are reversely displayed.
4. Press the **[F0]** key.  
The display of “DELETION” disappears and the reversely-displayed blocks are deleted.

**(Note) Max. number of characters to delete at one time is 1024.**

**If it exceeds the max. number, an alarm message is displayed.**

**Screen in deletion of blocks (Ex.)**

(PROGRAM 0042)
PROGRAM EDIT

```

DELETION
(CIRCLE D5.0);
N0005 G90G54G64;
N0010 G00Z400;
N0015 X-50. Y-50. S5000M03;
N0020 G02X-50. Y-150. I0. J-50. F2000;
N0025 X-150. Y-150. I-50. J0. ;
N0030 X-150. Y-50. I0. J50. ;
N0035 X-50. Y-50. I50. J0. ;
N0040 S6000M04;
N0045 G03X-100. Y-50. I-25. J0. F2500

```

MOVE CURSOR + F0 : COPY  
(F3 : PASTE OF COPY DATA)

DELETE
CANCEL  
DELETE

F0
F1
F2
F3
F4

9

Press the **[F4]** key once (a), and shift the cursor to the block following the block to delete (b).

Pressing the **[F0]** key again deletes the reversely-displayed blocks and the display of “DELETION” disappears.

## 9.7 Paste function in extended mode

A group of blocks specified for copy or deletion by the procedures 1.~4.in 8.5 or 1.~4. in 8.6 are taken in memory and stored until the same operation as above is done or the power to the machine is turned OFF.

Press the **[F3]** key permits to read the same contents repeatedly and input in the block before the cursor position.

This function is called a pasting.

Pasting can be used in the following ways.

- \* Restoring after deleting blocks
- \* Shifting a group of blocks to another position
- \* Copying a group of blocks to more than position
- \* Copying a partial program to another program

## 9.8 Editing completion

### i) [F0] key

Pressing this key stores the edited contents and finish editing.

The screen changes back to the program No. inputting.

If the edited program is in operation, the editing completion check screen is displayed.

### ii) [F2] key

Pressing this key makes the edited contents ineffective.

The screen changes back to the program No. inputting.

### iii) [F4] key

Pressing this key returns to the edit status.

### Screen of program editing completion check in operation

```
( P R O G R A M   0 0 4 2 )                                P R O G R A M   E D I T
( C I R C L E   D 5 . 0 ) ;
N 0 0 0 5   G 9 0 G 5 4 G 6 4 ;
N 0 0 1 0   G 0 0 Z 4 0 0 ;
N 0 0 1 5   X - 5 0 . Y - 5 0 . S 5 0 0 0 M 0 3 ;
N 0 0 2 0   G 0 2 X - 5 0 . Y - 1 5 0 . I 0 . J - 5 0 . F 2 0 0 0 ;
N 0 0 2 5   X - 1 5 0 . Y - 1 5 0 . I - 5 0 . J 0 . ;
N 0 0 3 0   X - 1 5 0 . Y - 5 0 . I 0 . J 5 0 . ;
N 0 0 3 5   X - 5 0 . Y - 5 0 . I 5 0 . J 0 . ;
N 0 0 4 0   S 6 0 0 0 M 0 4 ;
N 0 0 4 5   G 0 3 X - 1 0 0 . Y - 5 0 . I - 2 5 . J 0 . F 2 5 0 0 ;
```

O P E R A T I N G . D O Y O U C H A N G E ?

E N D

F0

E D I T

F2

M O D E

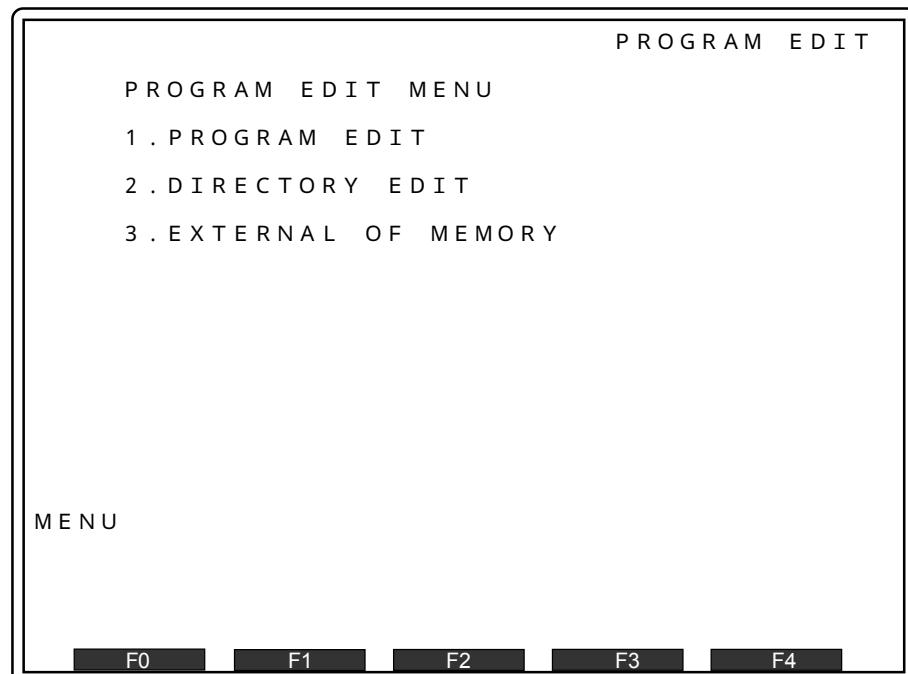
F3

F4

## 9.9 Memory status display

Memory status display is an indication of the memory occupied by machining data, schedule programs and data bank on the display.

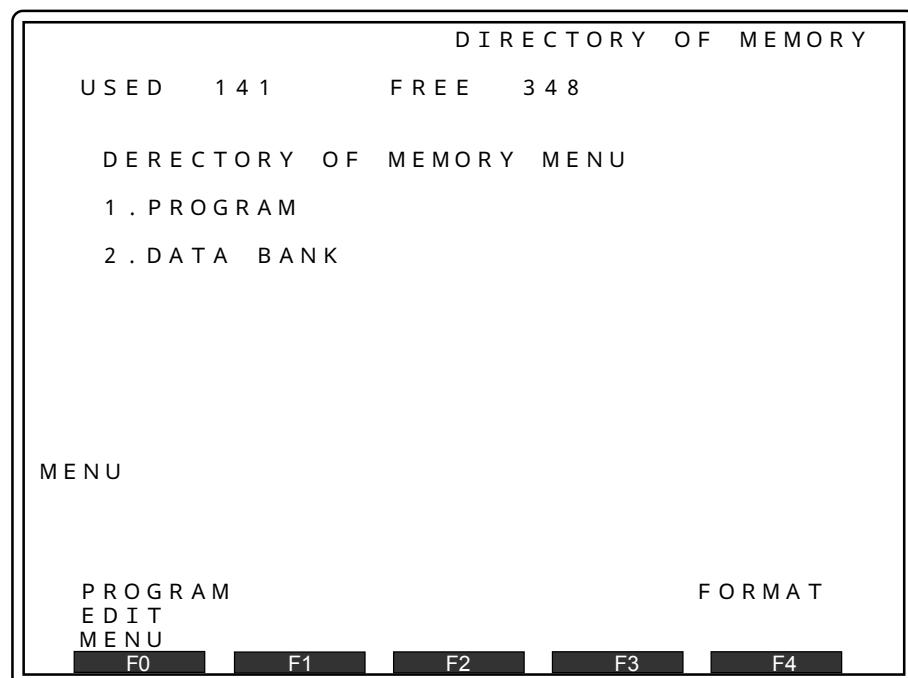
1. Set the PROTECT switch on OFF position.
2. Press [EDIT] key.



3. Press [2] and [EOB/ENT] keys.

The screen showing the free memory and the occupied memory appears on the display.

4. Set the PROTECT switch on On position.



- 1 block occupies a memory of 256 bytes.
- On the program edit menu screen, a menu can also be selected by the procedure below:
  - 1 Set the cursor on "2. MEMORY DISPLAY".
  - 2 Press [EOB/ENT] key.

## 9.10 Format of memory

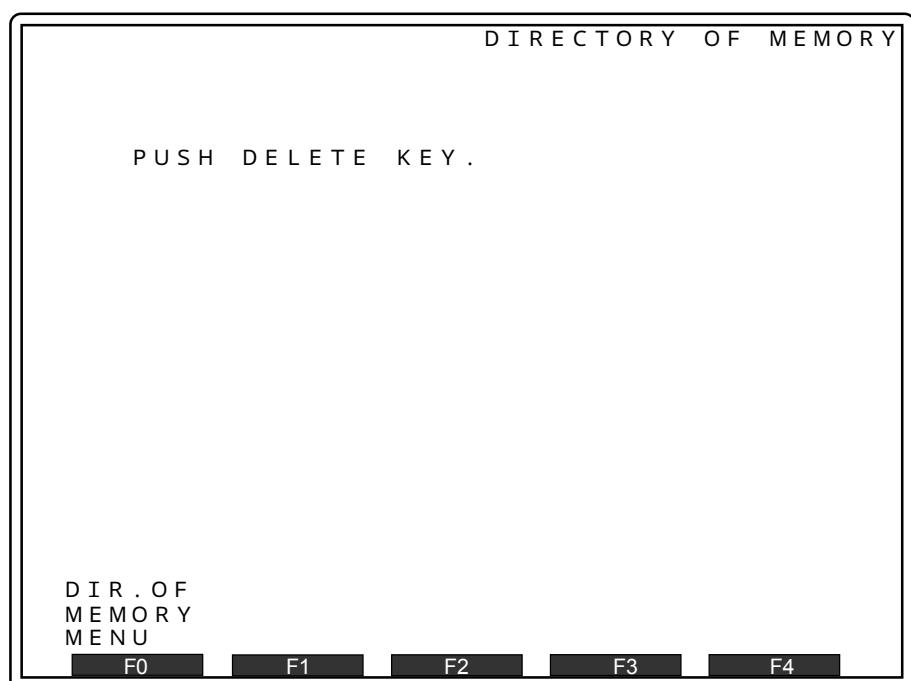
When memory is formatted, all data which has memorized are deleted.

Program

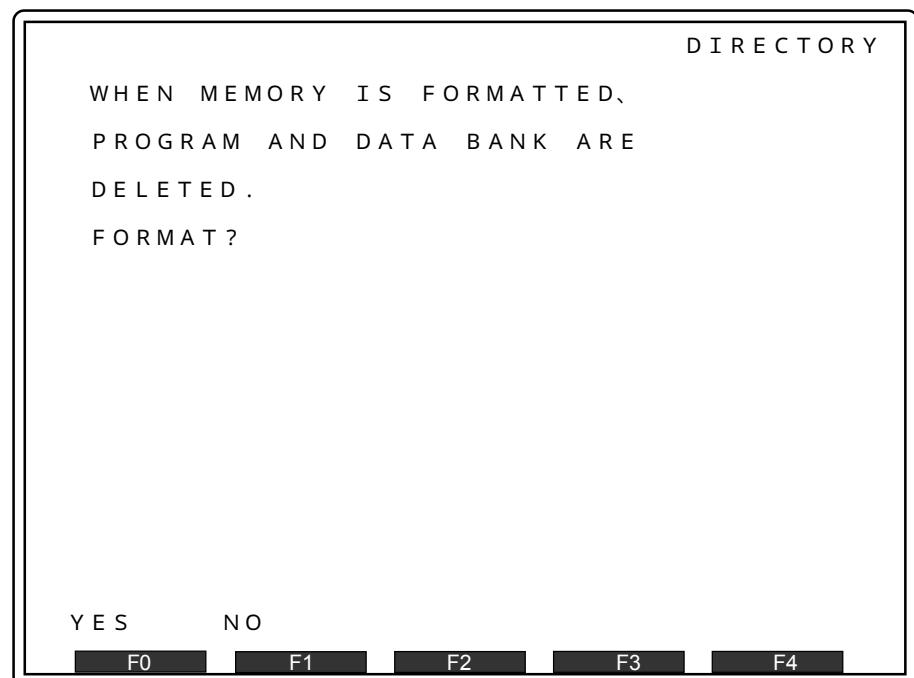
Data bank

etc

1. Press **[F4]** key on DIRECTORY OF MEMORY MENU.
2. Press **[DEL]** key.



3. When **[F0]** key is pushed , memory is formatted.



## 9.11 Program memory display

### 9.11.1 Program memory display

Enter [1] and press [EOB/ENT] key on DIRECTORY OF MEMORY MENU.

P R O G R A M		D I R E C T O R Y O F M E M O R Y					
U S E D	8 5						
F R E E	3 4 8						
0 0 0 1	1	0 0 3 6	1	1 1 1 1	4	4 0 1 1	2
0 0 0 2	9	0 0 4 4	1	1 1 1 2	2	4 0 1 2	2
0 0 0 3	3	0 0 4 5	1	1 1 1 3	2	4 0 1 3	2
0 0 0 5	6	0 0 4 6	1	1 1 1 4	2	4 0 1 4	1
0 0 0 6	3	0 1 0 0	1	1 1 1 5	1		
0 0 0 7	1	0 1 6 0	1	1 6 0 1	1		
0 0 1 7	1	0 1 7 1	1	1 6 0 2	1		
0 0 1 8	1	0 1 8 1	1	2 1 1 1	5		
0 0 1 9	1	0 1 9 1	1	2 1 1 2	2		
0 0 2 1	1	0 3 4 1	1	2 1 1 3	2		
0 0 2 2	1	0 3 5 1	1	2 1 1 4	2		
0 0 2 3	1	0 3 6 1	1	2 1 1 5	1		
0 0 2 4	1	0 4 4 1	1	4 0 0 1	1		
0 0 3 4	1	0 4 5 1	1	4 0 0 2	1		
0 0 3 5	1	0 4 6 1	1	4 0 0 3	1		
N O . —							
D I R . O F M E M O R Y M E N U				C O P Y C H E C K			
	F0		F1		F2		F3
							F4

As for this example , DISPLAY PROGRAM LIST in USER PARAMETER -  
SWITCH 1 is entered [0].

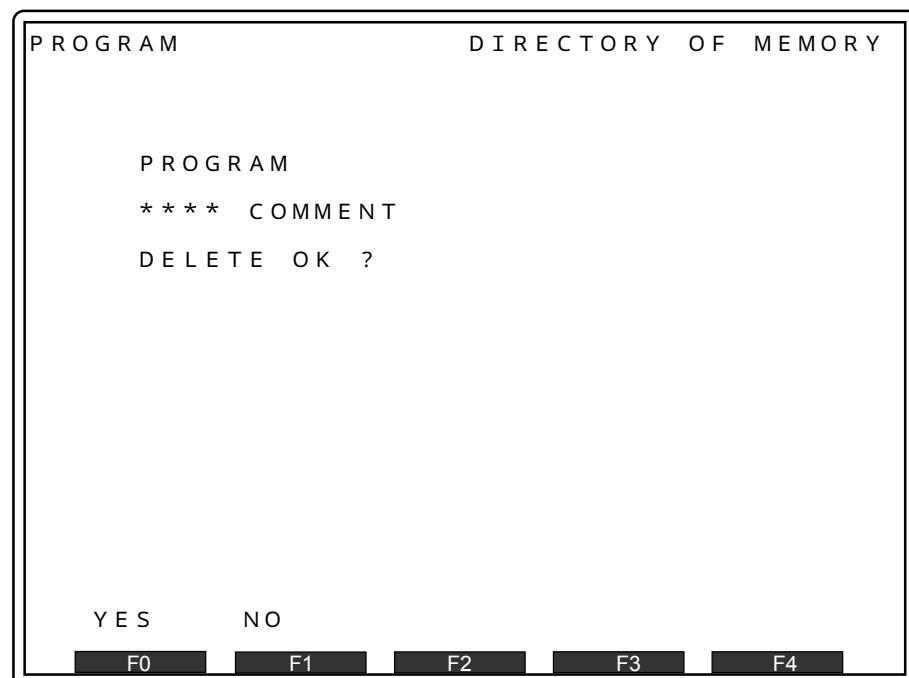
P R O G R A M				D I R E C T O R Y O F M E M O R Y					
U S E D		0 8 5							
U S E D		3 4 8							
0 0 0 1	1	(	0 0 0 0 1	X Y	F U L L	S T R K	9 7 / 1 2 / 0 2		
0 0 0 2	9	(	0 0 0 0 2	Z E N T A I	N A R A S I	2 6	9 7 / 1 2 / 0 2		
0 0 0 3	3	(	0 0 0 0 3	A T C	N A R A S I	2 6	9 7 / 1 2 / 0 2		
0 0 0 5	4	(	0 0 0 0 5	T C - 3 1 A	1 6 K )		9 7 / 1 2 / 0 2		
0 0 0 6	6	(	0 0 0 0 6	T C - 3 1 A	1 6 K	2 6	9 7 / 1 2 / 0 2		
0 0 0 7	3	(	0 0 0 0 7 )				9 7 / 1 2 / 0 2		
0 0 1 7	1	(	0 0 0 1 7	P I T C H	G O S A	X	9 7 / 1 2 / 0 2		
0 0 1 8	1	(	0 0 0 1 8	P I T C H	G O S A	Y	9 7 / 1 2 / 0 2		
0 0 1 9	1	(	0 0 0 1 9	P I T C H	G O S A	Z	9 7 / 1 2 / 0 2		
0 0 2 1	1	(	0 0 0 2 1	X Y	H E N S A	T C - 3	9 7 / 1 2 / 0 2		
0 0 2 2	1	(	0 0 0 2 2	Z	H E N S A	T C - 3 1	9 7 / 1 2 / 0 2		
0 0 2 3	1	(	0 0 0 2 3	H E N S A	C )		9 7 / 1 2 / 0 2		
0 0 2 4	1	(	0 0 0 2 4	M A G A Z I N	H E N S A		9 7 / 1 2 / 0 2		
0 0 3 4	1	(	0 0 0 3 4	L O S T	M O T I O N	X	9 7 / 1 2 / 0 2		
1 2 2 4	1	(	0 0 0 3 5	L O S T	M O T I O N	Y	9 7 / 1 2 / 0 2		
N O . —									
D I R . O F M E M O R Y M E N U				C O P Y / C H E C K					
F0		F1		F2		F3		F4	

As for this example ,DISPLAY PROGRAM LIST in USER PARAMETER -  
SWITCH 1 is entered [1].

## 9.11.2 Deleting machining data

### (1) Deletion of a set of program.

- 1 Enter a program number to be deleted and press [DEL] key.



9

The screen above shows that the program number 0043 is deleted.

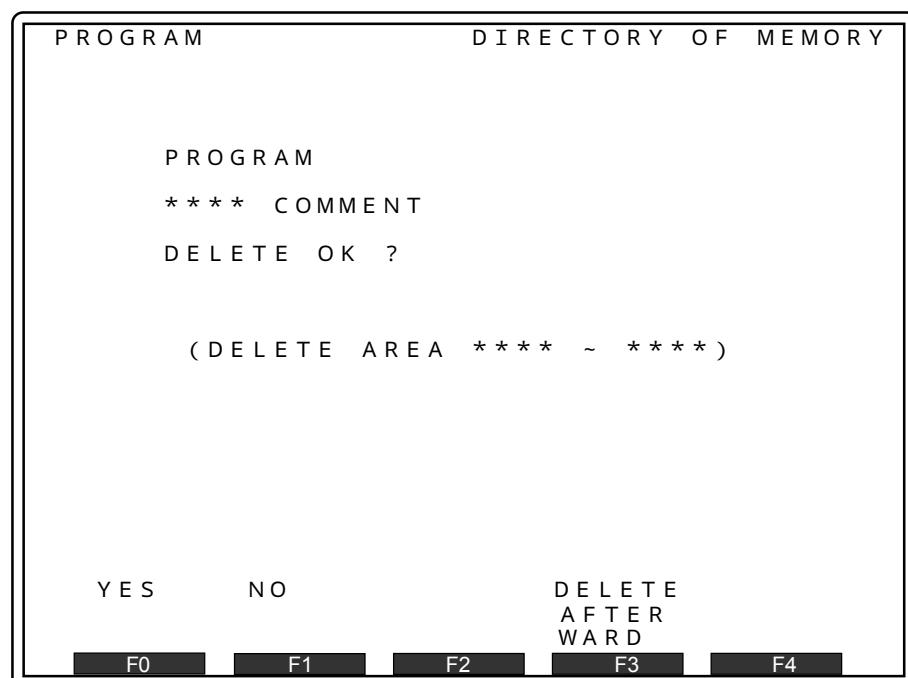
- 2 Press [F0] key to delete the data and press [F1] key not to delete the data.

**(2) Deletion of several sets of program**

- 1 Enter a range of program numbers to be deleted and press [DEL] key.

Program number range setting methods:

- A: Head program number to be deleted*
- [A], [I], [B] : Machining data from A to B
- B: End program number to be deleted*
- [I], [B]: Machining data from 1 to B
  - [A], [I]: Machining data from A to 8999



The screen above shows that the program numbers 0043 to 0100 is deleted.

- 2 Press [F0] or [F3] key to delete the data and press [F1] key not to delete the data.

**[F0] key:** The program in inquiry is deleted. When pressed, the message "DELETION" appears on the display. When the deletion is completed, the confirmation screen of the next program appears. If there is no more program, the memory display screen appears.

**[F1] key:** The program in inquiry is deleted. When pressed, the confirmation screen of the next program appears. If there is no more program, the memory display screen appears.

**[F3] key:** All the program subsequent to the program in inquiry are deleted. When pressed, the message "DELETION" appears on the display.

### 9.11.3 Copying / Checking program

Program already registered can be copied to make another program from the copied program.

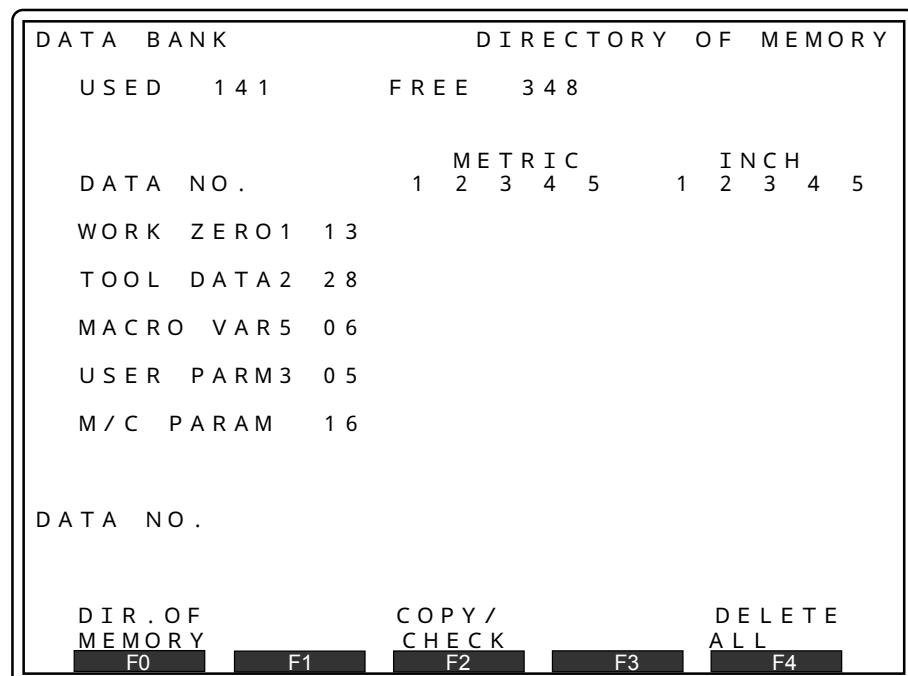
1. Set the PROTECT switch on OFF position.
2. Enter a program number to be copied and press [-] key.
3. Enter a new program number and press [F2] key.

When the PROTECT switch is set on ON , and the operation which is shown 2 and 3 is done , program can be collated.

## 9.12 Data bank memory display

### 9.12.1 Data bank memory display

Enter [2] and press [EOB/ENT] key on DIRECTORY OF MEMORY MENU.



9

DATA can be registered to 5 kinds at the maximum classified by a millimeter system, an inch system.

The number which is indicated on the right of DATA BANK NAME is the DATA NO. which is effective.

‘●’ or ‘■’ is indicated on registered DATA NO.

‘■’ is indicated on effective DATA NO.

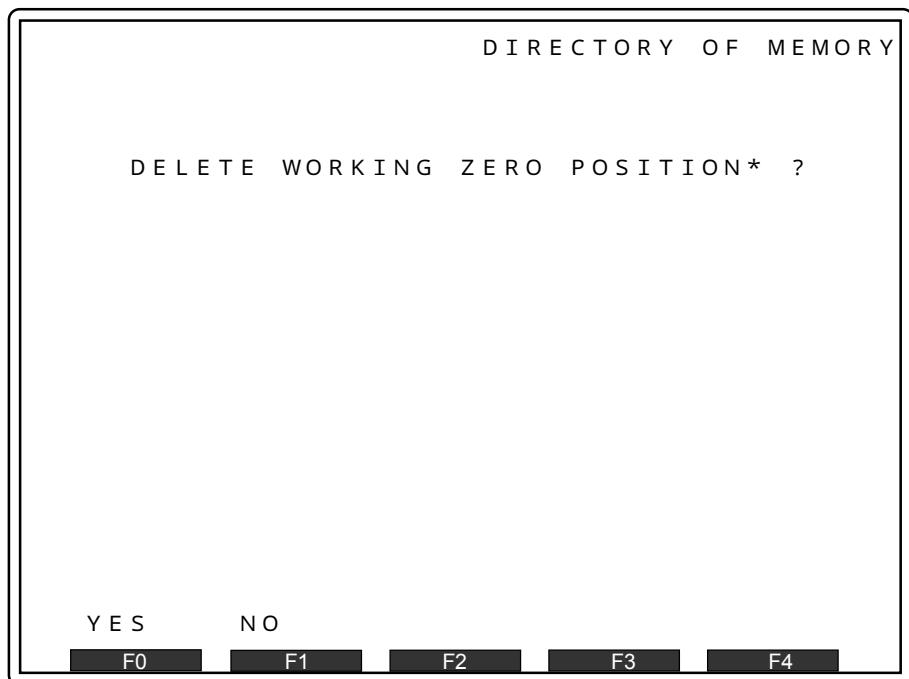
### 9.12.2 Changing effective DATA NO.

DATA BANK		DIRECTORY OF MEMORY									
USED	141	FREE 348									
		METRIC					INCH				
DATA NO.		1	2	3	4	5	1	2	3	4	5
WORK	ZERO	1	13								
TOOL	DATA	2	28								
MACRO	VAR	5	06								
USER	PARM	3	05								
M/C	PARAM		16								
DATA NO.											
DIR. OF MEMORY MENU				COPY / CHECK				DELETE ALL			
F0		F1		F2				F3		F4	

Move a cursor to changed DATA , and enter the DATA NO. which make effective.  
In an example of a front page , when it is entered [2] , effective DATA NO. of  
TOOL DATA change to 2 from5.

### 9.12.3 Deleting data bank

#### (1) Deletion of one DATA

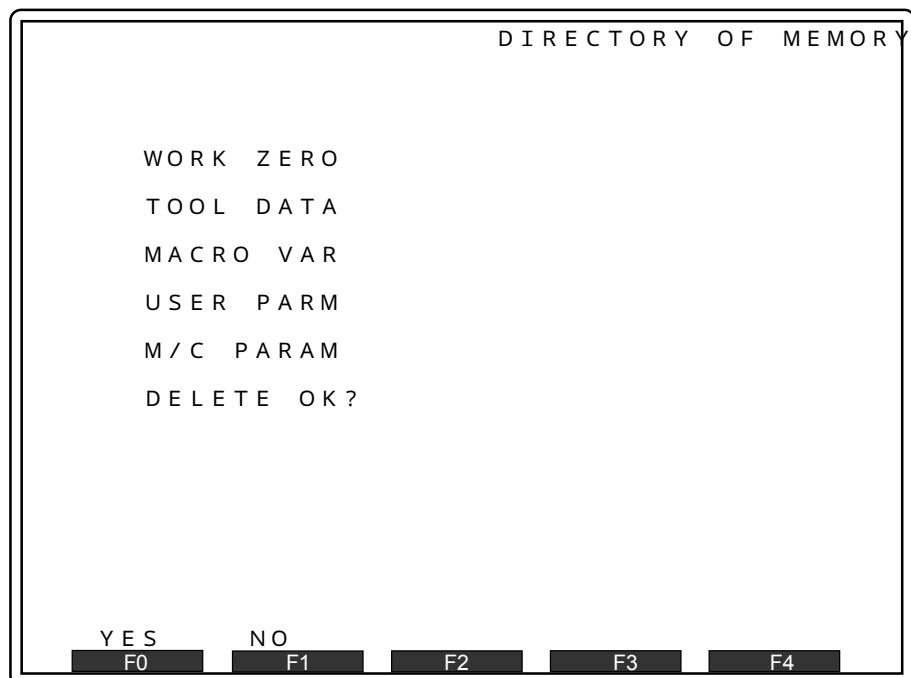


9

Move a cursor to deleted DATA , and press [DEL] key.

In an example of a front page , when it is entered [1] , and pressed [DEL] key , a display changes like this example.

**(2) Deletion of all DATA**



Press [F4] key on DATA BANK memory display.  
A display changes like this example.

(This page is blank.)

# CHAPTER 10

## EXTERNAL PROGRAM I/O

- 10.1 Computer (Master Station TC)**
- 10.2 PTP/PTR (Master Station TC)**
- 10.3 Input/output by Computer (T/C slave station)**
- 10.4 List of Character Codes Used for Communication**
- 10.5 Protocol of PTP/PTR**
- 10.6 Computer Communication Protocol Type 1**
- 10.7 Computer Communication Protocol Type 2**
- 10.8 List of Computer Communication Methods**
- 10.9 File format**

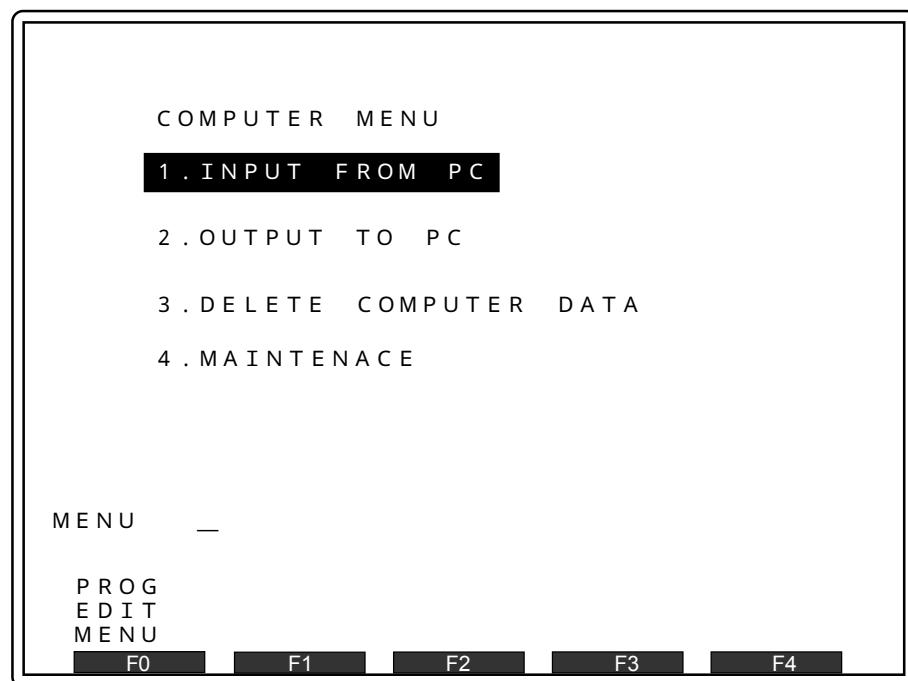
## 10.1 Computer (Master Station TC)

Set [CONNECTION OBJECT] to [1. COMPUTER] for [3. COMMUNICATION] of the user parameter.

### [When the computer is selected for data bank communication]

The computer communication is done by the Brother's original communication system.  
Therefore, the software for the computers should be provided by users.

1. Enter [3] or move the cursor to that number on the <PROGRAM EDIT MENU> screen, and press the [ENT] key.  
The <COMPUTER MENU> screen appears.

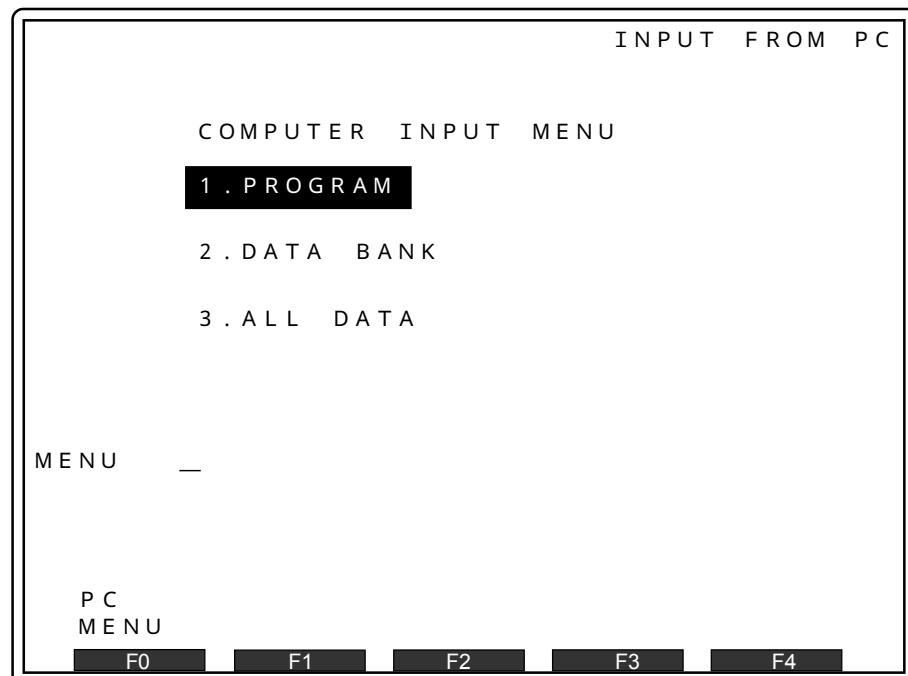


2. Enter the desired item number by pressing the appropriate numerical key or move the cursor to the desired item, and press the [EOB/ENT] key.
3. Press the [F0] key to return to the <PROGRAM EDIT MENU> screen.

### 10.1.1 Input from computer

The data stored in the computer is input into the TC or cross-reference check is performed.

1. Enter [1] or move the cursor to that number on the <COMPUTER MENU> screen, and press the [EOB/ENT] key.  
The <COMPUTER INPUT MENU> screen appears.



2. Enter the desired item number by pressing the appropriate numerical key or move the cursor to the desired item, and press the [EOB/ENT] key.
3. Press the [F0] key to return to the <COMPUTER MENU> screen.

### 10.1.1.1 Input from computer - Program

When the [PROTECT] select switch is set to [PROTECT OFF], input mode is entered. When set to [PROTECT ON], check mode is entered.

1. Enter [1] or move the cursor to that number on the <COMPUTER INPUT MENU> screen, and press the [EOB/ENT] key.

PROGRAM	DIR.	OF	TC	INPUT	FROM	PC
0 0 0 1 * * *	0 1 0 1	* * *	1 1 0 1	* * *	8 0 0 1	* * *
0 0 0 2 * * *	0 1 0 2	* * *	1 1 0 2	* * *	8 0 0 2	* * *
0 0 0 3 * * *	0 1 0 3	* * *	1 1 0 3	* * *	8 0 0 3	* * *
0 0 0 4 * * *	0 1 0 4	* * *	1 1 0 4	* * *	8 0 0 4	* * *
0 0 0 5 * * *	0 1 0 5	* * *	1 1 0 5	* * *	8 0 0 5	* * *
0 0 0 6 * * *	0 1 0 6	* * *	1 1 0 6	* * *	8 0 0 6	* * *
0 0 0 7 * * *	0 1 0 7	* * *	1 1 0 7	* * *	8 0 0 7	* * *
0 0 0 8 * * *	0 1 0 8	* * *	1 1 0 8	* * *	8 0 0 8	* * *
0 0 0 9 * * *	0 1 0 9	* * *	1 1 0 9	* * *	8 0 0 9	* * *
0 0 1 0 * * *	0 1 1 0	* * *	1 1 1 0	* * *	8 0 1 0	* * *
0 0 1 1 * * *	0 1 1 1	* * *	1 1 1 1	* * *	8 0 1 1	* * *
0 0 1 2 * * *	0 1 1 2	* * *	1 1 1 2	* * *	8 0 1 2	* * *
0 0 1 3 * * *	0 1 1 3	* * *	1 1 1 3	* * *	8 0 1 3	* * *
0 0 1 4 * * *	0 1 1 4	* * *	1 1 1 4	* * *	8 0 1 4	* * *
0 0 1 5 * * *	0 1 1 5	* * *	1 1 1 5	* * *	8 0 1 5	* * *

PROGRAM NO. —

SET PRGM NO & PUSH EDIT START KEY  
A - B : NO. A IS CHANGED TO NO. B & INPUT  
A/B : NO. A TO NO. B ARE INPUT.  
PROTECT OFF : INPUT MODE  
PROTECT ON : CHECK MODE

PC	DIR. OF
INPUT	PC
MENU	

F0 F1 F2 F3 F4

PROGRAM	DIR. OF	TC	INPUT	FROM	PC
0 0 0 1	* * *	( A B C D E F G H I J K L M N O P Q R S	9 7 / 0 5 / 2 2		
0 0 0 2	* * *	( C O M E N T )	9 7 / 0 5 / 2 2		
0 0 0 3	* * *	G 9 0 G 5 4 G 6 4 G 0 0	9 7 / 0 5 / 2 2		
0 0 0 4	* * *	G 0 0 X - 1 0 0 . 0 0 0 Y - 5 0 . 0	9 7 / 0 5 / 2 2		
0 0 0 5	* * *	G 0 1 Z 5 0 . 0 0 0 F 1 0 0	9 7 / 0 5 / 2 2		
0 0 0 6	* * *		9 7 / 0 5 / 2 2		
0 0 0 7	* * *		9 7 / 0 5 / 2 2		
0 0 0 8	* * *		9 7 / 0 5 / 2 2		
0 0 0 9	* * *		9 7 / 0 5 / 2 2		
0 0 1 0	* * *		9 7 / 0 5 / 2 2		
0 0 1 1	* * *		9 7 / 0 5 / 2 2		
0 0 1 2	* * *		9 7 / 0 5 / 2 2		
0 0 1 3	* * *		9 7 / 0 5 / 2 2		
0 0 1 4	* * *		9 7 / 0 5 / 2 2		
0 0 1 5	* * *		9 7 / 0 5 / 2 2		

PROGRAM NO. —

SET PRGM NO & PUSH EDIT START KEY  
A-B: NO. A IS CHANGED TO NO. B & INPUT  
A/B: NO. A TO NO. B ARE INPUT.  
PROTECT OFF: INPUT MODE  
PROTECT ON : CHECK MODE

PC INPUT MENU	DIR. OF PC	F0	F1	F2	F3	F4
---------------------	---------------	----	----	----	----	----

## Outline

1. Check mode: Checks whether the program in the external device is identical to the program stored in the TC.
2. Input mode: Inputs the program in the external device into the TC.
3. A-B: Inputs program No. A stored in the external device to the TC as program No. B.
4. A/B: Continuously inputs programs from Nos. A to B in the external device to the computer, piece by piece.

10

e.g. '1/5' means:

When in input mode: Inputs programs 0001 to 0005.

When in check mode:

Checks programs 0001 to 0005.

5. Use the [PAGE DOWN] and [PAGE UP] keys to scroll the page.  
Note that the cursor does not move.
6. Press the [F0] key to return to the <COMPUTER INPUT MENU> screen.
7. Press the [F1] key to display the directory on the computer side.

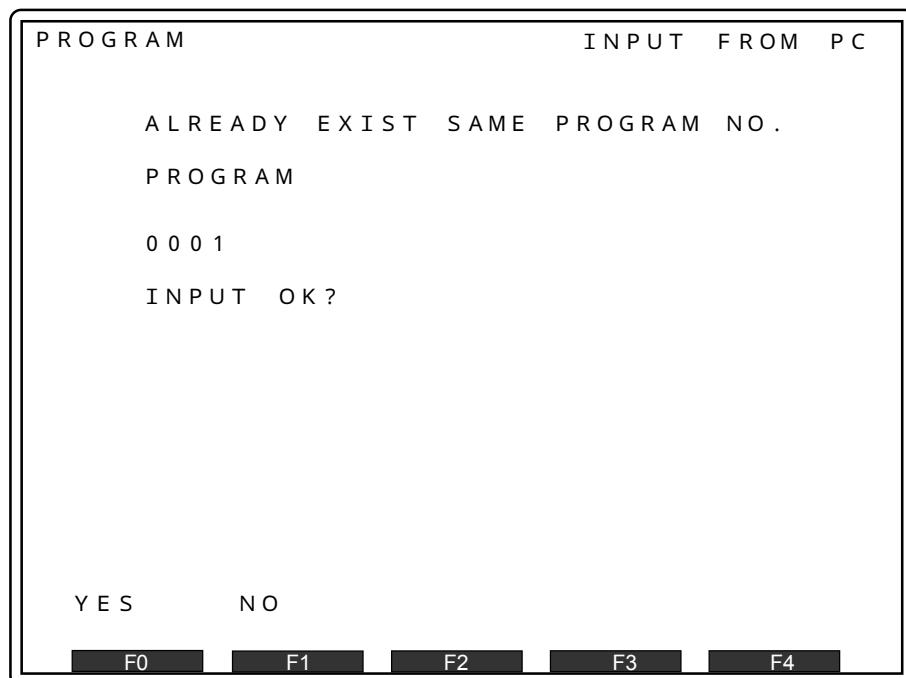
## Operation method

Enter the program number and press the [E.STA] key.

When in input mode: If there is any program because an identical name exists in the TC, the input confirmation screen appears. If none exists, the designated program is transferred and the <DIRECTORY OF MEMORY> screen appears upon completion.

When in check mode: Program's cross-reference check is performed. The check results are displayed upon completion.

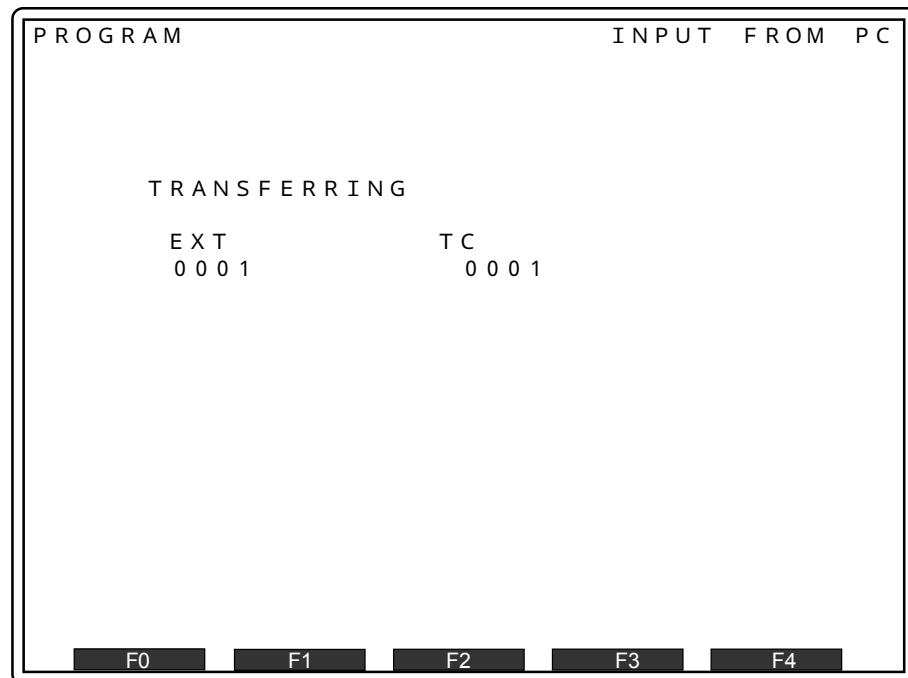
### When an identical program exists in the TC



10

## Outline

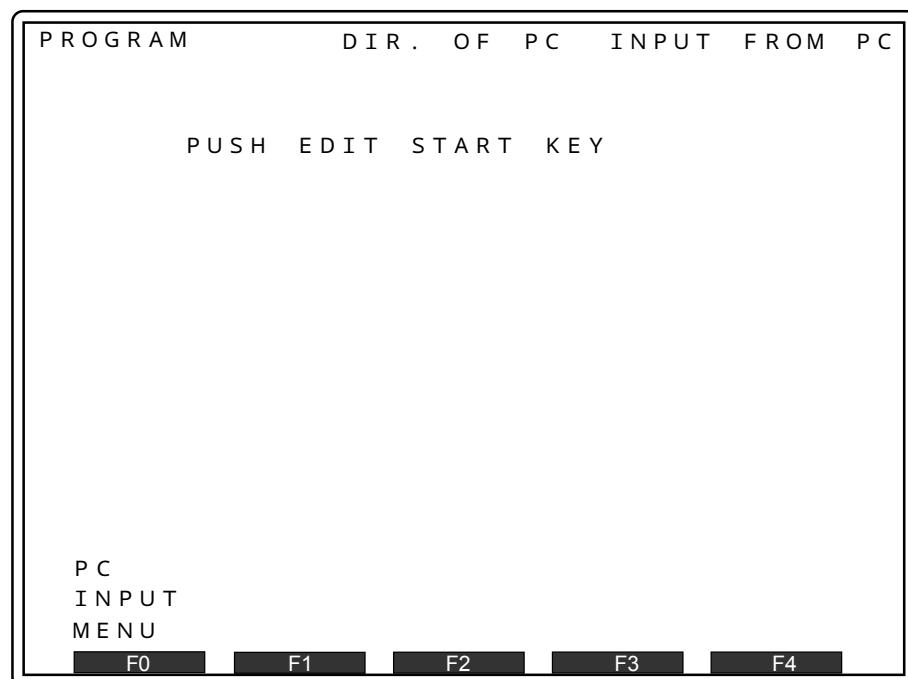
1. Press the [F0] key to input the program. The <TRANSFERRING> screen appears.
2. Press the [F1] key to cancel program input.  
The display returns to the <DIRECTORY OF MEMORY> screen.



**DIRECTORY OF COMPUTER**

Press the [F1] key on the <DIRECTORY OF TC> screen. If computer memory request has not been made yet, the <PUSH EDIT START KEY> screen appears.

If made, the <DIRECTORY OF COMPUTER> screen appears.

**10****Outline**

1. Press the [F0] key to return to the <COMPUTER INPUT MENU> screen.
2. Press the [E.STA] key. The computer directory is requested, and the <DIRECTORY OF COMPUTER> screen appears.

PROGRAM	DIR. OF	PC	INPUT	FROM PC
0 0 0 1 * * *	0 1 0 1 * * *	1 1 0 1 * * *		8 0 0 1 * * *
0 0 0 2 * * *	0 1 0 2 * * *	1 1 0 2 * * *		8 0 0 2 * * *
0 0 0 3 * * *	0 1 0 3 * * *	1 1 0 3 * * *		8 0 0 3 * * *
0 0 0 4 * * *	0 1 0 4 * * *	1 1 0 4 * * *		8 0 0 4 * * *
0 0 0 5 * * *	0 1 0 5 * * *	1 1 0 5 * * *		8 0 0 5 * * *
0 0 0 6 * * *	0 1 0 6 * * *	1 1 0 6 * * *		8 0 0 6 * * *
0 0 0 7 * * *	0 1 0 7 * * *	1 1 0 7 * * *		8 0 0 7 * * *
0 0 0 8 * * *	0 1 0 8 * * *	1 1 0 8 * * *		8 0 0 8 * * *
0 0 0 9 * * *	0 1 0 9 * * *	1 1 0 9 * * *		8 0 0 9 * * *
0 0 1 0 * * *	0 1 1 0 * * *	1 1 1 0 * * *		8 0 1 0 * * *
0 0 1 1 * * *	0 1 1 1 * * *	1 1 1 1 * * *		8 0 1 1 * * *
0 0 1 2 * * *	0 1 1 2 * * *	1 1 1 2 * * *		8 0 1 2 * * *
0 0 1 3 * * *	0 1 1 3 * * *	1 1 1 3 * * *		8 0 1 3 * * *
0 0 1 4 * * *	0 1 1 4 * * *	1 1 1 4 * * *		8 0 1 4 * * *
0 0 1 5 * * *	0 1 1 5 * * *	1 1 1 5 * * *		8 0 1 5 * * *

PROGRAM NO. —

SET PRGM NO & PUSH EDIT START KEY  
 A-B: NO. A IS CHANGED TO NO. B & INPUT  
 A/B: NO. A TO NO. B ARE INPUT.  
 PROTECT OFF: INPUT MODE  
 PROTECT ON : CHECK MODE

PC INPUT MENU	DIR. OF TC	PC MEMORY REQUEST		
F0	F1	F2	F3	F4

## Outline

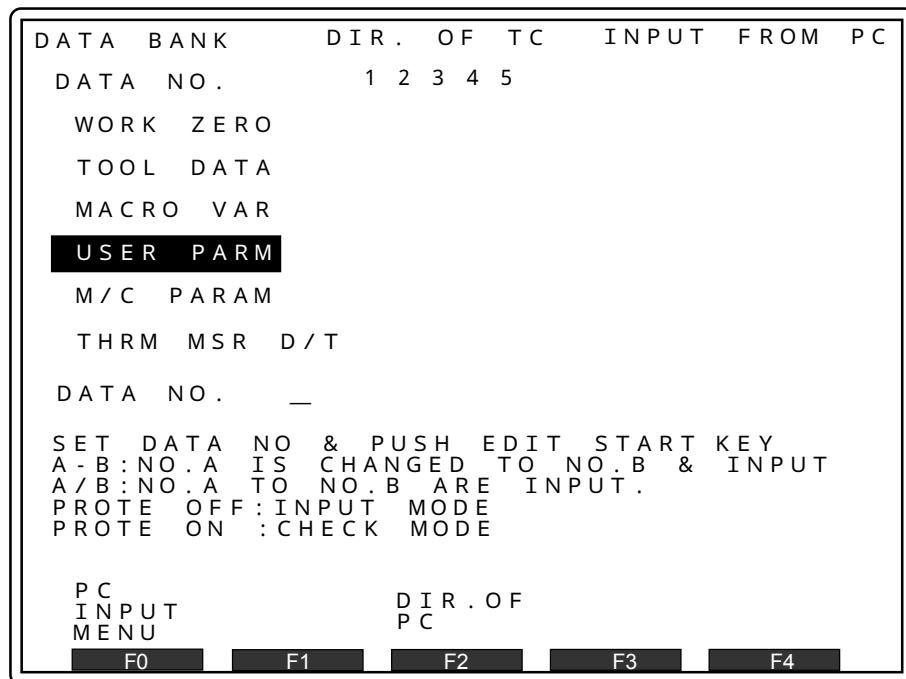
1. Use the [UP], [DOWN], [LEFT], and [RIGHT] keys to move the cursor.
2. Press the [F1] key and the <DIRECTORY OF TC> screen is displayed.
3. Press the [F2] key and the <PUSH EDIT START KEY> screen is displayed.
4. Descriptions 1 to 7 for the <DIRECTORY OF TC> screen apply hereafter.

## Operation method

Refer to 'Operation method' for the <DIRECTORY OF TC> screen or move the cursor to the desired program and press the [E.STA] key.

### 10.1.1.2 Input from computer - Data bank

Enter [2] or move the cursor to that number on the <COMPUTER INPUT MENU> screen, and press the [EOB/ENT] key.



#### Outline

1. : Indicates that the data bank exists.
2. : Indicates the data bank currently used for the TC.
3. A-B: Inputs No. A data in the external device into the TC as data No. B.
4. A/B: Continuously inputs programs from Nos. A to B in the external device to the computer, piece by piece.
5. Use the [UP] and [DOWN] keys to move the cursor.
6. Press the [F0] key to return to the <COMPUTER INPUT MENU> screen.
7. Machine parameters are invalid for A/B.
7. Press the [F2] key to display the data bank on the computer side.

#### Operation method

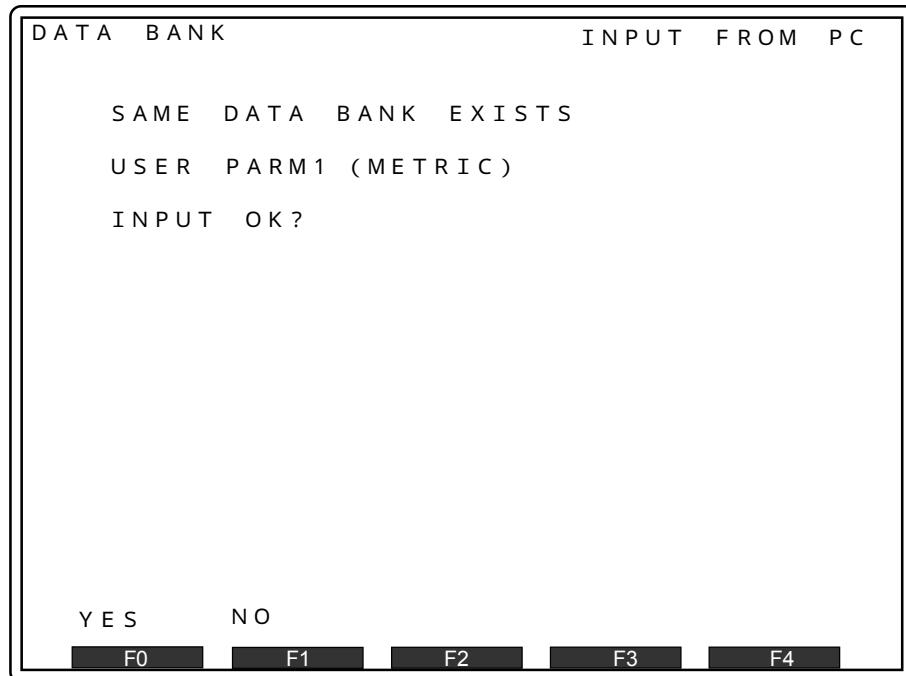
Move the cursor to the desired data bank, enter the data number, and press the [E STA] key.

When in input mode:

If an identical data bank exists in the TC, the input confirmation screen appears. If none exists, the data bank is transferred and the <DATA LIST> screen appears upon completion.

When in check mode:

Data bank's cross-reference check is performed. The check results are displayed upon completion.



