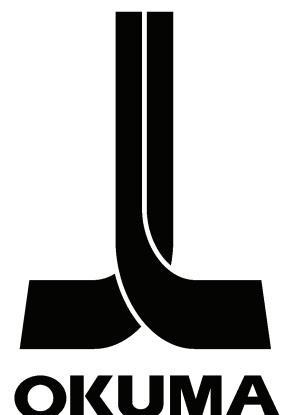


LB-EXII Series

OPERATION & MAINTENANCE (16th Edition)

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LB2000EXII
LB2500EXII
LB3000EXII
LB4000EXII



INTRODUCTION

Thank you very much for your purchase of this machine.

This instruction manual contains information on correct machine operation that is essential for maximizing performance and for maintaining machine precision. It also covers essential information on machine inspection and maintenance as well as safety precautions.

Please read it carefully and follow the instructions contained.

Please also refer to the [Separate volume technical sheet].

For information related to the Control Apparatus, please see the separately provided [Control Apparatus Related Manual].

Note

In this manual, all dimensions in the images are in "mm (inch)" unless otherwise specified.

TABLE OF CONTENTS

SECTION 1 SAFETY GUIDE	1
1-1. General advice	1
1-2. Basic security advice	1
1-2-1. Warning signals and symbols.....	1
1-2-2. Electric system	4
1-2-3. Strong magnetic fields.....	4
1-2-4. Pneumatic, hydraulic and coolant system.....	5
1-2-5. Laser radiation.....	6
1-3. Personal security	7
1-4. Intended use.....	7
1-5. Improper use	8
1-6. What to do in case of emergency	9
1-6-1. Emergency stop	9
1-6-2. Fire protection	10
1-7. General advice for the user	11
1-7-1. Prerequisites for operating the machine.....	11
1-7-2. Caution plates	11
1-7-3. Structural alterations to machines and systems.....	12
1-7-4. Replacement parts	12
1-7-5. Requirements for operators and maintenance staff	13
1-7-6. Special applications.....	14
1-7-7. Safety at the workplace	14
1-7-8. Powder dust/mist.....	14
1-7-9. Precautions against fire	14
SECTION 2 OUTLINE	16
2-1. Features of this Machine	16
2-1-1. Features of Machine Components	17
2-1-2. Features of Machine Functions	18
2-2. Parts of the Machine	19
2-2-1. Main Unit	19
2-3. Supporting load	25
2-3-1. How to support	25
2-3-2. One-side/both-side center support weight.....	26
2-3-3. Precautions Related to Workpieces and Tools	28
2-4. Safety Functions	29
2-4-1. Interlock and Door Lock Functions.....	29
2-4-2. Door lock switch positions and types	30
2-4-3. Door Lock Releasing in Emergency	32

SECTION 3 TRANSPORT AND INSTALLATION	33
3-1. About Safety	33
3-2. Site selection guidelines	34
3-3. Water for Factory Use	34
3-4. Foundation Requirements	35
3-5. Transporting the Machine	36
3-5-1. Lifting the Machine	36
3-6. Preparation Before Delivery	54
3-6-1. About Fixtures	54
3-6-2. Power supply.....	54
3-6-3. Power Requirements and Fuse Capacity.....	56
3-6-4. Inspection of Cable Connection	61
3-6-5. Preparation of Air Source	61
3-7. Machine Installation	65
3-7-1. Leveling the Machine	66
3-7-2. Precautions for Installation	69
3-7-3. Installation Procedure.....	70
SECTION 4 PREPARATION FOR OPERATION	71
4-1. Supplying lubricating oil/hydraulic oil	71
4-1-1. Lubrication Oil Charts (MNTKEY0420)	72
4-1-2. Lubrication Oils for Machine Tools	88
4-2. Lubrication and Inspection Method.....	89
4-2-1. Lubricating the spindle	89
4-2-2. Lubricating the bed saddle cross-slide slideway (MNTKEY0440).....	89
4-2-3. Lubricating the hydraulic chuck.....	90
4-3. Coolant	91
4-3-1. Coolant Precautions	91
4-3-2. Recommended Coolant.....	92
4-4. C-axis Brake	93
SECTION 5 OPERATION	94
5-1. Operation Panels	94
5-2. Axis Direction.....	95
5-2-1. Spindle nomenclature (Tailstock/Sub-spindle specification)	95
5-3. Before Starting Operation	96
5-3-1. General Checks.....	96
5-3-2. Before Turning on the Power	96
5-3-3. Precautions during Manual Operation and Continuous Operation.....	97
5-3-4. Spindle Precautions	98
5-3-5. Tool Precautions	98
5-3-6. Things to remember during set-up and configuration.....	98

TABLE OF CONTENTS

5-3-7.	Workpiece Loading and Unloading	99
5-3-8.	Dry and minimum quantity machining (MQL)	99
5-3-9.	When a Problem Occurs	100
5-4.	Manual Operations	101
5-4-1.	Power ON/OFF.....	101
5-4-2.	Emergency Stop.....	104
5-5.	Spindle Speed Selection	105
5-5-1.	Spindle Speed Selection	105
5-5-2.	Spindle Speed - Spindle Power/Torque Diagrams.....	108
5-6.	Selecting Rotary Tool Spindle Speed.....	130
5-6-1.	Selecting Rotary Tool Spindle Speed.....	130
5-6-2.	Rotary tool spindle speed - Spindle Power/Torque Diagrams.....	131
5-7.	Turret selection	134
5-7-1.	Turret selection key (For 2-saddle machine).....	134
5-7-2.	Left/Right spindle selection key (For parallel 2-spindle machine)	134
5-7-3.	Basic Manual Operation	134
5-8.	Manual Pulse Feed.....	136
5-8-1.	Operating Conditions.....	136
5-9.	Turret Rotation Indexing	138
5-9-1.	Precautions on the turret	139
5-9-2.	Mounting rotary tool.....	141
5-10.	How to switch "Use"/"Not use" of "HEAVY TOOLING DATA"	146
5-11.	If heavy tools are used	152
5-12.	Moving the Tailstock	171
5-12-1.	Using the operation panel	171
5-12-2.	Using the foot switch	172
5-13.	Sub-spindle movement	173
5-14.	Spindle inching motion	173
5-15.	Adjusting the Hydraulic Unit Pressure	174
5-15-1.	Pressure Indication.....	175
5-15-2.	Pressure adjustment	176
5-15-3.	Replacing Oil and Filter (MNTKEY0410)	176
5-16.	Adjusting the NC Tailstock	178
5-16-1.	NC Tailstock Construction.....	178
5-16-2.	Adjusting Tailstock Spindle Thrust	179
5-16-3.	Switching Between Center-work and Chuck-work	181
5-16-4.	Allowable Loads and Speeds of the Rotating Center	182
5-16-5.	Quill Taper Adjustment (Optional)	183
5-17.	Operating the Hydraulic Chuck.....	184
5-17-1.	Precautions on the chuck	184
5-17-2.	Safe chuck work	186
5-17-3.	Construction of Hydraulic Chuck	191
5-17-4.	Construction of Hollow Chuck Cylinder	192

TABLE OF CONTENTS

5-17-5.	Chuck pressure adjustment.....	193
5-17-6.	Setting Maximum Spindle Speed	196
5-17-7.	Hydraulic Chuck Clamping Force Characteristics Diagram	198
5-17-8.	Changing the grip direction of the chuck	205
5-17-9.	Attaching the Chuck	206
SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS		214
6-1.	General Information.....	215
6-2.	Cleaning agents.....	215
6-3.	Periodical Inspection Schedule	216
6-3-1.	Check wipers (MNTKEY0710)	216
6-3-2.	Precautions when cleaning the safety window glass on the front door.....	217
6-4.	Adjusting Centralized Lubrication Unit.....	218
6-4-1.	Adjusting Pump Delivery	218
6-4-2.	Maintenance and Countermeasures	218
6-4-3.	Others (MNTKEY0441)	219
6-5.	Collecting used lubrication oil (MNTKEY0490).....	220
6-5-1.	Where lubrication oil tanks located.....	220
6-6.	Cleaning the coolant unit (MNTKEY0580).....	224
6-6-1.	Cleaning the separately located coolant tank.....	224
6-6-2.	Cleaning the Filter	225
6-6-3.	Cleaning coolant tank filters (Discharging from the side) (MNTKEY0581)	225
6-6-4.	Cleaning coolant tank filters (Discharging from the back)	227
6-7.	Procured Parts.....	228
6-8.	Alignment of Headstock.....	228
6-9.	Measures to Be Taken when Inspecting X-axis Ball Screw.....	230
6-10.	Safety window glass for front door	231
6-10-1.	Replacement Interval	231
6-10-2.	Precautions for Lifting the Machine	231
6-10-3.	Replacement Procedure.....	232
6-10-4.	Replacement of safety window glass for front door.....	232
6-11.	Troubleshooting.....	238
6-11-1.	Trouble with Headstock.....	238
6-11-2.	Trouble with Turret	238
6-11-3.	Others.....	252
6-11-4.	How to modify jibs on the saddle cross-slide slideway.....	253
6-12.	Adjusting belt tension (MNTKEY0210)	255
6-12-1.	Spindle driving belt	255
SECTION 7 OPTIONS		257
7-1.	Switching high-low pressure on the chuck	257
7-1-1.	Outline	257

TABLE OF CONTENTS

7-1-2.	Hydraulic Circuit Diagram (Example)	262
7-1-3.	Operating method.....	263
7-2.	Oil Skimmer	264
7-2-1.	Outline	264
7-3.	Touch setter.....	267
7-3-1.	Outline	267
7-3-2.	Operating method.....	268
7-4.	Parts catcher	271
7-4-1.	Outline	271
7-4-2.	Acceptable workpiece size	273
7-4-3.	Precautions when removing the workpiece.....	273
7-4-4.	Advancing the bucket.....	273
7-4-5.	Manual operation.....	274
SECTION 8	PRESERVATION	276
8-1.	Preservation during transportation and storage	276
8-2.	Cleaning before preservation	276
8-3.	Truck transportation and warehouse storage	276
8-4.	Removing preservation.....	276
8-5.	Machine transportation	276
SECTION 9	DISPOSAL OF THE MACHINE.....	277
9-1.	Material groups	277
9-2.	Operating materials	277
9-3.	Disposal of electronic components.....	277
9-4.	Disposal of the packaging	277

SECTION 1 SAFETY GUIDE

1-1. General advice

Your personal safety is important!

The machine is equipped with safety devices which serve to protect personnel and the machine itself from hazards arising from unforeseen accidents. However, operators must not rely exclusively on these safety devices. They must also become fully familiar with the safety guidelines presented below to ensure accident-free operation.

This instruction manual and the warning signs attached to the machine cover only those hazards which OKUMA can predict. Be aware that they do not cover all possible hazards.

Every person responsible for installing, operating, maintaining, repairing and inspecting the machine must have read and understood the following safety regulations.

The machine may only be operated by trained and authorized personnel.

Responsibilities for operating, servicing and maintenance of the machine must be clearly laid down and adhered to.

Note

The content will be updated according to the safety regulations when required and without notice.

1-2. Basic security advice

1-2-1. Warning signals and symbols

The following warning indications are used in this manual to draw attention to information of particular importance. Read the instructions marked with these symbols carefully and follow them.

DANGER	Indicates an imminently hazardous situation which, if not avoided, <u>will result in death or serious injury</u> .
WARNING	Indicates a potentially hazardous situation which, if not avoided, <u>could result in death or serious injury</u> .
CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in minor or moderate injury</u> .
SAFETY INSTRUCTIONS	Indicates general instructions for <u>safe operation</u> .

**Danger due to suspended loads**

This symbol warns of lifted or suspended loads.

Never step under lifted or suspended loads.

Non-observance of these instructions could result in death or serious injury.

**Danger due to toppling of the machine**

This symbol warns of machines or machine parts that may topple over.

Always observe the specifications related to load support and load carrying devices.

Non-observance of these instructions could result in death or serious injury.

**Danger of being crushed**

This symbol warns of risks of hands and upper limbs being crushed.

Non-observance of these instructions could result in death or serious injury.

**Danger of slipping**

This symbol warns of a danger of slipping in the area of use and the work area of the machine.

Non-observance of these instructions could result in death or serious injury.

**Danger of being cut**

This symbol warns of a danger of being cut due to sharp edges and cutting edges of tools.

Non-observance of these instructions could result in death or serious injury.

**Danger due to laser beams**

This symbol warns of a danger due to laser beams.

Non-observance of these instructions could result in death or serious injury.

**Danger due to electrical voltage**

This symbol warns of a danger due to electrical voltage.

Non-observance of these instructions could result in death or serious injury.

**Risk of explosion**

This symbol warns of a risk of explosion.

Non-observance of these instructions could result in death or serious injury.

**Fire hazard**

This symbol indicates situations which may lead to a fire. Keep open flames and heat sources away and prevent the formation of sparks!

Non-observance of these instructions could result in death or serious injury.



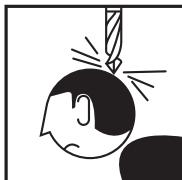
Danger due to strong magnetic fields

Danger of the effect of magnetic forces on ferromagnetic objects!
Do not allow these objects to enter the close range of magnets!
Non-observance of these instructions could result in death or serious injury.



Danger due to crushing zone

This symbol warns of an area in which body parts may be crushed and persons may be caught.
Non-observance of these instructions could result in death or serious injury.



Danger due to protruding tools

This symbol warns of protruding tools with sharp edges and cutting edges.
Non-observance of these instructions could result in death or serious injury.



Personal protective equipment

These symbols instruct you to use personal protective equipment when performing certain work on the machine. Depending on the situation, all persons in the operation area of the machine must wear the protective clothing mentioned below.
Non-observance of these instructions could result in death or serious injury.



No access for persons with pacemakers

Access is prohibited to persons with cardiac pacemakers.
Electromagnetic or magnetic fields may cause malfunctions in these devices.

No access for persons with metallic implants

Access is prohibited to persons with metallic implants.
Electromagnetic or magnetic fields may cause metallic implants to be heated and, therefore, lead to considerable body injuries.

No open flames or heat sources

Open flames or heat sources are forbidden. Depending on the type of production, there may be highly inflammable media or substances in the area around the machine.



Do not extinguish with water

Seats of fire must not be extinguished with water.

1-2-2. Electric system



Danger due to electrical voltage

Incorrect handling or failure to follow these instructions may result in electric shock, causing serious injury or death.

Do not operate the machine with the switch cabinet doors, terminal boxes, or control panels open.

The electrical equipment of the machine must be regularly checked. Immediately rectify any defects, such as loose connections or damaged cables.

The connection of the machine to the electrical mains supply and work on the electrical equipment and in the switch cabinet may be performed only by qualified staff. When performing this work, the regulations and guidelines for the installation and operation of electrical systems applicable at the place of installation must be observed.

The electric system remains active even after the main switch is turned off.

1-2-3. Strong magnetic fields



Danger due to powerful magnets

Some products contain powerful magnets, which could be dangerous if exposed by disassembling the products.

Products containing powerful magnets are provided with a caution plate to indicate where such magnets are used.

- (1) Get assistance from OKUMA for disassembling or repairing the powerful magnet housing unit.
 - Strong magnetic force is exposed during and after disassembling these units, causing extreme danger.
 - Disassembling work requires special knowledge and jigs.
- (2) Danger due to powerful magnets

The following are examples of possible damage caused by being close to powerful magnets.

 - Medical electronic instruments such as pacemakers could malfunction, resulting in serious bodily injury or loss of life.
 - Magnetic metal devices implanted in the body (e.g. artificial eyes, brain artery clips) may be attracted by the powerful magnetic force, causing life threatening danger.
 - Metal clothing accessories may be attracted by the powerful magnetic force, resulting in body injury.
 - Tools or parts may be attracted by the powerful magnetic force, resulting in body injury.
 - Precision equipment could malfunction if it is placed near the machine.
 - Data loss may be caused if any electromagnetic media is placed near the machine.
- (3) Contact OKUMA when disassembling a magnet housing unit is necessary to dispose of the machine.

1-2-4. Pneumatic, hydraulic and coolant system



Work on the hydraulic, pneumatic or coolant system may be performed only by qualified staff in compliance with the guidelines and regulations applicable at the place of installation.

The system must be depressurised before disconnecting a pipe or disassembling a control or driving unit. Lower or secure the loads, switch off the pumps, and relieve the pressure accumulators. Also with machines with automatic pressure relief, check on the pressure gauge whether the system is really depressurised! Pressure accumulators are equipped with safety valves. The safety valves are leaded, and their setting fixed. Changing the setting of these valves can be life-threatening. Do not change the setting of these valves!

Checking and maintenance of pressure accumulators must be performed according to national regulations.

If you notice damage to pressure hoses, pressure pipes and screw fittings (e.g. chafe marks or leaks), the machine must be immediately switched off even if there are only minor defects and may be put into operation again only after the defects have been eliminated.

There is danger of injuries, explosion and fire due to the discharge of media under high pressure.

There is danger of injuries, explosion and fire due to the discharge of hydraulic fluid under high pressure. Therefore, leaks and damage to the piping must be immediately repaired.

Check at regular intervals whether pressure hoses, pressure pipes and screw fittings are intact and immediately replace them even if they are only slightly damaged.

Regularly replace the pressure hoses according to the applicable regulations. Observe instructions provided by OKUMA.

Hydraulic and compressed air pipes should be laid and installed by a specialist.

Do not mix up the connections! Fittings and the length and quality of the hoses must meet the requirements.

Pipes, hoses and machine parts may be damaged if the hydraulic system is not vented when it is put into operation again after repair or after being moved to a different location.

Penetration of oil into the ground must be prevented under all circumstances.

Cooling lubricants which attack plastics, rubber or paint, must not be used. These may damage hoses (hydraulic, pneumatic), cables and seals.

Cooling lubricants may contain harmful substances.

Cooling lubricants pose an environmental hazard. Make sure they are disposed of properly.

1-2-5. Laser radiation



Observe the warnings and the instructions in the operation manual of the device manufacturer!

Danger due to laser beam

Danger of severe eye and skin injuries due to invisible or visible laser beams!

Do not look into the laser beam directly or with optical devices!

Wear suitable protective goggles depending on the laser intensity!

Do not allow parts of the body to be exposed to radiation.

1-3. Personal security

Wear tight-fitting clothing in order to avoid accidents.

In particular, avoid wearing ties, scarves, rings, and necklaces. There is danger of getting caught in the machine's moving parts. If you have long hair, bundle your hair by wearing a hat or other head wear.

Depending on the situation, all persons in the machine working area must wear the following protective clothing:



Protective goggles

Break proof protective goggles with side shield must be worn during all turning and milling work. Flying metallic chips may cause severe eye injuries or loss of eyesight.

Suitable special goggles must be worn when performing any kind of work within the danger zone of active laser devices.



Safety shoes

Safety shoes with steel toe caps must be worn for protection against being crushed.



Safety gloves

Machining results in high temperatures and sharp edges on the workpiece. Do not touch workpieces, tools or chips with bare hands! Gloves may not be worn if there is danger of them getting caught.



Hearing protection

Wear hearing protection if the noise emission at the machine location exceeds the permissible level. Do not remove any noise insulation equipment.



Safety helmet

A safety helmet must be worn when performing overhead assembly and disassembly work, working with the crane, or if there is a risk of head injuries, particularly due to falling tools or workpieces.

1-4. Intended use

This machine can be used primarily for turning, milling, drilling, tapping, centering, hob cutting, and boring of metallic materials.

The performance details of the machine are specified in the Technical Data in the operating instructions.

The machine is designed for machining at ambient temperatures between 10 °C (50 °F) and 40 °C (104 °F). Ambient temperatures under 10 °C (50 °F) and over 40 °C (104 °F) can lead to malfunctions in individual components.

Any other use or any use beyond this scope is considered improper use. OKUMA shall not be responsible for any damages resulting from such use. The customer shall be responsible for all associated risk.

Proper use also means that the operating instructions must be observed and the prescribed inspection and maintenance intervals must be adhered to.

1-5. Improper use

The machine is not designed for:

- machining any flammable material
- machining composite (fiber) and resin materials
- machining carbon material
- machining magnesium material
- Use of oil-based coolants

Improper use includes, among other things, using the machine in:

- explosive environment
- residential areas
- water protection areas

If the machine is not used according to its intended purpose or not used properly, this may lead to:

- danger of life and limb
- damage to the machine
- damage to other property

Non-observance of this instruction may result in forfeiture of any liability and warranty.

1-6. What to do in case of emergency

1-6-1. Emergency stop

Press EMG. STOP button:

- if persons are in danger.
- if there is a danger of the machine or the workpiece being damaged.

SAFETY INSTRUCTIONS	Indicates general instructions for <u>safe operation</u> .
----------------------------	--

Please check all EMG. STOP button positions (depending on machine model) before using the machine.

Important

EMG. STOP button does not completely switch off the machine!

When the emergency stop function is triggered, the machine is brought to a standstill as quickly as possible. Damage may occur to workpieces and tools.

Should a person get pinned in the machine, the machine will not be operated when the EMG. STOP push button switch is on hold. In that case turn the EMG. STOP push button to the right to reset it and press the CONTROL ON push button switch. If an alarm is displayed, reset the alarm by pressing the RESET button. Then set the mode selection switch on the operation panel to the SET mode from the PRODUCTION, SET and TEST mode options, and select MANUAL with the operation mode key. Now free the person by reversing the machine using the pulse handle with the ENABLE switch held down, while paying the attention to the axis direction.

Note) If there are no mode selection or ENABLE switches, the above underlined steps are not necessary.

Emergency Measures in Door-close and Power-OFF State

When fire breaks out inside the machine while the door is closed and the power is OFF, open the door using the door lock switch "release key" and extinguish the fire.

For door interlock switch positions, refer to [SECTION 2, 2-4-2. Door lock switch positions and types].

1-6-2. Fire protection

Please follow general safety regulations for fire protection in your facility.

Take every measure so that you can extinguish the fire immediately by placing a fire extinguisher near the machine and have an operator always watch the machining condition, or by installing an auto extinguisher.

What to do if there is a fire

- (1) Immediately leave the interior of the machine and close the protective doors.
- (2) Switch off the machine:
 - Press the EMG. STOP button.
 - Shut off the main breaker in the control box.

1-7. General advice for the user

1-7-1. Prerequisites for operating the machine

Operate the machine only when it is in a safe condition. This particularly requires that the machine should be cleaned and maintained. Changes in the machine that impair its safety must be rectified without any delay.

Observe the time limits for periodic tests/inspections.

All existing safety devices must be regularly checked at the fixed inspections intervals.

Use only virus-free devices and data carriers on the machine.

This instruction manual must always be kept close to the machine working area and made available to the operating and maintenance staff. In addition to this instruction manual, generally accepted regulations as well as local and national regulations on accident prevention and environment protection must be provided and their observance regularly checked.

Any necessary personal protective equipment must be provided by the operator. It is also the operator's duty to take measures ensuring the proper use of all necessary protective equipment by the staff.

When selecting operating oils, auxiliary oils or cleaning agents such as cooling lubricant, lubricant, hydraulic oil, or detergents, abide by requirements on environmental preservation and disposal as well as restrictions imposed on manufacturing sites concerning contained amounts of toxic substances.

1-7-2. Caution plates

- The following caution plates are attached to the machine and related equipment. Carefully read and follow the instructions inscribed on the plates.
- All safety and caution signs on the machine must be kept in a legible state and must never be removed.
- Do not peel or damage the caution plates. If a plate is lost or becomes illegible, place an order with OKUMA for a new plate by referring to the OKUMA part number written on the plate.

For information on Caution Plates, refer to the [Separate volume technical sheet].

1-7-3. Structural alterations to machines and systems

Specification of this machine in its original condition, is stated in the operation manual. Do not modify or reassemble this machine. Do not modify or rebuild the machine and do not attach any fittings to it without written consultation with the OKUMA local representative!

Non-observance of this instruction may result in forfeiture of any liability and warranty. The following cases also are subject to the same treatment.

- Installation and setting of safety devices and valves.
- Welding on load-bearing parts of the machine. Electrical components can be damaged if electric welding is carried out on the machine or to parts connected to it, even when the machine is switched off. OKUMA accepts no liability for damage caused in this way.
- Changes in the cooling lubricant (e.g. type, mixing ratio).

As a basic principle, the safety of workers (operator and maintenance/repair personnel) must be taken into consideration when making structural alterations. All rebuilding or attachment measures must be tested and confirmed by authorities.

If the following structural alterations are performed, related documentation (applicable operation, maintenance, or cleaning manuals, or other documents related to matters such as risk analyses, declarations of conformity) must be revised by local OKUMA representatives.

- Replacing a component with the one with increased performance (e.g. motors, linear axes, etc.).
- Replacing or using control units.
- Removing, attaching or modifying parts or system components (geometric form). This may lead to another source of danger.
- Exchanging of bigger work holding systems, which are not covered by the specific regulation of [Safety of machine tools].

1-7-4. Replacement parts

Spare parts must meet technical requirements specified by OKUMA.

All OKUMA specified replacement parts meet these requirements.

Use of replacement parts other than those specified by OKUMA may result in personal injury or damage to the machine.

1-7-5. Requirements for operators and maintenance staff

Every person dealing with the setup, installation, test operation, operation and maintenance of the machine must read and understand this instruction manual, particularly [SECTION 1 SAFETY GUIDE], before starting work for the first time.

The machine may be operated and maintained only by persons who are specially trained for this kind of work. This is especially important for the electrical, pneumatic, and hydraulic or coolant related equipment of the machine.

After completion of installation work, a qualified staff or an authorized representative from OKUMA will provide basic instructions to operators who will engage in the operation and maintenance of the machine, on how to operate the machine.

The operator agrees to provide operation and maintenance training to new machine operators and maintenance personnel at the equivalent level of detail and with full consideration across all safety requirements.

Staff to be trained or instructed or staff undergoing general training may be allowed to work on the machine only under constant supervision by an experienced person!

If more than one person works on the machine, clearly define the job responsibilities of each individual and adhere to those job assignments.

With regard to safety, there must not be any ambiguity as to the responsibilities.

Persons with health restrictions must find out before working on the machine which additional dangers the machine poses to them. This applies, for example, to persons with implants or a cardiac pacemaker.

If there are any malfunctions or safety-relevant modifications in the machine, immediately stop the machine and secure it. Inform the person in charge of the appropriate department about the malfunction and have it rectified immediately!

Do not use any methods of operation which may compromise safety!

The moving unit and rotary unit are installed inside the cover. Turn off the main power and ensure safety before removing the cover for cleaning, inspection or setup, or stepping inside the machine movable range.

Before switching on or running the machine, make sure that nobody can be put at risk when the machine starts and that there are no persons in the danger zone of the machine!

Do not switch off or remove suction and venting devices while the machine is running!

During machine operation, there may be no persons in the area around the pressure relief valves. In the event of an explosion in the workplace, hot combustion gases may escape causing a hazard to persons.

Do not make any program changes (software) in programmable control systems that may impair the safety of the machine!

Mobile and Wireless telephones are not allowed.



Use of mobile phones, wireless telephones, wireless sets or any other radio frequency devices in close proximity to the open control box is prohibited. It can't be ruled out that they have an interfering effect on the CNC control.

Ensure that all safety and danger signs are attached to the machine so they are clearly legible, and adhere to the instructions on them.

Do not put anything in the working area. The machine could be seriously damaged.

Keep the operator station and the access points free from tools, auxiliary materials and other objects. Ensure that the work place at and around the machine is clean and neatly organized.

The safety key to the machine control panel, electrical switch box, terminal box, setup unit (oil pressure, air pressure), and other safety related equipment should be controlled by a person specially trained and approved in the operation of such equipment.

Use only virus-free devices and data carriers on the machine.

Electrical limit switches, hydraulic solenoid valves and other control or actuating elements included in the controlling process cannot be operated. Non-observance of this instruction may lead to injuries to persons or damage to the machine.

1-7-6. Special applications

Special machining applications in combination with non-standardized machine equipment require careful assessment inspection. Please check with an OKUMA representative for each individual case.

Exceptional application cases are:

- machining magnesium material
- use of oil-based coolants
- machining composite (fiber) and resin materials
- machining carbon material
- machining any flammable material

When it is necessary to implement any one of the above exceptions, be sure to consult with an OKUMA representative to obtain expert advice necessary for maintaining machine safety. The OKUMA representatives are ready to offer a special kit for these exceptional requirements. Non-observance of this instruction may result in forfeiture of any liability and warranty.

1-7-7. Safety at the workplace



Caution! Risk of slipping

There is a danger of slipping if oil or coolant spills on the floor. You can be seriously injured if you slip while holding heavy parts or sharp tools.

Please follow the listed advice:

- Keep the workplace clean and tidy.
- Do not place anything on top of the NC controller. Items may fall and cause damage or injury.
- Do not leave unnecessary tooling nearby the machinery.
- Ensure proper lighting to have clear visual working conditions.

1-7-8. Powder dust/mist

When hazardous substance (powder dust and mist) are generated by machining, we would recommend using a dust collector or a mist collector.

1-7-9. Precautions against fire

- Selecting coolant

Use nonflammable coolant.

- a. Never use oil coolant because it could catch fire from heated chips, tool's frictional heat, or grinding spark.

When using oil coolant for unavoidable reason, observe the following:

- a. Check the tool edge condition, tool life, and set the cutting conditions that never cause fire before you start machining.

- b. Clean the coolant filter at regular intervals to maintain sufficient coolant discharge, and always check the coolant for normal discharge.
 - c. Be sure to place a fire extinguisher near the machine, have an operator always watch them, and install an auto extinguisher to prepare for the possibility of fires.
 - d. Do not place any flammable objects near the machine.
 - e. Dispose of chips not to allow them to stack.
 - f. Periodically clean the inside and surrounding of the machine while checking that all the devices are normally operating.
 - g. Never attempt unintended operation.
 - h. When using oil coolant for grinding, you are requested to install fire-fighting equipment such as auto extinguisher. In this case, inform us of your intention in the stage of examining your facility.
 - i. Be sure to install a fire damper when you place a mist collector.
- When machining flammable material
 - a. Before machining any of the flammable solid materials such as resin, rubber, or wood, carefully study and understand the material characteristics and observe the above precautions to take all possible measures to prevent fire.
 - b. Use particular care when machining magnesium, because its chips react to the water-soluble coolant and generate hydrogen. The hydrogen may catch fire from burnt chips, resulting in explosive fire.
 - Performing dry machining (See [SECTION 5, 5-3-8. Dry and minimum quantity machining (MQL)].)
 - a. Dry machining is a fire hazard because workpiece, tool, or chips are not cooled. Therefore, never place any flammable objects near the machine and dispose of chips not to allow them to stack.
 - b. Take the same safety measures as in the case of using oil coolant described above, such as checking the tool edge state and tool life, and setting cutting conditions that never cause fire.
 - Emergency measures in door-close and power-OFF state
 - a. Should fire break out in the machine when the door is closed and the power is OFF, open the door using the door lock switch release key and extinguish the fire.
(For details, refer to [SECTION 2, 2-4. Safety functions].)

SECTION 2 OUTLINE

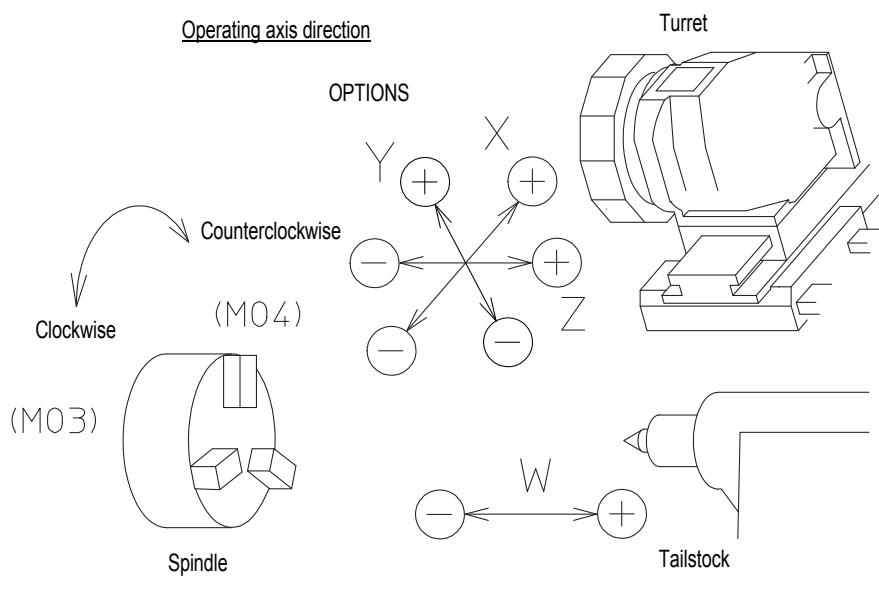
2-1. Features of this Machine

This is a CNC LATHE with a high-speed rotation type turret for turning or for combined working capable of drilling or milling (optional). The turret can support Y-axis (optional) for more extensive machining.

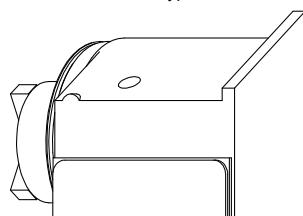
The machine, designed for high-speed and high-precision machining, can also promote automation and labor saving. With high productivity and machining accuracy, the machine is suitably used for machining of parts in a wide application range including automobiles, construction equipment, airplanes, hydraulic/pneumatic equipment, and molds.

The machine is available in three types; "T type" having no tailstock or sub-spindle, "C type" having a tailstock and "W type" having a sub-spindle.

Axis moving directions in the machine coordinate system



C Type



Spindle (Sub)

W type

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Fig. 2-1

2-1-1. Features of Machine Components

Machine configuration and functions

LB2000EXII	Main spindle	<ul style="list-style-type: none"> Bearing inside diameter: $\Phi 100$ (3.94) 6,000 min^{-1} (Optional bearing inside diameter: $\Phi 120$ (4.72) 5,000 min^{-1}) 11 kW/7.5 kW (15 hp/10 hp) (15 min./cont.: 6,000 min^{-1}) (Optional: 15 kW/11 kW (20 hp/15 hp) (20 min./cont.: 6,000 min^{-1}) 22 kW/15 kW (30 hp/20 hp) (30 min./cont.: 5,000 min^{-1})
	Sub-spindle	<ul style="list-style-type: none"> Bearing inside diameter: $\Phi 100$ (3.94) 6,000 min^{-1} 11 kW/7.5 kW (15 hp/10 hp) (20 min./cont.: 6,000 min^{-1})
	Turret for combined working (M-axis)	<ul style="list-style-type: none"> 45 to 6,000 min^{-1} (Optional: 45 to 6,500 min^{-1}) 5.5 kW/3.7 kW (7.5 hp/5 hp) (2 min./cont.: 45 to 6,000 min^{-1}) (Optional: 7.1 kW/4.1 kW (9.47 hp/5.47 hp) (30 min./cont.: 45 to 6,500 min^{-1})
	Rapid traverse	X-axis 25 m/min (82 fpm) Z-axis 30 m/min (98 fpm)
LB2500EXII	Main spindle	<ul style="list-style-type: none"> Bearing inside diameter: $\Phi 120$ (4.72) 5,000 min^{-1} 22 kW/15 kW (30 hp/20 hp) (30 min./cont.: 5,000 min^{-1}) (Optional: 30 kW/22 kW (40 hp/30 hp) (30 min./cont.: 5,000 min^{-1})
	Turret for combined working (M-axis)	<ul style="list-style-type: none"> 45 to 6,000 min^{-1} 7.1 kW/4.1 kW (9.47 hp/5.47 hp) (30 min./cont.: 45 to 6,000 min^{-1})
	Rapid traverse	X-axis 25 m/min (82 fpm) Z-axis 30 m/min (98 fpm)
LB3000EXII	Main spindle	<ul style="list-style-type: none"> Bearing inside diameter: $\Phi 120$ (4.72) 5,000 min^{-1} (Optional bearing inside diameter: $\Phi 140$ (5.51) 4,200 min^{-1}) 22 kW/15 kW (30 hp/20 hp) (30 min./cont.: 5,000 min^{-1}) (Optional: 30 kW/22 kW (40 hp/30 hp) (30 min./cont.: 5,000 min^{-1}) 30 kW/22 kW (40 hp/30 hp) (30 min./cont.: 4,200 min^{-1})
	Sub-spindle	<ul style="list-style-type: none"> Bearing inside diameter: $\Phi 100$ (3.94) 6,000 min^{-1} 11 kW/7.5 kW (15 hp/10 hp) (20 min./cont.: 6,000 min^{-1})
	Turret for combined working (M-axis)	<ul style="list-style-type: none"> 45 to 6,000 min^{-1} 7.1 kW/4.1 kW (9.47 hp/5.47 hp) (30 min./cont.: 45 to 6,500 min^{-1})
	Rapid traverse	X-axis 25 m/min (82 fpm) Z-axis 30 m/min (98 fpm)
LB4000EXII	Main spindle	<ul style="list-style-type: none"> Bearing inside diameter: $\Phi 140$ (5.51) 4,200 min^{-1} (Optional bearing inside diameter: $\Phi 160$ (6.30) 3,000 min^{-1}) (Optional bearing inside diameter: $\Phi 240$ (9.45) 1,400 min^{-1}) 30 kW/22 kW (40 hp/30 hp) (30 min./cont.: 4,200 min^{-1}) (Optional: 37 kW/30 kW (50 hp/40 hp) (30 min./cont.: 3,000 min^{-1}) (Optional: 37 kW/30 kW (50 hp/40 hp) (30 min./cont.: 1,400 min^{-1})
	Turret for combined working (M-axis)	<ul style="list-style-type: none"> 45 to 6,000 min^{-1} 7.5 kW/4.3 kW (10 hp/5.73 hp) (25 min./cont.: 45 to 6,000 min^{-1})
	Rapid traverse	X-axis 25 m/min (82 fpm) Z-axis 30 m/min (98 fpm)

Table 2-1

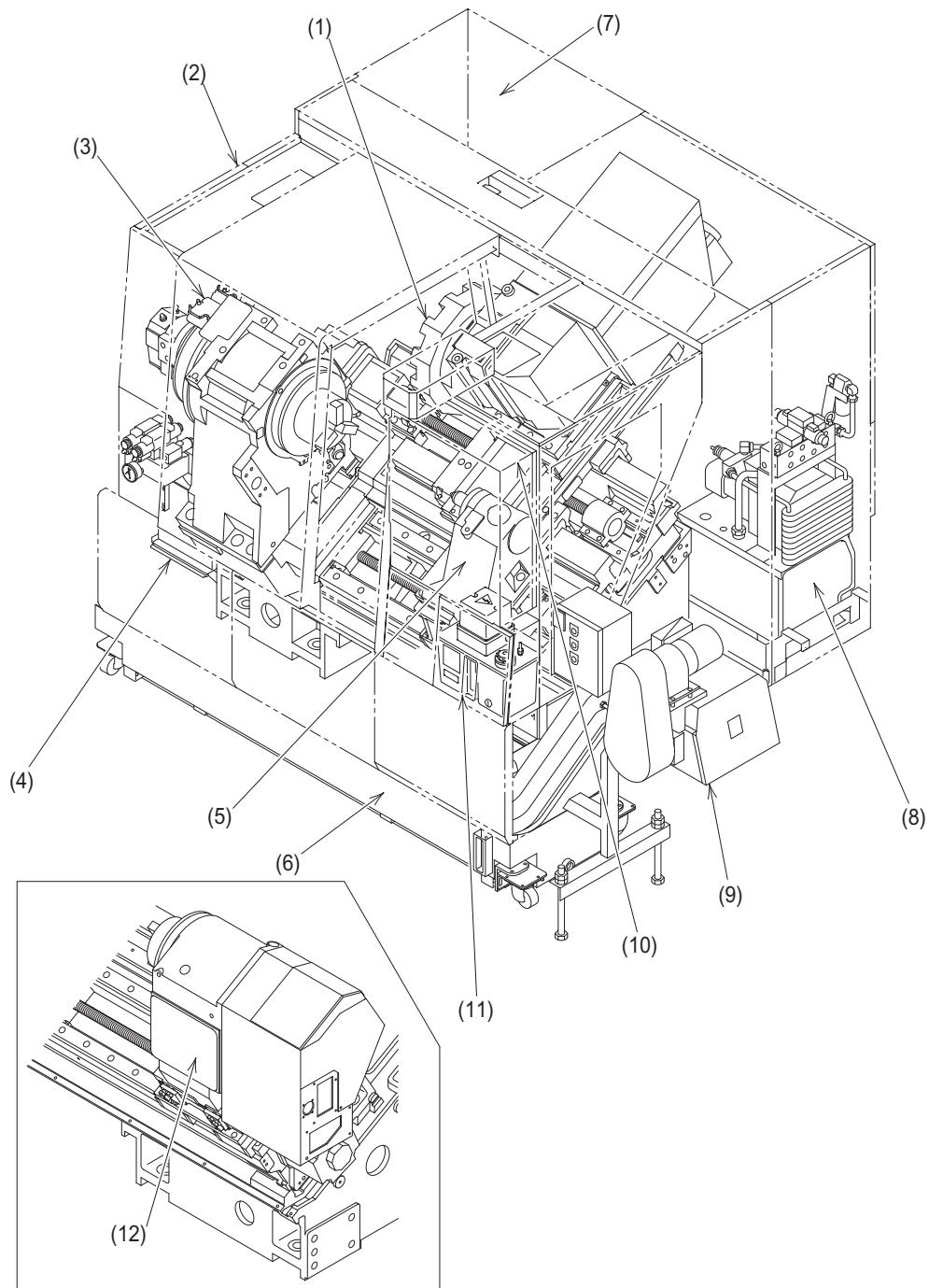
2-1-2. Features of Machine Functions

- (1) Machining size with age is now stable thanks to box slant bed design.
- (2) High-speed rotating NC turret with 0.1 sec./index (LB4000EXII with 0.2 sec./index)
- (3) A wide variety of options such as coolant unit, chip disposal equipment, automatic gauging unit, tool management, and jigs are available.
- (4) A full-enclosure shielding (w/ceiling) is provided as a standard equipment to keep the working environment clean.

2-2. Parts of the Machine

2-2-1. Main Unit

LB2000EXII

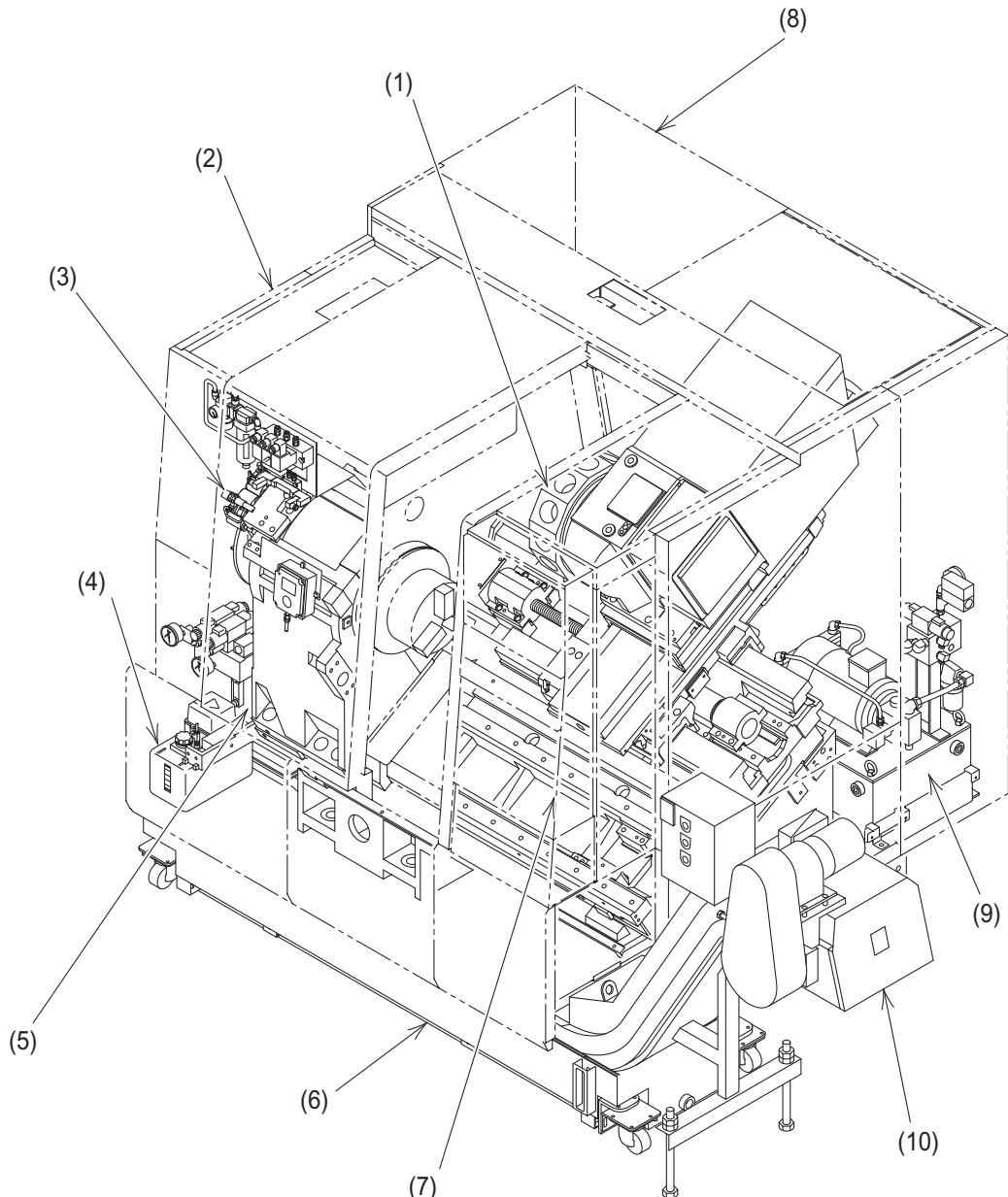


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Fig. 2-2

SECTION 2 OUTLINE

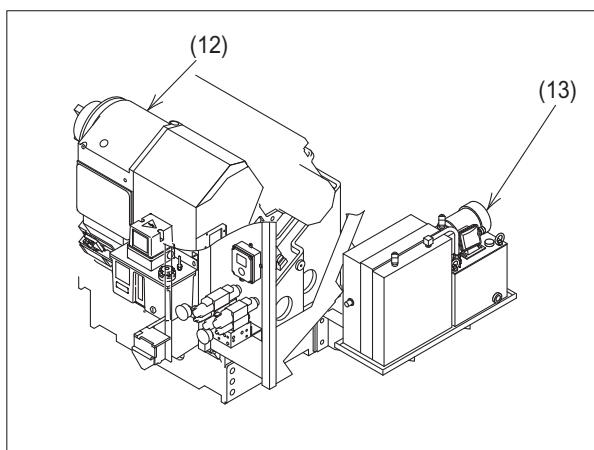
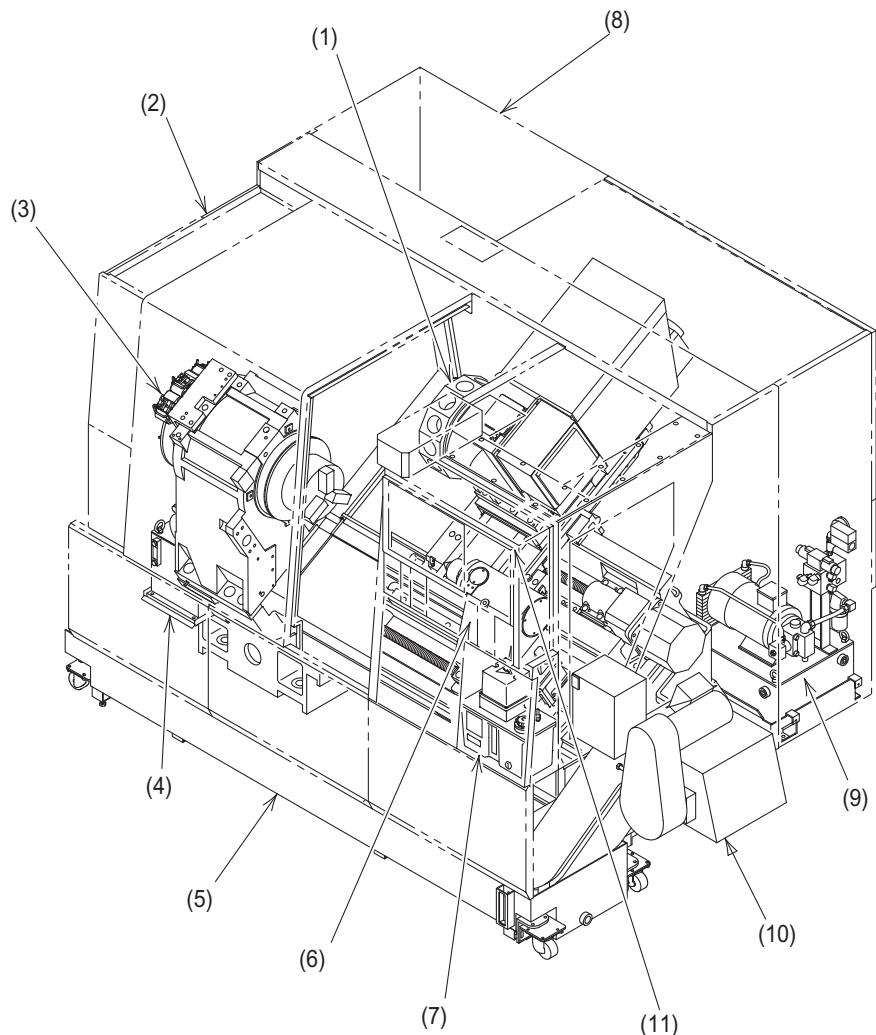
1	Turret	7	Control box
2	Full-enclosure shielding	8	Hydraulic unit
3	Headstock	9	Chip conveyor (side)
4	Spindle fan air conditioner	10	NC operation panel
5	Tailstock	11	Lubrication unit
6	Coolant tank	12	Sub-spindle

LB2500EXII

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Fig. 2-3

1	Turret	6	Coolant tank
2	Full-enclosure shielding	7	NC operation panel
3	Headstock	8	Control box
4	Lubrication unit	9	Hydraulic unit
5	Spindle fan air conditioner	10	Chip conveyor (side)

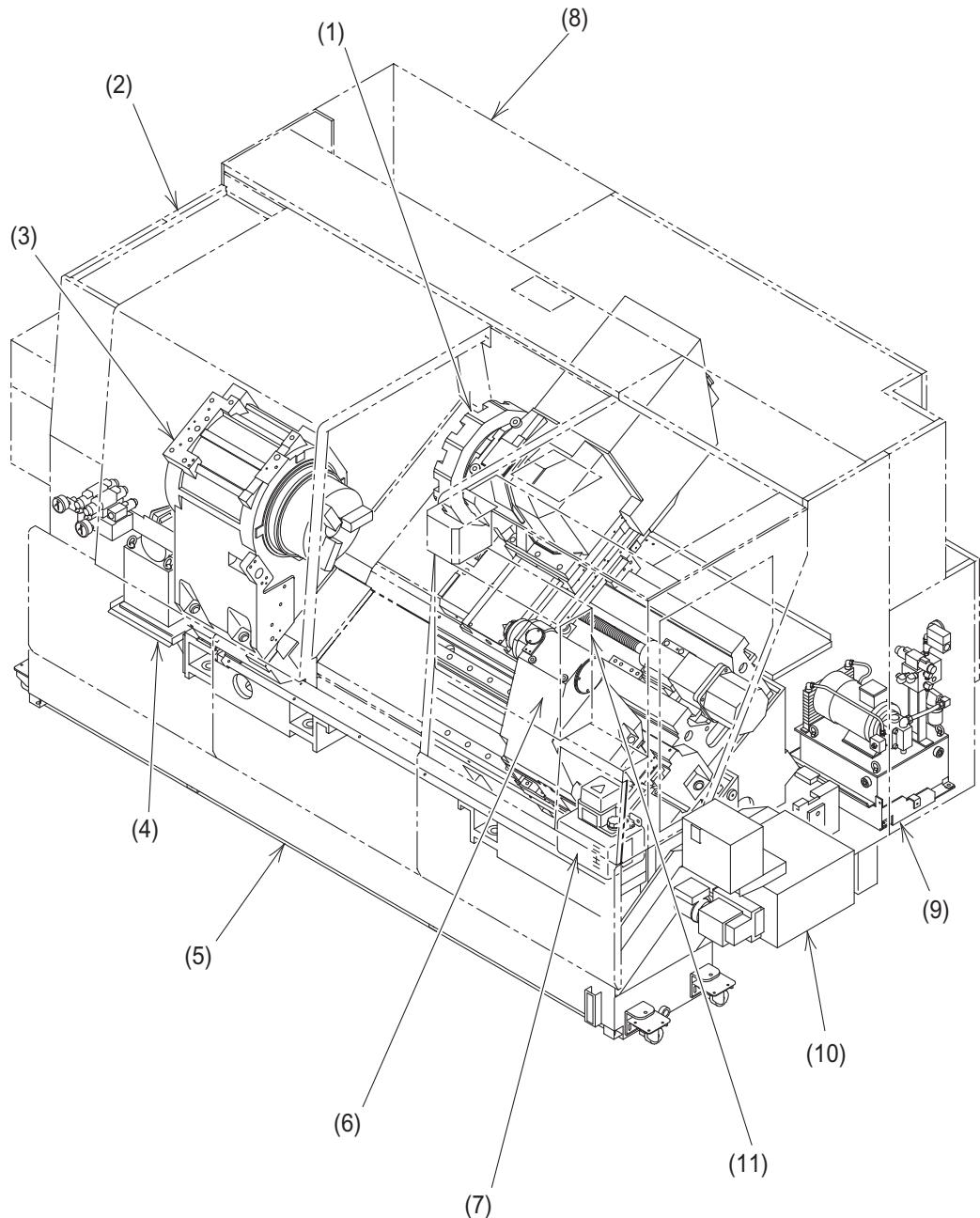
LB3000EXII

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Fig. 2-4

SECTION 2 OUTLINE

1	Turret	8	Control box
2	Full-enclosure shielding	9	Hydraulic unit
3	Headstock	10	Chip conveyor (side)
4	Spindle fan air conditioner	11	NC operation panel
5	Coolant tank	12	Sub-spindle
6	Tailstock	13	Sub-spindle fan air conditioner
7	Lubrication unit		

LB4000EXII

LE12016R1600400070001

Fig. 2-5

1	Turret	7	Lubrication unit
2	Full-enclosure shielding	8	Control box
3	Headstock	9	Hydraulic unit
4	Spindle fan air conditioner	10	Chip conveyor (side)
5	Coolant tank	11	NC operation panel
6	Tailstock		

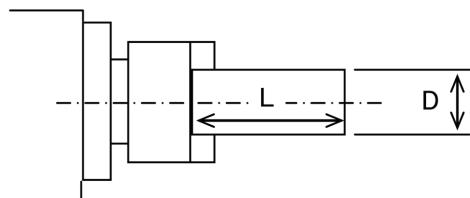
2-3. Supporting load

2-3-1. How to support

(1) One-side support weight

This indicates the sum of spindle clamping unit weight (including chuck, jaws, adapters, backing metal, and any other attachment) and workpiece weight.
The weight should not exceed the maximum gripping force of the chuck.