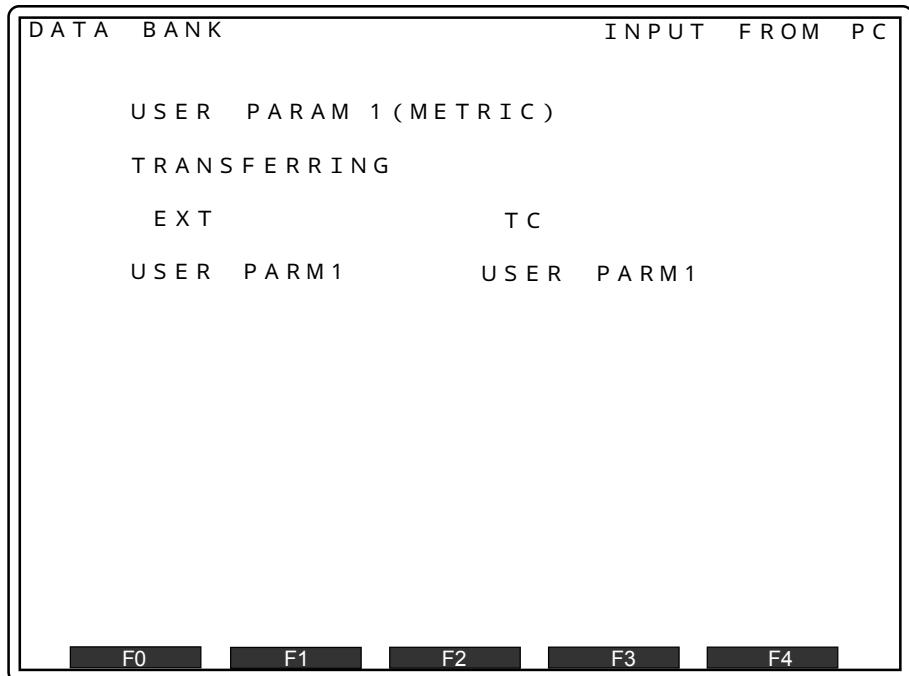
## Remarks

The same operation method applies for other data banks (TOOL DATA, etc.).

10

## Outline

1. Press the [F0] key. The data bank is deleted from the TC and the data bank of the designated No. is input. At this time, the <TRANSFERRING> screen appears.
2. Press the [F1] key to cancel data bank input. The display returns to the <DATA LIST> screen.



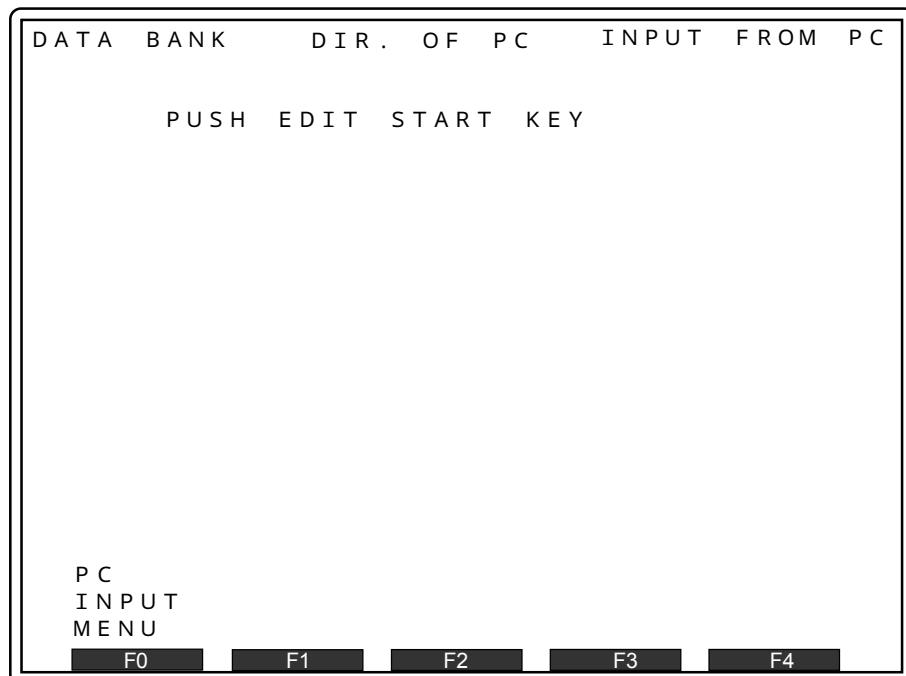
## Remarks

The same operation method applies for other data banks (TOOL DATA, etc.).

10

## COMPUTER MEMORY REQUEST

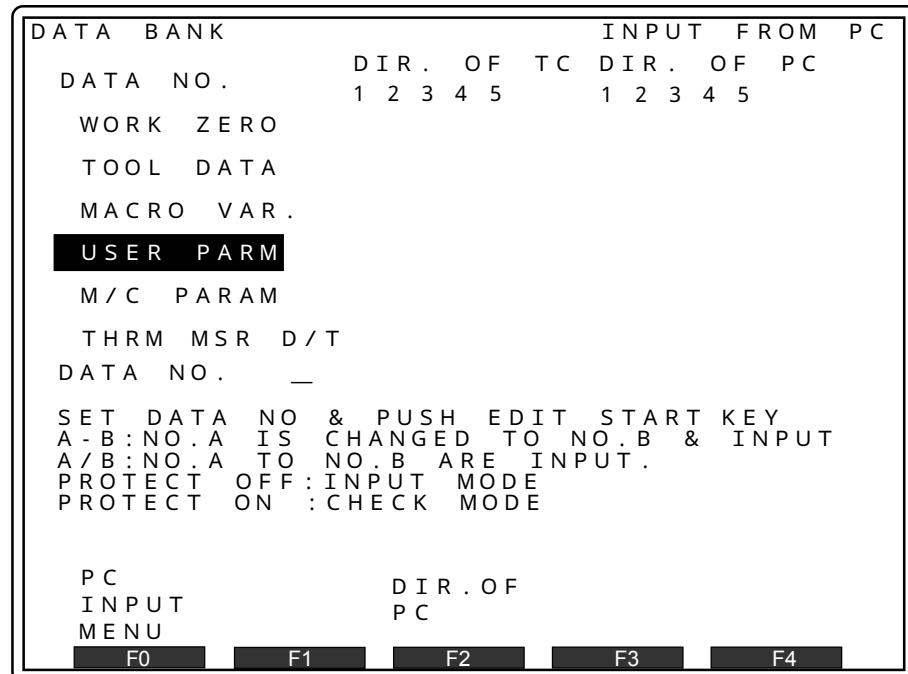
Press the [F2] key on the <DIRECTORY OF TC> screen. If computer memory request has not been made yet, the <PUSH EDIT START KEY> screen appears.



10

### Outline

1. Press the [F0] key to return to the <COMPUTER INPUT MENU> screen.
2. Press the [E.STA] key. The computer directory is requested, and the <DIRECTORY OF COMPUTER> screen appears.



## Outline

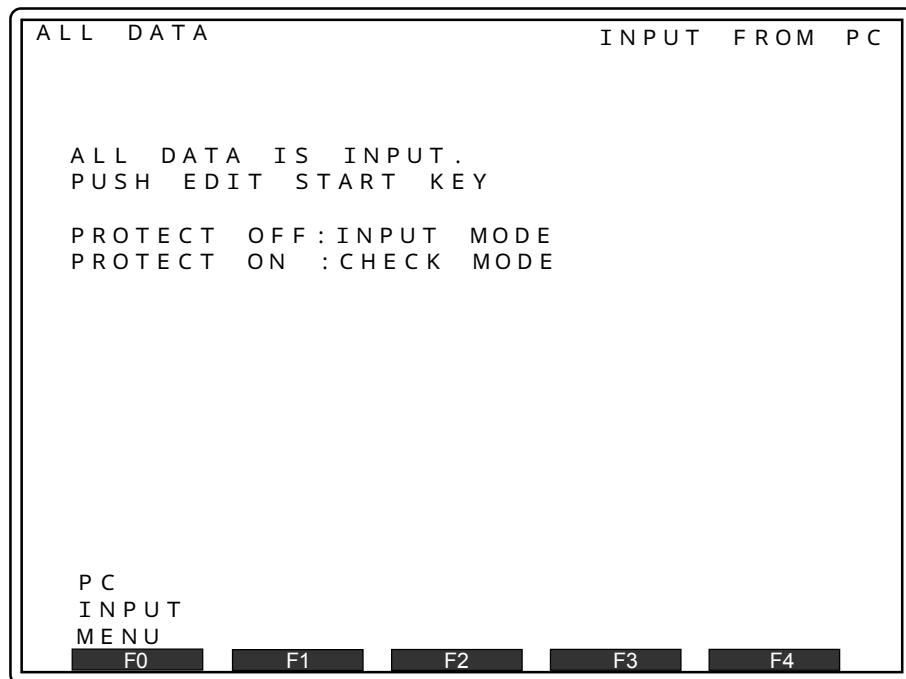
Refer to 'Outline' for the <DIRECTORY OF TC> screen.

## Operation method

Refer to 'Operation method' for the <DIRECTORY OF TC> screen.

### 10.1.1.3 Input from computer - All data

All programs stored in the computer and all data banks corresponding to the unit system currently selected (metric or inch) are input. Enter [3] or move the cursor to that number on the <COMPUTER INPUT MENU> screen, and press the [EOB/ENT] key.



10

#### Outline

1. Press the [F0] key to return to the <COMPUTER INPUT MENU> screen.
2. Set the [PROTECT] select switch to [PROTECT OFF] to select input mode; set to [PROTECT ON] to select check mode.

#### Operation method

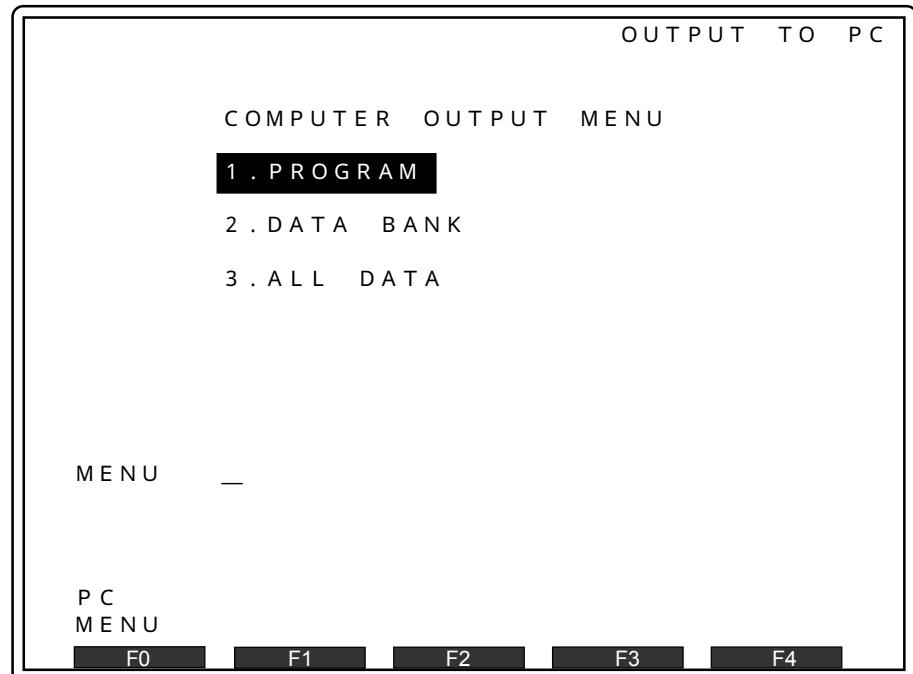
When input mode is selected, press the [E.STA] key and all data is input.

When check mode is selected, press the [E.STA] key and cross-reference check is performed for all data, and the check results are displayed upon completion.

### 10.1.2 Computer output menu

The data stored in the TC is output to the computer.

1. Enter **[2]** or move the cursor to that number on the <COMPUTER MENU> screen, and press the **[EOB/ENT]** key.  
The <COMPUTER OUTPUT MENU> screen appears.



2. Enter the desired item number by pressing the appropriate numerical key or move the cursor to the desired item, and press the **[EOB/ENT]** key.
3. Press the **[F0]** key to return to the <COMPUTER OUTPUT MENU> screen.

### 10.1.2.1 Output to computer - Program

Enter [1] or move the cursor to that number on the <COMPUTER OUTPUT MENU> screen, and press the [EOB/ENT] key.

PROGRAM	DIR.	OF	TC	OUTPUT	TO	PC
0 0 0 1 * * *	0 1 0 1 * * *		1 1 0 1 * * *		8 1 0 1 * * *	
0 0 0 2 * * *	0 1 0 2 * * *		1 1 0 2 * * *		8 1 0 2 * * *	
0 0 0 3 * * *	0 1 0 3 * * *		1 1 0 3 * * *		8 1 0 3 * * *	
0 0 0 4 * * *	0 1 0 4 * * *		1 1 0 4 * * *		8 1 0 4 * * *	
0 0 0 5 * * *	0 1 0 5 * * *		1 1 0 5 * * *		8 1 0 5 * * *	
0 0 0 6 * * *	0 1 0 6 * * *		1 1 0 6 * * *		8 1 0 6 * * *	
0 0 0 7 * * *	0 1 0 7 * * *		1 1 0 7 * * *		8 1 0 7 * * *	
0 0 0 8 * * *	0 1 0 8 * * *		1 1 0 8 * * *		8 1 0 8 * * *	
0 0 0 9 * * *	0 1 0 9 * * *		1 1 0 9 * * *		8 1 0 9 * * *	
0 0 1 0 * * *	0 1 1 0 * * *		1 1 1 0 * * *		8 1 1 0 * * *	
0 0 1 1 * * *	0 1 1 1 * * *		1 1 1 1 * * *		8 1 1 1 * * *	
0 0 1 2 * * *	0 1 1 2 * * *		1 1 1 2 * * *		8 1 1 2 * * *	
0 0 1 3 * * *	0 1 1 3 * * *		1 1 1 3 * * *		8 1 1 3 * * *	
0 0 1 4 * * *	0 1 1 4 * * *		1 1 1 4 * * *		8 1 1 4 * * *	
0 0 1 5 * * *	0 1 1 5 * * *		1 1 1 5 * * *		8 1 1 5 * * *	

PROGRAM NO.  
SET PRGM NO & PUSH EDIT START KEY  
A-B: NO.A IS CHANGED TO NO.B & OUTPUT  
A/B: NO.A TO NO.B ARE OUTPUT.

PC            DIR. OF  
OUTPUT        PC  
MENU

F0    F1    F2    F3    F4

PROGRAM	DIR. OF TC	OUTPUT TO PC
0 0 0 1 * * *	( A B C D E F G H I J K L M N O P O R S	9 7 / 0 5 / 2 2
0 0 0 2 * * *	( C O M E N T )	9 7 / 0 5 / 2 2
0 0 0 3 * * *	G 9 0 G 5 4 G 6 4 G 0 0	9 7 / 0 5 / 2 2
0 0 0 4 * * *	G 0 0 X - 1 0 0 . 0 0 0 Y - 5 0 . 0	9 7 / 0 5 / 2 2
0 0 0 5 * * *	G 0 1 Z 5 0 . 0 0 0 F 1 0 0	9 7 / 0 5 / 2 2
0 0 0 6 * * *		9 7 / 0 5 / 2 2
0 0 0 7 * * *		9 7 / 0 5 / 2 2
0 0 0 8 * * *		9 7 / 0 5 / 2 2
0 0 0 9 * * *		9 7 / 0 5 / 2 2
0 0 1 0 * * *		9 7 / 0 5 / 2 2
0 0 1 1 * * *		9 7 / 0 5 / 2 2
0 0 1 2 * * *		9 7 / 0 5 / 2 2
0 0 1 3 * * *		9 7 / 0 5 / 2 2
0 0 1 4 * * *		9 7 / 0 5 / 2 2
0 0 1 5 * * *		9 7 / 0 5 / 2 2
PROGRAM NO.		
SET PRGM NO & PUSH EDIT START KEY		
A - B : NO . A IS CHANGED TO NO . B & OUTPUT		
A / B : NO . A TO NO . B ARE OUTPUT .		
PC OUTPUT DIR. OF PC		
MENU		
F0	F1	F2
F3	F4	

## Outline

1. A-B: Outputs program No. A stored in the TC to the computer as program No. B.
2. A/B: Continuously outputs the programs Nos. A to B in the TC to the computer, piece by piece.  
e.g. '1/3' means:  
Outputs programs 0001 to 0003 stored in the TC to the external device.
3. Use the [PAGE DOWN] and [PAGE UP] keys to scroll the page.
4. Use the [CURSOR DOWN] and [CURSOR UP] keys to move the cursor.  
Note that the [LEFT] and [RIGHT] keys are valid only when [DISPLAY PROGRAM LIST] is set to [NO] for [1. SWITCH 1] of the user parameter.
5. Press the [F0] key to return to the <COMPUTER OUTPUT MENU> screen.
6. Press the [F1] key to display the <DIRECTORY OF COMPUTER> screen.

## Operation method

Enter the desired program number by pressing the appropriate numerical key, move the cursor to the desired program (only when TC program list is displayed), and press the [E.STA] key.

### When memory request is made

If an identical program exists in the computer, the deletion confirmation screen appears. If none exists, the program is transferred and the screen returns to the <DIRECTORY OF MEMORY> screen upon completion.

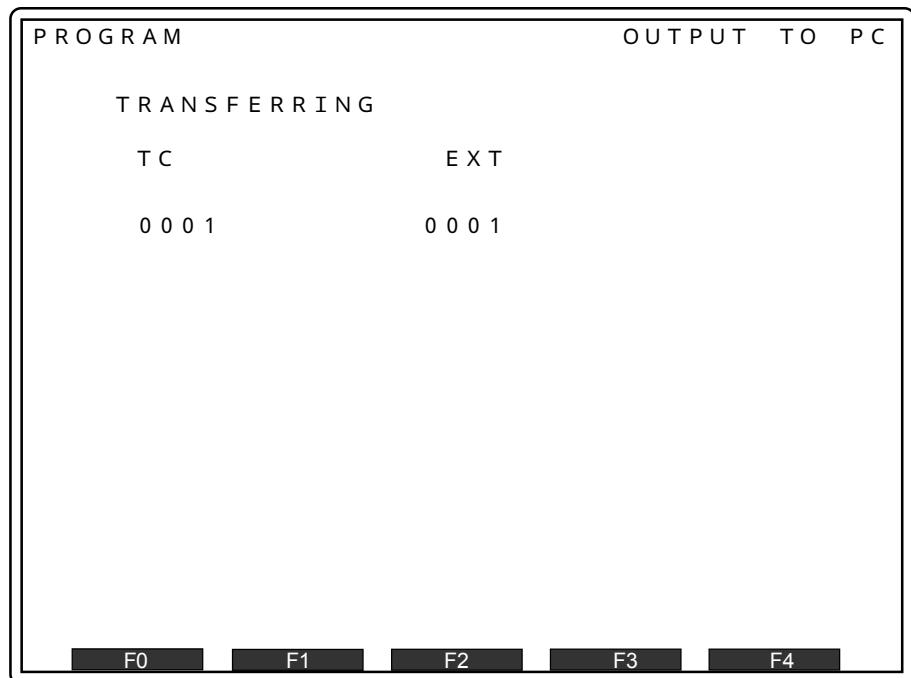
### When memory request is not made

The program is transferred and the display returns to the <DIRECTORY OF MEMORY> screen upon completion.

### **<When an identical program exists in the computer>**

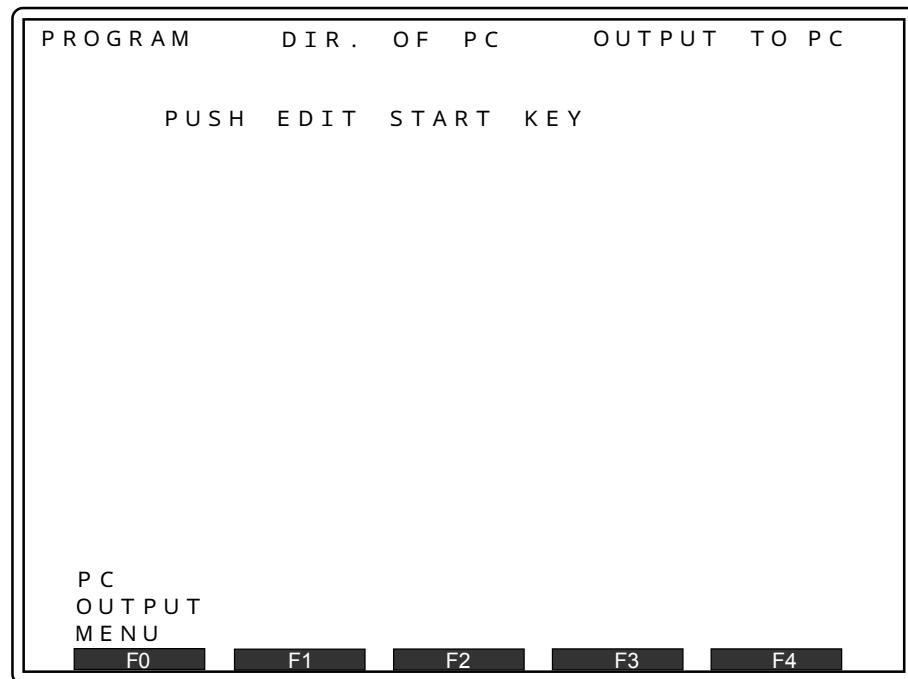
## Outline

1. Press the **[F0]** key. The program stored in the computer and having the same number as the designated one is deleted from the computer, and the designated program is output. At this time, the <TRANSFERRING> screen appears.
  2. Press the **[F1]** key to cancel program output. The display returns to the <DIRECTORYOFMEMORY>screen.



## DIRECTORY OF COMPUTER

Press the [F1] key with the <DIRECTORY OF TC> screen displayed. If the memory display request has not been made yet, the <PUSH EDIT START KEY> screen appears. If made, the computer memory display screen appears.



## 10

### Outline

1. Press the [F0] key to return to the <COMPUTER OUTPUT MENU> screen.
2. Press the [E.STA] key, the computer directory is requested, and the <DIRECTORY OF COMPUTER> screen appears.

PROGRAM	DIR.	OF	TC	OUTPUT	TO	PC
0 0 0 1 * * *	0 1 0 1	* * *	1 1 0 1	* * *	8 1 0 1	* * *
0 0 0 2 * * *	0 1 0 2	* * *	1 1 0 2	* * *	8 1 0 2	* * *
0 0 0 3 * * *	0 1 0 3	* * *	1 1 0 3	* * *	8 1 0 3	* * *
0 0 0 4 * * *	0 1 0 4	* * *	1 1 0 4	* * *	8 1 0 4	* * *
0 0 0 5 * * *	0 1 0 5	* * *	1 1 0 5	* * *	8 1 0 5	* * *
0 0 0 6 * * *	0 1 0 6	* * *	1 1 0 6	* * *	8 1 0 6	* * *
0 0 0 7 * * *	0 1 0 7	* * *	1 1 0 7	* * *	8 1 0 7	* * *
0 0 0 8 * * *	0 1 0 8	* * *	1 1 0 8	* * *	8 1 0 8	* * *
0 0 0 9 * * *	0 1 0 9	* * *	1 1 0 9	* * *	8 1 0 9	* * *
0 0 1 0 * * *	0 1 1 0	* * *	1 1 1 0	* * *	8 1 1 0	* * *
0 0 1 1 * * *	0 1 1 1	* * *	1 1 1 1	* * *	8 1 1 1	* * *
0 0 1 2 * * *	0 1 1 2	* * *	1 1 1 2	* * *	8 1 1 2	* * *
0 0 1 3 * * *	0 1 1 3	* * *	1 1 1 3	* * *	8 1 1 3	* * *
0 0 1 4 * * *	0 1 1 4	* * *	1 1 1 4	* * *	8 1 1 4	* * *
0 0 1 5 * * *	0 1 1 5	* * *	1 1 1 5	* * *	8 1 1 5	* * *

PROGRAM NO.  
SET PRGM NO & — PUSH EDIT START KEY  
A - B : NO. A IS CHANGED TO NO. B & OUTPUT  
A / B : NO. A TO NO. B ARE OUTPUT.

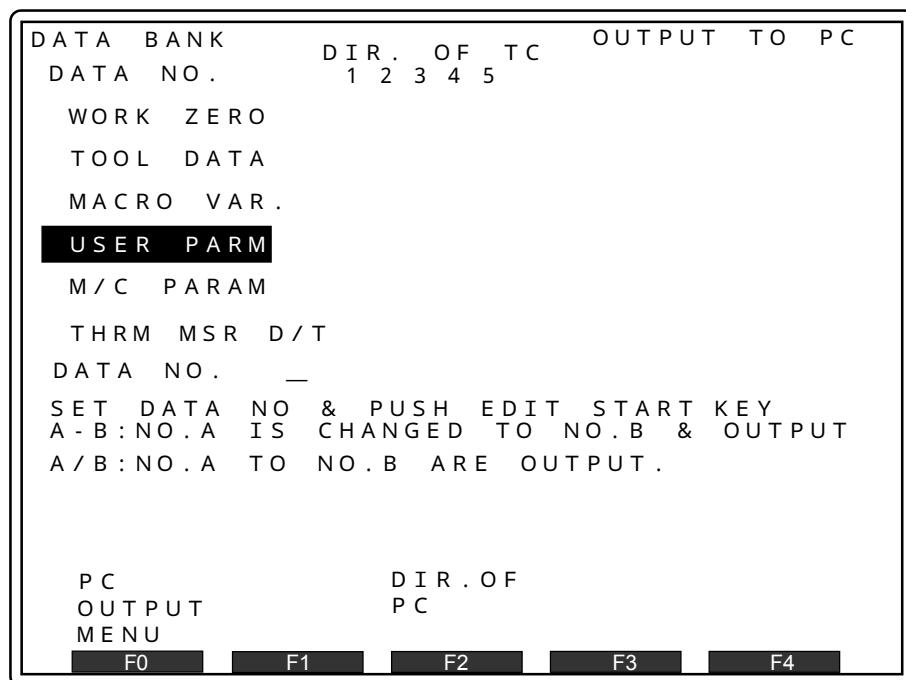
PC OUTPUT MENU	DIR. PC	OF	PC MEMORY REQUEST	
F0	F1	F2	F3	F4

## Outline

1. Use the [PAGE DOWN] and [PAGE UP] keys to scroll the page.
2. Press the [F1] key and the <DIRECTORY OF TC> screen appears.
3. Press the [F2] key and the <PUSH EDIT START KEY> screen appears.

### 10.1.2.2 Output to computer - Data bank

Enter [2] or move the cursor to that number on the <COMPUTER OUTPUT MENU> screen, and press the [EOB/ENT] key.



### Outline

1. : Indicates that the data bank exists.  
: Indicates the data bank currently used for the TC.
2. A-B: Outputs data No. A of the external device to the TC as data No. B.
3. A/B: Continuously outputs the data Nos. A to B in the external device to the TC, piece by piece.
4. Use the [UP] and [DOWN] keys to move the cursor.
5. Press the [F0] key to return to the <COMPUTER OUTPUT MENU> screen.
6. When [1] or [2] is selected for [THRM MSR D/T], thermal measurement data or automatic thermal displacement compensation data is output respectively.
7. Thermal measurement data is invalid for A-B and A/B.
8. Machine parameters are invalid for A/B.
9. Press the [F2] key to display the data bank on the computer.

Press the [1] key in the thermal measurement data, display the <COMPUTER OUTPUT MENU> screen.

## Operation method

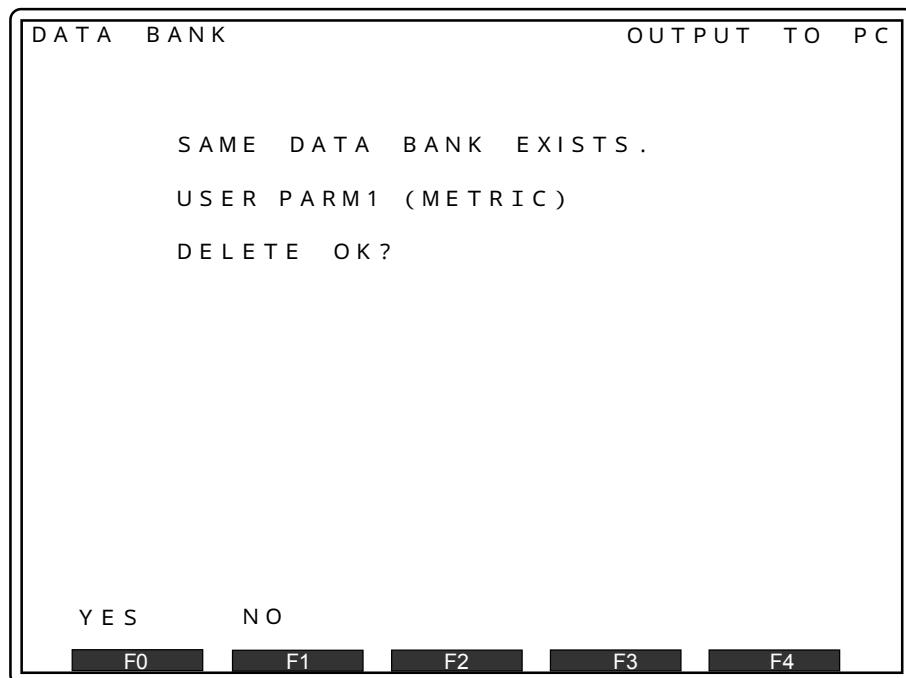
Move the cursor to the desired data bank, enter the data number, and press the [E.STA]key.

### When memory request is made

If an identical data bank exists in the computer, the deletion confirmation screen appears. If none exists, the data bank is transferred and the data bank list screen appears upon completion.

### When memory request is not made

The program is transferred and the data bank list screen appears upon completion.

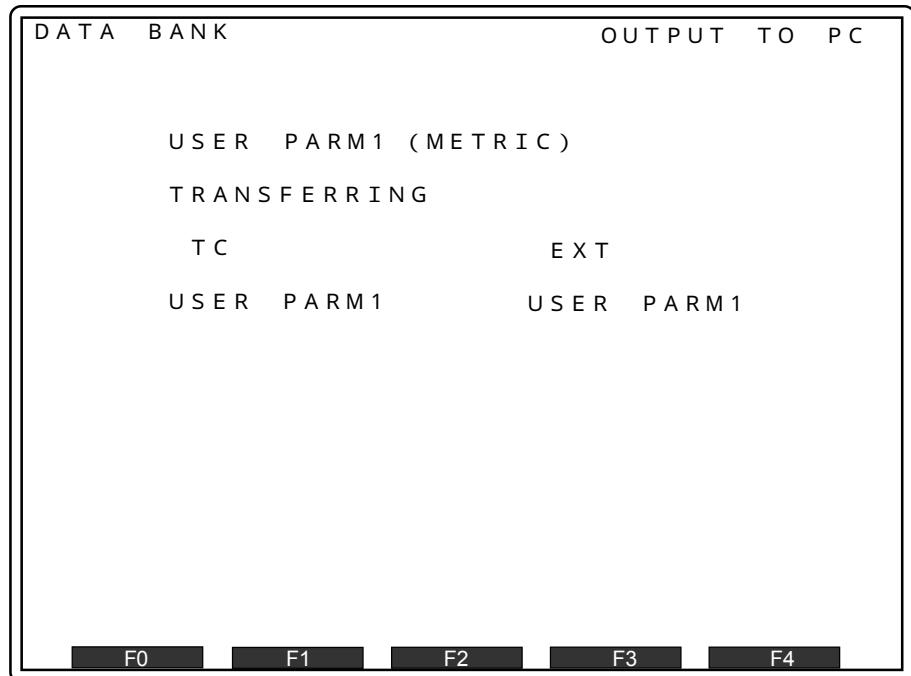


## Remarks

The same operation method applies for other data banks (TOOL DATA, etc.).

## Outline

1. Press the [F0] key. The data bank identical to the designated one is deleted from the computer, the <TRANSFERRING> screen appears and the designated data bank is output.
2. Press the [F1] key to cancel data bank output. The data bank list screen appears.

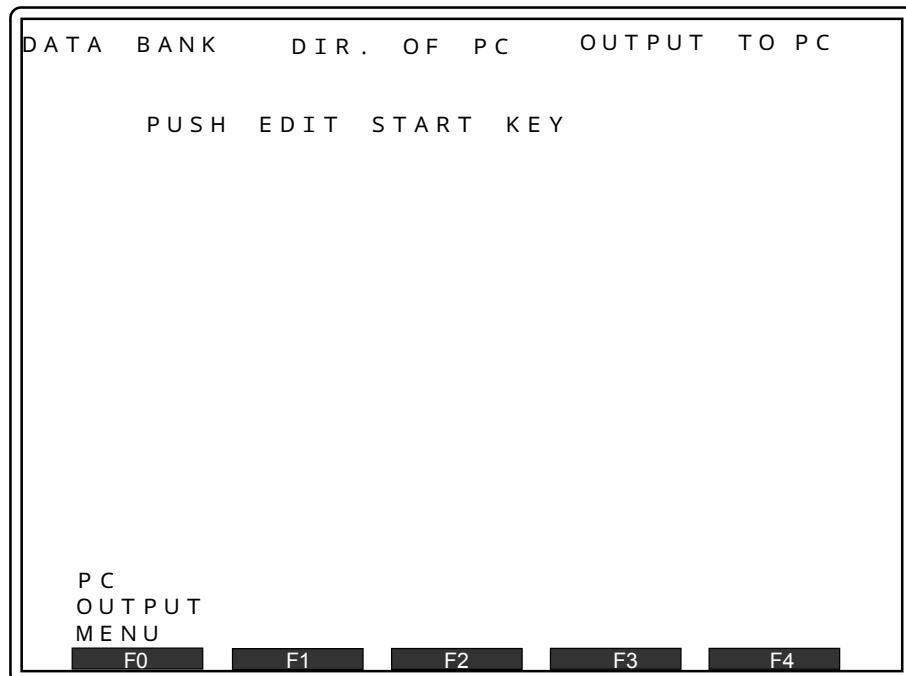


## Remarks

The same operation method applies for other data banks (TOOL DATA, etc.).

## DIRECTORY OF COMPUTER

Press the [F2] key with the <DIRECTORY OF TC> screen displayed. If the computer memory request has not been made yet, the <PUSH EDIT START KEY> screen appears.



10

### Outline

1. Press the [F0] key to return to the <COMPUTER OUTPUT MENU> screen.
2. Press the [E.STA] key. The computer directory is requested and the <DIRECTORY OF COMPUTER> screen appears.

## Outline

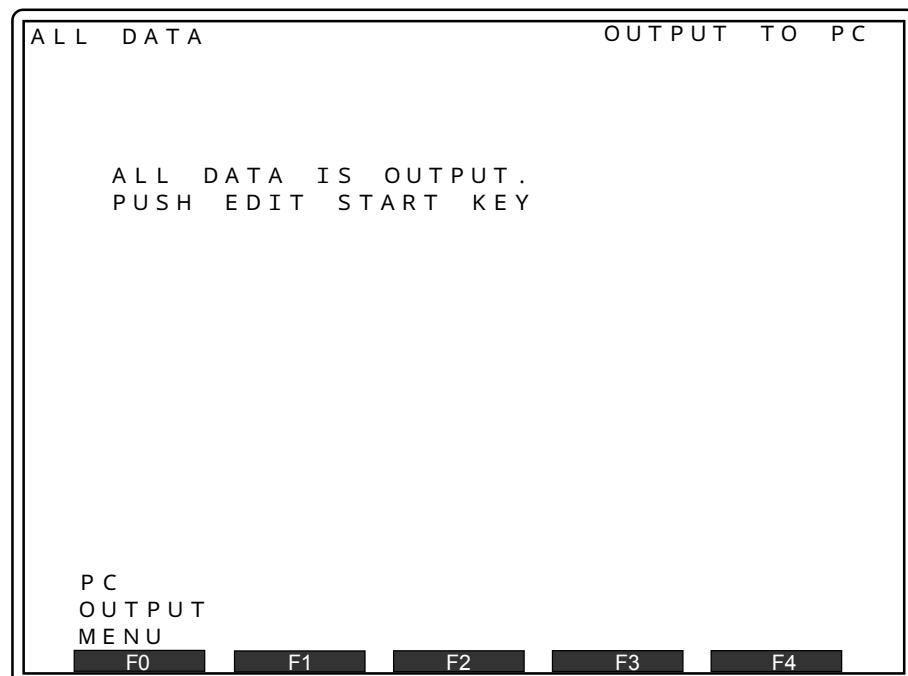
Refer to 'Outline' for the <DIRECTORY OF TC> screen

## Operation method

Refer to 'Operation method' for the <DIRECTORY OF TC> screen.

### 10.1.2.3 Output to computer - All data

All programs stored in the TC and all data banks corresponding to the unit system currently selected (metric or inch) are output. Enter [3] or move the cursor to that number on the <COMPUTER OUTPUT MENU> screen, and press the [EOB/ENT] key.



10

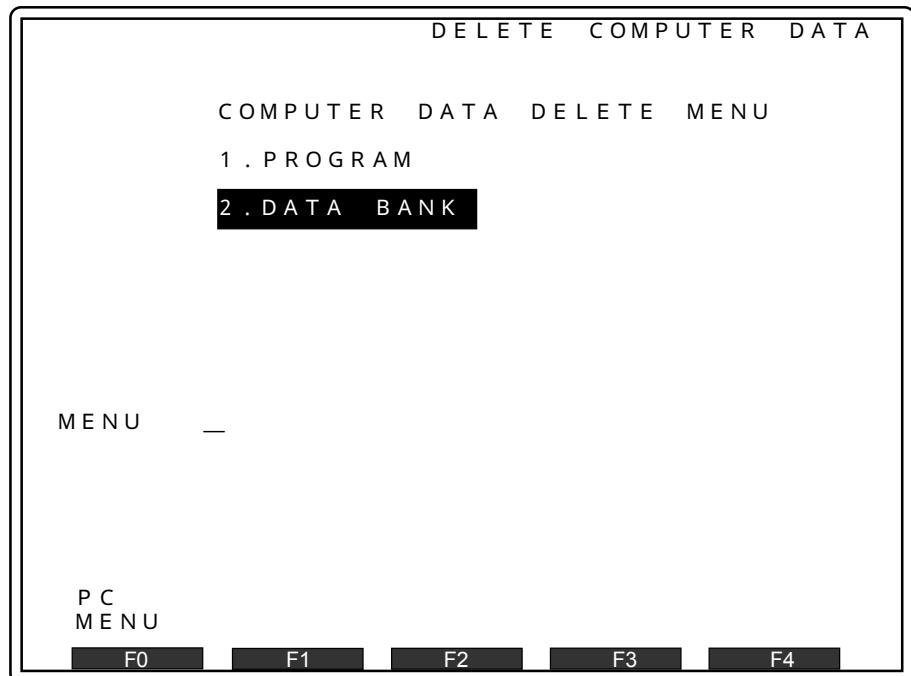
### Outline

1. Press the [F0] key to return to the <COMPUTER OUTPUT MENU> screen.
2. Press the [E.STA] key. The <TRANSFERRING> screen appears and all data is output.

### 10.1.3 Computer data delete menu

Programs or data banks stored in the computer are deleted.

1. Enter [3] or move the cursor to that number on the <COMPUTER MENU> screen, and press the [EOB/ENT] key.  
The <COMPUTER DATA DELETE MENU> screen appears.



10

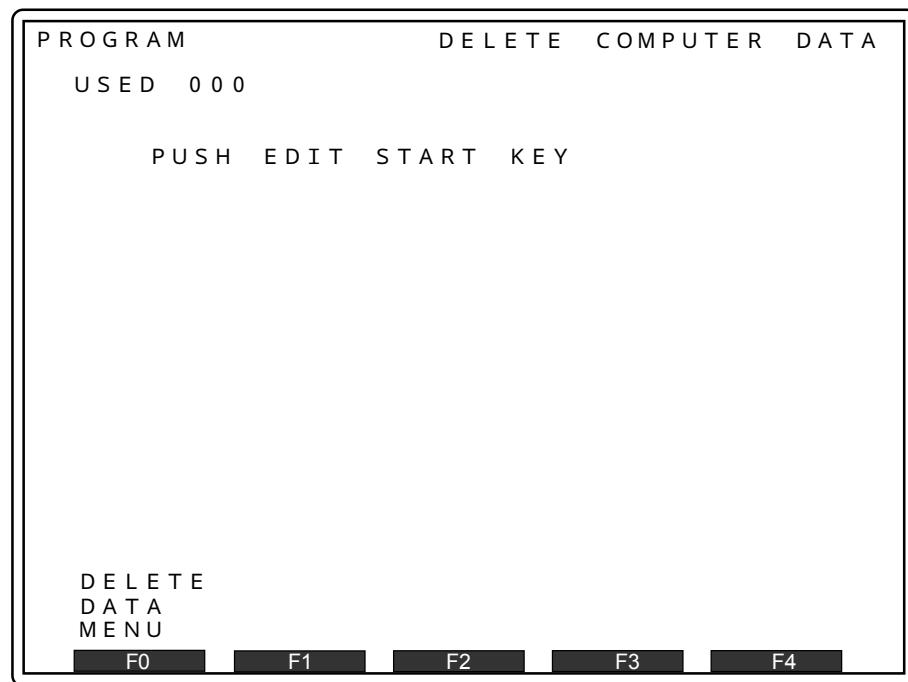
2. Enter the desired item number by pressing the appropriate numerical key or move the cursor to the desired item, and press the [EOB/ENT] key.
3. Press the [F0] key to display the <COMPUTER MENU> screen.

### 10.1.3.1 Computer data deletion - Program

Programs stored in the computer are deleted.

Enter [1] or move the cursor that number on the <COMPUTER DATA DELETE MENU> screen, and press the [EOB/ENT] key.

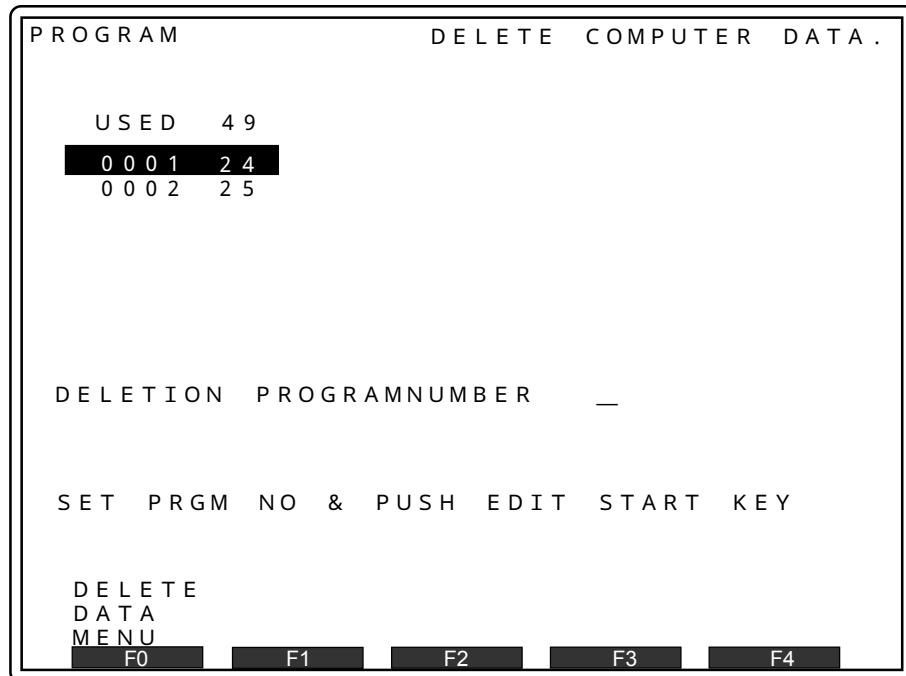
If the memory request has not been made yet, the <PUSH EDIT START KEY> screen appears. If made, the computer's program list screen appears.



10

### Outline

1. Press the [F0] key to return to the <COMPUTER DATA DELETE MENU> screen.
2. Press the [E.STA] key. The directory is requested, and the computer's program list screen appears.



## Outline

1. Use the [UP], [DOWN], [LEFT], and [RIGHT] keys to move the cursor.
2. A/B: Continuously deletes the programs from No. A to No. B from the external device, piece by piece.
3. Use the [PAGE DOWN] and [PAGE UP] keys to scroll the page.
4. Press the [F0] key to return to the <COMPUTER DATA DELETE MENU> screen.
5. [USED] indicates the volume of data stored in the computer.

10

## Operation method

Enter the program number or move the cursor to the desired program to be deleted, and press the [EDIT START] key. The deletion confirmation screen appears.

PROGRAM DELETE COMPUTER DATA

USED 007

PROGRAM

0001

DELETE OK?

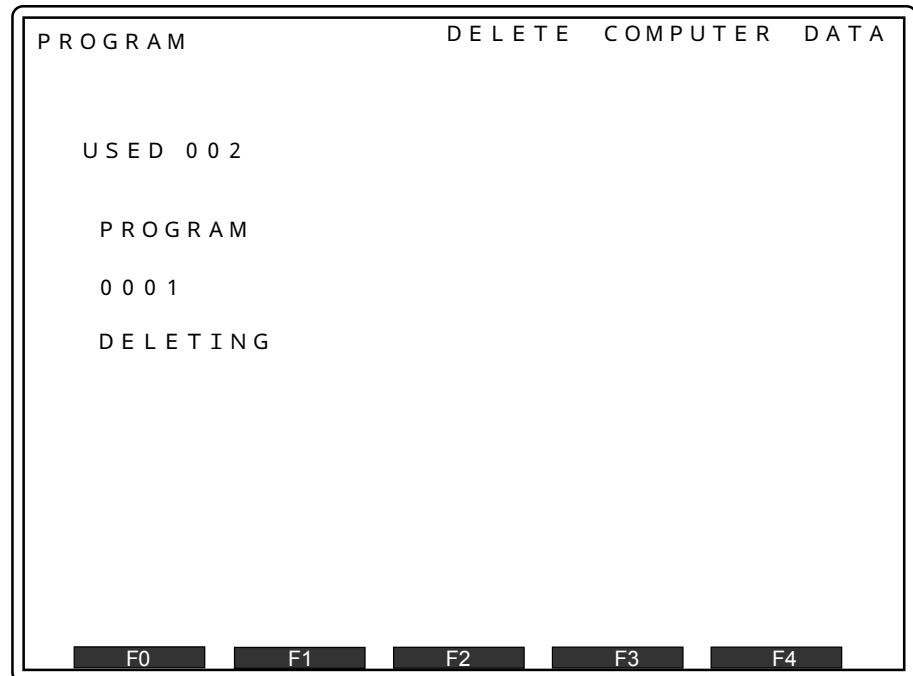
YES NO

F0 F1 F2 F3 F4

## Outline

1. Press the **[F0]** key to delete the program.
  2. Press the **[F1]** key to cancel deletion.

10

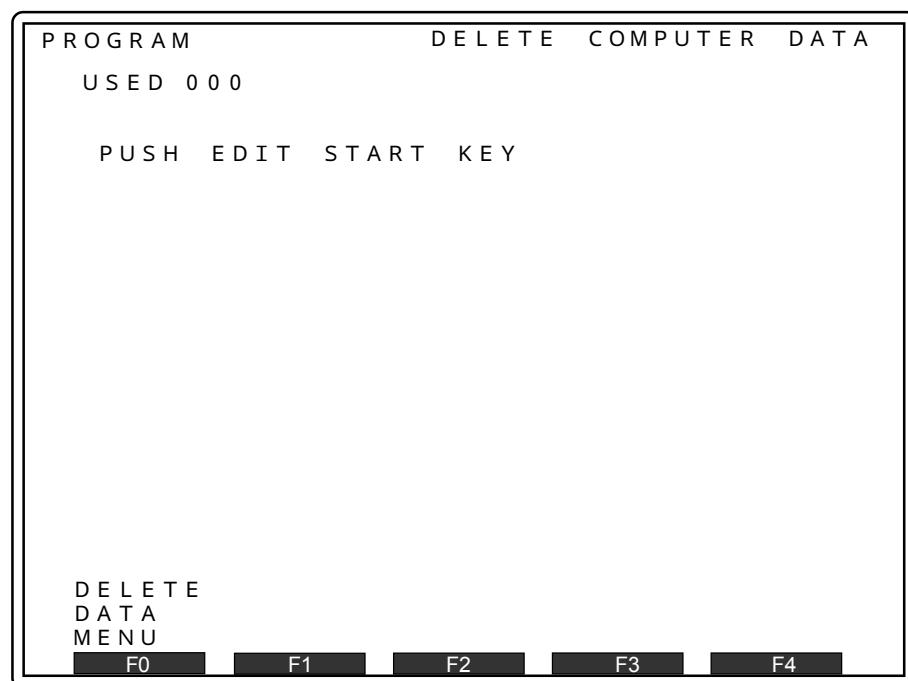


### 10.1.3.2 Computer data deletion - Data bank

Data banks stored in the computer are deleted.

Enter [2] or move the cursor to that number on the <COMPUTER DATA DELETE MENU> screen, and press the [EOB/ENT] key.

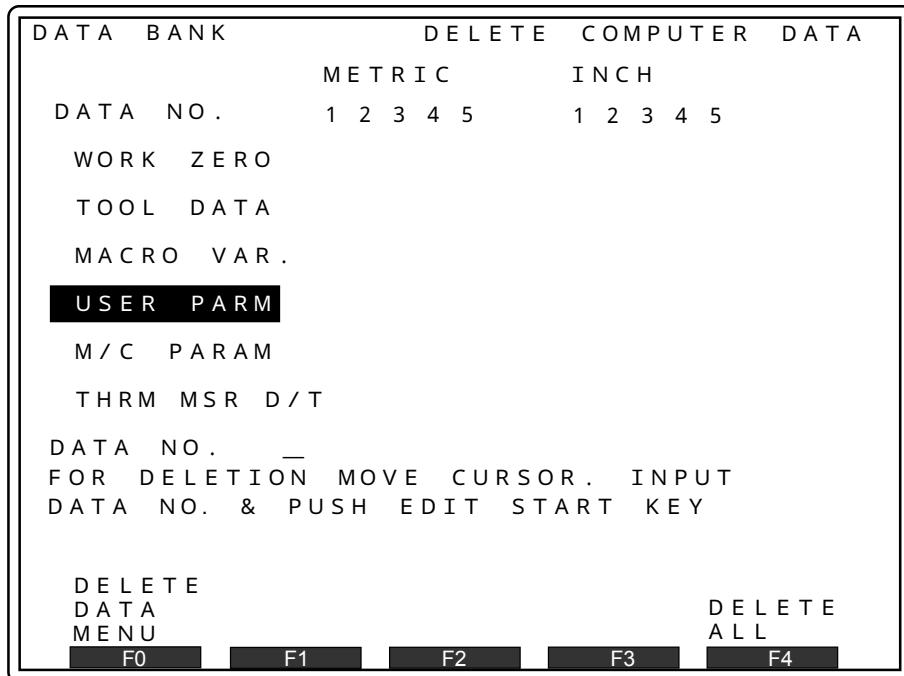
If the memory request has not been made yet, the <PUSH EDIT START KEY> screen appears. If made, the computer's data list screen appears.



10

#### Outline

1. Press the [F0] key to return to the <COMPUTER DATA DELETE MENU> screen.
2. Press the [E.STA] key. The directories are requested, and the computer's data list screen appears.



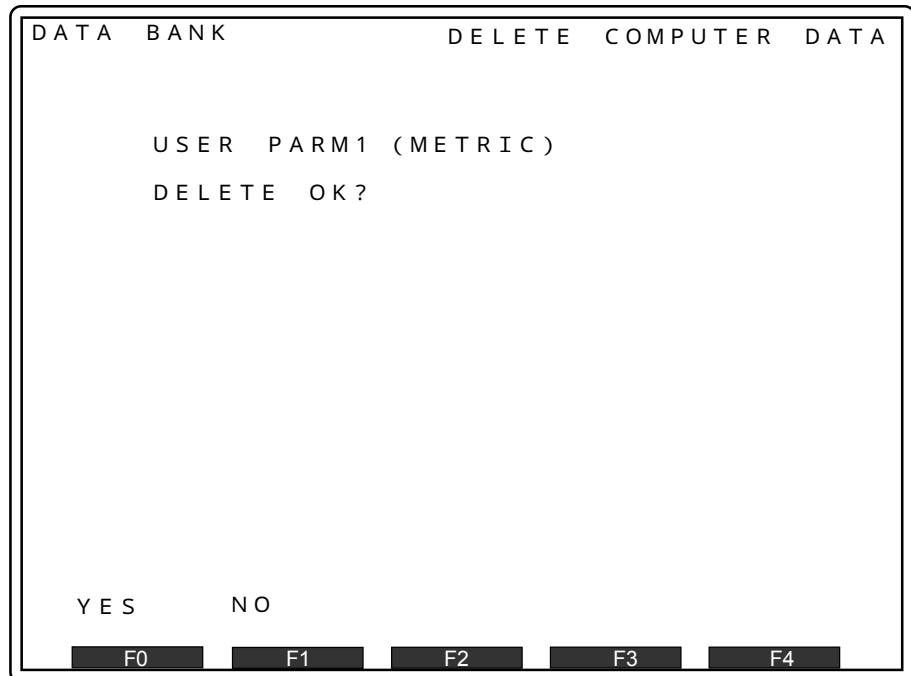
## Outline

1. : Indicates that the data bank exists.
2. Press the [F0] key to return to the <COMPUTER DATA DELETE MENU> screen.
3. Press the [F4] key and the computer's all data delete confirmation screen appears.

10

## Operation method

Move the cursor to the data bank to be deleted, enter the data number, and press the [E.STA] key. The corresponding data bank is deleted from the computer.