The workpiece drop values are calculated with the assumption that workpiece size is as follow: $L/D = 2.5$.



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Fig. 2-6

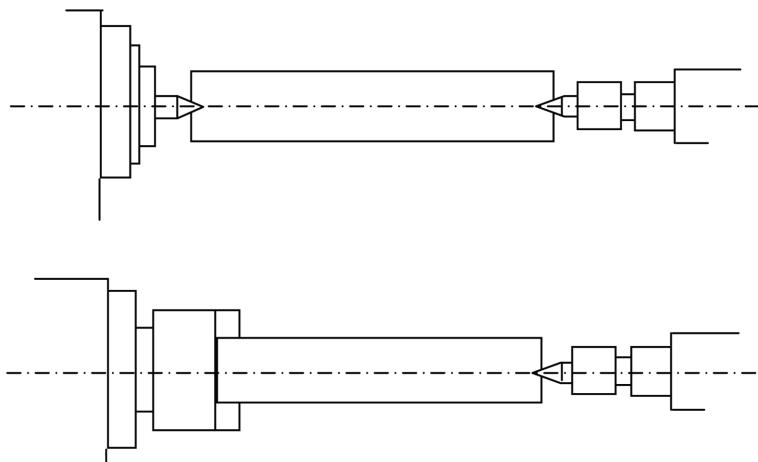
(2) Both-side center support weight

This indicates the weight that loaded workpiece can be stably supported with the center of the tailstock during work loading.

When the workpiece is supported between centers, the figures show the maximum workpiece weight.

This indicates the sum of spindle clamping unit weight (including chuck, jaws, adapters, backing metal, and any other attachment) and workpiece weight, when the workpiece is supported by the spindle chuck.

The weight should not exceed the maximum gripping force of the chuck or the maximum thrust of the centers.

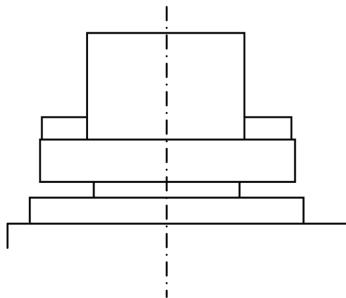


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Fig. 2-7

(3) Maximum spindle load

This indicates the sum of spindle clamping unit weight (including chuck, jaws, adapters, backing metal, and any other attachment) and workpiece weight when vertical lathes is adopted. The weight should not exceed the range that shortens the spindle life.



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Fig. 2-8

2-3-2. One-side/both-side center support weight

- (1) One-side/both-side center support weights in the table include weight of faceplate, chuck, jaws and workpiece.
- (2) Contact OKUMA for data which is not found in the table.
- (3) One-side/both-side center support weights does not include loads due to cutting.
Maximum workpiece weight is calculated by extracting the cutting load from the one-side/both-side center support weights.
- (4) Refer to [SECTION 2, 2-3-1. How to support] section for details of the one-side/both-side center support weights.



Indicates an imminently hazardous situation which, if not avoided, **will result in death or serious injury.**

Do not load any workpiece that exceeds the weight that clamping unit or centers can support. Workpieces that exceed the maximum support weight could drop off or fly out. Use the chuck or centers that are suitable for workpiece size and/or weight. Refer to [SECTION 5, 5-17-1. Precautions on the chuck]. Negligence could result in serious injury to people. If not properly clamped, workpiece or jaws could strike through the protective cover or safety window glass, resulting in death or serious injury to people. Always follow the instruction manual provided by the manufacturers of the chuck or centers.



Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

Heavy cutting on a shaft workpiece with center support may cause the center support to become unstable. Increase tailstock thrust. Reduce the cutting load if thrust has reached an upper limit.



Indicates a potentially hazardous situation which, if not avoided, **may result in minor or moderate injury.**

Do not load any workpiece that exceeds the weight that clamping unit or centers can support. Overloading shortens life of spindle bearings.

SECTION 2 OUTLINE

Machine				Reference: KITAGAWA model	
Model	Spindle size	One-side Support weight [kg (lb)]	Both-side center Support weight [kg (lb)]	Chuck model (chuck weight)	
LB2000EXII	Standard spindle Φ140 (5.51) flat	115 (4.52)	300 (11.81)	hollow	B-206-01 (11.9 kg (26.2 lb))
					B-208-01 (22.3 kg (49.1 lb))
					BB206-01 (11.7 kg (25.7 lb))
	Big-bore spindle A2-6	160 (352)	300 (660)	solid	N-06-LB (13.0 kg (28.6 lb))
					B-208A6 (22.3 kg (49.1 lb))
					B-210A6 (34.5 kg (75.9 lb))
	Sub-spindle Φ140 (5.51) flat	115 (253)	-	hollow	BB208A6 (23.0 kg (50.6 lb))
					N-08A6 (25.0 kg (55 lb))
					B-206-01 (11.9 kg (26.2 lb))
LB2500EXII	Standard spindle A2-6	160 (352)	-	hollow	B-208-01 (22.3 kg (49.1 lb))
					B-210A6 (34.5 kg (75.9 lb))
					BB208A6 (23.0 kg (50.6 lb))
				solid	N-08A6 (25.0 kg (55 lb))
LB3000EXII	Standard spindle A2-6	160 (352)	500 (1,100)	hollow	B-208-01 (22.3 kg (49.1 lb))
					B-210A6 (34.5 kg (75.9 lb))
					BB208A6 (23.0 kg (50.6 lb))
	Big-bore spindle A2-8	230 (506)	500 (1,100)	solid	N-08A6 (25.0 kg (55 lb))
					B-210A8 (34.5 kg (75.9 lb))
					B-212A8 (55.3 kg (121.7 lb))
	Sub-spindle Φ140 (5.51) flat	115 (253)	-	hollow	BB210A8 (31.8 kg (70 lb))
					N-10A8 (37.0 kg (81.4 lb))
					B-206-01 (11.9 kg (26.2 lb))
LB4000EXII	Standard spindle A2-8	230 (506)	800 (1,760)	hollow	B-210A8 (34.5 kg (75.9 lb))
					B-212A8 (55.3 kg (121.7 lb))
					BB210A8 (31.8 kg (70 lb))
	Big-bore spindle A2-11	300 (660)	800 (1,760)	solid	N-10A8 (37.0 kg (81.4 lb))
					B-215A11 (116.0 kg (255.2 lb))
				hollow	BB212A11 (52 kg (114 lb))
				solid	N-15A11 (96 kg (211 lb))

Table 2-2

2-3-3. Precautions Related to Workpieces and Tools

(1) Workpiece materials

The machine can cut ordinary structural steels such as carbon steel, ferrous material such as castings, and non-ferrous material such as aluminum.

The machine can also cut non-metallic materials such as ceramics or graphite. These materials, however, require dust preventive measures to protect the human body and the machine. Consult OKUMA for the measures.

Further, when working with flammable material, take ample safety precautions. Refer to [SECTION 1, 1-6-2. Fire protection].

(2) Maximum Workpiece Size and Mass

For maximum machining dimensions, refer to the [Separate volume technical sheet]. For maximum workpiece weight (including chuck weight) that can be machined on this machine, refer to [2-3-2 One-side/both-side center support weight].

An imbalanced workpiece may disable the machine to exert its full performance even if the workpiece size and mass are within the allowable ranges. Take the workpiece balance into consideration and make sure that the workpiece is securely chucked to ensure safety in machining.

(3) Tools to be used

For tools to be used, firstly check machining area and movement range with the [Separate volume technical sheet] and then select tools (turning tool), etc.

For combined working turret (optional), refer to [SECTION 5, 5-9-1. Precautions on the turret] and [SECTION 5, 5-9-2. Mounting rotary tool] of this manual.

We would recommend a well-balanced tooling layout to maximize this machine's capability.

2-4. Safety Functions

2-4-1. Interlock and Door Lock Functions

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
<p>By default, this machine is equipped with the following Interlock function and door lock mechanism to ensure the safety of workers such as the machine operator. These functions are important for safe operation of the machine. Thoroughly understand the explanations below before operating the machine.</p> <ul style="list-style-type: none">• Maximum spindle speed interlock function The spindle speed is limited by the max. spindle speed (set by G50 command) and the allowable chuck rotation speed. The spindle speed is limited to whichever is lower. For the allowable chuck rotation speed, specify the lowest speed among the chuck, fixture, and drive cylinder. Without setting of the max. spindle speed, the spindle cannot be rotated by the program. For details regarding speed setting method and set values, refer to the [OSP-P300L OPERATION MANUAL] separately issued.• Door interlock E function When door is open, AUTO and MDI are not available. This function restricts the machine's operation when the door Interlock switch is off while changing machine setup or confirming programs because it is dangerous to operate the spindle or turret at high speed while the door is open.<ul style="list-style-type: none">a) Max. spindle speed: 50 min⁻¹b) Max. feedrate: 2 m/min (7 fpm)c) Turret rotation is limited to 1 position at a time. (MANUAL mode only. Operation in other modes is disabled.)For details about conditions, refer to the [OSP-P300L SAFE OPERATION FUNCTIONS INSTRUCTION MANUAL] separately issued.• Door Lock Function This is the function for preventing the operator from opening the front door accidentally. During automatic operation, the safety door switch on the door locks the door so it does not open. Be sure to check that the machine has stopped before opening the door. Note that the attempt to forcibly open the locked door may damage the switch.	

2-4-2. Door lock switch positions and types

Position	Class
Operation door	Spring lock
MG door	Electromagnetic lock

Table 2-3



Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

- The operation door is locked when the power is turned off. Therefore, before you enter the machine, be sure to use a door stopper to prevent the door from locking so you do not get trapped inside the machine.
- Never remove or modify the door interlock switch.
- If the switch becomes faulty, please contact OKUMA or OKUMA's service representative immediately. It is strictly forbidden to operate the machine with the faulty door interlock switch.
- Failing to follow these instructions may lead to being caught between, or hit by, moving parts. It may also result in being caught in rotating tools.
- When confined, refer to [SECTION 2, 2-4-3. Door lock releasing in emergency] to release the door lock switch.

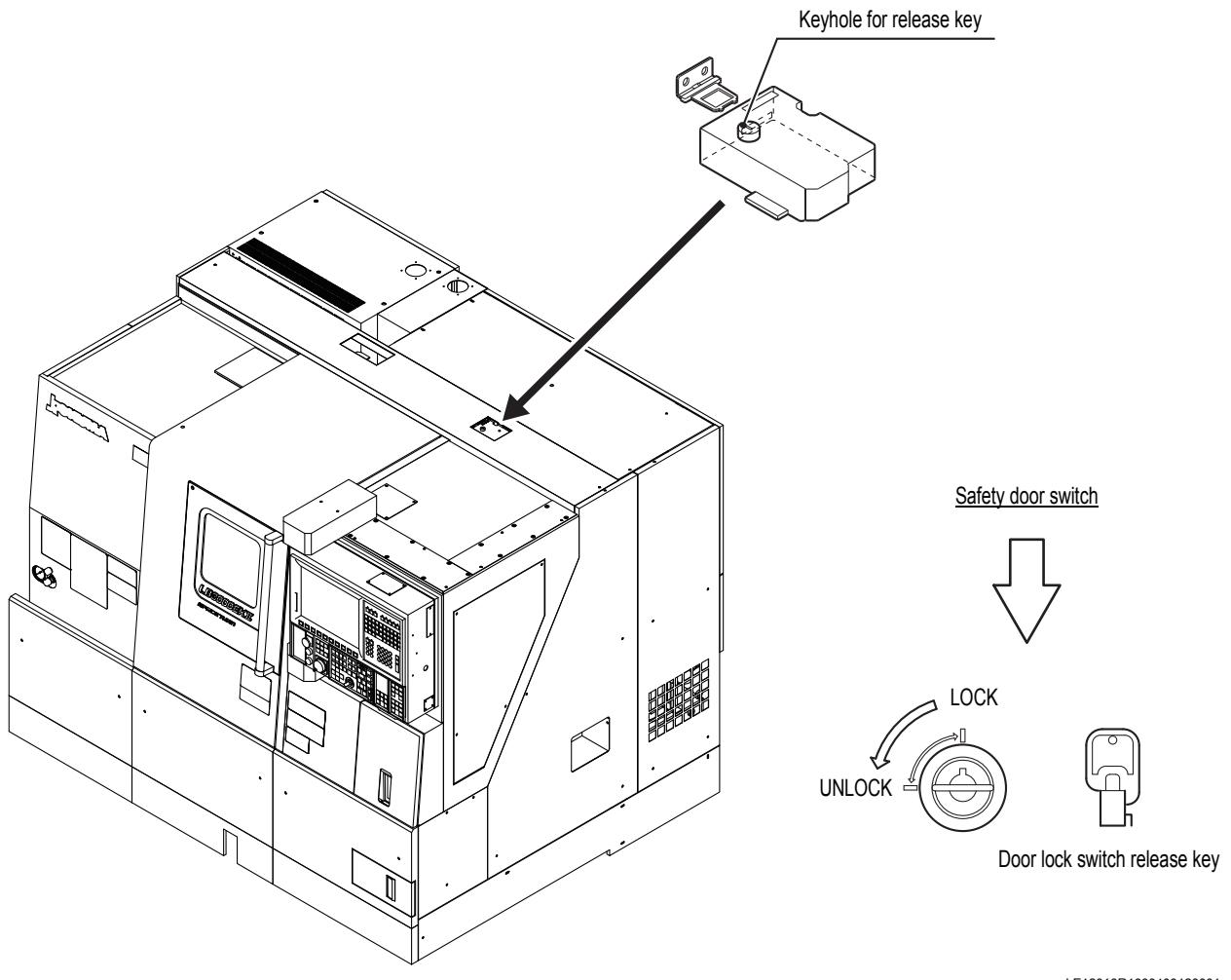


Fig. 2-9

*The figure is for LB3000EXII.

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2-4-3. Door Lock Releasing in Emergency

It is possible to open the door when the machine makes an emergency stop. However, when the power is shut off, or when there is a power outage, the door will not open. In such a case, release the door lock through the following procedure:

Procedure : _____

- 1-** The door lock switches are located on the operation door. (see separate diagram for location.)
- 2-** Remove the cap on the release keyhole of the door lock switch, and insert the special release key into the hole.
- 3-** Turn the special release key to UNLOCK to release the lock.
- 4-** Open the door.
 - When restarting the machine, turn the special release key from UNLOCK to LOCK.
 - When the door is in unlock state, the machine does not operate even if the door is closed.
 - Only the person in charge shall keep the special release key.



Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

- When entering the enclosure shielding after unlocking the door lock switch, be careful with the spindle because it might be coasting. Do not get near the spindle until you confirm that the spindle is stopped.
- When you unlock the door during machine operation, the machine is stopped by interlock function. Do not unlock the door lock switch while the machine is running.

SECTION 3 TRANSPORT AND INSTALLATION

3-1. About Safety



Protective clothing

Make sure you wear protective gear when performing work.



The machine can cause crush injuries.

Use only means of transportation (fork lift, crane, ropes) of sufficient power and size. Do not step under the machine when it is being moved. Maintain a safe distance from the machine.

Do not lift the machine higher than necessary. Do not touch the bottom of the machine by hand. Observe the floor loading capacity. The floor must be capable of sustaining the machine load. A stress analyst should be appointed to do the calculations.

The machine can topple over

[3-5. Transporting the Machine] covers the following content.



- Weight
- Installation places
- Safety ropes
- The prescribed lifting gear

These instructions must be strictly observed when transporting the machine and its components. All other methods for transporting the machine or its components are not allowed.

The lifting gear must be theoretically appropriate for the situation and its permissible load bearing capacity must be adequate. The chains, ropes, hooks and swivel eye bolts must also be able to safely support these weights.

Assign the job of attaching loads and instructing crane operators only to qualified staff! The person giving instructions must be in the operator's range of sight or have verbal contact with the operator. Secure the lifting rods by adjusting rings! The rope or the machine part must not slip on the rod.

Transportation safety devices must not be disassembled during transportation and installation.

If the part to be lifted has sharp edges, attach pads in order to prevent the rope or the machine from being damaged.

Never lift the machine part quickly or with a jerk with the lifting gear or a crane.

Lift slowly.

Make sure that the load is well balanced.

3-2. Site selection guidelines

To ensure that the machine can deliver its full performance, please adhere to the following installation conditions.

- (1) We recommend that you perform an appropriate foundation work if the ground is not hard enough or the land may sink after installation. Refer to [3-4. Foundation Requirements].
- (2) The installation site should be as far as possible from vibration sources, such as roads, stamping/press type equipment, or planer type machine tools. If nearby sources of vibration are unavoidable, dampening pits around the machine foundation, for example, should help lessen vibrations.
- (3) If there are high-frequency power generators, electric discharge machines or electric welding machines around or when power is supplied from the same power distributor panel, electrical interference may cause NC malfunctions. Please consult with the OKUMA service engineer dispatched during machine installation.
- (4) The ideal operating environment calls for an ambient temperature between 10 °C (50 °F) and 40 °C (104 °F) with humidity between 40 and 75 % at 20 °C (68 °F).
- (5) Keeping ambient temperature at a constant level is an essential factor for accurate machining.
- (6) In order to maintain static machine accuracy within guaranteed values, the machine should be installed in an area where it is not affected by airflow. Air conditioning is not essential, but an ambient temperature between 17 °C (63 °F) and 25 °C (77 °F) is recommended.
- (7) To maintain static machine accuracy within the Standard Guaranteed Values:
 - a. Keep ambient temperature variance for a full day or 24 hours within ±2 °C (36 °F).
 - b. Ambient temperature variances from the floor level to a height of the machine (3 m (10 ft.)) should be held within 1 °C (34 °F).
- (8) Usually, no consideration is required on heat insulation against the machine foundation.
- (9) Keep the floor level error within 10 mm (0.39 in.).

3-3. Water for Factory Use

Please use potable water when diluting the coolant.

Water that contains bacteria or salt can damage machine parts.

3-4. Foundation Requirements

SAFETY INSTRUCTIONS	Indicates general instructions for <u>safe operation</u> .
	<p>With a solid ground, a concrete floor about 200 mm (7.87 in.) thick and no gaps between ground and floor, foundation work or anchoring is not required. The structural rigidity of the machine permits normal machining. Foundation bolt is not necessary, either.</p> <p>For long-maintained accuracy and where sub-soil or ground under the floor is not strong enough, a new concrete foundation should be set up in accordance with the Foundation Plan in this section. (Refer to the [Separate volume technical sheet].)</p> <ul style="list-style-type: none">• Foundation requirements vary depending on the characteristics of the sub-soil. Under any soil conditions, it is important that sub-soil should be well compacted to keep the foundation from unsettling once the machine has been installed.• Where sub-soil is too soft, it is necessary to drive concrete piles into the sub-soil.• The Foundation Plan attached to this Manual is prepared for laying a typical concrete foundation specifically for the machine. The concrete thickness or depth should be determined in terms of the ground condition in each case.

3-5. Transporting the Machine

This machine integrates hydraulic unit, control box, and NC unit into one construction instead of having them as separate units, and so the machine can be easily moved or transported.

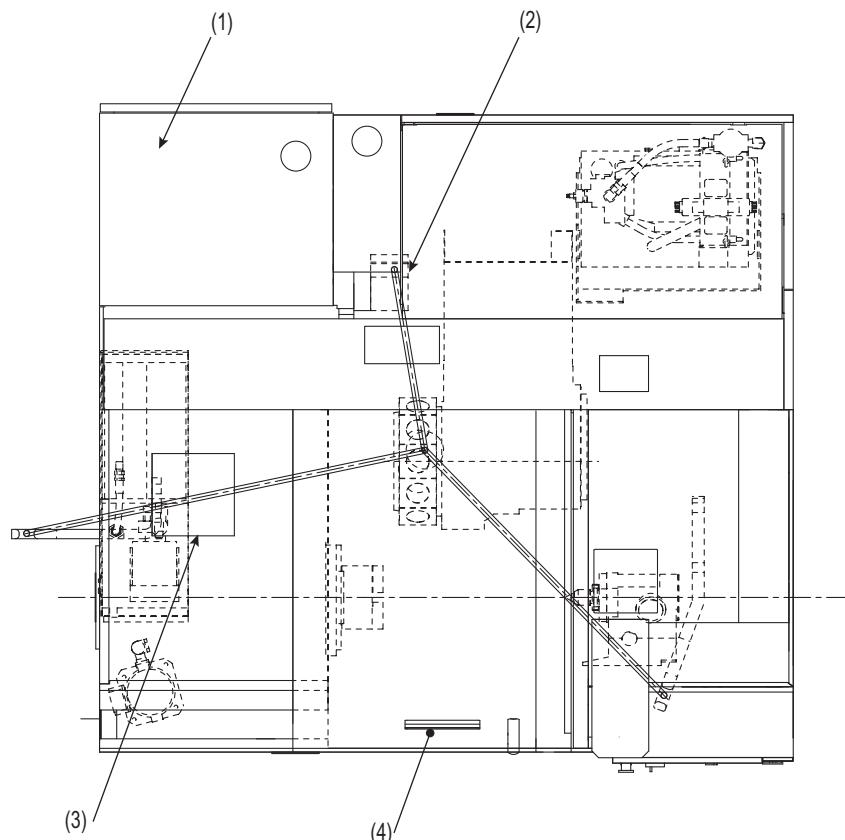
(Note that the coolant tank is installed separately.)

It is possible to relocate the machine either by hoisting it by the lifting hooks provided, by rolling it over rollers, or by using a forklift. Each of these methods are explained below.

3-5-1. Lifting the Machine

- Moving the machine in a plant for changing the layout, etc.
- Lifting the machine to load it on a truck

LB2000EXII tailstock model (300 between centers)



LE12016R1600500060001

Fig. 3-1

1	NC unit	3	Spindle upper cover
2	Lifting hook (3 points)	4	Front side anti-chip cover

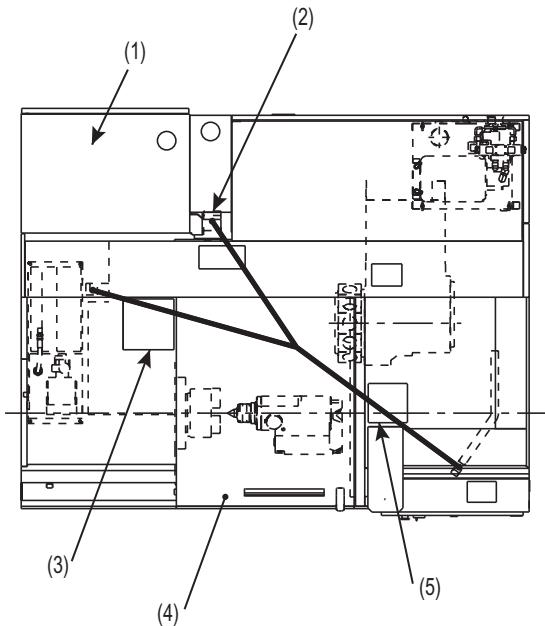
Procedure :

- 1- Move the turret to the X+190 mm (7.48 in.) position (Z+30 mm (1.18 in.) for MY) in advance to fix the saddle with accessory fixtures.
Move the tailstock to the extreme left.

SECTION 3 TRANSPORT AND INSTALLATION

- 2-** Remove the front cover on the left side.
- 3-** Remove the cover at the bottom of the back.
- 4-** Remove coolant pump wiring and piping.
- 5-** Pull out the coolant tank.
- 6-** Leave the front side anti-chip cover (front door) open by 100 mm (3.94 in.).
- 7-** Remove the spindle upper cover for wiring.
- 8-** Attach the bundled lifting hooks in place.

Now lifting is ready.

LB2000EXII Tailstock model (500 between centers)

LE12016R1600500410001

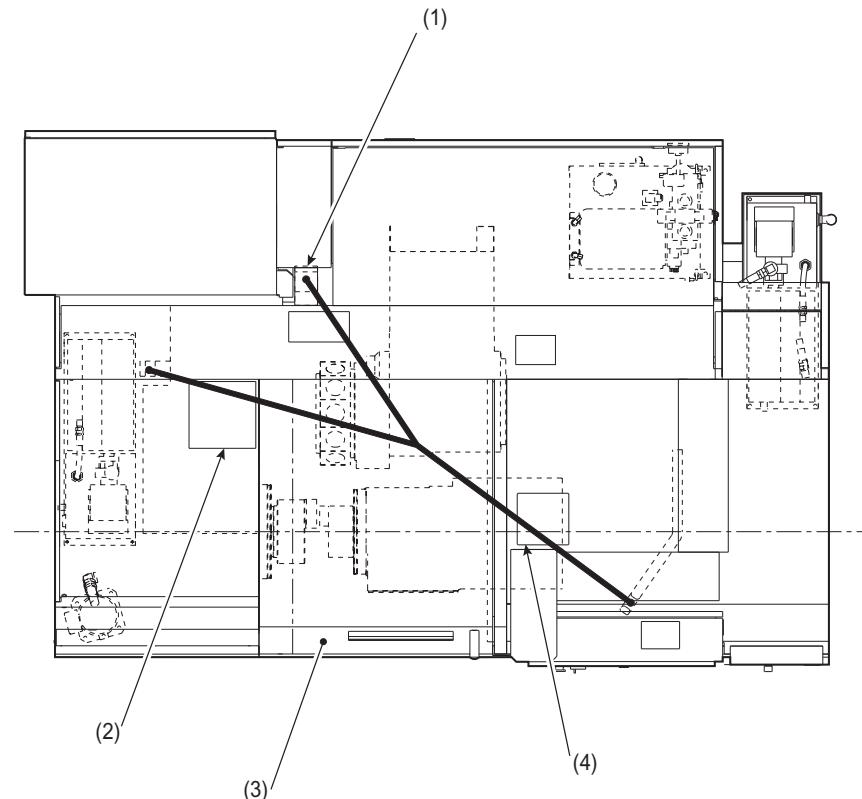
Fig. 3-2

1	NC unit	4	Front side anti-chip cover
2	Lifting hook (3 points)	5	Right side -fixed cover Upper cover
3	Spindle upper cover		

Procedure : —

- 1-** Move the turret to the X+200 mm (7.87 in.) position in advance to fix the saddle with accessory fixtures.
Move the tailstock to the extreme left.
- 2-** Remove the cover on the left side.
- 3-** Remove the cover at the bottom of the back.
- 4-** Remove coolant pump wiring and piping.
- 5-** Pull out the coolant tank.
- 6-** Leave the front side anti-chip cover (front door) closed.
- 7-** Remove the upper covers on the upper half of the spindle and the right side-fixed cover individually for wiring.
- 8-** Attach the bundled lifting hooks in place.

Now lifting is ready.

LB2000EXII Sub-spindle specification

LE12016R1600500070001

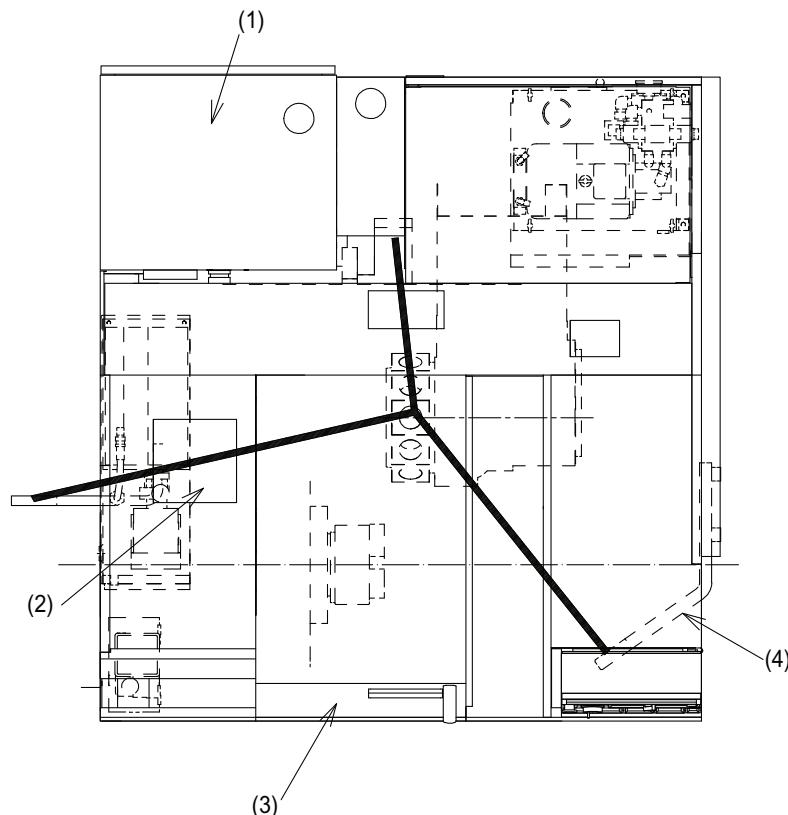
Fig. 3-3

1	Lifting hook (3 points)	3	Front side anti-chip cover
2	Spindle upper cover	4	Right side -fixed cover Upper cover

Procedure :

- 1-** Move the turret to the X+200 mm (7.87 in.) position in advance to fix the saddle with accessory fixtures.
Move the sub-spindle to the W+67 mm (2.64 in.) position.
- 2-** Remove the cover on the left side.
- 3-** Remove the cover at the bottom of the back.
- 4-** Remove coolant pump wiring and piping.
- 5-** Pull out the coolant tank.
- 6-** Leave the front side anti-chip cover (front door) closed.
- 7-** Remove the upper covers on the upper half of the spindle and the right side-fixed cover individually for wiring.
- 8-** Attach the bundled lifting hooks in place.

Now lifting is ready.

LB2500EXII

LE12016R1600500080001

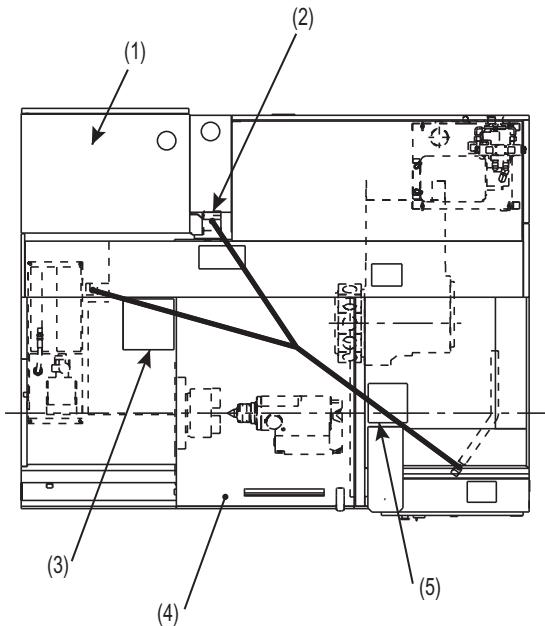
Fig. 3-4

1	NC unit	3	Front side anti-chip cover
2	Spindle upper cover	4	Lifting hook (3 points)

Procedure :

- 1-** Move the turret to Z+92 mm (3.62 in.) position and fix the saddle with accessory fixtures.
- 2-** Remove the cover on the left side.
- 3-** Remove the cover at the bottom of the back.
- 4-** Remove coolant pump wiring and piping.
- 5-** Pull out the coolant tank.
- 6-** Leave the front side anti-chip cover (front door) open by 150 mm (5.91 in.).
- 7-** Remove the upper cover on the upper half of the spindle for wiring.
- 8-** Attach the bundled lifting hooks in place.

Now lifting is ready.

LB3000EXII Tailstock model (500 between centers)

LE12016R1600500090001

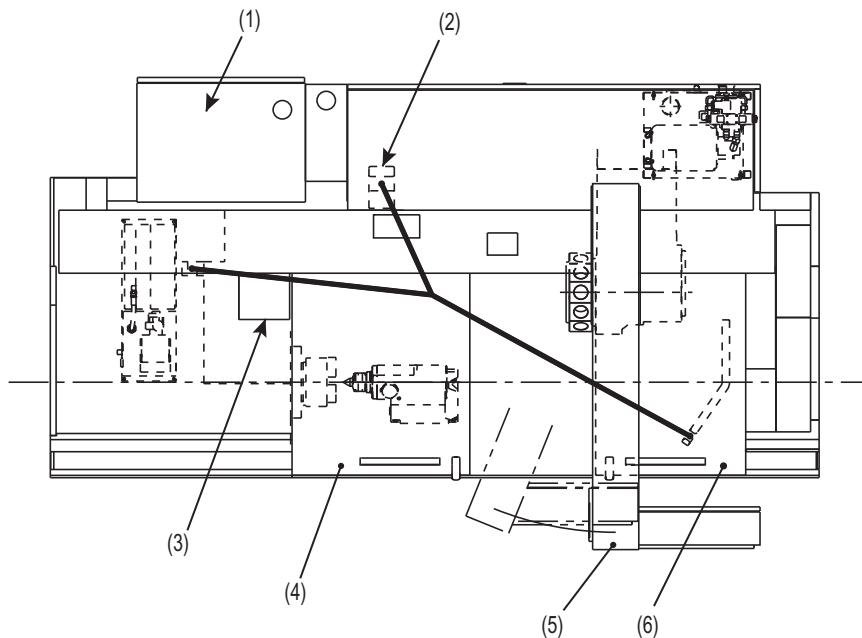
Fig. 3-5

1	NC unit	4	Front side anti-chip cover
2	Lifting hook (3 points)	5	Right side -fixed cover Upper cover
3	Spindle upper cover		

Procedure : —

- 1-** Move the turret to the X+200 mm (7.87 in.) position in advance to fix the saddle with accessory fixtures.
Move the tailstock to the extreme left.
- 2-** Remove the cover on the left side.
- 3-** Remove the cover at the bottom of the back.
- 4-** Remove coolant pump wiring and piping.
- 5-** Pull out the coolant tank.
- 6-** Leave the front side anti-chip cover (front door) closed.
- 7-** Remove the upper covers on the upper half of the spindle and the right side-fixed cover individually for wiring.
- 8-** Attach the bundled lifting hooks in place.

Now lifting is ready.

LB3000EXII Tailstock model (1,000 between centers)

LE12016R1600500100001

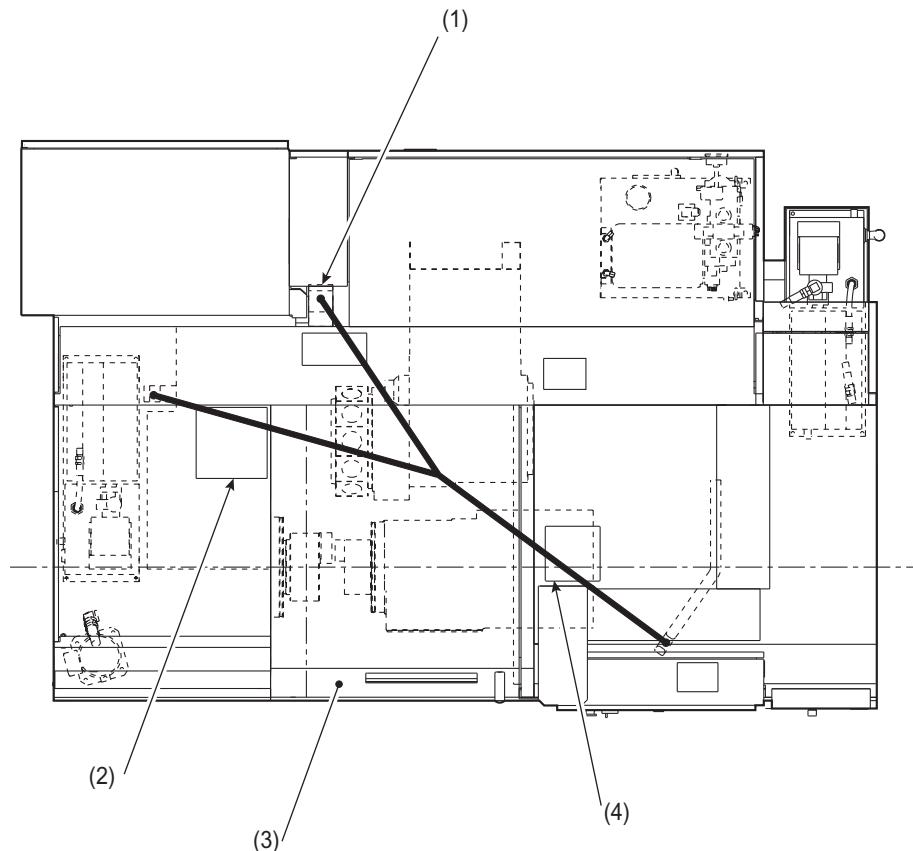
Fig. 3-6

1	NC unit	4	Left-front anti-chip cover
2	Lifting hook (3 points)	5	Operation panel duct
3	Spindle upper cover	6	Right-front anti-chip cover

Procedure :

- 1-** Move the turret to the X+200 mm (7.87 in.) position in advance to fix the saddle with accessory fixtures.
Move the saddle to the extreme right, while the tailstock to the extreme left.
- 2-** Remove the cover on the left side.
- 3-** Remove the cover at the bottom of the back.
- 4-** Remove coolant pump wiring and piping.
- 5-** Pull out the coolant tank.
- 6-** Leave the left-front side anti-chip cover (front door) closed.
- 7-** Leave the right-front side anti-chip cover (front door) open.
- 8-** Move the operation panel duct to the right side.
- 9-** Remove the upper cover on the upper half of the spindle for wiring.
- 10-** Attach the bundled lifting hooks in place.

Now lifting is ready.

LB3000EXII Sub-spindle model (500 between centers)

LE12016R1600500110001

Fig. 3-7

1	Lifting hook (3 points)	3	Front side anti-chip cover
2	Spindle upper cover	4	Right side -fixed cover Upper cover

Procedure :

- 1-** Move the turret to the X+200 mm (7.87 in.) position in advance to fix the saddle with accessory fixtures.
Move the sub-spindle to the W+67 mm (2.64 in.) position to fix it with accessory fixtures.

Note

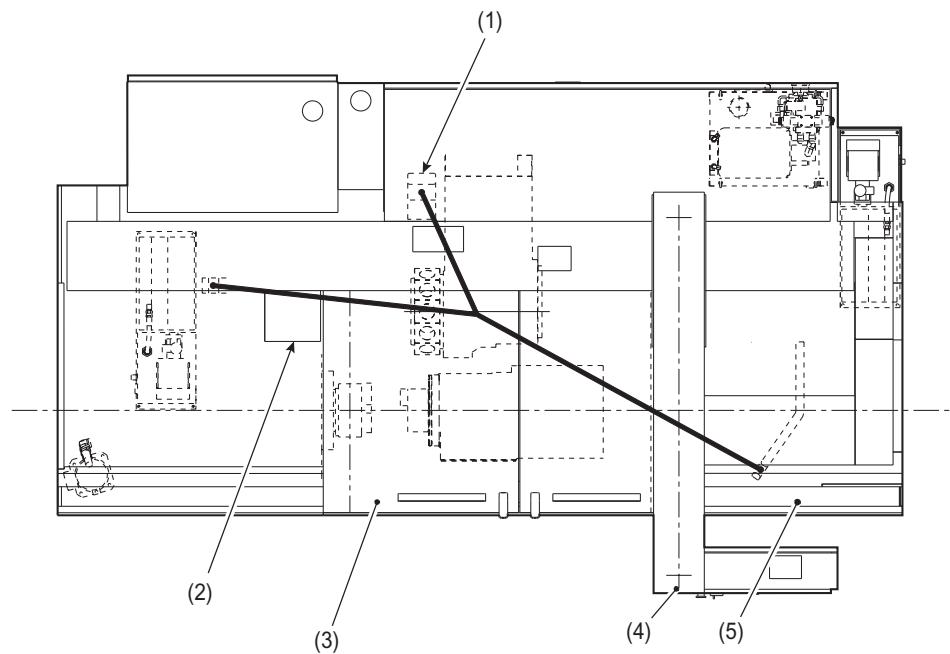
Please contact OKUMA if you cannot fix the sub-spindle in place due to your spindle tooling specification.

- 2-** Remove the cover on the left side.
- 3-** Remove the cover at the bottom of the back.
- 4-** Remove coolant pump wiring and piping.
- 5-** Pull out the coolant tank.

SECTION 3 TRANSPORT AND INSTALLATION

- 6-** Leave the front side anti-chip cover (front door) closed.
- 7-** Remove the upper covers on the upper half of the spindle and the right side-fixed cover individually for wiring.
- 8-** Attach the bundled lifting hooks in place.

Now lifting is ready.

LB3000EXII Sub-spindle model (800 between centers)

LE12016R1600500120001

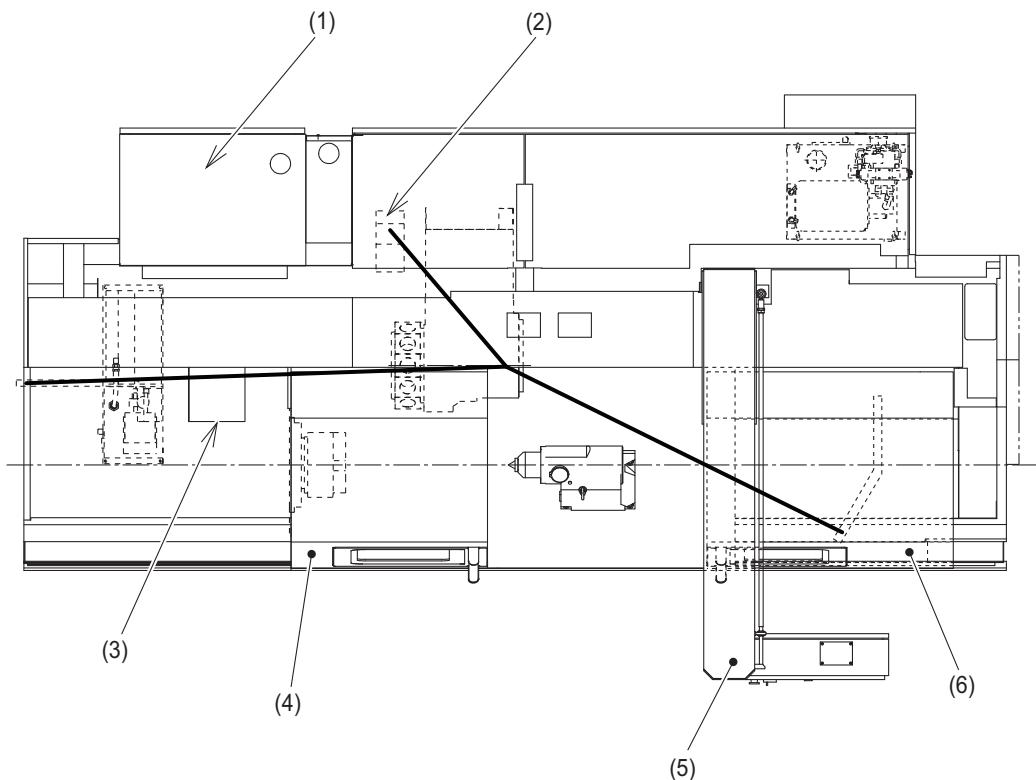
Fig. 3-8

1	Lifting hook (3 points)	4	Operation panel duct
2	Spindle upper cover	5	Right-front anti-chip cover
3	Left-front anti-chip cover		

Procedure :

- 1-** Move the turret to the Z+200 mm (7.87 in.) position in advance to fix the saddle with accessory fixtures.
Move the saddle to the extreme right, while the sub-spindle to W+497 mm (19.57 in.).
- 2-** Remove the cover on the left side.
- 3-** Remove the cover at the bottom of the back.
- 4-** Remove coolant pump wiring and piping.
- 5-** Pull out the coolant tank.
- 6-** Leave the left-front side anti-chip cover (front door) closed.
- 7-** Leave the right-front side anti-chip cover (front door) open.
- 8-** Move the operation panel duct to the right side.
- 9-** Remove the upper cover on the upper half of the spindle for wiring.
- 10-** Attach the bundled lifting hooks in place.

Now lifting is ready.

LB3000EXII Tailstock model (1,300 between centers)

LE12016R1600500420001

Fig. 3-9

1	NC unit	4	Left-front anti-chip cover
2	Lifting hook (3 points)	5	Operation panel duct
3	Spindle upper cover	6	Right-front anti-chip cover

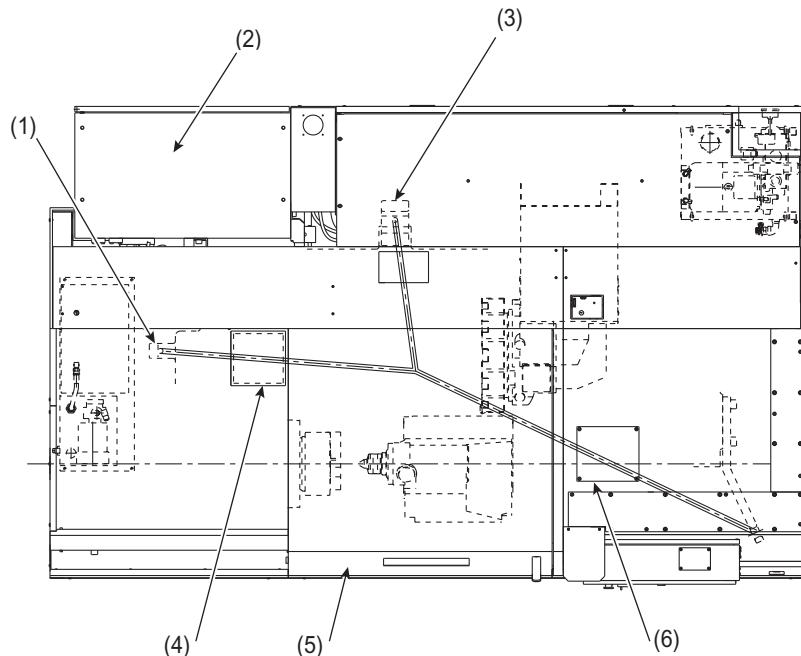
Procedure :

- 1-** Move the turret to the X+200 mm (7.87 in.) position in advance to fix the saddle with accessory fixtures.
Move the saddle to Z+900 mm (35.43 in.), while the tailstock to the extreme left.
- 2-** Remove the cover on the left side.
- 3-** Remove the cover at the bottom of the back.
- 4-** Remove coolant pump wiring and piping.
- 5-** Pull out the coolant tank.
- 6-** Leave the left-front side anti-chip cover (front door) closed.
- 7-** Leave the right-front side anti-chip cover (front door) open.
- 8-** Move the operation panel duct to the right side.
- 9-** Remove the upper cover on the upper half of the spindle for wiring.

SECTION 3 TRANSPORT AND INSTALLATION

10- Attach the bundled lifting hooks in place.