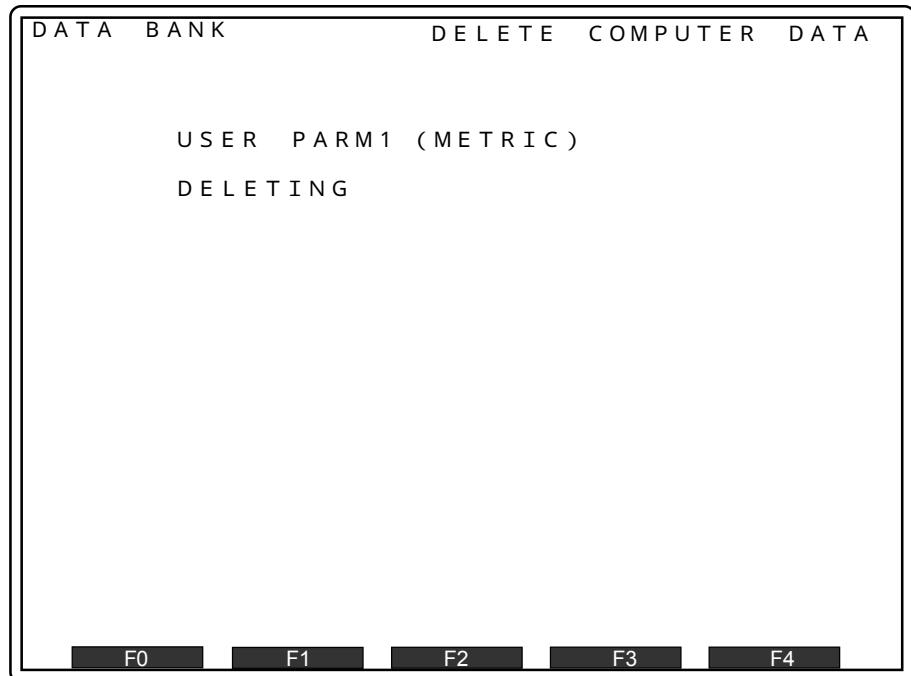
## Outline

1. Press the [F0] key to delete the data bank.
2. Press the [F1] key to cancel deletion.

## Remarks

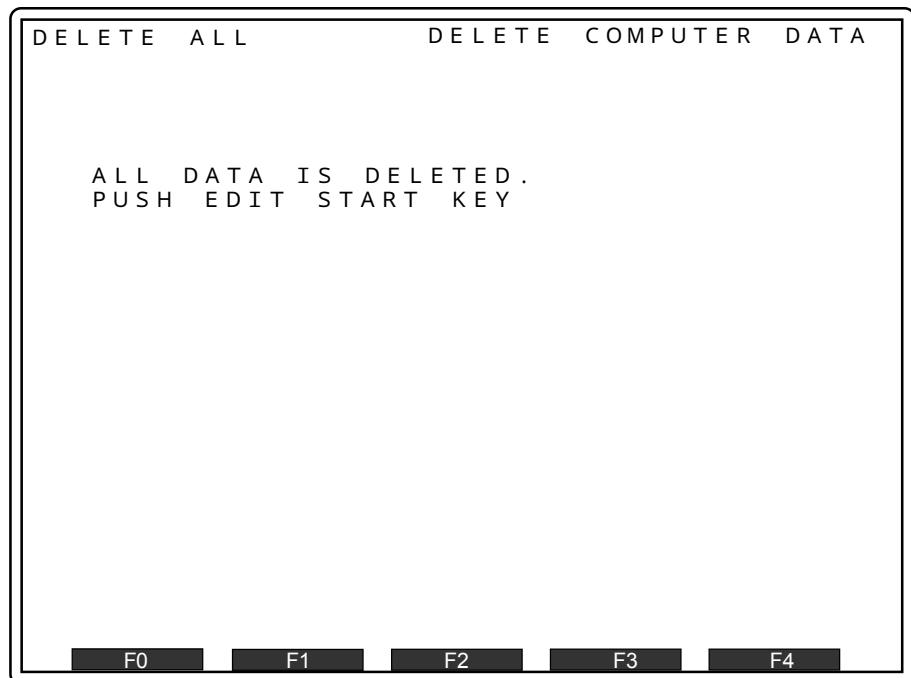
10

The same operation method applies for other data banks (TOOL DATA, etc.).



### Remarks

The same operation method applies for other data banks (TOOL DATA, etc.).



## Outline

1. Press the [F0] key to return to the <DIRECTORY OF COMPUTER> screen.

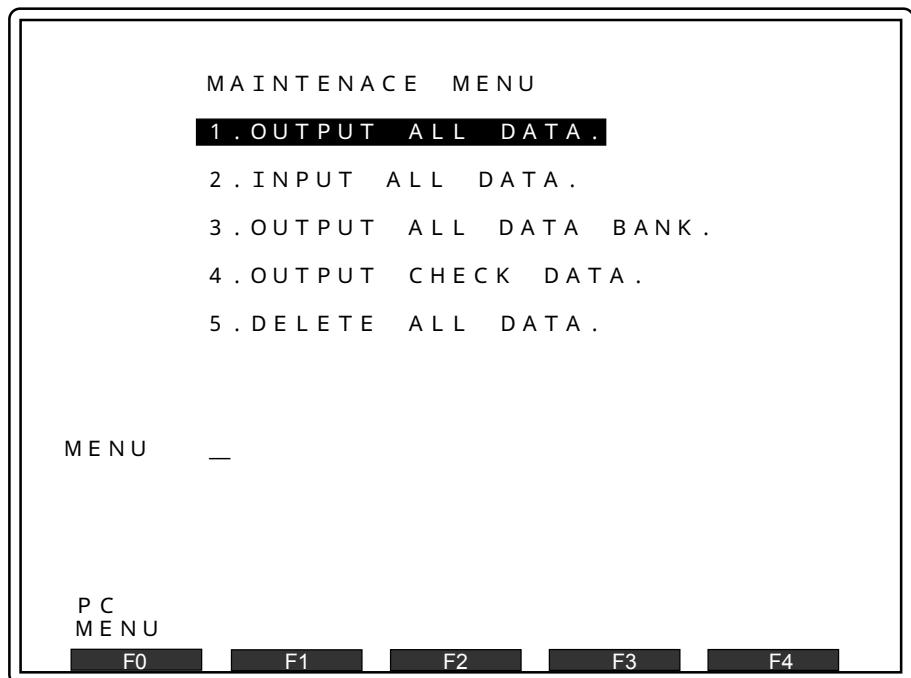
## Operation method

Press the **[E.STA]** key, and all data banks are deleted from the computer.

10

### 10.1.4 MAINTENANCE MENU

1. Enter [4] or move the cursor to that number on the <COMPUTER MENU> screen, and press the [EOB/ENT] key.  
The <MAINTENANCE MENU> screen appears.

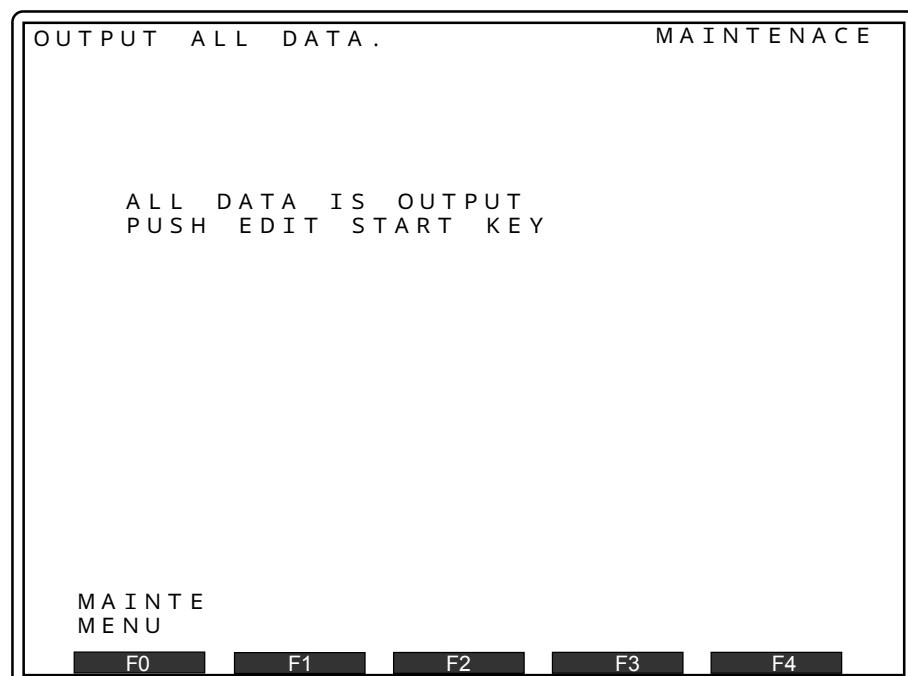


10

2. Enter the item number by pressing the appropriate numerical key or move the cursor to the item number and press the [EOB/ENT] key. The corresponding screen appears.
3. Press the [F0] key and the <COMPUTER MENU> screen appears.

#### 10.1.4.1 Maintenance - OUTPUT ALL DATA

All programs stored to the TC, working zero position data, tool data, macro variable data, user parameters, machine parameters, machine data, and production data are output.



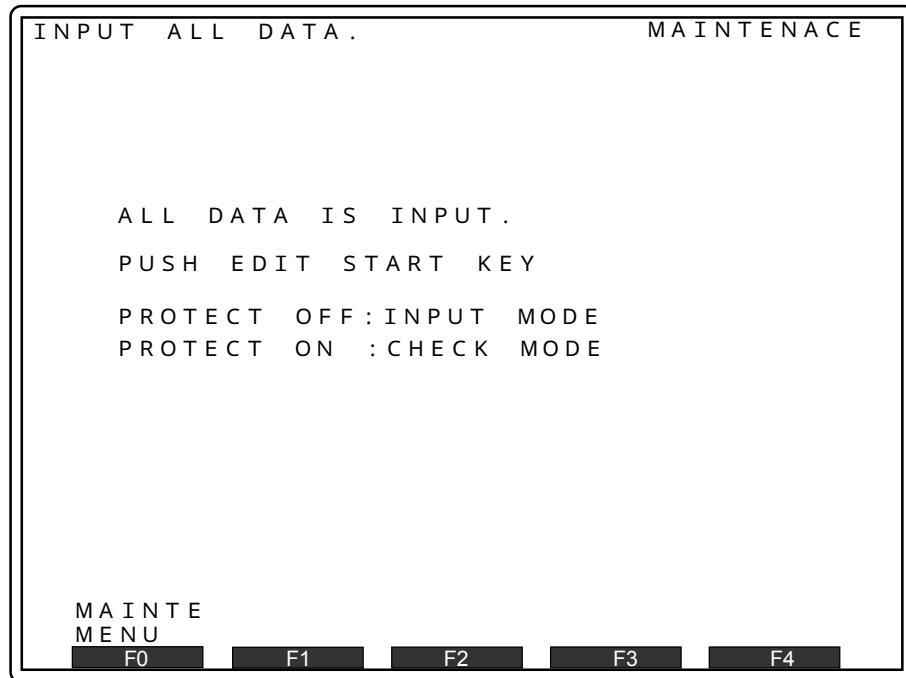
10

#### Outline

1. Press the [F0] key to return to the <MAINTENANCE MENU> screen.
2. Press the [E.STA] key to output all data.

### 10.1.4.2 Maintenance - INPUT ALL DATA

All programs stored in the computer, working zero position data, tool data, macro variable data, user parameters, machine parameters, machine data, and production data are input.



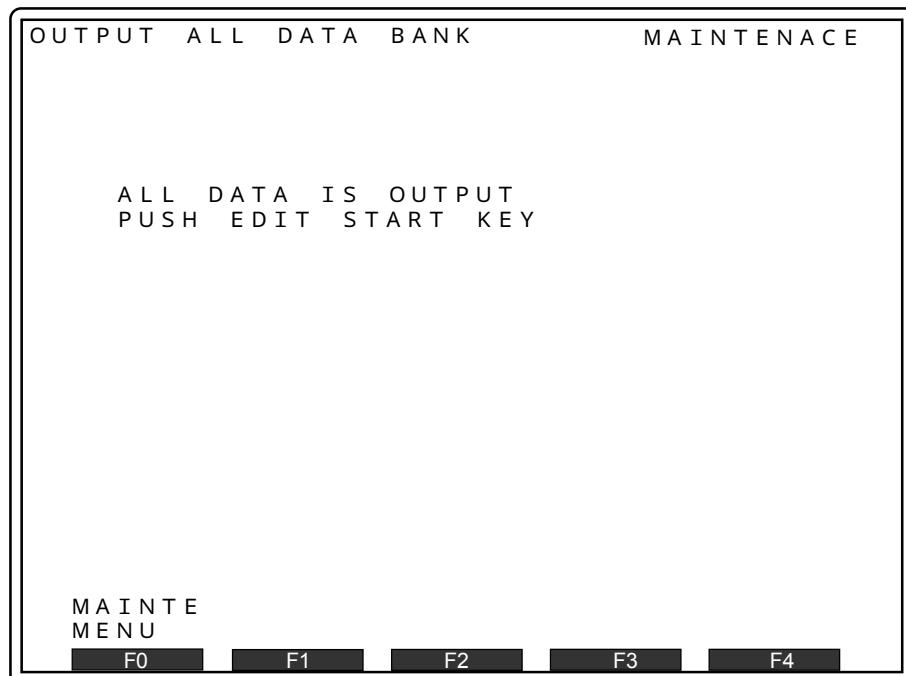
## 10

### Outline

1. Press the [F0] key to return to the <MAINTENANCE MENU> screen.
2. When input mode is selected, press the [E.STA] key and all data is input. When check mode is selected, press the [E.STA] key and cross-reference check is performed for all data.

### 10.1.4.3 Maintenance - OUTPUT ALL DATA BANK

Working zero position data, tool data, macro variable data, user parameters, machine parameters, machine data, and production data are output.



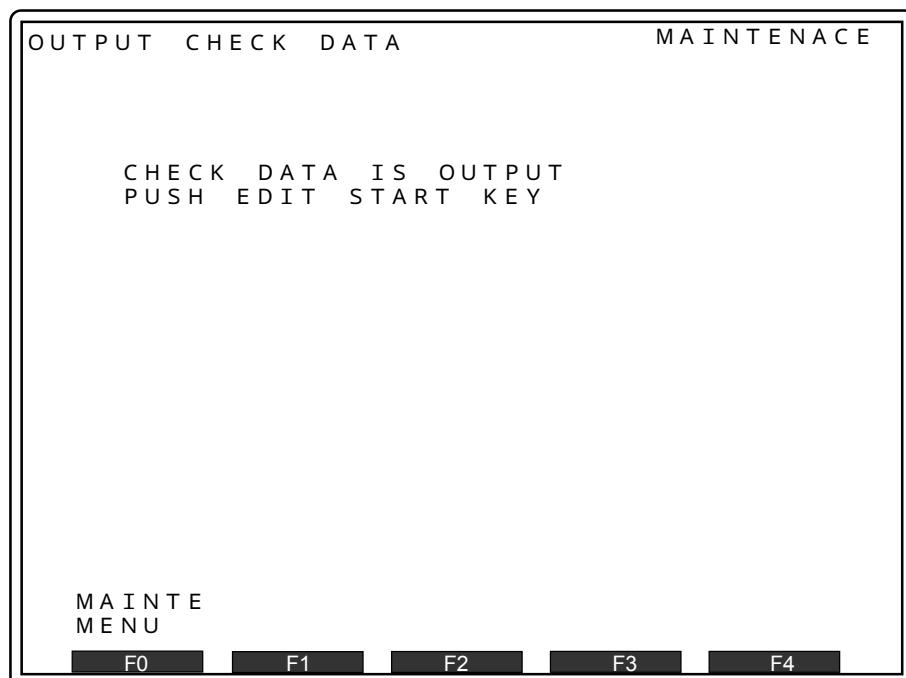
10

#### Outline

1. Press the [F0] key to return to the <MAINTENANCE MENU> screen.
2. Press the [E.STA] key to output all the data banks.

#### 10.1.4.4 Maintenance - OUTPUT CHECK DATA

In addition to the items output from the <OUTPUT All Data> screen, thermal measurement data, log, memory operation data, operation panel data, position data, input/output data, version data are output.



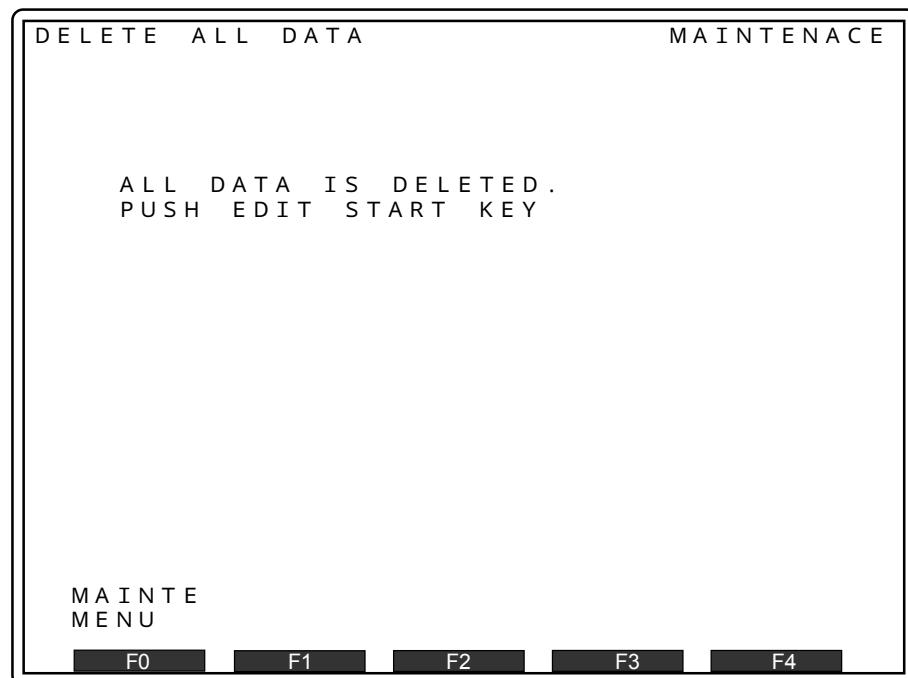
10

#### Outline

1. Press the [F0] key to return to the <MAINTENANCE MENU> screen.
2. Press the [E.STA] key to output the check data.

### 10.1.4.5 Maintenance - DELETE ALL DATA

All program stored to the computer, working zero position data, tool data, macro variable data, user parameters, machine parameters, thermal measurement data, machine data, and production data, log, memory operation data, operation panel data, position data, input/output data, version data are deleted.



10

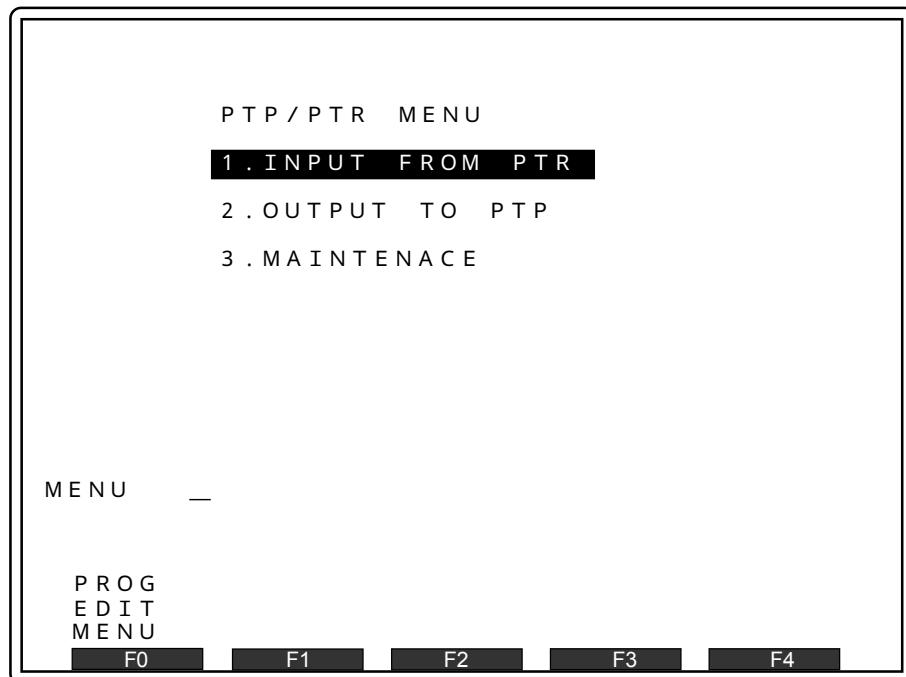
#### Outline

1. Press the [F0] key to return to the <MAINTENANCE MENU> screen.
2. Press the [E.STA] key to delete all data.

## 10.2 PTP/PTR (Master Station TC)

Set [CONNECTION OBJECT] to [0:PTP/PTR] for [3. COMMUNICATION] of the user parameters.

1. Enter [3] or move the cursor on the <PROGRAM EDIT MENU> screen, and press the [EOB/ENT] key.  
The <PTP/PTR MENU> screen appears.



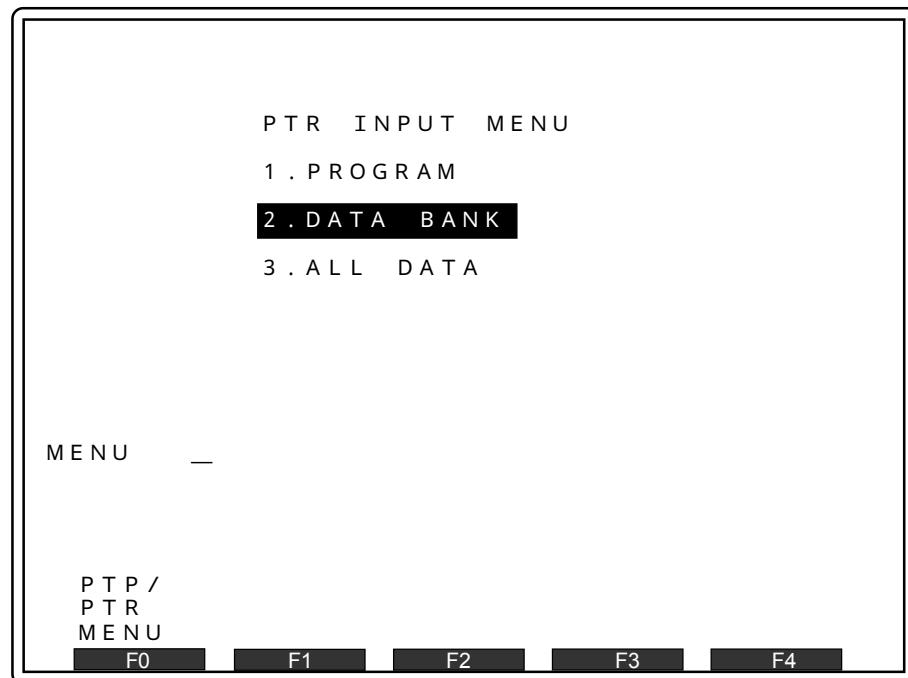
10

2. Enter the desired item number by pressing the appropriate numerical key or move the cursor to the desired item, and press the [EOB/ENT] key.
3. Press the [F0] key to return to the <PROGRAM EDIT MENU> screen.

### 10.2.1 PTR input menu

The data stored on the tape is input to the TC or cross-reference check is performed.

1. Enter [1] or move the cursor to that number on the <PTP/PTR MENU> screen, and press the [EOB/ENT] key.  
The <PTR INPUT MENU> screen appears.



10

2. Enter the desired item number by pressing the appropriate numerical key or move the cursor to the desired item, and press the [EOB/ENT] key.
3. Press the [F0] key to return to the <PTP/PTR MENU> screen.

### 10.2.1.1 Input from PTR - Program

When the [PROTECT] select switch is set to [PROTECT OFF], input mode is entered. When set to [PROTECT ON], check mode is entered.

1. Enter [1] or move the cursor to that number on the <PTP/PTR MENU> screen, and press the [EOB/ENT] key.

10

PROGRAM	DIR.	OF	TC	INPUT	FROM	PTR
0 0 0 1	2 4	0 0 5 2	1			
0 0 0 2	2 5	0 0 5 3	1			
0 0 0 3	1	0 0 5 4	1			
* 0 0 0 4	1	0 0 5 5	1			
0 0 1 5	9	0 0 5 6	1			
0 0 4 2	1	0 6 6 6	1			
0 0 4 3	1	0 4 1 0	1			
0 0 4 4	1	3 1 0 0	5			
0 0 4 5	1	3 1 0 1	5			
0 0 4 6	1	3 1 0 2	1			
0 0 4 7	1	3 1 0 3	1			
0 0 4 8	1	9 9 0 1	1			
0 0 4 9	1	9 9 0 2	1			
0 0 5 0	1	9 9 0 3	1			
0 0 5 1	1	9 9 0 4	1			
PROGRAM NO.						
SET PRGM NO &						
A - B : NO . A IS						
CHANGED TO NO . B &						
INPUT						
PROTECT OFF : INPUT MODE						
PROTECT ON : CHECK MODE						
PTR						
INPUT						
MENU						
F0	F1	F2	F3	F4		

PROGRAM	DIR.	OF	TC	INPUT	FROM	PTR
0 0 0 1	2 4				9 7 / 0 7 / 0 6	
0 0 0 2	2 5				9 7 / 0 6 / 2 2	
0 0 0 3	1				9 7 / 0 7 / 0 5	
* 0 0 0 4	7				9 7 / 0 7 / 0 6	
0 0 1 5	1				9 7 / 0 7 / 0 6	
0 0 4 2	1	T A P	M 3		9 7 / 0 6 / 2 3	
0 0 4 3	9	A R B			9 7 / 0 6 / 2 1	
0 0 4 4	1	* * * * *	* * * * *		9 7 / 0 6 / 2 4	
0 0 4 5	1	T A P	M 4		9 7 / 0 6 / 2 3	
0 0 4 6	1	T A P	M 5		9 7 / 0 6 / 2 3	
0 0 4 7	1	D R I L L	5		9 7 / 0 6 / 2 3	
0 0 4 8	1	C B O R			9 7 / 0 6 / 2 3	
0 0 4 9	1	C H A M F E R			9 7 / 0 6 / 2 3	
0 0 5 0	1	* * * * *	* * * * *		9 7 / 0 6 / 2 4	
0 0 5 1	1	* * * * *	* * * * *		9 7 / 0 6 / 2 4	

PROGRAM NO.	—
SET PRGM NO & PUSH EDIT START KEY	
A-B: NO. A IS CHANGED TO NO. B & INPUT	
PROTECT OFF: INPUT MODE	
PROTECT ON: CHECK MODE	
PTR	INPUT
INPUT	ALL
MENU	

F0      F1      F2      F3      F4

## Outline

1. Check mode: Checks whether the program in the external device is identical to the program stored in the TC.
2. Input mode: Inputs the program in the external device to the TC.
3. A-B: Inputs program No. A in the external device to the TC as program No. B.
4. Use the [PAGE DOWN] and [PAGE UP] keys to scroll the page. Note that the cursor does not move.
5. Press the [F0] key to return to the <PTR INPUT MENU> screen.
6. Press the [F4] key to perform batch input.

10

(Note 1)

When a program containing data after M02, M30, or M99 block is batch-output to the PTP (paper tape puncher), the section of the program after M02, M30, or M99 block cannot be input when the tape is read by the PTR (paper tape reader).

When a program that does not contain M02, M30, or M99 code (assume that such a program is, for example, number 1000) is batch-output to the PTP, programs after number 1000 cannot be input correctly when the tape is read by the PTR.

In addition, when the data is entered in check mode, a [CHECK ERROR] will occur. Do not create such a program.

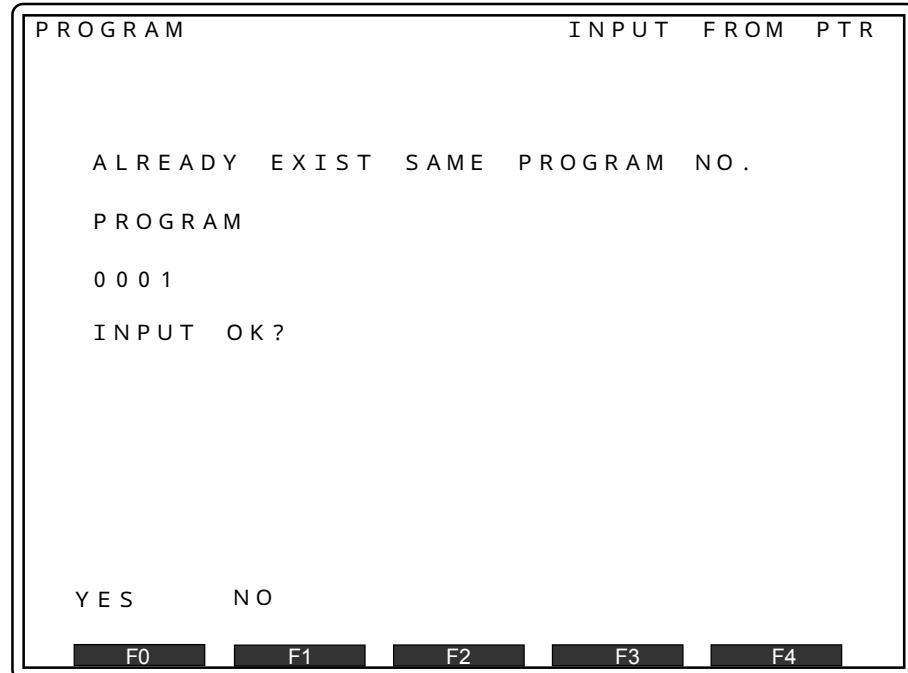
## Operation method

Enter the program number and press the [E STA] key.

When in input mode: If any program with an identical name exists in the TC, the input confirmation screen appears. If none exists, the designated program is transferred and the <DIRECTORY OF MEMORY> screen appears upon completion.

When in check mode: Program's cross-reference check is performed. The check results are displayed upon completion.

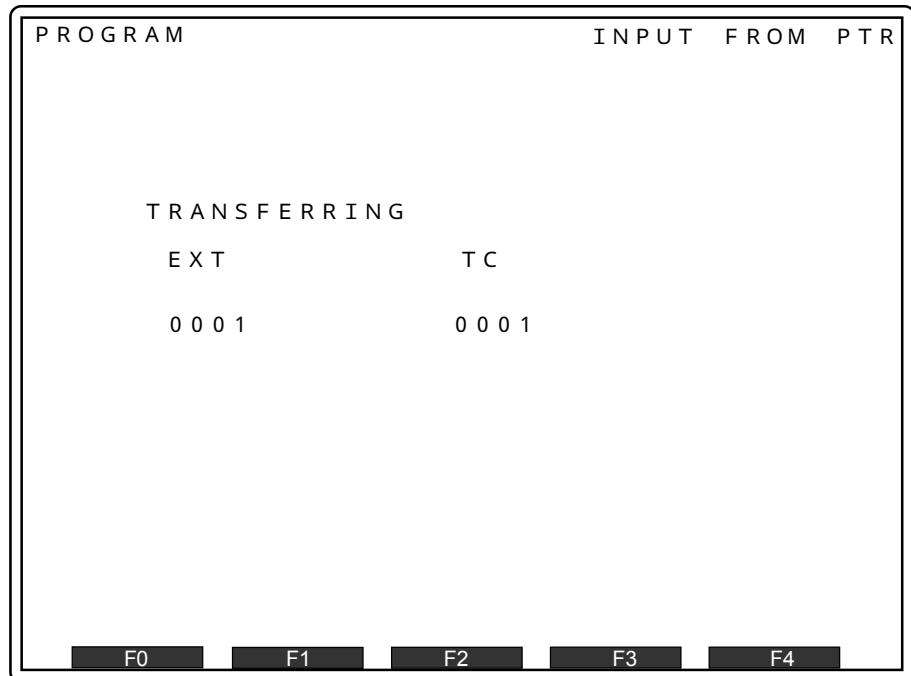
When an identical program exists in the TC



## Outline

1. Press the [F0] key to input the program. The <TRANSFERRING> screen appears.
2. Press the [F1] key to cancel program input. The display returns to the <DIRECTORYOFMEMORY>screen.

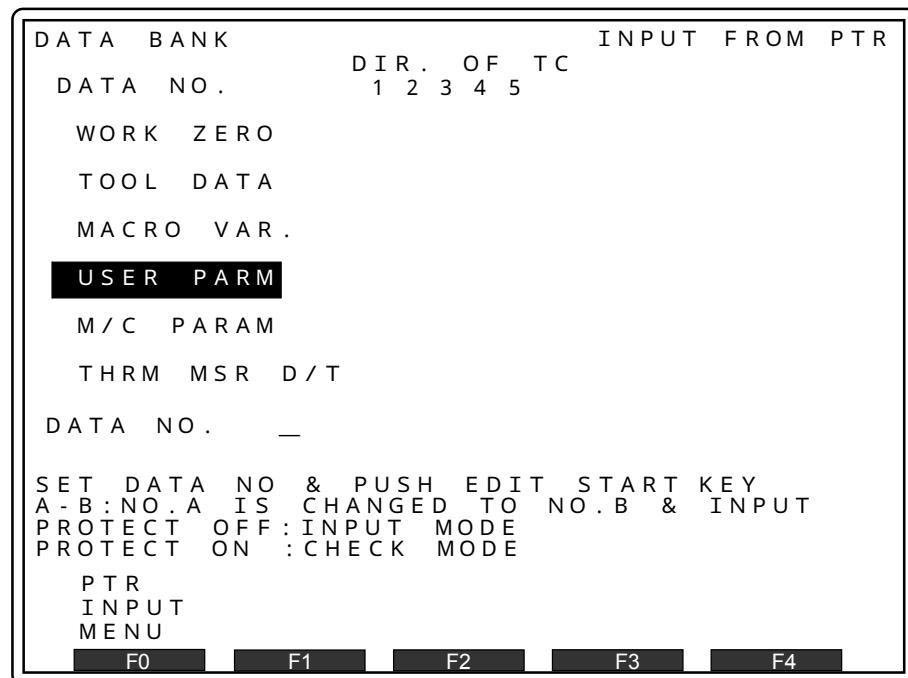
10



### 10.2.1.2 Input from PTR - Data bank

When the [PROGRAM PROTECT] select switch is set to [PROTECT OFF], input mode is entered. When set to [PROTECT ON], check mode is entered.

Enter [2] or move the cursor to that number on the <PTR INPUT MENU> screen, and press the [EOB/ENT] key.



## Outline

1. : Indicates that the data bank exists.  
      : Indicates the data bank currently used for the TC.
  2. A-B: Inputs data No. A in the external device to the TC as data No. B.
  3. Use the [PAGE UP] and [PAGE DOWN] keys to move the cursor.
  4. Press the [F0] key to return to the <PTR INPUT MENU> screen.
  5. Enter the data number and press the [E.STA] key. The corresponding data number is input at the place where the cursor is placed.
- e.g. When the cursor is placed at [TOOL DATA], enter [1] and press the [E.STA] key. Tool data 1 of the external device is input.

## Operation method

Move the cursor to the desired data bank, enter the data number, and press the [E.STA] key.

- |                     |   |
|---------------------|---|
| When in input mode: | If an identical data bank exists in the TC, the input confirmation screen appears. If none exists, the data bank is transferred and the <DATA LIST> screen appears upon completion. |
| When in check mode: | Data bank's cross-reference check is performed. The check results are displayed upon completion.  |

When the data number is not designated (when only the [E.STA] key is pressed), the data number currently used for the TC is stored.

## When an identical data bank exists in the TC

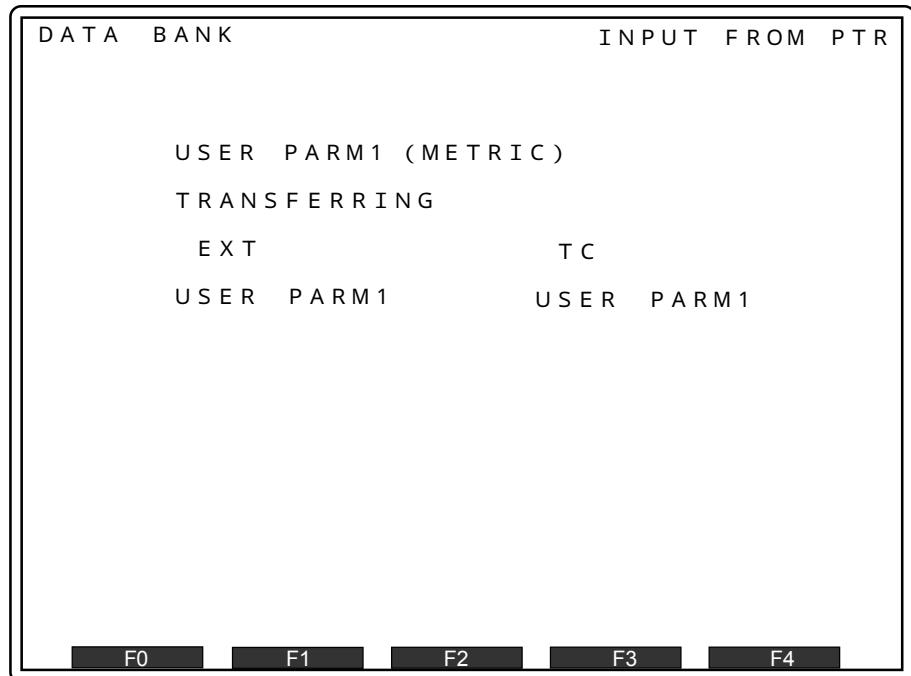
## Remarks

10

The same operation method applies for other data banks (TOOL, DATA, etc.).

## Outline

1. Press the **[F0]** key. The data bank is deleted from the TC and the data bank of the designated No. is input. At this time, the <TRANSFERRING> screen appears.
  2. Press the **[F1]** key to cancel data bank input. The display returns to the data bank list screen.



### Remarks

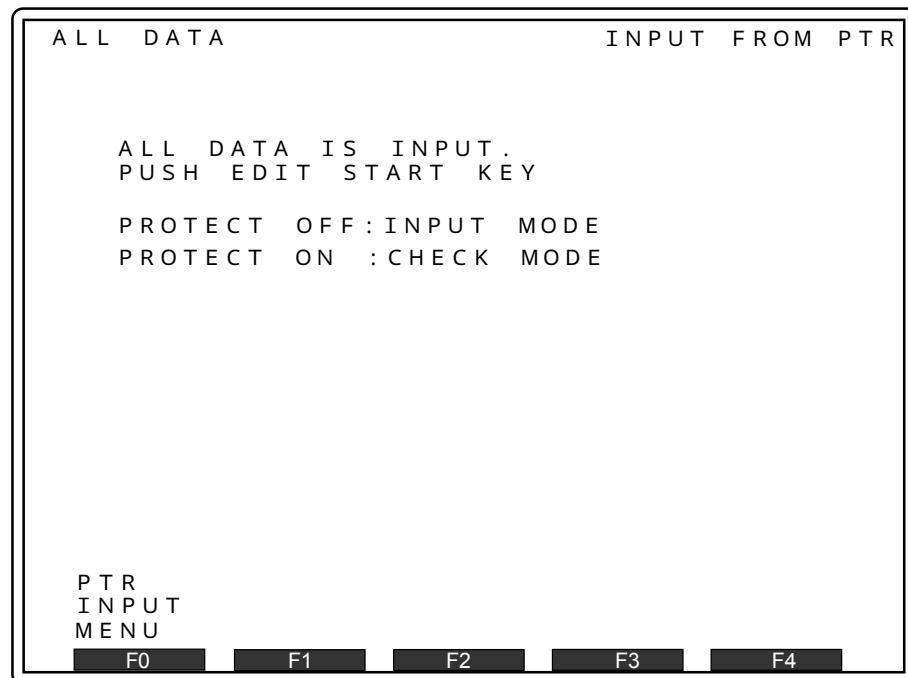
**10**

The same operation method applies for other data banks (TOOL DATA, etc.).

### 10.2.1.3 Input from PTR - All data

All programs stored in the external device and all data banks corresponding to the unit system currently selected (metric or inch) are input.

Enter [3] or move the cursor to that number on the <PTR INPUT MENU> screen, and press the [EOB/ENT] key.



10

### Outline

1. Press the [F0] key to return to the <PTR INPUT MENU> screen.
2. Set the [PROTECT] select switch to [PROTECT OFF] to select input mode: set to [PROTECT ON] to select check mode.

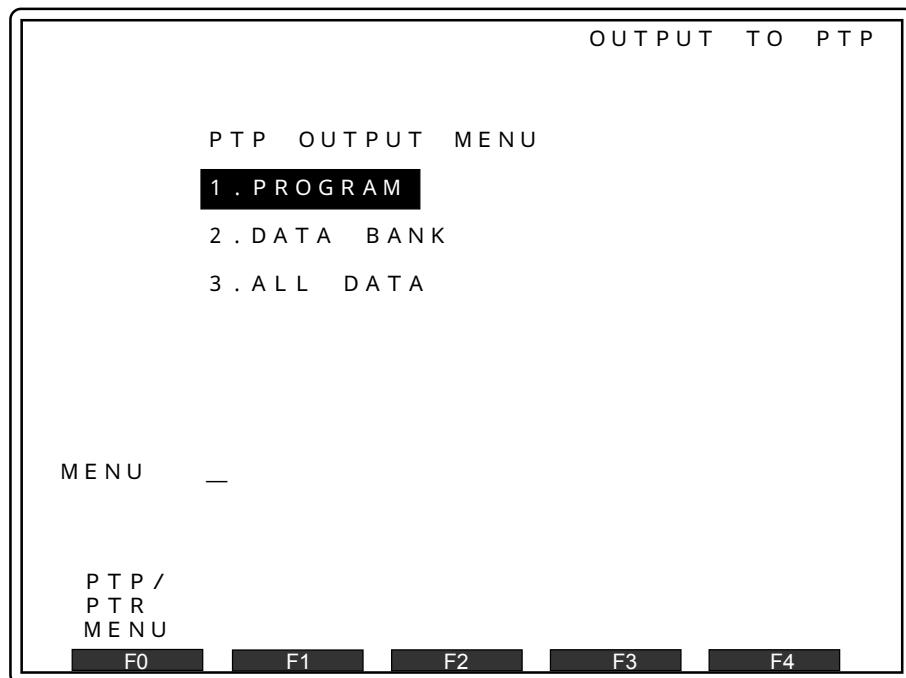
### Operation method

When input mode is selected, press the [E.STA] key and all data is input.

When check mode is selected, press the [E.STA] key and cross-reference check is performed for all data.

### 10.2.2 PTP output menu

1. Enter [2] or move the cursor to that number on the <PTP/PTR MENU> screen, and press the [EOB/ENT] key. The <PTP OUTPUT MENU> screen appears.



10

2. Enter the desired item number by pressing the appropriate numerical key or move the cursor to the desired item, and press the [EOB/ENT] key.
3. Press the [F0] key to return to the <PTP/PTR MENU> screen.

### 10.2.2.1 Output to PTP

1. Enter [1] or move the cursor to that number on the <PTP OUTPUT MENU> screen, and press the [EOB/ENT] key.

PROGRAM	DIR.	OF	TC	OUTPUT	TO	PTP
0 0 0 1 2 4	0 0 5 2	1				
0 0 0 2 2 5	0 0 5 3	1				
0 0 0 3 1	0 0 5 4	1				
0 0 0 4 1	0 0 5 5	1				
0 0 1 5 9	0 0 5 6	1				
0 0 4 2 1	0 6 6 6	1				
0 0 4 3 1	0 4 1 0	1				
0 0 4 4 1	3 1 0 0	5				
0 0 4 5 1	3 1 0 1	5				
0 0 4 6 1	3 1 0 2	1				
0 0 4 7 1	3 1 0 3	1				
0 0 4 8 1	9 9 0 1	1				
0 0 4 9 1	9 9 0 2	1				
0 0 5 0 1	9 9 0 3	1				
0 0 5 1 1	9 9 0 4	1				

PROGRAM NO. —

SET PRGM NO & PUSH EDIT START KEY  
A - B : NO. A IS CHANGED TO NO. B & OUTPUT.  
A / B : NO. A TO NO. B ARE OUTPUT.

PTP  
OUTPUT  
MENU

F0 F1 F2 F3 F4

PROGRAM	DIR.	OF	TC	OUTPUT	TO	PTP
0 0 0 1	2 4			9 7 / 0 7 / 0 6		
0 0 0 2	2 5			9 7 / 0 6 / 2 2		
0 0 0 3	1			9 7 / 0 7 / 0 5		
0 0 0 4	7			9 7 / 0 7 / 0 6		
0 0 1 5	1			9 7 / 0 7 / 0 6		
0 0 4 2	1	T A P	M 3	9 7 / 0 6 / 2 3		
0 0 4 3	9	A R B		9 7 / 0 6 / 2 1		
0 0 4 4	1	*****	*****	9 7 / 0 6 / 2 4		
0 0 4 5	1	T A P	M 4	9 7 / 0 6 / 2 3		
0 0 4 6	1	T A P	M 5	9 7 / 0 6 / 2 3		
0 0 4 7	1	D R I L L	5	9 7 / 0 6 / 2 3		
0 0 4 8	1	C B O R		9 7 / 0 6 / 2 3		
0 0 4 9	1	C H A M F E R		9 7 / 0 6 / 2 3		
0 0 5 0	1	*****	*****	9 7 / 0 6 / 2 4		
0 0 5 1	1	*****	*****	9 7 / 0 6 / 2 4		

PROGRAM NO.  
SET PRGM NO & PUSH EDIT START KEY  
A-B: NO.A IS CHANGED TO NO.B & OUTPUT.  
A/B: NO.A TO NO.B ARE OUTPUT.

PTP  
OUTPUT  
MENU

F0 F1 F2 F3 F4

## Outline

1. A-B: Outputs program No. A stored in the TC to the computer as program No. B.
2. A/B: Continuously outputs the programs from Nos. A to B in the TC to the computer, piece by piece.

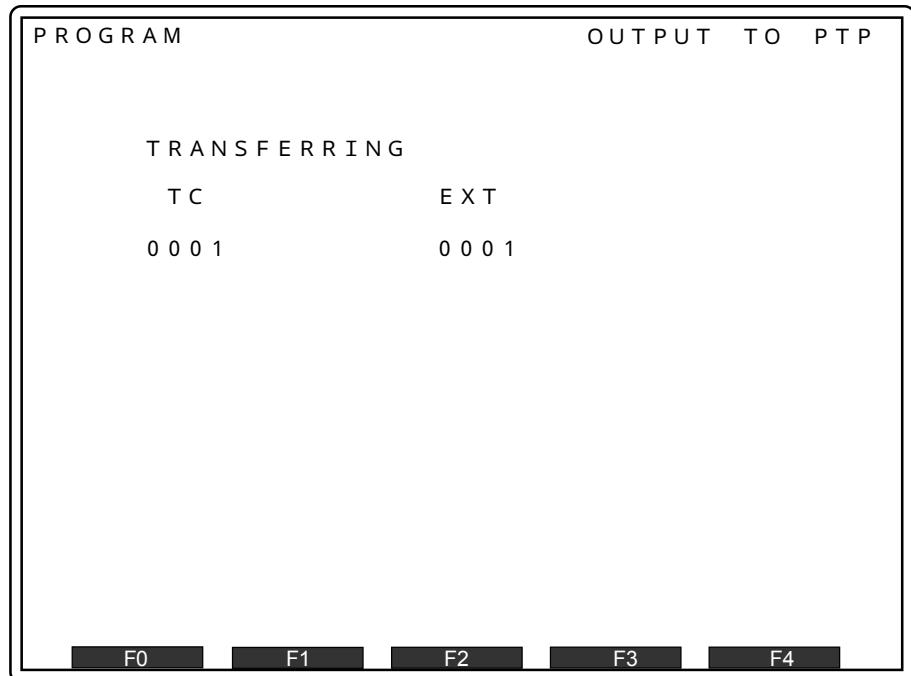
e.g. '1/3' means:

Outputs programs 0001 to 0003 stored in the TC to the external device.

3. Use the [PAGE DOWN] and [PAGE UP] keys to scroll the page.
4. Use the [CURSOR UP] and [CURSOR DOWN] keys to move the cursor. Note that the [CURSOR LEFT] and [CURSOR RIGHT] keys are valid to move the cursor only when not displaying the commands.
5. Press the [F0] key to return to the <PTP OUTPUT MENU> screen.

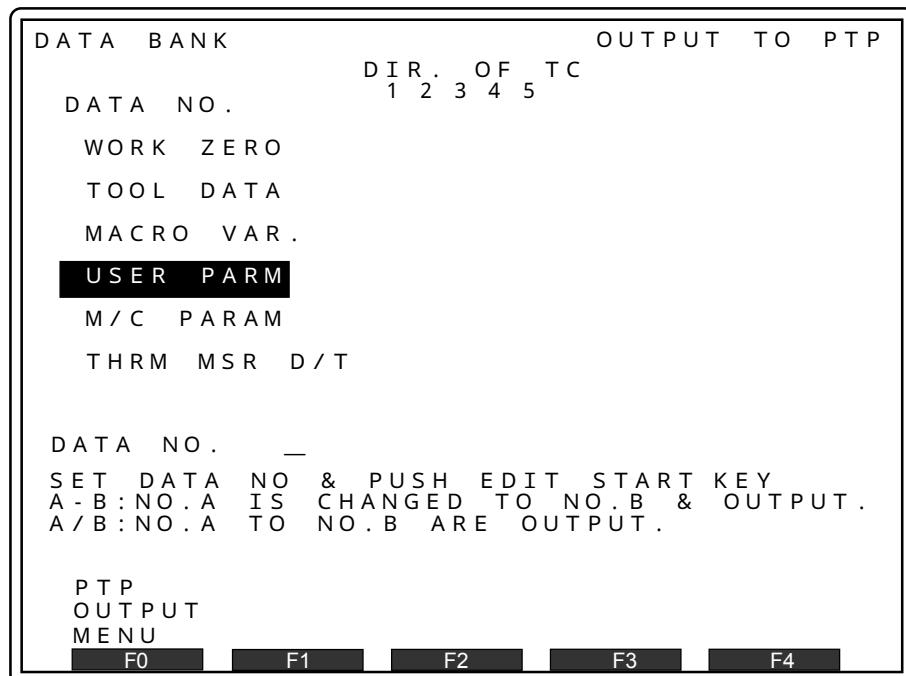
## Operation method

Enter the program number or move the cursor to the desired program to be output, and press the [E STA] key. Program output commences.



### 10.2.2.2 Output to PTP - Data bank

1. Enter [2] or move the cursor to that number on the <PTP OUTPUT MENU> screen, and press the [EOB/ENT] key.



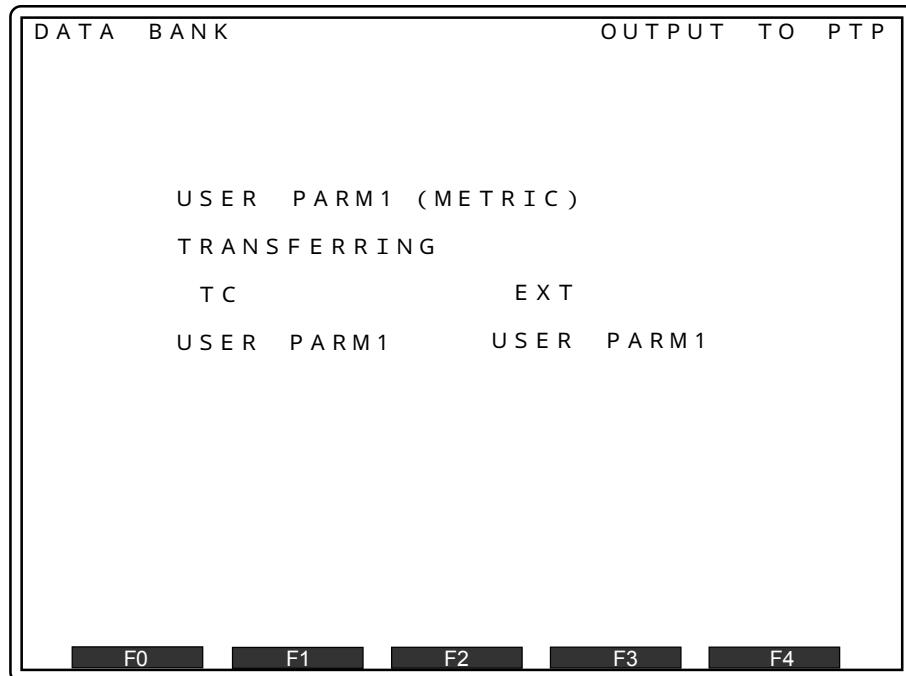
## 10

### Outline

1. : Indicates that the data bank exists.
2. : Indicates the data bank currently used for the TC.
3. A-B: Inputs data No. A in the external device to the TC as data No. B.
4. A/B: Continuously inputs the data Nos. A to B in the external device to the TC, piece by piece.
5. Use the [CURSOR UP] and [CURSOR DOWN] keys to move the cursor.
6. Press the [F0] key to return to the <PTP OUTPUT MENU> screen.
7. Machine parameters are invalid for A/B.

### Operation method

Move the cursor to the desired data bank to be output, enter the data number, and press the [E STA] key. The designated data bank is output. The <DATA LIST> screen appears upon completion.



### Remarks

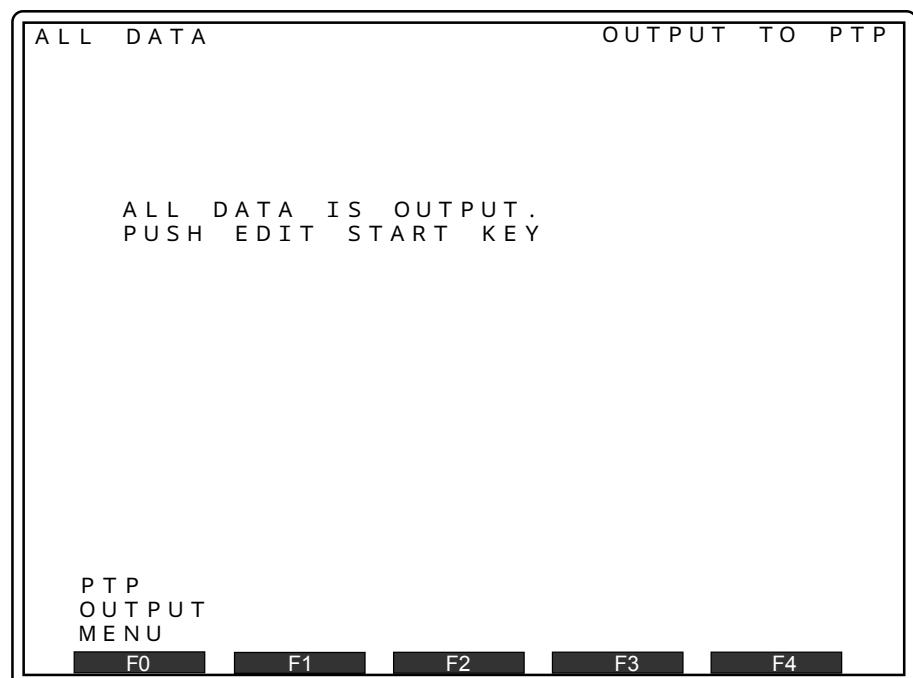
10

The same operation method applies for other data banks (TOOL DATA, etc.).

### 10.2.2.3 Output to PTP - All data

All programs stored in the TC and all data banks corresponding to the unit system currently selected (metric or inch) are output.

Enter [3] or move the cursor to that number on the <PTP OUTPUT MENU> screen, and press the [EOB/ENT] key.

**10**

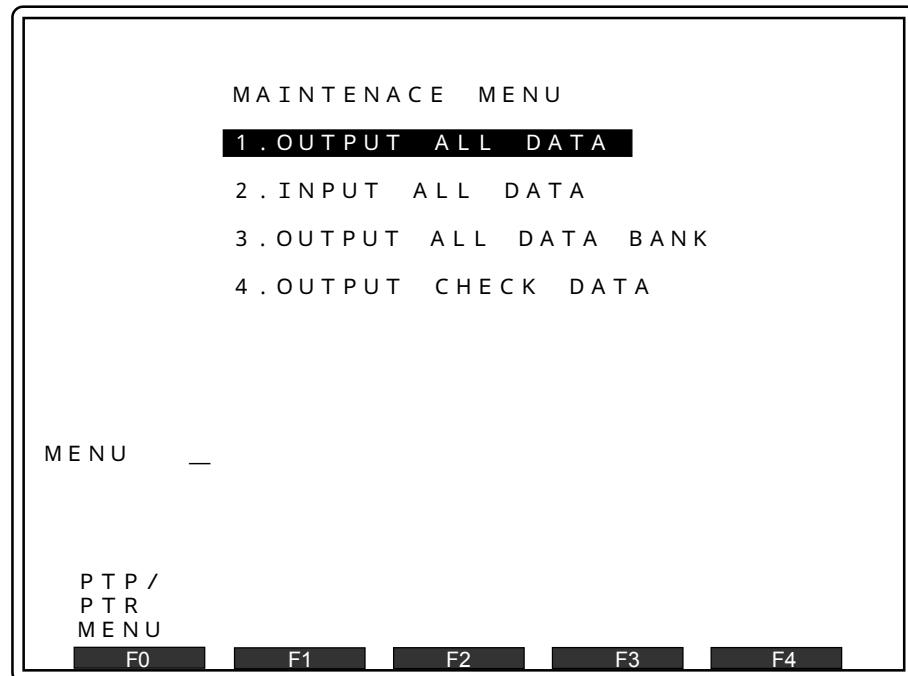
## Outline

1. Press the [F0] key to return to the <PTP OUTPUT MENU> screen.
2. Press the [E\_STA] key. The <TRANSFERRING> screen appears and all data is output.

### 10.2.3 Maintenance menu

1. Enter [3] or move the cursor to that number on the <PTP/PTR MENU> screen, and press the [EOB/ENT] key.

The <MAINTENANCE MENU> screen appears.



10

2. Enter the desired item number by pressing the appropriate numerical key or move the cursor to the desired item, and press the [EOB/ENT] key.
3. Press the [F0] key to return to the <PTP/PTR MENU> screen.

### **10.2.3.1 Maintenance - All data output**

Refer to the descriptions for Computer - Maintenance - All data output.

### **10.2.3.2 Maintenance - All data input**

Refer to the descriptions for Computer - Maintenance - All data input.

### **10.2.3.3 Maintenance - All data bank output**

Refer to the descriptions for Computer - Maintenance - All data banks output.

### **10.2.3.4 Maintenance - Check data output**

Refer to the descriptions for Computer - Maintenance - Check data output.

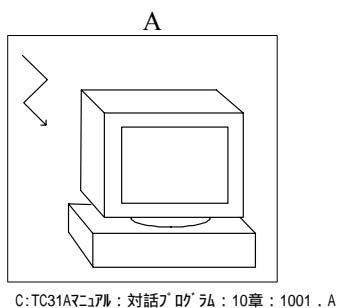
## 10.3 Input/output by Computer (T/C slave station)

When a T/C slave station communication is used, even if the TC is in the machining state, the program for the next machining can be downloaded to the TC and the corrected program after testing can be stored in the computer.

For communication with the computer, a communication method exclusively for BROTHER is used, so software used on the computer side must be created.

Please designate "Computer communication protocol type 2" when a TC slave station is used.

The A mark is displayed on the screen during communication with the slave station.



### 1 ) TC directory data input

To inquire the TC directory data, the instruction Slave station directory data input is given to the TC by the computer.

When the machine is communicating either with the reader/puncher, computer (host station TC), TC slave station communication is not available.

### 2 ) Data output to the TC

Data in the computer is output to the TC.

The instruction Data output is given to the TC by the computer.

Set the EDIT MODE selection switch to EDIT.

When the machine is communicating either with the reader/puncher, computer (host station TC), TC slave station communication is not available.

Thermal measurement data cannot be output.

10

NOTE: When data existing in the TC is overwritten with new data, set DATA OVERWRITE of user parameter 3 to 1: YES. If overwriting is attempted when DATA OVERWRITE is set to 0: NO, an error occurs and the data is not stored in the TC.

### 3 ) Data input from the TC

Data in the TC is input to the computer.

The instruction Data input is given to the TC by the computer.

## 10.4 List of Tape Codes Used for Communication

Tape code can be selected among the following three codes.

- a) ISO code
- b) ISO code (7bit)
- c) EIA code

I S O										E I A								Meaning
Character	8	7	6	5	4	3	2	1	Character	8	7	6	5	4	3	2	1	
0									0									Figure 0
1									1									Figure 1
2									2									Figure 2
3									3									Figure 3
4									4									Figure 4
5									5									Figure 5
6									6									Figure 6
7									7									Figure 7
8									8									Figure 8
9									9									Figure 9
A									A									Address A
B									B									Address B
C									C									Address C
D									D									Address D
E									E									Address E
F									F									Address F
G									G									Address G
H									H									Address H
I									I									Address I
J									J									Address J
K									K									Address K

I S O								E I A								Meaning	
Character	8	7	6	5	4	3	2	1	Character	8	7	6	5	4	3	2	1
L									L								Adress L
M									M								Adress M
N									N								Adress N
O									O								Adress O
P									P								Adress P
Q									Q								Adress Q
R									R								Adress R
S									S								Adress S
T									T								Adress T
U									U								Adress U
V									V								Adress V
W									W								Adress W
X									X								Adress X
Y									Y								Adress Y
Z									Z								Adress Z
DEL									DEL							(1)	Delete
NUL									BLANK							(1)	No punch
BS									BS							(1)	Backspace
HT									TAB							(5)	Tabulator
LF/NL									EOB/CR								End of block
CR									X								(7) Carriage return
SP									SP								Space

I S O									E I A									Meaning
Character	8	7	6	5	4	3	2	1	Character	8	7	6	5	4	3	2	1	
%									ER									(6) End of record
(									C/O(2+4+5)									Control out
)									C/I(2+4+7)									Control in
+									+									Positive sign
-									-									Negative sign
:																	(4) Colon	
/									/									Optional block skip
.									.									Period (Decimal point)
#																		(3) Sharp
\$																		(1) Dollar sign
&									&									(3) Ampersand
'																		(1) Apostrophe
*																		(2) Asterisk
,									,									(2) Comma
;																		(1) Semicolon
<																		(1) Left angle bracket
=																		(1) Equal sign
>																		(1) Right angle bracket
?																		(2) Question mark
@																		(1) At mark
“																		(1) Quotation mark
[																		(3) Open square bracket
]																		(3) Close square bracket

- \* 1. Blank in “processing” indicates that data are read normally.
- \* 2. (1) in “processing” and any other codes not listed in this table indicate that one of the following precessing will be taken except for label skip section according to parameter setting.

- a) When inputted, the communication is stopped as an error.
- b) It is converted to a specific code.

[ISO : ? (question mark)]

- c) When inputted, it is ignored.

- \* 3. (2) in “processing” indicates that data are read normally but it will cause an error in operation if it is located in the significant section.

- \* 4. (3)

- \* 5. (5) in “processing” indicates that it is converted to “O” (address O) when inputted in ISO.

- \* 6. (6) in “processing” indicates that it can be only used for tape start or tape end code in both ISO or EIA.

- \* 7. (7) in “processing” indicates that it can be only used for tape start or tape end code in both ISO and EIA.

- \* 8. (8) in “processing” indicates that it is always ignored when inputted on ISO.

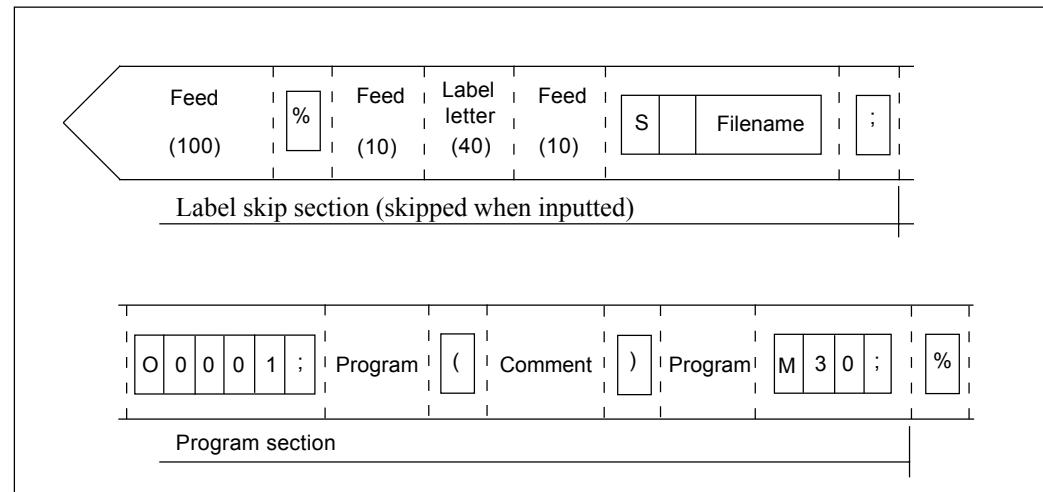
- \* 9. In ISO (7bit) codes, the bit 8 of ISO code in this table is always masked (not punched).

- \* 10. Switching ISO/EIA is automatically distinguished by the first LF/EOB on the tape when a tape is inputted.

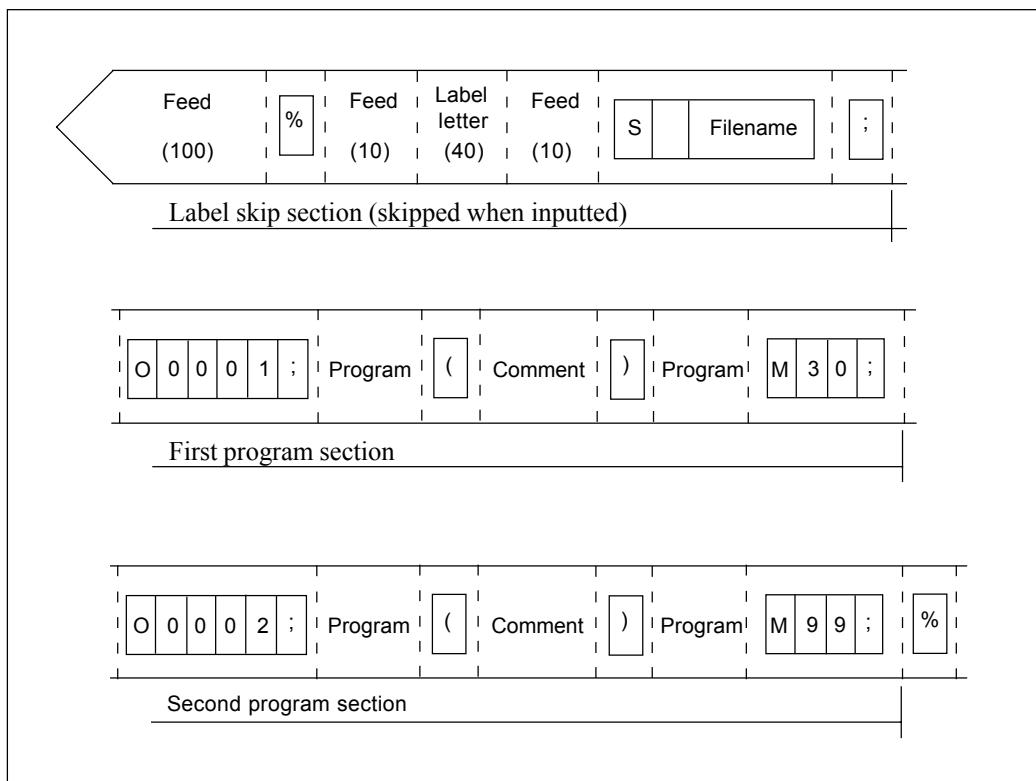
## 10.5 Protocol of PTP/PTR

### 10.5.1 Tape Format

a) When there is only one program on the tape :



b) When there are several program on the tape :



- \* 1.  % is tape start and tape end code (ISO : %, EIA : ER).
  - \* 2.  ; is end of block code (ISO : LF, EIA : EOB).
  - \* 3.    is a space (ISO/EIA : SP).
  - \* 4. Feed (ISO : NULL, EIA : BLANK)
  - \* 5. Label letter is a leading label of the tape (selectable by parameter).
  - \* 6. 

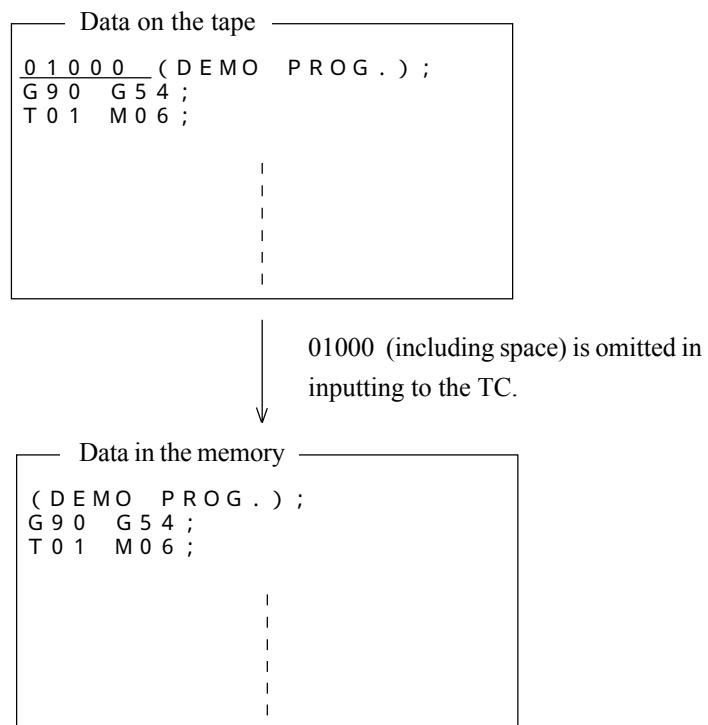
S		Filename
---	--	----------

 indicates the direction of data transfer and the kind of data (fixed to 10 characters). Filename is refer to computer communication.
  - \* 7. The figure in brackets ( ) shows the number of characters outputted.
  - \* 8. Program number data (  0  0  0  1  ; ,  0  0  0  2  ; ) at the top of program can be omitted when inputting to TC.
  - \* 9. The data on the program No. at the beginning of each program is used only if there is no specification of program No. to input to the TC.  
They are not stored in memory.

Therefore, the block following the program No. data at the beginning of the program is regarded as the first one.

- \*10. The program No. data at the beginning of a program should be used in general as an independent block containing a comment.

If it is not used as independent block, the address 0 and the data on the following No. are omitted.

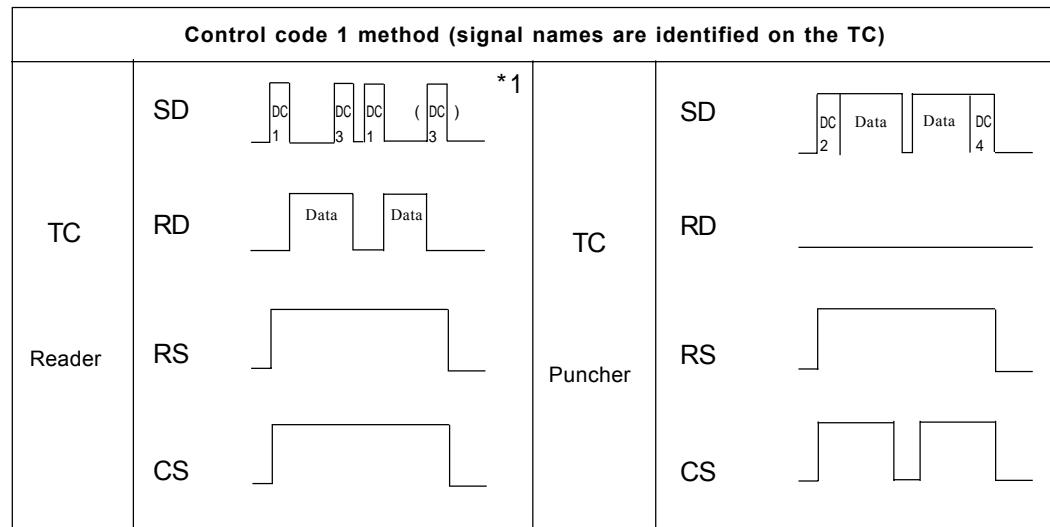
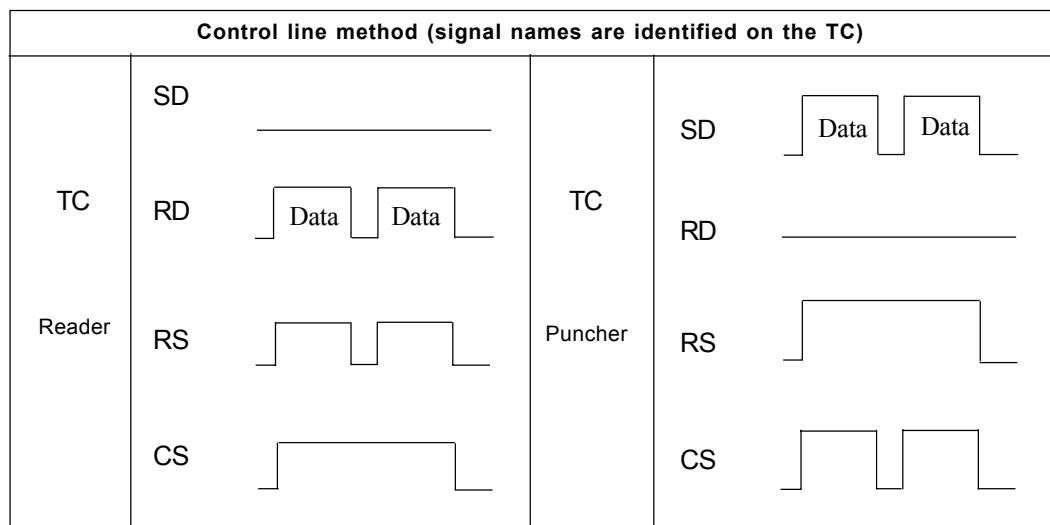


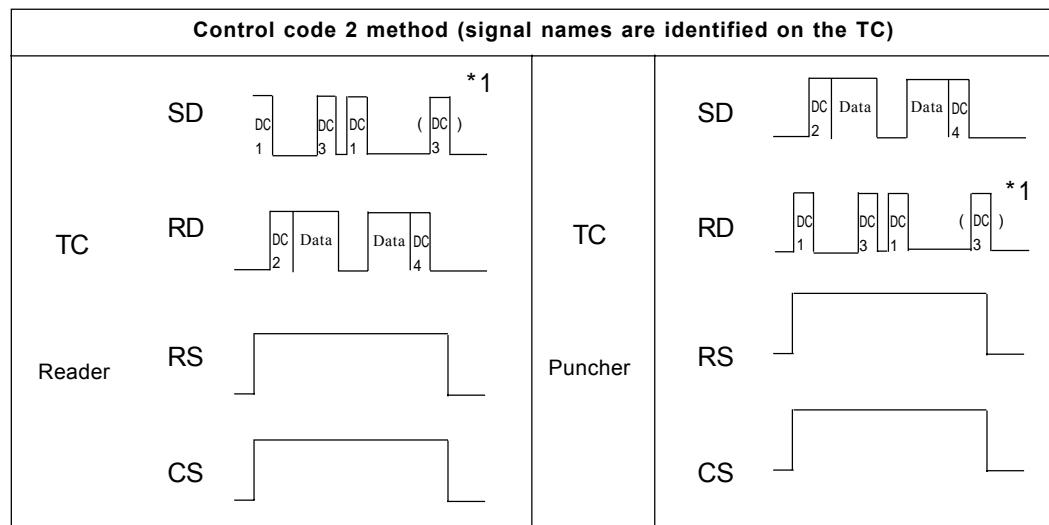
- \*11. When the ISO code is used, ":" (colon) can be used instead of the address 0 for the program No. data at the beginning of a program.

### 10.5.2 List of Communication Method

Depending on the parameter, one of the following can be selected:

- a) Control line method
- b) Control code 1 method
- c) Control code 2 method





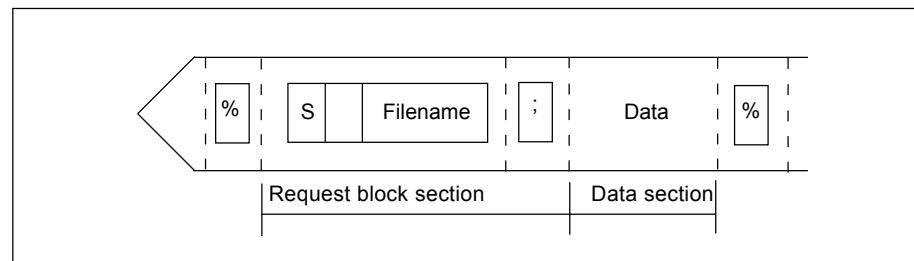
\* 1 : Depending on the parameter, YES or NO can be selected for code DC 3 in the brackets.

\* 2 : Values of codes DC 1 to DC 4 can be set in the parameters.

## 10.6 Computer Communication Protocol Type 1

### a) Data output

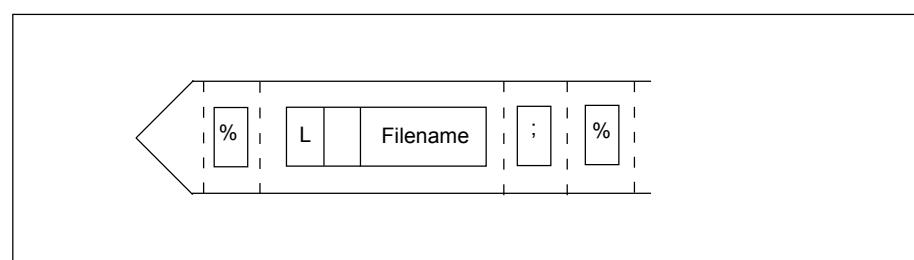
Master station outputs the data to slave station , adding a request block in front of the data.



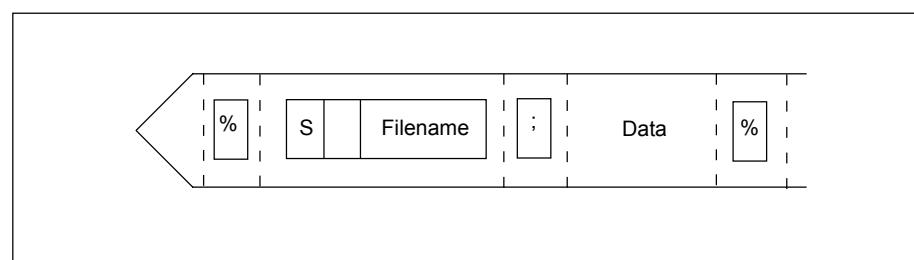
Slave station saves the inputted data according to the request block in front of the data.

### b) Data input

Master station outputs a request block of data to be inputted to the slave station.

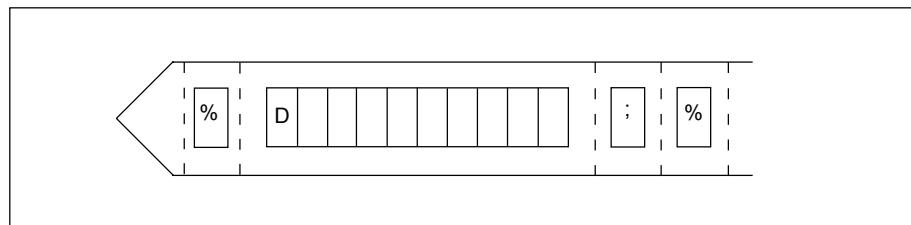


Slave station outputs the requested data to the master station , adding the request block in front of the data.

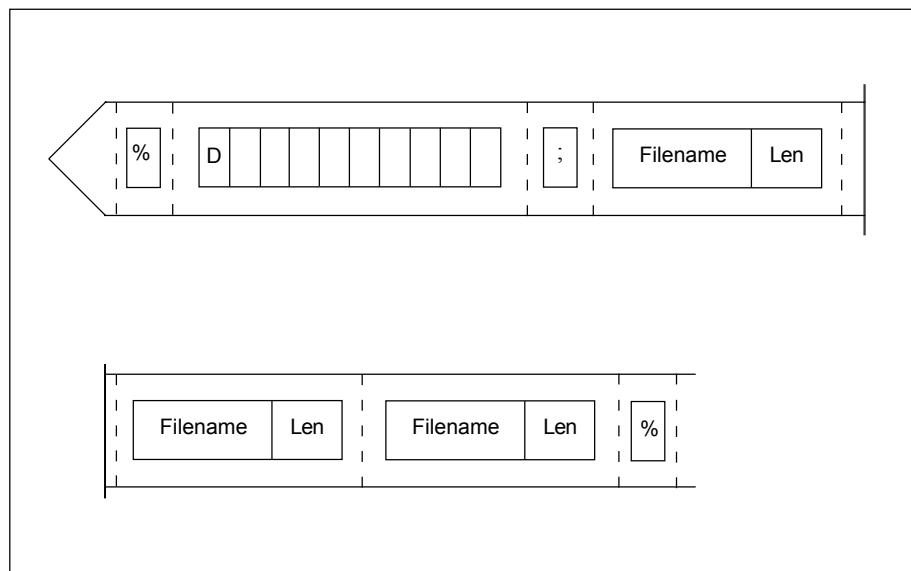


**c) Directory data input on slave station**

Master station outputs a request block as below to the slave station.



Slave station outputs the directory data to the master station , adding the request block in front of the data.



- \* 1.  % is tape start and tape end code (ISO : %, EIA : ER).
  - \* 2.  ; is end of block code (ISO : LF, EIA : EOB).
  - \* 3.     is a space (ISO/EIA : SP).
  - \* 4.  S     Filename    and     L     Filename    indicate the direction of data transfer and the kind of data (fixed to 10 characters).

S indicates data output.

**L** indicates data input.

Filename depends on the kinds of data as follows :

Working zero position 

P	O	S	N	u	*		
---	---	---	---	---	---	--	--

 u : 

M
---

 (metric data) or 

I
---

 (inch data)

Tool data 

T	O	L	N	u	*		
---	---	---	---	---	---	--	--

Macro variable **M C R N u \***

User parameter | P | R | M | N | u | \* |

Maxhineparameter	P	R	M	*					
------------------	---	---	---	---	--	--	--	--	--

Maxhineparameter	P	R	M	*					
------------------	---	---	---	---	--	--	--	--	--

\* 5. When requesting directory, specify  [Filename] in the same manner as 4.

[Len] should specify data size using three figures of

0  0  1 -  9  9  9.

\* 6. Refer to Tape code list as for character codes.

## 10.7 Computer Communication Protocol Type 2

### 10.7.1 External device communication function

Once Computer Communication Protocol Type 2 is set as Command - Response type , the command acceptance status can be externally checked , ensuring problem - free and precise control.

#### Data transfer function

Saving or sending data can be requested of the TC.

#### Remote operation

Performing origin return , starting and stopping memory operation can be remotely controlled via communication, Further , external I/O signals can be manipulated via communication , enabling elaborate remote control.

### 10.7.2 File list and operation range

u ... Unit System (metric :M, Inch :1)

n ... Program number, Data bank number

Kind of data	Contents of data	File name
Program		Onnn
Working zero position		POSNun
Tool Data		TOLNun
Macro variable		MCRNun
User parameter		PRMNun
Machine parameter		PRMn
Thermal Measurement Data		MSMTNu
Production Data 1	Magazine tool Operation time Operation program number Edit program number	PRD1N
Production Data 2	Work counter Operation time Operation log	PRD2N
Machine Monitor Data (Production Data 3)	Operation/Edit program number Operation time Production counter	MONTRN
Machine Data 1	Software switch Magazine origin data etc..	SYS99
Machine Data 2	Z-axis thermal distortion data	SYS98
Machine Data 3	X-axis thermal distortion data	SYS97
Machine Data 4	Y-axis thermal distortion data	SYS96
Auto thermal displacement compensation Data		HEACNu
Input/Output Data	I/O screen information	ION
Memory Operation Data	Operation status, Alarm	MEMN
Operation Panel Data	Switch status, Door status	PANELN
Position Data	Modal information, Position information	PDSPN
Version Data	Control software version information	VERN
Alarm Log Data		LOGN

### Operation of the TC from external device

Output ... Output from the TC to the external device  
 Input ... Input from the TC to the external device to the TC

... Operable independently  
 ... Operable comprehensively  
 ✕ ... Not operable

Data name	Output	Input	Delete
Program			
Work Zero Position			
Tool Data			
Macro variable			
User Parameter			
Machine Parameter			
Thermal Measurement Data		✗	✗
Production Data 1,2			✗
Machine Monitor Data (Production Data 3)		✗	✗
Machine Data 1~ 4			✗
Auto Thermal Displacement Compensation Data		✗	✗
Input/Output Data		✗	✗
Memory Operation Data		✗	✗
Operation Panel Data		✗	✗
Position Data		✗	✗
Version Data		✗	✗
Alarm Log Data		✗	✗

Production data 1 , 2 and Machine data 1~ 4 cannot be input to and output from the TC unless the TC is reset.

Operation from the TC to the external device.

For other data , an error may occur in the TC after entry. Conditions when an error occurs are the same as those when the corresponding data is changed on the operation panel.

### Operation of external device from the TC

Data name	Output	Input	Delete	Output all data	Input all data	Delete data bank
Program						x
Work Zero Position						
Tool Data						
Macro Variable						
User Parameter						
Machine Parameter						
Thermal Measurement Data		x	x	x	x	x
Production Data 1,2	x	x	x			x
Machine Monitor Data (Production DAta 3)	x	x	x		x	x
Machine Data 1 ~ 4	x	x	x			x
Auto Thermal Displacement Compensation Data	x	x	x		x	x
Input/Output Data	x	x	x		x	x
Memory Operation Data	x	x	x		x	x
Operation Panel Data	x	x	x		x	x
Position Data	x	x	x		x	x
Version Data	x	x	x		x	x
Alarm Log Data	x	x	x		x	x

### 10.7.3 Remote protocol command list

#### Data operation group

- Request directory: Requests the other station to send the directory data.  
 Save data: Sends the designated data to the other station.  
 Load data: Requests the other station to send the designated data.  
 Delete data: Deletes the designated data.

10

#### Operation control group

- Operation command: Normally starts and stops the program operation or externally starts the program operation.  
 Change command: Selects the designated program.  
     Changes to the designated data bank.  
     Changes to the designated mode.  
     Changes the lock key status.  
     Changes the Registration tool on the Magazine screen.  
 I/O signal command: Utilizes the signal function provided as external I/O signals during communication.

## 10.7.4 Control format

### 1. Basic format

The basic format is composed of the header , data portion , and footer.

The data portion may not exist depending on the control statement.

### 2. Header (19 bytes)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
%	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2

%: Start symbol

11t53.wmf

i1: Identifier . . . 1 byte

C: Command R: Response

For a command with one identifier ‘C’ , response with one identifier ‘R’ is definitely returned.

Identifier ‘R’ is used for the response to the command. The completion code is set as well as the same contents as those for the command.

c1-c3:Command . . . 3 bytes

f1-f4: Function . . . 4bytes

s1-s8: Transmission statement . . . 8 bytes

r1-r2: Completion code . . . 2 bytes

Completion code 00: Normal end Other than 00: Abnormal end

The blanks shown in the table of command header that follow from next page indicate space.

10

### 3. Data portion

The portion starting with ‘LF’ until ‘LF’ of the footer appears is defined as the data portion.

### 4. Footer (4 bytes)

The footer is delimited be ‘LFss%’.

‘ss’ indicates the checksum and a 2- digit decimal number is output.

For calculation , all portions after % in the header to the character immediately before ‘LF’ of the footer are added to decimal number and divided by decimal 16.

**Data operation group**

**<Request directory>**

**Request the directories of all data.**

Request the master station to send the directory.

The directory data is returned as a response, in the format below.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	D	R	Q	A	A	L	L	△									

9-85-1.xls

\*Response data

Header	LF	Data name	Size	...	Footer						
--------	----	-----------	------	-----------	------	-----------	------	-----------	------	-----	--------

9-85-4.xls

Data name: ... 8 bytes (See Note 1)

Size: ... 3 bytes

The data size is indicated by the number of blocks. One block contains 128 bytes.

The footer appears after the existing pieces of data are output.

10

**Request the directory by designating the data name.**

Request the master station to send the directory of the designated data.

This function is useful when confirming whether the designated data is present at the master station.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	D	R	Q	S	E	L	△	n1	n2	n3	n4	n5	n6	n7	n8		

9-85-2.xls

n1n2n3n4n5n6n7n8 : Designates the data name. (See Note 1)

\*Response data

The data is returned in the same format as the case requesting directories of all data.

**<Save data>****Save the designated data at the master station.**

Transmit the designated data to the computer of the master station.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	S	A	V					n1	n2	n3	n4	n5	n6	n7	n8		

9-86-1.xls

n1n2n3n4n5n6n7n8 :Designates the data name. (See Note 1)

\*Command data

Header	LF	... Data ...	LF	Footer
--------	----	--------------	----	--------

9-86-2-1.xls

The contents of the designated data are sent to the portion after &lt;LF&gt;.

The footer is recognized upon detection of the next &lt;LF&gt;. The data is the portion between &lt;LF&gt; and &lt;LF&gt;.

### <Load data>

**Delete the designated data from the master station.**

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	L	O	D					n1	n2	n3	n4	n5	n6	n7	n8		

9-87-1.xls

n1n2n3n4n5n6n7n8 :Designates the data name. (See Note 1)

\*Response data

The format to be used is the same as the one used for command data explained in <Save data>.

(The character that follows % changes from C to R.)

### <Delete file>

**Delete the designated data from the master station.**

Request the master station to delete the designated data.

The receiving station returns a response when the designated data has been deleted.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	D	E	L					n1	n2	n3	n4	n5	n6	n7	n8		

9-87-2.xls

n1n2n3n4n5n6n7n8 :Designates the data name. (See Note 1)

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#### (Note 1)

“Data name” means file name that is described in the table “File list and operation range (10.7.2)”.

e.g.

When deleting the tool list data of program number 3 with Inch unit , input the command header as follows.

Data name (8 bytes)

%	C	D	E	L					T	O	L	C	I	3			
---	---	---	---	---	--	--	--	--	---	---	---	---	---	---	--	--	--

(The blanks shown in the table of command header that follow from next page indicate space.)

## Operation control group

### <Operation command>

#### Program operation is started.

Start operation of the designated program. Once the program number is designated, the program starts regardless of the input status of the external I/O signals or program number selection signals (PR01, PR02, PR04, or PR08).

Designating the program number can be omitted.

In this case, the program is selected as below.

When any of the external I/O signals (PR01, PR02, PR04, or PR08) are input, the instructions according to the signal are followed.

When any of the external I/O signals are not input, the program currently selected in memory operation mode is started.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	M	E	M	S	T	R	T	p1	p2	p3	p4						

9-88-1.xls

p1p2p3p4 : Program number (Can be omitted)

#### Stop the program operation.

The program is stopped.

Once ON is commanded, the ON state is maintained until OFF is commanded.

Accordingly, to resume operation, OFF must be commanded. The program stops when either the external I/O signal (EXSTOP) or the state commanded via communication is ON. When both are ON, the machine determines that the stop key is pressed.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	M	E	M	S	T	O	P	s1	s2	s3							

9-88-2.xls

s1s2s3 ON ... Creates the state when the stop key is pressed.

OFF ... Creates the state when the stop key is not pressed.

**Externally start the program operation (For TC-31A, 32A, R2A only).**

The designated program is externally started.

Designate the number of the program to be operated. Once the program number is designated, the program starts regardless of the input status of the external I/O signals or program number selection signals (PR01, PR02, PR04, or PR08).

Designating the program number can be omitted. In this case; the program is selected as below.

When any of the external I/O signals (PR01, PR02, PR04, or PR08) are input, the instructions according to the signal are followed.

When any of the external I/O signals are not input, the program designated by the parameter is started. If external start is reserved after the program has been already externally started, this reservation is cancelled.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	M	E	M	Q	T	S	T	p1	p2	p3	p4						

9-89-1.xls

p1p2p3p4 : Operation program number (Can be omitted)

**<Change command>****Change the program selection.**

The designated program number is selected. The designated program is displayed on the program screen during memory operation mode. The program cannot be changed while performing an operation on it or editing the designated program. The program can be changed only in memory operation mode or in edit mode.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	C	H	G	P	R	O	G	p1	p2	p3	p4						

9-90-1.xls

p1p2p3p4 : Program number

**Change the current data bank.**

The data bank currently used can be changed. Only the data name used for the data bank can be designated. The data bank cannot be changed while performing an operation on it or editing .

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	C	H	G	D	B	K	△	n1	n2	n3	n4	n5	n6	n7	n8		

9-90-2.xls

n1n2n3n4n5n6n7n8 : Designates data bank name

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**Change the mode.**

The mode can be changed as desired.

Note that this cannot be done while operating the machine or editing the program , or data.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	C	H	G	M	O	D	E	m1	m2	m3	m4						

9-90-3.xls

m1m2m3m4: MNL ... Switch to MANUAL mode.

MDI ... Switch to MDI mode.

MEM ... Switch to MEMORY mode.

EDIT ... Switch to EDIT mode.

## Change the key status of memory operation mode.

The ON/OFF status of each key to be used during memory operation mode can be changed.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	C	H	G	k1	k2	k3	k4	s1	s2	s3							

9-91-1.xls

k1k2k3k4 : DRYR... Dryrun SNGL ... Single block MACL ... Machine lock OPTS ... Optional stop BLKS ... Block skip	s1s2s3 : ON OFF
--	--------------------

## Change the tools in the magazine.

The number assigned to a tool in the magazine can be changed.

Note that this cannot be done while operating the machine or editing the program.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	C	H	G	M	A	G	k1	m1	m1	t1	t2						

9-90-2.xls

k1: M . . . Changing tool  
 S . . . Changing group  
 K . . . Changing tool type

m1m2: magazine number ('00' is assigned to the tool to be mounted in the spindle)

t1t2 : tool number or group number (when k 1 = M , S)

t1 : Standard tool ; 1. Large tool ; 2 (when k1 = K)

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**Manipulate the external I/O signals.**

Provided external I/O signal functions can be used during communication.

Input signals can be operated and referred to ; output signals can be referred to only. For input signals , not only communication command status but also actual signal input to the terminal (hereafter called ‘actual signal’) are referred to , and the status recognized by the machine is returned. The attached table shows the relationship of the signal operation using the actual signals and communication commands , and the symbols of signals that can be commanded.

\*Command header

	i1	c1	c2	c3	f1	f2	f3	f4	s1	s2	s3	s4	s5	s6	s7	s8	r1	r2
%	C	I	O	C	c1	c2	c3	c4	s1	s2	s3	s4	s5	s6				

9-92-1.xls

c1c2c3c4:      REF ...      Reference

MOD ...      Manipulate the designated signal.

s1s2s3s4s5s6 : Signal (See the tables attached from next page)

\*Command data while being operated and response data while being referred to it.

Header	LF	s1s2s3	LF	%
--------	----	--------	----	---

9-92-2.xls

s1s2s3 : ON ...      Turn the designated signal ON.

OFF ...      Turn the designated signal OFF.

## External Input signal

Signals can be referred to and/or changed.

Data name	Kind of signal operation	Data name	Kind of signal operation
PR01	ON/OFF	M460	ON/OFF
PR02	ON/OFF	M462	ON/OFF
PR04	ON/OFF	M464	ON/OFF
PR08	ON/OFF	M466	ON/OFF
PR016	ON/OFF	M468	ON/OFF
PR032	ON/OFF	SPLOCK	ON/OFF
PR064	ON/OFF	ATLOCK	ON/OFF
EXORG	ON	XYLOCK	ON/OFF
CTURN	ON	ZLOCK	ON/OFF
EXREF	ON	4LOCK	ON/OFF
EXREF 2	ON	5LOCK	ON/OFF
EXREF 3	ON	6LOCK	ON/OFF
EXREF 4	ON	MDLOCK	ON/OFF
MFIN	ON	KYLOCK	ON/OFF
OPSKIP	ON/OFF	PRLOCK	ON/OFF
OPSTOP	ON/OFF	EDLOCK	ON/OFF
EXER 10	ON/OFF	DRLOCK	ON/OFF
EXER 11	ON/OFF	EXZORG	ON
EXER 12	ON/OFF	WPEDOK	ON/OFF
EXER 13	ON/OFF	TLEDOK	ON/OFF
EXER 14	ON/OFF	MCEDOK	ON/OFF
EXER 15	ON/OFF	UPEDOK	ON/OFF
EXER 16	ON/OFF	MPEDOK	ON/OFF
EXER 17	ON/OFF	WCEDOK	ON/OFF
EXER 18	ON/OFF	MGEDOK	ON/OFF
EXER 19	ON/OFF	PRSNSR	ON/OFF
EXER 20	ON/OFF	OILEMP	ON/OFF
EXER 21	ON/OFF	BOXDR	ON/OFF
EXER 22	ON/OFF	EXEMS	ON/OFF
EXER 23	ON/OFF	EXRESET	ON
EXER 24	ON/OFF	1028-1.tbl	
EXER 25	ON/OFF		

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For functions of each signal , refer to Chapter 5 Data Bank ->User Parameter -> External I/O signal in the operation manual.

Signals can only be referred to.

Data name	Data name	Data name	Data name
M11	AUTO	M451	RE4FN
M12	STL	M455	RE5FN
M14	MEMOK	M456	RE6FN
M18	NCOK	GRN	RE4FN 2
M21	ALM	YEL	RE5FN 2
M22	ALMLV 1	RED	RE6FN 2
M24	ALMLV 2	DUTUP	RE4FN 3
M28	TOOL	CUTPRE	RE5FN 3
M00	TOLPRE	STPOUT	RE6FN 3
M30/1	ORGFIN	DROPEN	RE4FN 4
M30/2	SPTURN	DRCLS	RE5FN 4
REFIN	ZPX	INDRCL	RE6FN 4
REFIN 2	ZPY	RDYLED	PULOFF
REFIN 3	ZPZ	STPLED	QTSEL 1
REFIN 4	ZPSP	DRYRUN	QTSEL 2
M08	ZP4	SINGL	OILPMP
M400	ZP5	RESTAT	BATALM
M402	ZP6	RPD100	XPOSSW
M404	PFIN 1	SPN100	YPOSSW
M406	PFIN 2	FED100	ZPOSSW
M408	RSTOUT	RELEASE	4POSSW
M480	MEMMOD	SAFETY	5POSSW
M482	TLBRKE	COOLSW	6POSSW
M484	RUNSTP	CHIPSW	ALMA
M486	M450	SDDRCL	(*) MOUT
MF			1029-1.tbl

For functions of each signal , refer to Chapter 5 Data Bank ->User Parameter ->External I/O signal in the operation manual.

(\*)1)Decode value of M21 to M28 for S1;decode value of M1 to M18 for S2;a space is entered for S3.

## 10.8 List of Computer Communication Methods

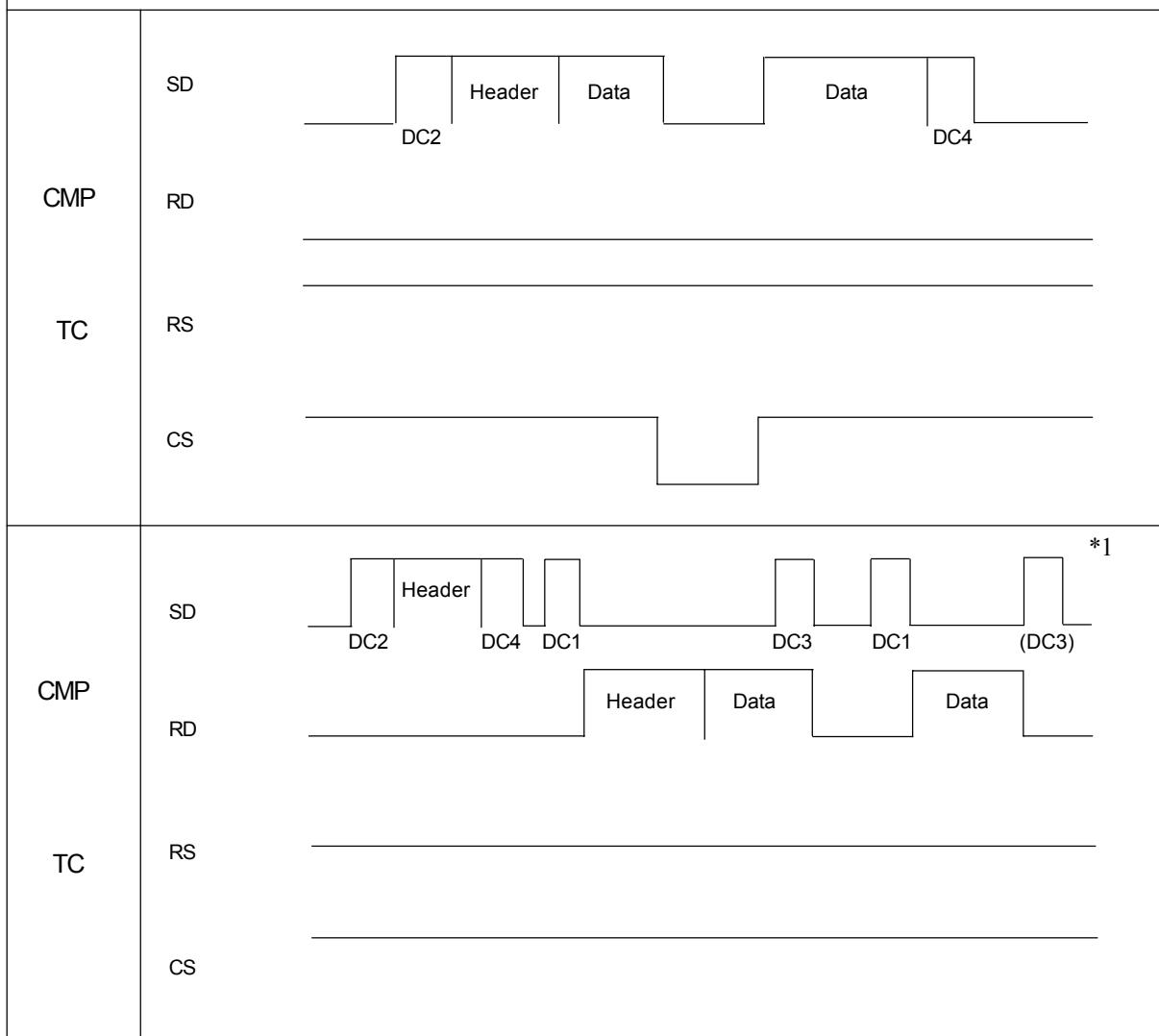
Depending on the parameter , one of the following can be selected :

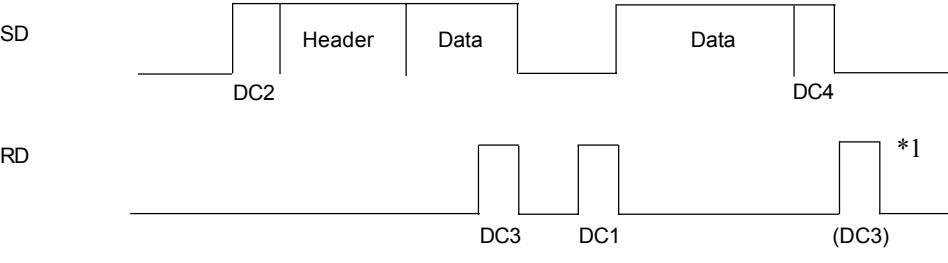
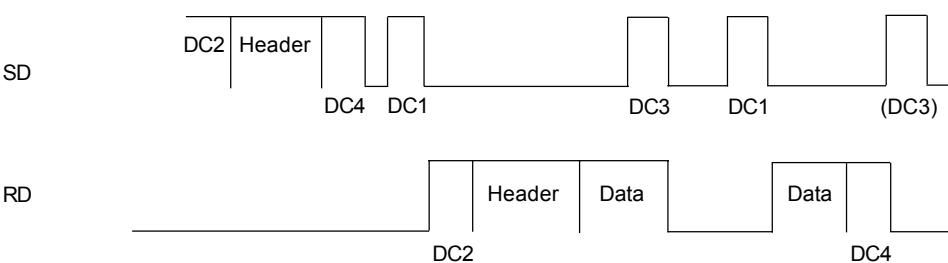
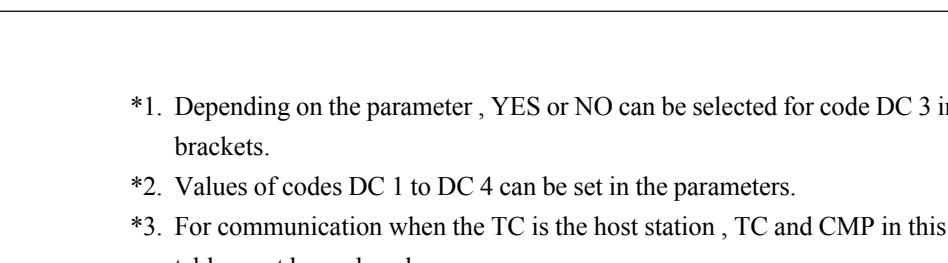
- a) Control line method
- b) Control code 1 method
- c) Control code 2 method

Control line method Host station : CMP (computer) Slave station : TC (signal names are identified on the TC)	
CMP	SD
	RD
	RS
	CS
TC	
	
	
	
CMP	SD
	RD
	RS
	CS

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**Control code 1 method Host station : CMP (computer) Slave station : TC (signal names are identified on the CMP)**



Control code 2 method Host station : CMP (computer) Slave station : TC (signal names are identified on the CMP)	
CMP	
TC	
CMP	
TC	

- \*1. Depending on the parameter , YES or NO can be selected for code DC 3 in the brackets.
- \*2. Values of codes DC 1 to DC 4 can be set in the parameters.
- \*3. For communication when the TC is the host station , TC and CMP in this table must be replaced.

## 10.9 File format

This section describes the data format of each file.

The format includes the symbols and item names.

Each item is delimited by a comma (,) and each symbol is delimited by a line feed code.

### 10.9.1 Machine monitor data (Production data 4) File name: MONTRN

Symbol	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)
P01	Operation program number	4	Edit program number	4				
T01	Total operation time	9	Power on time	9	Operation time	9		
C01	Count	3	Current value	6	Target value	6	End signal value	6
C02	Count	3	Current value	6	Target value	6	End signal value	6
C03	Count	3	Current value	6	Target value	6	End signal value	6
C04	Count	3	Current value	6	Target value	6	End signal value	6

**Note 1: Schedule flag: [0: Not schedule program 1: Schedule program]**

**Note 2: Items related to time: First five bytes • hours, following two bytes • minutes; last two bytes • secondsminutes; last two bytes • seconds**

(Sample data)

Operation program No. 0001, Edit program No. 0010

Total operation time 1234:23:56, Power on time 33333:44:55,

Operation time 65:43:21

Production counter

	Counter 1	Counter2	Counter 3	Counter4
Count	1	0	999	10
Current value	345	0	999999	2000
Target value	1000	0	999999	5000
End signal value	950	0	999999	4000

The data for the above conditions is expressed as below.

```
P 0 1,0 0 0 1,0 0 1 0
T 0 1, 1 2 3 4 2 3 5 6,3 3 3 3 3 4 4 5 5, 6 5 4 3 2 1
C 0 1, 1, 3 4 5, 1 0 0 0, 9 5 0
C 0 2, 0, 0, 0, 0
C 0 3,9 9 9,9 9 9 9 9,9 9 9 9 9,9 9 9 9 9
C 0 4, 1 0, 2 0 0 0, 5 0 0 0, 4 0 0 0
```

### 10.9.2 Thermal measurement data

File name: MSMTNu

[u: Unit system M: Metric, I: Inch]

Thermal distortion compensation data measured by Z-axis measuring system

Symbol	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)
H001	No. of calculations	6	Tool number	2	Initialization flag	1	No. of commands	7
	Measurement displacement	7	Measurement displacement sum	7				
H002	No. of calculations	6	Tool number	2	Initialization flag	1	No. of commands	7
	Measurement displacement	7	Measurement displacement sum	7				
H003	No. of calculations	6	Tool number	2	Initialization flag	1	No. of commands	7
	Measurement displacement	7	Measurement displacement sum	7				

Same as above up to 300

H300	No. of calculations	6	Tool number	2	Initialization flag	1	No. of commands	7
	Measurement displacement	7	Measurement displacement sum	7				

**Note 1: Data: Output in reverse chronological order**

**Note 2: Measurement displacement and displacement sum**

**(plus or minus sign is added)**

**Metric: 5 digit value with 3 decimal places**

**Inch: 5 digit value with 4 decimal places**

**Note 3: Initialization flag: [ 0: Not initialized 1: Initialized ]**

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### 10.9.3 Automatic thermal distortion

compensation data File name: HEACNu

[u: Unit system (M: Metric, I: Inch)]

Symbol	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)
A001	No. of calculations	5	Correction flag	1	Z-axis travel sum	11	Spindle rotation sum	10
	Z-axis displacement	9 or 10	Spindle displacement	9 or 10	Z-axis displacement sum	7	Spindle displacement sum	7
A002	No. of calculations	5	Correction flag	1	Z-axis travel sum	11	Spindle rotation sum	10
	Z-axis displacement	9 or 10	Spindle displacement	9 or 10	Z-axis displacement sum	7	Spindle displacement sum	7
A003	No. of calculations	5	Correction flag	1	Z-axis travel sum	11	Spindle rotation sum	10
	Z-axis displacement	9 or 10	Spindle displacement	9 or 10	Z-axis displacement sum	7	Spindle displacement sum	7

Same as above up to 540

Symbol	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)
B001	No. of calculations	5	Correction flag	1	X-axis travel sum	11	Spindle rotation sum	10
	X-axis displacement	9 or 10	Spindle displacement	9 or 10	X-axis displacement sum	7	Spindle displacement sum	7
B002	No. of calculations	5	Correction flag	1	X-axis travel sum	11	Spindle rotation sum	10
	X-axis displacement	9 or 10	Spindle displacement	9 or 10	X-axis displacement sum	7	Spindle displacement sum	7
B003	No. of calculations	5	Correction flag	1	X-axis travel sum	11	Spindle rotation sum	10
	X-axis displacement	9 or 10	Spindle displacement	9 or 10	X-axis displacement sum	7	Spindle displacement sum	7

Same as above up to 540

C001	No. of calculations	5	Correction flag	1	Y-axis travel sum	11	Spindle rotation sum	10
C002	Y-axis displacement	9 or 10	Spindle displacement	9 or 10	Y-axis displacement sum	7	Spindle displacement sum	7
	No. of calculations	5	Correction flag	1	Y-axis travel sum	11	Spindle rotation sum	10
C003	Y-axis displacement	9 or 10	Spindle displacement	9 or 10	Y-axis displacement sum	7	Spindle displacement sum	7
	No. of calculations	5	Correction flag	1	Y-axis travel sum	11	Spindle rotation sum	10
	Y-axis displacement	9 or 10	Spindle displacement	9 or 10	Y-axis displacement sum	7	Spindle displacement sum	7

Same as above up to 540

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**Note 1: Correction flag: [0: Not executed 1: Executed]****Note 2: Travel sum of each axis****Metric: 10 digit value with 3 decimal places****Inch: 10 digit value with 4 decimal places****Note 3: Displacement of each axis (plus or minus sign is added)****Metric: 7 digit value with 6 decimal places****Inch: 8 digit value with 7 decimal places****Note 4: Displacement sum of each axis (plus or minus sign is added)****Metric: 5 digit value with 3 decimal places****Inch: 5 digit value with 4 decimal places**

### 10.9.4 Memory operation data

File name: MEMN

Symbol	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)
A01	Operation program No.	4	Operation state	1	Inner pallet state	1	Spare part usage	1
	Mode	1						
E01	Alarm 1	4	Alarm2	4	Alarm 3	4	Alarm 4	4
	Alarm 5	4	Alarm 6	4	Alarm 7	4	Alarm 8	4
	Alarm 9	4	Alarm 10	4				

**Note 1:** Operation state: [0: Not operating 1: Operating 2: Pause 3: Block stop]

**Note 2:** Inner pallet state: [0: Not indexed 1: Pallet 1 2: Pallet 2]  
'0' generally applies to machines without a quick table.