Now lifting is ready.

LB4000EXII (750 between centers)

LE12016R1600500130001

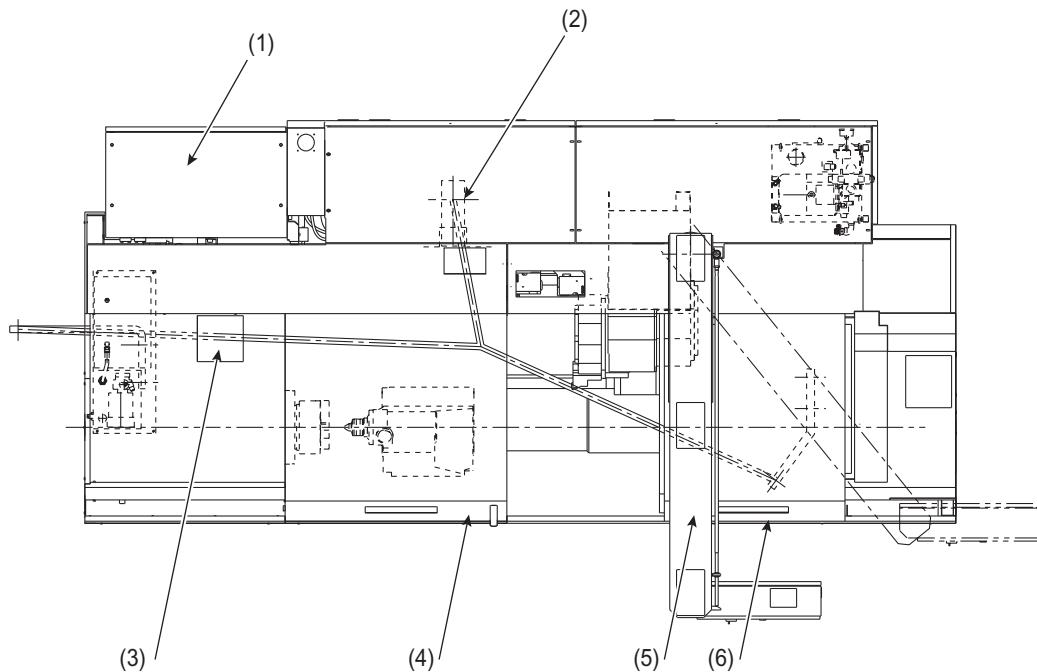
Fig. 3-10

1	Leg casting hook	4	Spindle upper cover
2	NC unit	5	Front side anti-chip cover
3	Lifting hook (3 points)	6	Right side -fixed cover Upper cover

Procedure :

- 1-** Move the saddle by -190 mm (7.48 in.) from Z+ end, while MY machine to -275 mm (10.83 in.) position to fix the saddle with accessory fixtures. Move the tailstock to the extreme left.
- 2-** Remove the rear cover on the left side.
- 3-** Remove coolant pump wiring and piping.
- 4-** Pull out the coolant tank.
- 5-** Leave the front side anti-chip cover (front door) closed.
- 6-** Remove the upper covers on the upper half of the spindle and the right side-fixed cover individually for wiring.
- 7-** Attach the bundled lifting hooks in place.

Now lifting is ready.

LB4000EXII (1,500 between centers)

LE12016R1600500140001

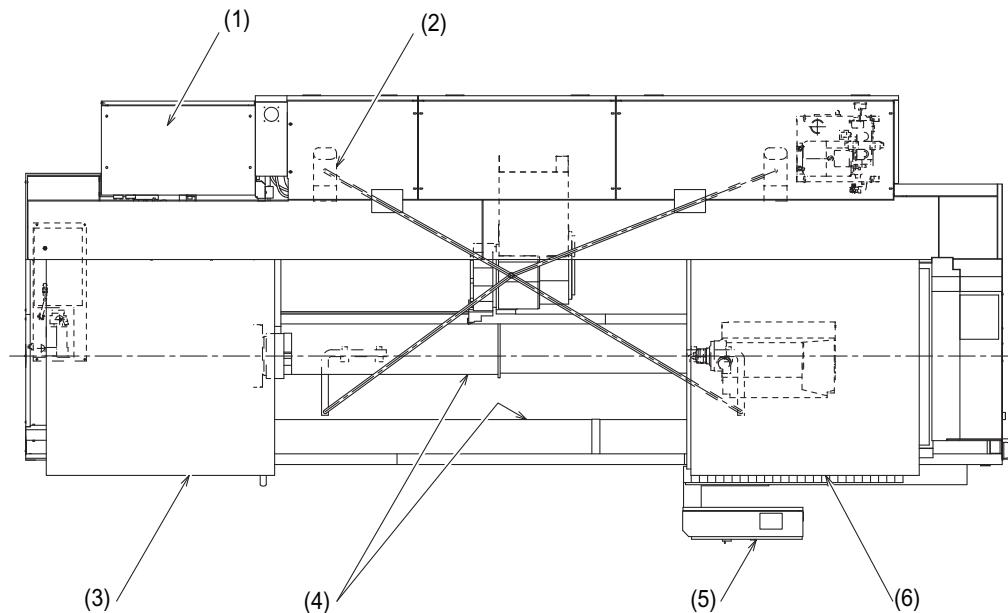
Fig. 3-11

1	NC unit	4	Left-front anti-chip cover
2	Lifting hook (3 points)	5	Operation panel duct
3	Spindle upper cover	6	Right-front anti-chip cover

Procedure :

- 1-** Move the saddle by -340 mm (13.39 in.) from Z+ end, while MY machine to -425 mm (16.73 in.) position to fix the saddle with accessory fixtures. Move the tailstock to the extreme left.
- 2-** Remove the cover on the lower left side.
- 3-** Remove the lower-right cover on the back.
- 4-** Remove coolant pump wiring and piping.
- 5-** Pull out the coolant tank.
- 6-** Leave the left-front side anti-chip cover (front door) closed.
- 7-** Leave the right-front side anti-chip cover (front door) open.
- 8-** Remove the upper cover on the upper half of the spindle for wiring.
- 9-** Attach the bundled lifting hooks in place.

Now lifting is ready.

LB4000EXII (2,000 between centers)

LE12016R1600500150001

Fig. 3-12

1	NC unit	4	Chip shooter
2	Lifting hook (4 points)	5	Front movable operation panel
3	Front door Left	6	Front door Right

Procedure :

- 1-** Move the saddle by -340 mm (13.39 in.) from Z+ end, while MY machine to -425 mm (16.73 in.) position to fix the saddle with accessory fixtures. Move the tailstock to the extreme left.
- 2-** Remove the lower-right cover and lower-left cover on the back.
- 3-** Remove coolant pump wiring and piping.
- 4-** Pull out the coolant tank.
- 5-** Leave the left-front side anti-chip cover (front door) open.
- 6-** Leave the right-front side anti-chip cover (front door) open.
- 7-** Attach the bundled lifting hooks in place.

Now lifting is ready.

Lifting procedure

Precautions for Lifting the Machine



Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**



- The wire rope should have a nominal $\Phi 20$ (0.79) or larger. Failing to do so may result in dropping the machine leading to death or serious injury.
- Change an angle formed by each wire rope so that the wire rope will not contact the finished surfaces of the machine.
(Do not tilt any wire rope exceeding 40° away from the vertical direction.)
- Lift the machine carefully while balancing it.
- Use extra care to lower the machine gently onto the floor; Never apply shocks to the machine when placing it on the floor.
See the following table for machine mass.
(Including the hydraulic power unit, the control box, NC unit, and tool magazine.)

Model	Specifications	Between centers	Machine Mass (Approx. kg (lb))
LB2000EXII (L)	1SC	300	3,400 (7,480)
		500	4,300 (9,460)
LB2000EXII (M)	1SC	300	3,450 (7,590)
		500	4,350 (9,570)
LB2000EXII (W)			4,600 (10,120)
LB2000EXII (MW)			4,700 (10,340)
LB2000EXII (MY)	1SC	300	4,200 (9,240)
		500	4,850 (10,670)
LB2500EXII (L)			3,400 (7,480)
LB2500EXII (M)			3,500 (7,700)
LB3000EXII (L)	1ST	250	4,250 (9,350)
	1SC	500	4,400 (9,680)
	1SC	1,000	6,000 (13,200)
	1SC	1,300	6,300 (13,860)
LB3000EXII (M)	1ST	250	4,350 (9,570)
	1SC	500	4,500 (9,900)
	1SC	1,000	6,100 (13,420)
	1SC	1,300	6,400 (14,080)
LB3000EXII (MY)	1ST	250	4,850 (10,670)
	1SC	450	5,000 (11,000)
	1SC	950	6,600 (14,520)
	1SC	1,250	6,900 (15,180)
LB3000EXII (W)		500	4,650 (10,230)
		800	6,250 (13,750)

SECTION 3 TRANSPORT AND INSTALLATION

Model	Specifications	Between centers	Machine Mass (Approx. kg (lb))
LB3000EXII (MW)		500	4,750 (10,450)
		800	6,350 (13,970)
LB3000EXII (MYW)		500	5,250 (11,550)
		800	6,850 (15,070)
LB4000EXII (L/M)	1ST	380	6,000 (13,200)
	1SC	750	6,300 (13,860)
	1SC	1,500	8,200 (18,040)
	1SC	1,500 (B7 spindle spec.)	9,400 (20,680)
	1SC	2,000	11,000 (24,200)
	1SC	2,000 (B7 spindle spec.)	12,000 (26,400)
LB4000EXII (MY)	1ST	380	6,400 (14,080)
	1SC	750	6,700 (14,740)
	1SC	1,500	8,600 (18,920)
	1SC	1,500 (B7 spindle spec.)	9,800 (21,560)
	1SC	2,000	12,000 (26,400)
	1SC	2,000 (B7 spindle spec.)	13,000 (28,600)

Table 3-1

Precautions when moving the machine on a roller**CAUTION**

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.



Be careful that the machine does not tip over on any side so that the machine base may not strike the ground.

SECTION 3 TRANSPORT AND INSTALLATION**Cautions when moving the machine with a forklift****CAUTION**

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.



When moving the machine with a forklift, exercise great care when inserting the forks under the machine so it does not damage machine parts such as the jack bolt and rotary joint. Depending on the specification, these parts may protrude from the bottom.

Lift the machine by placing the hydraulic jack in casting indentations on the lower right and left machine bases and put those four corners of the machine bases on the tirroller.

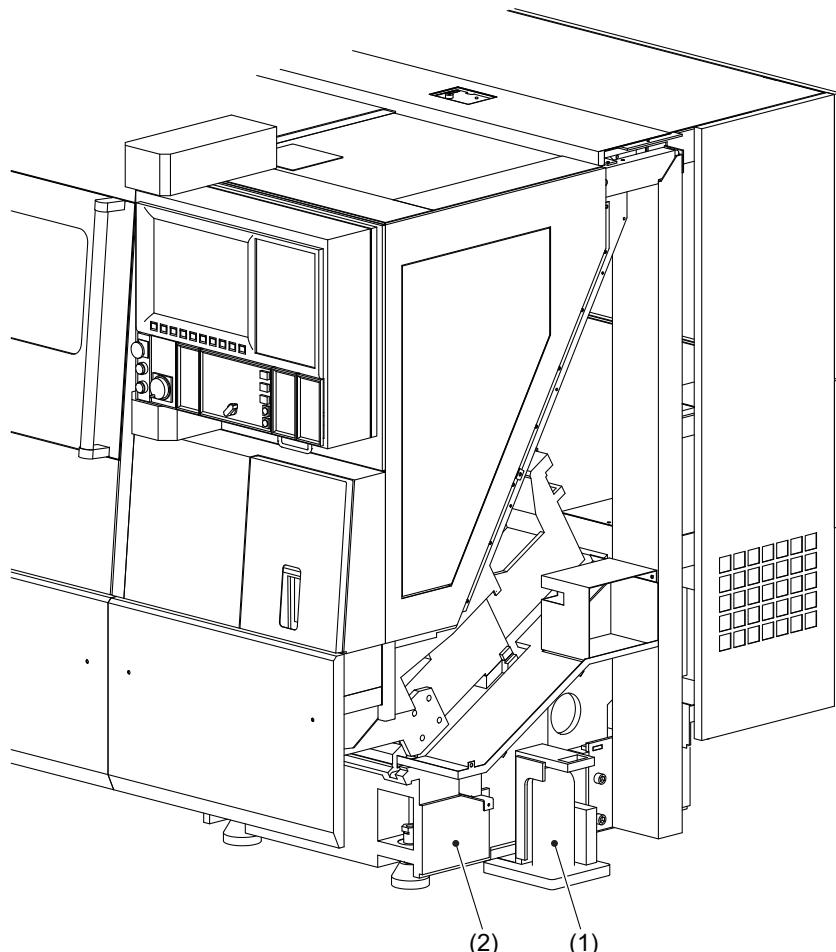


Fig. 3-13

1	Hydraulic jack	2	Machine base
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3-6. Preparation Before Delivery

3-6-1. About Fixtures

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	Before connecting the main power cable to the machine, the fixtures used to secure the machine during transportation must be removed.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	The fixtures are red. Store the removed fixtures in a safe place. These fixtures will be used to secure the machine when the machine is moved or repositioned in the future. Failing to do so may result in damage to the machine.

3-6-2. Power supply

Power Specification

Supply 200 V by using transformers if your power supply does not support 200 V.

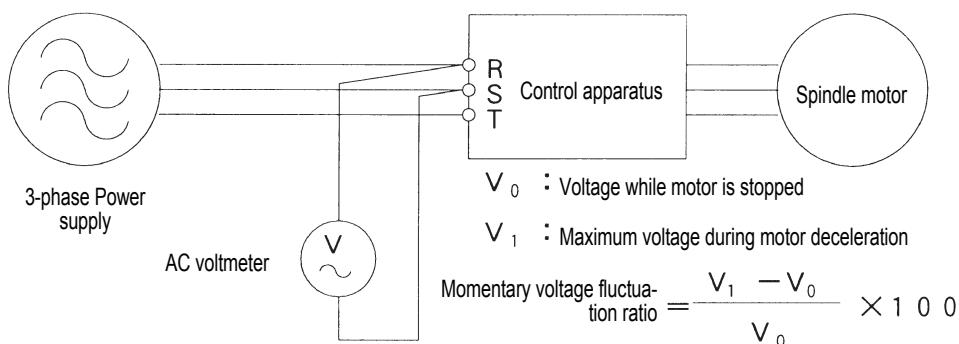
- Normal rated voltage : 200 V
- Allowable voltage range : 180 Vrms to 220 Vrms (Includes voltage fluctuation caused by load.)
- Frequency : 50 Hz/60 Hz
- Allowed frequency range : 49 Hz to 61 Hz
- Power Source Inductance : Allowed power source inductance instantaneous voltage fluctuation at maximum power output 15 % or less
(However, voltage fluctuation must be within allowable voltage range.)

▲ CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in minor or moderate injury.</u>
	High power source inductance of input power supply results in longer acceleration/deceleration time of the spindle. Also, operating with a high-inductance power supply can trigger the protection circuit in the DC power supply unit. Rated output is guaranteed under normal rated voltage. Fluctuation in input voltage can result in rated output not being met, even if the fluctuation is within the allowable voltage range.

Measuring momentary voltage fluctuation ratio

Procedure :

- 1- Connect an AC voltmeter to the power source terminals at the machine as shown in the illustration.



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Fig. 3-14

- 2- Measure the voltage while the spindle motor stops and take it as V_0 .
- 3- Measure the voltage while the spindle motor is decelerating, and take the maximum value as V_1 .
- 4- Calculate the momentary voltage fluctuation ratio using the formula shown below.
Momentary voltage fluctuation ratio = $(V_1 - V_0) / V_0 \times 100$

Note

- 1) Due to the slow response of digital AC voltmeters, its measurement of momentary voltage fluctuation ratio tends to be lower than the actual value. Whenever possible, use an analog AC voltmeter.
- 2) Since measurement is not easy if a deceleration time is short, start spindle deceleration from a speed as high as possible.
- 3) If you have any question on momentary voltage fluctuation ratio, please contact your OKUMA representative.

Power Supply Unit (MPS)

The table below shows the allowable power source inductance for connecting MPS unit. Use the values shown in the table when judging the connect ability of MPS unit.

Power Supply unit	Power Source Inductance
MPS10	Max. 400 μ H
MPS20	Max. 140 μ H
MPS30	Max. 140 μ H
MPS45A	Max. 70 μ H
MPS60	Max. 70 μ H

Table 3-2

Note

- 1) If more than one machine is connected to the same power source, the inductance of the power source can be obtained by dividing the value in the table by the number of machines connected to the same power source.
- 2) Inductance by laying cable is approximately 12 μH if KIV cable is used and wiring distance is 50 m (164 ft.).
- 3) We advise you not to install a capacitor for power-factor improvement, because it may hinder proper power regeneration.
- 4) If you have any question on power source inductance, please contact your OKUMA representative.

3-6-3. Power Requirements and Fuse Capacity



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Only technicians specially trained in electrical equipment may provide power to the machine.

Power supply

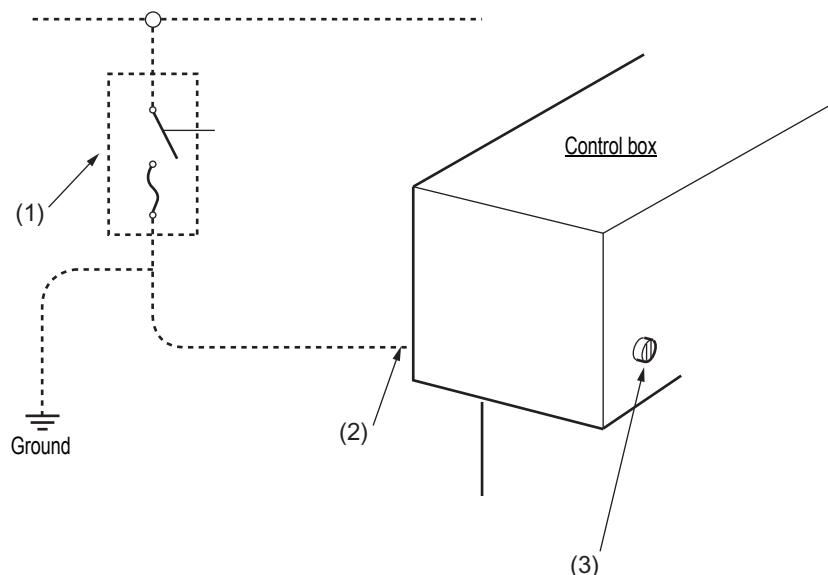
The number of phases: 3 phases

Frequency: 50 Hz/60 Hz

Voltage: See the following table (plus or minus 10 %)

Power source inductance: Refer to the table [3-6-2. Power supply].

Connect wires for transformers (optional) according to power supplies and voltages.
If no transformers are used, supply 200 V voltages.



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Fig. 3-15

1	Circuit breaker for wiring (See the table next page for capacity)	3	Main switch
2	Cable thickness (See the table next page)		

SECTION 3 TRANSPORT AND INSTALLATION

	Rated voltage	Standard spindle		Standard spindle power boost		Big-bore spindle	
		Circuit breaker for wiring Rated current capacity	Cable thickness	Circuit breaker for wiring Rated current capacity	Cable thickness	Circuit breaker for wiring Rated current capacity	Cable thickness
LB2000EXII (L/M/MY)	Power requirements	17.9 kVA (20.2 kVA)		22.4 kVA (25.5 kVA)		27.6 kVA (30.6 kVA)	
	200 V	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)	100 A	30 mm ² (0.05 in. ²)
	220 V	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)	100 A	30 mm ² (0.05 in. ²)
	230 V	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)	100 A	30 mm ² (0.05 in. ²)
	380 V	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)
	400 V	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)
	415 V	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)
	440 V	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)
	480 V	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)
LB2000EXII (W/MW)	Power requirements	20.7 kVA (23.0 kVA)		25.2 kVA (27.5 kVA)		30.3 kVA (32.6 kVA)	
	200 V	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)	100 A	30 mm ² (0.05 in. ²)
	220 V	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)	100 A	30 mm ² (0.05 in. ²)
	230 V	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)	100 A	30 mm ² (0.05 in. ²)
	380 V	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)
	400 V	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)
	415 V	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)
	440 V	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)
	480 V	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)	50 A	14 mm ² (0.02 in. ²)
LB2500EXII	Power requirements	26.5 kVA (28.8 kVA)		35.5 kVA (37.8 kVA)			
	200 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)		
	220 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)		
	230 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)		
	380 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)		
	400 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)		
	415 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)		
	440 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)		
	480 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)		
LB3000EXII (L/M/MY)	Power requirements	29.0 kVA (31.3 kVA)		38.0 kVA (40.3 kVA)		38.0 kVA (40.3 kVA)	
	200 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)	125 A	38 mm ² (0.06 in. ²)
	220 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)	125 A	38 mm ² (0.06 in. ²)
	230 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)	125 A	38 mm ² (0.06 in. ²)
	380 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	400 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	415 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	440 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	480 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	600 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)

SECTION 3 TRANSPORT AND INSTALLATION

	Rated voltage	Standard spindle		Standard spindle power boost		Big-bore spindle	
		Circuit breaker for wiring Rated current capacity	Cable thickness	Circuit breaker for wiring Rated current capacity	Cable thickness	Circuit breaker for wiring Rated current capacity	Cable thickness
LB3000EXII (W/MW)	Power requirements	32.0 kVA (34.3 kVA)		41.1 kVA (43.4 kVA)		41.1 kVA (43.4 kVA)	
	200 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)	125 A	38 mm ² (0.06 in. ²)
	220 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)	125 A	38 mm ² (0.06 in. ²)
	230 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)	125 A	38 mm ² (0.06 in. ²)
	380 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	400 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	415 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	440 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	480 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	600 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
LB3000EXII (MYW)	Power requirements	33.1 kVA (35.4 kVA)		42.2 kVA (44.5 kVA)		42.2 kVA (44.5 kVA)	
	200 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)	125 A	38 mm ² (0.06 in. ²)
	220 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)	125 A	38 mm ² (0.06 in. ²)
	230 V	100 A	30 mm ² (0.05 in. ²)	125 A	38 mm ² (0.06 in. ²)	125 A	38 mm ² (0.06 in. ²)
	380 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	400 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	415 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	440 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	480 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
	600 V	50 A	14 mm ² (0.02 in. ²)	75 A	22 mm ² (0.03 in. ²)	75 A	22 mm ² (0.03 in. ²)
LB4000EXII	Power requirements	36.0 kVA (38.3 kVA)		46.3 kVA (48.6 kVA)			
	200 V	125 A	38 mm ² (0.06 in. ²)	150 A	50 mm ² (0.08 in. ²)		
	220 V	125 A	38 mm ² (0.06 in. ²)	150 A	50 mm ² (0.08 in. ²)		
	230 V	125 A	38 mm ² (0.06 in. ²)	150 A	50 mm ² (0.08 in. ²)		
	380 V	75 A	22 mm ² (0.03 in. ²)	100 A	30 mm ² (0.05 in. ²)		
	400 V	75 A	22 mm ² (0.03 in. ²)	100 A	30 mm ² (0.05 in. ²)		
	415 V	75 A	22 mm ² (0.03 in. ²)	100 A	30 mm ² (0.05 in. ²)		
	440 V	75 A	22 mm ² (0.03 in. ²)	100 A	30 mm ² (0.05 in. ²)		
	480 V	75 A	22 mm ² (0.03 in. ²)	100 A	30 mm ² (0.05 in. ²)		

Table 3-3

() indicates specification with loaders.

SECTION 3 TRANSPORT AND INSTALLATION

Machine model	LB2000EXII			
Spindle specifications	Main standard spindle	Main standard spindle power-boost	Main big-bore spindle	Sub-spindle
Speed range min^{-1}	50 to 6,000	50 to 6,000	45 to 5,000	50 to 6,000
Spindle output kW (hp)	PREX 11/7.5 (15/11) (20 min./cont.)	PREX 15/11 (20/15) (20 min./cont.) (High speed side) PREX 15/11 (20/15) (15 min./cont.) (Low speed side)	VAC 22/15 (30/20) (30 min./cont.) (High speed side) VAC 22.8/15 (30.40/20) (10 min./cont.) (Low speed side)	PREX 11/7.5 (15/11) (20 min./cont.)
Max. torque N-m (lbf-ft)	160 (118) (Low speed side) 66 (48) (High speed side)	202 (149) (Low speed side) 75 (55) (High speed side)	427 (315) (Low speed side) 191 (141) (High speed side)	88 (64) (Low speed side) 39 (28) (High speed side)
Constant output range min^{-1}	660 to 1,600 (Low speed side) 1,600 to 6,000 (High speed side)	710 to 1,900 (Low speed side) 1,900 to 6,000 (High speed side)	510 to 1,100 (Low speed side) 1,100 to 5,000 (High speed side)	1,200 to 2,700 (Low speed side) 2,700 to 6,000 (High speed side)

Table 3-4

Machine model	LB2500EXII	
Spindle specifications	Main standard spindle	Main standard spindle power-boost
Speed range min^{-1}	45 to 5,000	45 to 5,000
Spindle output kW (hp)	VAC 22/15 (30/20) (30 min./cont.) (High speed side) VAC 22.8/15 (30.40/20) (10 min./cont.) (Low speed side)	VAC 30/22 (40/30) (30 min./cont.) (High speed side) VAC 22.8/15 (30.40/20) (10 min./cont.) (Low speed side)
Max. torque N-m (lbf-ft)	427 (315) (Low speed side) 191 (141) (High speed side)	427 (315) (Low speed side) 238 (176) (High speed side)
Constant output range min^{-1}	510 to 1,100 (Low speed side) 1,100 to 5,000 (High speed side)	510 to 820 (Low speed side) 1,200 to 5,000 (High speed side)

Table 3-5

SECTION 3 TRANSPORT AND INSTALLATION

Machine model	LB3000EXII			
Spindle specifications	Main standard spindle	Main standard spindle power-boost	Main big-bore spindle	Sub-spindle
Speed range min^{-1}	45 to 5,000	45 to 5,000	42 to 4,200	50 to 6,000
Spindle output kW (hp)	VAC 22/15 (30/20) (30 min./cont.) (High speed side) VAC 22.8/15 (30.40/20) (10 min./cont.) (Low speed side)	VAC 30/22 (40/30) (30 min./cont.) (High speed side) VAC 22.8/15 (30.40/20) (10 min./cont.) (Low speed side)	PREX 30/22 (40/30) (30 min./cont.)	PREX 11/7.5 (15/11) (20 min./cont.)
Max. torque N-m (lbf-ft)	427 (315) (Low speed side) 191 (141) (High speed side)	427 (315) (Low speed side) 238 (176) (High speed side)	700 (517) (Low speed side) 341 (252) (High speed side)	109 (80) (Low speed side) 39 (28) (High speed side)
Constant output range min^{-1}	510 to 1,100 (Low speed side) 1,100 to 5,000 (High speed side)	510 to 820 (Low speed side) 1,200 to 5,000 (High speed side)	410 to 840 (Low speed side) 840 to 4,200 (High speed side)	960 to 2,700 (Low speed side) 2,700 to 6,000 (High speed side)

Table 3-6

Machine model	LB4000EXII		
Spindle specifications	Main standard spindle	Main big-bore spindle	Main B7 spindle
Speed range min^{-1}	42 to 4,200	30 to 3,000	12 to 1,400
Spindle output kW (hp)	PREX 30/22 (40/30) (30 min./cont.)	PREX 37/30 (50/40) (30 min./cont.)	VAC 37/30 (50/40) (30 min./cont.)
Max. torque N-m (lbf-ft)	700 (517) (Low speed side) 341 (252) (High speed side)	1,178 (869) (Low speed side) 393 (290) (High speed side)	995 (734)
Constant output range min^{-1}	410 to 840 (Low speed side) 840 to 4,200 (High speed side)	300 to 900 (Low speed side) 900 to 3,000 (High speed side)	355 to 1,400

Table 3-7

3-6-4. Inspection of Cable Connection

Connect power supply wires in the correct phase order.

You can check the correct phase order by reading the hydraulic pressure raised to the specified value (4.5 MPa (653 psi)).

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property</u> .
<p>1) Connect the ground wire to the external protective earth terminal (PE) in the control box.</p> <p>2) Do not connect the power cord and the grounding wire in series; Doing so may interfere with other equipment or cause malfunction of the leak breaker, etc.</p> <p>3) When a leak breaker is used, select the one meeting the following rating.</p> <ul style="list-style-type: none"> • Ratings of leak breakers, etc. For inverter circuit use Sensitive current of 100 mA or more. Middle-sensitivity high-speed inverter type <p>4) Check the momentary voltage fluctuation ratio to be 15 % or less by following the [3-6-2. Measuring momentary voltage fluctuation ratio]. The momentary voltage fluctuation ratio of 15 % or more may result in longer spindle acceleration/deceleration time and/or trigger the protection circuit in the servo power supply unit.</p> <p>5) If you have any question on momentary voltage fluctuation ratio or power source inductance, please contact your OKUMA representative.</p> <p>6) Lead power supplies in from the lower part of dust- and water-proof type control panel with appropriate dust- and water-resistant finishing applied. Dust- and water-resistant finishing is necessary even if power supply cables are lead in from the upper part of control panel. Properly maintain power supply cables so as not to tense connection parts of the power supply line main breaker.</p>	

3-6-5. Preparation of Air Source

Prepare the air source based on the following conditions.

Flow Rate

The table below shows the amount of compressed air required for the machine.

Standard spindle model	900 L/min (237.8 gpm) (ANR)
------------------------	-----------------------------

Table 3-8

Give additional 10 % to the required air supply to ensure all the pneumatic units are provided with sufficient air supply.

If a compressor is shared with the other machine, air gun, or air grinder, the flow rate may become lower than the specified rate. In this case, check the flow rate with the airflow meter to see if the compressor can supply enough air even while the other machine is using the air.

Pressure

- (1) Primary air pressure should be set in the range of 0.5 MPa (72.6 psi) to 0.7 MPa (101.6 psi) and kept above 0.5 MPa (72.6 psi).

Primary air pressure of more than 0.5 MPa (72.6 psi) must be maintained even when air is used at the airflow rate in the table below, or when an external device such as an air gun or air grinder is used on the same system.

The following table, given for your reference, shows the typical pressure loss generated in the pipe from compressor to the pneumatic unit inlet.

Airflow rate	Typical pressure loss in pipe per meter		
	3/8	1/2	3/4
500 L/min (132.1 gpm) (ANR)	0.0033 MPa (0.4788 psi)	0.0009 MPa (0.1306 psi)	0.0002 MPa (0.029 psi)
700 L/min (184.9 gpm) (ANR)	0.0065 MPa (0.9432 psi)	0.0018 MPa (0.2612 psi)	0.0003 MPa (0.0435 psi)
1,000 L/min (264.2 gpm) (ANR)	0.0133 MPa (1.9299 psi)	0.0036 MPa (0.5224 psi)	0.0006 MPa (0.0871 psi)
1,200 L/min (317 gpm) (ANR)	0.0192 MPa (2.786 psi)	0.0052 MPa (0.7545 psi)	0.0009 MPa (0.1306 psi)
1,400 L/min (369.9 gpm) (ANR)	0.0261 MPa (3.7872 psi)	0.0071 MPa (1.0302 psi)	0.0012 MPa (0.1741 psi)

Table 3-9

- (2) Secondary air pressure should be kept constant at 0.4 MPa (58.0 psi) using the pressure regulator on the machine.

Moisture

Use clean and dry air for the compressed air.

An air filter is mounted to the side of the machine. The air delivered from the compressor is normally hot and moist. Therefore, mount a freeze-dryer or after-cooler between the compressor and the air filter to remove moisture (temperature at machine air inlet is within 5 °C (41 °F) + room temperature).

This is to prevent moisture from rusting the inside of the tubings which can be detrimental to the machine.

Piping

The piping ID from the compressor to the pneumatic unit must be 12 mm (1/2 in.) or more.

When the water is accumulated in the piping, it may cause a reduction of the valid area and the pressure loss. So set the drain opening at the lowest piping place and so on, and make sure to drain the water from the piping.

Filter drain

If you chose to install a filter drain as a precaution against moisture, we recommend using an auto-drain type filter.

Maintenance is necessary even for the auto-draining type, but when any filter other than this type is used, please pay good attention to maintenance, especially.

Compressor selection

- (1) Select a model that is rated with discharge pressure that is slightly higher than the required pressure.
(We recommend a model with discharge pressure that is higher than the operating pressure by +0.2 MPa (29 psi).)
- (2) Select a model that is rated with discharge flow rate that is greater than the operating flow rate.
(We recommend a rating that is 10 % to 20 % more than required.)

Compressed air

To prevent failure of pneumatic equipment, a different quality class of compressed air is recommended for each equipment. Impurities contained in each quality class of compressed air are listed below.

Operating pressure: 0.5 MPa (72.6 psi) (5 bar)

Quality class recommended by DIN ISO 8573-1

Air quality grade

International standard	ISO 8573-1:1991	Quality grade
Japan Industrial Standards	JIS B 8392-1:2000	Quality grade

Quality grade	Max. particle diameter (μm ($\mu\text{in.}$))	Min. pressure dew point ($^{\circ}\text{C}$ ($^{\circ}\text{F}$)))	Highest oil concentration (mg/m^3)
1	0.1 (4)	-70 (-94)	0.01
2	1 (40)	-40 (-40)	0.1
3	5 (200)	-20 (-4)	1.0
4	15 (600)	+3 (+37)	5
5	40 (1,600)	+7 (+45)	25
6	-	+10 (+50)	-

Table 3-10

The quality grade of primary side air pressure should meet the following.

- Solid particle diameter: 5 μm (200 $\mu\text{in.}$)
- Pressure dew point: 3 $^{\circ}\text{C}$ (37 $^{\circ}\text{F}$)
- Oil concentration: 1.0 mg/m^3

Quality grade: Grade 3 in Max. particle diameter; Grade 4 in Min. pressure dew point; Grade 3 in Highest oil concentration; or better.

Operating pressure

Operating pressure is 0.5 MPa (72.6 psi) (5 bar).

The machine is switched off when air pressure falls to 0.3 MPa (43.5 psi) (3 bar) or less.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.

When the required air pressure supply line is reduced in diameter, it may lead to malfunction or damage to the equipment.

By choosing compressed air of the appropriate quality class, compressed air preparation can be optimized, resulting in lower maintenance cost through less machine down time.

Air pressure line connection

For the required nominal diameter of the air supply line, refer to the mark next to the equipment, or the foundation plan. Make sure the supply line diameter is not reduced (when using one-touch couplings, for example).

3-7. Machine Installation

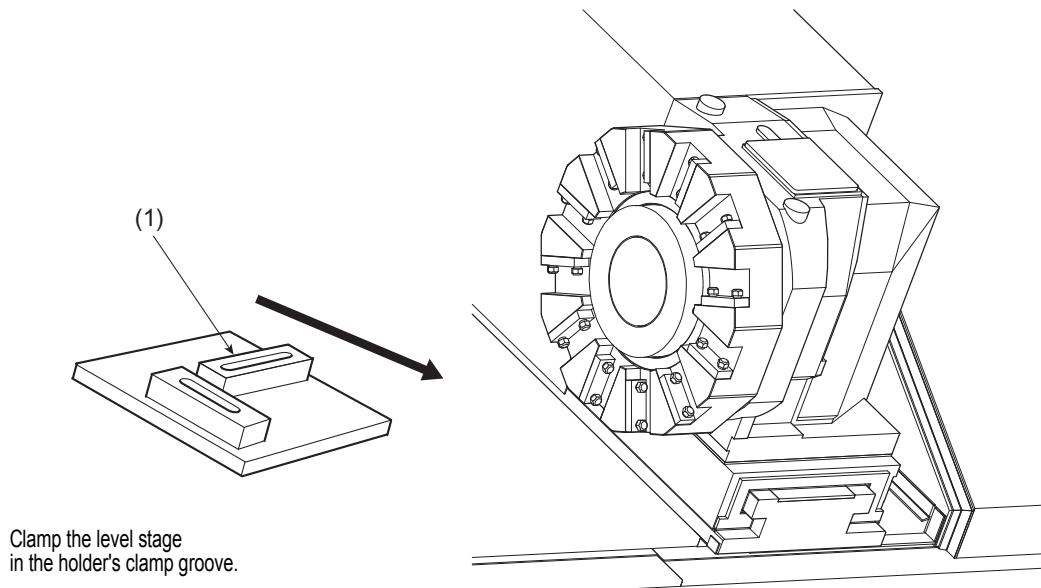
Levelness of the machine has great influence on machining accuracy and machine life. Therefore, take particular care to level the machine when installing the machine.

		No. of Leveling Jack Screws (Number of jack bolts)	Remarks
LB2000EXII	300 between centers (L/M/MY)	6	Pass foundation bolt.
	250 between centers (L/M/MY)	8	
	450 between centers (MY)	8	
	500 between centers (L/M)	8	
	500 between centers (W/MW)	8	
LB2500EXII	L/M	6	
LB3000EXII	250 between centers (L/M/MY)	8	Pass foundation bolt.
	450 between centers (MY)	8	
	500 between centers (L/M/W/MW/MYW)	8	
	800 between centers (W/MW/MYW)	10	
	950 between centers (MY)	10	
	1,000 between centers (L/M)	10	
	1,250 between centers (MY)	12	
	1,300 between centers (L/M)	12	
LB4000EXII	380 between centers	8	
	750 between centers	8	
	1,500 between centers	10	
	2,000 between centers	16	

Table 3-11

3-7-1. Leveling the Machine

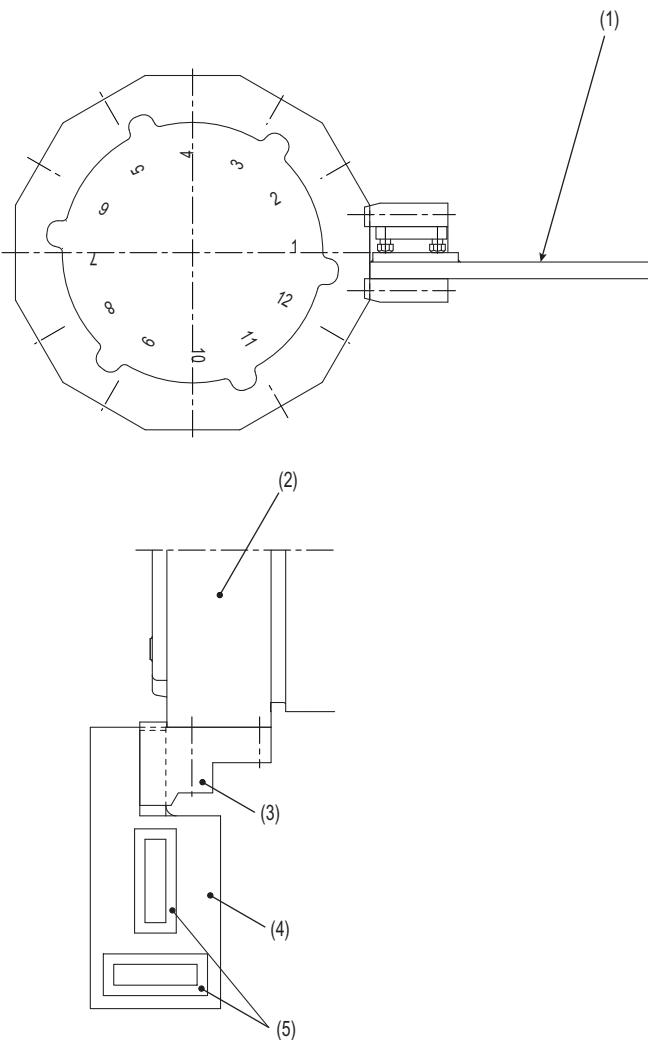
- (1) Check for levelness of the machine as shown in the figure while making sure with a level that the right and left ends on the bed sliding surface are horizontal in X and Z directions.
Maintain feeding speed override around 30 %.



LE12016R1600500340001

Fig. 3-16

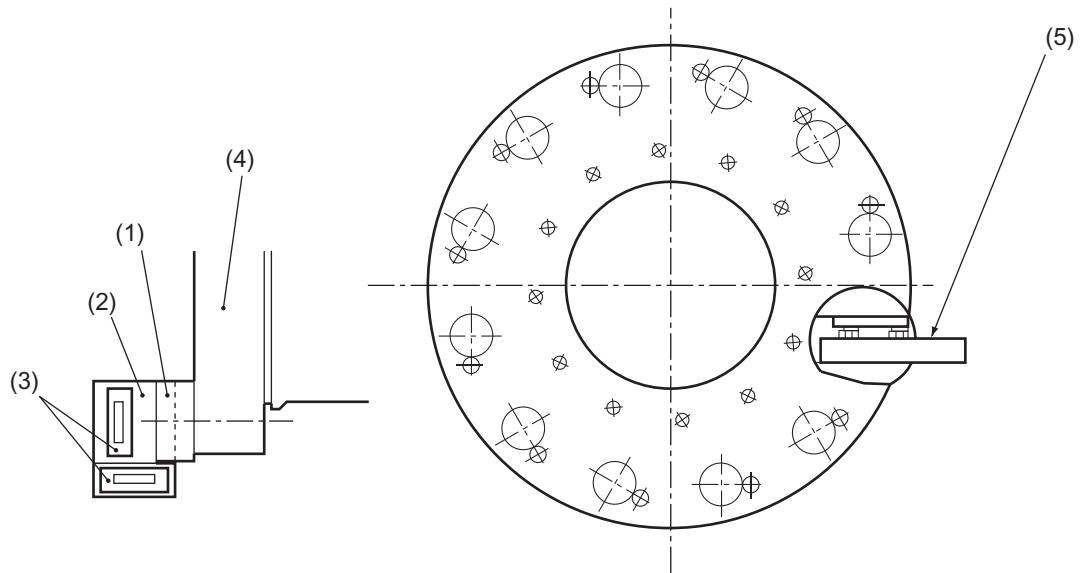
1	Level
---	-------

SECTION 3 TRANSPORT AND INSTALLATION

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Fig. 3-17

1	Position where the level is placed	4	Level stage
2	Turret	5	Level
3	Outside holder I		



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Fig. 3-18

1	Outside holder A or B	4	Turret
2	Level stage	5	Position where the level is placed
3	Level		

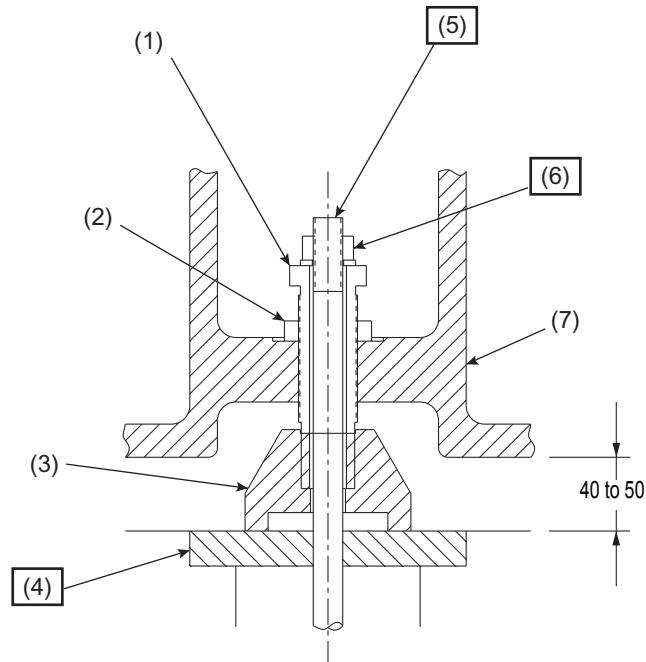
- (2) Ensure that the leveling jack screws and the foundation bolts are firmly tightened before checking the levelness.

Tolerance: 0.02 mm (0.0008 in.) per 1 m (3 ft.)

In-use level accuracy: error within half division (0.01 mm (0.0004 in.) per 1 m (3 ft.))

3-7-2. Precautions for Installation

- Keep the underside of the leveling plates free of any oily substance.
- Ensure that a clearance of about 40 mm (1.57 in.) to 50 mm (1.97 in.) is left between the bottom surface of the machine base and the leveling plate.
- Fill the foundation bolt holes with mortar so as to reach the underside of the respective leveling plates. Be sure to compact the mortar thoroughly.



LE12016R1600500350001

Items whose numbers are boxed (□) in the figure are not supplied with the machine.

Fig. 3-19

1	Leveling jack screw	5	Foundation bolt
2	Lock nut	6	Nut and washer
3	Foundation washer	7	Machine base
4	Leveling plate		

3-7-3. Installation Procedure

Procedure : —

- 1-** Place the leveling plate ($\square 150$ (5.91) \times 19) over the foundation bolt holes worked based on the Foundation Plan.
- 2-** Place foundation washers (furnished together with the machine) on the leveling plates and then place the machine on them.
- 3-** Pass foundation bolts through the hole in the leveling plate and a center bore through the built-in jack screw assembly. Secure each foundation bolt carefully, using a washer and a nut on its upper end.
- 4-** Use wedge pieces, shims, or leveling blocks under the machine base to level the machine approximately.
- 5-** Pour mortar into the foundation bolt holes and allow it to set.
- 6-** After the mixture has become hard enough, remove the shims or leveling blocks from under the machine base, and level the machine within the specified limits.

SECTION 4 PREPARATION FOR OPERATION

4-1. Supplying lubricating oil/hydraulic oil

[Supplement]

Perform lubrication of each part of the machine according to [4-1-1. Lubrication Oil Charts] and [4-1-2. Lubrication Oils for Machine Tools].

(1) Always use the specified lubricating oil.

- If the oil other than specified is used, the lubrication unit might fail to operate normally.
- Lubricating oil used in common with coolant or lubricating oil used in common with hydraulic oil might cause corrosion of lubrication unit or mixing of oils to result in lubrication failure, which, in turn, leads to damages to the slideway surfaces.

(2) For coolant, use the specified coolant.

- Coolant usually contains chemical additives such as activator. If improper coolant is used, lubricating oil will be affected by chemicals and therefore, use the specified coolant in principle.
- If coolant which is not our recommendation is to be used, make sure to check if it will not cause any following problems. Mixing with lubricating oil, possible parting, peel of paint, rusting, and swelling of packings. If a problem is found during the use of the coolant, avoid the use of such coolant.

(3) To prolong lubricant and filter performance (and life), pay attention to the handling and maintenance of lubricants such as when mixing and replenishing them.

When using an emulsion type coolant, for example:

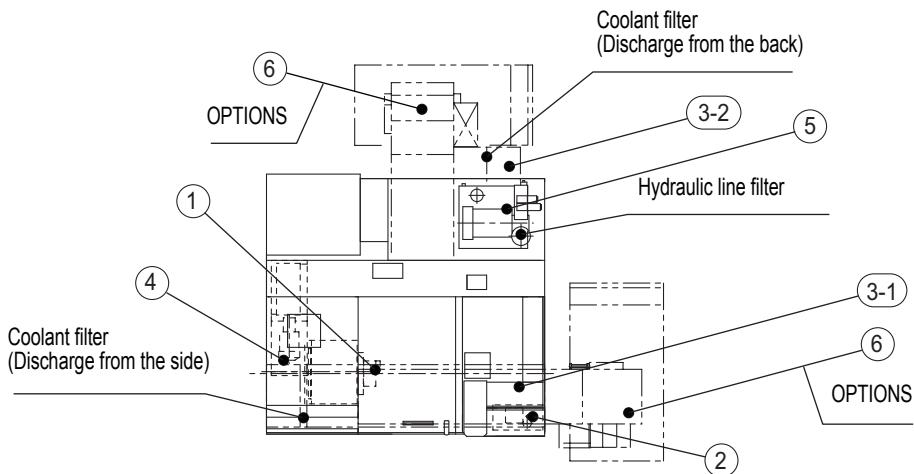
- If you supply water after pouring undiluted coolant into the tank, the coolant tends to gel and causes the filter to clog in a short time.
- If the coolant is not sufficiently stirred after being supplied, it tends to gel and causes the filter to clog in a short time.
- If the PH value is 8.5 or less, the coolant is apt to rot quickly. The rotten coolant deteriorates its lubrication ability and emits odors.

(4) Amount of lubricating oil and its discharge condition must be checked everyday.

- Whether or not lubricating oil is properly supplied can be checked by checking oil level in the tank.
- Lubricants and coolants listed in [4-1-1. Lubrication Oil Charts] are emptied prior to machine shipment and therefore, must be replenished by the customer during initial installation.