**Note 3:** Spare part usage: [0: Not used 1: Used]

**Note 4:** Mode: [0: MANU 1: MDI 2: MEM 3: EDIT 4: MANU+MDI 5: MEM+EDIT]

**Note 5:** Alarms: Alarm number of the current alarm (up to 10)

### 10.9.5 Operation panel data

File name: PANELN

Symbol	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)
D01	Outer (front) door state	1	Inner door state	1	Side door state	1		
K01	Mode	1	Screen	1	Block skip	1	Optional stop	1
	Single operation	1	Dru run	1	Machine lock	1	Coolant switch	1
	Chip flow switch	1	Machine light switch	1				
S01	Rapid traverse override state	1	Cutting feed override state	3	Spindle override state	3	Emergency stop	1
	Door interlock state	1	Mode change	1	Data protection	1		

**Note 1:** Items related to doors: [0: Closed 1: Open]  
(Not required for non-existent doors)

**Note 2:** Mode: [0: MANU 1: MDI 2: MEM 3: EDIT 4: MANU+MDI 5: MEM+EDIT]

**Note 3:** Screen: [0: DSP OFF 1: ALARM 2: DATA BANK 3: ATC TOOL 4: PRGRM 5: MANU COND 6: POS 7: I/O 8: MONITR ]

**Note 4:** Block skip to machine light switches: [0: On 1: Off]

**Note 5:** Rapid traverse override state: [0: Speed 1 1: Speed 2 2: Speed 3 3: 100%]

**Note 6:** Cutting feed override state and spindle override state: Current ratio (%)

**Note 7:** Emergency stop: [0: Off 1: On]

**Note 8:** Door interlock state: [0: Invalid 1: Valid]

**Note 9:** Mode change and data protection: [0: Permit 1: Prohibit]

### 10.9.6 Position data File name: PDSPN

Symbol	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)
G01	G0 group	3	G4 group	3	G53 group	3	G54 group	3
	G22 group	3	G40 group	3	G43 group	3	G80 group	3
	G90 group	3	G92 group	3	G17 group	3	G94 group	3
	G9 group	3	G61 group	3	G98 group	3	G28 group	3
	G36 group	3	G25 group	3	G100 group	3	G10 group	3
	G65 group	3	G66 group	3	G68 group	3	G120 group	3
	G121 group	3	G131 group	3	G133 group	3	G54.1 group	3
M01	M0 group	3	M3 group	3	M8 group	3	M6 group	3
	M98 group	3	M2 group	3	M99 group	3	M211 group	3
	M212 group	3	M213 group	3	M214 group	3	M400 group	3
	M800 group	3	M29 group	3	M120 group	3	M480 group	3
	M450 group	3	M460 group	3	M250 group	3	M200 group	3
	M230 group	3	M410 group	3	M430 group	3	M440 group	3
	M442 group	3	M470 group	3	M471 group	3	M480 group	3
	M320 group	3	M322 group	3	M330 group	3	M340 group	3
	M234 group	3	M203 group	3	M206 group	3	M207 group	3
	M448 group	3	Undefined	3	Undefined	3	Undefined	3
	Undefined	3	Undefined	3	Undefined	3	Undefined	3
	Undefined	3	Undefined	3	M238 group	3	M999 group	3
P01	Machine coordinate position X-axis	9	Machine coordinate position Y-axis	9	Machine coordinate position Z-axis	9	Machine coordinate position 4th-axis	
	Machine coordinate position 5th-axis	9	Machine coordinate position 6th-axis	9				
P02	Absolute coordinate position X-axis	9	Absolute coordinate position Y-axis	9	Absolute coordinate position Z-axis	9	Absolute coordinate position 4th-axis	9
	Absolute coordinate position 5th-axis	9	Absolute coordinate position 6th-axis	9				
P03	Remaining distance X-axis	9	Remaining distance Y-axis	9	Remaining distance Z-axis	9	Remaining distance 4th-axis	9
	Remaining distance 5th-axis	9	Remaining distance 6th-axis	9				
X01	Feed rate	7	Spindle speed	6	Inner pallet state	1	Spindle tool number	2
	Next tool number	2	Magazine number	2				

**Note 1: G, M symbols : Modal value of G/M code**

**Note 2: X, Y, and Z-axes of position related data (symbol P)  
(plus or minus sign is added)**

**Metric: 7 digit value with 3 decimal places**

**Inch: 7 digit value with 4 decimal places**

**4th to 6th-axes of position related data (symbol P)**

**(plus or minus sign is added) :**

**7 digit value with 3 decimal places**

**Note 3: Feed rate:**

**Metric: Integers only**

**Inch: 6 digit value with 1 decimal place**

**Note 4:** Inner pallet state: [0: Not indexed 1: Pallet 1 2: Pallet 2]  
 '0' generally applies to machines without a quick table.

**Note 5:** Magazine number:

Arm turn type: Next tool pot number

Turret type: Spindle magazine number

### 10.9.7 Version data File name: VERN

Symbol	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)
M01	Model	10						
V01	Main version	10	Local version	10	Slave version	10	SEQ(S) version	10
	SEQ(U) version	10						
S01	Machine number	6						

**Note 1:** Machine number: [Machine No.] of user parameter 1

### 10.9.8 Alarm log data File name: LOGN

Symbol	Item name	Data length (byte)						
A01	Status	1	Index	2				
B01	mmddhhmm	8	Alarm number	4	Auxiliary number	4	Attribute	3
	Operation program number	4	Edit program number	4	Machine coordinate position X-axis	9	Machine coordinate position Y-axis	9
	Machine coordinate position Z-axis	9	Machine coordinate position 4th-axis	9	Machine coordinate position 5th-axis	9	Machine coordinate position 6th-axis	9
	Machine coordinate position 7th-axis	9	Machine coordinate position 8th-axis	9	Mode	1	Screen	1
B02	mmddhhmm	8	Alarm number	4	Auxiliary number	4	Attribute	3
	Operation program number	4	Edit program number	4	Machine coordinate position X-axis	9	Machine coordinate position Y-axis	9
	Machine coordinate position Z-axis	9	Machine coordinate position 4th-axis	9	Machine coordinate position 5th-axis	9	Machine coordinate position 6th-axis	9
	Machine coordinate position 7th-axis	9	Machine coordinate position 8th-axis	9	Mode	1	Screen	1

Same as above up to 50

Symbol	Item name	Data length (byte)						
C01	Main input 01	16	Main input 02	16	Main input 03	16	Main input 04	16
	Main input 05	16	Main input 06	16	Main input 07	16	Main input 08	16
	Main input 09	16	Main input 10	16	Main input 11	16	Main input 12	16
	Main input 13	16	Main input 14	16				
C02	Main input 01	16	Main input 02	16	Main input 03	16	Main input 04	16
	Main input 05	16	Main input 06	16	Main input 07	16	Main input 08	16
	Main input 09	16	Main input 10	16	Main input 11	16	Main input 12	16
	Main input 13	16	Main input 14	16				

Same as above up to 50

D01	Main input 01	16	Main input 02	16	Main input 03	16	Main input 04	16
	Main input 05	16	Main input 06	16	Main input 07	16	Main input 08	16
	Main input 09	16	Main input 10	16	Main input 11	16	Main input 12	16
D02	Main input 01	16	Main input 02	16	Main input 03	16	Main input 04	16
	Main input 05	16	Main input 06	16	Main input 07	16	Main input 08	16
	Main input 09	16	Main input 10	16	Main input 11	16	Main input 12	16

Same as above up to 50

E01	Local input 01	8	Local input 02	8	Local input 03	8		
E02	Local input 01	8	Local input 02	8	Local input 03	8		

Same as above up to 50

F01	Local input 01	8	Local input 02	8				
F02	Local input 01	8	Local input 02	8				

Same as above up to 50

G01	Slave input 01	16	Slave input 02	16	Slave input 03	16	Slave input 04	16
G02	Slave input 01	16	Slave input 02	16	Slave input 03	16	Slave input 04	16

Same as above up to 50

H01	Slave input 01	16	Slave input 02	16				
H02	Slave input 01	16	Slave input 02	16				

Same as above up to 50

I01	X-axis deviation	7	Y-axis deviation	7	Z-axis deviation	7	Spindle deviation	7
	4th-axis deviation	7	5th-axis deviation	7	6th-axis deviation	7	7th-axis deviation	7
	8th-axis deviation	7						
I02	X-axis deviation	7	Y-axis deviation	7	Z-axis deviation	7	Spindle deviation	7
	4th-axis deviation	7	5th-axis deviation	7	6th-axis deviation	7	7th-axis deviation	7
	8th-axis deviation	7						

Same as above up to 50

J01	Program execution pointer	10	Execution block	128				
J02	Program execution pointer	10	Execution block	128				

Same as above up to 50

Symbol	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)	Item name	Data length (byte)
K01	C-axis current limit	5	C-axis current command	5				
K02	C-axis current limit	5	C-axis current command	5				

Same as above up to 50

**Note 1:** Data: Output in reverse chronological order

**Note 2:** Status: Number of alarm logs: [1: Less than 50 2: 50 or more]

**Note 3:** X, Y, and Z-axes of coordinate position  
(plus or minus sign is added) :

Metric: 7 digit value with 3 decimal places

Inch: 7 digit value with 4 decimal places

4, 5, and 6-axes of coordinate position

(plus or minus sign is added) :

7 digit value with 3 decimal places

**Note 4:** Mode: [0: MANU 1: MDI 2: MEM 3: EDIT 4: MANU+MDI  
5: MEM+EDIT ]

**Note 5:** Screen: [0: DSP OFF 1: ALARM 2: DATA BANK  
3: ATC TOOL 4: PRGRM 5: MANU COND 6: POS 7: I/O  
8: MONITR ]

**Note 6:** Program execution pointer: Number of data from top of a program.

**Note 7:** C-axis current limit and current command are effective only for machines with a quick table.

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# CHAPTER 11

## EFFECTIVE PROGRAMMING

- 11.1 Modal/comment information
- 11.2 Tool change (non-stop ATC : G100)
- 11.3 Synchro-tap (G77-78, 74, 84)
- 11.4 Calculation of hole positions  
(Coordinate calculation : G36-39)

(Note) Programs in this chapter are recommended samples for reference.  
It does not mean that the machine can only work with these  
programs.

## 11.1 Modal/comment information

An NC program will work differently depending on the modal information. Consequently if modal information is wrongly set when a program is called, it may cause a serious trouble.

Therefore, it is recommended to input all the modal information at the top of program.

The following codes should be set for modal information.

- a) G54-59 (Work coordinate system)
- b) G90/91 (Absolute/incremental command)
- c) G61/64 (Exact stop/cutting mode)
- d) G80 (Canned cycle cancel)
- e) G98/99 (Initial/R point level return)

Enter a comment to show the content of program in the first block of the program.

Reference comment will improve the operability of editing, communication and machine operation.

### <<Programming example>>

```
( D E M O   P R G . ) ;      Comment line to show the content of program
;
G 5 4   G 9 0   G 6 4   G 8 0   G 9 9 ;      All modal information in the first block
;
N 0 0 1 0 ( T 0 1   F A C I N G   1 0 0 x 3 1 . 9 ) ;
;
```

## 11.2 Tool change (Non-stop ATC : G100)

Brother's original non-stop ATC cycle can drastically shorten the machining time.  
Non-stop ATC cycle executes the following motions by a command in one block.

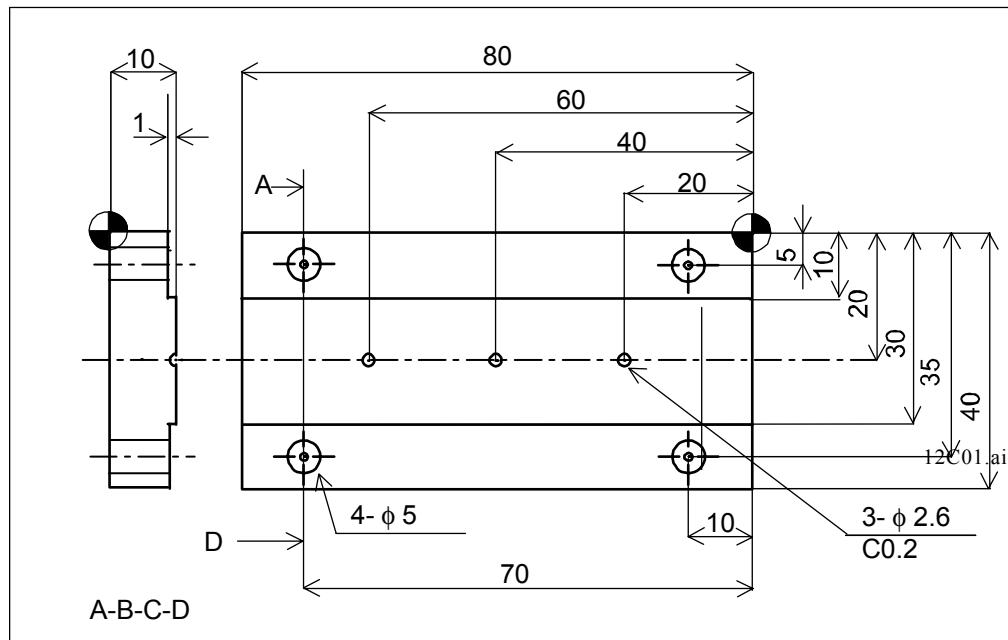
- (1)-1. The Z axis moves to ATC synchronous start position. Simultaneous motion
- (1)-2. Spindle orientation
- (1)-3. Tool dia. offset cancel
  
- (2)-1. Z-axis positioning to ATC zero position (Z-axis tool change position)
- (2)-2. Tool length offset cancel Simultaneous motion
- (2)-3. Execution of tool dia. offset
- (2)-4. X/Y axes positioning to the next machining start position
  
- (3)-1. Tool change
  
- (4)-1. Z-axis moves to ATC synchronous start position
- (4)-2. Execution of tool length offset Simultaneous motion
- (4)-3. Spindle rotation as specified
  
- (5)-1. Z-axis positioning to the next machining position

**(Note 1) Tool change by M06 is also available.**

**(Note 2) Tool length offset and tool dia. offset are executed when G43/44 or G41/42 is respectively commanded in G100 block.**

**(Note 3) The movement of ATC deffer depending on the machine type. Refer to 5.5 Canned Cycle for Tool Change in the programming manual as for further detail. In this chapter, the descriptions are based on the ATC movement of TC-22A and TC-31A.**

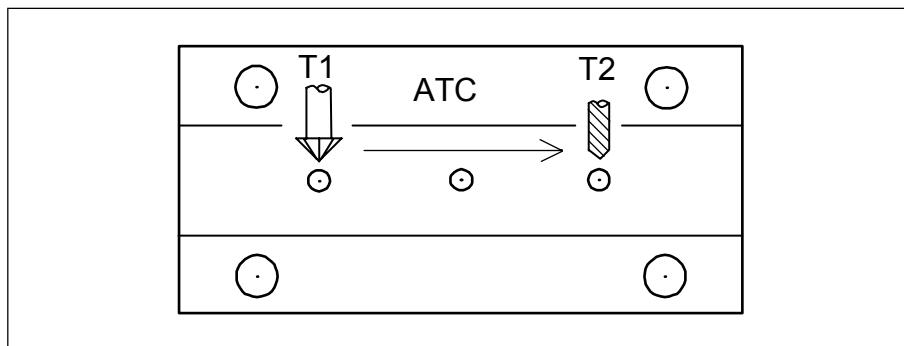
Actual programming example is explained here based on the following sample workpiece.



```
(SMPL1);
;
G54G90G64G80G99;
M08;
N0100 G100X-20.Y-20.Z12.T1G43H1
        S10000M3(CENTERDRILL DIA 3.0 X3);
N0105 T2;
N0110 G81X-20.Y-20.Z8.5R12.F1000;
N0115 X-40.;
N0120 X-60.;
N0200 G100X-20.Y-20.Z12.T2G43H2
        S8000 M3 (DRILL DIA 2.6 X3);
N0205 T3;
N0210 G81X-20.Y-20.Z6.25R12.F800;
N0215 X-40.;
N0220 X-60.;
N0300 G100X10.Y-10.Z9.1T3G42D3G43H3G80
        S10000M3(ENDMILL DIA 16.0 ROUGH CUT);
N0305 T4;
N0310 G1X-82.F700;
N0315 G0Y-30.;
N0320 G1X10.;
N0400 G100X10.Y-10.Z9.0T4G42D4G43H4
        S10000M3(ENDMILL DIA 16.0 FINE CUT);
N0405 T5;
N0410 G1X-82.F700;
N0415 G0Y-30.;
N0420 G1X10.;
N0500 G100X-10.Y-5.Z11.T5G43H5
        S10000M3(DRILL DIA 5.0);
N0505 T1;
N0510 G81X-10.Y-5.Z-3.44R11.F1000;
N0515 X-70.R12.;
N0520 Y-35.R11.;
N0525 X-10.;
N9999 G100X-210.Y-150.G53;
        M09;
        M02;
```

Tool No.	Machining details
01	Centerdrill Hole of $\phi$ 2.6 Center hole + Chamfering
02	Drill Hole of $\phi$ 2.6 Boring
03	Endmill of $\phi$ 16 Milling Roughing
04	Endmill of $\phi$ 16 Milling Finishing
05	Drill Hole of $\phi$ 5 Boring

### 11.2.1 Hole machining "ATC" Hole machining <<Example : Center drill (T1) " Drill (T2)>>



12C02.ai

```
(SMPL1);
;
G54G90G64G80G99;
M08;
N0100 G100X-20.Y-20.Z12.T1G43H1
          S10000M3(CENTER DRILL DIA 3.0X3);
N0105 T2;
N0110 G81X-20.Y-20.Z8.5R12.F1000;
N0115 X-40.;
N0120 X-60.;
N0200 G100X-20.Y-20.Z12.T2G43H2
          S8000M3 (DRILL DIA 2.6X3);
N0205 T3;
N0210 G81X-20.Y-20.Z6.25R12.F800;
N0215 X-40.;
N0220 X-60.;
```



11

After center drilling, command G100 code in the next block (N0200).

Set the following items in G100 block.

- a ) Drill start position ----- Address X, Y, Z
- b ) Direction and number of tool length  
offset for the drill to be used ----- G43, Address H
- c ) Spindle rotation direction and spindle  
speed for drilling ----- M03, address S

The actual motion will be as follows:

N0120 --- Finished the last center drilling, and returns to R point.

- N0200 --- 1. The Z axis moves to ATC synchronous start position and the spindle orientation is performed.
2. The Z axis moves to ATC zero position (Z axis tool change position) and X and Y axes move to the hole to be machined first. At this time, tool length offset of the center drill is cancelled.
3. The tool is change for drilling tool (tool No.2).
4. The Z axis moves to ATC synchronous start position, and tool length offset and spindle clockwise rotation are performed.
5. The Z axis moves to the drilling start position.

N0205 --- The magazine swivels to index the tool to be used next (rough finishing end mill, tool No. 3).

N0210 --- Drills the first hole, and returns to R point.

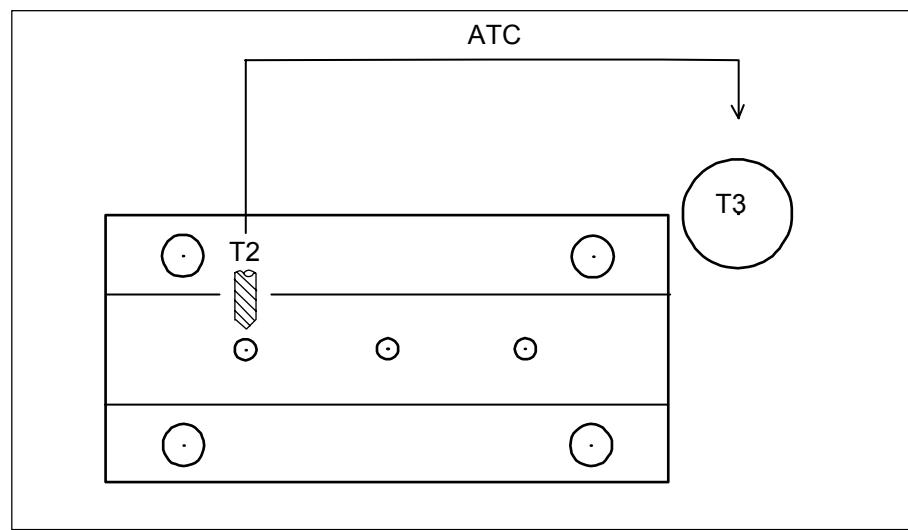
**(Note 1) As tool length offset before tool change is automatically cancelled at tool change (N0200), it is not necessary to cancel it in the program.**

**(Note 2) Addresses X and Y in the N0210 block can be omitted because the positioning of these axes has been finished in the N0200 block.**

**(Note 3) When using coordinate calculation function (G36-39) for hole positions after tool change, the program will be as follows:**

```
(SMPL2);  
;  
G54G90G64G80G99;  
M08;  
N0100G100X-20.Y-20.Z12.T1G43H1  
S10000M3(CENTER DRILL DIA 3.0 X 3);  
N0105T2;  
N0110G81Z8.5R12.F1000K0;  
N0115G37X-20.Y-20.I20.J180.K3;  
N0200G100X-20.Y-20.Z12.G43H2  
S8000M3(DRILL DIA 2.6 X 3);  
N0205T3;  
N0210G81Z6.25R12.F800K0;  
N0215G37X-20.Y-20.I20.J180.K3;
```

### 11.2.2 Hole machining → Tool change → Milling <<Example : Drill (T2) → Endmill (T3)>>



12C03.ai

```

N0205T3;
N0210G81X-20.Y-20.Z6.25R12.F800;
N0215X-40.;
N0220X-60.;
N0300G100X10.Y-10.Z9.1G42D3G43H3G80
S10000 M3 (ENDMILL DIA 16.0 ROUGH CUT);
N0305T4;
N0310G1X-82.F700;
N0315G0Y-30.;
N0320G1X10.;
```

11

After drilling, command G100 code in the next block (N0300).

Set the following items in G100 block.

- a) Milling start position ----- Address X, Y, Z
- b) Direction and number of tool length  
offset for the endmill to be used ----- G43, address H
- c) Direction and number of tool dia.  
offset for the endmill to be used ----- G42, address D
- d) Spindle rotation direction and spindle  
speed for milling ----- M03, address S

The actual motion will be as follows:

N0220 --- Finished the last drilling, and returns to R point.

N0300 -- 1.The Z axis moves to ATC synchronous start position and spindle orientation is performed.

2.The Z axis moves to ATC zero point (Z axis tool change position), tool diameter offset is performed, and X and Y axes move to the hole to the milling approach position.

At this time, tool length offset of the drill is cancelled.

3.The tool is changed for rough finishing end mill (tool No.3).

4.The Z axis moves to ATC synchronous start position, and tool length offset and spindle clockwise rotation are performed.

5.The Z axis moves to the milling approach position.

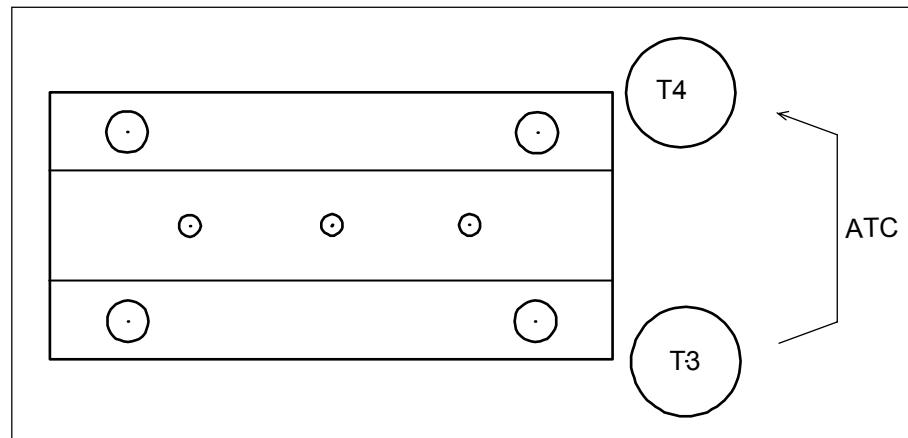
N0305 --- The magazine swivels to index the tool to be used next (finishing end mill, tool No. 4).

N0310 --- Executes milling operation.

**(Note 1) As tool length offset before tool change is automatically cancelled at tool change (N0300), it is not necessary to cancel it in the program.**

### 11.2.3 Milling → Tool change → Milling

<<Example : Endmill (T3) → Endmill (T4)>>



12C04-1.ai

```

N0305T4;
N0310G1X-82.F700;
N0315G0Y-30.;
N0320G1X10.;

N0400G100X10.Y-10.Z9.0G42D4G43H4
S10000 M3 (ENDMILL DIA 16.0 FINE CUT);

N0405T5;
N0410G1X-82.F700;
N0415G0Y-30.;

N0420G1X10.;
```



11

After milling, command G100 code in the next block (N0400).

Set the following items in G100 block.

- a) Milling start position ----- Address X, Y, Z
- b) Direction and number of tool length  
offset for the endmill to be used ----- G43, address H
- c) Direction and number of tool dia.  
offset for the endmill to be used ----- G42, address D
- d) Spindle rotation direction and spindle  
speed for milling ----- M03, address S

The actual motion will be as follows:

N0320 --- Executes milling operation to the release position.

- N0400 --- 1. The Z axis moves to ATC synchronous start position and spindle orientation is performed. At this time, tool diameter offset of the end mill already used is cancelled.
2. The Z axis moves to ATC zero point (Z axis tool change position), tool diameter offset is performed, and X and Y axes move to the milling approach position. At this time, tool length offset of the end mill is cancelled.
3. The tool is changed for finishing end mill (tool No.4).
4. The Z axis moves to ATC synchronous start position, and tool length offset and spindle clockwise rotation are performed.
5. The Z axis moves to the milling approach position.

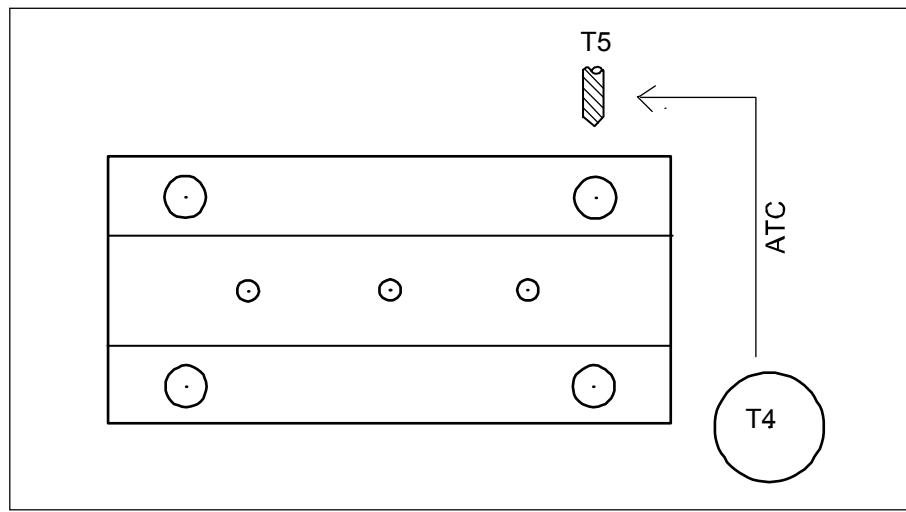
N0405 --- The magazine swivels to index the tool to be used next (drill, tool No. 5).

N0410 --- Executes milling operation.

**(Note 1) As tool length offset before tool change is automatically cancelled at tool change (N0400), it is not necessary to cancel it in the program.**

### 11.2.4 Milling → Tool change → Hole machining

<<Example : Endmill (T4) → Drill (T5)>>



12C05.ai

```

N0405T5;
N0410G1X-90.F700;
N0415G0Y-30.;
N0420G1X10.;
N0500G100X-10.Y-5.Z11.G43H5
S10000 M3 (DRILL DIA 5.0);
N0505T1;
N0510G81X-10.Y-5.Z-3.44R11.F1000;
N0515X-70.R12.;
N0520Y-35.R11.;
N0525X-10.;
N9999G100X-210.Y-150.G53;
M09;
M02;

```

11

After milling, command G100 code in the next block (N0500).

Set the following items in G100 block.

- a) Drilling start position ----- Address X, Y, Z
- b) Direction and number of tool length  
offset for the drill to be used ----- G43, address H
- c) Spindle rotation direction and spindle  
speed for drilling ----- M03, address S

The actual motion will be as follows:

N0420 --- Executes milling operation to the release position.

N0500 --- 1. The Z axis moves to ATC synchronous start position and spindle orientation is performed. At this time, tool diameter offset of the end mill already used is cancelled.

2. The Z axis moves to ATC zero point (Z axis tool change position) and Y axes move to the hole to be machined first. At this time, tool length offset of the end mill is cancelled.

3. The tool is changed for finishing end mill (tool No.5).

4. The Z axis moves to ATC synchronous start position, and tool length offset and spindle clockwise rotation are performed.

5. The Z axis moves to the drilling start position.

N0505 --- The magazine swivels to index the tool to be used next (center drill, tool No. 1).

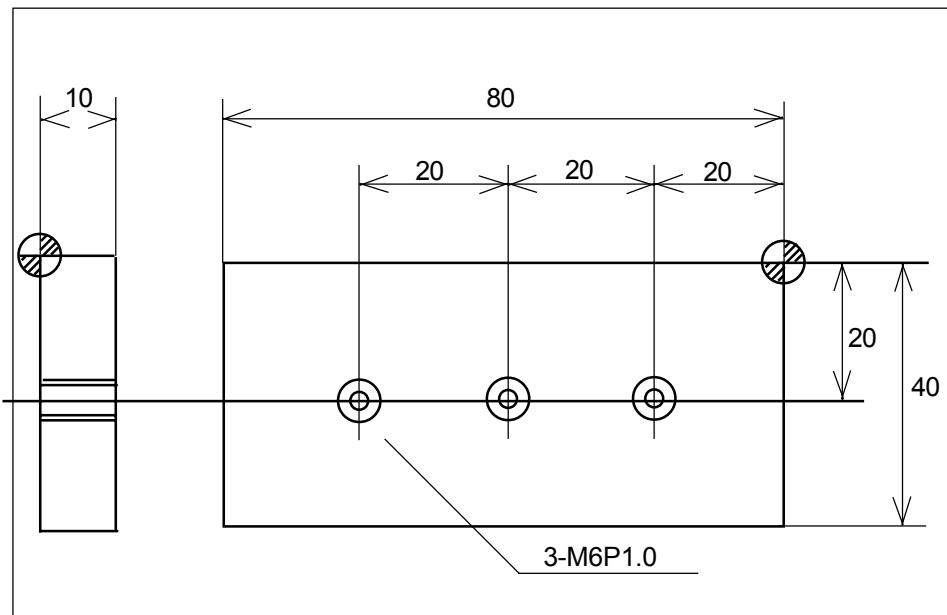
N0510 --- Drills the first hole, and returns to R point.

**(Note 1) As tool length offset and tool dia. offset before tool change are automatically cancelled at tool change (N0500), it is not necessary to cancel it in the program.**

**(Note 2) Addresses X and Y in the N0510 block can be omitted because the positioning of these axes has been finished in the N0500 block.**

## 11.3 Synchro-tap (G77-78,74,84)

By utilizing Brother's original synchro-tap cycle, highly accurate tapping is available at a high speed. Actual programming example is explained here based on the following sample workpiece.



11

```

(SMPL3);
;
G54G90G64G80G99;
M08;
N0100G100X-20.Y-20.Z12.T1G43H1
    S10000 M3(DRILL DIA 5.1 X 3);
N0105T2;
N0110G81 X-20.Y-20.Z-3.45R12.F1000;
N0115X-40.;
N0120X-60.;
N0200G100 X-20.Y-20.Z12.G43 H2(TAP M6 X 3);
N0205T1;
N0210G77X-20.Y-20.Z-5.R12.I1.Q999.S2000;
N0215X-40.;
N0220X-60.;
N9999G100X-210.Y-150.G53;
M09;
M02;

```

Tool No.	Machining details
0 1	Drill Hole of 5.1 Drilling
0 2	Tap M6 x P1 Synchro-tapping

After attaching a tap by tool change, command G77 (right-hand thread) or G78 (left-hand thread) code in the next block (N0210).

Set the following items in G77/78 block.

- a) Tapping position ----- Address X, Y, Z
- b) Z axis machining start position ----- Address R
- c) Pitch -----
  - Metric thread : Address I (Pitch distance)
  - Inch thread : Address J (Number of threads per inch)
- d) Depth of cut ----- Address Q
- e) Spindle speed----- Address S

<<Explanation on motion>>

N0210 --- 1. X/Y axes moves to the first tapping position.

2. The Z axis moves to the tapping start position.
3. Synchro-tap cycle is executed at 2000 min<sup>-1</sup>.

In this example, as depth of cut (address Q) is larger than tapping depth, synchro-tap cycle is executed by one cut.

After synchro-tapping, the Z axis returns to the tapping start position.

4. As R point return (G99) is commanded in the program, synchro-tap cycle is finished with Z axis at the tapping start position.

N0215 --- X/Y axes moves to the second tapping position.  
Synchro-tap cycle is executed in the same way as N0210.

**(Note 1) If strict tapping accuracy is not required, it is possible to set a higher spindle speed for tap return than that for tapping, in synchro-tap cycle.**

In this case, program as below using an address L.

f) Spindle speed for return ----- Address L.

```
N0200G100.X-20. Y-20. Z12. G43 H2(TAPM6×3);
N0205T1;
N0210G77.X-20. Y-20. Z-5. R12. I1. Q999. S2000L4000;
N0215X-40. ;
N0220X-60. ;
```

In the above example, spindle speed for tapping is 2000 min<sup>-1</sup>, and that for tap return is 4000 min<sup>-1</sup>.

**Note 2) It is possible to execute synchro-tap cycle using an ordinary tapping cycle code (G84 (right-hand thread)) or G74 (left-hand thread)).**

Program as below:

```
N0200G100.X-20. Y-20. Z12. G43 H2(TAPM6×3);
N0205T1;
N0210G84X-20. Y-20. Z-5. R12. F2000 S2000;
N0215X-40. ;
N0220X-60. ;
```

Set an address F (Z-axis feedrate) based on the following formula.

\*Metric thread

$$F (\text{mm/min}) = \text{Pitch} (\text{mm}) \times \text{Spindle speed (address S : min}^{-1}\text{)}$$

\* Inch thread

$$F (\text{mm/min}) = (25.4 / \text{No. of threads}) \times \text{Spindle speed (address S : min}^{-1}\text{)}$$

In tapping cycle of G74/84, as the value of address F is rounded to a whole number, it may cause a little error.

$$\begin{aligned} \text{Ex.) } \text{Pitch} &= 0.8, & \text{spindle speed} &= 1252 \text{ min}^{-1} \\ F(\text{mm/min}) &= 0.8 \times 1252 = 1001.6 \text{ (as calculated)} \\ &= 1001 \text{ (setting value)} \rightarrow \underline{0.6 \text{ (mm/min) rounded down}} \end{aligned}$$

It is recommended to use G77 or G78 for synchro-tap cycle unless it is definitely required.

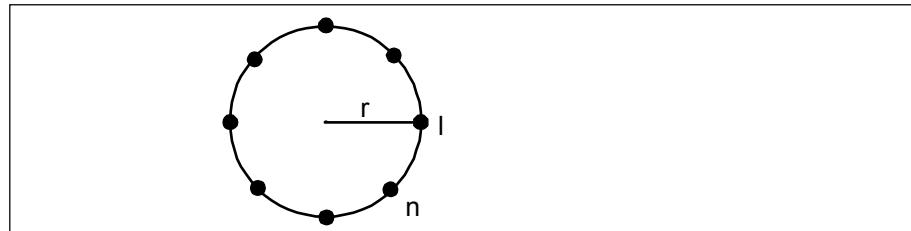
## 11.4 Calculation of hole positions

### (Coordinate calculation : G36-39)

Coordinate calculation function can calculate the coordinates in the following four patterns.

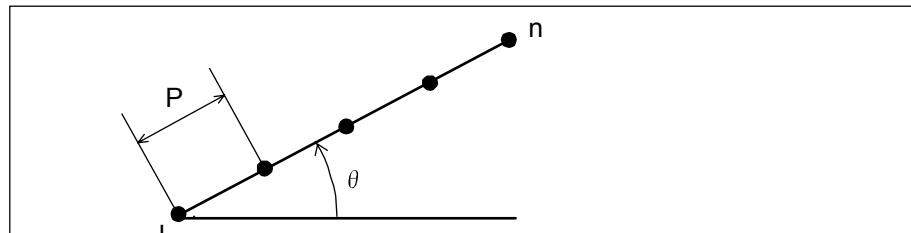
When this function is used together with canned cycle and subprogram modal calling, programming of hole machining will be much easier.

a) Bolt hole cycle (divisions on periphery) ---- G36



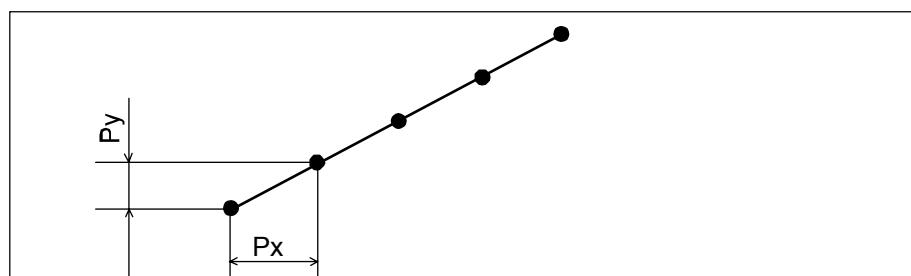
12C08.ai

b) Linear (angle) ----- G37



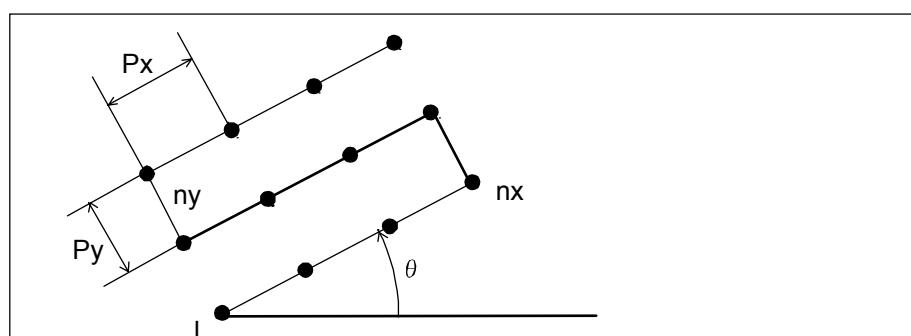
12C09.ai

c) Linear (X,Y) ----- G38



12C10.ai

d) Grid ----- G39



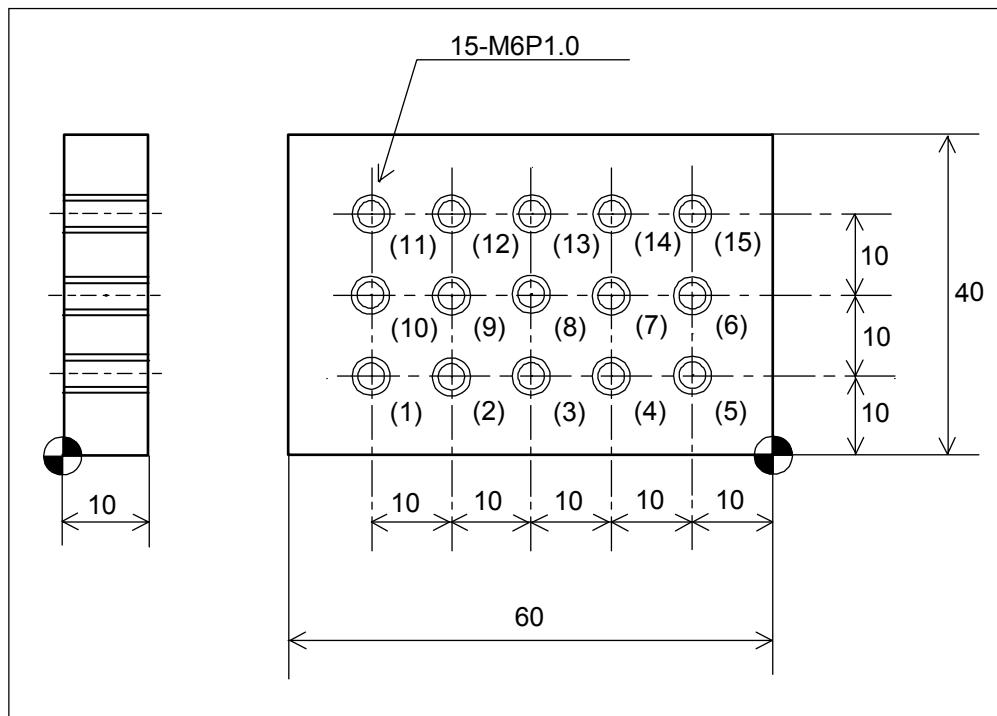
12C11.ai

11

(Note 1) Refer to 5. Canned Cycle and 6. Coordinate Calculation Function in the programming manual for further detail.

Actual programming example is explained here based on the following sample workpiece.

1. Combination of grid (G39) and canned cycle



12C12-1.ai

(SMPL4-1);  
 ;  
 G54G90G64G80G99;  
 M08;  
 N0100G100X-50.Y10.Z12.T1G43H1  
 S6000 M3(DRILL DIA 5.1 X 15);  
 N0105T2;  
 N0110G81Z-3.45R12.F1000K0;  
N0115G39X-50.Y10.I10.J10.K5P3Q0.;  
N0200G100X-50.Y10.Z12.G43H2  
 (TAP M6 X 15);  
 N0205T1;  
 N0210G77Z-5.R12.I1.Q999.S2000K0;  
N0215G39X-50.Y10.I10.J10.K5P3Q0.;  
 N9999G100X-210.Y-150.G53;  
 M09;  
 M02;

Tool No.	Machining details
01	Drill Hole of 5.1 Drilling
02	Tap M6 × P1 Synchro-tap

After defining a canned cycle, command G39 (grid) of coordinate calculation code in the next block (N0115, N0215).

Set the following items in G39 block.

- a) Reference point coordinate (machining start) position : Address X, Y
- b) Hole pitch in the X-axis direction : Address I
- c) Hole pitch in the Y-axis direction : Address J
- d) Number of holes in the X-axis direction : Address K
- e) Number of holes in the Y-axis direction : Address P
- f) Angle with the X axis on grid : Address Q

<<Explanation on motion>>

N0110 --- Defines drilling cycle.

As “0” is specified for address K, only definition of canned cycle is given without actual motion.

N0115 --- Calculates XY coordinates of holes in the increasing order of numbers in brackets ( ) as coordinate calculation of grid is defined, and then moves to the hole positions.

The drilling cycle defined in N0110 is executed at each hole position.

N0210 --- Defines synchro-tap cycle.

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As “0” is specified for address K, only definition of canned cycle is given without actual motion.

N0215 --- Calculates XY coordinate of holes in the increasing order of numbers in brackets ( ) as coordinate calculation of grid is defined, and moves to the hole positions.

The synchro-tap cycle define in N0210 is executed at each hole position.

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# CHAPTER 12.1

## COOLANT UNIT

**Coolant is used to cool the tools and workpiece, and to remove the machining chips. The coolant unit supplies coolant to the machining section, chip flow and oil hole .**

- 1. Cautions for Handling**
- 2. Sketch Drawing**
- 3. Operation Procedure**

# 1 Cautions for Handling

## ⚠ WARNING

**Because the coolant tank is heavy, you may suffer from a herniated vertebral disk or drop the tank on your feet when lifting the tank.**

**Do not lift the coolant tank even when removing chips.**

## ⚠ WARNING

**When machining workpiece using an oil type coolant, the machined part may heat up and catch fire.**

**Do not use oil type coolant when a fire alarm and automatic fire extinguisher are not installed.**

**When machining the workpiece, an operator must attend the machine.**

### a) Coolant

- (1) Depending on the type of coolant and its method of use, bubbles may be generated in the coolant within the tank. In this case, use deforming agent or reduce the amount of discharge.
- (2) For the chip flow, use water soluble oil only. If non water soluble oil is used, sufficient coolant is not supplied to the machining tools due to large adhesive resistance.

When using such a coolant, turn off the [CHP. F] key on the keyboard so that the chip flow is not activated even if the program instruction is given.

- (3) Do not drain coolant oil. Cosign disposal of machines to a company specialized for handling such.
- (4) Some types of coolant may cause rust in parts within the guide section due to their material. Further, there are types of coolant that tend to cause corrosion. Please check with the coolant manufacturer for coolant characteristics before use.

Move each axis one full stroke at least once a day to lubricate the guide and ball screw, and prevent rust.

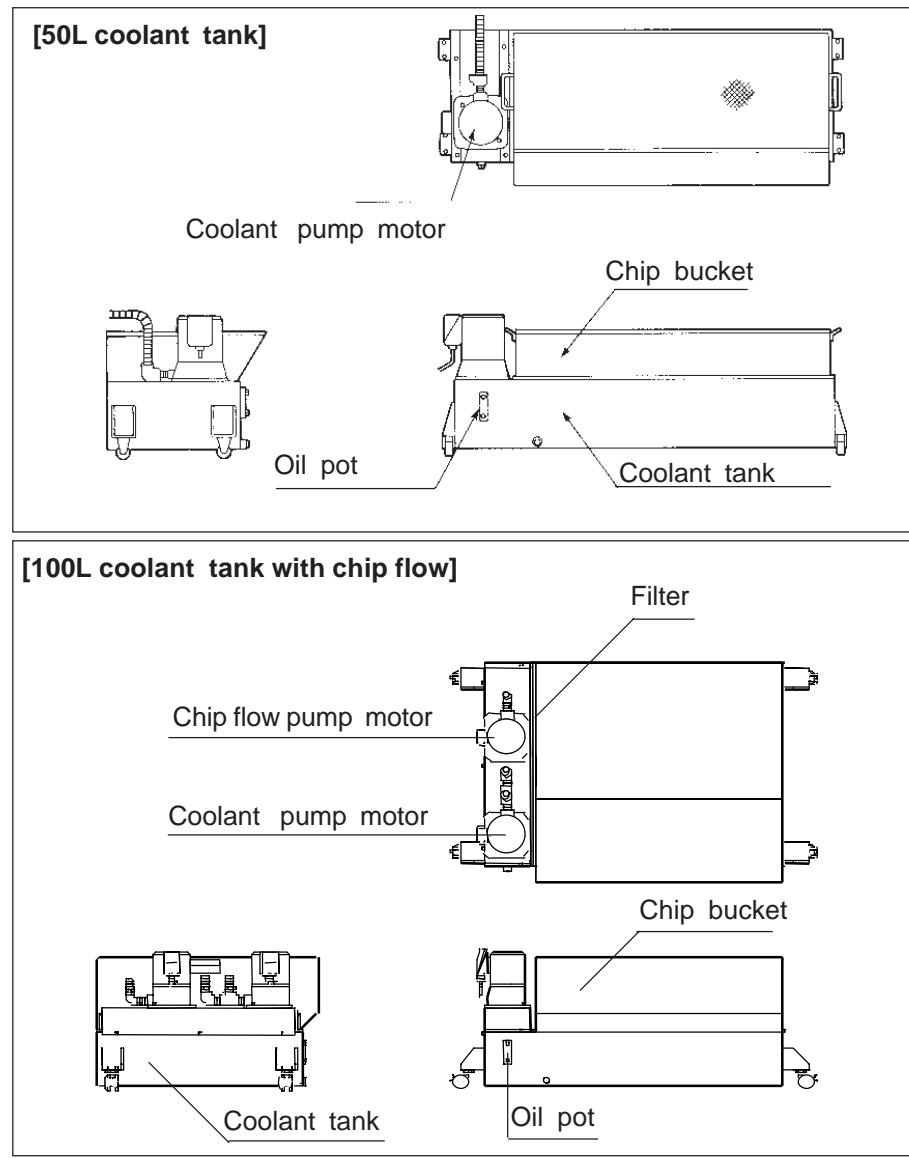
Performing this before and after operation is the most effective.

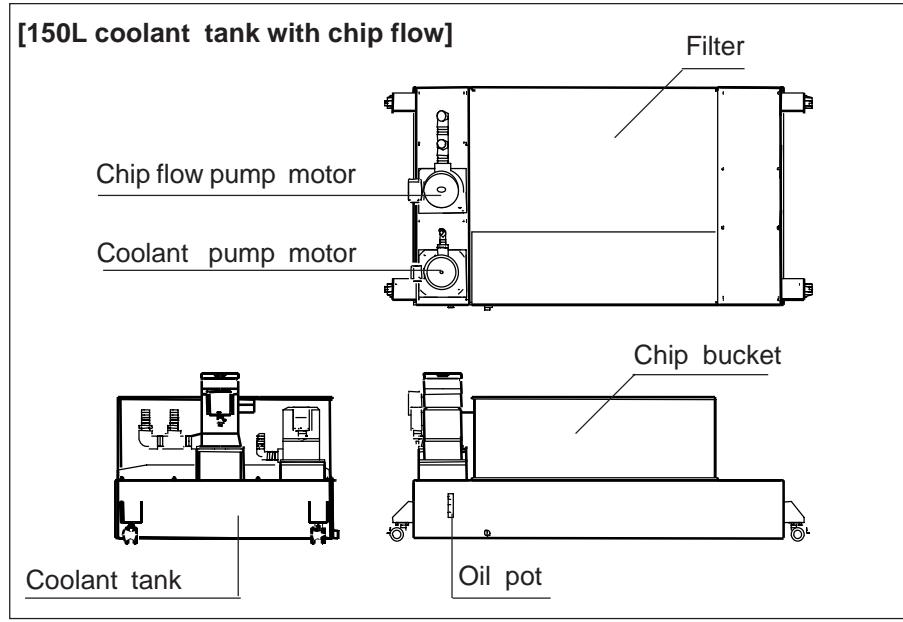
### b) Maintenance

- (1) Remove chips accumulated in the chip bucket daily. If the chips are accumulated excessively, coolant may splash around.
- (2) When the coolant is not discharged well, the filter may be clogged. Clean the filter.
- (3) To fully utilize the coolant and coolant tank, regularly replace the entire coolant and clean the coolant tank.

**Weight of coolant tank**

Specifications		Weight(kg)
50L	nozzle	40
100L	nozzle, chip flow	80
150L	nozzle, chip flow	110

**2 Sketch Drawing**



TS2AOP12-1-2.doc

## 3 Operation Procedure

### (1) Coolant operation

- 1 Turn the power on.
- 2 Return the machine to the zero position.
- 3 When the [CLT] key on the keyboard, the key lamp will light and the motor will rotate.
- 4 Press the [MDI] key to enter MDI operation mode
- 5 Check that all work doors are closed.  
(NC)
- 6 Press the [CAN] key to clear the edit field.
- 7 Enter [M8] using the numerical keys.  
(Conversation)
- 6 Set the cursor on "COOLANT" with [DOWN] cursor key.
- 7 Enter [1] and press [ENT] key.
- 8 Press the [START] switch and coolant flows.
- 9 When the [CLT] switch is set to OFF, the lamp on the switch goes out and coolant stops.  
When the [CLT] switch is set to On, coolant flows again.
- 10 When the [RST] key is pressed, the valve closes and coolant stops although the coolant pump keeps rotating.

## (2) Chip flow operation

- 1 Turn the power on.
- 2 Return the machine to the zero position.
- 3 Set the **[CHIP FLOW]** switch on the operation panel to ON. The lamp on the switch lights.
- 4 Press the **[MDI]** key to enter MDI operation mode.
- 5 Check that all work doors are closed.  
(NC)
- 6 Press the **[CAN]** key to clear the edit field.
- 7 Enter **[M400]** using the numerical keys.  
(Conversation)
- 6 Set the cursor on "EXE SIGNAL" with **[DOWN]** cursor key.
- 7 Enter **[400]** and press **[ENT]** key.
- 8 When the **[START]** key is pressed, the chip flow motor rotates and water flows, flows the the chips.
- 9 When the **[CHIP FLOW]** switch is set to OFF, water stops.  
When the **[CHIP FLOW]** switch is set to ON, water flows again.
- 10 When the **[RST]** key is pressed, stop the chip shower pump and chip shower.

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## CHAPTER 12.2

### MANUAL PULSE GENERATOR

**Manual pulse generator is a device switch, when turned with its handle in manual mode, allows fine feed of an axis specified.**

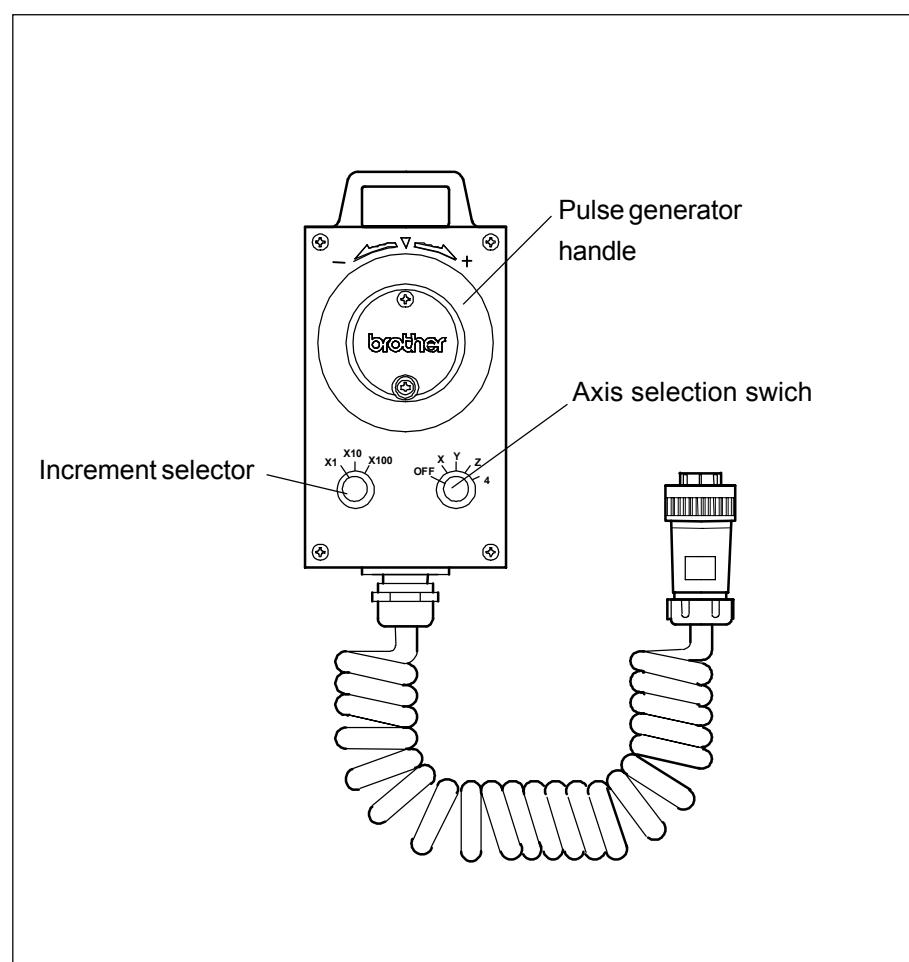
1. Cautions
2. Overall View
3. Operation Procedure

# 1 Cautions

When the axis selection switch is set on X, Y or Z, manual operation through the main operation panel is deactivated.

This status can be checked by pressing the AXIS FEED key on the operation panel: the message MANUAL PULSE MODE ON appears on the screen if the above-mentioned operation is deactivated.

# 2 Overall view



1103C01-1.doc

### 3 Operation procedure

Follow the procedure below when utilizing the manual pulse generator.

- 1 Press the **[MANU]** key to validate the manual operation mode.
- 2 Select the axis with the axis selection switch on the manual pulse generator.
- 3 Select the increment of feed with the increment selector.
- 4 Turn the handle.

Increment	Feed			
	Metric (mm)		Inch (inch)	
	One division	One turn	One division	One turn
X1	0.001	0.1	0.0001	0.01
X10	0.01	1	0.001	0.1
X100	0.1	10	0.01	1

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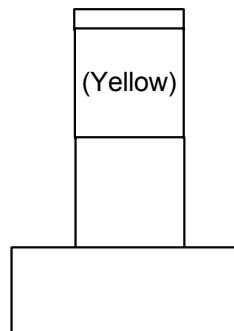
## CHAPTER 12.3

### INDICATION LAMP

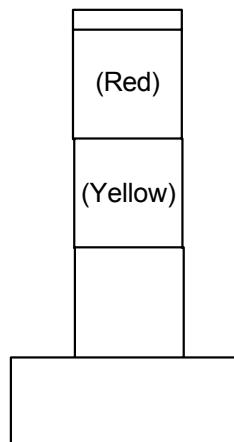
1. External View
2. Function of indicator lamps

# 1 External View

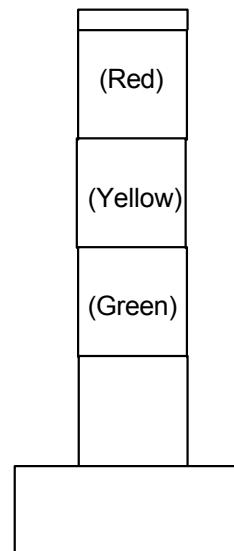
(Single -lamp type)



(Twin -lamp type)



(Three -lamp type)



## 2 Function of indicator lamps

Indication lamps inform distant operators of machine status (in operation, cutting completed, error).

### **(1) Red lamp**

- 1) When the EMERGENCY STOP switch is pressed.
- 2) When an alarm turning off the servo system occurs.
- 3) When a positioning switch of automatic door or jig has a failure.
- 4) When the production counter ends (on condition that this setting is validated with the USER PARAMETER(SWITCH1))

### **(2) Yellow lamp**

- 1) When a memory operation ends (on M30 output).
- 2) When the production counter ends (on condition that this setting is validated with the USER PARAMETER(SWITCH1))

### **(3) Green lamp**

- 1) During a memory operation or MDI operation (on STL output)

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## CHAPTER 12.4

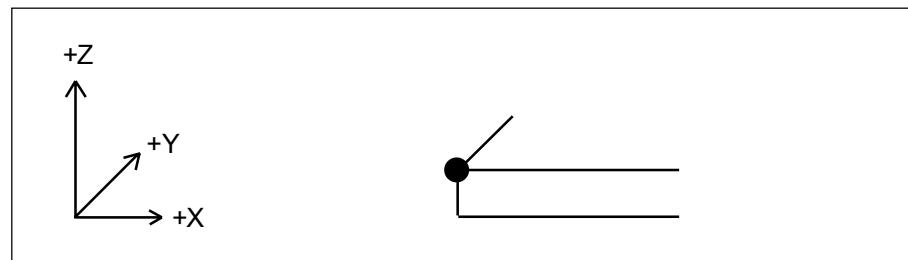
### AUTOMATIC CENTERING UNIT

1. Preparation for center alignment
2. Operation of center alignment
3. Setting of data on center alignment
4. Mounting and dismounting of probe

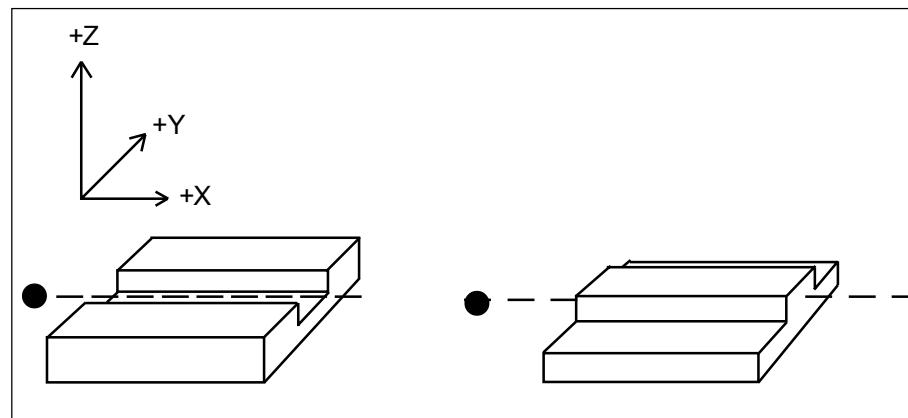
## Center alignment

The following 5 shapes can be automatically centered.

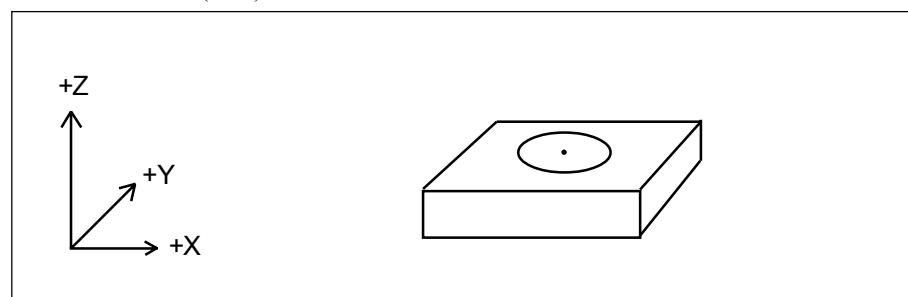
1. Corner -- X and Y coordinates of a corner



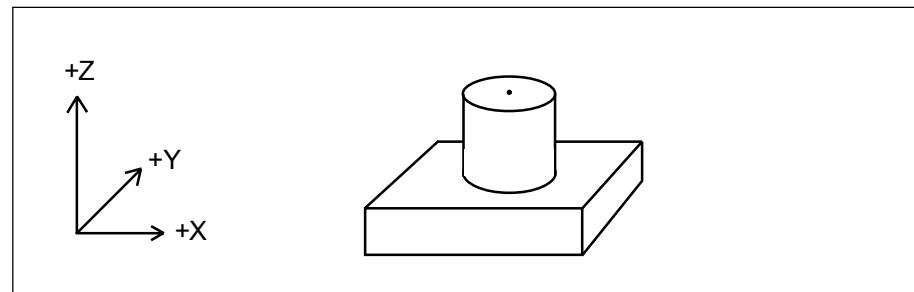
2. Parallel -- X and Y coordinates of the axis of parallel groove or boss



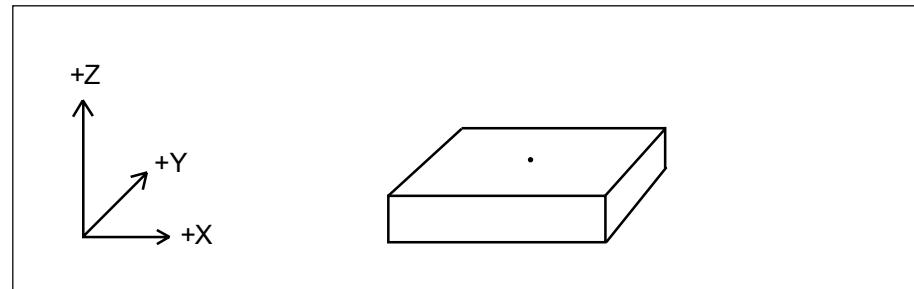
3. Center of circle(hole) -- X and Y coordinates of the center of a hole



4. Center of circle(boss) -- X and Y coordinates of the center of a boss



5. Z-axis height -- Z coordinate of the top surface of a workpiece



※ Only a centering tool releasing in the Z-axis direction can be measured.

6. Probe offset value (G121/G129)

Calculates the offset value used for corner measurement.

7. Probe offset value (G124/G125)

Calculates the offset value used when calculating the circle center by three-point measurement.

# 1 Preparation for center alignment

1. Before starting center alignment, Check the following points.

- 1) Check that the parameters and the tool data necessary for the center alignment are correctly set.  
Improper setting may result in probe damages.
- 2) Check that the probe is properly mounted, and function properly.
- 3) After finishing all the setting for center alignment, press the [SINGL] key (LED ON) and check each motion in the single mode.
- 4) When a high-precision alignment is required, repeat measurements several time to take necessary data. The measurement accuracy depends greatly on the used probe and the machine condition.

2. Mode change during center alignment

The mode cannot be changed during the center alignment.

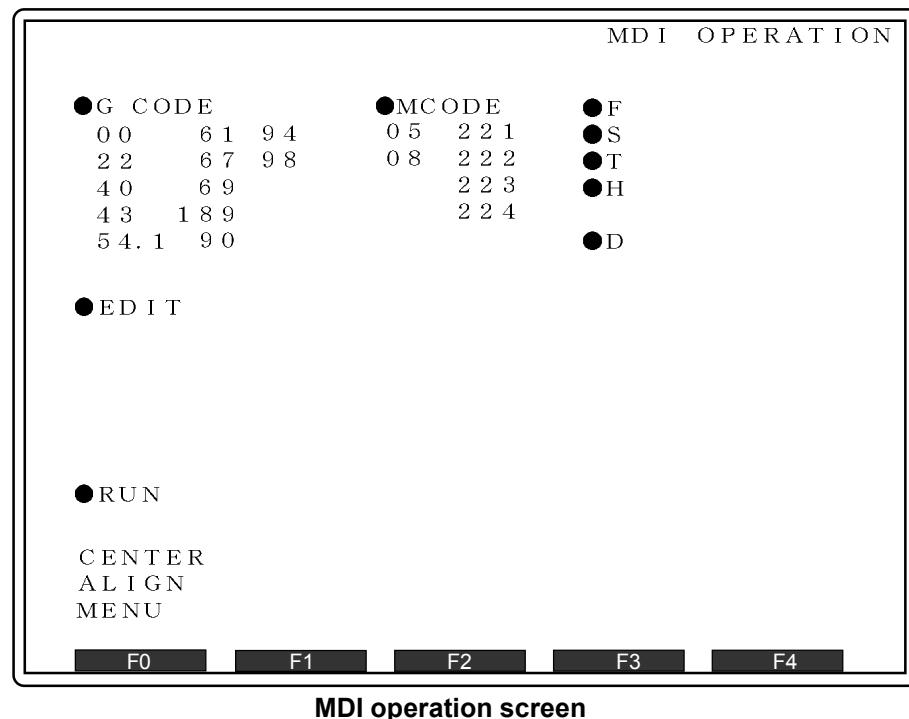
(halt and block stop included)

If it is required, press the [RST] key first.

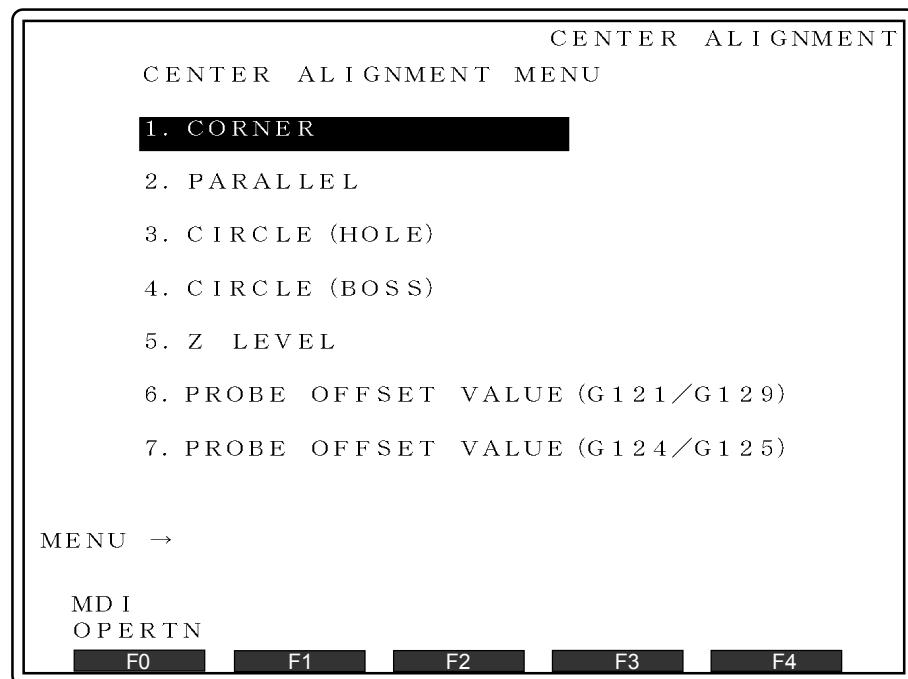
## 2 Operation of center alignment

Calling of center alignment screen

- 1) Press the [MDI] key and display MDI operation screen.



2) Press [F0] key and change to the center alignment menu screen.



**Center alignment menu screen**

- 3) Select the item to be executed from the menu and enter No. , or move the cursor to No. and press the [ENT] key.
- 4) When the screen for setting each form is displayed, set the measurement positions, etc., and press the START switch to execute center alignment. Details of setting items of each form and alignment motions are described in "2.1" through "2.8".

**(Note 1) Specifying the coordinates of each setting item can be done automatically by pressing the [F2] key.**

\* Automatic coordinate setting by [F2] key

The measurement positions and the absolute Z-axis coordinates can be automatically set in the following procedures.

- 1) Press [MANU] key while pressing [MDI] key, in the center alignment mode.
- 2) Move the tool to the measurement position and the Z-axis position by manual operation.
- 3) Pressing the [F4](TEACH POS) key, the current absolute coordinates is set to the coordinates of the setting item pointed by the cursol automatically. The X and Y are simultaneously set, and the height and return are individually set.

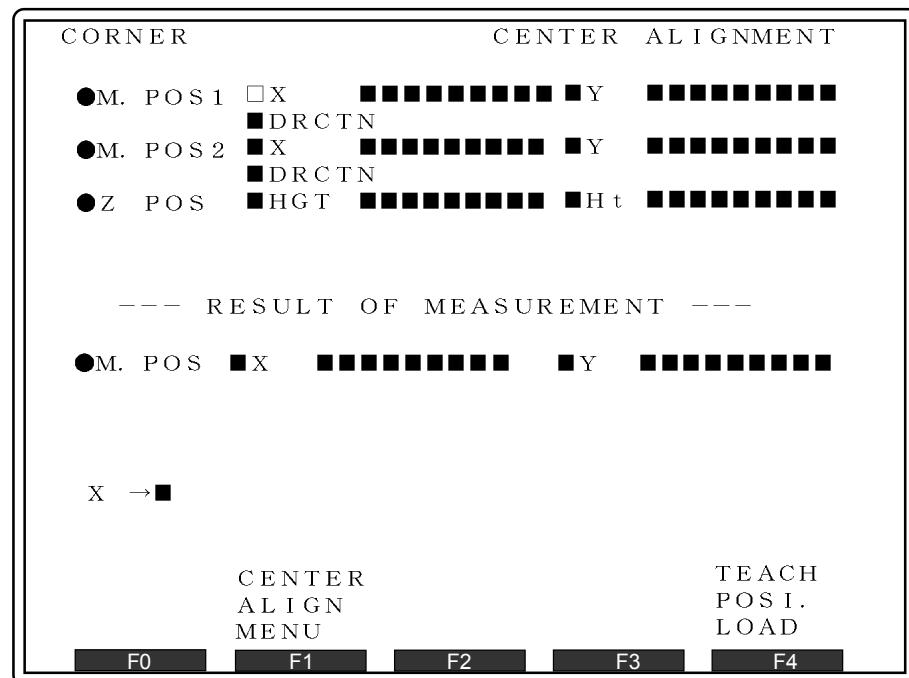
**(Note 2) The center alignment mode functions regardless of the modal status other than G54~G59(working coordinates selection).**

**(Note 3) In the center alignment mode, the working coordinate system and tool length in the tool data 99 are automatically offset.**

## 2.1 Corner

Measurement of X and Y coordinates of a corner.

After setting of 1.CORNER at center alignment menu screen.



**(Note)**Check that PROBE OFFSET VALUE 1 and PROBE OFFSET VALUE 2 of parameter 7 are set.  
 When not set, correct measurement results cannot be obtained.  
 Refer to 2.6 Probe Offset Value (G121/G129) for setting method.

1) Set the necessary values

\* Measurement position 1 (X,Y)

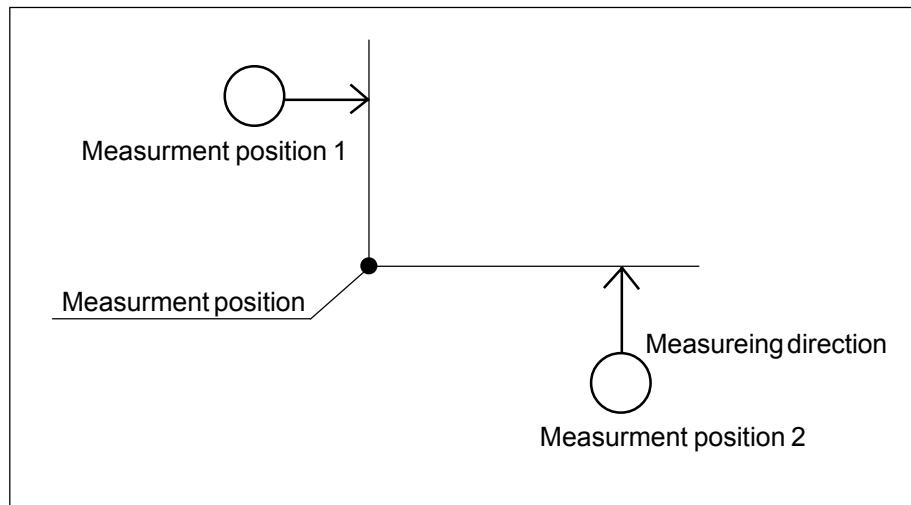
Specify the alignment start point 1 with the X/Y absolute coordinates.

\* Measurement position 1 (Direction)

\* Measurement position 2 (X,Y)

Specify the alignment start point 2 with the X/Y absolute coordinates.

\* Measurement position 2 (Direction)

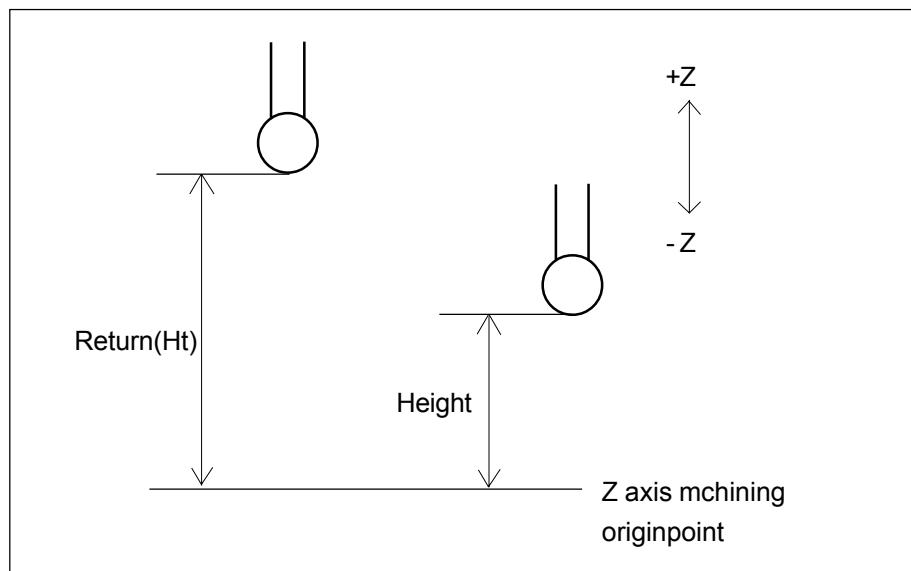


\* Z axis position (Height)

Specify the measurement height with the Z absolute coordinates.

\* Z axis position (Ht)

The return height during the movement from the measurement positions 1 to 2 and after the measurement is finished is specified by the Z absolute coordinates.



- 2) Press the START switch and execute the center alignment operation in the following procedures.
  - 1) Execute the measurement start motion.
  - 2) Measure the pattern 1 at the measurement position 1.
  - 3) Measure the pattern 1 at the measurement position 2.
  - 4) Obtain the measurement value at the measurement position 1 in the specified direction.
  - 5) Obtain the measurement value at the measurement position 2 in the specified direction.
  - 6) Move to the measurement position.

**Measurement start motion**

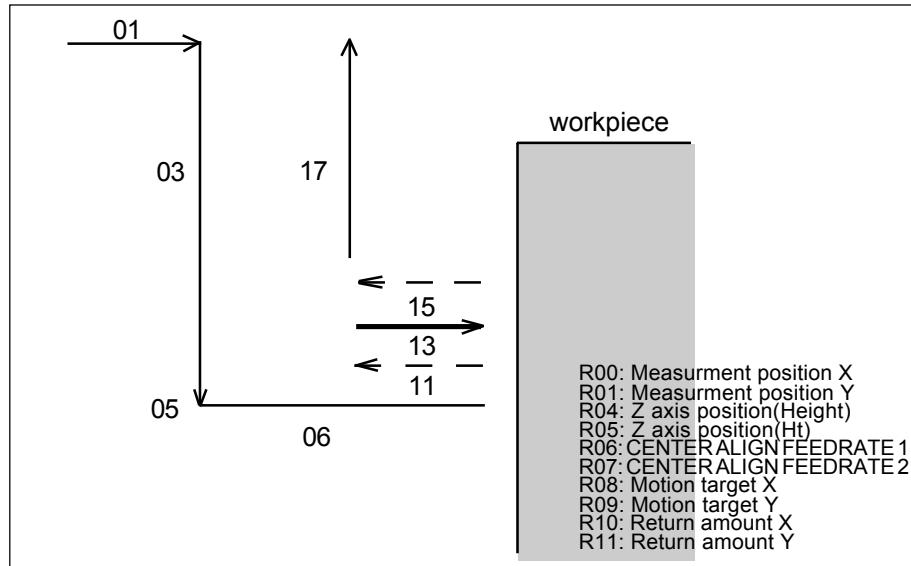
<Code>	<Contents>
1.G31 Z R05 F R06;	Z movement to return position (Movement by skip function, CENTER ALIGN FEEDRATE 1)

**Movement to measurement positions**

<Code>	<Contents>
1.G31 X R00 Y R01 F R06;	X/Y movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
2.M321;	Detection signal OFF check

R00 : Measurement position X  
R01 : Measurement position Y  
R06: CENTER ALIGN FEEDRATE 1

Measurement pattern 1



— : Movement by skip function (CENTER ALIGN FEEDRATE 1)

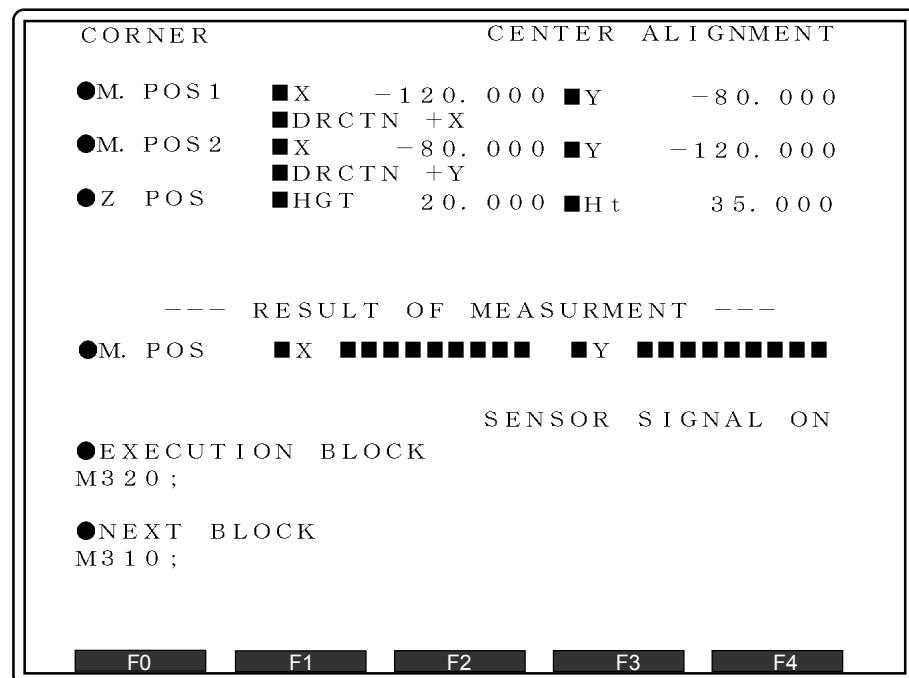
— : Movement by skip function (CENTER ALIGN FEEDRATE 2)

— — : Linear interpolation (CENTER ALIGN FEEDRATE 1)

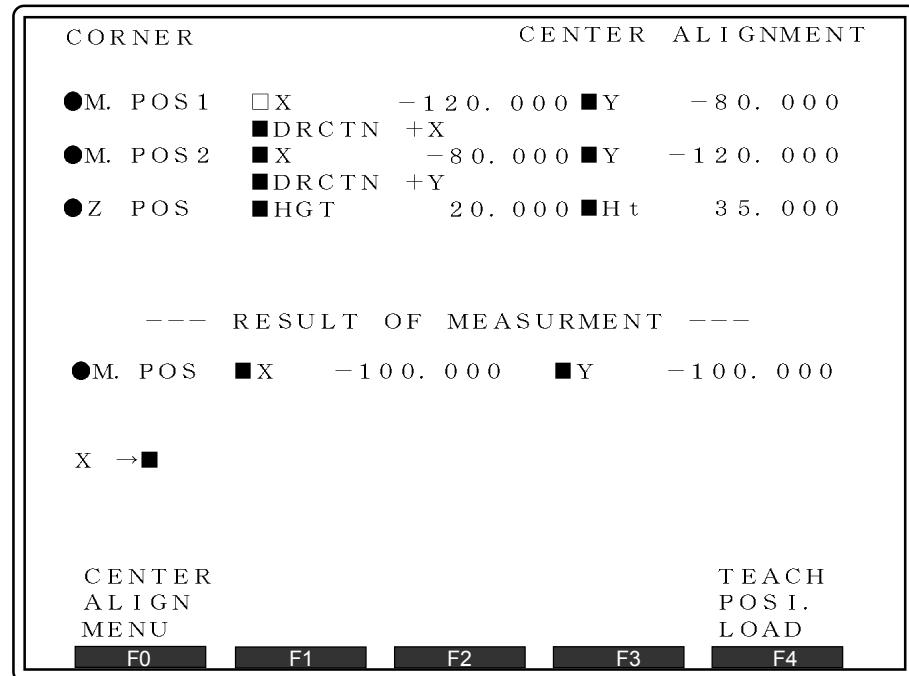
<Code>	<Contents>
1.G31 X R00 Y R01 F R06;	X/Y movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
2.M321;	Detection signal OFF check
3.G31 Z R04 F R06;	Z movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
4.M321;	Detection signal OFF check
5.M19;(M111);	Spindle orientation 0°(180°)※1
6.G31 X R08 Y R09 F R06;	X/Y movement to target position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
7.M320;	Detection signal ON check
8.M310;	X/Y measurement position take-in
9.M302;	X return position calculation
10.M302;	Y return position calculation
11.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
12.M321;	Detection signal OFF check
13.G31 X R08 Y R09 F R07;	X/Y movement to target position (Movement by skip function, CENTER ALIGN FEEDRATE 2)
14.M310;	X/Y detection position take-in
15.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
16.M05;	Spindle stop
17.G31 Z R05 F R06;	Z movement to return position (Movement by skip function, CENTER ALIGN FEEDRATE 1)

**(Note 1) When the target position of movement by skip function is in the +X or +Y direction, the spindle orientation is 0°. When in the -X or -Y direction, the spindle orientation is 180°**

The following screen is displayed during operation.



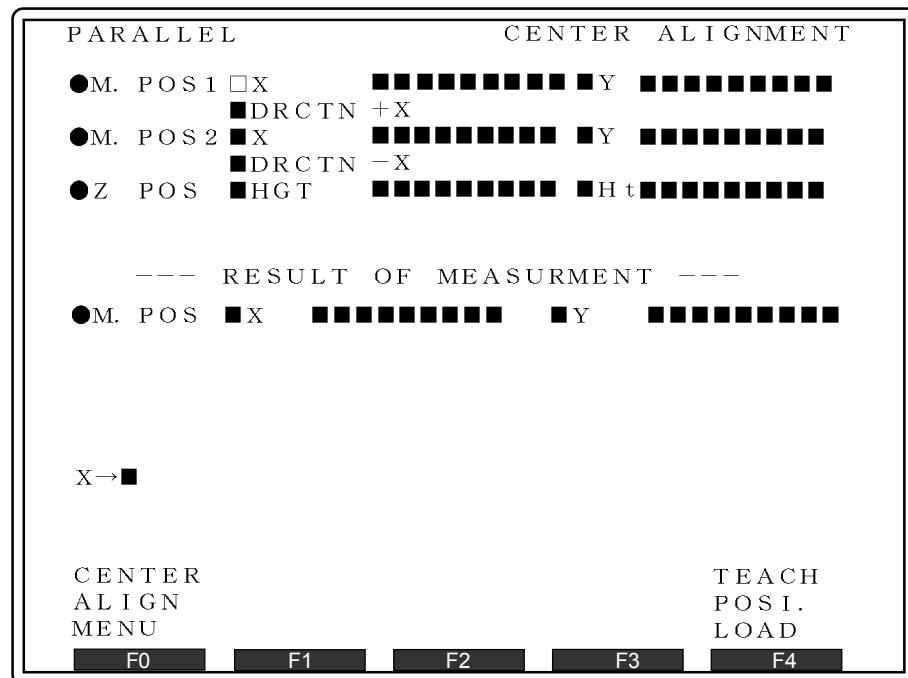
- 3) After measurement is finished, the results are displayed and the X/Y axes move to the measurement position.



## 2.2 Parallel

Measurement of X and Y coordinates of the axis of parallel groove or boss

After setting of 2.PARALLEL at the center alignment menu screen



1) Set the necessary values

\* Measurement position 1 (X,Y)

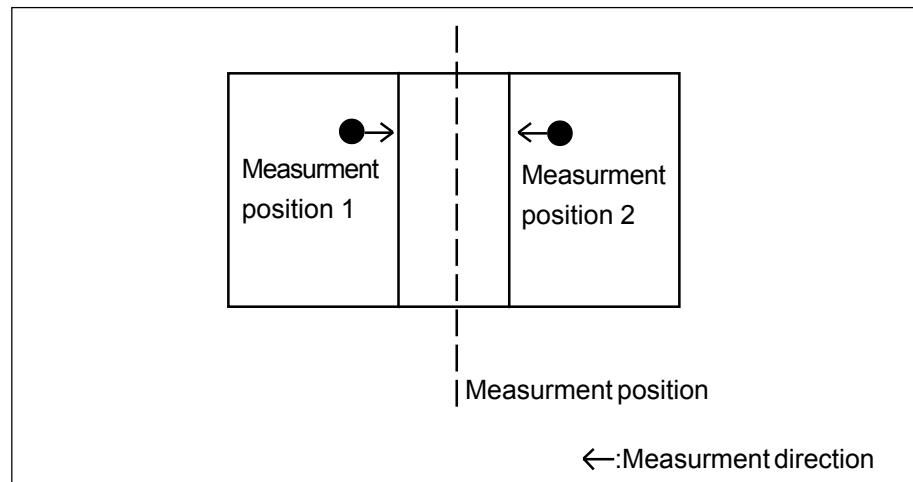
Specify the alignment start point 1 with the X/Y absolute coordinates.

\* Measurement position 1 (Direction)

\* Measurement position 2 (X,Y)

Specify the alignment start point 2 with the X/Y absolute coordinates.

\* Measurement position 2 (Direction)

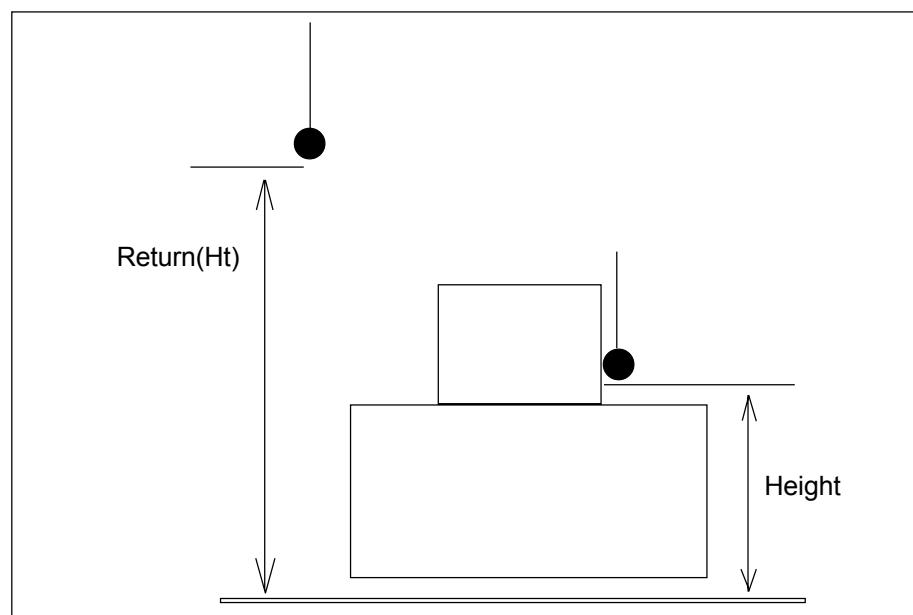


\* Z axis position (Height)

Specify the measurement height with the Z absolute coordinates.

\* Z axis position (Ht)

The return height during the movement from the measurement positions 1 to 2 and after the measurement is finished is specified by the Z absolute coordinates.



- 2) Press the START switch and execute the center alignment operation in the following procedures.
    - 1) Execute the measurement start motion.
    - 2) Measure the pattern 1 at the measurement position 1.
    - 3) Measure the pattern 1 at the measurement position 2.
    - 4) Obtain the measurement value at the measurement position 1 in the specified direction.
    - 5) Obtain the measurement value at the measurement position 2 in the specified direction.
    - 6) Move to the measurement position.

### Measurement start motion

<Code> <Contents>

1.G31 Z R05 F R06; Z movement to return position

(Movement by skip function, CENTER ALIGN FEEDRATE 1)

## Movement to measurement positions

<Code> <Contents>

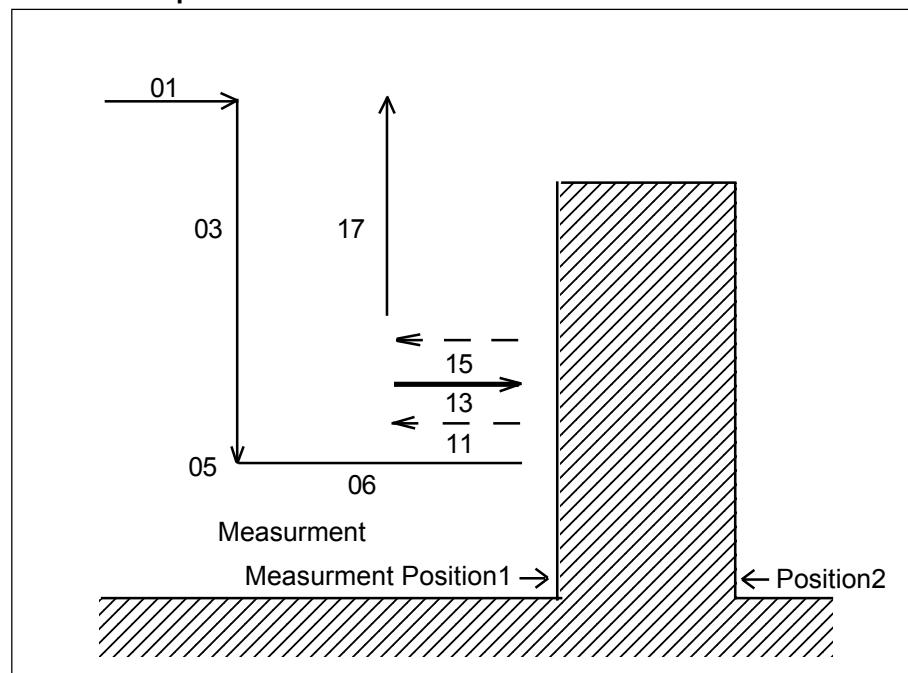
1.G31 X R00 Y R01 F R06; X/Y movement to measurement position

(Movement by skip function, CENTER ALIGN  
FEEDRATE1)

## 2.M321; Detection signal OFF check

R00:Measurement position X  
R01:Measurement position Y  
R06:CENTERALIGNFEEDRATE

**Measurement pattern 1**



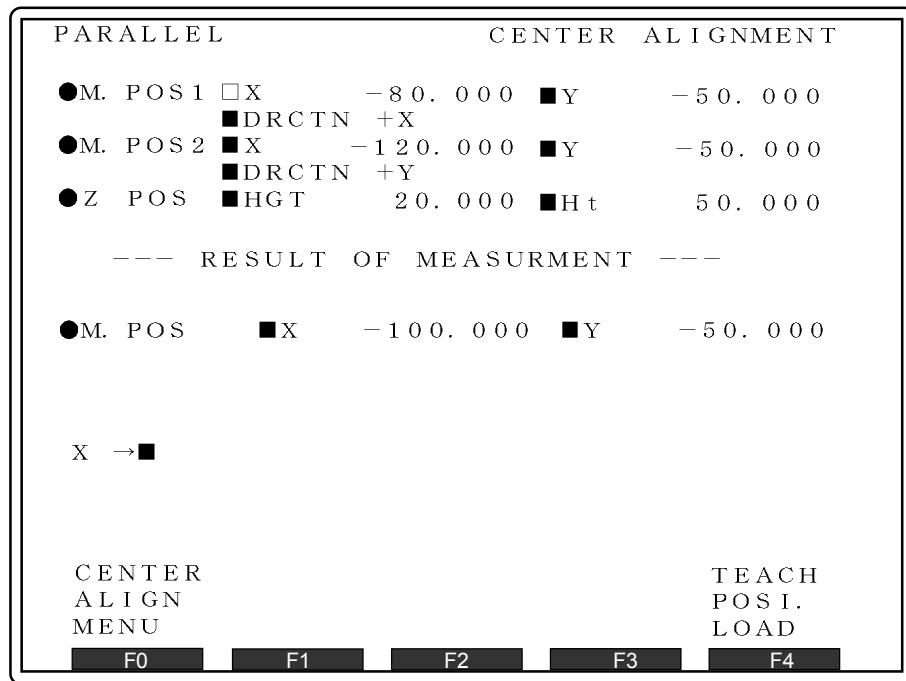
- : Movement by skip function (CENTER ALIGN FEEDRATE 1)
- : Movement by skip function (CENTER ALIGN FEEDRATE 2)
- — : Linear interpolation (CENTER ALIGN FEEDRATE 1)

R00:Measurement position 1X  
R01:Measurement position 1Y  
R04:Z axis position(Height)  
R05:Z axis position(Ht)  
R06:CENTRALIGNFEEDRATE 1  
R07:CENTRALIGNFEEDRATE2  
R09:Target position Y in the + direction  
R10:Return amount X in the + direction  
R11:Return amount Y in the + direction

<Code>	<Contents>
1.G31 X R00 Y R01 F R06;	X/Y movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
2.M321;	Detection signal OFF check
3.G31 Z R04 F R06;	Z movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
4.M321;	Detection signal OFF check
5.M19;(M111;)	Spindle orientation 0°(180°)*1
6.G31 X R08 Y R09 F R06;	X/Y movement to target position in the + direction (Movement by skip function, CENTER ALIGN FEEDRATE 1)
7.M320;	Detection signal ON check
8.M310;	X/Y detection position take-in in the + direction
9.M302;	X return position calculation
10.M302;	Y return position calculation
11.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
12.M321;	Detection signal OFF check
13.G31 X R08 Y R09 F R07;	X/Y movement to target position in the + direction (Movement by skip function, CENTER ALIGN FEEDRATE 2)
14.M310;	X/Y detection position take-in in the + direction
15.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
16.M05;	Spindle stop
17.G31 Z R05 F R06;	Z movement to return position (Movement by skip function, CENTER ALIGN FEEDRATE 1)

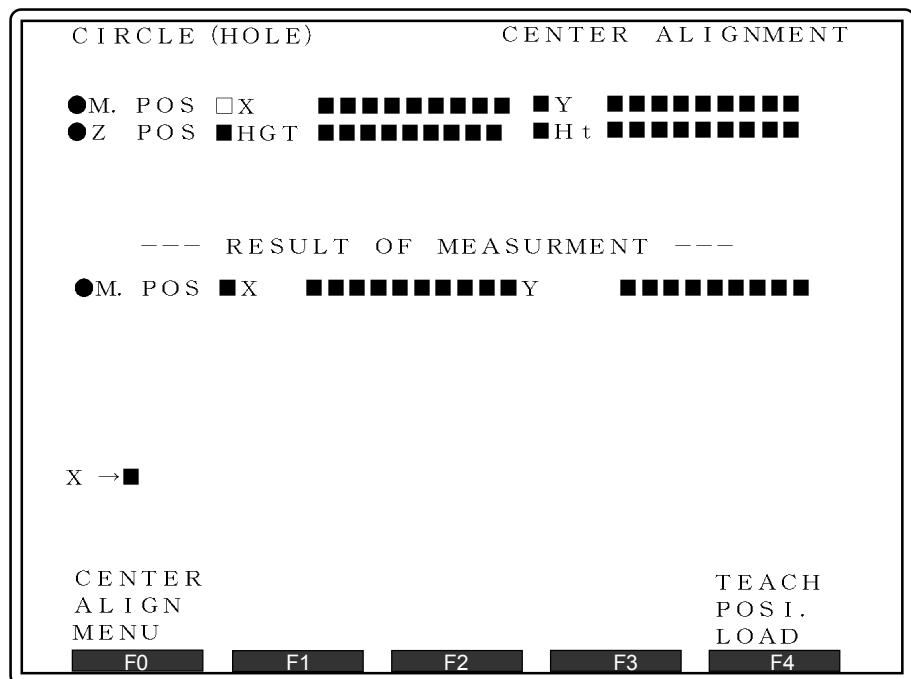
**(Note 1) When the target position of movement by skip function is in the +X or +Y direction, the spindle orientation is 0°.**  
**When in the -X or -Y direction, the spindle orientation is 180°.**

- 3) After measurement is finished, the results are displayed and the X/Y axes move to the measurement position.



## 2.3 Circle(hole)

Measurement of X and Y coordinates of the center of circular hole  
After setting of 3.CIRCLE (HOLE) at the center alignment menu screen

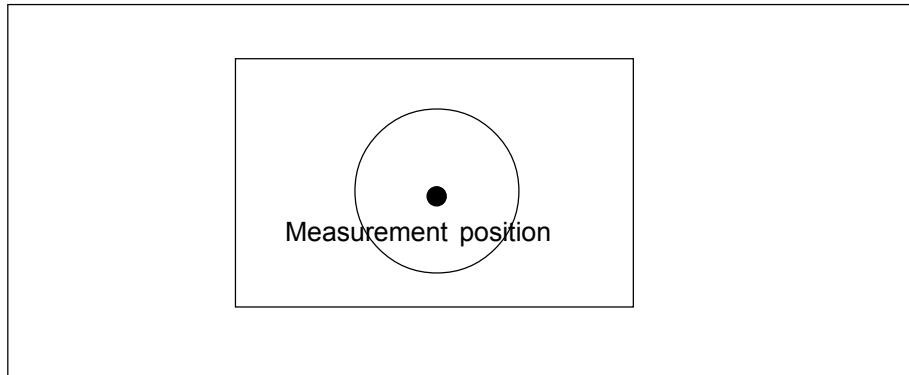


12

1) Set the necessary values

\* Measurement position 1 (X,Y)

Specify the alignment start point around the center of hole with the X/Y absolute coordinates.

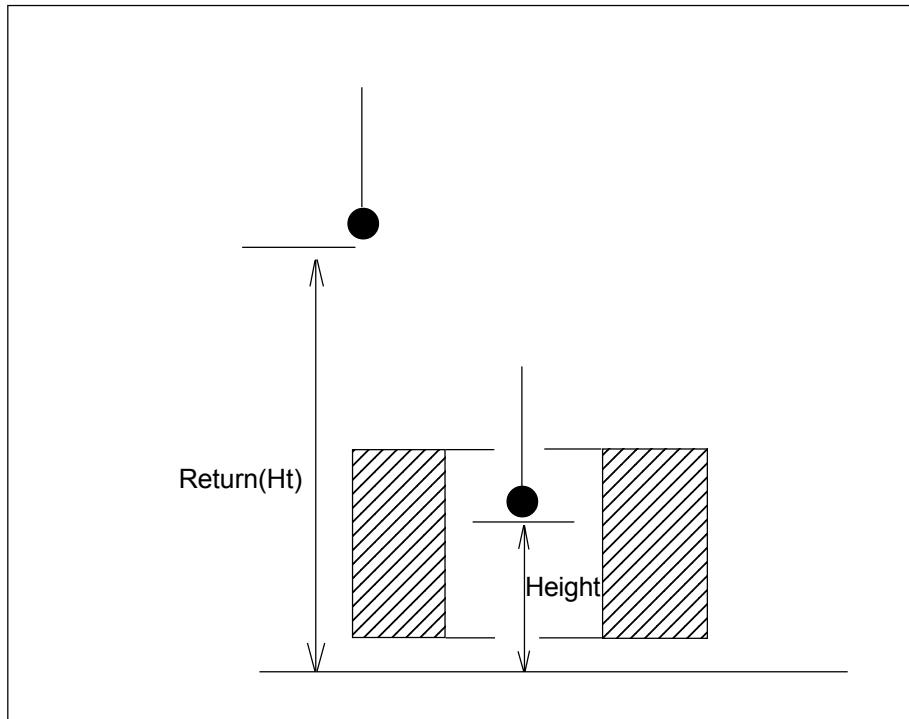


\* Z axis position (Height)

Specify the measurement height with the Z absolute coordinates.

\* Z axis position (Ht)

Specify the return height after measurement is finished with the Z absolute coordinates.



- 2) Press the START switch and execute the center alignment operation in the following procedures.
- (1) Execute the measurement start motion.
  - (2) Measure the pattern 3 in the X direction at the measurement position.
  - (3) Measure the pattern 3 in the Y direction at the position measured in above (2).
  - (4) Measure the pattern 3 in the X direction at the position measured in above (3).
  - (5) Move to the measurement position in above (4).

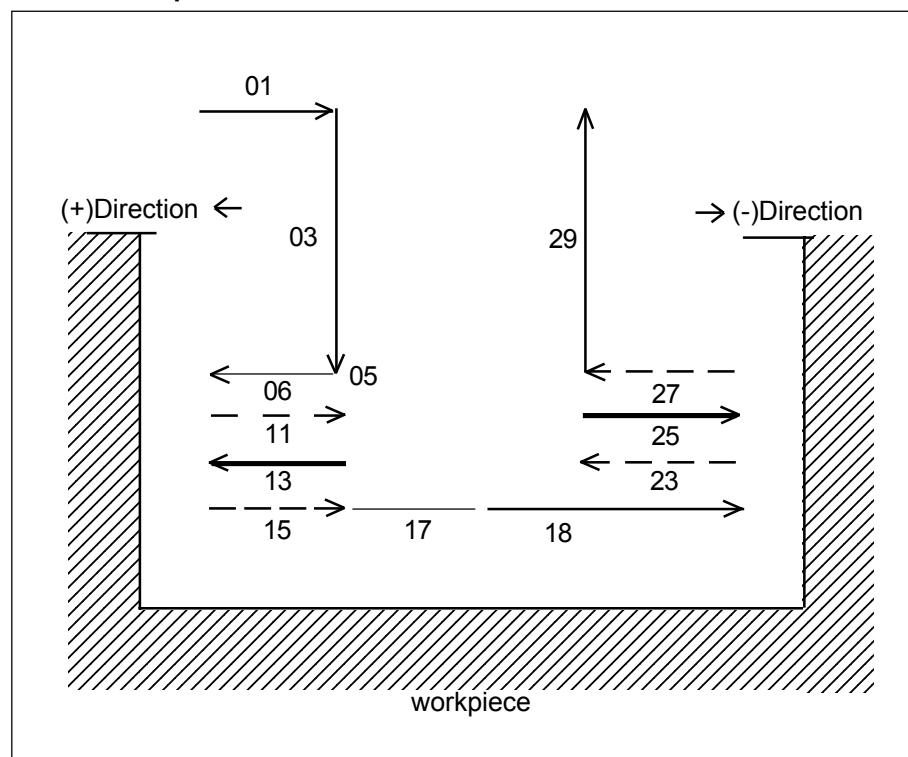
**Measurement start motion**

<Code>                                   <Contents>  
1.G31 Z R05 F R06;                   Z movement to return position  
   (Movement by skip function,  
   CENTERALIGNFEEDRATE1)

**Movement to measurement positions**

<Code>                                   <Contents>  
1.G31 X R00 Y R01 F R06;           X/Y movement to measurement position  
   (Movement by skip function,  
   CENTERALIGNFEEDRATE1)  
2.M321;                                   Detection signal OFF check  
  
   R00: Measurement position X  
   R01: Measurement position Y  
   R06: CENTERALIGNFEEDRATE1

**Measurement pattern 3**



- : Movement by skip function (CENTER ALIGN FEEDRATE 1)
- : Movement by skip function (CENTER ALIGN FEEDRATE 2)
- — — : Linear interpolation (CENTER ALIGN FEEDRATE 1)

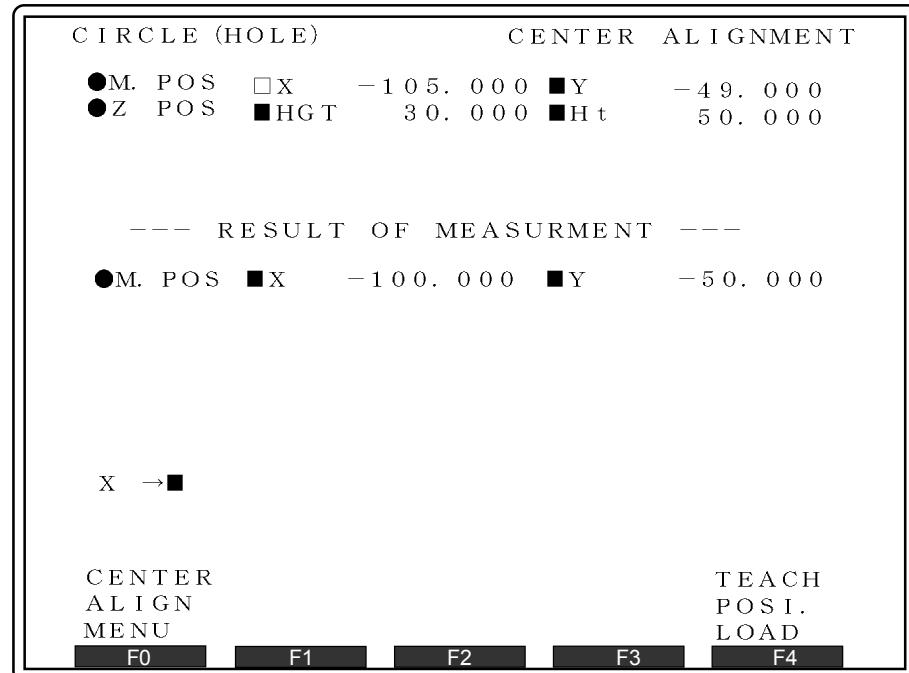
R00:Measurement position X  
R01:Measurement position Y  
R04:Z axis position(Height)  
R05:Z axis position(Ht)  
R06:CENTRALIGNFEEDRATE1  
R07:CENTRALIGNFEEDRATE2  
R08:Target position X in the + direction  
R09:Target position Y in the + direction  
R10:Return amount X in the + direction  
R11:Return amount Y in the + direction  
R12:Target position X in the - direction  
R13:Target position Y in the - direction  
R14:Return amount X in the - direction  
R15:Return amount Y in the - direction

<Code>	<Contents>
1.G31 X R00 Y R01 F R06;	X/Y movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
2.M321;	Detection signal OFF check
3.G31 Z R04 F R06;	Z movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
4.M321;	Detection signal OFF check
5.M19;	Spindle orientation 0°.
6.G31 X R08 Y R09 F R06;	X/Y movement to target position in the + direction (Movement by skip function, CENTER ALIGN FEEDRATE 1)
7.M320;	Detection signal ON check
8.M310;	X/Y detection position take-in in the + direction
9.M302;	X return position calculation
10.M302;	Y return position calculation
11.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
12.M321;	Detection signal OFF check
13.G31 X R08 Y R09 F R07;	X/Y movement to target position in the + direction (Movement by skip function, CENTER ALIGN FEEDRATE 2)
14.M310;	X/Y detection position take-in in the + direction
15.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
16.M321;	Detection signal OFF check
17.M111;	Spindle orientation 180°.
18.G31 X R08 Y R09 F R06;	X/Y movement to target position in the - direction (Movement by skip function, CENTER ALIGN FEEDRATE 1)
19.M320;	Detection signal ON check
20.M310;	X/Y detection position take-in in the - direction
21.M302;	X return position calculation
22.M302;	Y return position calculation
23.G01 X R14 Y R15 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
24.M321;	Detection signal OFF check
25.G31 X R12 Y R13 F R07;	X/Y movement to target position in the - direction (Movement by skip function, CENTER ALIGN FEEDRATE 2)
26.M310;	X/Y detection position take-in in the - direction
27.G01 X R14 Y R15 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
28.M05;	Spindle stop
29.G31 Z R05 F R06;	Z movement to return position (Movement by skip function, CENTER ALIGN FEEDRATE 1)

**(Note) "Z movement to return position" in the above (29) is done after all the measurements are done.**

**During the measurement, the Z moves to the measurement position.**

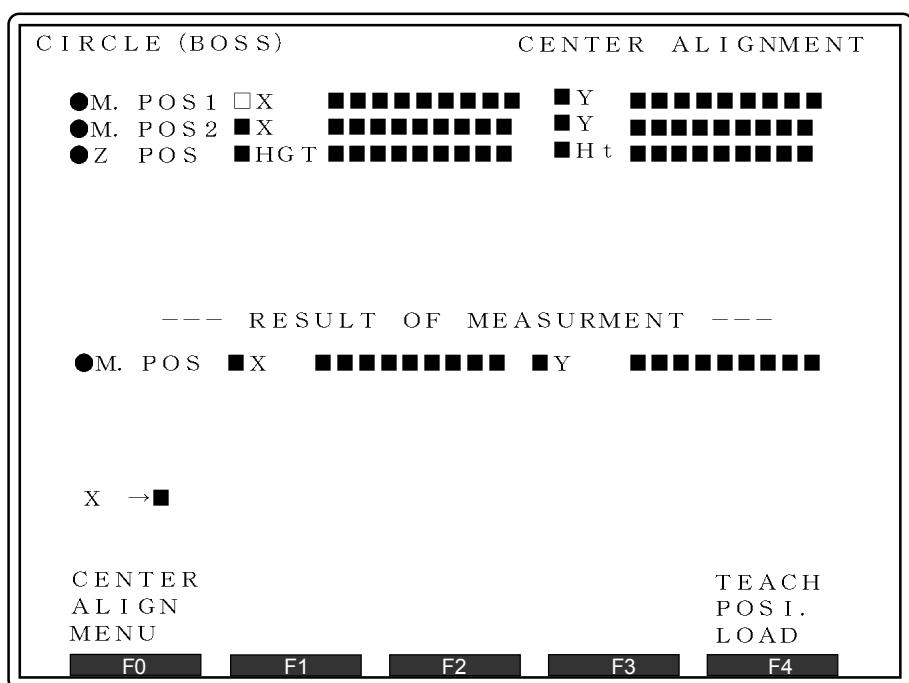
- 3) After measurement is finished, the results are displayed and the X/Y axes move to the measurement position.