4-1-1. Lubrication Oil Charts (MNTKEY0420)

LB2000EXII (300 between centers) (M/L/MY)



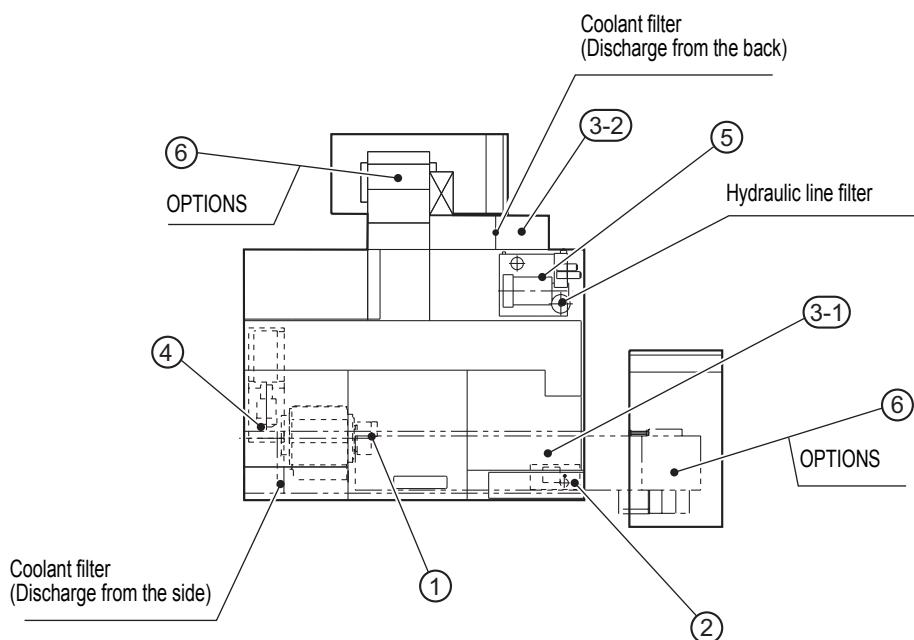
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Fig. 4-1

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3-1	Coolant tank	150 L (39.6 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
3-2	Coolant tank	160 L (42.3 gal)			
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Velocite Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	10 L (2.6 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-1

*1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.
For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION**LB2000EXII (500 between centers) (L/M/MY)**

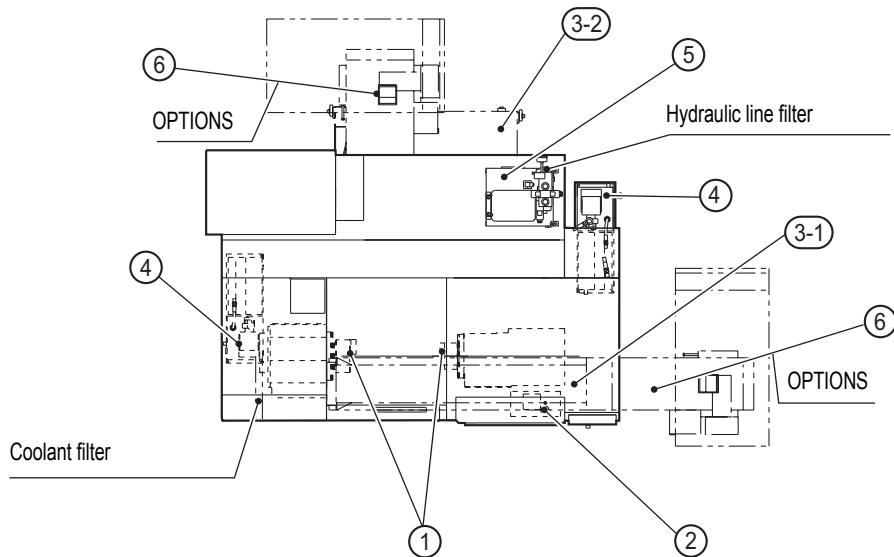
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Fig. 4-2

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3-1	Coolant tank	175 L (46.2 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
3-2	Coolant tank	195 L (51.5 gal)			
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Velocite Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-2

*1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.
For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION**LB2000EXII (W/MW)**

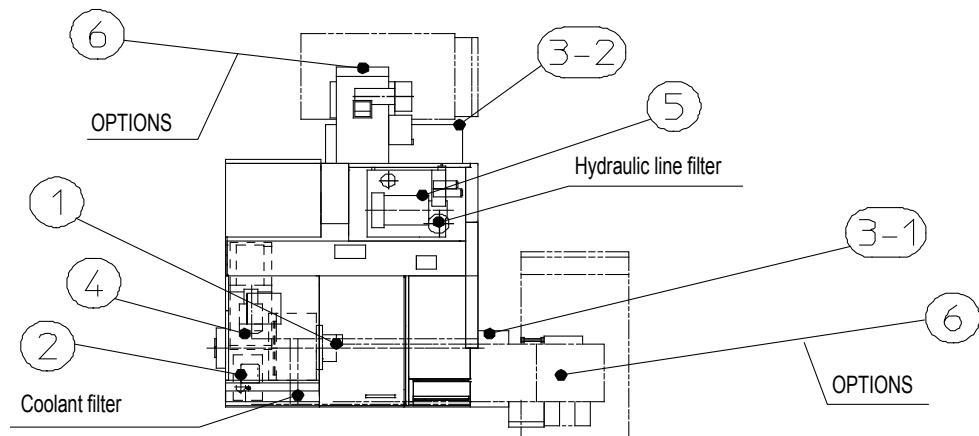
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Fig. 4-3

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3-1	Coolant tank	200 L (52.8 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
3-2	Coolant tank	195 L (51.5 gal)			
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Velocite Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

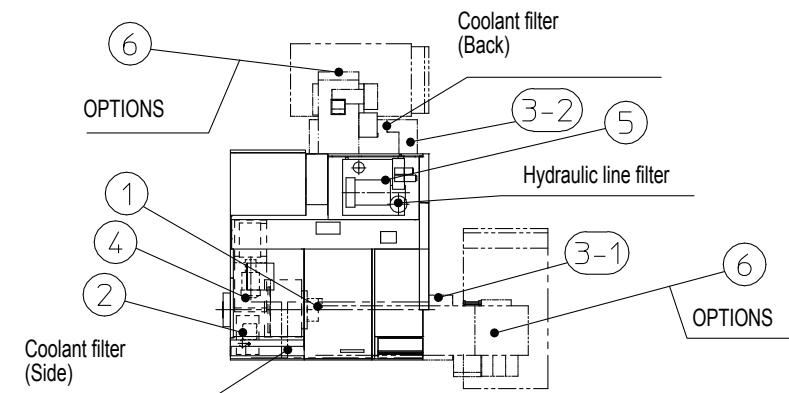
Table 4-3

*1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.
For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION**LB2500EXII (L)**

LE12016R1600600040001

Fig. 4-4

LB2500EXII (M)

LE12016R1600600050001

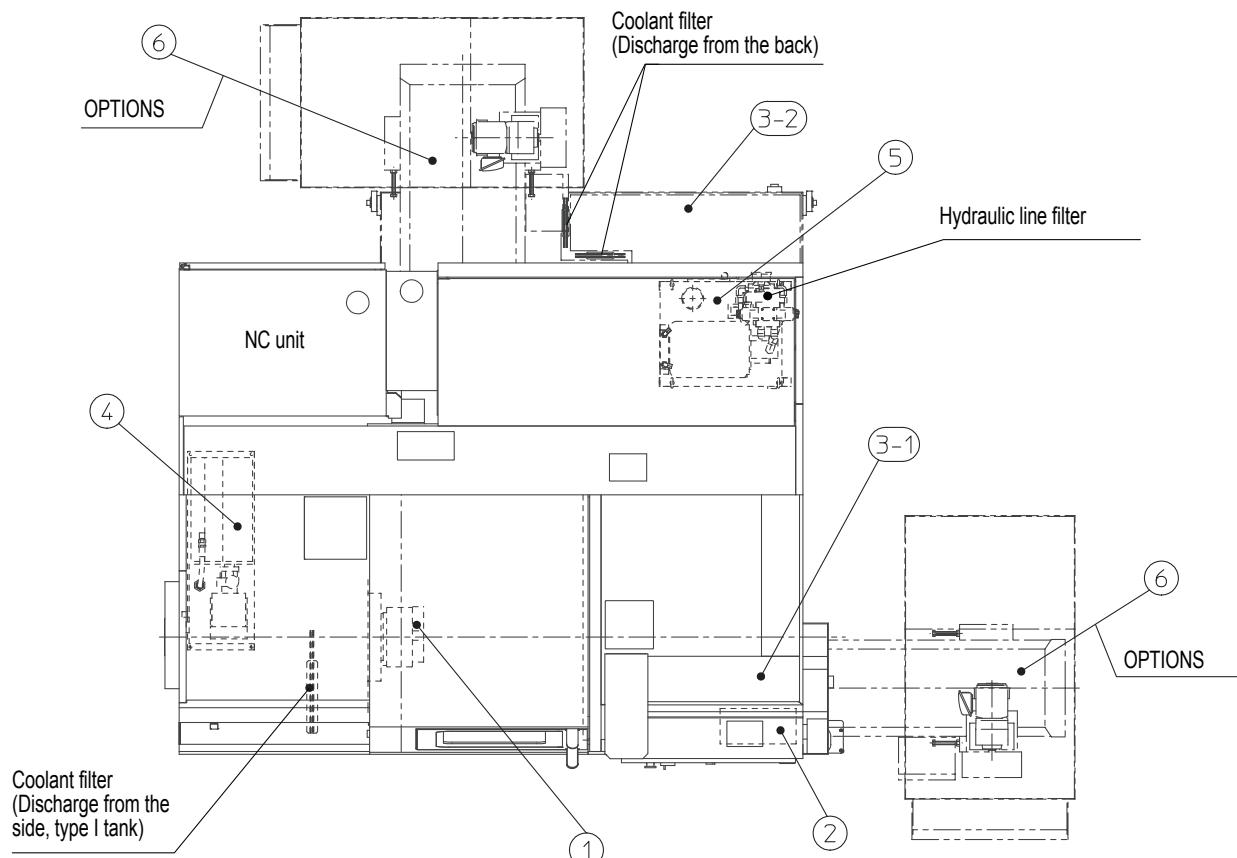
Fig. 4-5

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3-1	Coolant tank	140 L (37 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
3-2	Coolant tank	160 L (42.3 gal)			
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Veloce Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-4

★1: Use 1 part NC11 diluted with 20 to 30 parts water.

For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION**LB3000EXII (500 between centers) (M/MY)**

LE12016R1600600060001

Discharge from the side (type I tank), discharge from the back

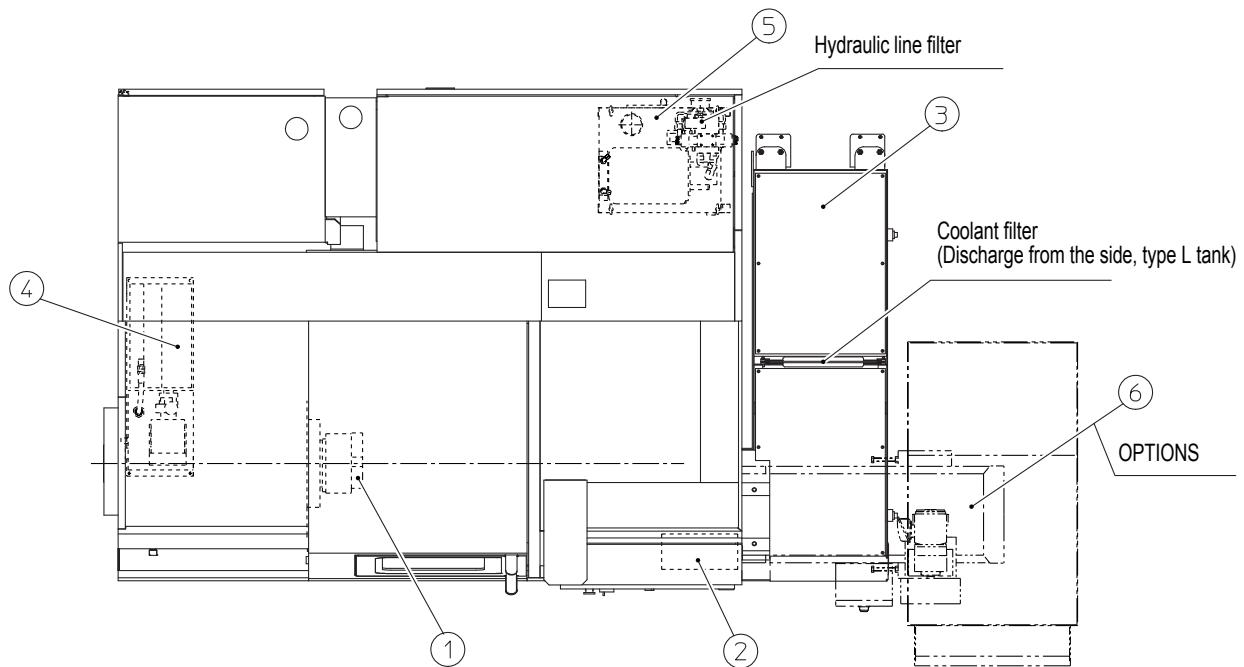
Fig. 4-6

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3-1	Coolant tank, type I tank	175 L (46.2 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
3-2	Coolant tank, discharge from the back	240 L (63.4 gal)			
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Velocite Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-5

*1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.

For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION

LE12016R1600600060002

Discharge from the side (type L tank)

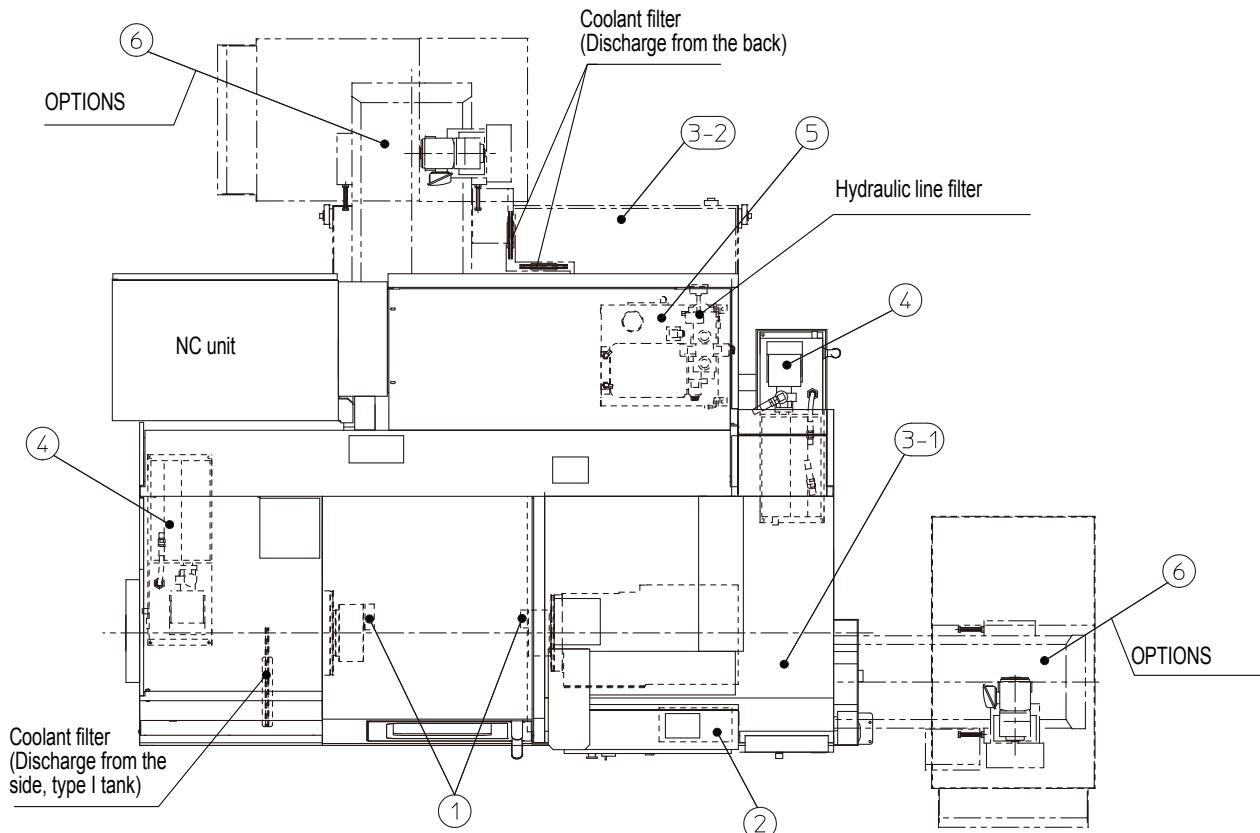
Fig. 4-7

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3	Coolant tank, type L tank	300 L (79.3 gal)	Hi-chip NC 11*1 (Taiyu)	-	Replenish when needed.
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Veloce Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-6

★1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.

For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

LB3000EXII (450 between centers) (MW/MYW/W)

LE12016R1600600070001

Discharge from the side (type I tank), discharge from the back

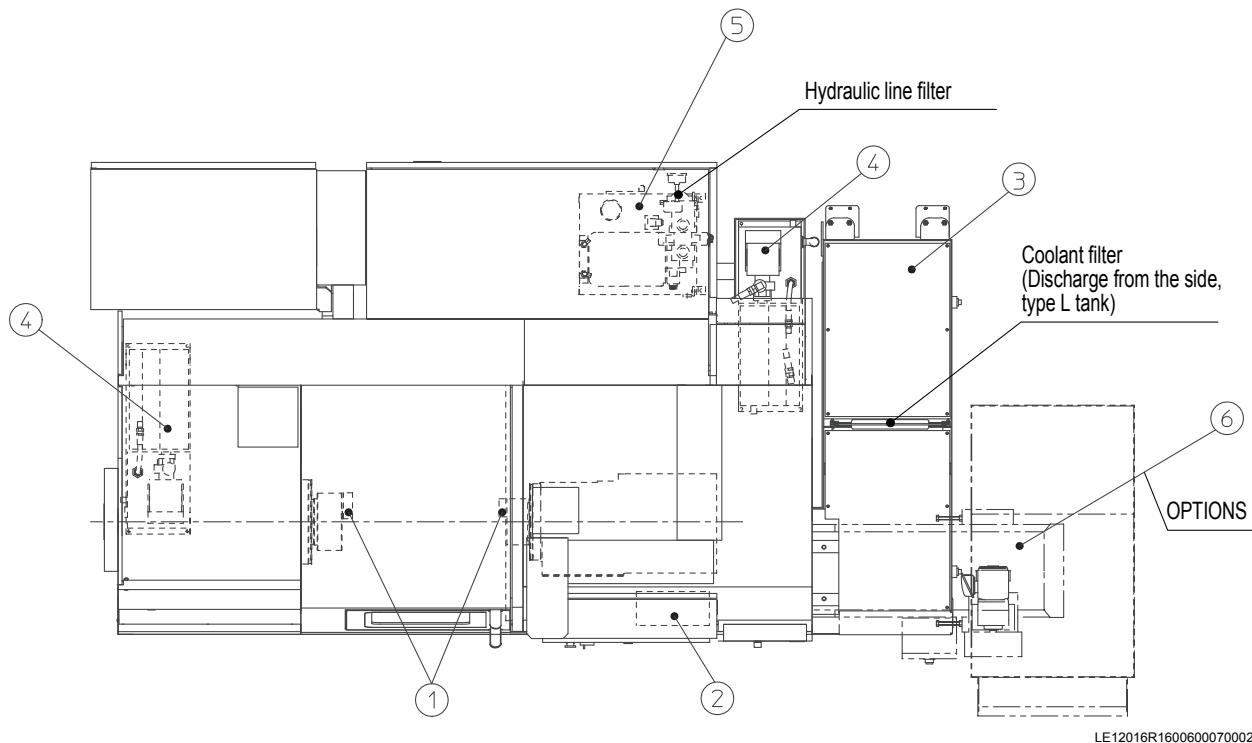
Fig. 4-8

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3-1	Coolant tank, type I tank	205 L (54.2 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
3-2	Coolant tank, discharge from the back	240 L (63.4 gal)			
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Veloce Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-7

★1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.

For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION

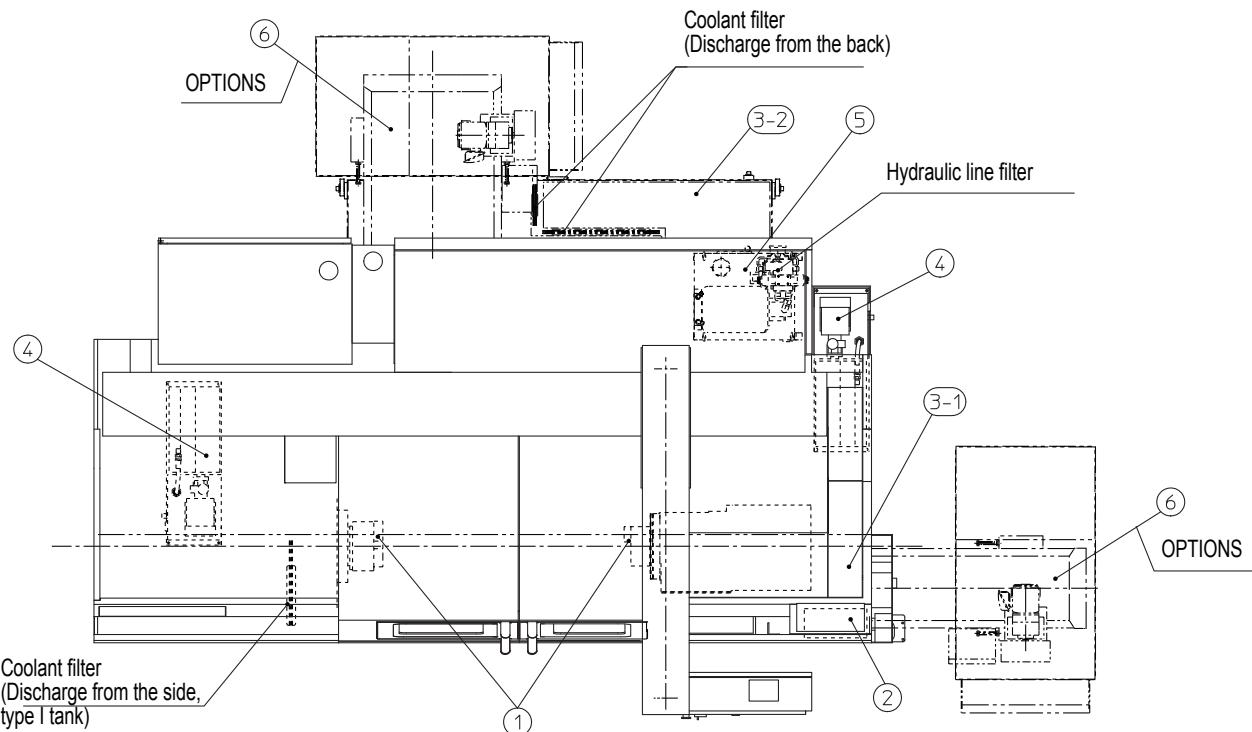
Discharge from the side (type L tank)

Fig. 4-9

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3	Coolant tank, type L tank	330 L (87.2 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Velocite Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-8

*1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.
For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION**LB3000EXII (800 between centers) (MW/MYW/W)**

Discharge from the side (type I tank), discharge from the back

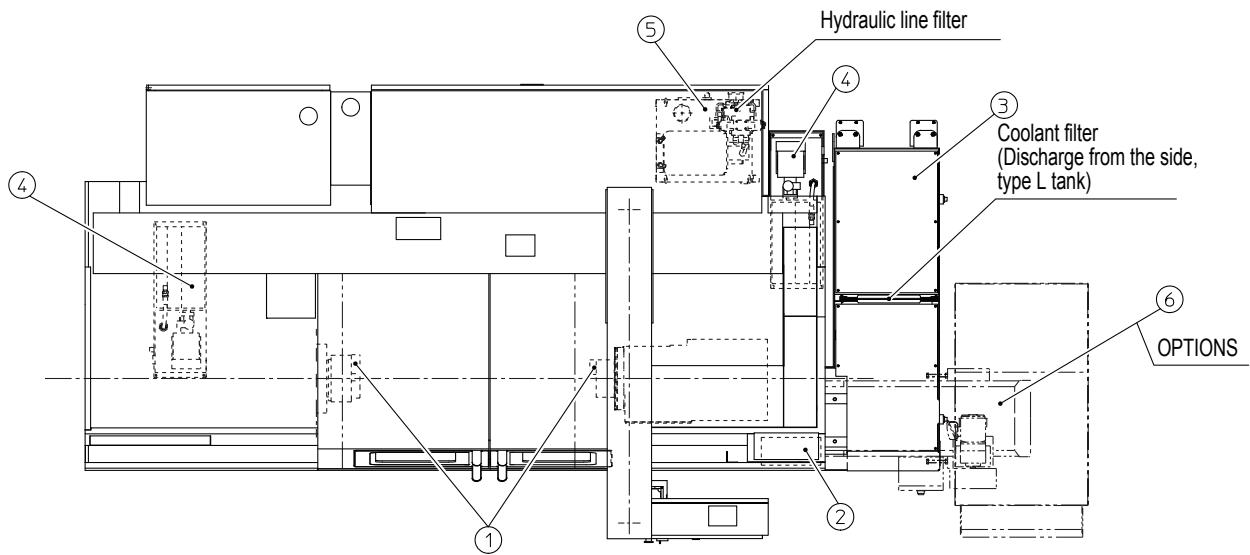
Fig. 4-10

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3-1	Coolant tank, type I tank	265 L (70 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
3-2	Coolant tank, discharge from the back	300 L (79.3 gal)			
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Veloce Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-9

★1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.

For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION

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Discharge from the side (type L tank)

Fig. 4-11

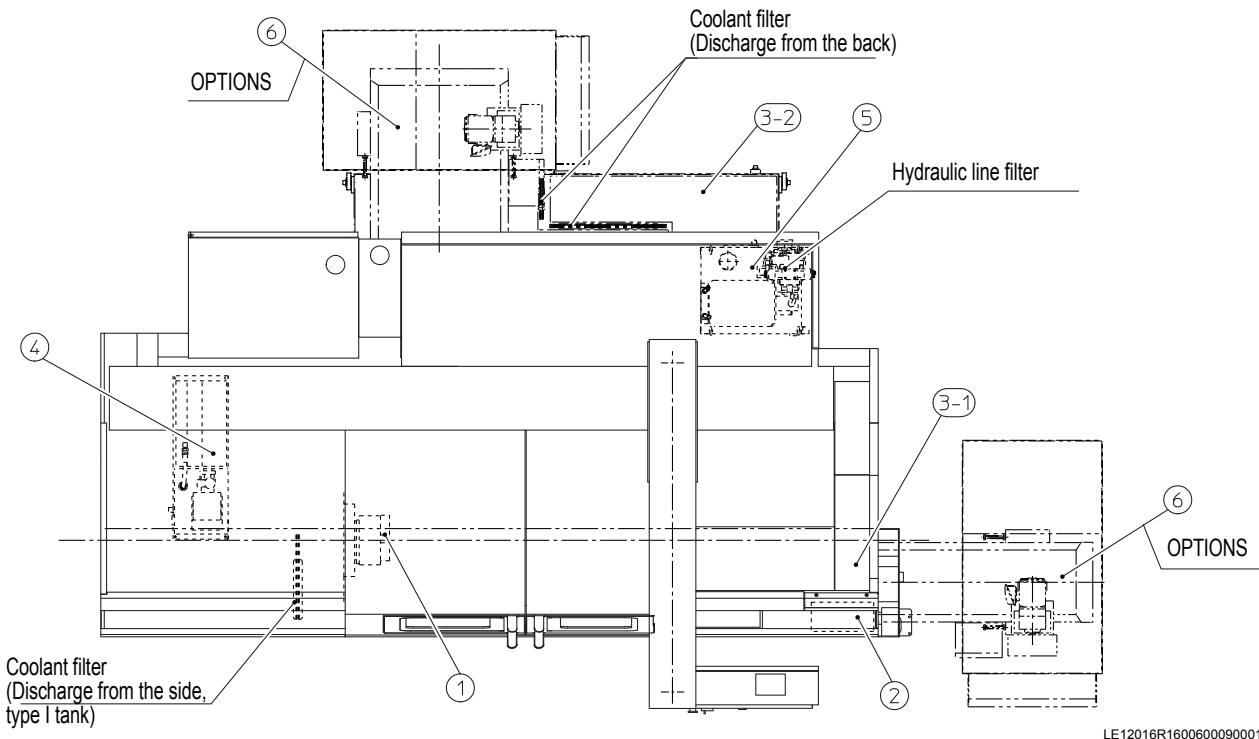
No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3	Coolant tank, type L tank	370 L (97.8 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Velocite Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-10

*1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.

For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION

LB3000EXII (1,000 between centers) (L/M/MY)

Discharge from the side (type I tank), discharge from the back

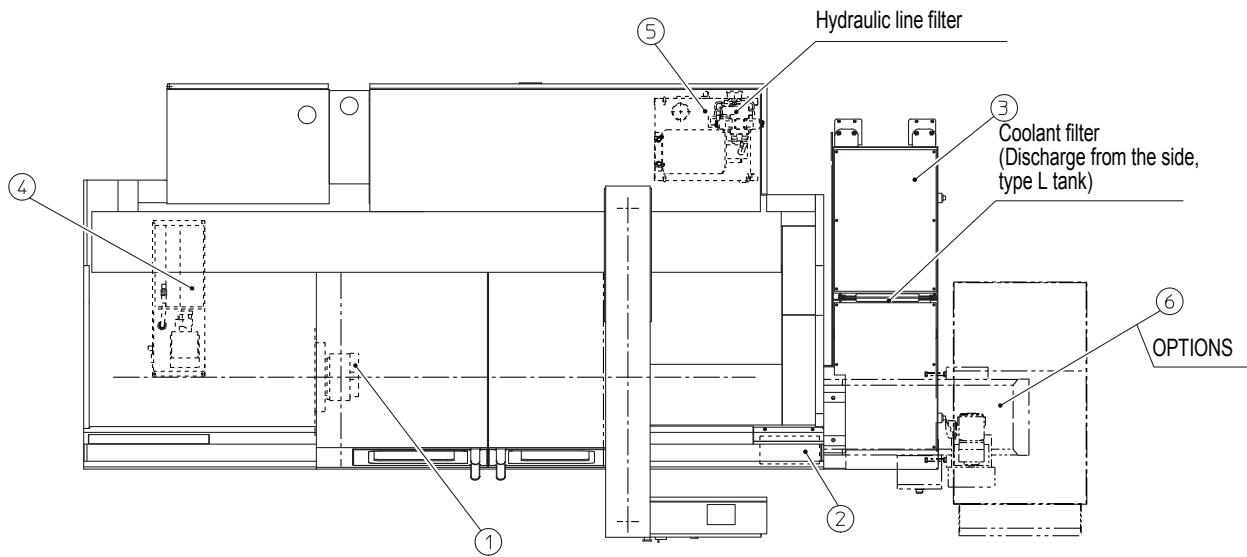
Fig. 4-12

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3-1	Coolant tank, type I tank	265 L (70.0 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
3-2	Coolant tank, discharge from the back	300 L (79.3 gal)			
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Veloce Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-11

*1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.

For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION

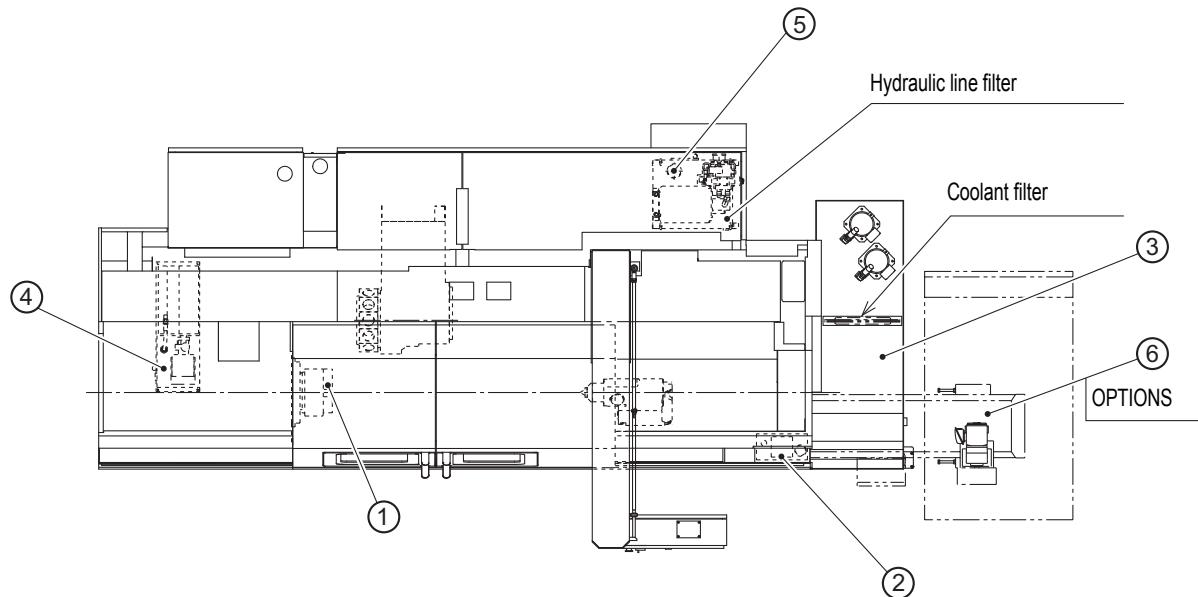
Discharge from the side (type L tank)

Fig. 4-13

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3	Coolant tank, type L tank	370 L (97.8 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Veloce Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-12

*1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.
For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION**LB3000EXII (1,300 between centers) (L/M/MY)**

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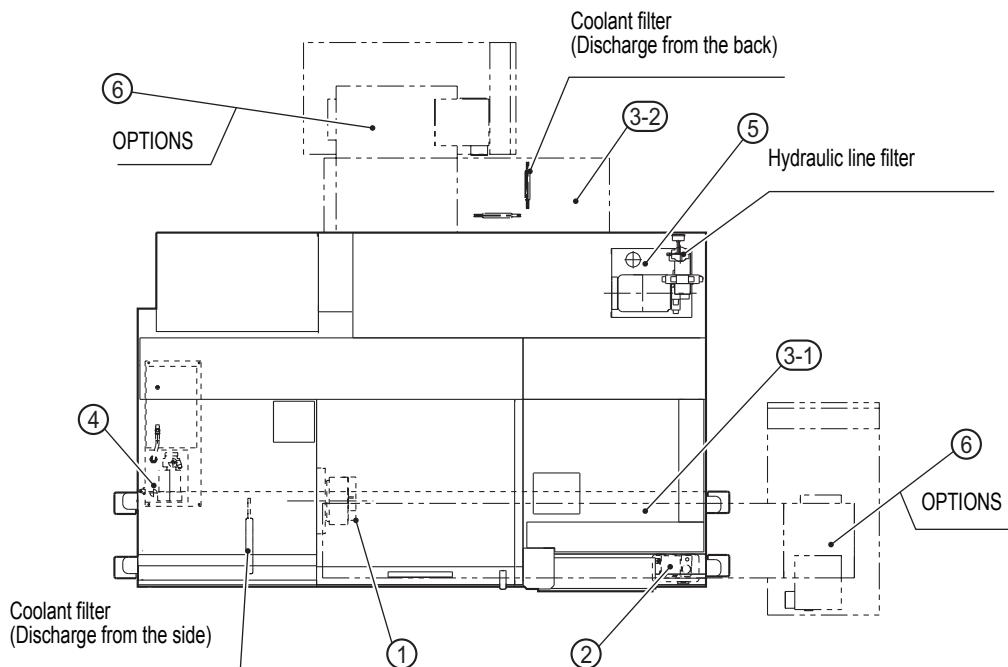
Fig. 4-14

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3	Coolant tank	435 L (114.9 gal)	Hi-chip NC 11*1 (Taiyu)	-	Replenish when needed.
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Velocite Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-13

*1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.

For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION**LB4000EXII (750 between centers) (L/M/MY)**

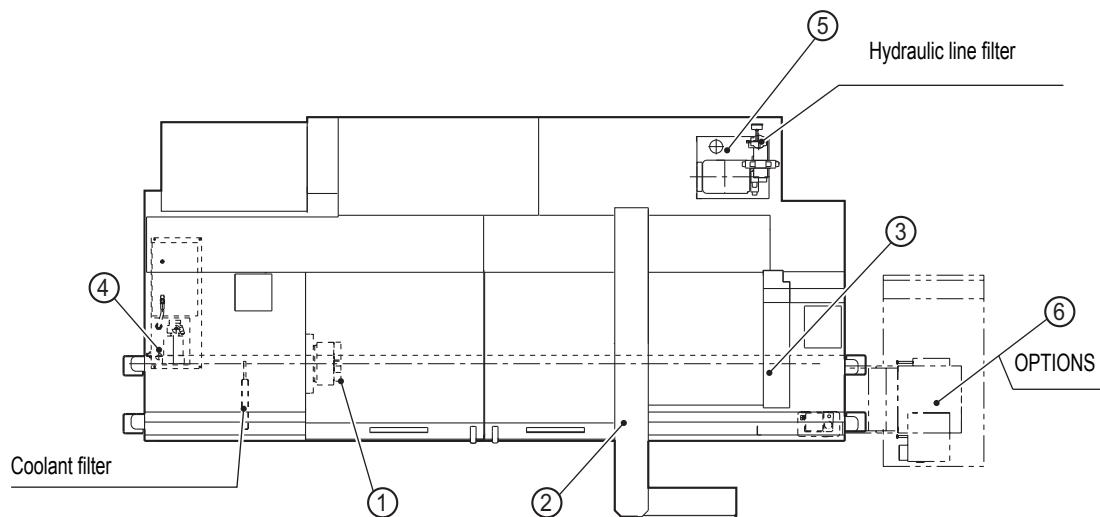
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Fig. 4-15

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3-1	Coolant tank	200 L (52.8 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
3-2	Coolant tank	240 L (63.4 gal)			
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Velocite Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-14

*1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.
For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION**LB4000EXII (1,500 between centers) (L/M/MY)**

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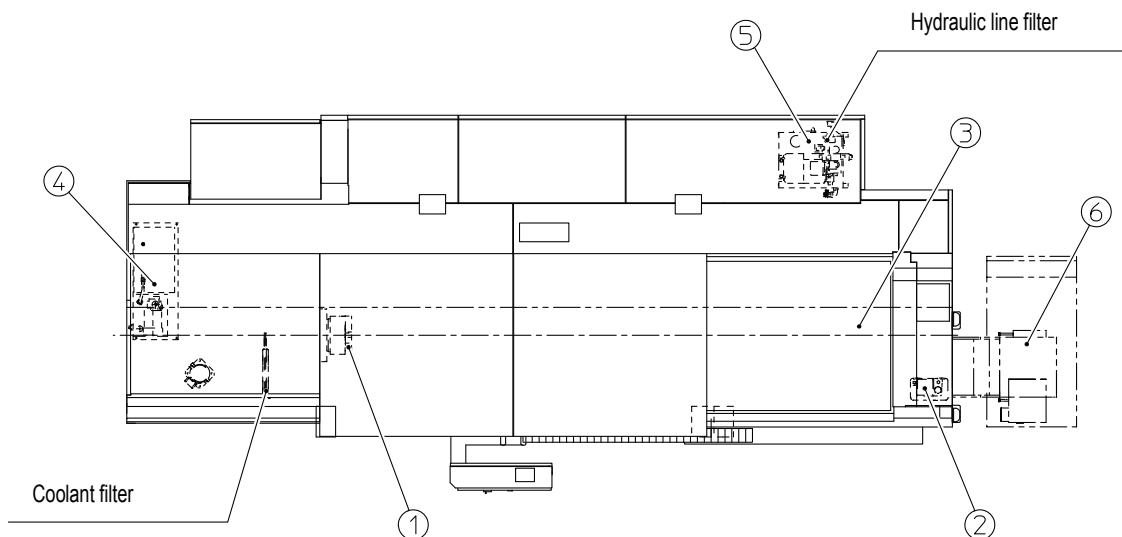
Fig. 4-16

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3	Coolant tank	290 L (76.6 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Velocite Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-15

★1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.

For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

SECTION 4 PREPARATION FOR OPERATION**LB4000EXII (2,000 between centers) (L/M/MY)**

LE12016R1600600120001

Fig. 4-17

No.	Where to supply oil	Tank Capacity	Recommended Oil	(ISO)	Lubrication Intervals
1	Chuck jaws	Adequate amount.	Refer to the Instruction Manual for the Chuck.	-	Every day when cleaning.
2	Slideway lube tank	4 L (1.1 gal)	Shell Tonna Oil S68 (Shell)	G68	Replenish when needed.
3	Coolant tank	540 L (142.7 gal)	Hi-chip NC 11* ¹ (Taiyu)	-	Replenish when needed.
4	Headstock cooling Unit	14 L (3.7 gal)	Mobil Velocite Oil No.3 (ExxonMobil)	FC2	Replace in 1 month after initial installation, and every 6 months after that.
5	Hydraulic unit	20 L (5.3 gal)	Mobil DTE Excel 32 (ExxonMobil)	HM32	Replace in 1 month after initial installation, and every 6 months after that.
6	Chip conveyor (Special accessory)	Adequate amount.	Mobilux EP2 (ExxonMobil)	XBCEA2	Replenish every 3 to 6 months.

Table 4-16

*1: Use 1 part NC11 diluted with 20 to 30 parts water or distilled water.
For equivalent products from other makers, refer to [4-1-2. Lubrication Oils for Machine Tools].

4-1-2. Lubrication Oils for Machine Tools

Lubricant type	Code	Manufacturer		
		Shell	BP Japan	ExxonMobil
Headstock gearbox	CKB32	Shell Tellus S2M32	Castrol HySpin AWS32	Mobil DTE Oil Light
Spindle lubrication system	FC10	Shell Tetra Oil 10SP	Castrol HySpin AWS10	Mobil Velocite Oil No.6
Slideway focused lubrication unit [Rotary tool (M) turret ball screw]	G68	Shell Tonna S3M68	Castrol Magna BD68	Mobil Vactra Oil No.2
	G220	Shell Tonna S3M220	-	Mobil Vactra Oil No.4
Hydraulic unit	HM32	Shell Tellus S2M32	Castrol HySpin AWS32	Mobil DTE Excel 32
Rotary tool holders	(Grease)	-	-	Mobilux EP2
Headstock cooling unit	FC2	Shell Tetra Oil 2SP	-	Mobil Velocite Oil No.3*
Turret, ball screw	XBCEA2	Alvania EP Grease 2	Optimol Longtime PD2	Mobilux EP2
ATC cam box		Shell Omala S2G150		Unirex N2
Oil mist oil air lubrication of spindle bearings	CKC150	Optigear BM150	Mobilgear 600 XP150	
Chuck master jaw on chuck	(Grease)	KITAGAWA model hydraulic chuck: Molykote EP grease (made by Dow Corning Corporation) or Kitagawa chuck grease (For special chucks, see the attached instruction manual.)		

Table 4-17

* ISO viscosity grade: 2 mm² (0.003 in.²)/S (40 °C (104 °F)) or equivalent

Note

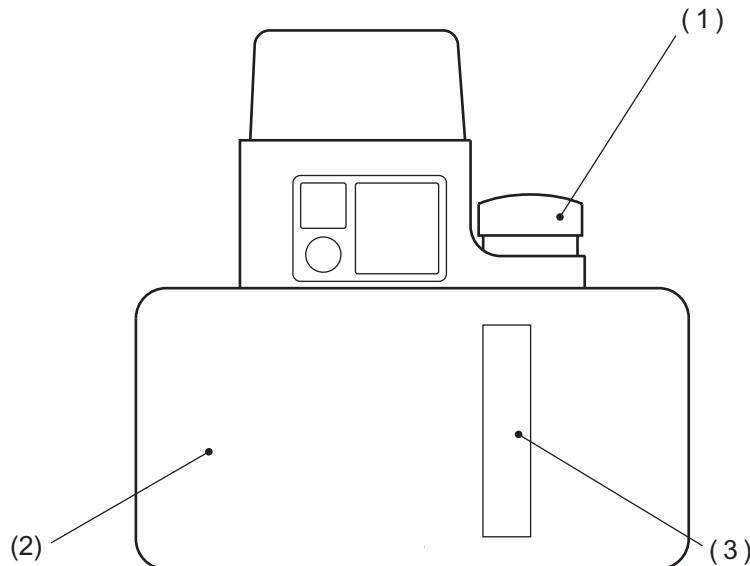
- The above table is based on the JIS B6016-1 (ISO/TR 3498) standard. Since OKUMA does not have experience using oils other than those listed below, selection should thus be made from them. Because slideway lubricating oil contains additives such as extreme-pressure additive, it could incur variety of troubles if reacting with other oils or coolant. Therefore, pay special attention to the use of slideway lubricating oil.
 - Headstock gearbox = Mobil DTE Oil Light (ExxonMobil)
 - Spindle lubrication system = Mobil Velocite Oil No.6 (ExxonMobil)
 - Slideway focused lubrication unit G68 = Shell Tonna S3M68 (Shell)
 - Slideway focused lubrication unit G220 = Shell Tonna S3M220 (Shell)
 - Hydraulic unit = Mobil DTE Excel 32 (ExxonMobil)
 - Rotary tool holders = Multemp PS No.2 (Kyodo Yushi)
 - Headstock cooling unit = Mobil Velocite Oil No.3 (ExxonMobil)
 - Turret, ball screw = Mobilux EP2, Unirex N2 (ExxonMobil)
 - Oil mist oil air lubrication of spindle bearings = Mobil DTE Oil Light (ExxonMobil)
- As for service point or amount of lubricating oil of the machine, refer to the instruction manual of respective machine models.
- Lubricating oil used in common with coolant or lubricating oil used in common with hydraulic oil might cause corrosion of lubrication unit or turbidness of oils to result in lubrication failure, which, in turn, leads to damages on the slideway surface or ball screw. (OKUMA takes no responsibility for the problems caused by using lubricating oil that we did not recommend.)
- As for oil replenishment for the optional accessories such as special chucks or chip conveyor, refer to the special instruction manual supplied with individual accessories.
- If the slideway lubricant gets into the coolant and causes undesirable effects, we have oil skimmer (optional) that may resolve the issue. Please contact OKUMA for details.

4-2. Lubrication and Inspection Method

4-2-1. Lubricating the spindle

Bearings are lubricated by enclosing grease. So, no further greasing is required.

4-2-2. Lubricating the bed saddle cross-slide slideway (MNTKEY0440)



LE12016R1600600150001

Fig. 4-18

1	Oil filler port	3	Oil level gauge
2	Lubricating oil tank		

Specified Oil (ISO)	G68
Tank Capacity	4 L (1.1 gal)
Replenish	Replenish as required. Low lubrication level alarm detected by the level switch occurs in the operating time shown in the following table. Check oil level every day and replenish lubricating oil before the alarm occurs.

Table 4-18

Operating time when alarm is detected by the level switch

		LB2000EXII	LB2500EXII	LB3000EXII	LB4000EXII
Model type	L	150	110	150	110
	M	150	140	125	110
	W	150	-	150	-
	MW	115	-	115	-
	MY	90	-	125	110
	MYW	-	-	90	-

Table 4-19

SECTION 4 PREPARATION FOR OPERATION**CAUTION**

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.

Check oil level before starting day's operation.

With the power ON, the lubricating oil is discharged by the amount of three times. The number of discharging times is set at the parameter. Consult OKUMA when changing this number.

The centralized lubricating oil tank is accessible by opening the oil filter port cover. This lubricating oil is fed to the bed slideway, the cross-slide slideway, X-axis and Z-axis ball screws, the turret, and the tailstock sleeve sub-spindle guide.

4-2-3. Lubricating the hydraulic chuck

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.

Lubricate the chucks daily using the grease specified by the chuck manufacturer. Depending on the chuck model No., the grease nipple will either attach to the end face of the chuck or to the outer circumference.

Since chips and foreign particle accumulate on the jaw moving surfaces on the chuck, clean them every day and lubricate them by applying drops of hydraulic oil [HM32 (ISO)].

4-3. Coolant

4-3-1. Coolant Precautions

There are various types of plastics, lacquer, resin based materials, and adhesives used on this machine. Each of these materials is selected carefully in consideration of being used with the coolant.

WARNING	Indicates a potentially hazardous situation which, if not avoided, <u>could result in death or serious injury</u> .
	<ul style="list-style-type: none">Do not inhale coolant mist. It may be harmful to your health. Never use coolant which has a 15 % or higher oil content.Mixing air and oil mist may result in formation of an explosive compound. Therefore, do not blow pressurized air or oxygen on the machine or on compounds. Also, keep fire away from the machine.The plant floor may be slippery from the coolant. Please use caution. 

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property</u> .
	<p>Do not use highly corrosive chemicals or additives. It may damage the machine and may cause malfunction.</p> <ul style="list-style-type: none">Before operating the machine, communicate with the coolant supplier to obtain recommendations on conformity and mixture ratio.Also take into consideration local conditions such as hardness of the water used for the coolant.OKUMA does not conduct tests on coolants.OKUMA assumes no responsibility for any loss or damage that may occur during machining operation that may result from following any recommendations made by coolant suppliers.When using synthetic coolants, make sure ample precautions are taken to prevent corrosion. Also check that compatibility between any coating material and plastic material and this machine is fully guaranteed.Strictly adhere to mixing ratio instructions from the coolant manufacturer.

4-3-2. Recommended Coolant

The table below shows the recommended coolants:

Products	Maker	Type	USE
NC 11	Taiyu	Soluble	Casting, iron, (aluminum)

Table 4-20

There are two types of water-soluble coolant:

Emulsion type (W1 type) is emulsified to a white liquid like milk when diluted with water. Soluble type (W2 type) becomes semitransparent or transparent when diluted with water. This coolant has an excellent effect on penetration and cooling and frequently used for grinding.

Soluble type (W2 type) includes detergent as a main ingredient and features excellent penetrating, cooling and washing effects and suitable for light cutting and grinding. In addition, resistance against rotting is stronger than the emulsion type (W1 type). But due to its excellent washing ability, it may dissolve the lubricating oil mixed with the coolant and damage the coating.

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property</u> .
Use only the water-soluble coolant recommended by OKUMA. Note that the water-soluble coolant of soluble type (W2 type) other than listed above may damage the coating. Also avoid using the chemical solution coolant because it damages not only the coating but also the slideways where chemical reaction with the lubricating oil tends to occur, and the rubber parts such as sealing material.	

Coolants listed in the above table are items that have undergone evaluation tests at OKUMA. If the above coolants are not available, those listed below also have shown good results.

Applicable materials to be cut	Machining Condition	Manufactured by: Quaker	Manufactured by: Shell
Cast Iron	Light to Heavy Duty	QUAKERCOOL 3760	Adrana D 208
Steel Alloys	Light to Moderate	QUAKERCOOL 3760 QUAKERCOOL 7102	Sitala D 3405
Steel Alloys	Heavy Duty	QUAKERAL 372	Adrana D 601.01
Stainless Steel	Heavy Duty	QUAKERCOOL 7105	Adrana D 601.01
Aluminum	Light to Moderate	QUAKERCOOL 7102	Sitala D 3405
Aluminum	Heavy Duty	QUAKERAL 372	Sitala D 3405
Copper/Brass	Light to Heavy Duty	QUAKERCOOL 7102	Adrana D 408
Nickel Alloys	Light to Heavy Duty	QUAKERAL 372	Adrana D 601.01
Titanium	Light to Heavy Duty	QUAKERAL 372	Adrana D 601.01

Table 4-21

Depending on their type and the method by which their concentration is managed, coolants can cause rust in the machine, drop in slideway lubricating performance, or damage to surface coating and rubber or resin parts used in various locations. Please refer to the coolant vendors 'Users' Manual.

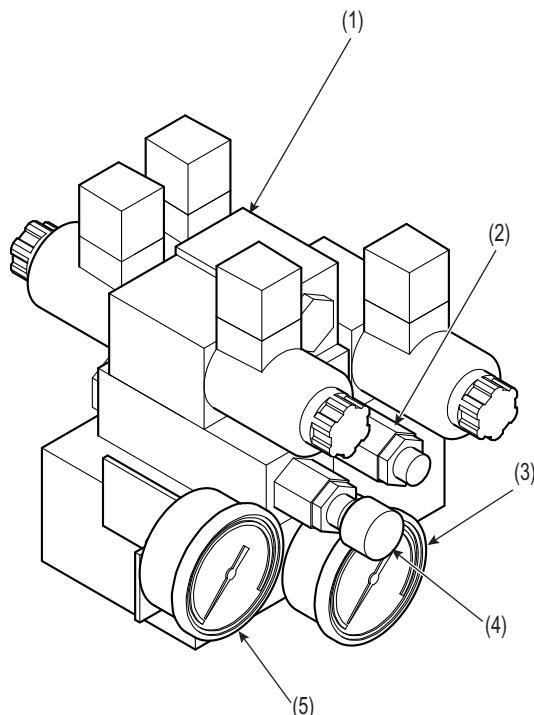
4-4. C-axis Brake

[Supplement]

For the C-axis, three kinds of brakes are applied meeting the machine operation.