## 2.4 Circle(boss)

#### Measurement of X and Y coordinates of the center of circular boss

After setting of 4.CIRCLE(BOSS) at the center alignment menu screen

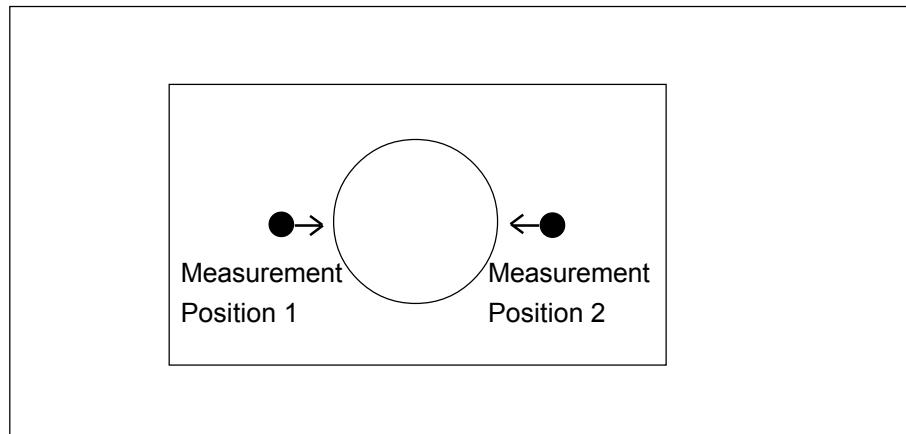


1) Set the necessary values

\* Measurement position 1 (X,Y)

\* Measurement position 2 (X,Y)

Specify the 2 points in the X direction around the Y center on the cylinder to be aligned as the alignment start points with the X/Y absolute coordinates.

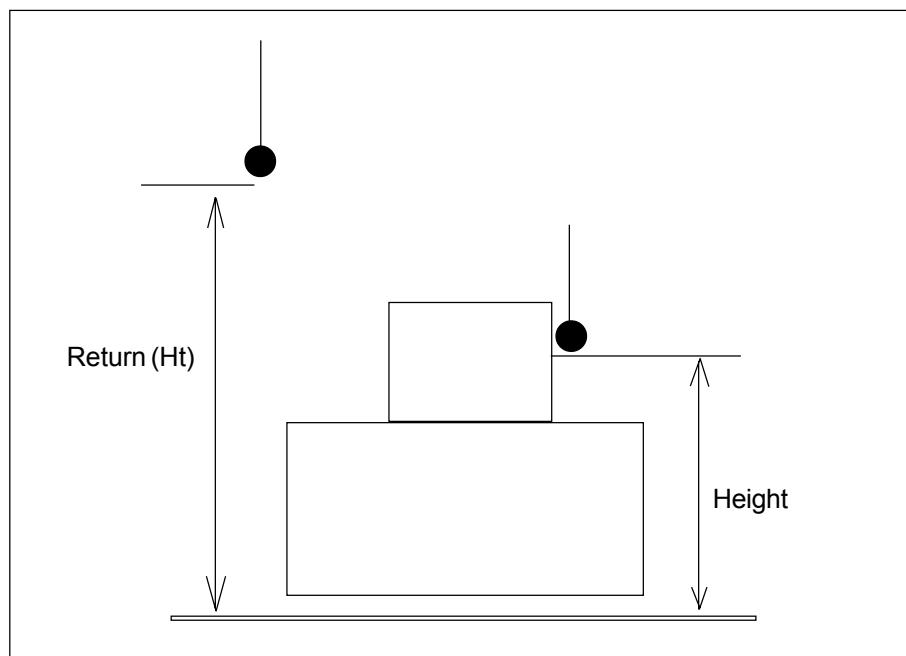


\* Z axis position (Height)

Specify the measurement height with the Z absolute coordinates.

\* Z axis position (Ht)

The return height during the movement from the measurement positions 1 to 2 and after the measurement is finished is specified by the Z absolute coordinates.



2) Press the START switch and execute the center alignment operation in the following procedures.

(1) Execute the measurement start motion.

(2) Convert the measurement position 1 and 2 to the data for measuring the circular center.

Measurment position 1 = (X1, Y1)

Measurment position 2 = (X2, Y2)

Conversionposition1=(min(X1,X2),(Y1+Y2)/2)

Conversionposition2=(max(X1,X2),(Y1+Y2)/2)

Conversion position 3 =(3 measurement position X,

(Y1+Y2)/2-(conversion position 2X -conversion position 1X)/2)

Conversion position 4 =(3 measurement position X,

(Y1+Y2)/2+(conversion position 2X -conversion position 1X)/2)

Conversion position 5=(conversion position 1X,4 measurment position Y)

Conversion position 6=(conversion position 2X,4 measurment position Y)

(3) Measure the pattern 2 in the X direction at the conversion position 1 and 2

(4) Measure the pattern 2 in the Y direction at the conversion position 3 and 4

(5) Measure the pattern 2 in the X direction at the conversion position 5 and 6

(6) Set the answer: Measurement value X = "Measurement of (5)"

Measurement value Y = "Measurement of (4)"

(7) Move to measurement position

### Measurement start motion

<Code>

1.G31 Z R05 F R06;

<Contents>

Z movement to return position

(Movement by skip function,

CENTERALIGNFEEDRATE1)

### Movement to measurement positions

<Code>

1.G31 X R00 Y R01 F R06;

<Contents>

X/Y movement to measurement position

(Movement by skip function,

CENTERALIGNFEEDRATE1)

2.M321;

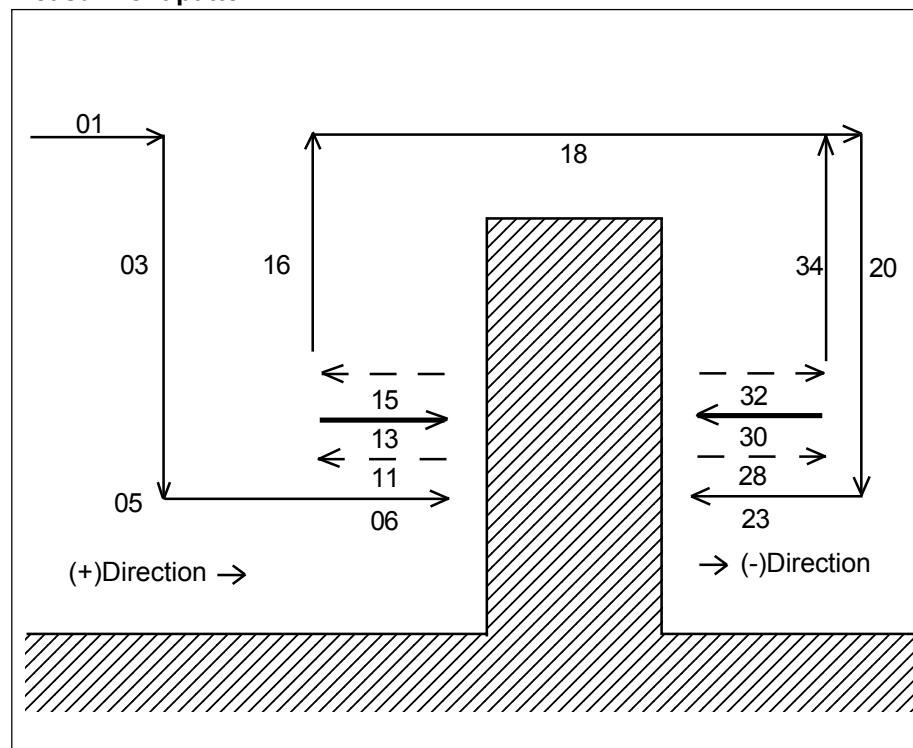
Detection signal OFF check

R00: Measurement position X

R01: Measurement position Y

R06: CENTERALIGNFEEDRATE1

**Measurement pattern 2**

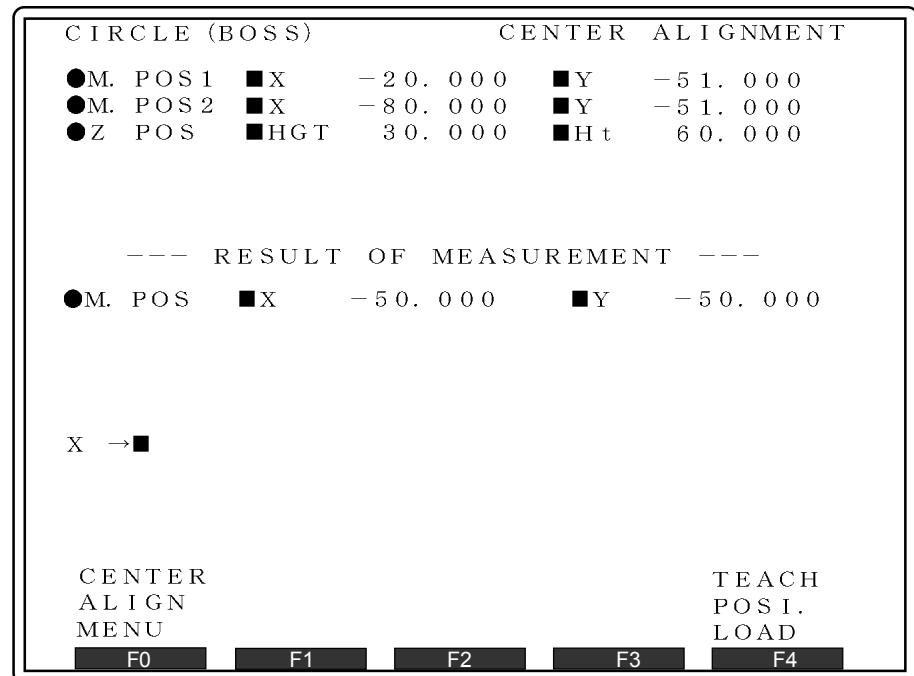


- : Movement by skip function (CENTER ALIGN FEEDRATE 1)
- : Movement by skip function (CENTER ALIGN FEEDRATE 2)
- — — : Linear interpolation (CENTER ALIGN FEEDRATE 1)

R00: Measurement position 1X  
 R01: Measurement position 1Y  
 R02: Measurement position 2X  
 R03: Measurement position 2Y  
 R04: Z axis position (Height)  
 R05: Z axis position (Ht)  
 R06: CENTERALIGNFEEDRATE1  
 R07: CENTERALIGNFEEDRATE2  
 R08: Target position X in the + direction  
 R09: Target position Y in the + direction  
 R10: Return amount X in the + direction  
 R11: Return amount Y in the + direction  
 R12: Target position X in the - direction  
 R13: Target position Y in the - direction  
 R14: Return amount X in the - direction  
 R15: Return amount Y in the - direction

<Code>	<Contents>
1.G31 X R00 Y R01 F R06;	X/Y movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
2.M321;	Detection signal OFF check
3.G31 Z R04 F R06;	Z movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
4.M321;	Detection signal OFF check
5.M19;	Spindle orientation 0°
6.G31 X R08 Y R09 F R06;	X/Y movement to target position in the + direction (Movement by skip function, CENTER ALIGN FEEDRATE 1)
7.M320;	Detection signal ON check
8.M310;	X/Y detection position take-in in the + direction
9.M302;	X return position calculation
10.M302;	Y return position calculation
11.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
12.M321;	Detection signal OFF check
13.G31 X R08 Y R09 F R07;	X/Y movement to target position in the + direction (Movement by skip function, CENTER ALIGN FEEDRATE 2)
14.M310;	X/Y detection position take-in in the + direction
15.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
16.G31 Z R05 F R06;	Z movement to return position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
17.M321;	Detection signal OFF check
18.G31 X R02 Y R03 F R06;	X/Y movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
19.M321;	Detection signal OFF check
20.G31 Z R04 F R06;	Z movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
21.M321;	Detection signal OFF check
22.M111;	Spindle orientation 180°
23.G31 X R12 Y R13 F R06;	X/Y movement to target position in the - direction (Movement by skip function, CENTER ALIGN FEEDRATE 1)
24.M320;	Detection signal ON check
25.M310;	X/Y detection position take-in in the - direction
26.M302;	X return position calculation
27.M302;	Y return position calculation
28.G01 X R14 Y R15 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
29.M321;	Detection signal OFF check
30.G31 X R12 Y R13 F R07;	X/Y movement to target position in the - direction (Movement by skip function, CENTER ALIGN FEEDRATE 2)
31.M310;	X/Y detection position take-in in the - direction
32.G01 X R14 Y R15 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
33.M05;	Spindle stop
34.G31 Z R05 F R06;	Z movement to return position (Movement by skip function, CENTER ALIGN FEEDRATE 1)

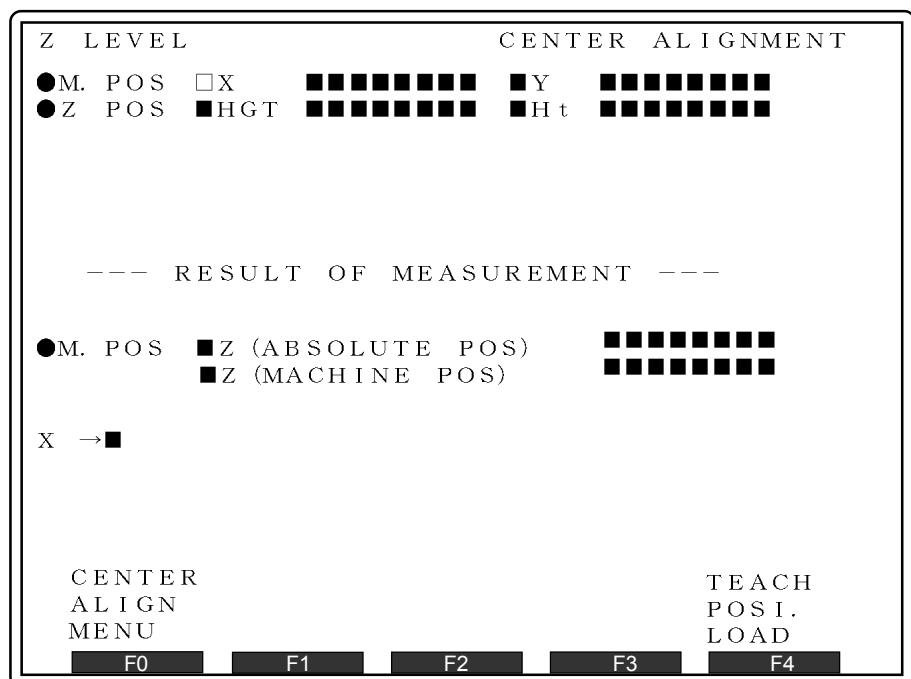
- 3) After measurement is finished, the results are displayed and the X/Y axes move to the measurement position.



## 2.5 Z LEVEL

Measurement of Z coordinates of the workpiece top surface

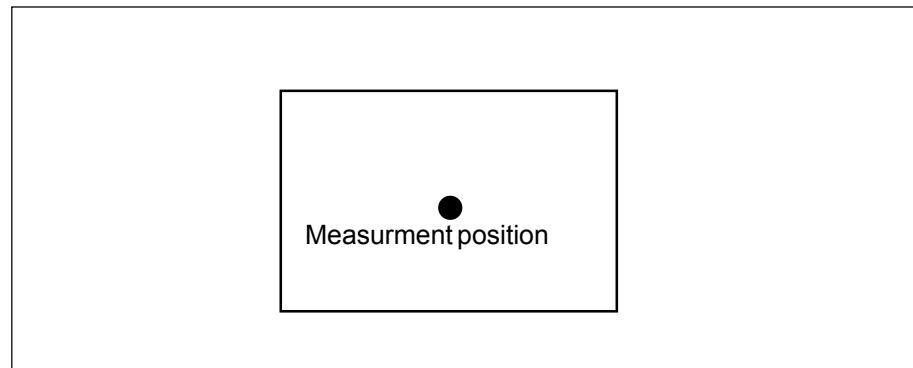
After setting of 5.Z LEVEL at the center alignment menu screen



1) Set the necessary values

\* Measurement position (X,Y)

Specify the alignment start point around the center of hole with the X/Y absolute coordinates.

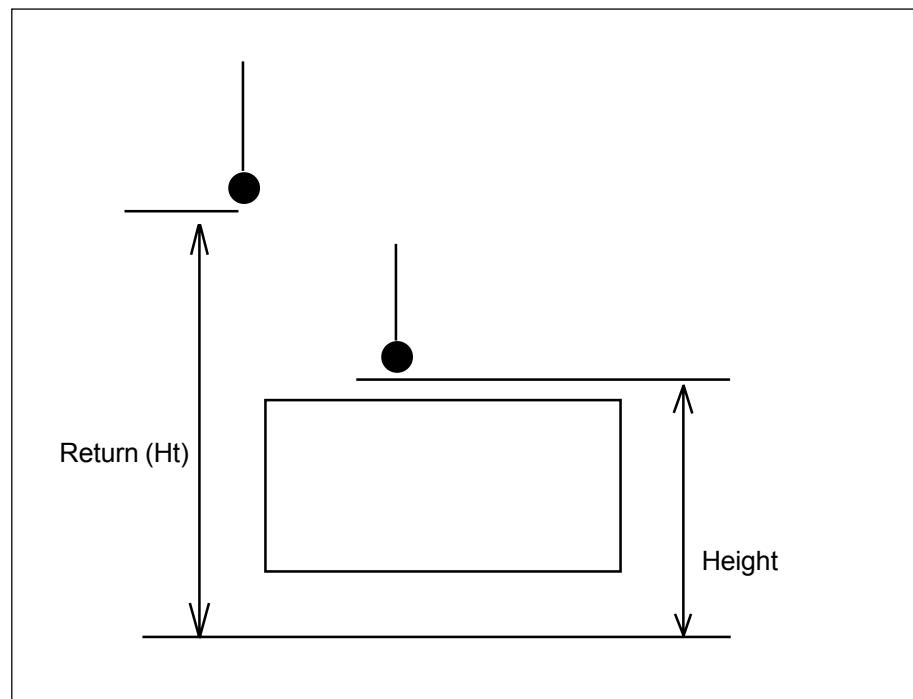


\* Z axis position (Height)

Specify the measurement height with the Z absolute coordinates.

\* Z axis position (Ht)

Specify the return height after measurement is finished with the Z absolute coordinates.



2) Press the START switch and execute the center alignment operation in the following procedures.

- 1) Execute the measurement start motion.
- 2) Measure the pattern 4 at the measurement position.
- 3) Set the measurement values.

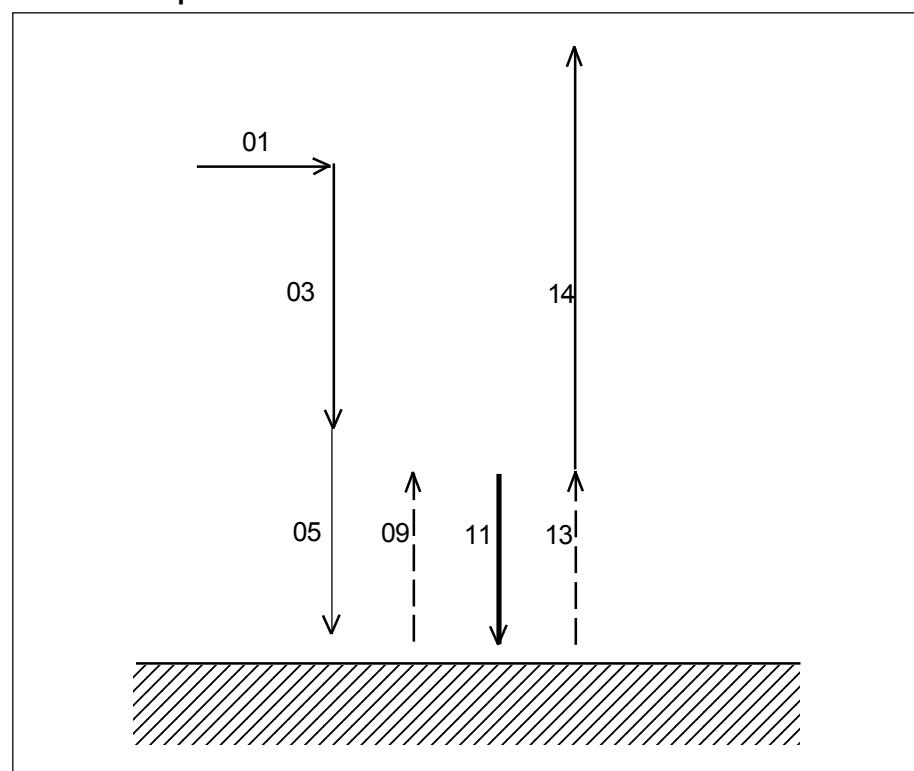
### Measurement start motion

<Code>                    <Contents>

1.G31 Z R05 F R06;    Z movement to return position

(Movement by skip function, CENTER ALIGN FEEDRATE 1)

### Measurement pattern 4

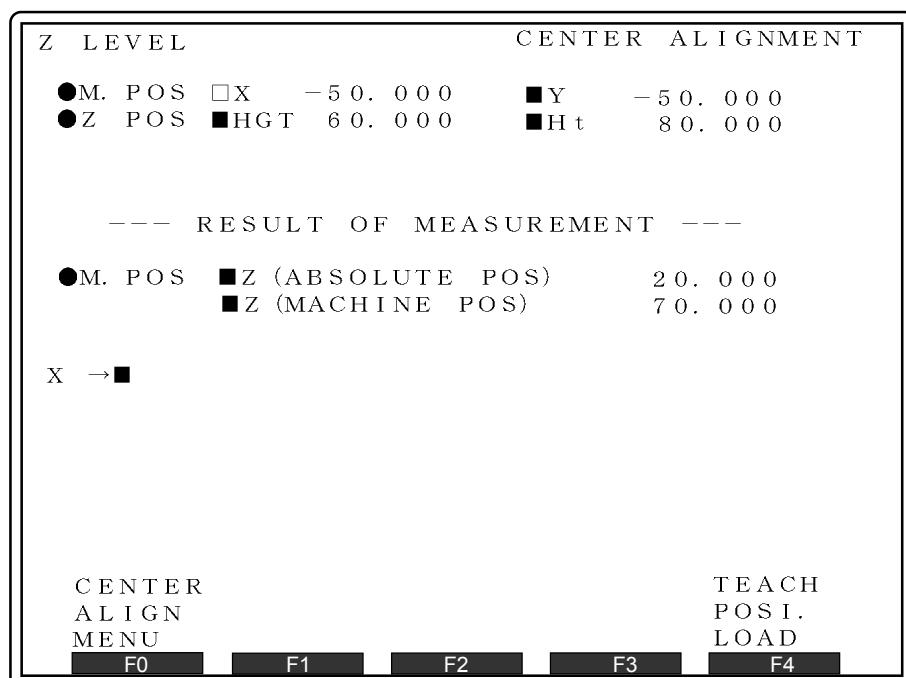


- : Contact movement (CENTER ALIGN FEEDRATE 1)
- : Contact movement (CENTER ALIGN FEEDRATE 2)
- — — : Linear interpolation (CENTER ALIGN FEEDRATE 1)

R00: Measurement position X  
 R01: Measurement position Y  
 R04: Z axis position (Height)  
 R05: Z axis position (Ht)  
 R06: CENTER ALIGN FEEDRATE 1  
 R07: CENTER ALIGN FEEDRATE 2  
 R08: Motion target Z  
 R10: Return amount Z

<Code>	<Contents>
1.G31 X R00 Y R01 F R06;	X/Y movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
2.M321;	Detection signal OFF check
3.G31 Z R04 F R06;	Z movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
4.M321;	Detection signal OFF check
5.G31 Z R08 F R06;	Z movement to target position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
6.M320;	Detection signal ON check
7.M311;	Z measurement position take-in
8.M302;	Z return position calculation
9.G01 Z R10 F R06;	Z return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
10.M321;	Detection signal OFF check
11.G31 Z R08 F R07;	Z movement to target position (Movement by skip function, CENTER ALIGN FEEDRATE 2)
12.M311;	Z detection position take-in
13.G01 Z R10 F R06;	Z return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
14.G31 Z R05 F R06;	Z movement to return position (Movement by skip function, CENTER ALIGN FEEDRATE 1)

- 3) After measurement is finished, the results are displayed and the X/Y axes move to the measurement position.



## 2. 6 Probe Offset Value

Some menu items of the center alignment and the automatic measurement require the settings of the probe offset value.

If the offset value is not set, some error may occur to the measurement results.

The items below do not require the probe offset values, thus setting to PROBE OFFSET VALUE is not necessary.

- Center Alignment "PARALLEL""CIRCLE(HOLE)""CIRCLE(BOSS)""ZLEVEL"
- Automatic measurement "G122,G123,G126,G127,G128"

The items below require the values set to PROBE OFFSET VALUE 1 and PROBE OFFSET VALUE2.

- Center Alignment "CORNER"
- Automatic measurement G121,G129

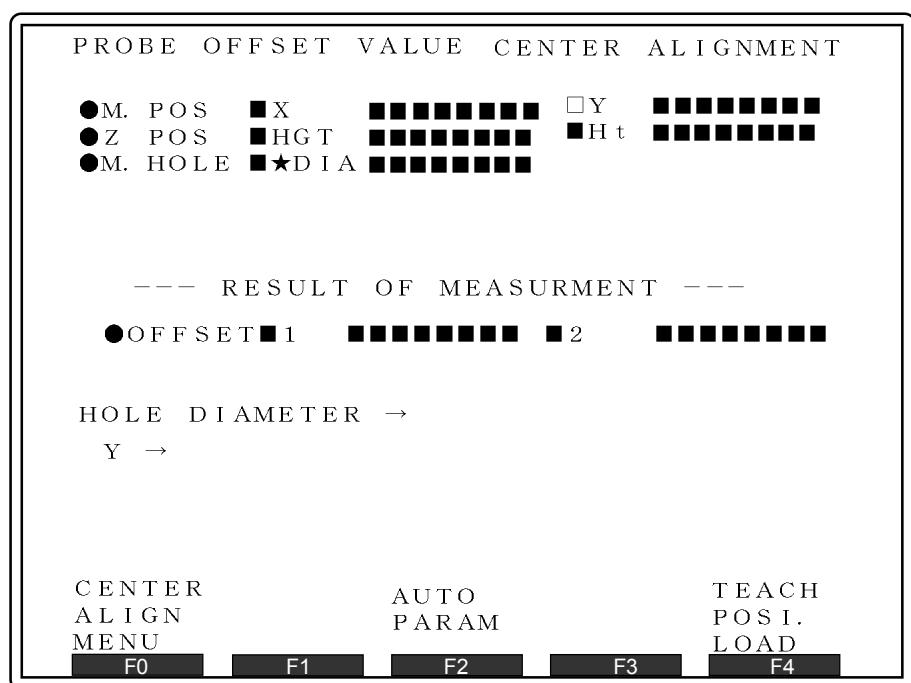
The items below require the values set to PROBE OFFSET VALUE 3 and PROBE OFFSET VALUE4.

- Automatic measurement G124,G125

## 2. 7 Probe offset value (G121/G129)

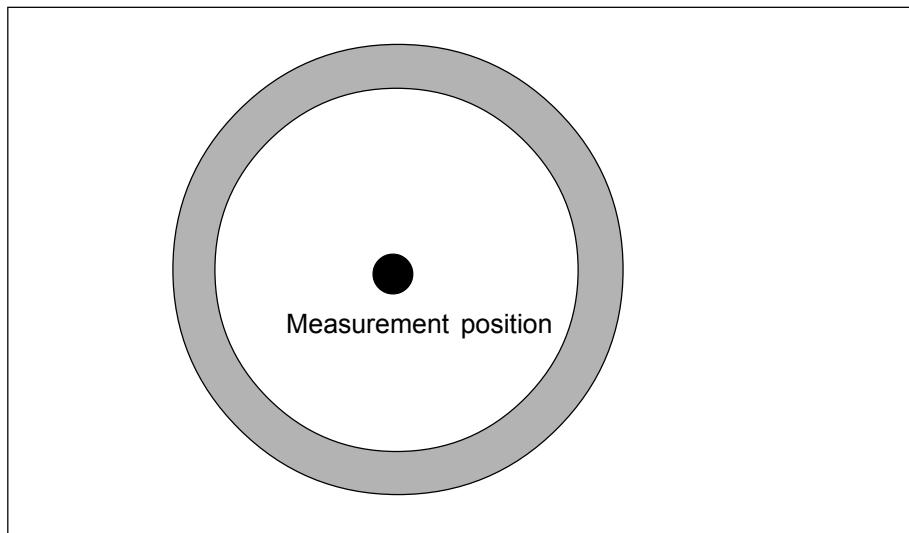
This command calculates the value to be set to PROBE OFFSET VALUE 1 and PROBE OFFSET VALUE 2 parameters.

The screen below is when 6. PROBE OFFSET VALUE (G121/G129) is set on the center alignment.



- 1) Prepare a ring gauge.
  - 2) Set the necessary values
- \* Measurement position 1 (X,Y)

The measurement position is specified by the X and Y absolute coordinate position, regarding the position near the center of the ring gauge as the start position of center alignment.

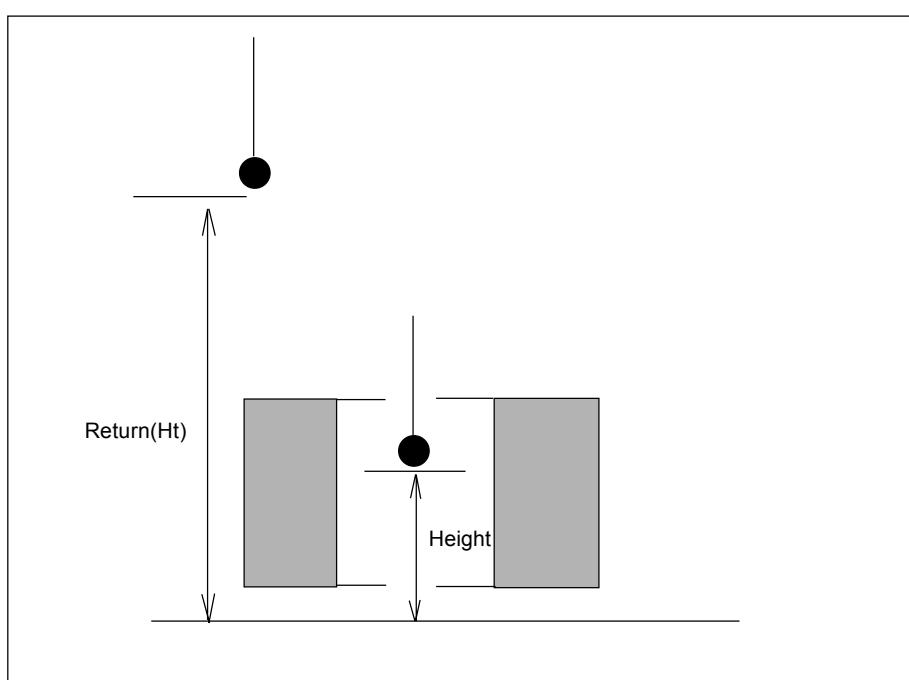


- \* Z axis position (Height)

Specify the measurement height with the Z absolute coordinates.

- \* Z axis position (Ht)

Specify the return height after measurement is finished with the Z absolute coordinates.



3) Press the START switch and execute the center alignment operation in the following procedures.

- (1) Execute the measurement start motion.
- (2) Measure the pattern 3 in the X direction at the measurement position.
- (3) Measure the pattern 3 in the Y direction at the position measured in above (2).
- (4) Measure the pattern 3 in the X direction at the position measured in above (3).
- (5) Move to the measurement position in above (4).

Measurement start motion

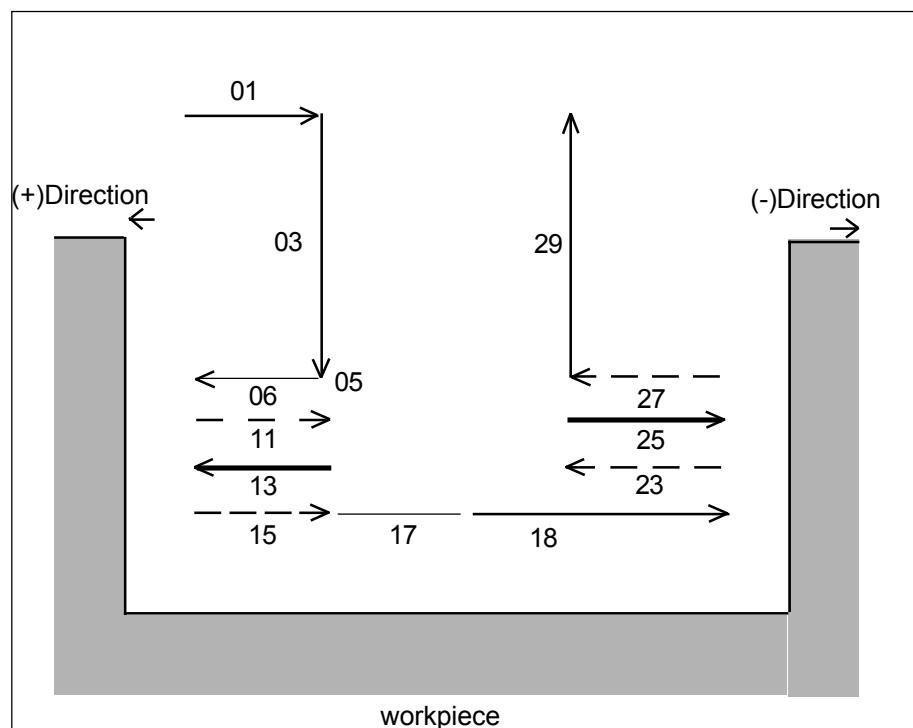
<Code>	<Contents>
1.G31 Z R05 F R06;	Z movement to return position (Movement by skip function, CENTER ALIGN FEEDRATE 1)

Movement to measurement positions

<Code>	<Contents>
1.G31 X R00 Y R01 F R06; X/Y movement to measurement position 2.M321; Detection signal OFF check	(Movement by skip function, CENTER ALIGN FEEDRATE 1)

R00:Measurement position X  
R01:Measurement position Y  
R06:CENTRALIGNFEEDRATE1

**Measurement pattern 3**



— :Movement by skip function (CENTER ALIGN FEEDRATE 1)  
— :Movement by skip function (CENTER ALIGN FEEDRATE 2)  
— — — :Linear interpolation (CENTER ALIGN FEEDRATE 1)

R00:Measurement position X  
R01:Measurement position Y  
R0:Z axis position(Height)  
R055:Z axis position(Ht)  
R06:CENTRALIGNFEEDRATE1  
R07:CENTRALIGNFEEDRATE2  
R08:Target position X in the + direction  
R09:Target position Y in the + direction  
R10:Return amount X in the + direction  
R11:Return amount Y in the + direction  
R12:Target position X in the - direction  
R13:Target position Y in the - direction  
R14:Return amount X in the - direction  
R15:Return amount Y in the - direction

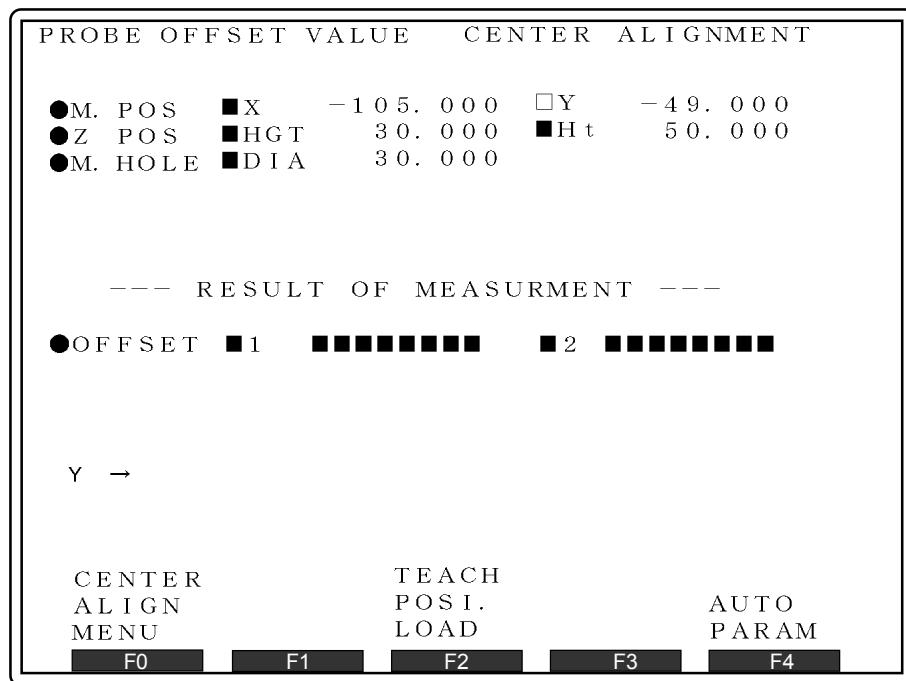
<Code>	<Contents>
1.G31 X R00 Y R01 F R06;	X/Y movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
2.M321;	Detection signal OFF check
3.G31 Z R04 F R06;	Z movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
4.M321;	Detection signal OFF check
5.M19;	Spindle orientation 0°
6.G31 X R08 Y R09 F R06;	X/Y movement to target position in the + direction (Movement by skip function, CENTER ALIGN FEEDRATE 1)
7.M320;	Detection signal ON check
8.M310;	X/Y detection position take-in in the + direction
9.M302;	X return position calculation
10.M302;	Y return position calculation
11.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
12.M321;	Detection signal OFF check
13.G31 X R08 Y R09 F R07;	X/Y movement to target position in the + direction (Movement by skip function, CENTER ALIGN FEEDRATE 2)
14.M310;	X/Y detection position take-in in the + direction
15.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
16.M321;	Detection signal OFF check
17.M111;	Spindle orientation 180°
18.G31 X R08 Y R09 F R06;	X/Y movement to target position in the - direction (Movement by skip function, CENTER ALIGN FEEDRATE 1)
19.M320;	Detection signal ON check
20.M310;	X/Y detection position take-in in the - direction
21.M302;	X return position calculation
22.M302;	Y return position calculation
23.G01 X R14 Y R15 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
24.M321;	Detection signal OFF check
25.G31 X R12 Y R13 F R07;	X/Y movement to target position in the - direction (Movement by skip function, CENTER ALIGN FEEDRATE 2)
26.M310;	X/Y detection position take-in in the - direction
27.G01 X R14 Y R15 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
28.M05;	Spindle stop
29.G31 Z R05 F R06;	Z movement to return position (Movement by skip function, CENTER ALIGN FEEDRATE 1)

**(Note) "Z movement to return position" in the above (29) is done after all the**

**measurements are done.**

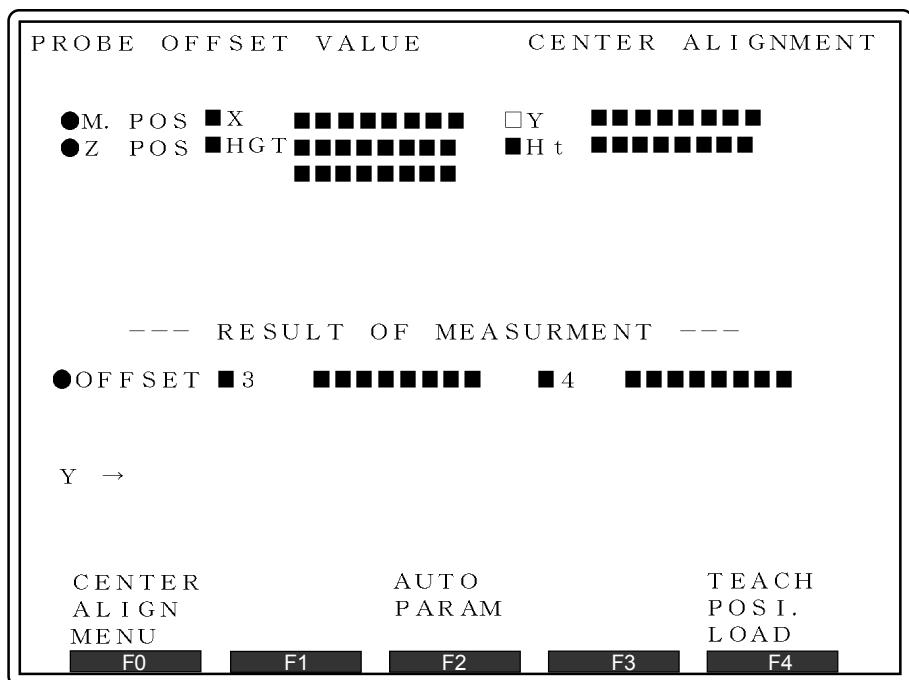
**During the measurement, the Z moves to the measurement position.**

4) After measurement, the measured results are displayed, and X and Y axes move to the ring gauge center.



These commands calculate the values to be set to PROBE OFFSET VALUE 3 and PROBE OFFSET VALUE 4 parameters.

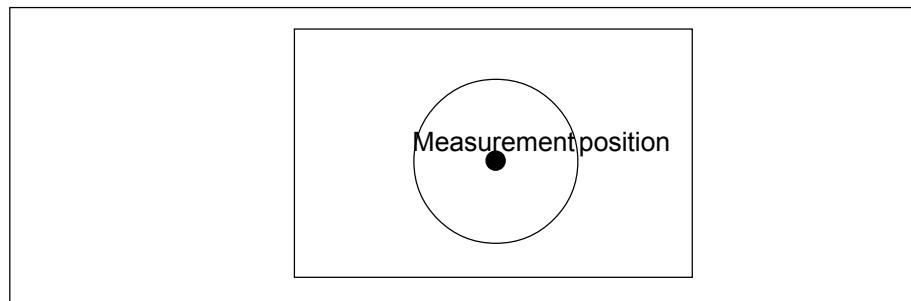
## 2. 8 Probe Offset Value (G124 and G125)



1) Set the necessary values

\*Measurement position 1 (X,Y)

Specify the alignment start point around the center of hole with the X/Y absolute coordinates.

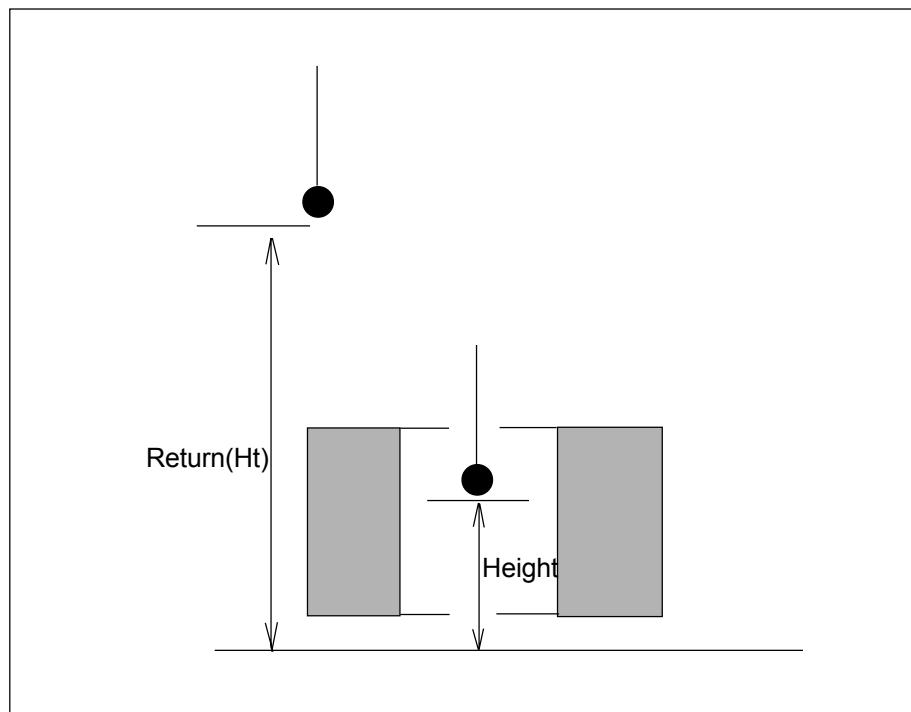


\*Z axis position (Height)

Specify the measurement height with the Z absolute coordinates.

\*Z axis position (Ht)

Specify the return height after measurement is finished with the Z absolute coordinates.



2) Press the START switch and execute the center alignment operation in the following procedures.

- (1) Execute the measurement start motion.
- (2) Measure the pattern 3 in the X direction at the measurement position.
- (3) Measure the pattern 3 in the Y direction at the position measured in above (2).
- (4) Measure the pattern 3 in the X direction at the position measured in above (3).
- (5) Measure the pattern 1 in the 120. direction at the position measured in above (4).
- (6) Measure the pattern 1 in the 240. direction at the position measured in above (4).
- (7) Move to the measurement position in above (4).

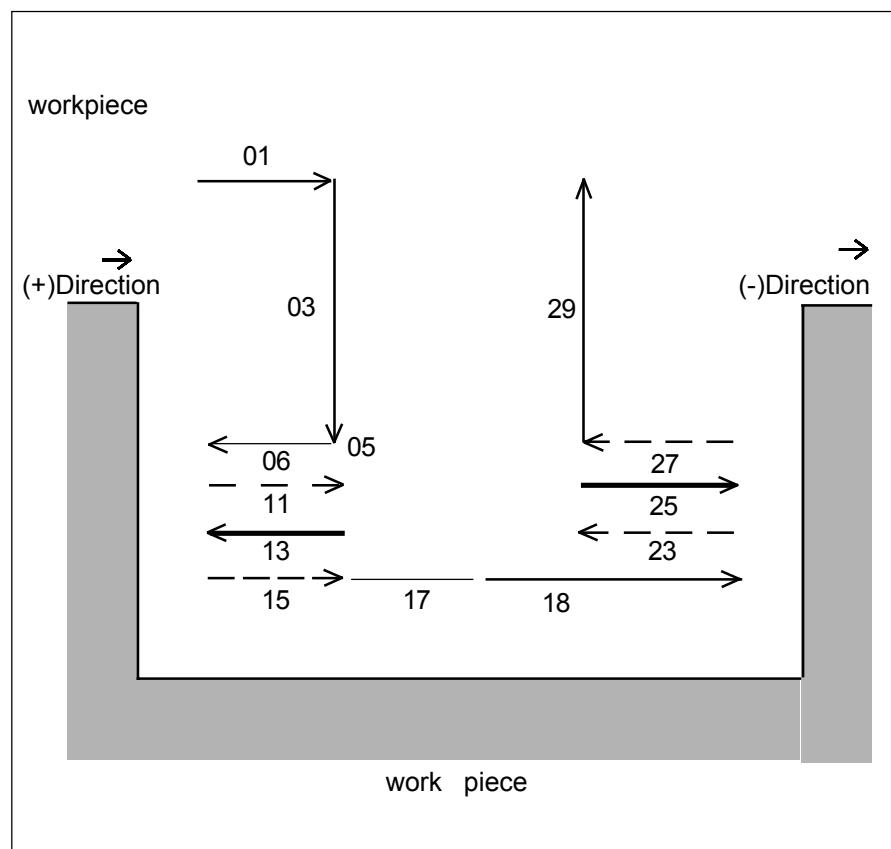
#### **Measurement start motion**

<Code>	<Contents>
1.G31 Z R05 F R06;	Z movement to return position
	(Movement by skip function, CENTER ALIGN FEEDRATE 1)

#### **Movement to measurement positions**

<Code>	<Contents>
1.G31 X R00 Y R01 F R06;	X/Y movement to measurement position
	(Movement by skip function, CENTER ALIGN FEEDRATE 1)
2.M321;	Detection signal OFF check
	R00:Measurement position X
	R01:Measurement position Y
	R06:FCENTERALIGNFEEDRATE1

**Measurement pattern 3**



— :Movement by skip function (CENTER ALIGN FEEDRATE 1)

— :Movement by skip function (CENTER ALIGN FEEDRATE 2)

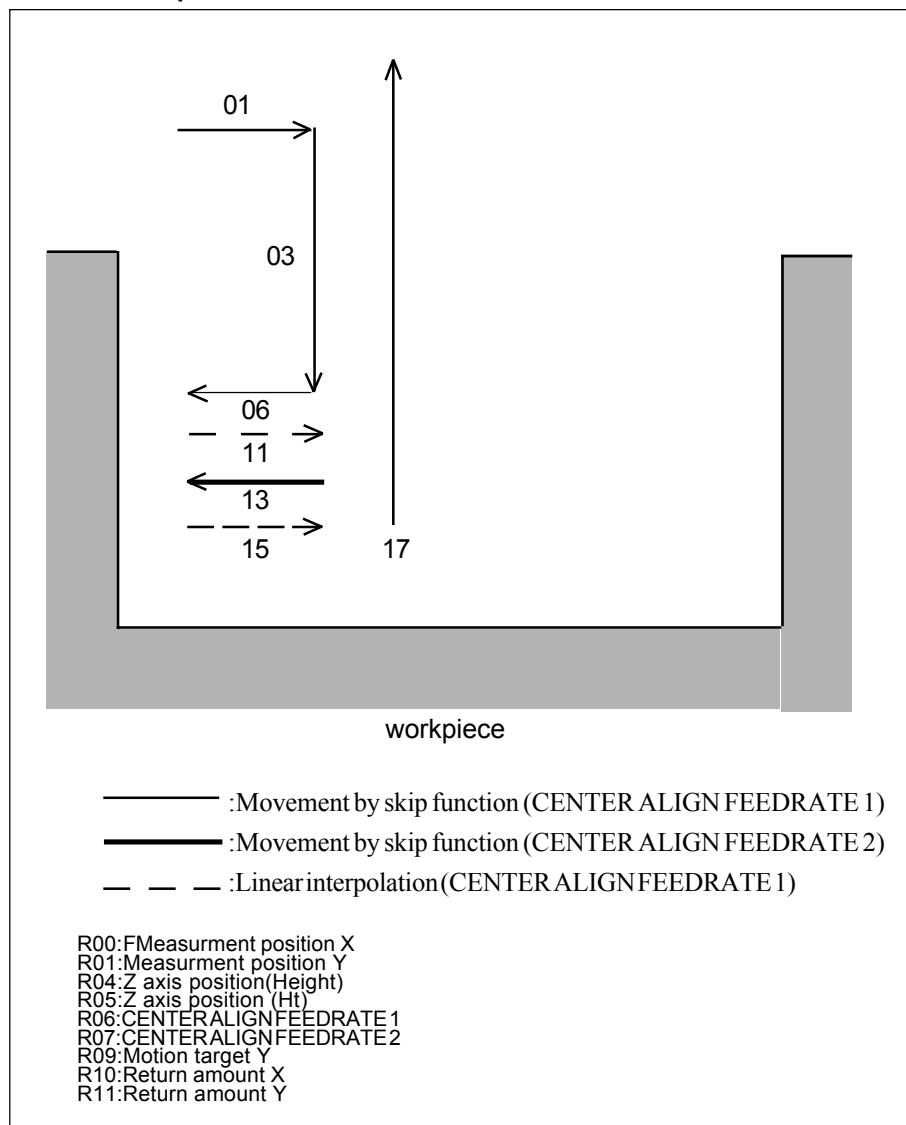
— — — :Linear interpolation(CENTER ALIGN FEEDRATE 1)

R00:Measurement position X  
 R01:Measurement position Y  
 R04:axis position(Height)  
 R05:Z axis position(Ht)  
 R06:CENTRALIGNFEEDRATE1  
 R07:CENTRALIGNFEEDRATE2  
 R08:Target position X in the + direction  
 R09:Target position Y in the + direction  
 R10:Return amount X in the + direction  
 R11:Return amount Y in the + direction  
 R12:Target position X in the - direction  
 R13:Target position Y in the - direction  
 R14:Return amount X in the - direction  
 R15:Return amount Y in the - direction

<Code>	<Contents>
1.G31 X R00 Y R01 F R06;	X/Y movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
2.M321;	Detection signal OFF check
3.G31 Z R04 F R06;	Z movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
4.M321;	Detection signal OFF check
5.M19;	Spindle orientation 0°
6.G31 X R08 Y R09 F R06;	X/Y movement to target position in the + direction (Movement by skip function, CENTER ALIGN FEEDRATE 1)
7.M320;	Detection signal ON check
8.M310;	X/Y detection position take-in in the + direction
9.M302;	X return position calculation
10.M302;	Y return position calculation
11.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
12.M321;	Detection signal OFF check
13.G31 X R08 Y R09 F R07;	X/Y movement to target position in the + direction (Movement by skip function, CENTER ALIGN FEEDRATE 2)
14.M310;	X/Y detection position take-in in the + direction
15.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
16.M321;	Detection signal OFF check
17.M111;	Spindle orientation 180°
18.G31 X R08 Y R09 F R06;	X/Y movement to target position in the - direction (Movement by skip function, CENTER ALIGN FEEDRATE 1)
19.M320;	Detection signal ON check
20.M310;	X/Y detection position take-in in the - direction
21.M302;	X return position calculation
22.M302;	Y return position calculation
23.G01 X R14 Y R15 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
24.M321;	Detection signal OFF check
25.G31 X R12 Y R13 F R07;	X/Y movement to target position in the - direction (Movement by skip function, CENTER ALIGN FEEDRATE 2)
26.M310;	X/Y detection position take-in in the - direction
27.G01 X R14 Y R15 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
28.M05;	Spindle stop
29.G31 Z R05 F R06;	Z movement to return position (Movement by skip function, CENTER ALIGN FEEDRATE 1)

**(Note) "Z movement to return position" in the above (29) is done after all the measurements are done. During the measurement, the Z moves to the measurement position.**

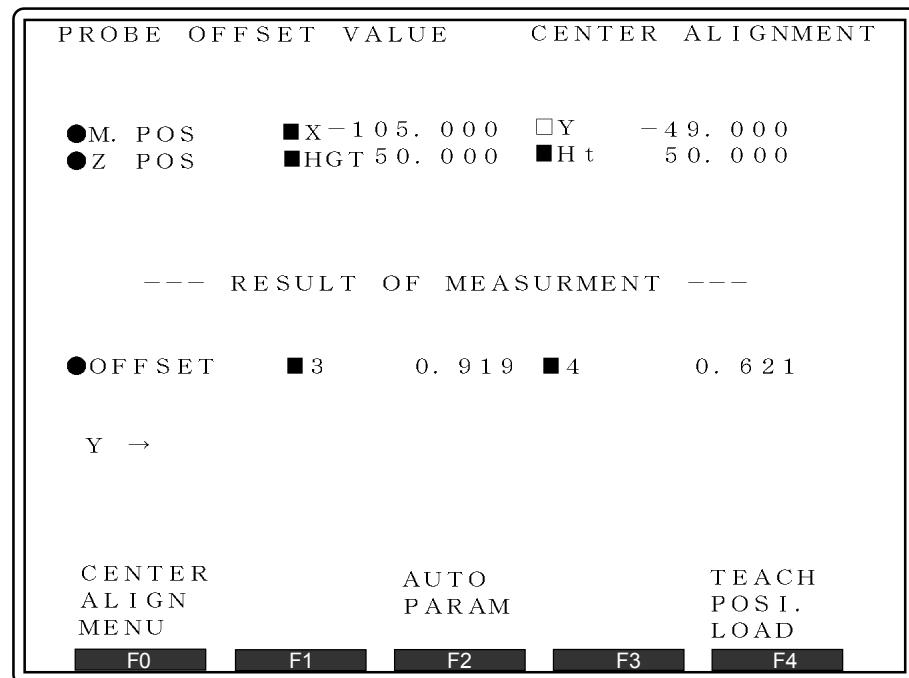
**Measurement pattern 1**



<Code>	<Contents>
1.G31 X R00 Y R01 F R06;	X/Y movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
2.M321;	Detection signal OFF check
3.G31 Z R04 F R06;	Z movement to measurement position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
4.M321;	Detection signal OFF check
5.M19;(M111);	Spindle orientation 0°(180°) *1
6.G31 X R08 Y R09 F R06;	X/Y movement to target position (Movement by skip function, CENTER ALIGN FEEDRATE 1)
7.M320;	Detection signal ON check
8.M310;	X/Y measurement position take-in
9.M302;	X return position calculation
10.M302;	Y return position calculation
11.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
12.M321;	Detection signal OFF check
13.G31 X R08 Y R09 F R07;	X/Y movement to target position (Movement by skip function, CENTER ALIGN FEEDRATE 2)
14.M310;	X/Y detection position take-in
15.G01 X R10 Y R11 F R06;	X/Y return (Linear interpolation, CENTER ALIGN FEEDRATE 1)
16.M05;	Spindle stop
17.G31 Z R05 F R06;	Z movement to return position (Movement by skip function, CENTER ALIGN FEEDRATE 1)

**(Note 1) When the target position of movement by skip function is in the +X or + Y direction, the spindle orientation is 0° When in the -X or -Y direction, the spindle orientation is 180°.**

- 3) After measurement , the results are displayed and the X/Y axes move to the measurement position.