- C-axis indexing (rapid feed)
Brake free
- Cutting while controlling C-axis (profile generation, etc.)
Brake pressure Low pressure (Pressure setting is different by model.)
- Cutting while clamping C-axis (keyway cutting, etc.)
Brake pressure 4.5 MPa (653 psi) (source pressure)

Arrangement of C-axis control related hydraulics



LE12016R1600600210001

Fig. 4-19

1	Brake pressure switching solenoid valve	4	(Chuck pressure adjustment valve)
2	Low pressure brake pressure adjustment valve	5	(Chuck pressure gauge)
3	Brake pressure gauge		

* Brake pressure Low pressure list

LB2000EXII	LB2500EXII	LB3000EXII	LB4000EXII
1 MPa (145 psi)	0.4 MPa (58 psi)	0.4 MPa (58 psi)	0.4 MPa (58 psi)

Table 4-22

* Do not adjust the pressure, since the pressure setting affects the C-axis rotation accuracy.

SECTION 5 OPERATION

This manual mainly explains the manual operation so that the operator can get used to the machine operation as soon as possible.

5-1. Operation Panels

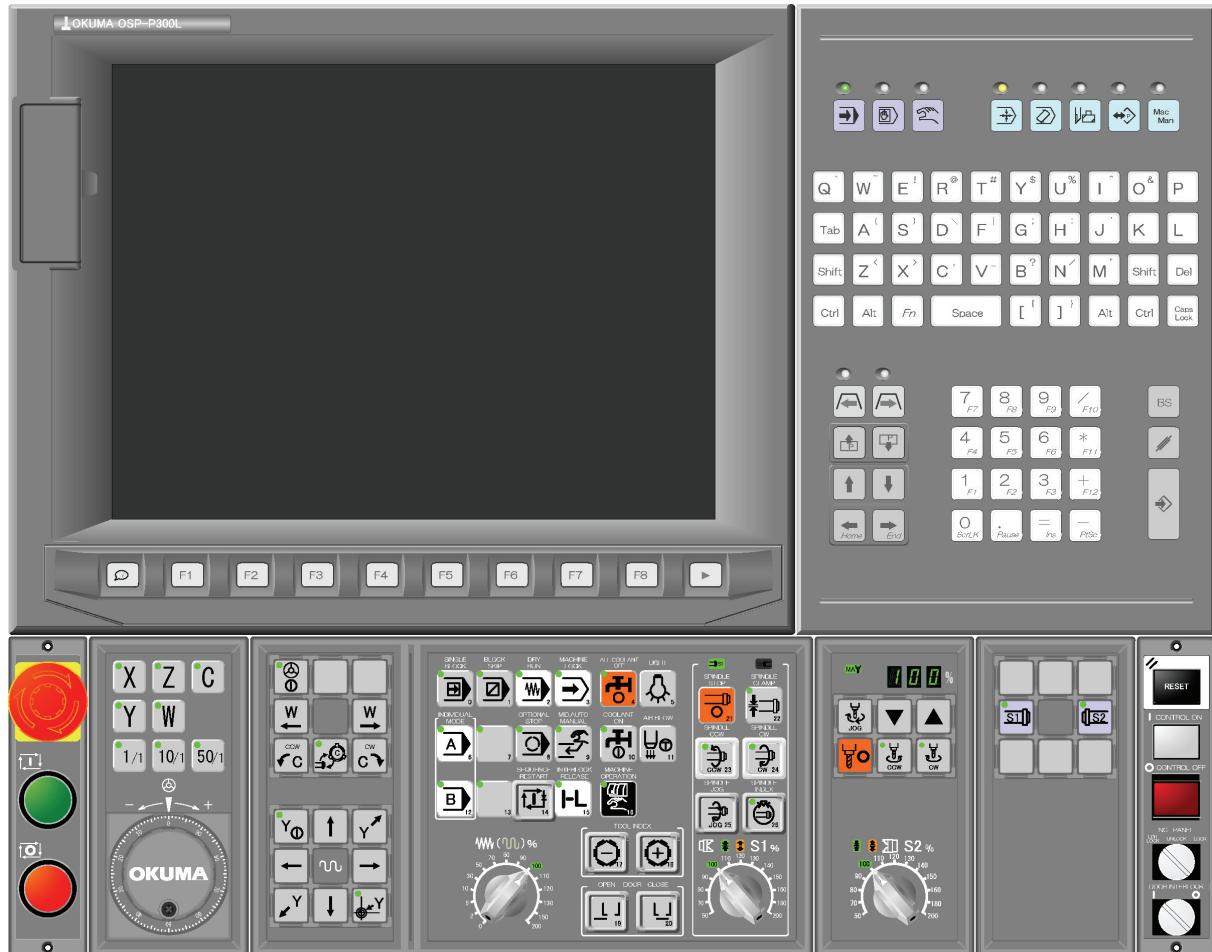
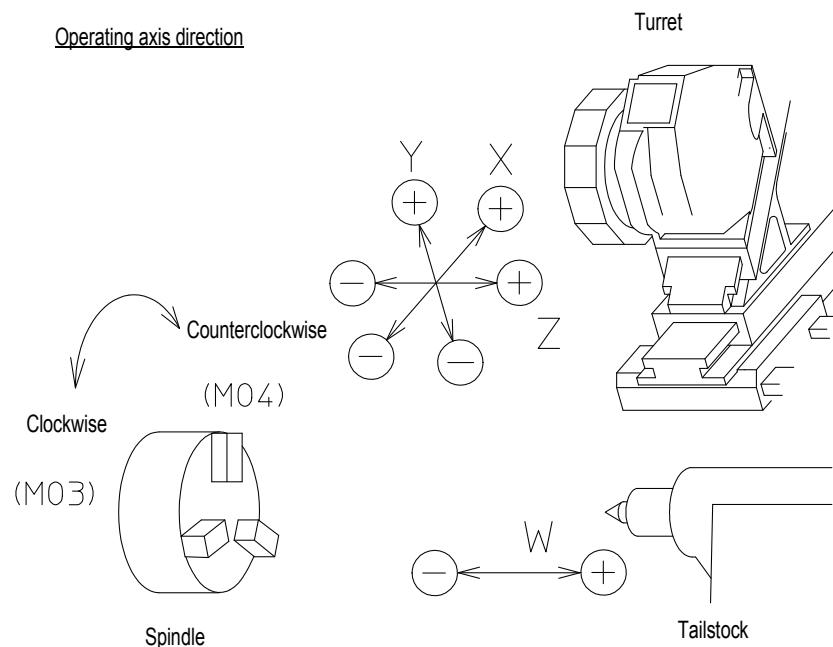


Fig. 5-1

LE12016R1600700020001

5-2. Axis Direction

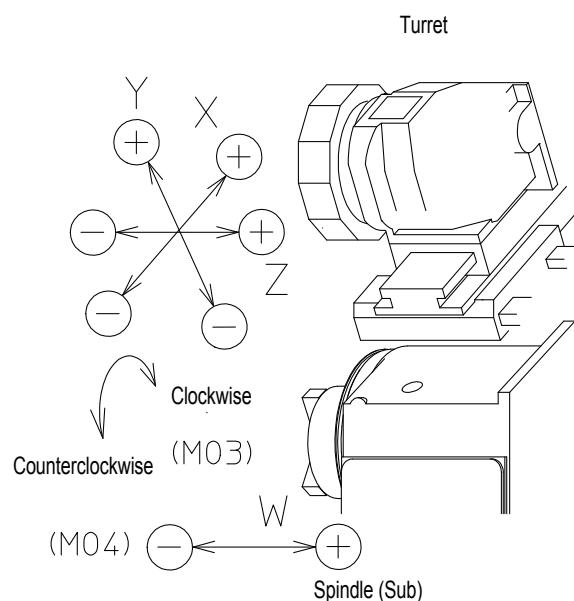
5-2-1. Spindle nomenclature (Tailstock/Sub-spindle specification)



LE12016R1600700030001

Fig. 5-2

*Y-axis is available only for MY machine.



LE12016R1600700030002

Fig. 5-3

*Y-axis is available only for MYW machine.

5-3. Before Starting Operation

5-3-1. General Checks

- Check the lubricating oil level every day before starting operation.
- Always use the OKUMA recommended and specified brands of lubricating oil.
- For coolant, use the OKUMA specified coolant.
- It is recommended to use a water-soluble coolant to prevent fire. Do not attempt unmanned operation when non-water-soluble (oil) coolant is used.
- Change and replenish the lubricating oil and coolant in each reservoir regularly according to the manual.
- Clean the filters regularly according to the manual.
- Make sure that each pressure gauge on the air and hydraulic lines displays correct value as described in this manual.
- Always turn off the power before beginning any work inside the front shield. In addition, turn off the power before beginning work at the back of the machine that requires an operator to enter the machine operating zone.
- When the front door is locked with the power turned off, the safety door switch mechanically locks the door. The door can be opened as described in [SECTION 2, 2-4-3. Door lock releasing in emergency].

5-3-2. Before Turning on the Power

- Make sure that the doors to the operation panel and the control box are closed.
- Make sure that there are no obstacles around the machine.
- Turn on the main switch before turning on the control on the operation panel.
- Make sure that no person is inside the machinery.
- Make sure that hydraulic and pneumatic piping are connected correctly.

5-3-3. Precautions during Manual Operation and Continuous Operation

- Always follow the instructions in the operation manual.
- Always make sure that all of the protective covers including the front door, front cover and the chuck cover are in place before operating the machine.
- Always close the front door before starting operation.
- When processing the first product, check operations and interference between parts thoroughly by performing idling -> cutting of a single block -> continuous operation in order.
- Make sure safety before spindle rotation, workpiece clamping and axis movement.
- Never touch chips or the workpiece while the spindle is rotating.
- Never attempt to stop a moving object by hand or with a tool.
- Check the jaw installation conditions, the hydraulic pressure, and the maximum allowable spindle speed for the power chuck.
- For the maximum allowable rotation speed, specify the speed lower than the lowest one among the chuck, fixture, and drive cylinder.
- Check the installation and arrangement of the tools.
- Check the tool offset settings.
- Check the zero offset settings.
- Make sure that SPINDLE OVERRIDE and FEED RATE settings on the NC operation panel are at 100 %.
- Before supplying the turret, check the software limit setting positions for both the X- and Z-axes.
- Check the turret index/rotation position.
- Check the tailstock body position.
- Make sure the cutting operation is within the allowable transmission power and torque ranges.
- Make sure that the workpiece is securely fitted in the chuck or fixture. Check the cutting fluid nozzle positions.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



Bring the machine to a complete stop by turning off the main switch before operations such as setup or adjustments inside the chip guard are carried out. Also turn off the main switch before you attempt to work inside the machine at the rear side of the machine.



5-3-4. Spindle Precautions

- (1) When removing chips adhering to the spindle or around the spindle, do not blow air or coolant at the spindle. The scattered chips or dust may enter the spindle and damage the bearings. When cleaning the spindle unit, use a broom or waste cloth.
- (2) While the dust is floating in the machining room, avoid turning the main power off or forcing the emergency stop except for an emergency case. If the power is turned off, the air supply to the spindle inside is cut off.
The dust may get in the spindle and cause damage to the bearings.

5-3-5. Tool Precautions

If an unbalanced tool is rotated at a speed higher than $3,000 \text{ min}^{-1}$, abnormal vibration will occur in the spindle drive system and the bearings will be damaged.

Use of unbalanced tool is also dangerous to the machine operator. Never use unbalanced tools. Especially when using a big-bore tool or boring bar, ensure that the tool is well-balanced.



WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

During high-speed cutting, chips or broken tool might fly off the machine. Strictly observe the safety precautions such as "Do not stand in front of rotating parts".

5-3-6. Things to remember during set-up and configuration

- Make sure that setup is complete.
- If the setup is changed, operate the machine step-by-step to make sure that cutting can be performed without any problems.
- Before changing the chuck and/or chuck jaws, make sure that the chuck fits the intended job.
- If two or more workers must work together, establish signals so that they can communicate.
- Use the crane or equivalent tool to handle heavy objects.
- When attempting an unfamiliar setup, double-check the setup before operation.
- Remove unnecessary toolholders from the turret.
- Ensure that the bolts for fixing the tool holders to the turret are securely tightened.
- Remove the bolts which are not used for fixing the tool holders.

5-3-7. Workpiece Loading and Unloading

- Ensure that the workpiece is in contact with the seating surface.
- Ensure that the workpiece is loaded straight.
- After loading the workpiece, check that it doesn't wobble.
- Do not put your fingers in the chuck.
- Before loading the workpiece in the chuck, clean the gripping surfaces of the chuck jaws.
- Before loading or unloading a workpiece, retract the turret so that the cutting tools in the turret cannot injure the operator.
- Before loading and unloading a workpiece, make sure that the spindle has come to a complete stop.
- Before running a new program, rotate the spindle to make sure that the workpiece is securely clamped in the chuck.
- Before machining an irregularly-shaped workpiece, make sure that it is balanced properly.
- When handling heavy workpieces, use a crane, hoist, or other similar tool.
- Before loading a workpiece, make sure that the workpiece has a portion that can be used for proper chucking.

5-3-8. Dry and minimum quantity machining (MQL)



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



Dry machining can cause fire.

Safety precaution measures have to be taken to avoid fire.

Hazards due to gases and vapors

Oil mists are harmful to health and may contain cancer-causing substances. Do not inhale oil mist!

Operate machines with suction systems only when the suction is working.

Harmful gases and vapors may escape when protective devices are opened. Ensure adequate ventilation or exhaust.

- Dry machining is a fire hazard because workpiece, tool, or chips are not cooled. Therefore, never place any flammable objects near the machine and dispose of chips and do not allow them to stack up.
- In machines for dry machining, the tools are cooled with oiled air. These machines are designed for machining with the currently standard cutting speeds. By no means may sparks or burning chips be formed during machining.
- The air volume exchange is designed for normal operating conditions.
- Ensure that no explosive air mixtures are produced from the machining operation.

- Machines designed for dry machining must never be used for machining magnesium materials.
- Thoroughly clean the machine and the filter system each time before you change the material to be machined.
- Machines that are designed only for dry machining must never be used for machining with cooling lubricants.

5-3-9. When a Problem Occurs

The following procedure should be performed:

- Check the NC program.
- Check the alarm message which is displayed on top line at the control.
- Consult the person in charge of maintenance to determine what corrective measures need to be taken. Make sure to consult any specially trained and skilled personnel who are authorised for this purpose. Clearly assign responsibility of operation, service, and maintenance of the machine to individuals, and follow instructions from the responsible individual.
- If two or more workers must work together, establish signals so that they can communicate.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



Shut off the machine's main breaker while servicing the machine. Secure the main breaker against unauthorised activation by locking it.

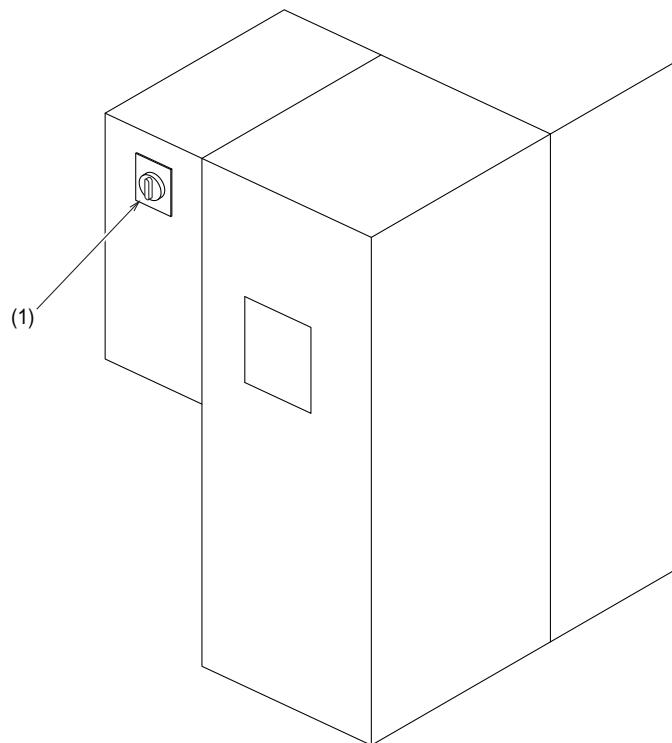
5-4. Manual Operations

For safe operation, safety devices such as door interlocks are provided as standard equipment. Before operating the machine, read the separately provided [OSP-P300L OPERATION MANUAL] and [SAFETY DOOR INTERLOCK FUNCTION MANUAL].

5-4-1. Power ON/OFF

Procedure : —

- 1- Turn the lever switch of the circuit breaker (main power switch) on the side of the NC control box to the ON position on the right.



LE12016R1600700150001

Control box

Fig. 5-4

1	Main switch
---	-------------

SAFETY INSTRUCTIONS

Indicates general instructions for **safe operation**.

- 1) Check the following before switching on power.
 - (1) Make sure that the doors to the operation panel and the control box are closed.
 - (2) Make sure that there are no objects around the machine.
- 2) If power is not supplied, check the factory power supply switch.
- 3) The pumps for the NC cooler, hydraulic unit, and M-spindle head lubrication unit start. Check the pressure for each unit.

- 2-** Press the CONTROL ON push button switch on the NC operation panel.

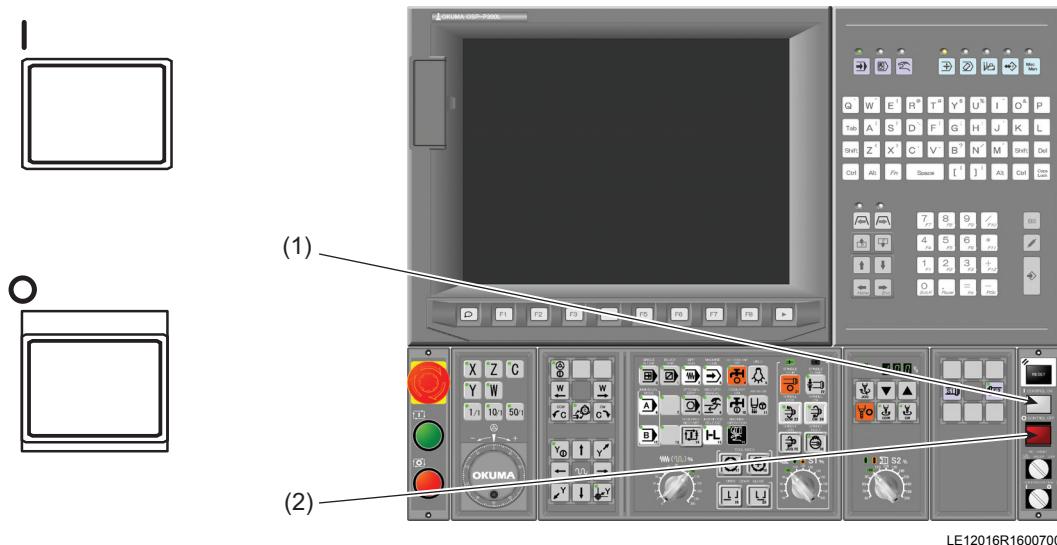


Fig. 5-5

1	CONTROL ON push button switch The switch is lighted.	2	CONTROL OFF push button switch All operational power is shut off.
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SAFETY INSTRUCTIONS

Indicates general instructions for safe operation.

If the CONTROL ON push button switch is not illuminated, one of the EMG. STOP push button switches has been activated and is still in a locked position. Check and reset the buttons.

Turn on the main switch before turning on the control on the operation panel.

- 3-** Upon power on, always perform the following operation to check that the machine is operating normally.
If the front door is closed, a warning [4704 ALARM-D Please open door] is displayed, so open the front door.
- 4-** First press the CONTROL OFF push button switch on the right hand or in the center of the NC operation panel to turn off the power supply. (Press the EMG. STOP push button switch if operation must be stopped immediately.)
After checking that the display has disappeared, turn the main power switch to the OFF position to the left of the NC control box.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



As described above, each of the machine units is active until the power is shut off with the power supply lever. Use caution as they may move unexpectedly.

[Supplement]

After the power is turned on, perform machine inspections and adjustments before you begin work by following instructions in [SECTION 6, 6-3. Periodical Inspection Schedule].

5-4-2. Emergency Stop

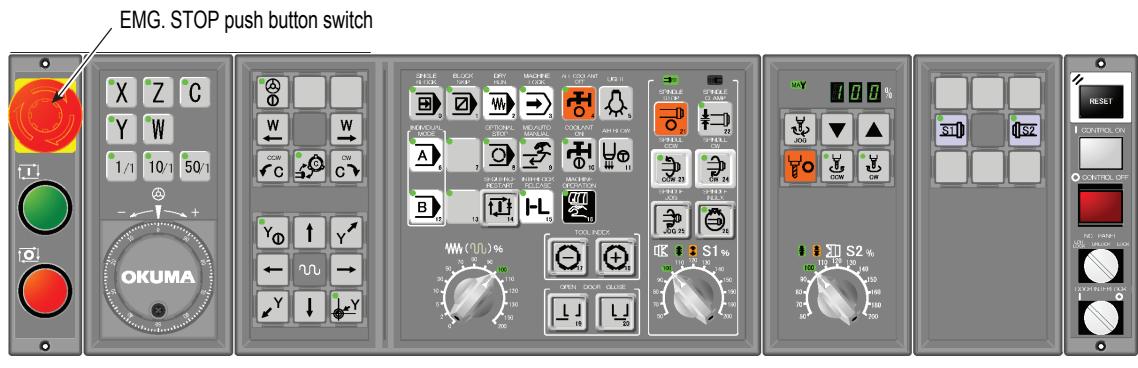


Fig. 5-6

NC operation panel	EMG. STOP push button switch
--------------------	------------------------------

Table 5-1

To stop the machine immediately during a MANUAL, AUTO or MDI (Manual Data Input) mode, press the red EMG. STOP push button switch. Control power will be shut off, the operation of the machine will stop, and the hydraulic pump will also stop running.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



- 1) Pressing the EMG. STOP push button switch only shuts off the control power. Main power to the circuit breaker stays on and the units remain energized.
- 2) Engaging emergency stop operation while the spindle is rotating may not stop the spindle rotation immediately due to its rotational inertia. To avoid being caught in rotary tools, do not approach them until they come to a full stop.

To turn the power ON after pressing the EMG. STOP push button switch, fix the problem, reset the button by turning it clockwise and press the CONTROL ON push button switch above the tape reader.

5-5. Spindle Speed Selection

5-5-1. Spindle Speed Selection

- (1) The machine is not equipped with controls for manually selecting the spindle speed.
- (2) The spindle speed can be changed automatically by a programmed S 4-digit command in the AUTO mode or by the command entered in the MDI mode.
- (3) A graph showing the relationship between spindle speed, torque, and output is provided in [SECTION 5, 5-5-2. Spindle Speed - Spindle Power/Torque Diagrams].
- (4) For the spindle speed in each spindle specification and spindle output specifications, see the table below:

Machine model	LB2000EXII			
Spindle specifications	Main standard spindle	Main standard spindle power-boost	Main big-bore spindle	Sub-spindle
Speed range min^{-1}	50 to 6,000	50 to 6,000	45 to 5,000	50 to 6,000
Spindle output kW (hp)	PREX 11/7.5 (15/11) (20 min./cont.)	PREX 15/11 (20/15) (20 min./cont.) (High speed side) PREX 15/11 (20/15) (15 min./cont.) (Low speed side)	VAC 22/15 (30/20) (30 min./cont.) (High speed side) VAC 22.8/15 (30.40/20) (10 min./cont.) (Low speed side)	PREX 11/7.5 (15/11) (20 min./cont.)
Max. torque N-m (lbf-ft)	160 (118) (Low speed side) 66 (48) (High speed side)	202 (149) (Low speed side) 75 (55) (High speed side)	427 (315) (Low speed side) 191 (141) (High speed side)	88 (64) (Low speed side) 39 (28) (High speed side)
Constant output range min^{-1}	660 to 1,600 (Low speed side) 1,600 to 6,000 (High speed side)	710 to 1,900 (Low speed side) 1,900 to 6,000 (High speed side)	510 to 1,100 (Low speed side) 1,100 to 5,000 (High speed side)	1,200 to 2,700 (Low speed side) 2,700 to 6,000 (High speed side)

Table 5-2

Machine model	LB2500EXII	
Spindle specifications	Main standard spindle	Main standard spindle power-boost
Speed range min^{-1}	45 to 5,000	45 to 5,000
Spindle output kW (hp)	VAC 22/15 (30/20) (30 min./cont.) (High speed side) VAC 22.8/15 (30.40/20) (10 min./cont.) (Low speed side)	VAC 30/22 (40/30) (30 min./cont.) (High speed side) VAC 22.8/15 (30.40/20) (10 min./cont.) (Low speed side)
Max. torque N-m (lbf-ft)	427 (315) (Low speed side) 191 (141) (High speed side)	427 (315) (Low speed side) 238 (176) (High speed side)
Constant output range min^{-1}	510 to 1,100 (Low speed side) 1,100 to 5,000 (High speed side)	510 to 820 (Low speed side) 1,200 to 5,000 (High speed side)

Table 5-3

Machine model	LB3000EXII			
Spindle specifications	Main standard spindle	Main standard spindle power-boost	Main big-bore spindle	Sub-spindle
Speed range min^{-1}	45 to 5,000	45 to 5,000	42 to 4,200	50 to 6,000
Spindle output kW (hp)	VAC 22/15 (30/20) (30 min./cont.) (High speed side) VAC 22.8/15 (30.40/20) (10 min./cont.) (Low speed side)	VAC 30/22 (40/30) (30 min./cont.) (High speed side) VAC 22.8/15 (30.40/20) (10 min./cont.) (Low speed side)	PREX 30/22 (40/30) (30 min./cont.)	PREX 11/7.5 (15/11) (20 min./cont.)
Max. torque N-m (lbf-ft)	427 (315) (Low speed side) 191 (141) (High speed side)	427 (315) (Low speed side) 238 (176) (High speed side)	700 (517) (Low speed side) 341 (252) (High speed side)	109 (80) (Low speed side) 39 (28) (High speed side)
Constant output range min^{-1}	510 to 1,100 (Low speed side) 1,100 to 5,000 (High speed side)	510 to 820 (Low speed side) 1,200 to 5,000 (High speed side)	410 to 840 (Low speed side) 840 to 4,200 (High speed side)	960 to 2,700 (Low speed side) 2,700 to 6,000 (High speed side)

Table 5-4

Machine model	LB4000EXII		
Spindle specifications	Main standard spindle	Main big-bore spindle	Main B7 spindle
Speed range min^{-1}	42 to 4,200	30 to 3,000	12 to 1,400
Spindle output kW (hp)	PREX 30/22 (40/30) (30 min./cont.)	PREX 37/30 (50/40) (30 min./cont.)	VAC 37/30 (50/40) (30 min./cont.)
Max. torque N·m (lbf·ft)	700 (517) (Low speed side) 341 (252) (High speed side)	1,178 (869) (Low speed side) 393 (290) (High speed side)	995 (734)
Constant output range min^{-1}	410 to 840 (Low speed side) 840 to 4,200 (High speed side)	300 to 900 (Low speed side) 900 to 3,000 (High speed side)	355 to 1,400

Table 5-5

[Supplement]

Rated output value is guaranteed when power supply voltage is 200 VAC. (* Power supply specification is different for each market.)

When the power supply voltage is below 200 V, the value may not reach the rated output value even within the allowable power supply voltage.

After the operating power supply is turned on, the [electrical angle initial position search function] is activated for a few seconds when the first spindle operation is started, and the spindle turns a maximum of 360 ° at low speed regardless of the speed command.

- This function is activated by CW/CCW or ORIENTATION command only for the first time after the operation power is supplied.
- The spindle speed may vary during activation of this function and the spindle may stop for an instant.



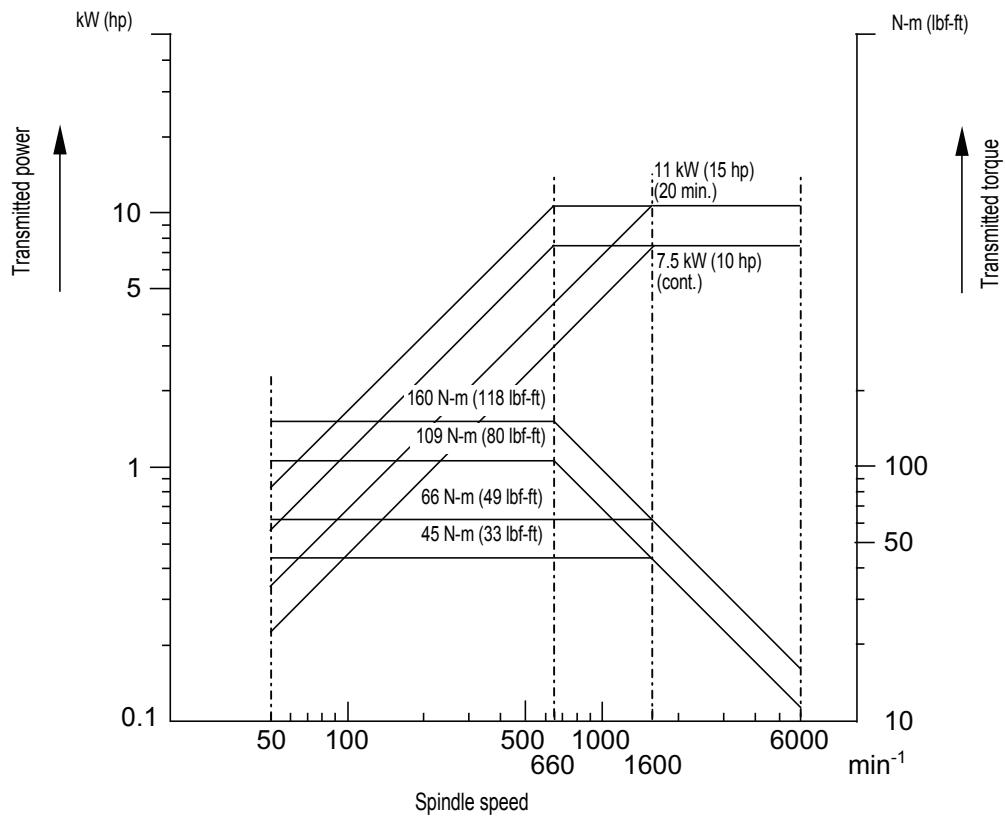
Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Refer to the [5-17-7. Hydraulic Chuck Clamping Force Characteristics Diagram] (the graph that shows the relation between the chuck rotation speed and its gripping force) as well.

5-5-2. Spindle Speed - Spindle Power/Torque Diagrams

LB2000EXII Main standard spindle

6,000 min⁻¹ Specification: PREX 11 kW/7.5 kW (15 hp/10 hp) (20 min./cont.)

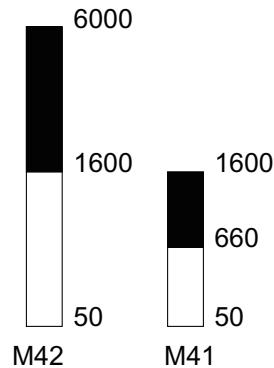


LE12016R1600700180001

Fig. 5-7

Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.

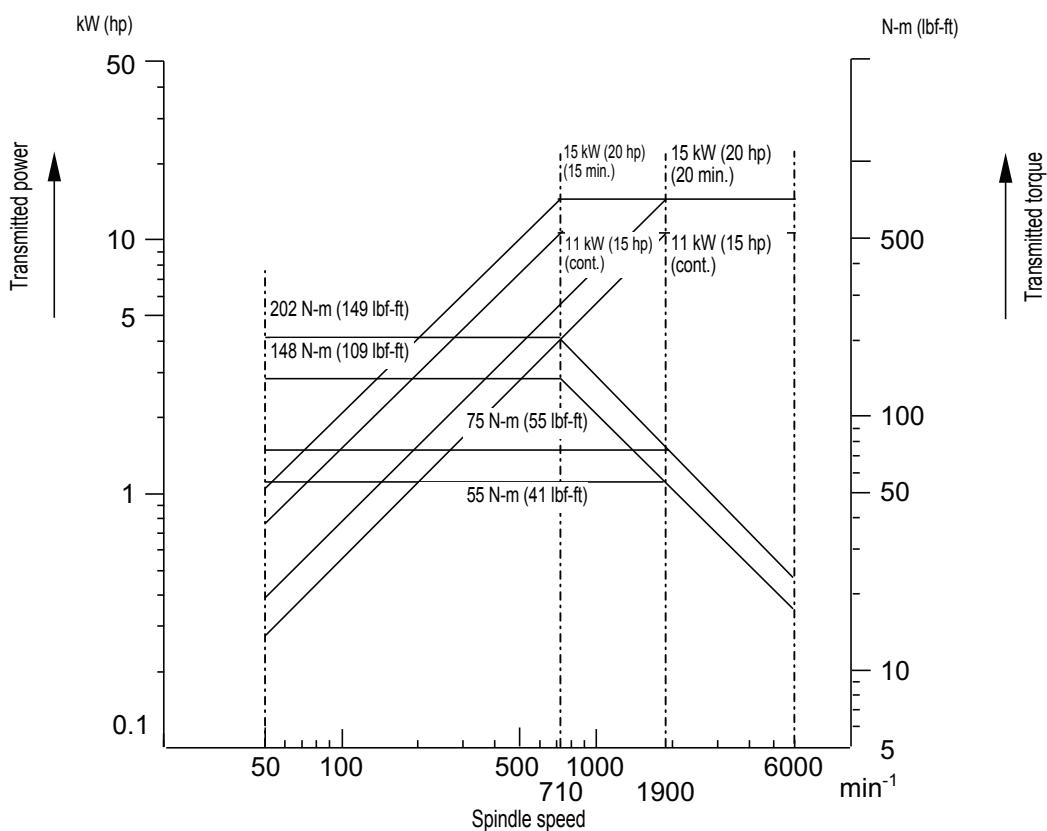


LE12016R1600700180002

Fig. 5-8

LB2000EXII Main standard spindle power-boost

6,000 min⁻¹ Specification: PREX 15 kW/11 kW (20 hp/15 hp) (20 min./cont.) High-speed side, PREX 15 kW/11 kW (20 hp/15 hp) (15 min./cont.) Low-speed side

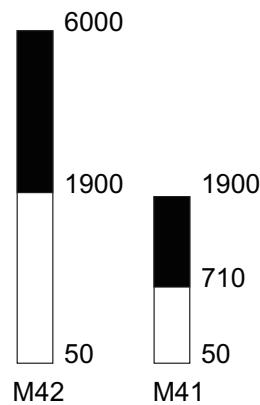


LE12016R1600700190001

Fig. 5-9

Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.



LE12016R1600700190002

Fig. 5-10

LB2000EXII Main big-bore spindle

5,000 min⁻¹ Specification: VAC 22 kW/15 kW (30 hp/20 hp) (30 min./cont.) High-speed side, VAC 22.8 kW/15 kW (30.40 hp/20 hp) (10 min./cont.) Low-speed side

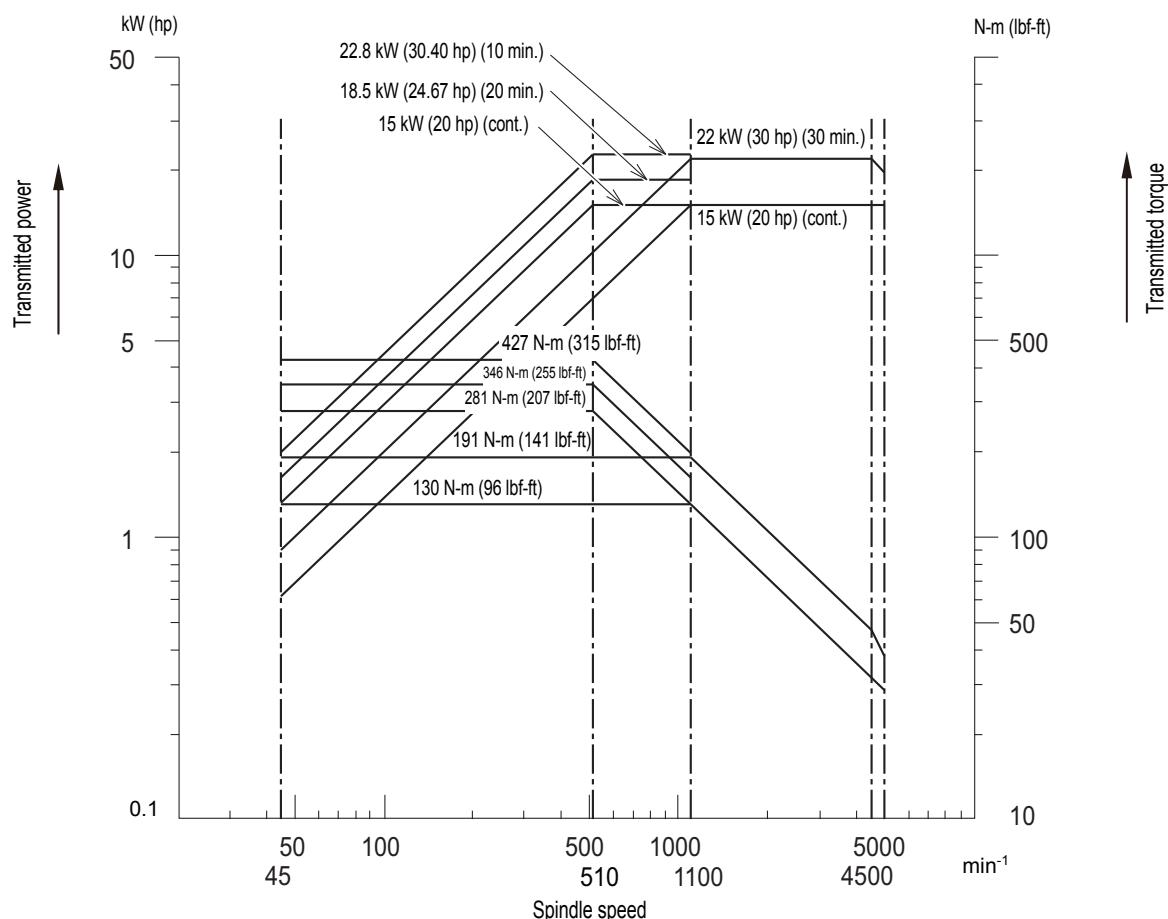
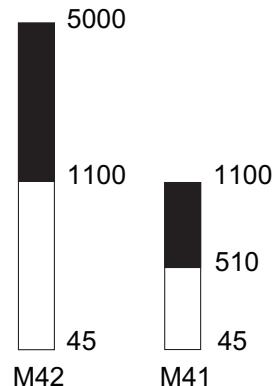


Fig. 5-11

LE12016R1600700200001

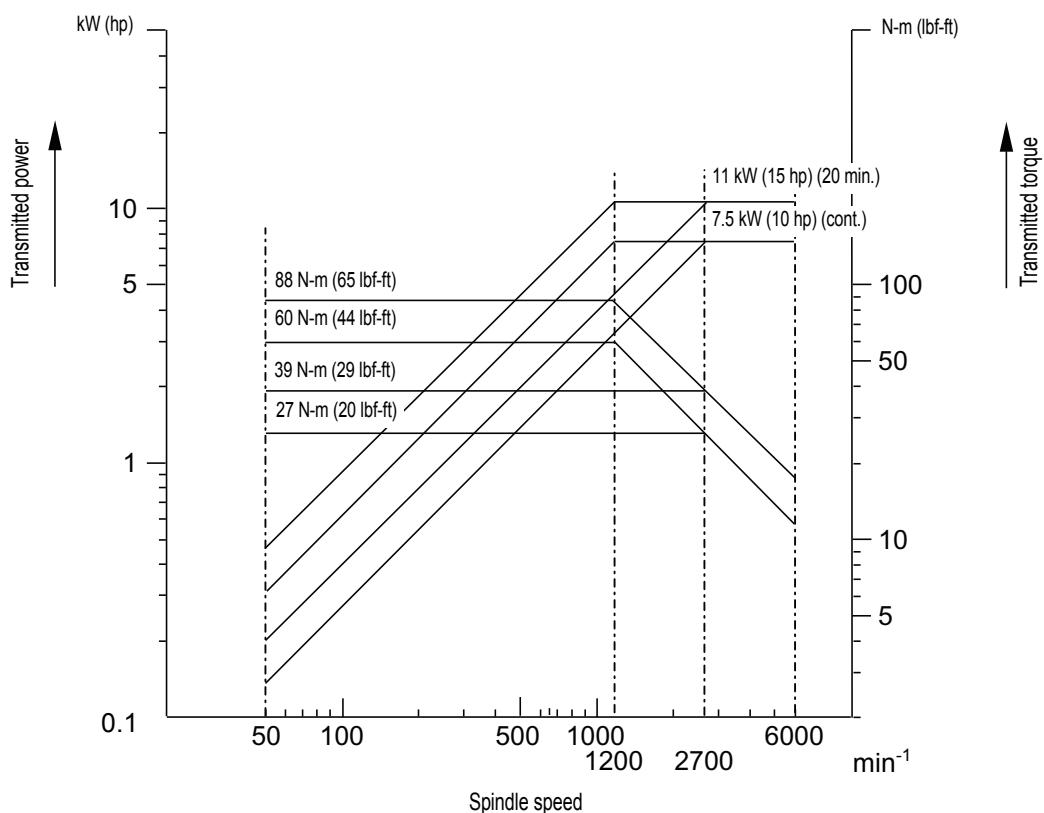
Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.



LE12016R1600700200002

Fig. 5-12

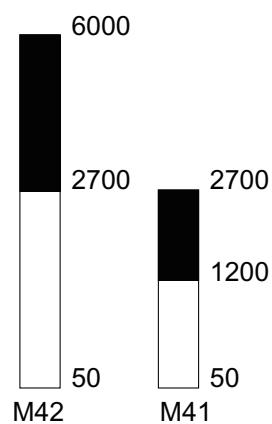
LB2000EXII Sub-spindle**6,000 min⁻¹ Specification: PREX 11 kW/7.5 kW (15 hp/10 hp) (20 min./cont.)**

LE12016R1600700210001

Fig. 5-13

Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.



LE12016R1600700210002

Fig. 5-14

LB2500EXII Main standard spindle

5,000 min⁻¹ Specification: VAC 22 kW/15 kW (30 hp/20 hp) (30 min./cont.) High-speed side, VAC 22.8 kW/15 kW (30.40 hp/20 hp) (10 min./cont.) Low-speed side

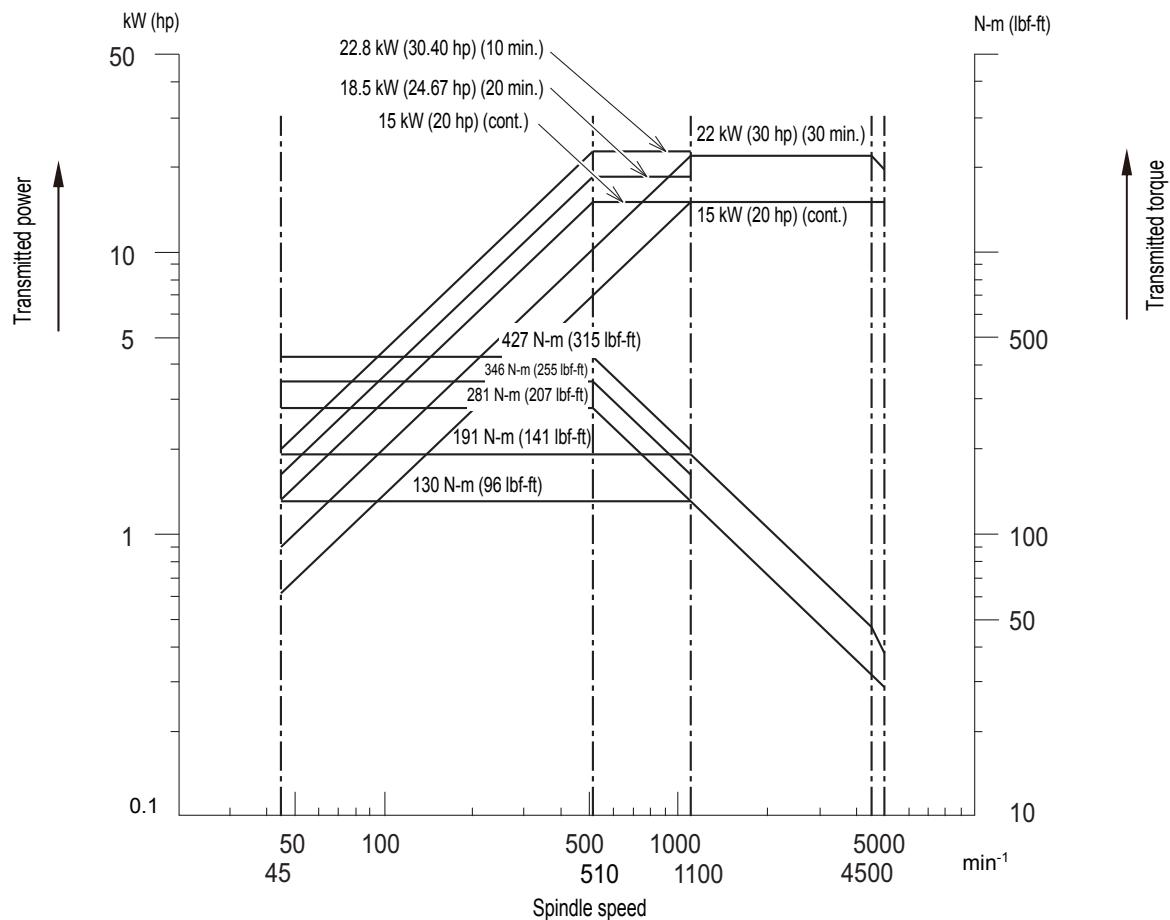
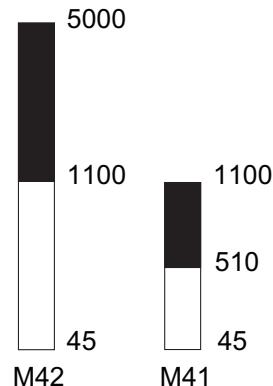


Fig. 5-15

LE12016R1600700220001

Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.



LE12016R1600700220002

Fig. 5-16

LB2500EXII Main standard spindle power-boost

5,000 min⁻¹ Specification: VAC 30 kW/22 kW (40 hp/30 hp) (30 min./cont.) High-speed side, VAC 22.8 kW/15 kW (30.40 hp/20 hp) (10 min./cont.) Low-speed side

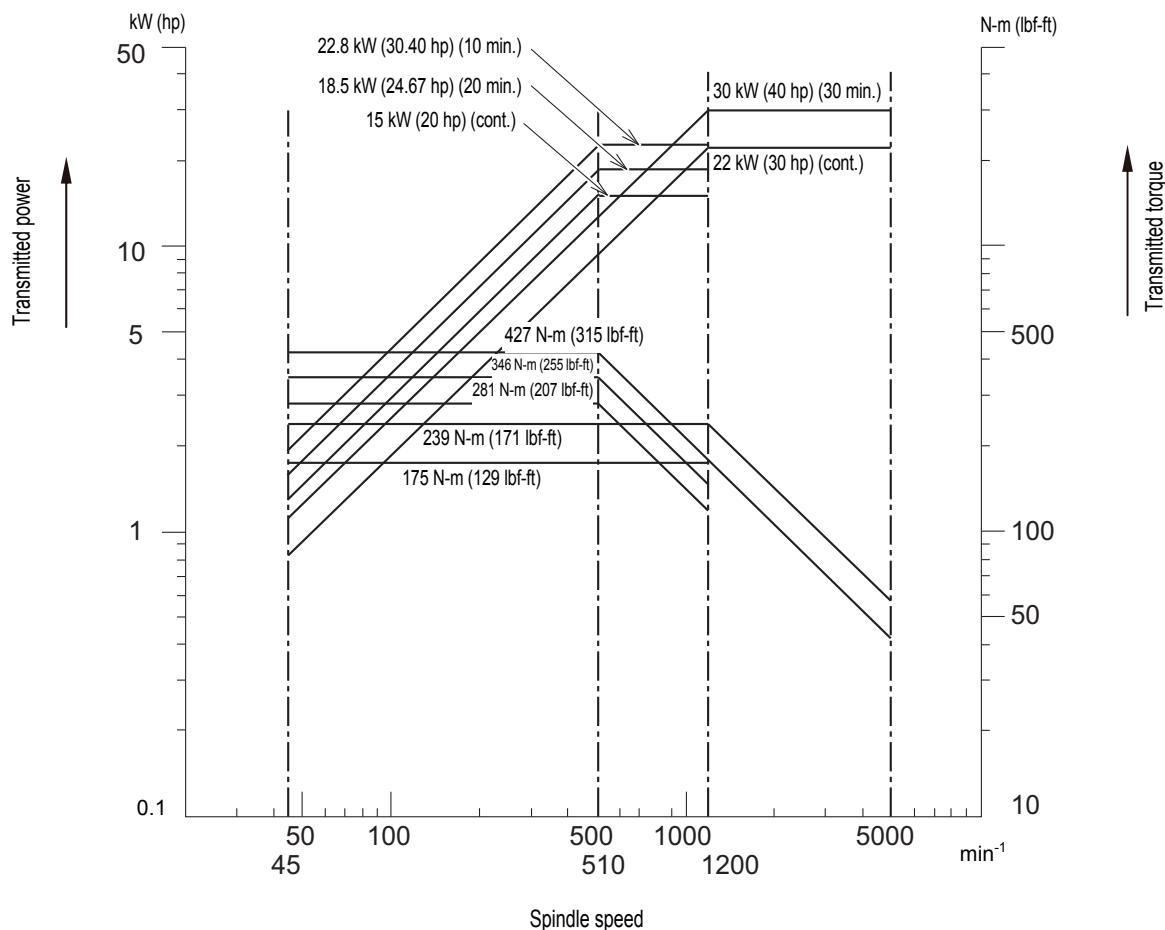
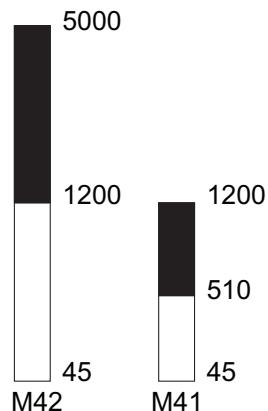


Fig. 5-17

LE12016R1600700230001

Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.



LE12016R1600700230002

Fig. 5-18

LB3000EXII Main standard spindle

5,000 min⁻¹ Specification: VAC 22 kW/15 kW (30 hp/20 hp) (30 min./cont.) High-speed side, VAC 22.8 kW/15 kW (30.40 hp/20 hp) (10 min./cont.) Low-speed side

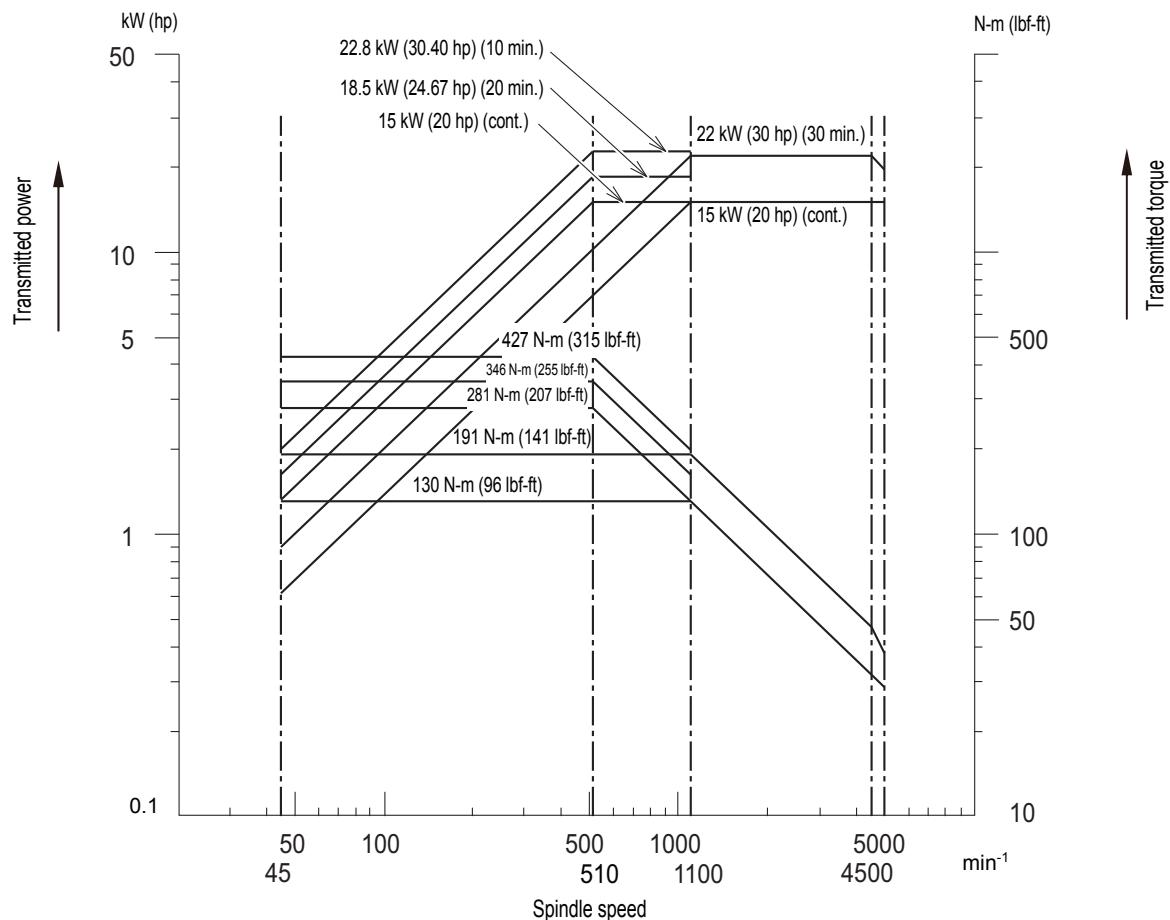
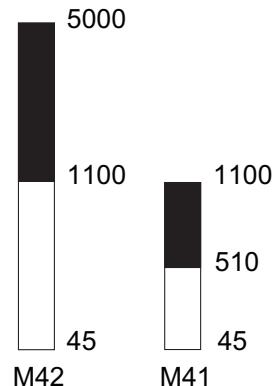


Fig. 5-19

LE12016R1600700240001

Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.



LE12016R1600700240002

Fig. 5-20

LB3000EXII Main standard spindle power-boost

5,000 min⁻¹ Specification: VAC 30 kW/22 kW (40 hp/30 hp) (30 min./cont.) High-speed side, VAC 22.8 kW/15 kW (30.40 hp/20 hp) (10 min./cont.) Low-speed side

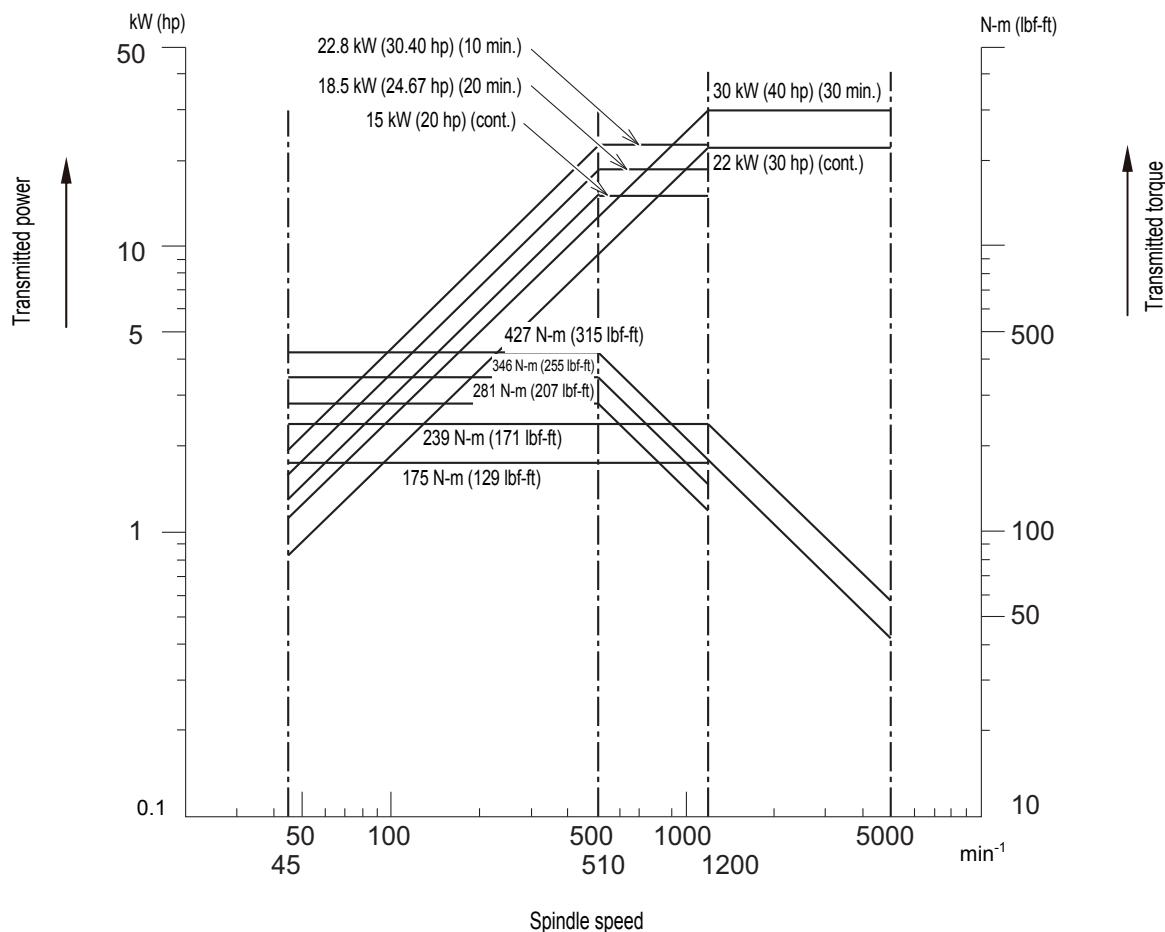
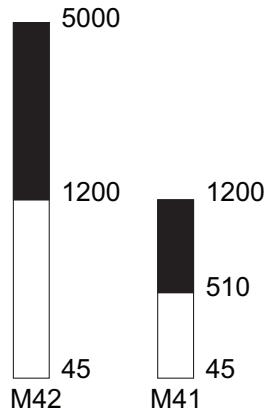


Fig. 5-21

LE12016R1600700250001

Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.



LE12016R1600700250002

Fig. 5-22

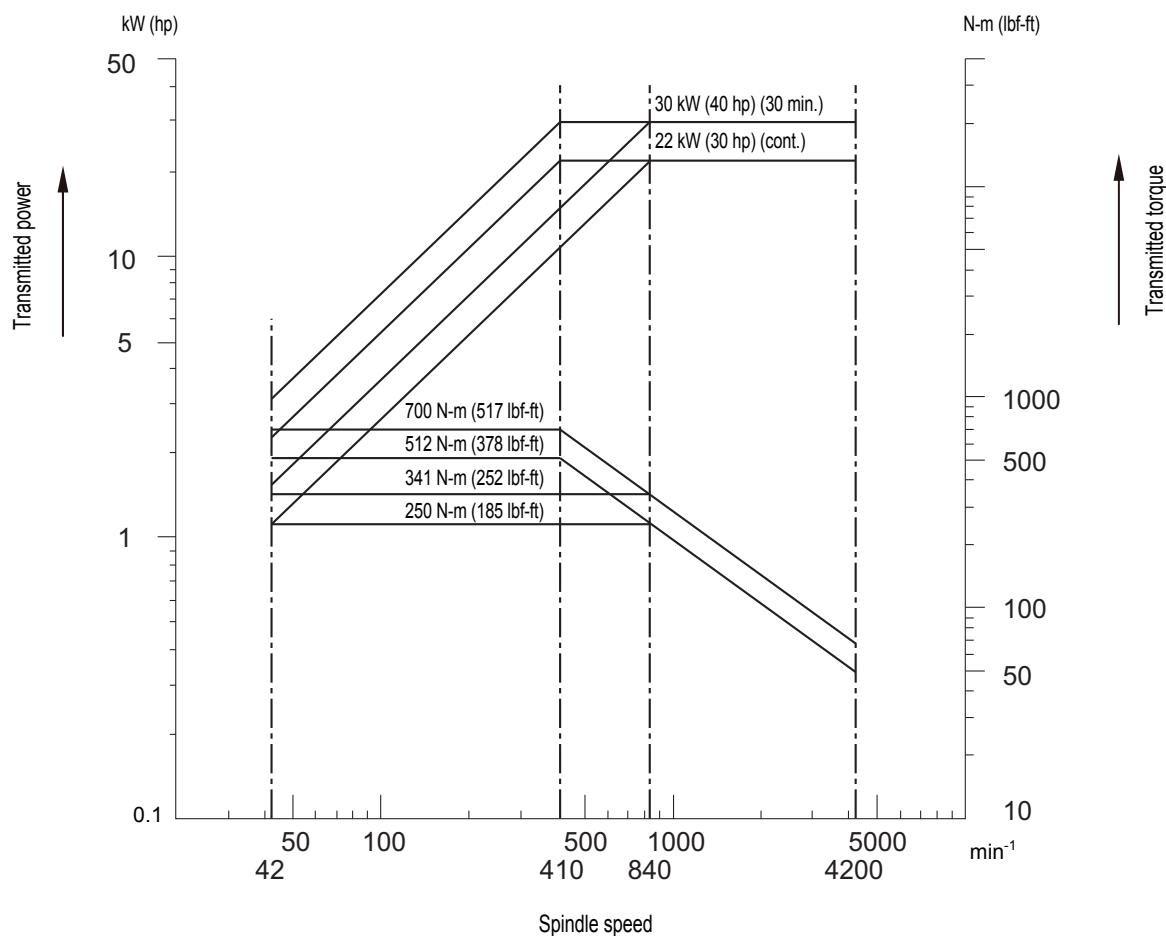
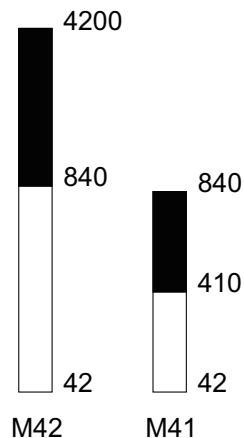
LB3000EXII Main big-bore spindle**4,200 min⁻¹ Specification: PREX 30 kW/22 kW (40 hp/30 hp) (30 min./cont.)**

Fig. 5-23

LE12016R1600700260001

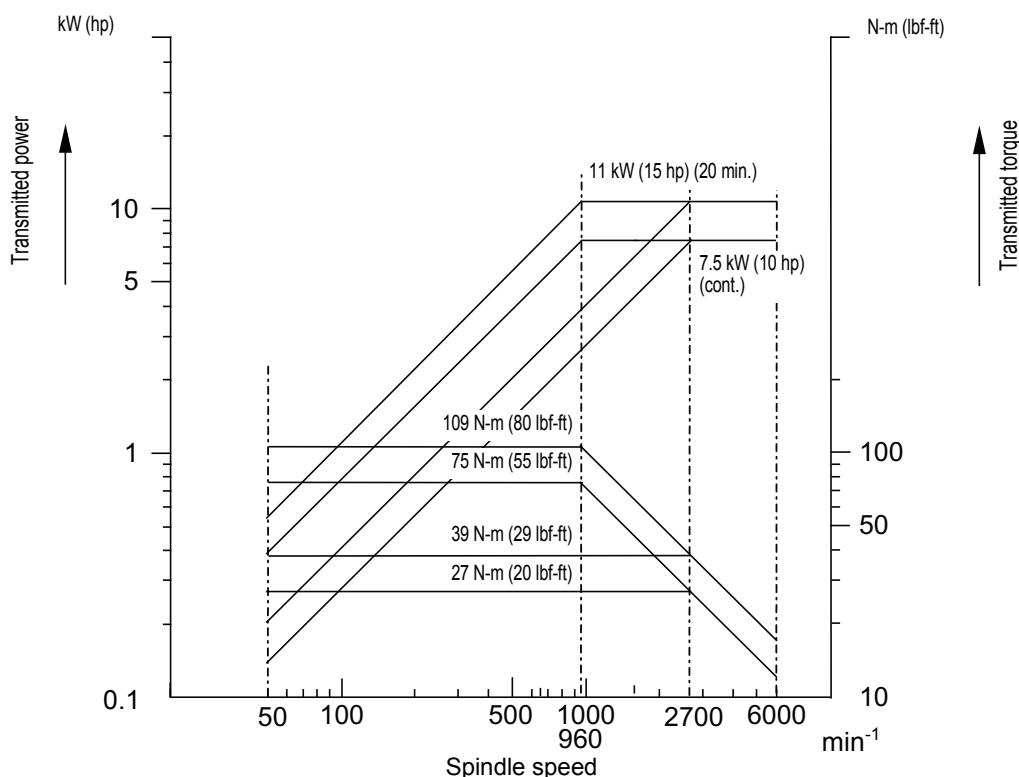
Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.



LE12016R1600700260002

Fig. 5-24

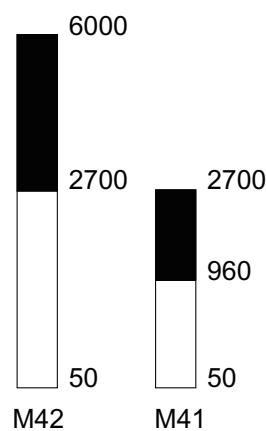
LB3000EXII Sub-spindle**6,000 min⁻¹ Specification: PREX 11 kW/7.5 kW (15 hp/10 hp) (20 min./cont.)**

LE12016R1600700270001

Fig. 5-25

Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.



LE12016R1600700270002

Fig. 5-26

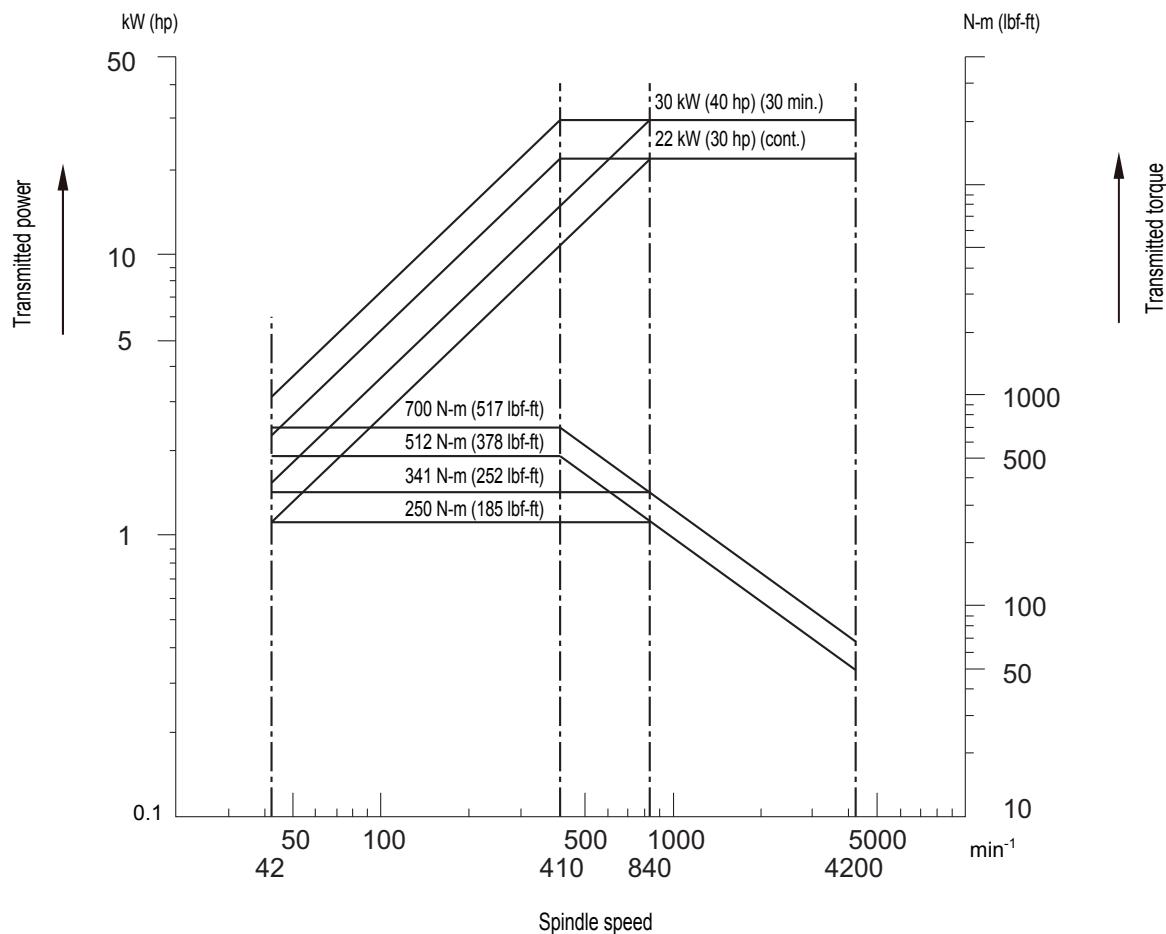
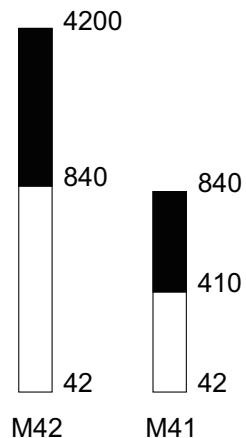
LB4000EXII Main standard spindle**4,200 min⁻¹ Specification: PREX 30 kW/22 kW (40 hp/30 hp) (30 min./cont.)**

Fig. 5-27

LE12016R1600700280001

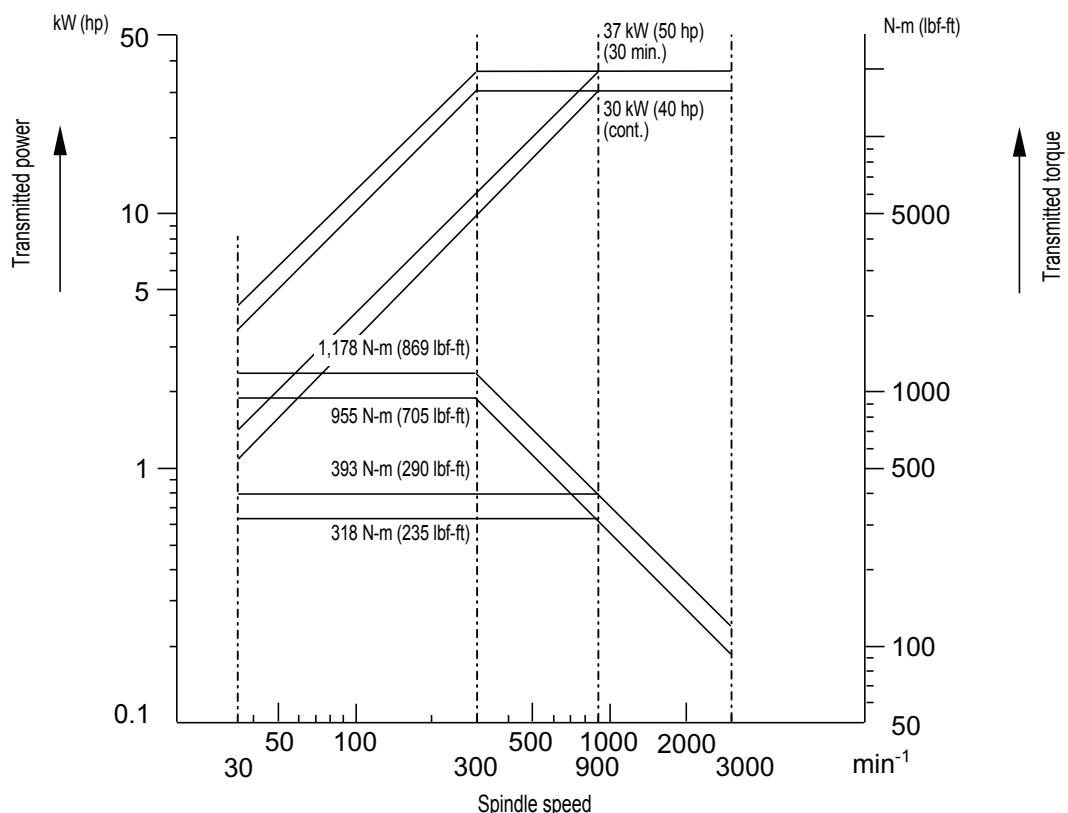
Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.



LE12016R1600700280002

Fig. 5-28

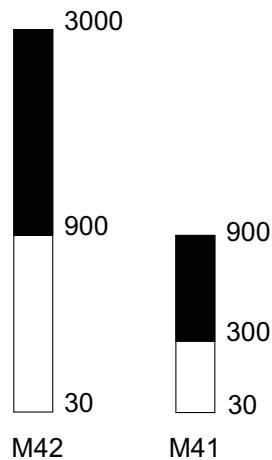
LB4000EXII Main big-bore spindle**3,000 min⁻¹ Specification: PREX 37 kW/30 kW (50 hp/40 hp) (30 min./cont.)**

LE12016R1600700290001

Fig. 5-29

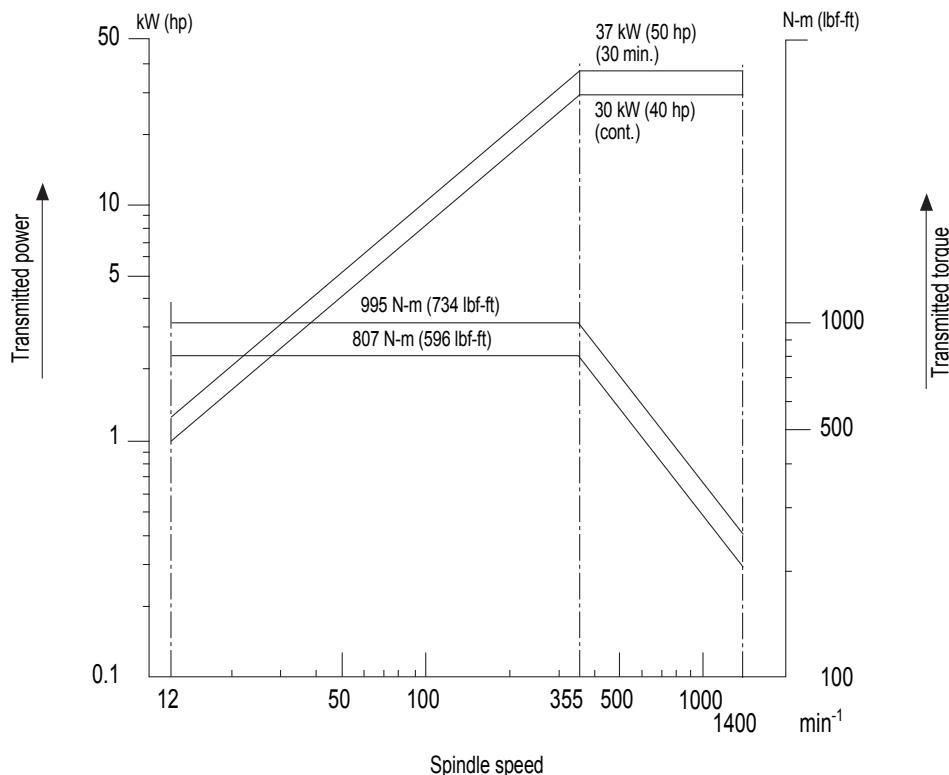
Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.

- The motor coil is switched for selecting High and Low for spindle speed.



LE12016R1600700290002

Fig. 5-30

LB4000EXII Main B7 spindle**1,400 min⁻¹ Specification: VAC 37 kW/30 kW (50 hp/40 hp) (30 min./cont.)**

LE12016R1600700560001

Fig. 5-31

Selection of the speeds shown in the shaded area (fixed output range) is useful during powerful cutting.



LE12016R1600700560002

Fig. 5-32

5-6. Selecting Rotary Tool Spindle Speed

5-6-1. Selecting Rotary Tool Spindle Speed

- (1) The machine is not equipped with controls for manually selecting the spindle speed.
- (2) The spindle speed can be changed automatically by a programmed S 4-digit command in the AUTO mode or by the command entered in the MDI mode.
- (3) A graph showing the relationship between spindle speed, torque, and output is provided in [5-6-2. Rotary tool spindle speed - Spindle Power/Torque Diagrams].
- (4) For the spindle speed in each spindle specification and spindle output specifications, see the table below:

Machine model	LB2000EXII	LB2500EXII/3000EXII	LB4000EXII
Speed range min ⁻¹	45 to 6,000	45 to 6,000	45 to 6,000
Spindle output kW (hp)	PREX 5.5/3.7 (7.5/5) (2 min./cont.)	PREX 7.1/4.1 (9.47/5.47) (25 min./cont.)	PREX 7.5/4.3 (10/5.73) (25 min./cont.)
Max. torque N·m (lbf·ft)	31.3 (23.1) 20.9 (15.4)	40.4 (29.8) 23.4 (17.3)	58.1 (42.9) 33 (24)
Constant output range min ⁻¹	1,680 to 6,000	1,680 to 6,000	1,240 to 6,000

Table 5-6

[Supplement]

Rated output value is guaranteed when power supply voltage is 200 VAC.
When the power supply voltage is below 200 V, the value may not reach the rated output value even within the allowable power supply voltage.

SAFETY INSTRUCTIONS

Indicates general instructions for safe operation.

Even if the speed command at the minimum speed or lower or at the maximum speed or higher is given, the spindle remains stopped and an alarm is issued. (However, if such a command is specified during spindle rotation, the spindle keeps rotating.)

WARNING

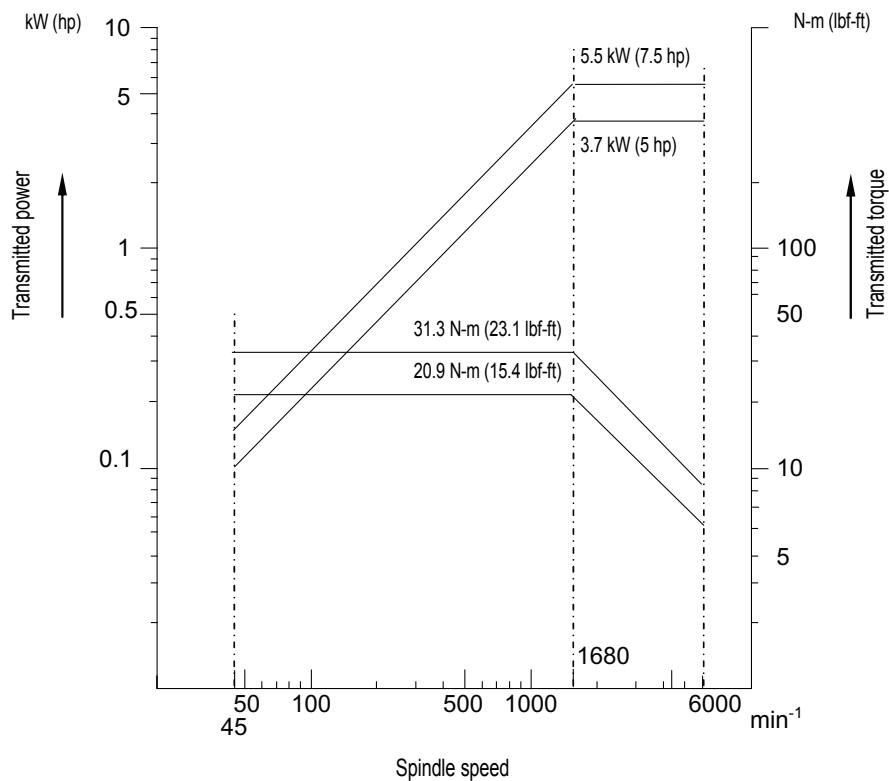
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

- Do not turn the tool installed at the spindle at a speed exceeding the limit.
The tool may fly out of the machine causing serious injury. For the allowable tool rotation speed, check with the tool maker.
- The SPINDLE OVERRIDE dial is always effective. If you set it to a value higher than 100 %, the spindle speed selected by the next speed command is also increased by the dial-selected rate.
Make it a rule to return the dial to 100 % or lower rate immediately after a cutting cycle is finished.

5-6-2. Rotary tool spindle speed - Spindle Power/Torque Diagrams

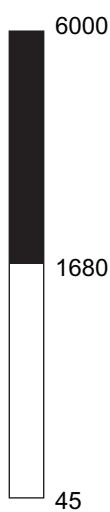
LB2000EXII Rotary tool spindle

6,000 min⁻¹ Specification: PREX 5.5 kW/3.7 kW (7.5 hp/5 hp) (2 min./cont.)



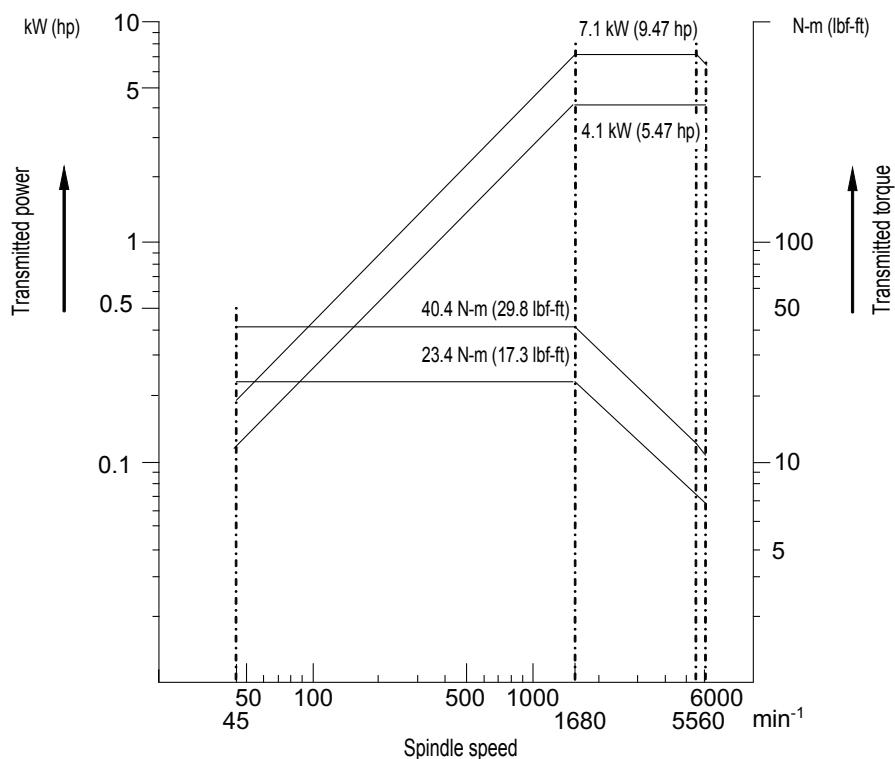
LE12016R1600700310001

Fig. 5-33



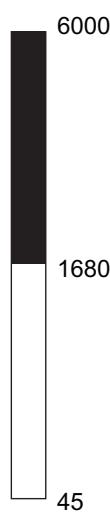
LE12016R1600700310002

Fig. 5-34

LB2500EXII, LB3000EXII Rotary tool spindle**6,000 min⁻¹ Specification: PREX 7.1 kW/4.1 kW (9.47 hp/5.47 hp) (25 min./cont.)**

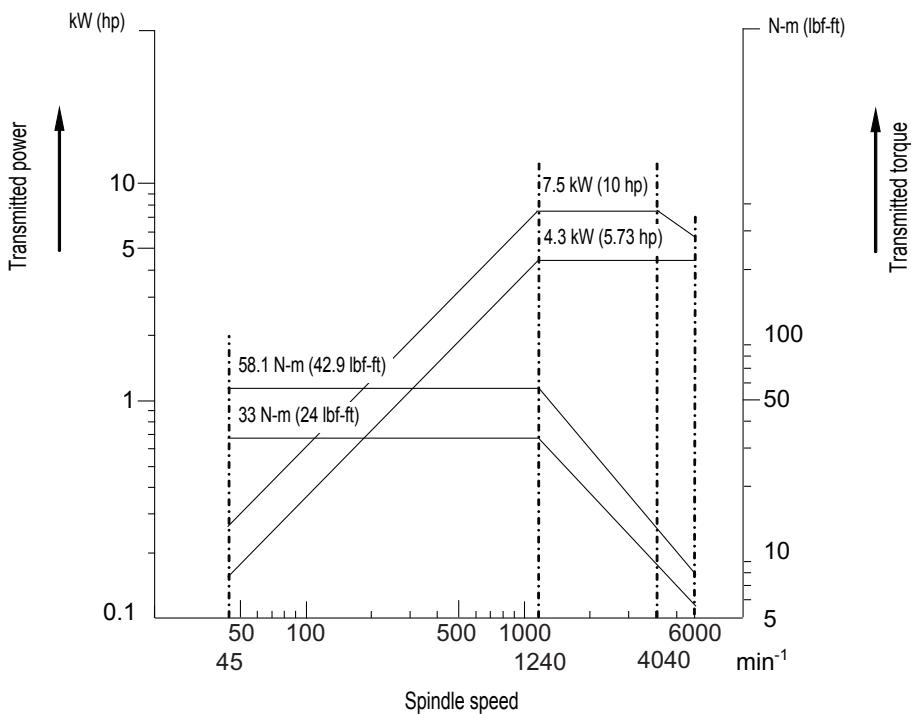
LE12016R1600700320001

Fig. 5-35



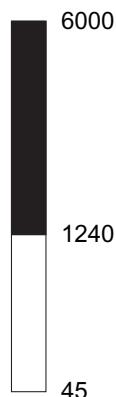
LE12016R1600700320002

Fig. 5-36

LB4000EXII Rotary tool spindle**6,000 min⁻¹ Specification: PREX 7.5 kW/4.3 kW (10 hp/5.73 hp) (25 min./cont.)**

LE12016R1600700330001

Fig. 5-37



LE12016R1600700330002

Fig. 5-38

5-7. Turret selection

5-7-1. Turret selection key (For 2-saddle machine)

Select which turret to operate - upper or lower.

Press A: Switches to upper turret (A turret)
 Press B: Switches to lower turret (B turret)

5-7-2. Left/Right spindle selection key (For parallel 2-spindle machine)

Press L: Switches to L side (left) operation
 Press R: Switches to R side (right) operation

5-7-3. Basic Manual Operation

Moving the turret (X- and Z-axes)

Procedure : _____

- 1-** Select MANUAL mode.



Fig. 5-39

- 2-** Press the feed button to move the axis in the direction of an arrow as shown in the diagram on the next page.

Adjust the FEED RATE switch to feed at a safe speed.

When working with the door open, operate at 70 % or less. Setting a higher value will trigger the alarm.

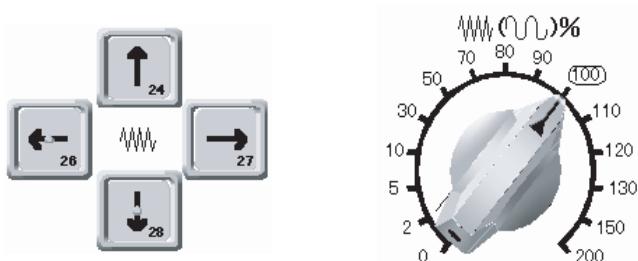


Fig. 5-40

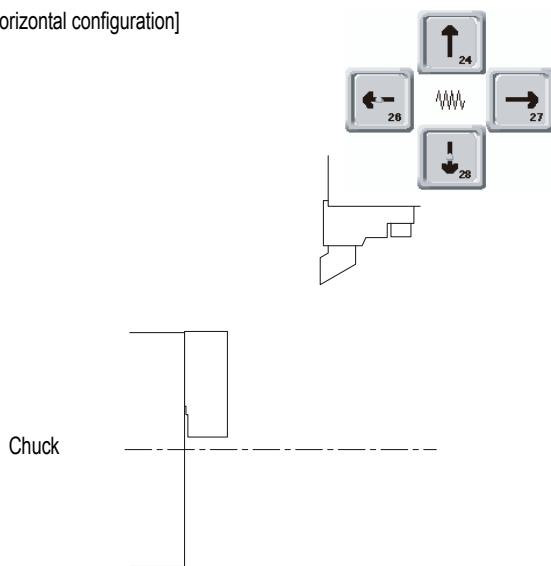
SAFETY INSTRUCTIONS

Indicates general instructions for **safe operation**.

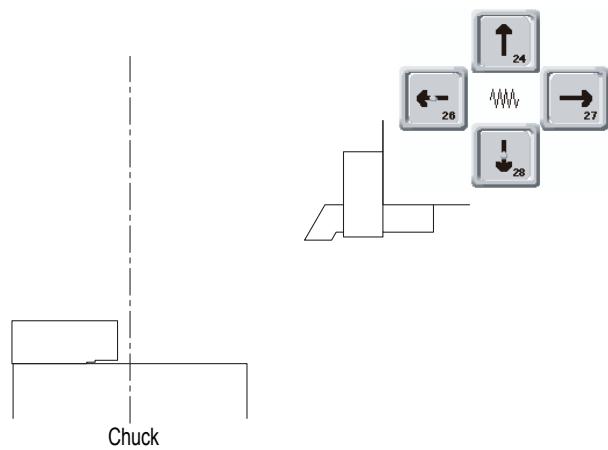
While at 100 % it will operate at normal speed, at 0 %, there will be no motion.
When manual feed is used with the door open, feed rate will be limited by the door interlock function.
Feed operation range is limited by the variable limit values in the parameter setting.
When equipped with collision avoidance specifications, simultaneous operation of 2 axes is not possible in manual operation.

Example of turret movement direction when viewed from the front of the machine.

[Horizontal configuration]



[Vertical configuration]



LE12016R1600700370001

Fig. 5-41

5-8. Manual Pulse Feed

The manual pulse feed operation is effective for feeding an axis a relatively short distance at a low feedrate, for example such as aligning a cutting tool with a workpiece or manually feeding an axis in a trial cut.

5-8-1. Operating Conditions

MANUAL mode should be selected on the NC operation panel.

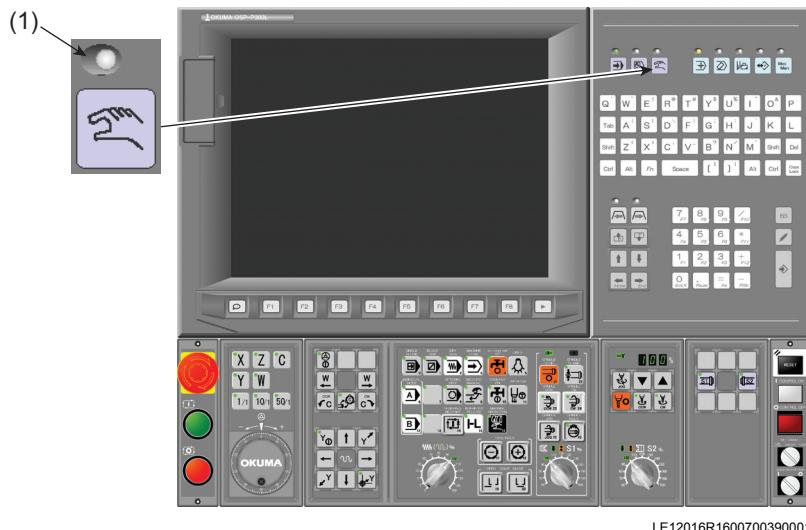
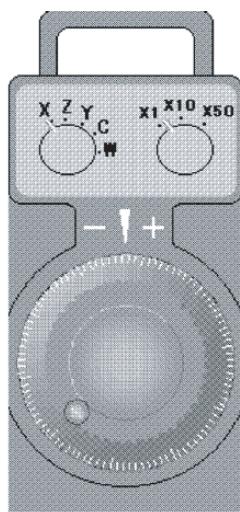


Fig. 5-42

- | | |
|---|-----------------------------|
| 1 | Check that the lamp is lit. |
|---|-----------------------------|

Movement by pulse handle is performed by switching the movement axis and the pulse feed unit.



Turning it clockwise moves it in the positive direction.
Turning it counterclockwise moves it in the negative direction.

LE12016R1600700390002

Fig. 5-43

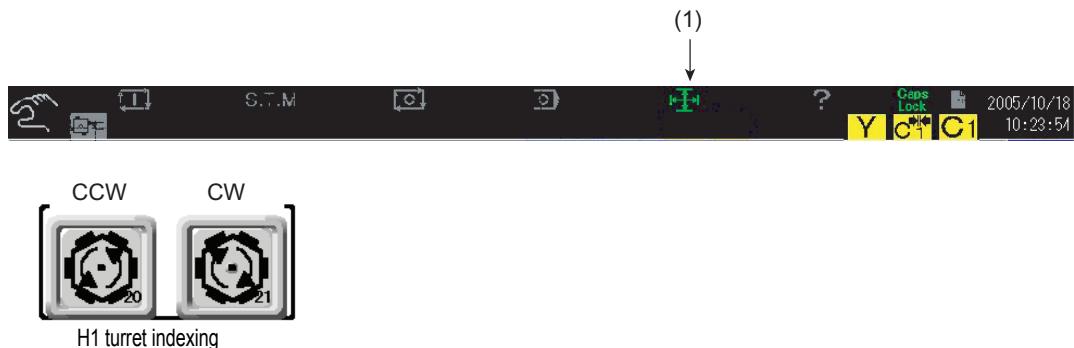
SAFETY INSTRUCTIONS

Indicates general instructions for **safe operation**.

An alarm will be activated when the given feed rate exceeds the maximum allowable axis feedrate. This may result if the pulse handle dial is turned quickly while a high multiplication factor has been set.

5-9. Turret Rotation Indexing

To ensure safe rotation of the turret, the INTERLOCK is provided. It is active only when the X-axis is at the positive limit.

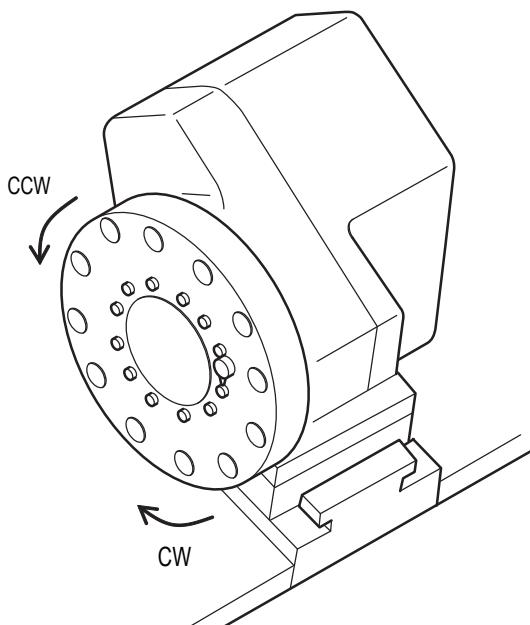


LE12016R1600700400001

Fig. 5-44

- | | |
|---|------------------------|
| 1 | Should be illuminated. |
|---|------------------------|

Pressing the turret CCW or CW button starts rotation.
The turret rotation continues while the button is pressed.
When the door is open, the door interlock function only allows motion 1 index at a time.



LE12016R1600700400002

Fig. 5-45



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



Keep hands away while it is in motion.
It will not move unless the X-axis is at its positive limit position.

5-9-1. Precautions on the turret

(1) M radial turret

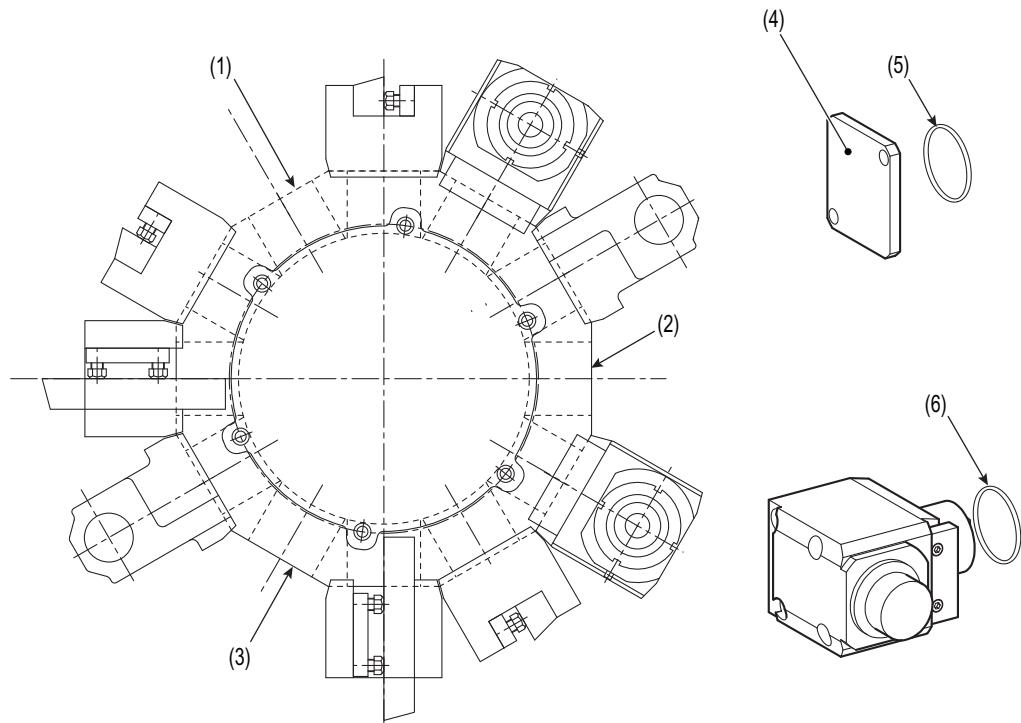
CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.

The combined working turret incorporates a rotary tool drive unit.

To protect this drive unit, observe the following instructions:

- Never forget to install a dummy tool to a blank station of the combined working turret.
- Make sure no chips or coolants get into the inside of the turret from holder mounting holes during toolholder exchanges.
- Never attempt to clean by air blow or coolant blow while no toolholder is mounted in the spindle.
- Make sure to use the bundled O-rings for holder mounting.
- Without the O-rings, coolants, etc. get in the turret, which may cause any troubles.
- Before indexing the tool, move the spindle head to the area where it does not interfere with the work or the chuck.
- The turret may not be completely clamped immediately after it is rotated. Therefore, wait at least 0.5 second before cutting operation.



LE12016R1600700410001

Fig. 5-46

1	Blank station	4	Dummy tool
2	Blank station	5	O-ring
3	Blank station	6	O-ring

(2) M turret: VDI

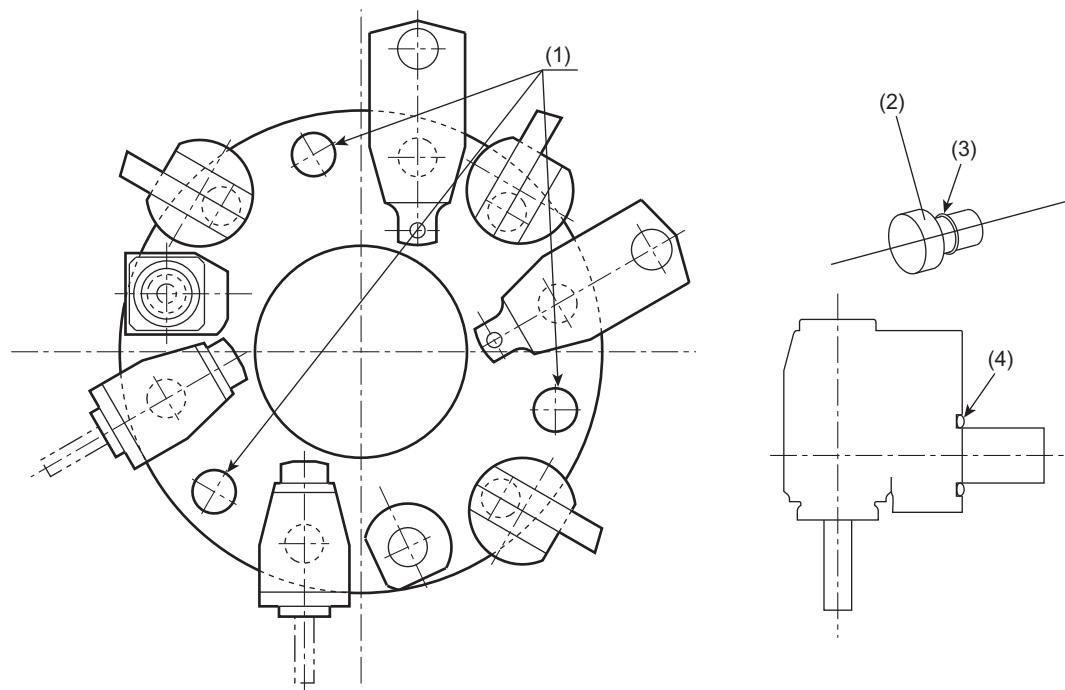
CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.

The combined working turret incorporates a rotary tool drive unit.

To protect this drive unit, observe the following instructions:

- Never forget to install a dummy tool to a blank station of the combined working turret.
- Make sure no chips or coolants get into the inside of the turret from holder mounting holes during toolholder exchanges.
Never attempt to clean by air blow or coolant blow while no toolholder is mounted in the spindle.
Make sure to use the bundled O-rings for holder mounting.
Without the O-rings, coolants, etc. get in the turret, which may cause any troubles.
- Do not send a rotating tool rotation command without indexing any station which has no rotating toolholder.
- Before indexing the tool, move the spindle head to the area where it does not interfere with the work or the chuck.
The turret may not be completely clamped immediately after it is rotated. Therefore, wait at least 0.5 second before cutting operation.