### 3 Setting of data on center alignment

#### 1) Setting of tool data

Register the tool length and tool diameter of the probe to be used to tool data 99.

#### 2) Setting of parameters

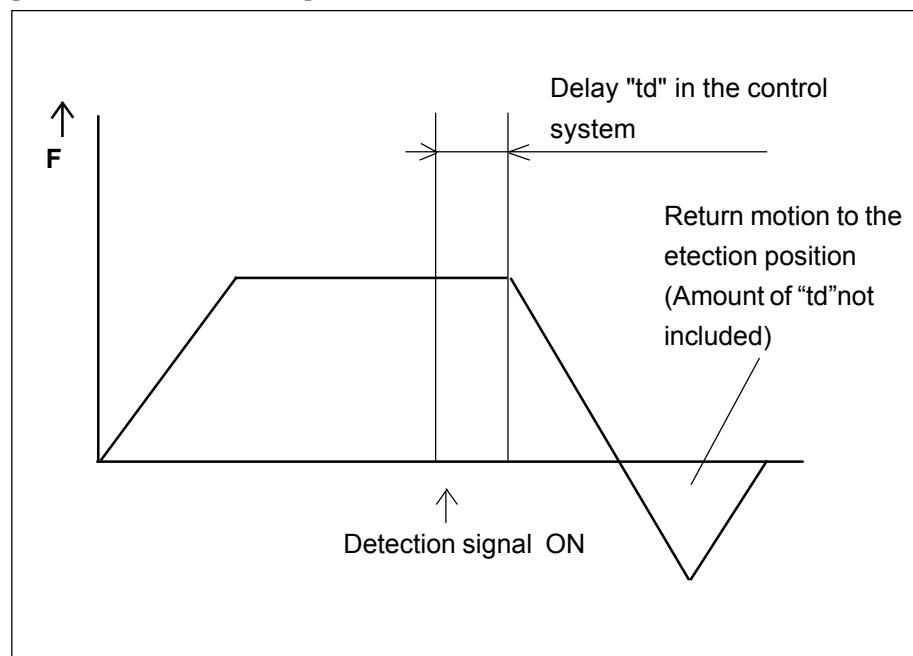
Set the following items for parameter(switch)

Item	Setting range	Description
CENTERALIGN FEEDRATE1	1~5000mm/min [500]	Set the positionning speed in a center aligning and the axis feedrate in a rough measurement.
CENTERALIGN FEEDRATE2	1~5000mm/min [500]	Set the axis feedrate in a fine measurement for center alignment.
CENTERALIGN RETRACTVALUE	0~99.999 [1.0]	Set the retract value after a rough measurement for fine measurement.

**(Note) The setting values of CENTER ALIGN FEEDRATE, CENTER ALIGN RETRACT VALUE and so on differ according to the probe mounted. Consult the probe maker and set the values.**

**Specifying center alignment parameters**

**[Center alignment motion]**



**1. CENTER ALIGN FEEDRATE 1**

- \*Relief amount of probe = L (mm)
- \*SKIP FEED TIME CONSTANT 1 = t (msec)
- \*CENTER ALIGN FEEDRATE 1 = F1 (mm/min)
- \*Delay in control system = td (msec) = 12 (msec)

$$L \geq \frac{((F1 \times td) \div (60 \times 1000)) + ((F1 \times t/2) \div (60 \times 1000))}{\text{Overtravel amount due to delay in control system} \quad \text{Overtravel amount}}$$

Overtravel amount due  
to delay in control  
system

Overtravel amount

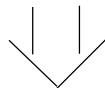
$$F1 \leq \frac{(120000L \div (24+t)) \div 1.2}{\text{Safety rate}}$$

Safety  
rate

## 2. CENTERALIGN FEEDRATE 2

- \*Allowable error in control system = E (mm)
- \*CENTERALIGN FEEDRATE 2 = F2 (mm/min)
- \*Delay in control system = td (msec) = 0.5 (msec)

$$E \geq (F2 \times td) \div 60$$



$$F2 \leq 120 \times E$$

## 3. CENTERALIGN RETRACT VALUE

- \*CENTER ALIGN RETRACT VALUE = Lb (mm)
- \*SKIP FEED TIME CONSTANT 1 = t (msec)
- \*CENTERALIGN FEEDRATE 2 = F2 (mm/min)

- (a) The Z upward movement from an excessively close point may cause an interference between the probe and a workpiece due to workpiece form dispersion.  
Moderate value is 1.0mm.
- (b) During the measurement, contact the probe and a workpiece at an ordinary speed (not at accelerated speed).

$$Lb \geq \text{MAX}(1.0, F2 \times t/6000)$$

## 4. Correction of automatic centering

- \* Lapse of time from the contact of centering tool with a workpiece to the activation of detection signal = tc (msec)
- \* Automatic centering speed 2 = F2 (mm/min)
- \* Correction of automatic centering = Lc (mm)

$$Lc = tc \times F2/60000$$

## 5. SKIP FEED TIME CONSTANT

This is determined by the CENTER ALIGN FEEDRATE 1 and a relief amount of probe.  
Set it to 100msec in general.

## 4 Mounting and dismounting of probe

Refer to the operation manual section 3-8 for mounting and dismounting the probe to and from the magazine.

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# CHAPTER 12.5

## AUTOMATIC DOOR

- 1. Outline**
- 2. Functions**
- 3. Operation Switches**
- 4. Automatic Operation**
- 5. Door Controller Parameter Settings**
- 6. Alarm messages**
- 7. Automatic Door Safety Device**
- 8. Area Sensor**
- 9. Door Stop Conditions**

# 1 Outline

Once connected, the automatic door can be controlled by parameter settings.  
Operation patterns can be set to parameters for selection.

## 2 Functions

- (1) Opening and closing of the automatic door
- (2) Area sensor (the automatic door stops immediately when the area sensor beam is obstructed.)

## 3 Operation Switches

- (1) Automatic door [MANU/AUTO] switch
  - [MANU] Operation with the [OPEN/CLOSE] switch is valid.  
The door is not opened and closed automatically.
  - [AUTO] Operation with the [OPEN/CLOSE] switch is invalid.  
The door is opened and closed automatically.
- (2) [OPEN/CLOSE] switch
  - Valid when the [MANU/AUTO] switch is set to MANU.
  - [OPEN] When [OPEN] is pressed, the door opens. More precisely, opening is initiated when the [OPEN] switch is released.
  - [CLOSE] When [CLOSE] is pressed, the door closes.  
More precisely, closing is initiated when the [CLOSE] switch is released.

**Note: Even when the [MANU/AUTO] switch is set to MANU, the [OPEN/CLOSE] switch is invalid when the door is locked.**

## 4 Automatic Operation

- (1) When the [MANU/AUTO] switch is set to MANU, the door does not operate automatically.
- (2) When the [MANU/AUTO] switch is set to AUTO, the door operates as described below.
  - 1. Press the [START] switch.
  - 2. The automatic door closes.
  - 3. The machine checks the door is closed.
  - 4. The machining begins.
  - 5. The machining is finished.
  - 6. The automatic door opens.

## 5 Door Controller Parameter Settings

### (1) User parameter (switch 1)

Item	Factory set value	Descriptions
AUTOMATIC DOOR (0: NO 1: YES)	0	
AREASENSORPATTERN (0: PATTERN 1 1: PATTERN 2)	1	Pattern 1: Valid when door is closing. Pattern 2: Valid when door is opening and closing.
RESETAUTOMATICDOORERROR (0: EMERGENCY STOP 1: STOP)	1	0:Emergency stop level error occurs. 1:Stop level error occurs.
AUTOMATICDOOROPERATIONTIME	5	Sets the automatic door opening and closing time.

## 6 Alarm messages

1. [DOORERROR]: When any of the followings occurs
  - (1) When the automatic door limit switch has turned on both at the door close and open end.
  - (2) When it took ## seconds (time set to parameter) for closing automatic door.
  - (3) When it took ## seconds (time set to parameter) for opening automatic door.

\* When the above error occurs, either emergency stop or stop can be selected.  
\* To reset the above error, eliminate the error cause and press the [RESET] key of the machine.
2. [AREASNSROBSTRUCTED]: Area sensor error
  - (1) When the area sensor beam is obstructed when the door is closing.
  - (2) When the area sensor beam is obstructed while [AREA SENSOR PATTERN] is set to [1: PATTERN 2] (valid when door is opening and closing)  
Eliminate the error cause and resume operation to reset the alarm.
3. [DOOR LOCKED]: The [OPEN/CLOSE] switch is invalid because the door is locked.
  - (1) The [OPEN/CLOSE] switch is pressed while the [MANU/AUTO] switch is set to MANU and the door is locked.

## 7 Automatic Door Safety Device

### Automatic door operation specifications

[MANU/AUTO] switch	DOOR INTERLOCK switch	Mode			
		MANUAL	MDI	MEMORY	PROGRAM EDIT
	Invalid	Can be used	Can be used	Can be used	Can be used
	Valid	Can be used (*1)			
	Invalid	Not operated	Not operated	Operated	Not operated
	Valid	Not operated	Not operated	Operated	Not operated

(Note 1) The [OPEN/CLOSE] switch is invalid when the door is locked.

## 8 Area Sensor

(TC-20A is not existed the area sensor.)

(1) Automatic door control

When the area sensor beam is obstructed while the automatic door is closing. The door stops.

When the area sensor beam is obstructed while the automatic door is opening. Whether or not the door stops can be set by parameter.

(2) When the automatic door is stopped in MEMORY mode because the area sensor beam is obstructed during door opening and closing, press the [RESTART] switch to resume operation.

(3) Alarm display

The [AREA SNSR OBSTRUCTED] alarm message appears in the following cases:

1. When the automatic door stops because the area sensor beam is obstructed during door opening and closing.
2. Door opening and closing is attempted while the area sensor beam is obstructed.

## 9 Door Stop Conditions

(1) Automatic door opening and closing is halted when:

1. An error occurs in the machine.
2. [\*DOOR ERROR] alarm has occurred.
3. The area sensor beam is obstructed.
4. The [STOP] key is pressed.
5. The [RESET] key is pressed.

(2) Door opening and closing when an alarm occurs

Even when an alarm that halts operation occurs, the door can be opened and closed as long as the following conditions are met:

1. The [MANU/AUTO] switch is set to MANU.
2. The [EMERGENCY] switch is off.
3. The [OPEN/CLOSE] switch is pressed while the [RELEASE] key is pressed.

However, door opening and closing stops when the [RELEASE] key is released or the [EMERGENCY] switch is turned on.

# CHAPTER 12.6

## AUTOMATIC INTERMITTENT LUBRICATING UNIT

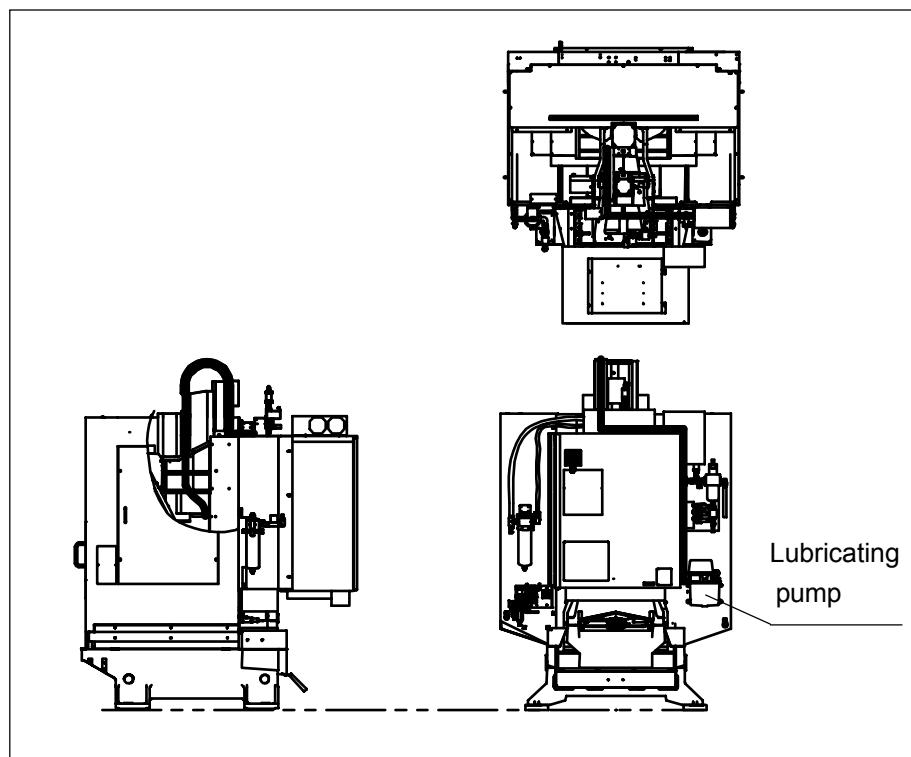
- 1. Cautions for Handling**
- 2. General View**
- 3. Recommended Lubricant**
- 4. Alarm**

# 1 Cautions for Handling

The ball screws and guides are basically lubricated with grease. This machine does not have a lubricating oil collector, so lubricating oil will be mixed into the coolant.

# 2 General View

The automatic intermittent lubricating unit serves to supply oil to ball screws of X, Y and Z axes and slide guides at a period automatically.



S2BOP10.doc

## 3 Recommended Lubricant

For this machine, slideway lubricants or general lubricants for machine tool, equivalent to ISO V68 class are recommended.

Recommended oil : FEBISK68/Esso

Vactra Oil No.2/Mobil

Tonna Oil T68/Shell

## 4 Alarm (EXTERNAL ERROR 23)

Insufficient lubricant causes 'EXTERNAL ERROR 23 on the display.

Refill the lubricant and press the reset key to cancel the alarm.

The interrupting condition for machine operation depends on the parameter 1 (Ext Error 23 Alarm Level) data.

Level 0: Operation is not stopped.

Level 1: Operation is stopped after the program is completed (M02, M30).

(However, if the operation is stopped midway, the situation becomes the same as level 2 because the [START] switch does not work.)

Level 2: Operation is stopped after the current block is completed.

Level 3: Operation is stopped immediately.

Level 4: The servo mechanism is stopped.

The desired level can be set from the above five levels.

For details, refer to the instruction manual → Parameters.

At our shipment, the parameter has been set to the level 1, interruption. after current cycle.

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# CHAPTER 12.7

## TOOL BREAKAGE DETECTION UNIT

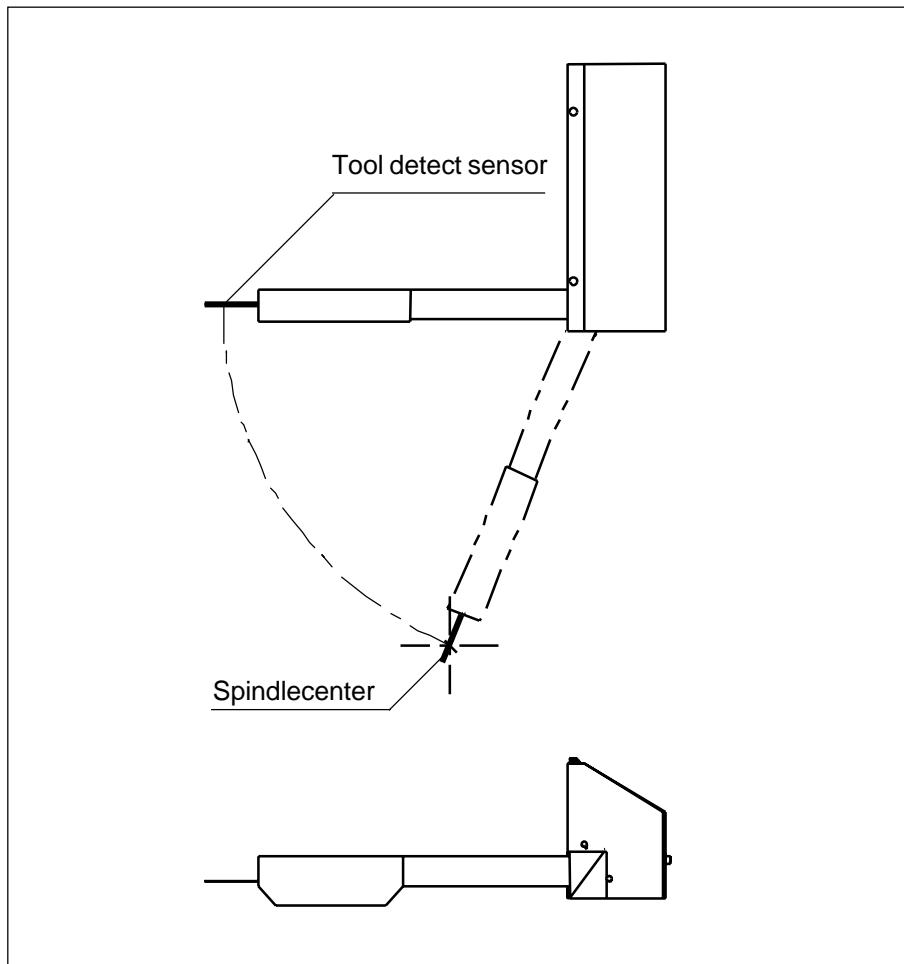
1. Cautions for Handling
2. Sketch Drawing
3. User Parameter (Switch 1) Setting
4. How to Use the Tool Breakage Detection Unit
5. Trouble shooting

An air cylinder drives the tool detection sensor of the tool breakage detection unit so that the sensor contacts the tool and any tool breakage can be detected. Tool breakage detection is performed for the tool after machining.

## 1 Precautions for Handling

1. Do not overload the tool detection sensor.
2. When machining chips are entangled in the tool, the chips may contact the tool detection sensor, leading to incorrect detection. When using the tool breakage detection unit, be sure to start machining under conditions that do not allow chips to entangle the tool.
3. The speed controller is factory-adjusted. Do not adjust it unless absolutely necessary.

## 2 Sketch Drawing



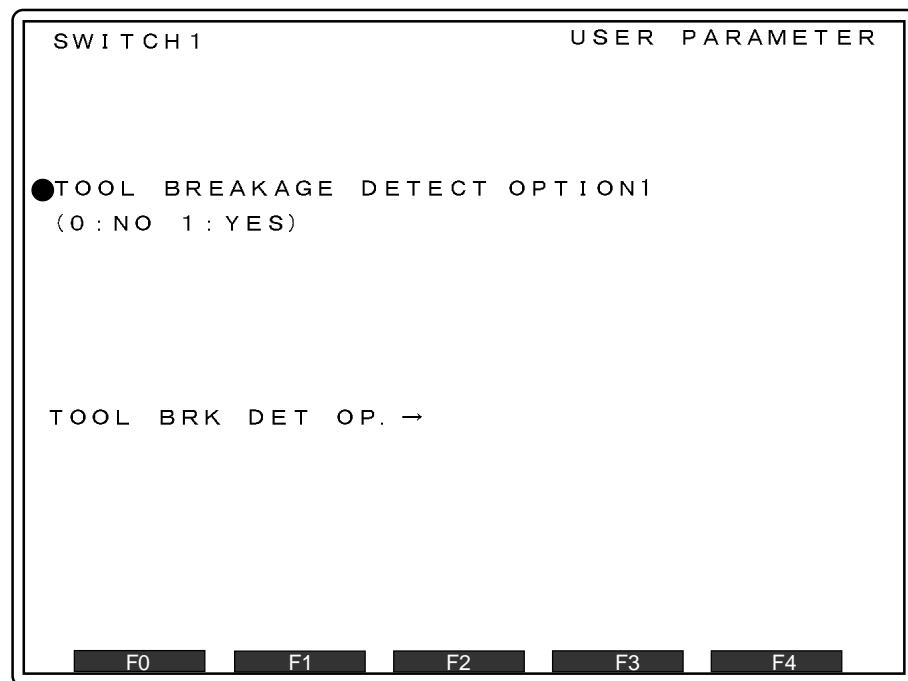
TS2A12-7-1.doc

# 3 User parameter (Switch 1) Setting

1. Press the [DATA BANK] key. The <DATA BANK MENU> screen is displayed.
2. Select [4] and press the [EOB/ENT] key. The <USER PARAMETER MENU> screen is displayed.
3. Select [1] and press the [EOB/ENT] key. The <USER PARAMETER (SWITCH1) > screen is displayed.
4. Using the [PAGE UP, DOWN] and [CURSORUP, DOWN] keys, move the cursor to the desired item and set the required data.
5. Press the [F0] key twice and parameter setting is completed. The <USER PARAMETER MENU> screen is displayed.

## 3.1 Tool breakage detection option

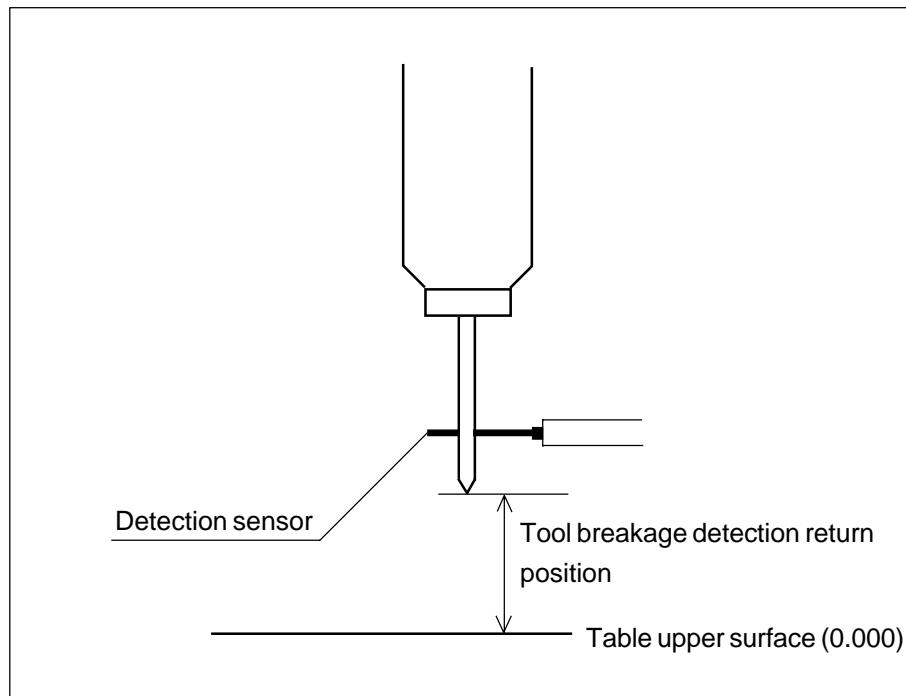
Set the "TOOL BREAKAGE DETECTION OPTION" of parameter 1 (switch) to "1" (YES).



## 3.2 Tool breakage detection return position

Setting of "Tool breakage detection return position"

In memory operation mode, set the tool tip return position, after tool breakage detection, in machine coordinates relative to the Z axis direction.



1. Mount a tool whose tool length is correctly set to the main spindle.
2. Switch to manual operation mode.
3. Using the [Z] key, move the Z axis vertically.  
Adjust the return position so that the tool tip comes to 1 cm below the detection sensor of the tool breakage detection unit.  
(Pulling out the detection sensor arm by hand is accepted. )
4. Subtract the main spindle tool length from the "Z" of the MACHINE COORDINATE POSITION on the <PRESENT POSITION> screen, and set this value to the TOOL BREAKAGE DETECTION RETURN POSITION of USER PARAMETER(SWITCH1).  
Below is an example when the machine coordinate position is 320.000 and the tool length is 115.000.  
 $320.000 - 115.000 = 205.000$ (Se205.000.)

**Present position**

PRESENT POS				
● MACHINE POS				
X				
Y				
Z	320.000			
F0	F1	F2	F3	F4

**User parameter**

SWITCH 1				
USER PARAMETER				
● TOOL BREAKAGE DETECT OPTION 1				
(0 : NO 1 : YES)				
● TOOL BRK DETECT RETURN POS 450.000				
TL BRK DET R POS→ 205.000				
F0	F1	F2	F3	F4

## REFERENCE TOOL LENGTH OFFSET NO. setting

When the program has been created using the reference tool, register the reference tool length as below ,or the tool tip cannot be returned to the tool breakage detecting position correctly.

Set the tool length offset number, in which the reference tool length is preset, to REFERENCE TOOL LENGTH OFFSET NO. of USER PARAMETER (SWITCH1).

### USER PARAMETER

SWITCH 1	USER PARAMETER
● TOOL BREAKAGE DETECT OPTION (0 : NO 1 : YES)	1
● TOOL BRK DETECT RETURN POS 0. 000	
● TOOL BRK DETECTION POS X 0. 000	
● TOOL BRK DETECTION POS Y 0. 000	
●REFERENCE TOOL LENGTH OFFSET NO.	0
TOOL LEN OFFSET NO. →	
F0 F1 F2 F3 F4	

When not using the reference tool ,set "0".

## 3.3 Tool breakage detection position on X (Y) axis

The X and Y positions to perform tool breakage detection are set on the machine coordinate.

This item is invalid for the TC-S2A.

# 4 How to Use the Tool Breakage Detection Unit

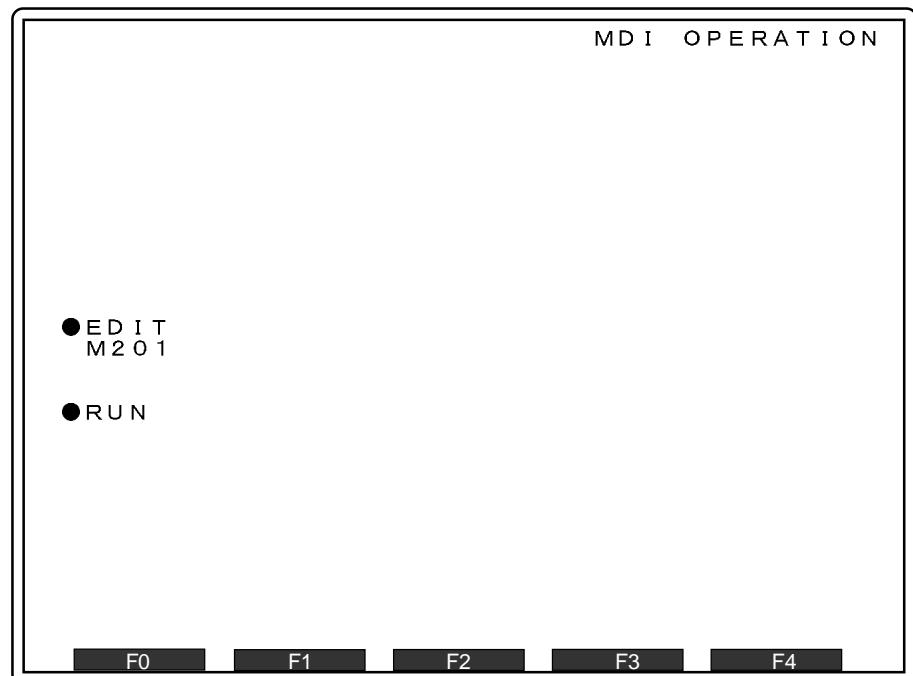
## 4.1 MDI operation

Switch to MDI operation and enter M200 or M201. When the [START] key is pressed, tool breakage detection is started.

**(NOTE)**

**The M201 will not move the tool to the tool breakage detection position. Move the tool to the tool breakage detection position before M201.**

**The M201 is good for check the tool breakage detection motion.**



## 4.2 Memory operation

Tool breakage detection is executed in memory operation when the M200 or M201 command is given.

### When the M200 command is given

When the M200 command is given, spindle orientation is executed while the Z-axis is traveling to the tool breakage detecting position present to user parameter (switch1). Then, breakage detection is started.

- (Note 1) **To use the M200 commanded, offset the tool length in advance, or the spindle nose travels to the tool breakage detecting position.**
- (Note 2) **When Tool Offset is on, the tool tip travels to the tool breakage detecting position, as defined by the offset specified to REFERENCE TOOL LENGTH OFFSET NO.**
- (Note 3) **The axis feed command cannot be given to the same block.**

### When the M201 command is given

When the M201 is given, spindle orientation is executed and breakage detection is started.

- (Note 1) **More tool in advance to the breakage detection position.**
- (Note 2) **The Z-axis command can be given to the same block, but the XY axes command cannot be given to the same block. The Z-axis command given to the same block travels in rapid feed.**

## 4.3 Notes for operation

When "NO" is selected to TOOL BREAKAGE DETECT OPTION, M200 and M201 will be invalid and tool breakage is not detected. However, the Z-axis command is available in the M201 command block.

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When MACHINE LOCK is ON, tool breakage is not detected regardless of M200 or M201. However, the Z-axis command is available in the M201 command block even when MACHINE LOCK is ON.

When DRY RUN is ON, tool breakage is not detected regardless of M200 or M201. However, Z-axis feed and spindle orientation are carried out.

## 4.4 When an alarm has occurred

When [**\*TOOL BROKEN ERROR**] has occurred as a result of tool breakage detection, cancel the alarm as below to restart operation.

1. Press the [**RST**] key.
2. Replace the broken tool with a new tool. Set the data and press the [**START**] key.

## 5 Troubleshooting

When [**\*TOOL BREAKAGE SENSOR ERROR**] has occurred.

When this error cannot be cleared even by pressing the [**RST**] key, the tool breakage detection unit is faulty, so tool breakage detection cannot be performed. In this case, please inform us of the situation. To continue memory operation, set the TOOL BREAKAGE DETECTION OPTION of User Parameter 1 to '0' (no use).

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# CHAPTER 12.8

## OIL HOLE SYSTEM

1. Cautions for handling
2. System outline
3. Piping and cable connection
4. Sketch drawing of the oil hole system
5. Filter cleaning

# 1 Cautions for Handling

## **▲ DANGER**

**High voltage parts are present in the control box.  
Touching such parts by mistake may result in serious  
injury or death.  
Only operators qualified for electrical work and familiar  
with the electrical circuits of this machine are allowed  
to maintain and inspect electrical components.**

Use the oil hole holder shown in the sketch drawing.

Only the oil hole holder manufactured by Nikken is accepted.

**Do not remove the holder cover, as a lot of chips and water splash  
upward. If the holder cover is not installed, machining chips  
penetrate into the tool magazine, resulting in machine damage  
or problems. In addition, chips stuck to the tool taper may hinder  
machining.**

Adjoining each of the oil hole holder on the magazine is defective.

Skip the space to set each of the oil hole holder.

Even if the oil holder with a cover is used, mist and chips may stick to the tool shank, and adversely affect the machining accuracy.

When highly accurate machining is required, take utmost care to prevent chips from sticking to the tool shank.

Rotating the oil hole holder without coolant in it damages the holder seal section.

The maximum rate of the oil hole holder is  $4000 \text{ min}^{-1}$ .

Rotating the holder faster than this damages the seal and bearing.

When installing a drill to the oil hole holder, observe the following:

    Limit of the machine tool length

    (200mm from the taper gauge line to the tool tip).

    Weight limit of the machine (3kg).

Regularly check the filter (30 mesh) in the tank and the suction filter (100 mesh 2 pcs.) connected to the pump inhale port, and remove the chips.

The frequency of cleaning differs depending on the operating conditions.

If cleaning is ignored, the amount of discharge and discharge pressure will decrease, and the though hole of the tool will be clogged with chips, leading to decrease in service life of the oil hole trochoid pump and holder seal section.

Refer to the filter cleaning sectiuon for the cleaning mathod.

Fill the tank with coolant so that the coolant reaches the upper level of the oil pot.

When there is insufficient coolant the trochoid pump will inhale air, which causes an abnormal sound, resulting in a drastic decrease in service life.

For installation of the oil hole holder to the magazine, refer to section '4.How to use the oil holder system'.

While installing, be careful of the cutting tool, and match the key and key groove. If the ATC is actuated when these are not matched correctly, the magazine grip may be damaged.

Do not discharge the coolant without mounting the oil hole holder to the spindle, or without mounting the cutting tool even if the oil hole holder is mounted.

For the chucking section, materials other than SK-10 and SK-16 are accepted.

However, it is required that the holder manufacture makes a drawing in accordance with the user's specifications, and the machine manufacturer Brother checks it.

When designing and installing the coolant tank, be sure to use an oil hole holder with a cover exclusively for BROTHER's Tapping Center.

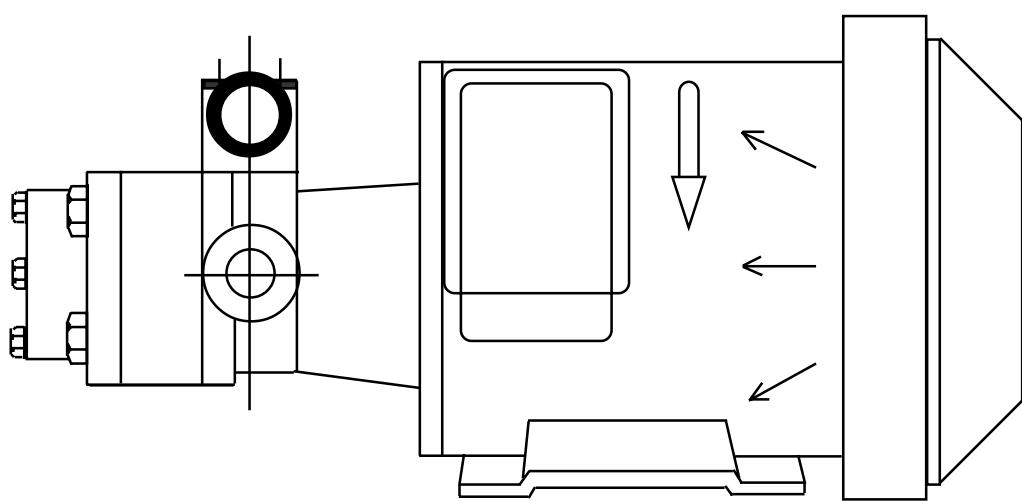
To prevent main spindle motor and Z ball screw problems due to splashed coolant, be sure to install the magazine rear cover made by BROTHER.

When designing the jigs, pay sufficient attention so that the oil hole holder cover does not contact the jig.

Rotate the trochoid pump in the direction of the arrow.

If rotated reversely, the oil seal will be damaged.(Refer to section of "Cable Connection."

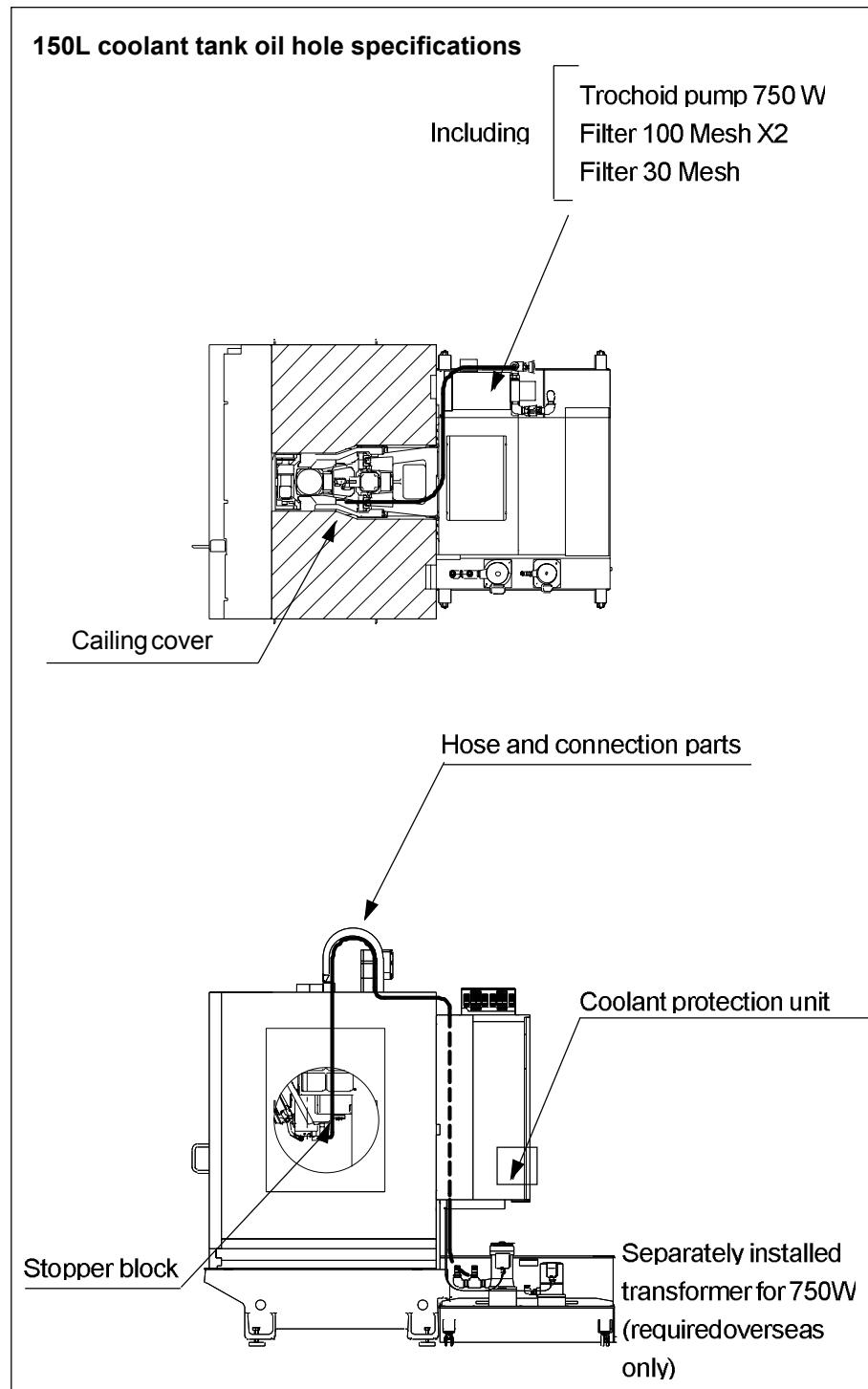
Direction of pump rotation



If air is being blown in the ← direction, the pump is rotating in the correct direction.

## 2 System outline

The oil hole system is constituted as below.

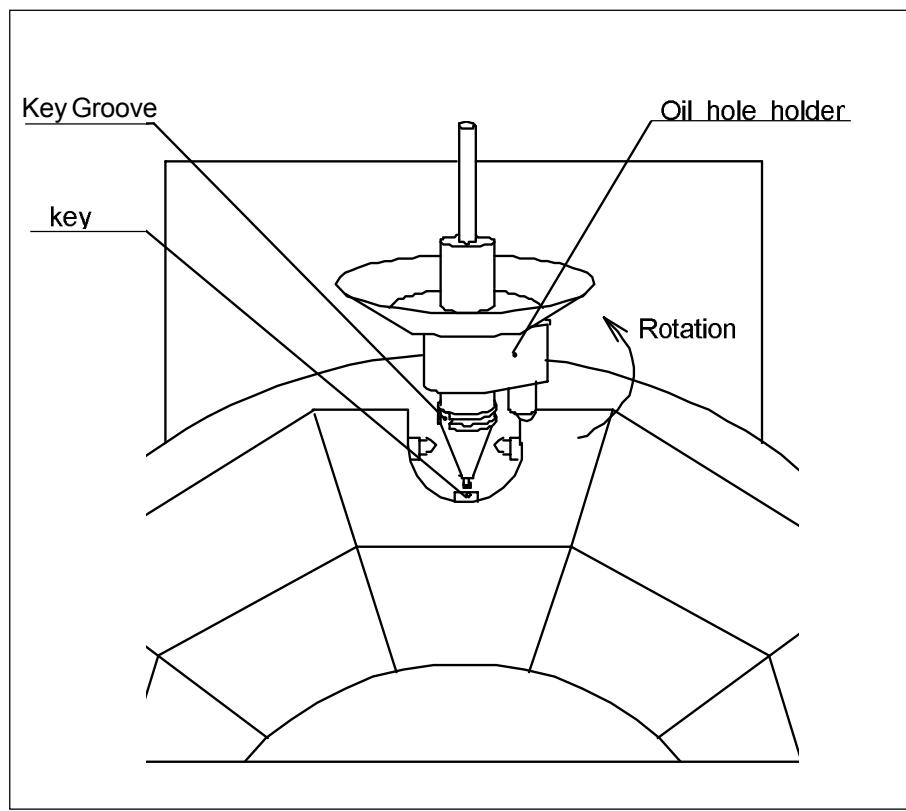


### 3 How to Use the Oil Hole System

#### 3.1 Oil hole holder installation to the magazine

When installing an oil hole holder, move the gripper to the specified tool installation position. Install the oil hole holder to the magazine by rotating it as shown in the drawing below.

Engage the gripper key and oil hole holder key groove, and gripper pin and oil hole holder V groove. Insert the oil hole holder to the end of the gripper and secure the holder. Install the holder so that the protruding side of the holder faces outside.



#### 3.2 Starting Oil Hole Pump

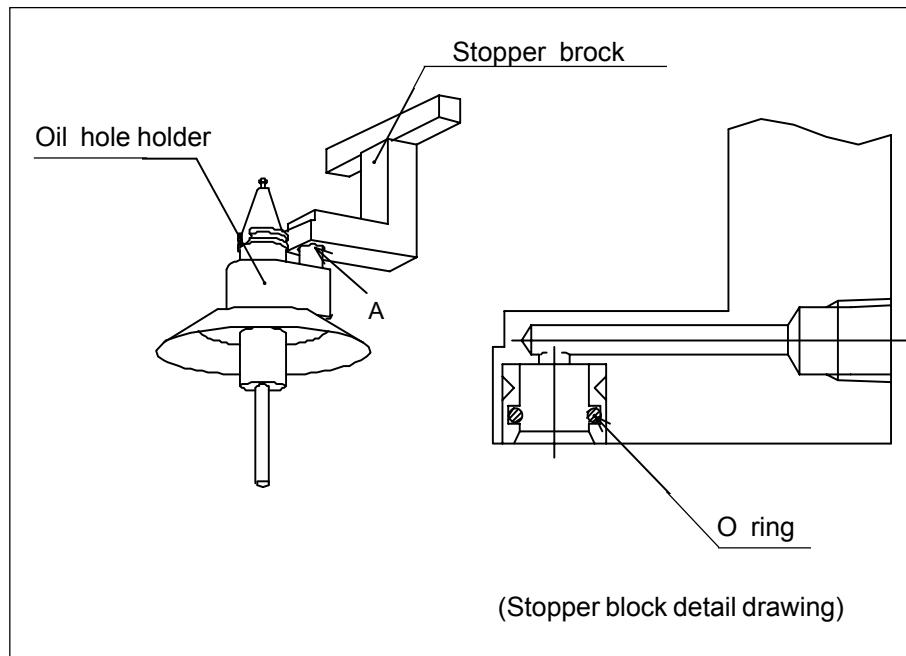
Turn on the coolant motor switch on the operation panel.

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To start, output the signal output code 408.

To stop, output the signal output code 409.

### 3.3 Caution for stopper block handling



オイルホール. pm6

If coolant is leaking from section A while using the oil hole holder, check the O ring in the stopper block.

If the O ring is damaged or not installed, replace or install it.

Name	Norminal
O ring	P12

# CHAPTER 12.9

## TAPE RUN

### 1. Tape Run Procedure

# 1 Tape run procedure

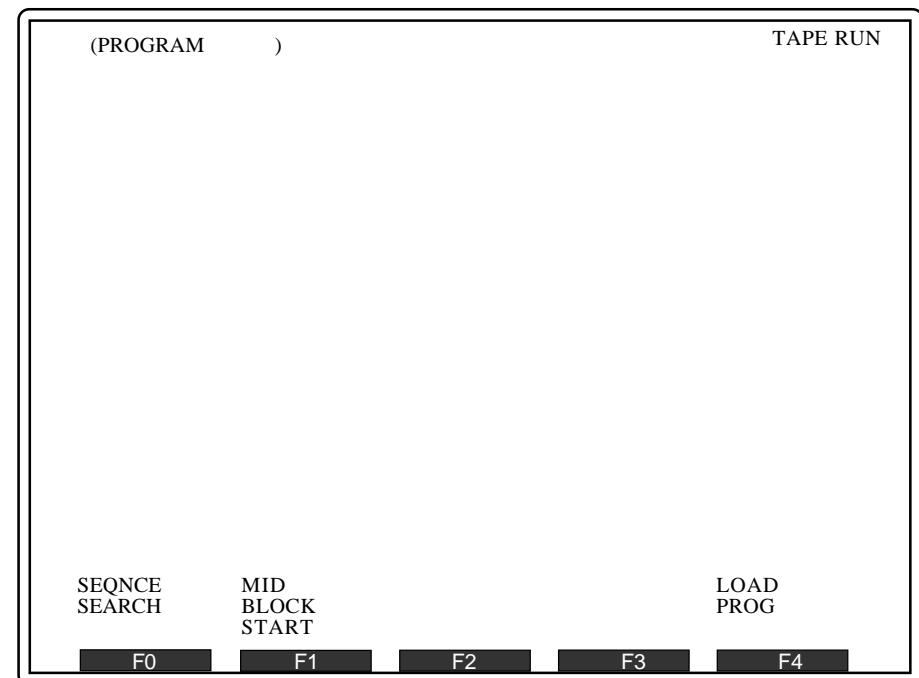
The tape run function operates the machine while reading the program from an external I/O device.

This function is used when executing a large program that cannot be stored in the NC.

Set the following before performing tape run.

- Set [SELECT MEMORY RUN TYPE] of [USER PARAMETER (SWITCH 1)] to [1:TAPE].
- Set [COMMUNICATION OBJECT] of [USER PARAMETER (COMMUNICATION)] to [PTP/PTR].
- Check the parameters set for [USER PARAMETER (COMMUNICATION)] and those set for the external I/O device.

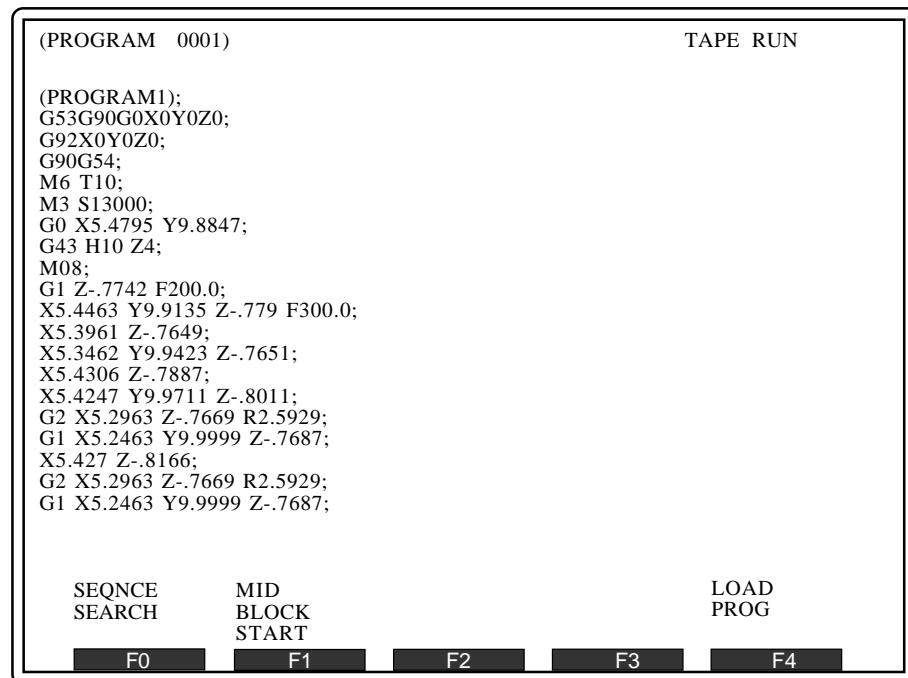
When memory operation mode is selected, the <Program> screen below appears.



Press the [START] key and load the program from the external I/O device. Tape run starts.

To check the contents of the program, press [F4] (LOAD PROGRAM).

The top section of the loaded program is displayed on the screen so you can check the contents.



When the program is the one you want, press the [START] key. Tape run starts. If the program is not the one you want, reset the external I/O device and then press the [F4] key to load the program from the external I/O device.

### [SEQUENCESEARCH]

When the [F0] key is pressed on the <Program> screen, the <Sequence Search> screen appears.

Sequence search is a function that enables a search to be performed according to the sequence number and the number of repeats. The Set Cursor and Specify Page search options are not available.

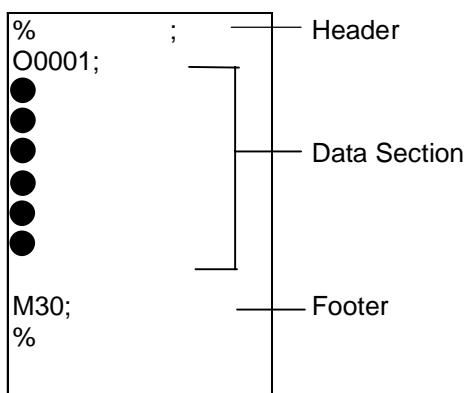
See 7.5 Sequence Search for sequence search procedure.

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### [RESTART]

When the [F1] key is pressed on the <Program> screen, the <Restart> screen appears. See 7.6 Restart Function for details of restart function.

### <Program format>



- Header : The section from % to EOB is recognized as the header.  
 The header is not displayed on the screen. It is only read and then discarded.
- Data section : The data section is regarded as the operation program.  
 The program number is included in the first block of the data.  
 The four-digit number after address O is recognized as the program number, and the program number is excluded when the program is loaded.  
 When address O does not exist, the four-digit number after address N is recognized as the program number.  
 When address O, address N, and : (colon) do not exist, it is considered that there is no program number.  
 “O” or “N” in the second block and after the data section are not recognized as the program number.
- Footer : When % appears after the header is read, this section is regarded as the footer.

### <Input program number check>

An alarm occurs when the following conditions are generated:

- The data is set for [PALLET 1 PROGRAM NUMBER] and [PALLET 2 PROGRAM NUMBER] of [USER PARAMETER (QUICK TABLE)].
- The pallet select switch is set to any keys except [OFF].
- The program number set for [USER PARAMETER (QUICK TABLE)] is not the same as the pallet program number.

This is not checked when there is no data set for these parameters.

In tape run mode, the pallet is loaded when operation is started although [PALLET 1 CARRY IN MOTION] of [USER PARAMETER (QUICK TABLE)] is set to [1ST TOOLCHNG].

### **<Reserved commands>**

The following codes cannot be used for tape run.

Subprogram call (M98, G65, G66)

Tool breakage detection (M203)

Z-axis thermal displacement offset (M206, M207)

M99

Macro (WHILE DO ~ END)

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