LE12016R1600700410002

Fig. 5-47

1	Blank station (toolholder hole)	3	O-ring
2	Dummy tool	4	O-ring

5-9-2. Mounting rotary tool

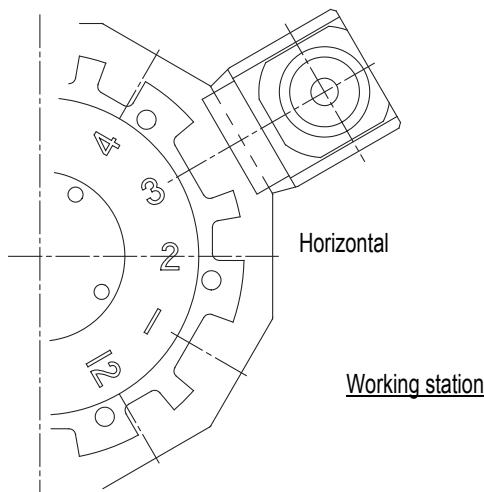
(1) M radial turret

[Supplement]

Follow the following procedure to make sure a rotating tool is accurately mounted on the turret.

Procedure :

- 1- They are mounted on a station two steps higher than the working station.



LE12016R1600700040001

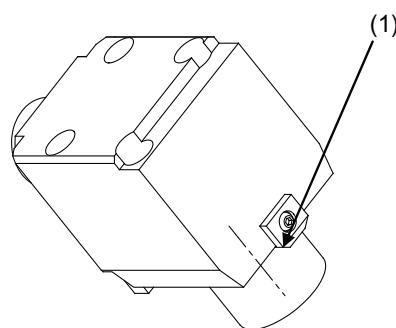
Fig. 5-48

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.

Do not start mounting right next to any working stations.

- 2- Loosen the A: Positioning block bolt on the back of the holder.

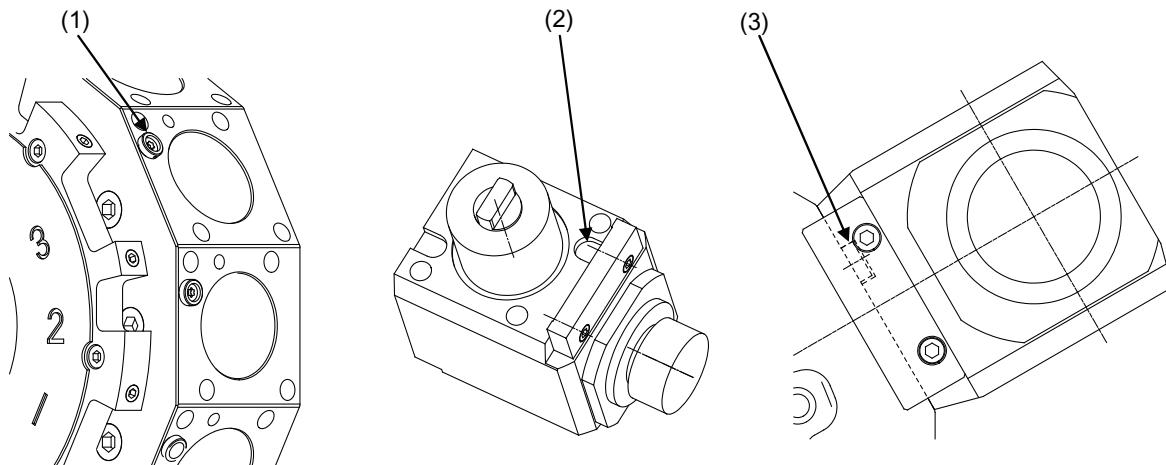


LE12016R1600700040002

Fig. 5-49

1	A: Positioning block
---	----------------------

- 3-** Apply the upper side of the B: Positioning pin against the upper side of the C: Holder groove in the turret.



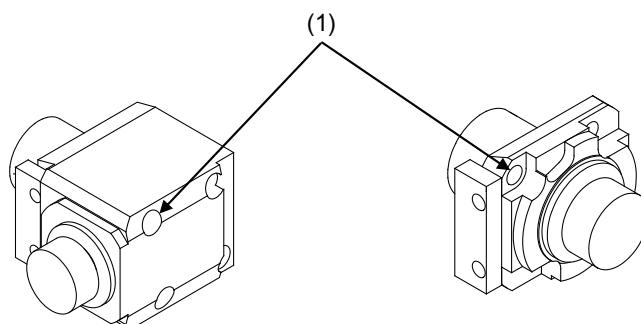
LE12016R1600700040003

Fig. 5-50

1	B: Positioning pin	3	Apply the upper side
2	C: Holder groove		

- 4-** Tighten the holder A: Positioning block firmly.

- 5-** Tighten bolts temporarily first and then firmly. Pick a bolt which is closest to the B: Positioning pin at first then in the order close to the pin.



LE12016R1600700040004

Fig. 5-51

1	A bolt close to the positioning pin
---	-------------------------------------

CAUTION

Indicates a potentially hazardous situation which, if not avoided, **may result in damage to your property.**

Never loosen the positioning base pin since it has been set before shipment.

[Supplement]

Positioning base pins on the turret have been adjusted before shipment, but if you find those pins are wrongfully aligned for any reason and their rearrangement is necessary, please contact OKUMA.

(2) M axial turret

[Supplement]

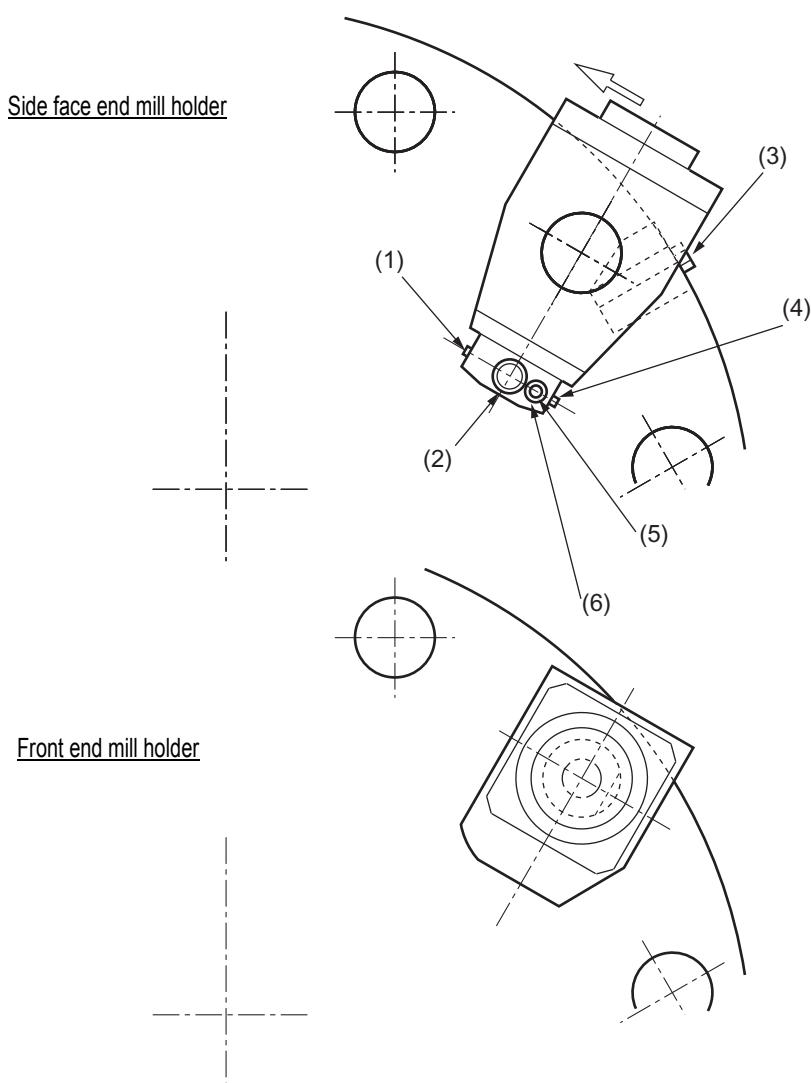
Follow the following procedure to make sure a rotating tool is accurately mounted on the turret.

Procedure : —

- 1-** Insert a holder into the turret hole of which is $\Phi 40$ (1.57).
- 2-** While pressing the holder front face against the turret, raise it to the arrow direction and apply standard set bolts and turret positioning pins.
- 3-** Under the "2-" condition, fix the holder by turning clamp bolts on the peripheral surface of the turret.
- 4-** Turn the fixing set bolts so they lightly touch the positioning pins (until the gap is cleared).
- 5-** Under the "4-" condition, tighten lock nuts and fix the fixing set pin.

[Supplement]

Only handle the fixing set bolts for holder mounting/dismounting.



LE12016R1600700040005

Fig. 5-52

1	Standard set bolt	4	Fixing set pin
2	Positioning pin	5	Fixing set bolt
3	Clamp bolts	6	Lock nut



Indicates a potentially hazardous situation which, if not avoided, **may result in minor or moderate injury.**

Never loosen standard set bolts since they have been set before shipment.

[Supplement]

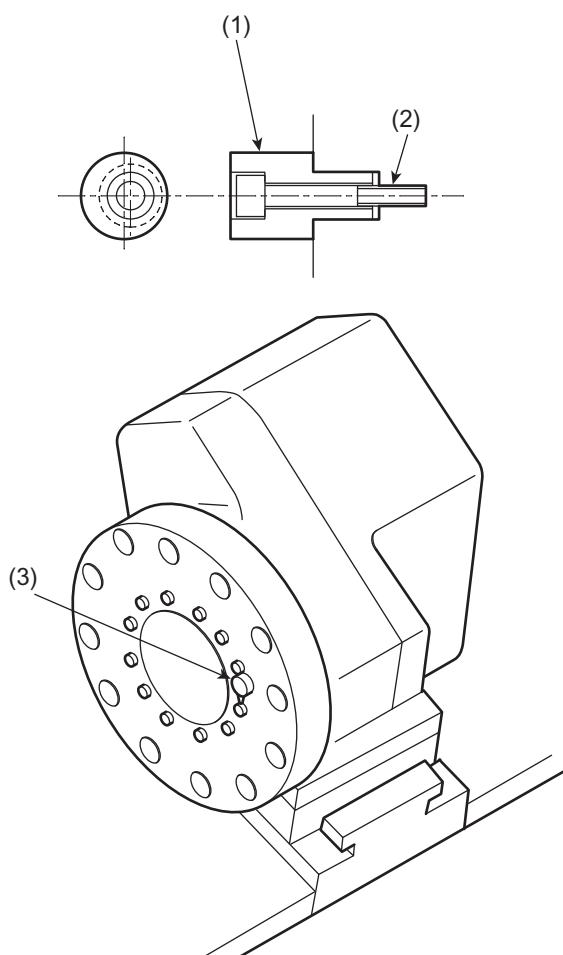
Turret eccentric pins on the turret have been adjusted before shipment, but if you find those pins are wrongfully aligned for any reason and their rearrangement is necessary, please follow the following procedure.

Procedure : —

- 1-** Loosen the bolt (A) which is positioned behind the misaligned eccentric pin.
- 2-** Measure the facing position of standard set bolt for a correct pin (tool number 1) and for the misaligned eccentric pin by using dial gauge.
- 3-** Compare the correct pin with the misaligned pin, turn the misaligned one to adjust their positions.
- 4-** Tighten the bolts to fix the eccentric pin.

Dispersion of the eccentric pin facing position

Within plus or minus 0.01 mm (0.0004 in.)



LE12016R1600700040006

Fig. 5-53

1	Eccentric pin	3	Dial gauge
2	Bolt (A)		

5-10. How to switch "Use"/"Not use" of "HEAVY TOOLING DATA"

Procedure :

- 1- Opening the "T-axis" screen in [SYSTEM PARAMETER].

- (1) Press the PARAMETER on the operation panel.

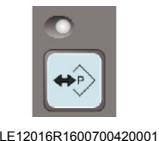


Fig. 5-54

- (2) The following details are displayed on the screen.

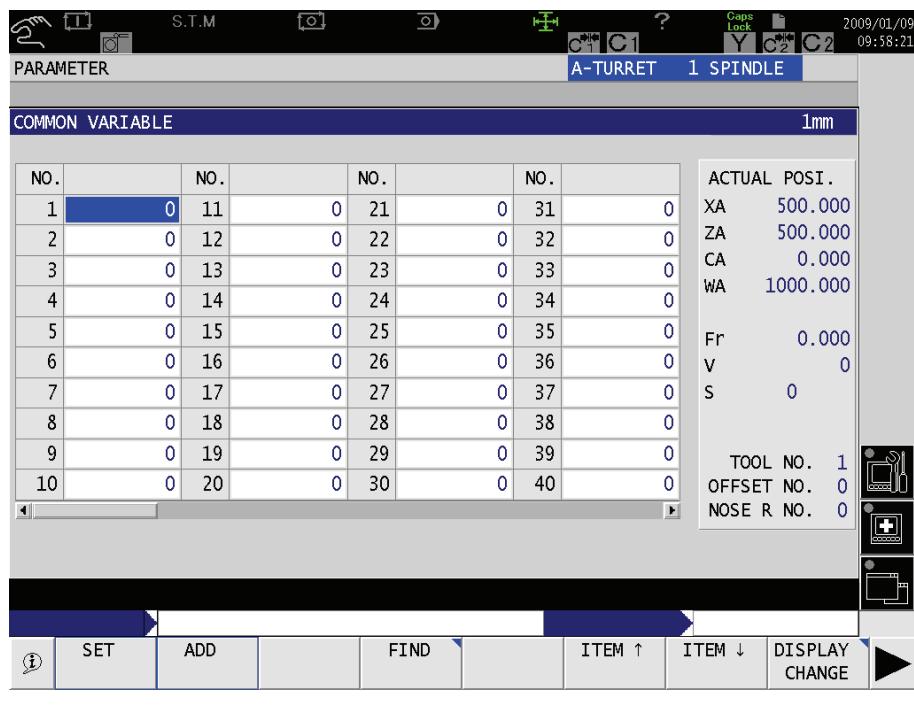


Fig. 5-55

- (3) Press the function key [F8] (DISPLAY CHANGE).

- (4) The following details are displayed on the screen.

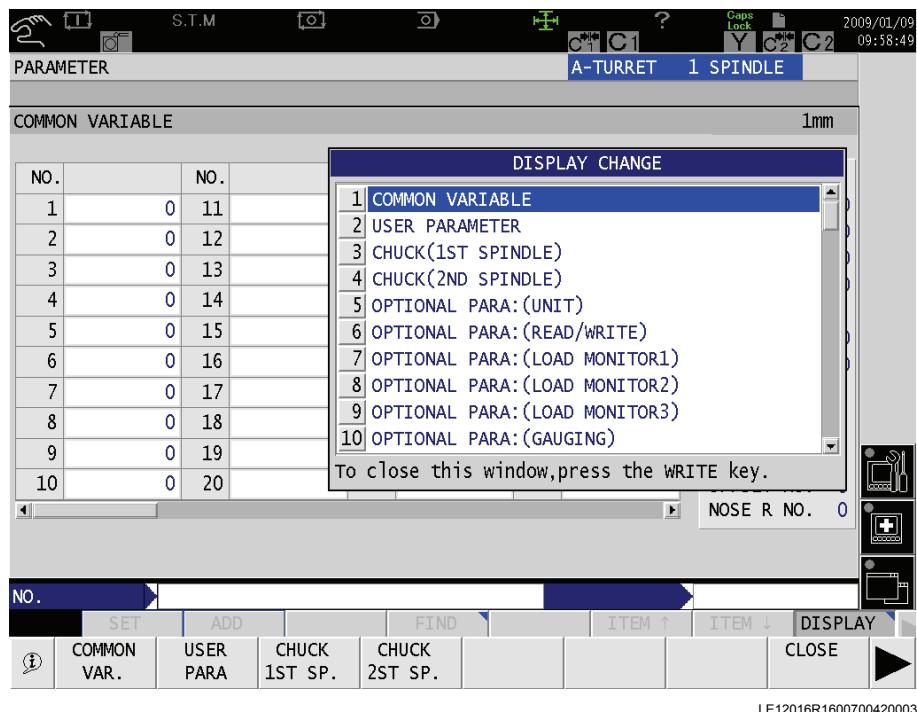


Fig. 5-56

- (5) Select the "SYSTEM PARAMETER" in the "DISPLAY CHANGE" menu by using cursor keys ($\uparrow\downarrow$) on the operation panel and press [F8] (CLOSE).

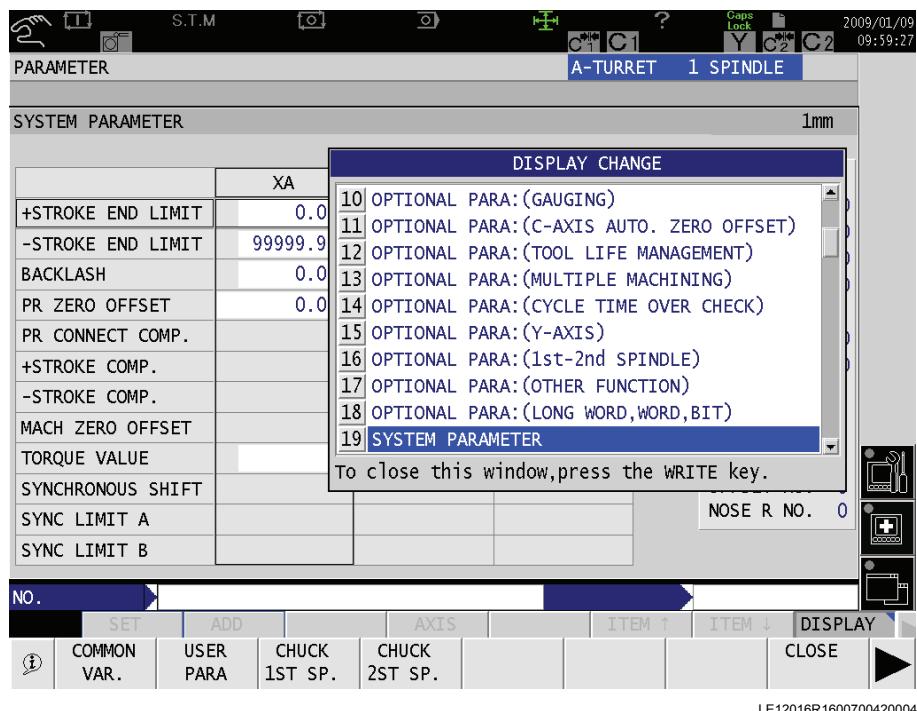


Fig. 5-57

- * If no "SYSTEM PARAMETER" items are displayed after cursor movement, follow the following steps a to f.

SECTION 5 OPERATION

- After the step (4), press the "►" (Extended function) at the rightmost function key.
- The function buttons are switched at the lower half of the following screen.

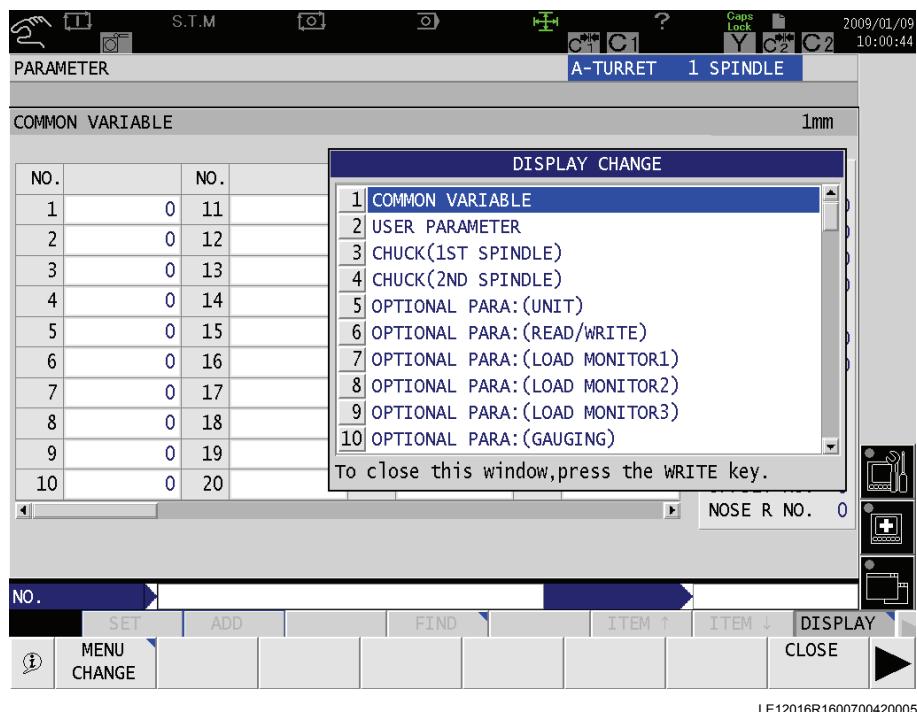


Fig. 5-58

- Press the function key [F1] (MENU CHANGE).
- The following details are displayed on the screen.

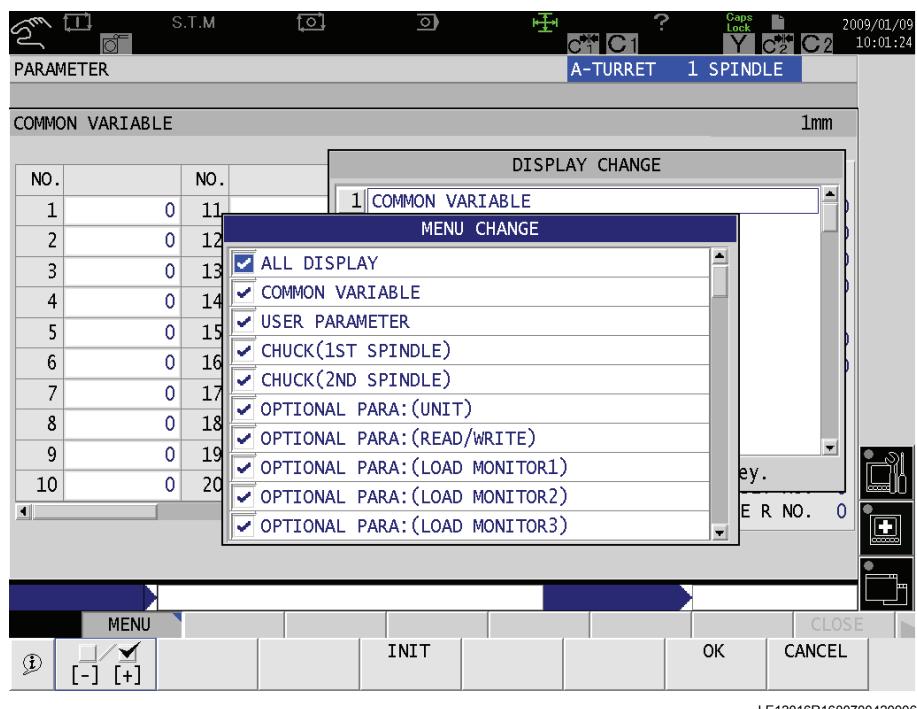


Fig. 5-59

SECTION 5 OPERATION

- e. Check the "ALL DISPLAY" on the "MENU CHANGE" pop-up screen by using a touch-pen and press [F7] (OK).
- f. Return to step 1-(5).

(6) The following details are displayed on the screen.

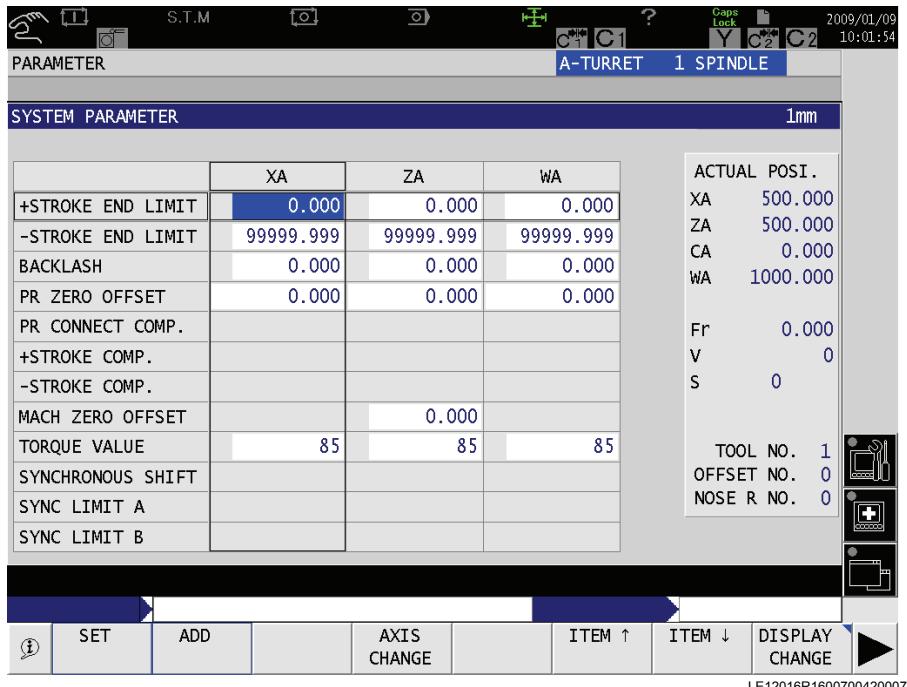


Fig. 5-60

(7) Press down the function key [F4] (AXIS CHANGE) several times to display the "T-axis" screen of the [SYSTEM PARAMETER].

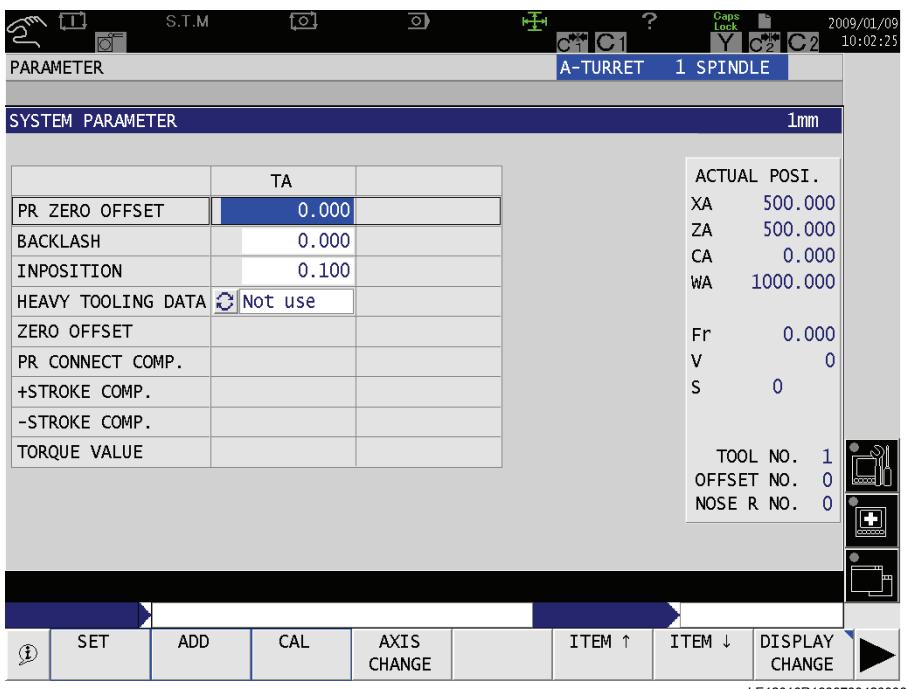


Fig. 5-61

(8) This completes procedure "1-" Opening the "T-axis" screen in [SYSTEM PARAMETER].

- 2-** Select "Use"/"Not use" for "HEAVY TOOLING DATA".
For selecting "Use"/"Not use", refer to [Reference for "Use"/"Not use" of "HEAVY TOOLING DATA"] of the [5-11]. If heavy tools are used] as a reference.
- 3-** Move the cursor to the "HEAVY TOOLING DATA" by using cursor keys ($\uparrow\downarrow$) on the operation panel.
The function buttons are switched at the lower half of the following screen.

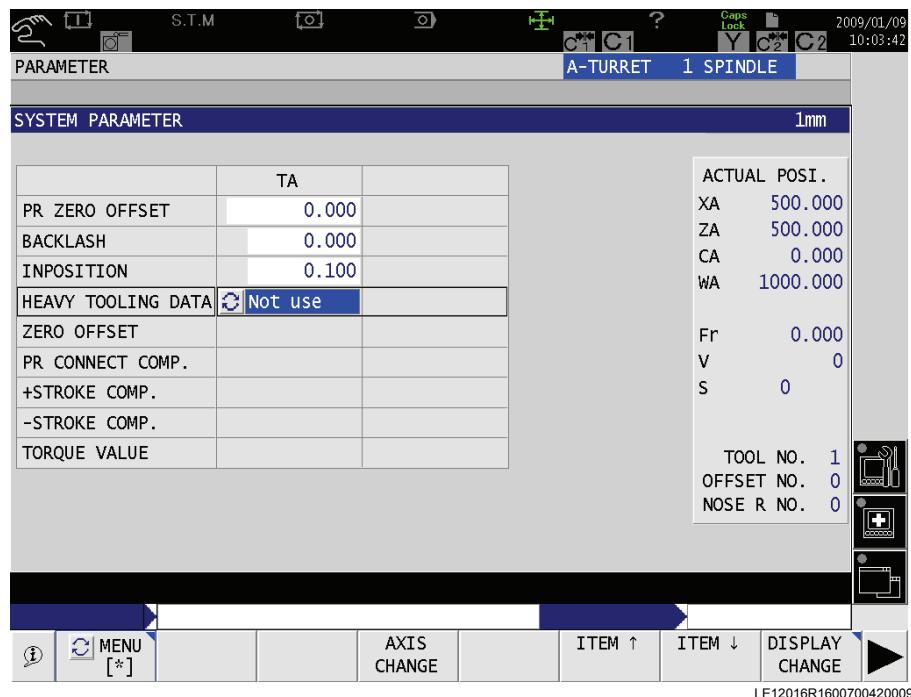


Fig. 5-62

- 4-** Press the function key [F1] (MENU).
The function buttons are switched at the lower half of the following screen.

- 5-** In order to switch "HEAVY TOOLING DATA" from "Not use" to "Use", press the function key [F3] (Use).
 In order to switch "HEAVY TOOLING DATA" from "Use" to "Not use", press the function key [F2] (Not use).

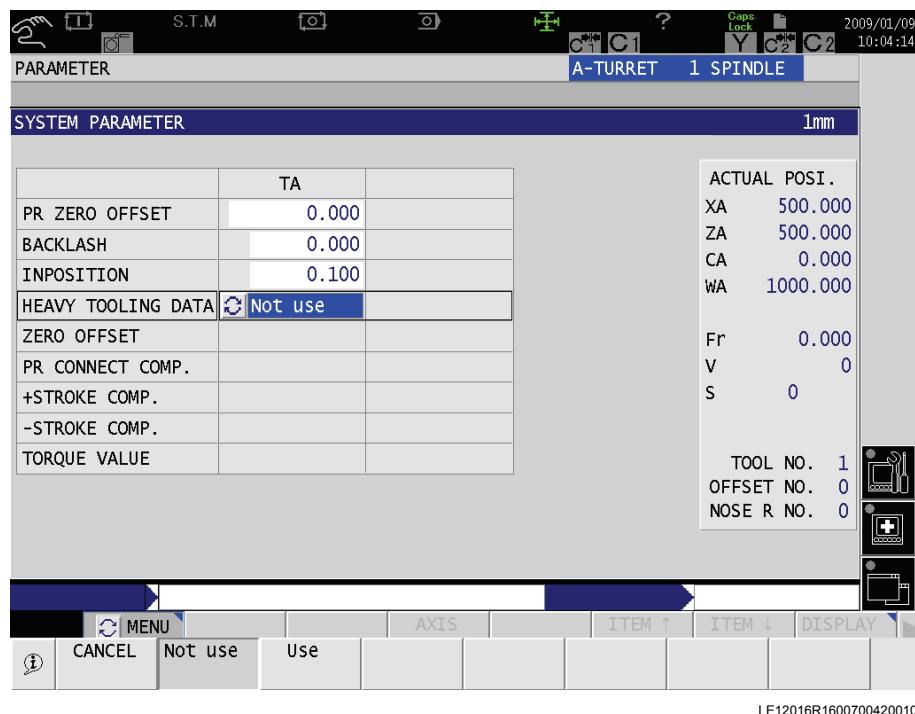


Fig. 5-63

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.

In the step "5-", if you wrongfully press a function key, those settings you have made became disabled. You need to specify settings again.
 After the main machine is powered ON, follow these steps.

- 6-** Turn the main machine ON again.

* Without repowering the main machine, the switched data cannot be activated.

The "HEAVY TOOLING DATA" switch-over is now done.

5-11. If heavy tools are used

- An alarm may be displayed if you rotate turret with many heavy tools installed on the turret. Read the following carefully and then set the "HEAVY TOOLING DATA" parameters to "Use".
- For how to specify settings, refer to [5-10. How to switch "Use"/"Not use" of "HEAVY TOOLING DATA"].

Reference for "Use"/"Not use" of "HEAVY TOOLING DATA"

LB2000EXII

For L turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	1.00 or less	In-base x 7 units
Use	1.01 or more	(Off-set In-base x 5 units)

Table 5-7

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I	+ □20 (0.79) × 100	0.10
Out II	+ □20 (0.79) × 100	0.10
In-base	+ Φ32 (1.26) × 170	0.14
(Off-set In-base)	+ Φ32 (1.26) × 170	(0.25)

Table 5-8

(Off-set In-base = LB2000EXII LW In-base I-S)

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-9.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	(Off-set In-base x 4 units)
Use	(Off-set In-base x 5 units)

Table 5-9

LB2000EXII

For M Radial turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	3.30 or less	Out I x 3, In-base x 3, Front x 3, Side face x 3
Use	3.31 or more	Front x 12

Table 5-10

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I	+ □25 (0.98) × 125	0.19
Out II	+ □25 (0.98) × 125	0.19
In-base	+ Φ32 (1.26) × 170	0.28
Front end mill holder	+ Φ20 (0.79) × 160	0.49
Side face end mill holder	+ Φ20 (0.79) × 160	0.14

Table 5-11

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-12.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	Front end mill x 4 units
Use	Front end mill x 5 units

Table 5-12

LB2000EXII

For M-VDI turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	1.16 or less	Side face end mill x 11 units
Use	1.17 or more	Side face end mill x 12 units

Table 5-13

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out A	+ □20 (0.79) × 120	0.04
Out B	+ □20 (0.79) × 120	0.07
Out C	+ □20 (0.79) × 90	0.08
In-base	+ Ø32 (1.26) × 155	0.08
Front end mill holder	+ Ø13 (0.51) × 132	0.07
Side face end mill holder	+ Ø13 (0.51) × 145	0.10

Table 5-14

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-15.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	Side face end mill x 4 units
Use	Side face end mill x 5 units or more

Table 5-15

LB2000EXII

For MY Radial turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	3.30 or less	Out I x 3, In-base x 3, Front x 3, Side face x 3
Use	3.31 or more	Front x 12

Table 5-16

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I	+ □20 (0.79) × 125	0.19
Out II	+ □20 (0.79) × 125	0.19
In-base	+ Φ32 (1.26) × 170	0.28
Front end mill holder	+ Φ20 (0.79) × 160	0.49
Side face end mill holder	+ Φ20 (0.79) × 160	0.14

Table 5-17

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-18.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	Front end mill x 4 units
Use	Front end mill x 5 units

Table 5-18

LB2000EXII

For LW turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	1.25 or less	In-base I-S x 5 units
Use	1.26 or more	In-base I-S x 12 units

Table 5-19

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I-S	+ □20 (0.79) × 150	0.10
Out II-S	+ □20 (0.79) × 80	0.10
Out III-S	+ □20 (0.79) × 150 + □20 (0.79) × 77	0.15
Out IV-S	+ □20 (0.79) × 150 + □20 (0.79) × 77	0.15
Out V-S	+ □20 (0.79) × 88	0.17
In-base I-S	+ Φ32 (1.26) × 170	0.25
In-base II-S	+ Φ20 (0.79) × 100	0.12
In-base III-S	+ Φ20 (0.79) × 100 × 2	0.12
In-base IV-S	+ Φ20 (0.79) × 100 + □20 (0.79) × 88	0.19

Table 5-20

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-21.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	*In-base I-S x 5 units
Use	When *-marked holder is mounted more than the specified number of units.

Table 5-21

★OPTIONS

LB2000EXII

For MW Radial turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	4.08 or less	Out I-S x 3, In-base-S x 3, Front x 3, Side face x 3
Use	4.09 or more	Front x 12

Table 5-22

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I	+ □20 (0.79) × 150	0.19
Out II	+ □20 (0.79) × 150	0.19
Out I-S	+ □20 (0.79) × 150 × 2	0.31
Out II-S	+ □20 (0.79) × 150 × 2	0.27
In-base	+ Ø32 (1.26) × 200	0.28
In-base-S	+ Ø32 (1.26) × 200 × 2	0.42
Front end mill holder	+ Ø20 (0.79) × 160	0.49
Side face end mill holder	+ Ø20 (0.79) × 160	0.14

Table 5-23

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-24.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	Front end mill x 4 units
Use	Front end mill x 5 units

Table 5-24

LB2500EXII

For L turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	3.00 or less	In-base x 12 units
Use	3.01 or more	(Off-set In-base x 9 units)

Table 5-25

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I	+ □25 (0.98) × 150	0.18
Out II	+ □25 (0.98) × 150	0.18
In-base	+ Φ40 (1.57) × 200	0.25
(Off-set In-base)	+ Φ40 (1.57) × 200	(0.36)

Table 5-26

(Off-set In-base = LB3000EXII LW In-base I-S or equivalent)

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-27.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	* (Off-set In-base x 5 units)
Use	When *-marked holder is mounted more than the specified number of units.

Table 5-27

★OPTIONS

LB2500EXII

For M Radial turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	3.30 or less	Out I x 3, In-base x 3, Front x 3, Side face x 3
Use	3.31 or more	Front end mill x 12 units

Table 5-28

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I	+ □25 (0.98) × 150	0.19
Out II	+ □25 (0.98) × 150	0.19
In-base	+ Ø40 (1.57) × 200	0.28
Front end mill holder	+ Ø20 (0.79) × 160	0.49
Side face end mill holder	+ Ø20 (0.79) × 160	0.14

Table 5-29

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-30.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	* Front end mill x 4 units
Use	When *-marked holder is mounted more than the specified number of units.

Table 5-30

*OPTIONS

LB3000EXII

For L turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	3.00 or less	In-base x 12 units
Use	3.01 or more	Off-set In-base x 12 units

Table 5-31

Tool holder inertia (kg·m²)

Holder	+	Turning tool	Inertia
Out I	+	□25 (0.98) × 150	0.18
Out II	+	□25 (0.98) × 150	0.18
In-base	+	Φ40 (1.57) × 200	0.25
* Off-set In-base	+	Φ40 (1.57) × 200	0.36

Table 5-32

★OPTIONS

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-33.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	* Off-set In-base x 5 units
Use	When *-marked holder is mounted more than the specified number of units.

Table 5-33

★OPTIONS

LB3000EXII

For M Radial turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	3.30 or less	Out I x 3, In-base x 3, Front x 3, Side face x 3
Use	3.31 or more	Front x 12

Table 5-34

Tool holder inertia (kg·m²)

Holder	+	Turning tool	Inertia
Out I	+	□25 (0.98) × 150	0.19
Out II	+	□25 (0.98) × 150	0.19
In-base	+	Φ40 (1.57) × 200	0.28
Front end mill holder	+	Φ20 (0.79) × 160	0.49
Side face end mill holder	+	Φ20 (0.79) × 160	0.14

Table 5-35

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-36.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	* Front end mill x 4 units
Use	When *-marked holder is mounted more than the specified number of units.

Table 5-36

*OPTIONS

LB3000EXII

For M-VDI turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	2.70 or less	Off-set In-base x 5 units
Use	2.71 or more	Front x 12

Table 5-37

Tool holder inertia (kg·m²)

Holder	+	Turning tool	Inertia
Out A	+	□25 (0.98) × 150	0.08
Out B	+	□25 (0.98) × 150	0.08
Out C	+	□25 (0.98) × 150	0.14
In-base	+	Φ20 (0.79) × 185	0.14
Off-set In-base	+	Φ20 (0.79) × 185	0.19
Off-set out	+	□25 (0.98) × 150	0.54
Front end mill holder	+	Φ20 (0.79) × 160	0.14
Side face end mill holder	+	Φ20 (0.79) × 160	0.26

Table 5-38

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-39.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	* Off-set In-base x 4 units
Use	When *-marked holder is mounted more than the specified number of units.

Table 5-39

★OPTIONS

LB3000EXII

For MY Radial turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	3.30 or less	Out I x 3, In-base x 3, Front x 3, Side face x 3
Use	3.31 or more	Front x 12

Table 5-40

Tool holder inertia (kg·m²)

Holder	+	Turning tool	Inertia
Out I	+	□25 (0.98) × 150	0.19
Out II	+	□25 (0.98) × 150	0.19
In-base	+	Φ40 (1.57) × 200	0.28
Front end mill holder	+	Φ20 (0.79) × 160	0.49
Side face end mill holder	+	Φ20 (0.79) × 160	0.14

Table 5-41

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-42.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	* Front end mill x 4 units
Use	When *-marked holder is mounted more than the specified number of units.

Table 5-42

*OPTIONS

LB3000EXII

For MY-VDI turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	3.20 or less	Off-set In-base x 5 units
Use	3.21 or more	Off-set In-base x 12 units

Table 5-43

Tool holder inertia (kg·m²)

Holder	+	Turning tool	Inertia
Out A	+	□25 (0.98) × 150	0.12
Out B	+	□25 (0.98) × 150	0.12
Out C	+	□25 (0.98) × 150	0.25
In-base	+	Φ20 (0.79) × 185	0.25
Off-set In-base	+	Φ20 (0.79) × 185	0.64
Off-set out	+	□25 (0.98) × 150	0.79
Front end mill holder	+	Φ20 (0.79) × 160	0.25
Side face end mill holder	+	Φ20 (0.79) × 160	0.37

Table 5-44

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-45.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	* Off-set In-base x 5 units
Use	When *-marked holder is mounted more than the specified number of units.

Table 5-45

★OPTIONS

LB3000EXII

For LW Radial turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	4.32 or less	In-base I-S x 12 units
Use	4.33 or more	There is no limit on standard holder.

Table 5-46

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I-S	+ □25 (0.98) × 150	0.13
Out II-S	+ □25 (0.98) × 89	0.19
Out III-S	+ □25 (0.98) × 90 × 2	0.21
In-base I-S	+ Φ40 (1.57) × 200	0.36
In-base II-S	+ Φ20 (0.79) × 144	0.15
In-base III-S	+ Φ20 (0.79) × 144 × 2	0.17
In-base IV-S	+ Φ20 (0.79) × 120 × 2 + □25 (0.98) × 90	0.25

Table 5-47

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property</u> .
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-48.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	
Use	There is no limit on standard holder.

Table 5-48

LB3000EXII

For MW Radial turret
For MYW Radial turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	4.08 or less	Out I-S x 3, In-base-S x 3, Front x 3, Side face x 3
Use	4.09 or more	Front x 12

Table 5-49

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I	+ □25 (0.98) × 150	0.19
Out II	+ □25 (0.98) × 150	0.19
Out I-S	+ □25 (0.98) × 150 × 2	0.31
Out II-S	+ □25 (0.98) × 150 × 2	0.27
In-base	+ Ø40 (1.57) × 200	0.28
In-base-S	+ Ø40 (1.57) × 200 × 2	0.42
Front end mill holder	+ Ø20 (0.79) × 160	0.49
Side face end mill holder	+ Ø20 (0.79) × 160	0.14

Table 5-50

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-51.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	* Front end mill x 4 units
Use	When *-marked holder is mounted more than the specified number of units.

Table 5-51

*OPTIONS

LB3000EXII

For MYW Radial turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	4.08 or less	Out I-S x 3, In-base-S x 3, Front x 3, Side face x 3
Use	4.09 or more	Front x 12

Table 5-52

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I	+ □25 (0.98) × 150	0.19
Out II	+ □25 (0.98) × 150	0.19
Out I-S	+ □25 (0.98) × 150 × 2	0.31
Out II-S	+ □25 (0.98) × 150 × 2	0.27
In-base	+ Ø40 (1.57) × 200	0.28
In-base-S	+ Ø40 (1.57) × 200 × 2	0.42
Front end mill holder	+ Ø20 (0.79) × 160	0.49
Side face end mill holder	+ Ø20 (0.79) × 160	0.14

Table 5-53

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-54.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	* Front end mill x 4 units
Use	When *-marked holder is mounted more than the specified number of units.

Table 5-54

★OPTIONS

LB4000EXII

For L turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	3.67 or less	In-base x 10 units
Use	3.68 or more	In-base x 12 units

Table 5-55

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I	+ □25 (0.98) × 150	0.23
Out II	+ □25 (0.98) × 150	0.23
In-base	+ Φ40 (1.57) × 200	0.35

Table 5-56

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-57. 	

HEAVY TOOLING DATA	Tool holder mounting example
Not use	There is no limit on standard holder.
Use	Check this data as required.

Table 5-57

LB4000EXII

For M-VDI turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	6.03 or less	Off-set In-base x 9 units
Use	6.04 or more	Front end mill x 12 units

Table 5-58

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out A	+ □25 (0.98) × 150	0.10
Out B	+ □25 (0.98) × 150	0.10
Out C	+ □25 (0.98) × 150	0.19
In-base	+ Φ20 (0.79) × 185	0.19
Off-set In-base	+ Φ20 (0.79) × 185	0.67
Off-set out	+ □25 (0.98) × 150	0.68
Front end mill holder	+ Φ25 (0.98) × 160	0.19
Side face end mill holder	+ Φ25 (0.98) × 160	0.37

Table 5-59

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
	<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-60.

HEAVY TOOLING DATA	Tool holder mounting example
Not use	There is no limit on standard holder.
Use	Check this data as required.

Table 5-60

LB4000EXII

For M Radial turret
For MY Radial turret

HEAVY TOOLING DATA	Tool holder Total of Inertia (kg·m²)	Tool holder mounting example
Not use	5.07 or less	Out I x 3, In-base x 3, Front x 3, Side face x 3
Use	5.08 or more	Front x 12

Table 5-61

Tool holder inertia (kg·m²)

Holder	+ Turning tool	Inertia
Out I	+ □25 (0.98) × 150	0.28
Out II	+ □25 (0.98) × 150	0.28
In-base	+ Ø40 (1.57) × 200	0.47
Front end mill holder	+ Ø25 (0.98) × 160	0.75
Side face end mill holder	+ Ø25 (0.98) × 160	0.19

Table 5-62

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
<ul style="list-style-type: none"> • Turret rotates slowly after "HEAVY TOOLING DATA" is switched to "Use". • For mounting a toolholder slanted to the turret (unbalanced), see Table 5-63. 	

HEAVY TOOLING DATA	Tool holder mounting example
Not use	* Front end mill x 4 units
Use	When *-marked holder is mounted more than the specified number of units.

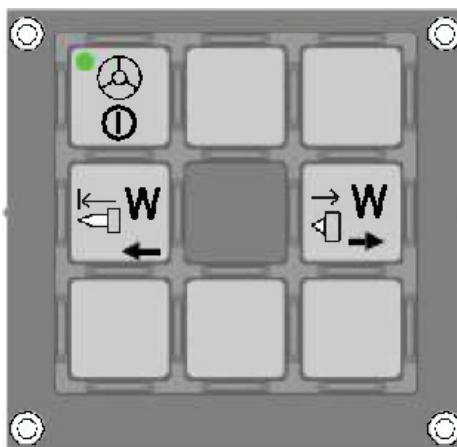
Table 5-63

★OPTIONS

5-12. Moving the Tailstock

When the tailstock is moved through manual operation, the operation can be done by selecting TAILSTOCK W← or TAILSTOCK W→ button on the following additional panel or by using foot pedals.

5-12-1. Using the operation panel



LE12016R1600700450001

Fig. 5-64

Procedure :

- 1-** Position the X-axis at the positive limit and stop spindle rotation.
 - 2-** On the additional operation panel, press
TAILSTOCK W← or TAILSTOCK W→ button to move it.
Feed override is enabled when the axis is being moved. (Does not operate at 0 %.)
- * When the door is open, for safety reasons, it does not move faster than a designated speed. If the designated speed is exceeded, it stops with an alarm. (Max. 2 m/min (7 fpm).)

Movement range

Teaching Mode On: Negative variable limit to Positive variable limit

Teaching Mode Off: Approach to Positive variable limit

- * For information on the position of the variable limit approach, refer to [5-16-2. Adjusting Tailstock Spindle Thrust].

5-12-2.Using the foot switch

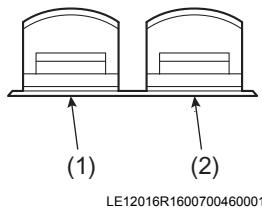


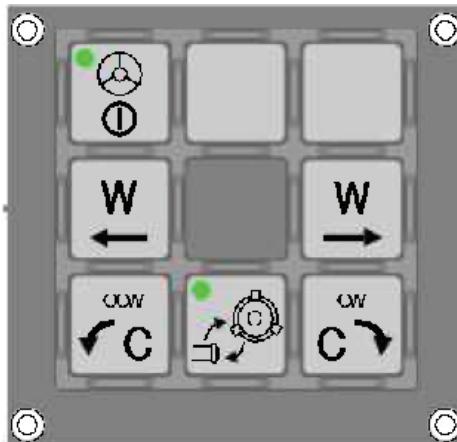
Fig. 5-65

1	Left foot pedal switch (2-step type) - Advances NC tailstock	2	Right foot pedal switch (1-step type) - Retracts NC tailstock
---	--	---	---

- (a) Left foot pedal switch (2-step type)
 - First step (the pedal is lightly stamped)
(Spindle rotates)
 - Second step (the pedal is fully stamped)
(Spindle rotates)
 - For advancing the NC tailstock
 - The NC tailstock advances while the pedal remains stamped.
 - The sleeve advances to the set tailstock position by stamping the foot pedal switch.
- (b) Right foot pedal switch (1-step type)
 - For retracting the NC tailstock
 - The NC tailstock retracts to the set retract position only while the foot pedal switch is being stepped on. If the switch is stepped on again in the set retract position, the NC tailstock retracts to its retract end.

5-13. Sub-spindle movement

- The W-axis movement feed is possible when in MANUAL and when [2ND SPINDLE] mode is off.
- Operation is possible with a pulse handle or flat key.



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Fig. 5-66

By pressing the W← or W→ buttons, W-axis movement starts.
Override is common to X- and Z-axes.

5-14. Spindle inching motion

The following procedure is used to operate the spindle in inching motion.

Procedure : —————

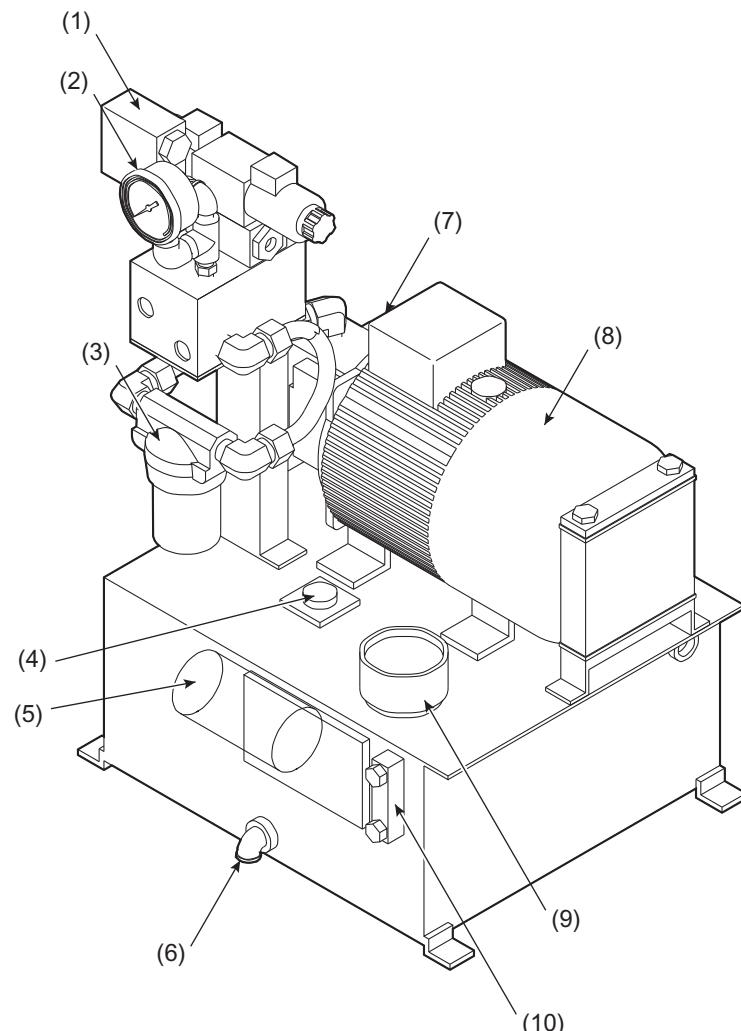
- 1- Press the JOG key on the model panel.

[Supplement]

- | |
|--|
| 1) Spindle speed for inching motion is set to the parameters. (Machine parameters) |
| 2) Inching motion takes place only while the key is pressed. |
| 3) While in spindle Jog operation, the SPINDLE OVERRIDE switch cannot be enabled. |

5-15. Adjusting the Hydraulic Unit Pressure

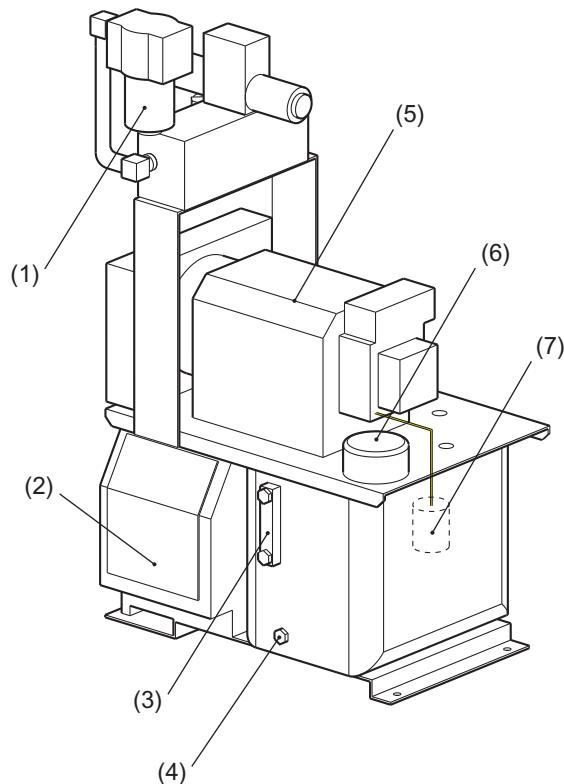
LB2000EXII (MW/W)/LB2500EXII (L/M)/LB3000EXII (L/M/MW/MY/MYW)/LB4000EXII (L/M/MY)



LE12016R1600700490001

Fig. 5-67

1	Pressure switch	6	Drain port
2	Pressure gauge	7	Source pressure adjustment valve
3	Line filter	8	Variable discharge pump
4	Level switch	9	Oil filler port
5	Suction filter	10	Oil level gauge

LB2000EXII (L/M/MY)

LE12016R1600700490002

- * Pressure switch (for detecting the source pressure of hydraulic unit) and pressure gauge are equipped.

Fig. 5-68

1	High pressure filter	5	Inverter-driven pump
2	Controller	6	Oil filler port
3	Oil level gauge	7	Suction strainer
4	Drain port		

5-15-1. Pressure Indication

The pressure gauge should indicate the following set pressure:

Source pressure	4.5 MPa (653 psi)
-----------------	-------------------

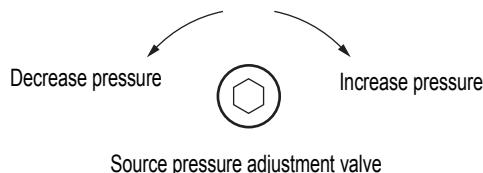
Table 5-64

5-15-2.Pressure adjustment

How to adjust the pressure for each functional unit will be explained. However, pressure for the turret is pre-adjusted at the factory so it normally does not require adjustment. Depending on operational conditions, if adjustment becomes necessary, please contact OKUMA.

When readjustment is to be made by your plant personnel, extreme caution must be taken in accordance with the instructions given here to avert any mechanical trouble in the drive lines.

- Source pressure adjustment (Adjustment is not usually required.)



LE12016R1600700510001

Pressure setting for source pressure abnormality alarm: 2 MPa (290 psi)

Fig. 5-69

5-15-3.Replacing Oil and Filter (MNTKEY0410)

Lubrication

Specified Oil (ISO)	HM32
Tank Capacity	See the lubrication table.
Replenish	Replace in 1 month after initial installation, and every 6 months after that.

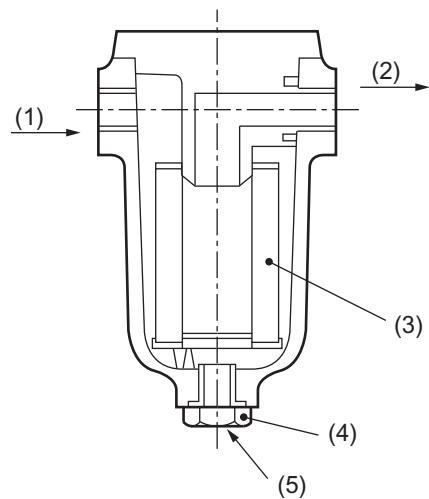
Table 5-65

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in damage to your property.</u>
Clean the suction filter, the line filter, and the tank when changing the oil. Check the pressure for respective actuators.	

A clogged filter element causes contaminated oil to circulate through the hydraulic system, which may lead to a machine trouble. Please replace that filter as follows.

Procedure : _____

- 1- Loosen nuts and drain oil.
- 2- Pull out the element downward and clean the case.
- 3- Replace the element.



LE12016R1600700520001

Filter (for hydraulic unit)

Fig. 5-70

1	Inlet	4	Nut
2	Outlet	5	Drain
3	Filter element		

Maker	Yamashin Filter
Type	DTII-04-30-15-Rc1/2
Part number	H0032-0016-79

Table 5-66

Lubrication quantity

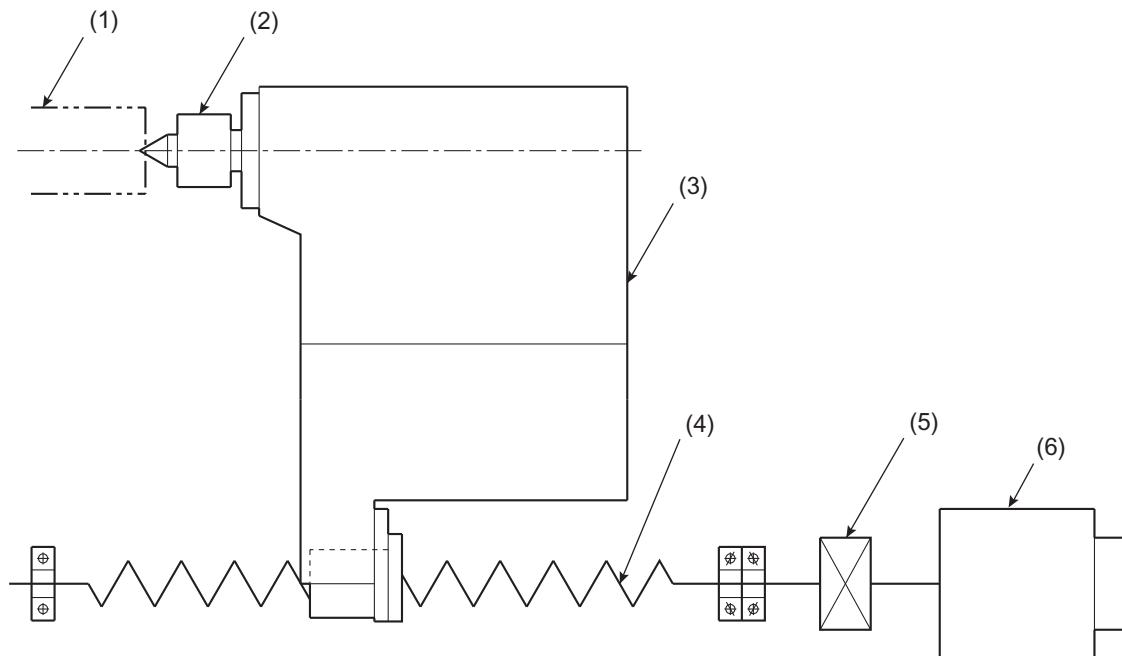
Model	LB2000EXII L LB2000EXII M LB2000EXII MY	LB2000EXII W LB2000EXII MW	LB2500EXII L LB2500EXII M
Oil quantity (L (gal))	10 (2.6)	20 (5.2)	20 (5.2)
Model	All LB3000EXII series		
Oil quantity (L (gal))	20 (5.2)		

Table 5-67

5-16. Adjusting the NC Tailstock

5-16-1.NC Tailstock Construction

The NC tailstock is designed for the OSP to control the tailstock thrust by motor torque. When a workpiece is gripped, the thrust spring incorporated into the ball screw flexes in accordance with the thrust, hence maintaining the necessary thrust.



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Fig. 5-71

1	Workpiece	4	Ball screw
2	Tailstock center	5	Coupling
3	Tailstock body	6	Motor

Positioning the NC Tailstock

Refer to the [OSP SPECIAL FUNCTIONS MANUAL].

5-16-2.Adjusting Tailstock Spindle Thrust

The tailstock uses the sizing position as the target when moving. Therefore, if the sizing position is not accurately set, the thrust will not be set correctly.

Whenever the workpiece length changes, make sure the sizing position is adjusted accordingly.
Set the sizing position using the following procedure.

Procedure :

- 1-** Grip the workpiece with the chuck.
- 2-** Return the X-axis to the positive limit and stop the spindle rotation.
- 3-** On the additional operation panel, press the Teaching Mode button to turn it on.
- 4-** Display the [TS. SETUP] sheet on the [RUN] screen.

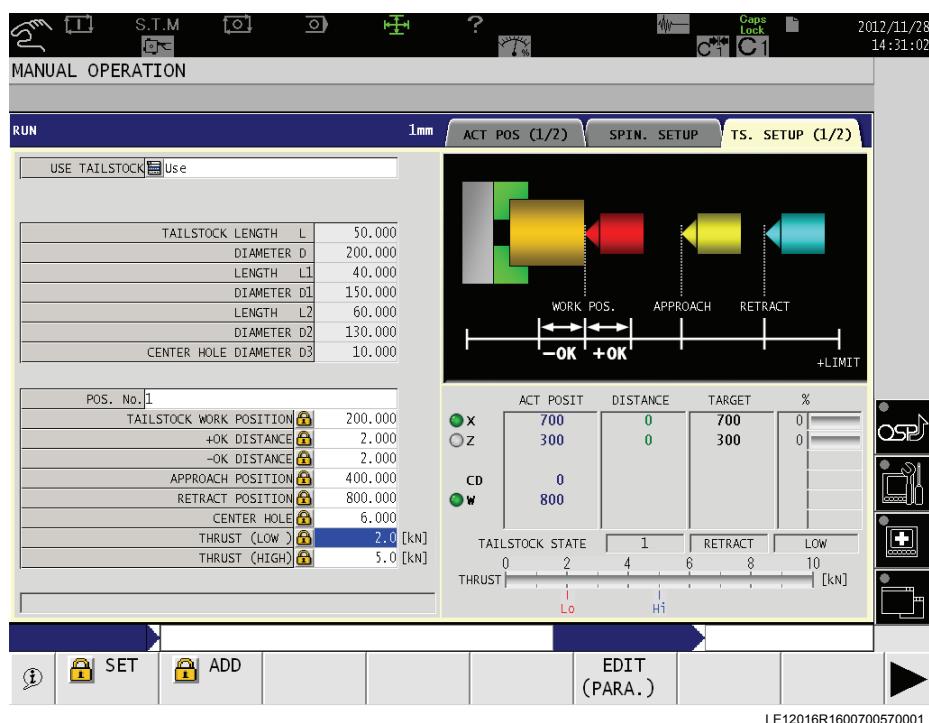


Fig. 5-72

- 5-** Set tailstock thrust.

- If the machine is equipped with "LOW" thrust and "HIGH" thrust switching capability (optional), set both.
- If there is no need to switch between "LOW" thrust and "HIGH" thrust, set the same value for both.

- 6-** Set the "RETRACT" position to a position where the workpiece can be removed from the chuck.

Move the tailstock to a position where the workpiece can be removed, then set the cursor on "RETRACT" and select CAL and WRITE buttons.

- 7-** Set the "APPROACH" to a position that does not interfere with the workpiece (2 mm to 3 mm (0.08 in. to 0.12 in.) from the end surface.)
(The "APPROACH" position is set to the W- side of the "RETRACT" position.)
On the 1st forward step of the foot pedal, bring it to within 2 mm to 3 mm (0.08 in. to 0.12 in.) from the end surface, align it with "APPROACH" and press CAL and WRITE buttons.
After the position is set, slightly retreat it from that position.

- 8-** From a position slightly retreated from the "APPROACH" position, by stepping on the foot pedal to a second step forward, the tailstock will be fed to the sizing position and will stop when it reaches the tailstock thrust.
When the sizing position is reached, "SIZING POSITION, REACHED AT THRUST" is displayed on the diagnosis screen.

- 9-** Move the cursor to the "WORK POSITION" with the currently selected sizing number and press CAL and WRITE buttons.

- 10-** Anticipated values are set in "-OK" and "+OK" as tolerance for the sizing position.

- 11-** To end the setup procedure of the sizing position, retreat the tailstock and turn off the Teaching Mode button.

[Supplement]

To obtain better thrust, set "APPROACH" to a position that is retreated 2 mm (0.08 in.) or more (W+ side) of "+OK" of the "WORK POSITION".

Operation after adjustment (Normal work)

Procedure : _____

- 1-** When the Teaching Mode button is turned off, workpiece is supported using M code or manual operation.

- 2-** Sizing operation (a second step forward on foot pedal) is performed by stepping on the pedal at a position on the W+ side of the "APPROACH" position.

- 3-** If the pedal is stepped on while the tailstock is positioned between the "WORK POSITION" and the "APPROACH", the following alarm is triggered.
[1367 ALARM-A NC Tailstock advance error]



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

When supporting the workpiece by hand while positioning the tailstock, be careful not to pinch your hand and fingers.

SAFETY INSTRUCTIONS

Indicates general instructions for safe operation.

The tailstock thrust largely affects the service life of the spindle and the rotating center. Do not set the thrust unnecessarily high.

Tailstock thrust adjusting range:

For Tailstock thrust adjusting range, see the appendix.

For how to adjust thrust, refer to the [OSP SPECIAL FUNCTIONS MANUAL].

Tailstock thrust

Inching specification (invalid)	LB2000EXII	LB3000EXII	LB4000EXII
Tailstock thrust adjusting range (kN (lbf))	(300 between centers): 0.5 to 3 (113 to 675) (500 between centers): 0.5 to 5 (113 to 1125)	0.5 to 5 (113 to 1125)	1 to 7.5 (225 to 1688)

Table 5-68

Inching specification (valid)	LB2000EXII	LB3000EXII	LB4000EXII
Tailstock thrust adjusting range (kN (lbf))	(300 between centers): 1 to 3 (225 to 675) (500 between centers): 1 to 5 (225 to 1125)	1 to 5 (225 to 1125)	1 to 7.5 (225 to 1688)

Table 5-69

SAFETY INSTRUCTIONS	Indicates general instructions for <u>safe operation</u> .
The tailstock thrust largely affects the service life of the spindle and the rotating center. Do not set the thrust unnecessarily high.	

5-16-3.Switching Between Center-work and Chuck-work

Set whether the NC tailstock is used (center-work) or not (chuck-work) by setting parameters.

Center-work

- The NC tailstock operates by the foot pedal switch.
- The spindle can rotate only when the left foot pedal switch is stamped to the second step.

Chuck-work

- The NC tailstock does not operate.
- The spindle can rotate only when the NC tailstock is located in between the set retract position and the retract end.

CAUTION	Indicates a potentially hazardous situation which, if not avoided, <u>may result in minor or moderate injury</u> .
----------------	--

Be careful with interference with the spindle because it is capable of spinning when the NC tailstock is positioned between the set retract position and the retract end, or when the machine is setup for chuck work.

5-16-4.Allowable Loads and Speeds of the Rotating Center

Use the rotating center under the allowable loads shown in the table below. It is recommended that you use the rotating center under conditions not exceeding this range.

Table for allowable loads Unit: kN (lbf) Service life: 2,000 hrs

MT NO.4 (LB2000EXII)

Spindle speed (min⁻¹) per load	Radial	Thrust
500	4.6 (1035.0)	2.4 (540.0)
1,000	3.8 (855.0)	1.9 (427.5)
1,500	3.3 (742.5)	1.5 (337.5)
2,200	3.0 (675.0)	1.5 (337.5)
3,000	2.7 (607.5)	1.4 (315.0)
4,000	2.4 (540.0)	1.2 (270.0)
6,000	2.2 (495.0)	1.1 (247.5)
6,300	2.0 (450.0)	1.0 (225.0)

Table 5-70

MT NO.05 (LB3000EXII/4000EXII)

Spindle speed (min⁻¹) per load	Radial	Thrust
500	6.3 (1417.5)	4.7 (1057.5)
1,000	5.9 (1327.5)	3.7 (832.5)
1,500	5.2 (1170.0)	3.2 (720.0)
2,000	4.8 (1080.0)	2.9 (652.5)
2,500	4.5 (1012.5)	2.7 (607.5)
3,000	4.2 (945.0)	2.5 (562.5)
3,500	4.0 (900.0)	2.4 (540.0)
4,000	3.9 (877.5)	2.3 (517.5)
4,200	3.8 (855.0)	2.3 (517.5)

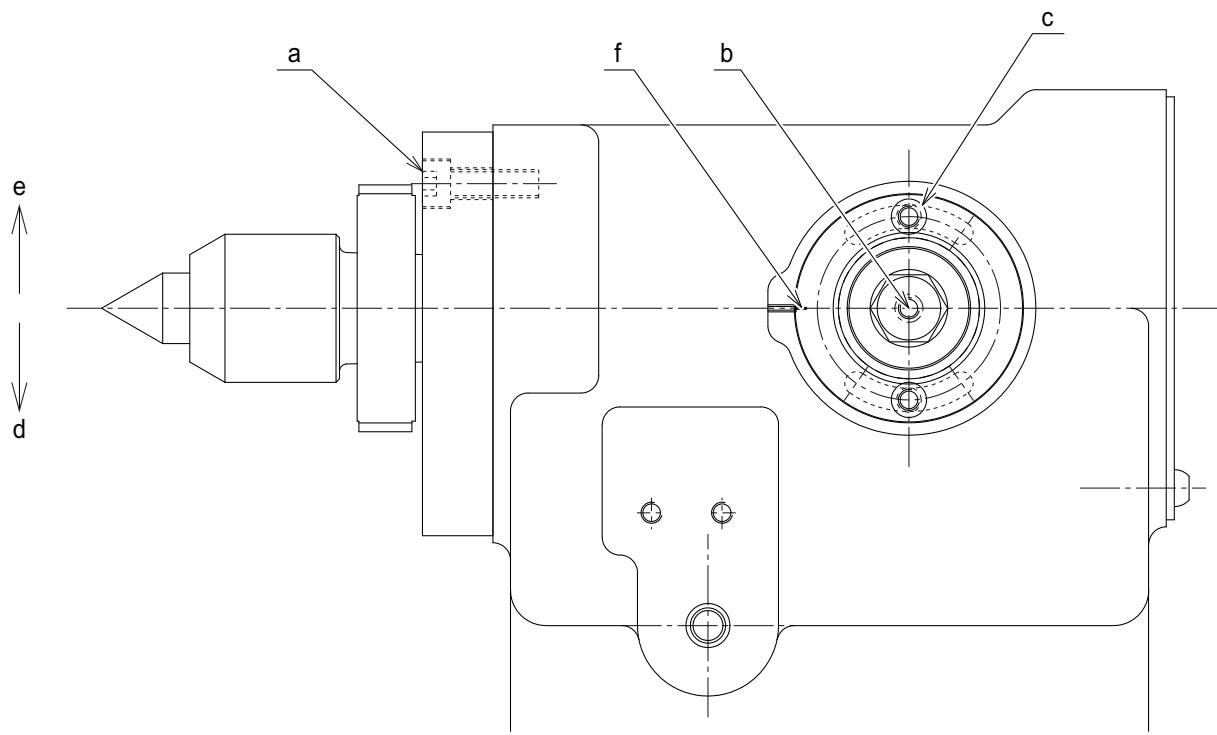
Table 5-71

5-16-5. Quill Taper Adjustment (Optional)

When the workpiece has a tapered portion, its cylindricity can be adjusted by using the taper adjusting device provided in the NC tailstock. The adjustment procedure is as follows:

Procedure : —

- 1-** Loosen the tailstock fixing bolt (a).
- 2-** Loosen the two bolts (c) so that the hexagon head screw (b) at the center of the device can be rotated.
- 3-** When the hexagon head screw (b) is rotated clockwise using a wrench, the center tip moves toward the direction of (d).
When rotated counterclockwise, the tip moves toward the direction of (e).
- 4-** A scale plate (f) is provided as a general guide for taper correction amounts. To check the actual effect of taper adjustment, directly measure the workpiece dimensions with a dial gauge or perform trial machining after adjusting the taper cylindricity.
- 5-** After the taper correction adjustment, be sure to tighten the bolts (a) and (c).



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Fig. 5-73

5-17. Operating the Hydraulic Chuck

5-17-1.Precautions on the chuck



Indicates an imminently hazardous situation which, if not avoided, **will result in death or serious injury.**

Chuck jaw may penetrate through the protective cover.

High danger will result in death or serious injury when chuck jaws strike through the protective cover or safety window glass.

The following safety advices have to be observed:

- Always follow the safety instruction of chuck/clamping device manufacturer.
- Select the right chuck that matches the specifications.
- Never exceed the maximum admissible spindle speed defined by chuck manufacturer.
- Always close the front door before starting the spindle.
- If a chuck or jig is unique to your application, check the maximum allowable spindle speed and stay within the limit. Also, take note of the workpiece gripping force and balance.
- Limit the maximum spindle speed by setting a G50 command with the spindle speed. The G50 command helps to ensure safety in operation.



Indicates a potentially hazardous situation which, if not avoided, **may result in minor or moderate injury.**

High risk of serious injury and damaging your property.

If the spindle must be rotated close to the maximum allowable chuck speed, observe the following points:

- Make sure that the workpiece clamped in the chuck is balanced.
- Apply the allowable maximum amount of pressure to grip the workpiece because centrifugal force reduces the chuck gripping force.

The maximum allowable spindle speed and application pressure are indicated on the name plate on the front shield and on the chuck body.

The allowable maximum speed and the applicable pressure ensure a chucking force that is more than one-third over the original chuck gripping force with the standard soft-top jaw set in line with the periphery of the chuck body.

- If special jaws (larger than standard soft-top jaws) are used, observe the following points:
 - Lower the spindle speed because centrifugal force and lower efficiency reduce the chuck gripping force.
 - If the jaw tightening nut (jaw nut) is outside of the periphery of the chuck, only one tightening bolt is holding the jaws in place. This is a potentially dangerous condition. Jaw nuts must always be within the periphery of the chuck.
 - Machine the jaws to the workpiece shape.

- Do not clamp a workpiece that has a diameter larger than the maximum chuck allowable clamp diameter with the jaws that extend out of the chuck periphery. Doing so may increase the chuck internal stress, causing breakage to the chuck body.
- Securely tighten the bolts on the chuck body, the jaws, and the block to the specified torque. Use lubrication oil. Make sure that the torque is at least 392 N to 490 N (88 lbf to 110 lbf).
- Workpieces should be clamped in the chuck without imbalance. Cutting conditions must be selected by referring to the [5-17-7. Hydraulic Chuck Clamping Force Characteristics Diagram] since chuck jaw gripping force varies depending on the spindle speed. The maximum spindle speed and maximum allowable pressure limit (maximum setting) are indicated on the instruction plate attached to the front of the chip guard. The maximum spindle speed refers to the speed at which the chuck can be turned, with its gripping force maintained more than one-third of its rating, while the outer ends of the individual top jaws are positioned evenly with the peripheral surface of the body.
- When soft top jaws larger than standard ones provided with the machine are prepared by the customer and used with the chuck, keep in mind that developing centrifugal force and decreasing efficiency may reduce the actual gripping force. Be sure to reduce the spindle speed accordingly.

5-17-2.Safe chuck work



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

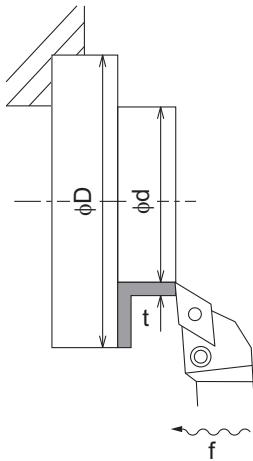
Chuck jaw may penetrate through the protective cover.

High danger will result in death or serious injury when chuck jaws strike through the protective cover or safety window glass.

Refer to the manual provided by its chuck maker for use of the chuck.

Follow the instructions provided in [5-17-1. Precautions on the chuck] of the instruction manual.

- Make sure to set the grip force of the chuck with sufficient safety factor.
(Safety factor: 2 to 3 or above) Operate within the rotation speed for this setting.
In the case of high jaws or special jaws, their centrifugal force increases according to the chuck rotation speed, resulting in increase of gripping force loss. Use the chuck after carefully examining the cutting conditions.
When using high jaws or special jaws or when gripping the workpiece at the tips of jaws, use the jaws by lowering the plunger input in reverse proportion to the jaw height. If jaws are used without lowering the plunger input, there is a danger that the chuck breaks and the fragments of chuck and workpiece disperse.



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Fig. 5-74

D: Grip diameter mm (in.)

d: Machining diameter mm (in.)

t: Cutout mm (in.)

f: Feed mm/rev (ipr)

k: Cutting resistance kg/mm² (Different for each kind of workpiece material.)

F: Grip force (Total tightening force of the 3 jaws) kg (lb)

μ : Friction coefficient of the jaw; Soft-top jaw: 0.11, Hard jaw: 0.17

Indications of K

Steel (S45C)	250 kg/mm ²
Cast metal (FC20)	150
Aluminum (Al)	60 to 30
Gunmetal (Bs)	60 to 30

Table 5-72

$$\text{Cutting moment: } \frac{d}{2} \times t \times f \times k \quad \text{kg-mm}$$

$$\text{Grip moment: } \frac{D}{2} \times F \times \mu \quad \text{kg-mm}$$

1. For continuous cutting: Grip moment > 1.5 x Cutting moment
 2. For intermittent cutting: Grip moment > 3.0 x Cutting moment
- Make sure the settings meet conditions 1 and 2.

- * If the above conditions cannot be met, cutting conditions need to be changed.

Beware when cutting workpieces, as centrifugal force will weaken grip force. (Especially when high jaws or special jaws are used.)

$$\text{Centrifugal force: } \frac{W}{g} \times r \times \left(\frac{2\pi N}{60} \right)^2$$

W: Weight kg (lb)

g: Gravitational acceleration 9.8 m/S²

r: Radius m (ft.)

N: Spindle speed min⁻¹

- In constant peripheral speed cutting, calculate the actual machining speed before designating G50 (max. speed limit function).

$$N = (1,000 \times V) / (\pi \times D)$$

N	Spindle speed	π	Circumference ratio, 3.14
V	Cutting speed	D	Machining diameter

Table 5-73

- For the jaw gripping width, usually secure a length of $1/3L$ or over.
If it is impossible or the gripping force is low, examine the gripping force including other conditions. This is because their gripping conditions differ from the usual ones.

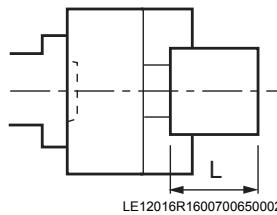


Fig. 5-75

- If an excessively long workpiece is held by chucking on one side, the workpiece may sway and damage the machine internal parts.
- To hold a long workpiece, avoid one-side chucking and use a tailstock or work rests to securely support the workpiece free end.
- The allowable work length varies with the cutting conditions or workpiece rigidity. As a criterion, if the length "L" in the figure below is longer than the value calculated by the formula below, it is recommended that a tailstock to be used.

$$L = L_1 + (L_1 \times 3.5)$$
- Even if the length "L" is shorter than the value calculated by the formula below, concern the overturning moment and use the tailstock if necessary.

$$L < L_1 + (L_1 \times 3.5)$$

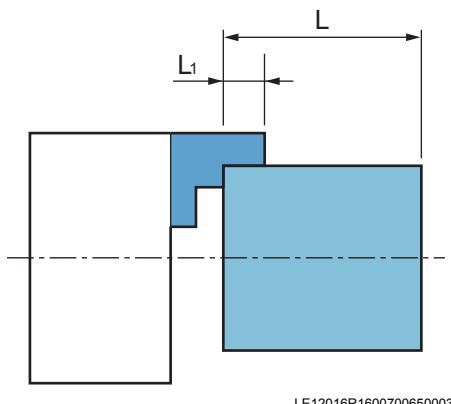


Fig. 5-76

SECTION 5 OPERATION

- When clamping a workpiece, jaws should be at the central area of the entire stroke (see the illustration). The clearance between the jaws and the workpiece should be 4 mm (0.16 in.) or less.

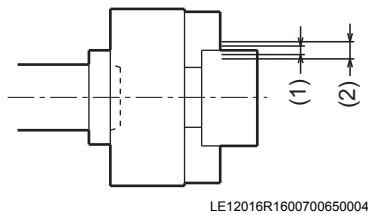


Fig. 5-77

1	Appropriate stroke range Within 1/3 range from the central area of the entire stroke	2	Entire stroke
---	---	---	---------------

- Before machining an unbalanced workpiece, carry out balancing of the workpiece weight. Or gradually increase or decrease its spindle speed.

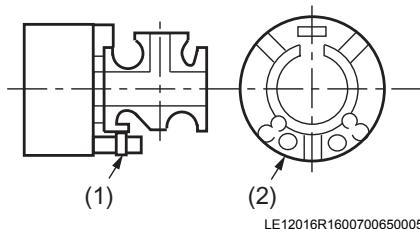


Fig. 5-78

1	Clamping block	2	Balance weight
---	----------------	---	----------------

- Never attempt to install jigs using T-nut. Be sure to fix the jigs with bolts. No chucks prepared by OKUMA have T-slot.

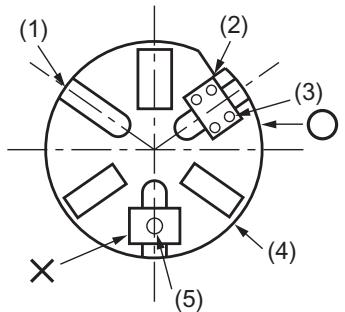


Fig. 5-79

1	T-slot	4	Jaw
2	Jig	5	T-nut
3	Bolt		

- When inserting a bar material into the hollow chuck, ensure that the bar does not protrude from the rear end of the cylinder.

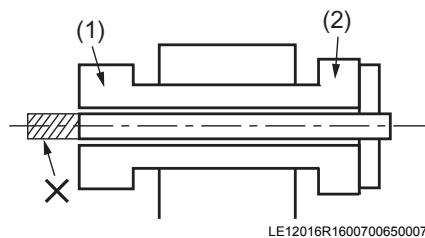


Fig. 5-80

1	Cylinder	2	Hollow chuck
---	----------	---	--------------

- Never use double chucking method.

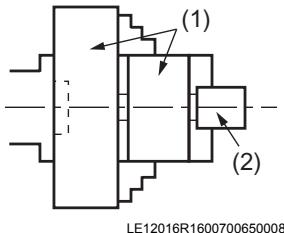


Fig. 5-81

1	Chuck	2	Workpiece
---	-------	---	-----------

- Where jaw nuts shown below go beyond the peripheral surface of the body, only one bolt secures the corresponding jaw and a very dangerous condition is created. Be sure to locate the jaw nuts within the periphery of the chuck.
It is a good and safe practice to use soft top jaws that are made to fit the actual work configuration.

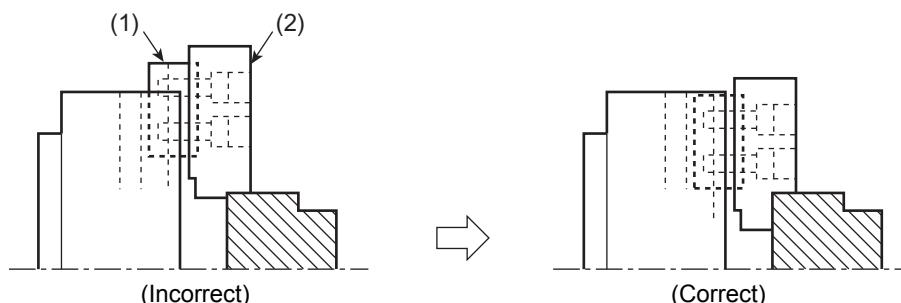


Fig. 5-82

1	Jaw nut	2	Jaw
---	---------	---	-----



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



Be careful not to pinch your hands when gripping the workpiece with the chuck.

5-17-3. Construction of Hydraulic Chuck

The construction of hydraulic chuck is shown below.

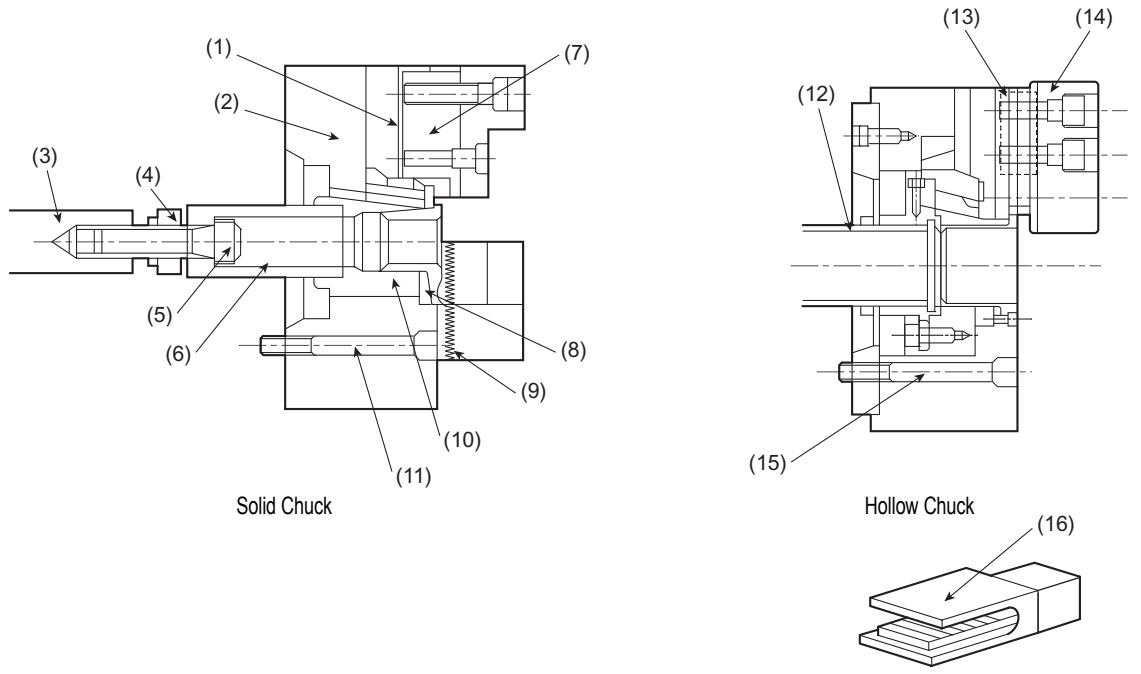
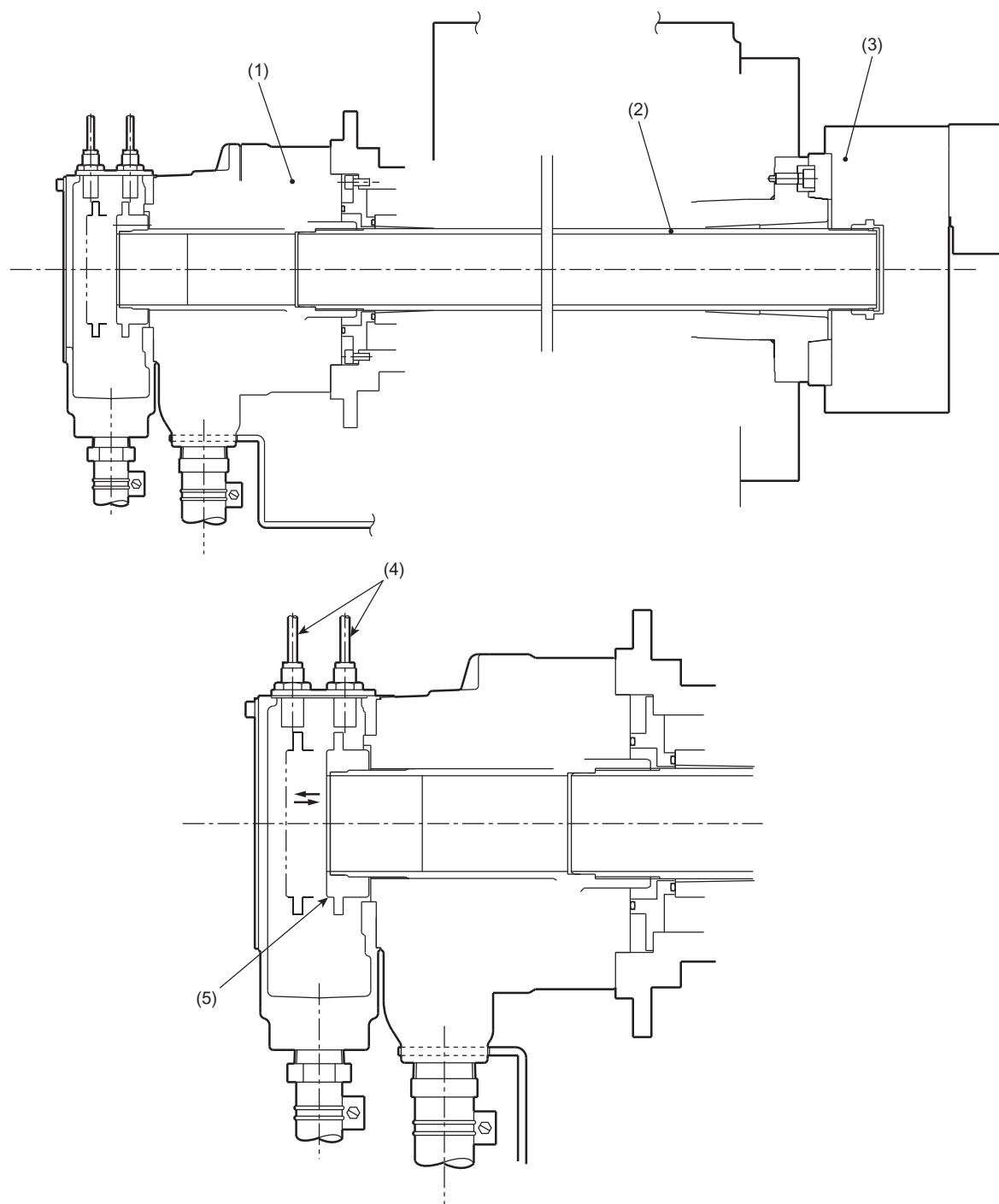


Fig. 5-83

1	Master jaw	9	Top jaw
2	Chuck body	10	Wedge plunger
3	Connecting rod	11	Mounting bolt
4	Nut	12	Draw tube
5	Draw screw	13	Jaw nut
6	Draw tube	14	Top jaw
7	Jaw nut	15	Mounting bolt
8	Pilot bushing	16	Chuck operating pedal

5-17-4. Construction of Hollow Chuck Cylinder



LE12016R1600700670001

Fig. 5-84

1	Hydraulic cylinder	4	Proximity switch
2	Draw tube	5	Dog
3	Hydraulic chuck		

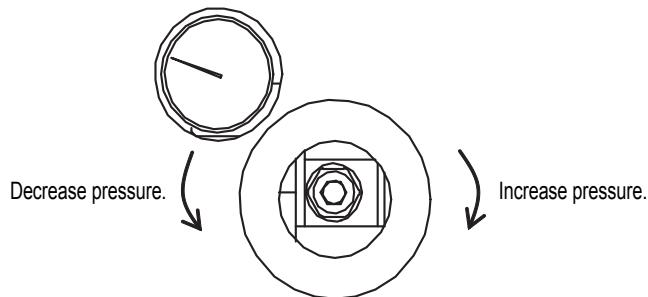
Position of the dog moving with the hydraulic rotary cylinder piston is detected by the proximity switches to confirm the chuck jaw position. (Optional)

5-17-5.Chuck pressure adjustment

How to adjust the pressure for each functional unit will be explained. However, pressure for the turret is pre-adjusted at the factory so it normally does not require adjustment. Depending on operational conditions, if adjustment becomes necessary, please contact OKUMA.

When readjustment is to be made by your plant personnel, extreme caution must be taken in accordance with the instructions given here to avert any mechanical trouble in the drive lines.

- Chuck pressure adjustment



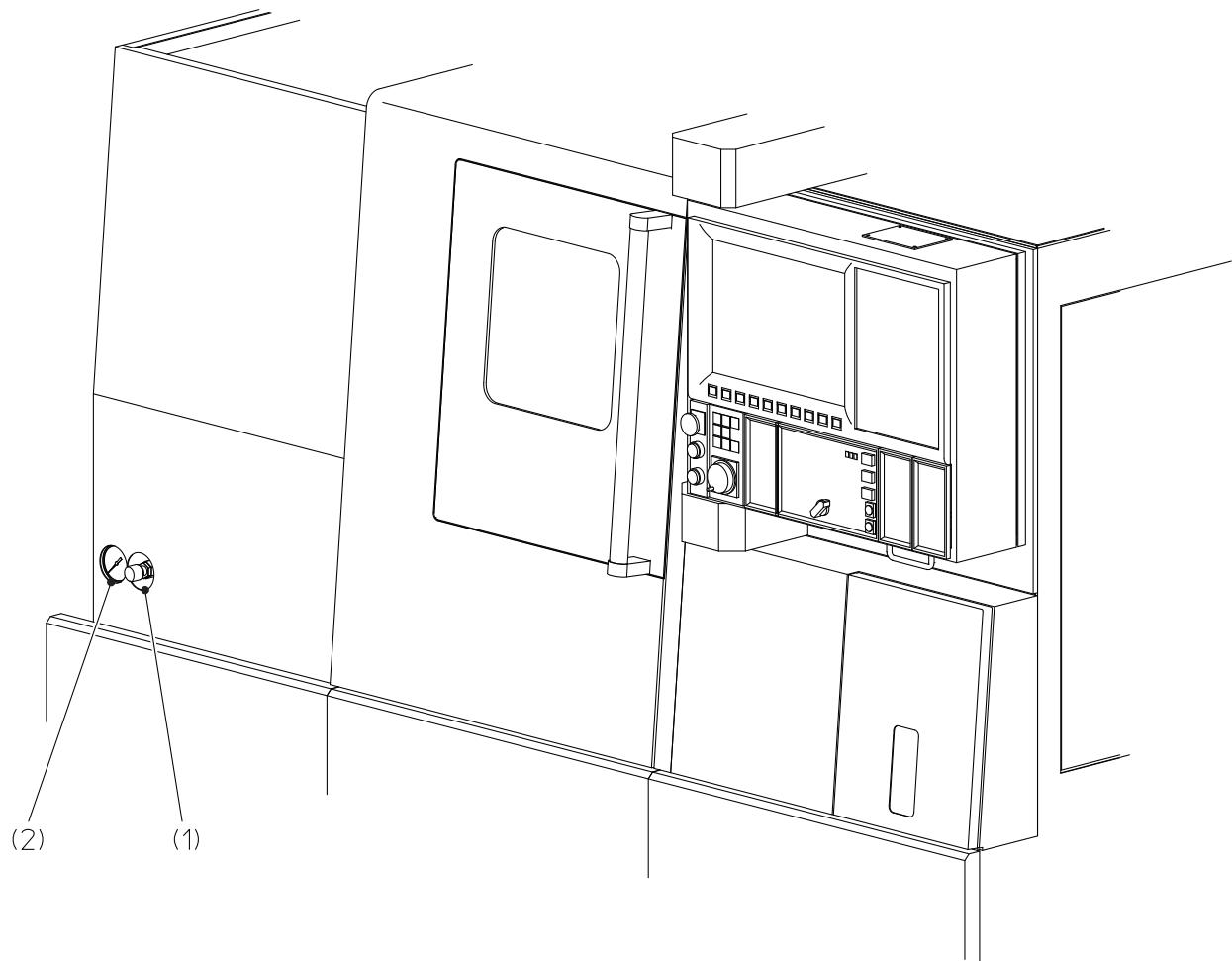
LE12016R1600700680001

Chuck pressure adjustment valve

Fig. 5-85

Position of the pressure adjustment valve

- Adjusting the hydraulic chuck pressure



LE12016R1600700690001

Fig. 5-86

1	Valve for adjusting the hydraulic chuck pressure	2	Pressure gauge for the hydraulic chuck pressure
---	--	---	---

*The figure presents LB3000EXII.

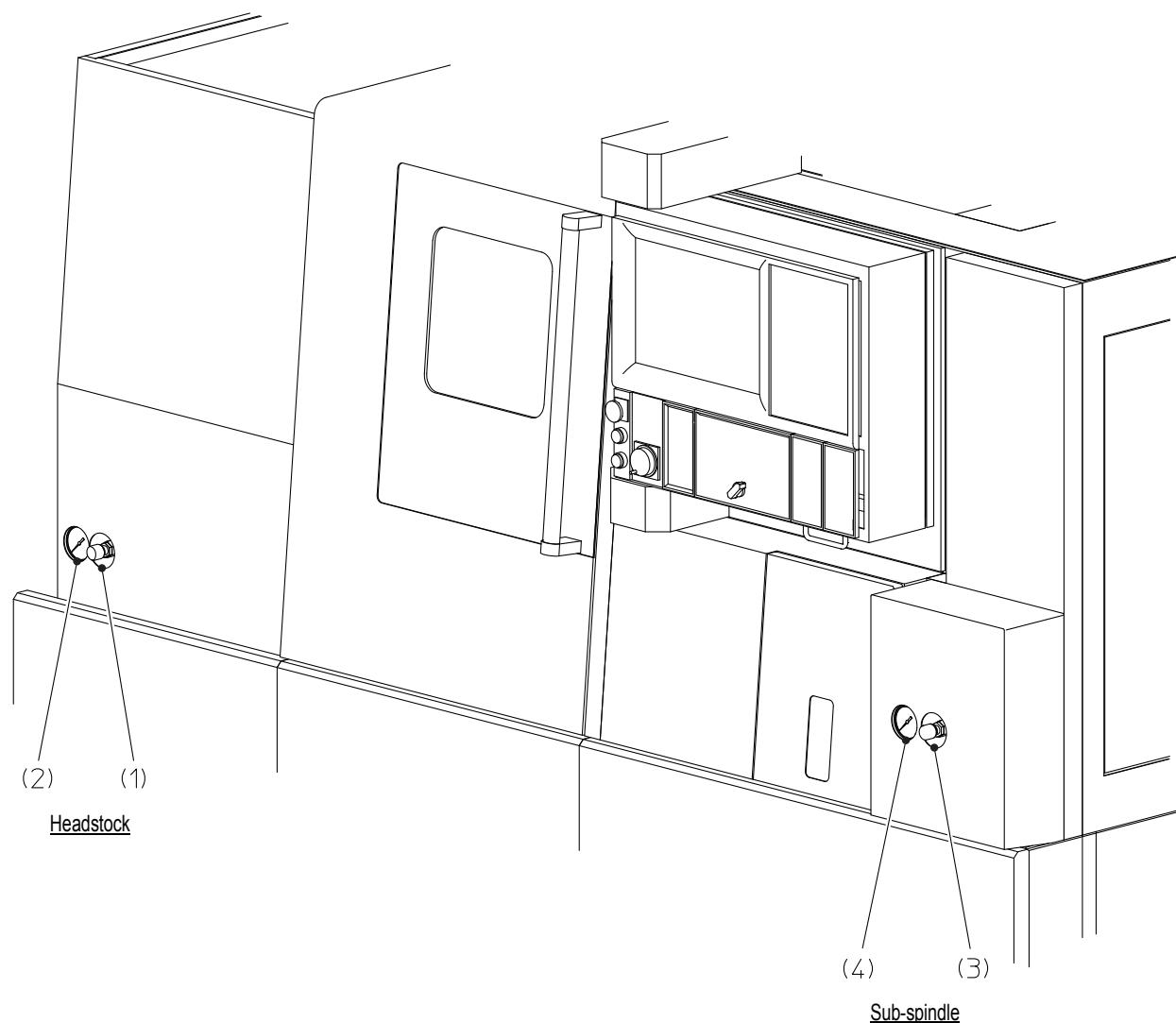


Fig. 5-87

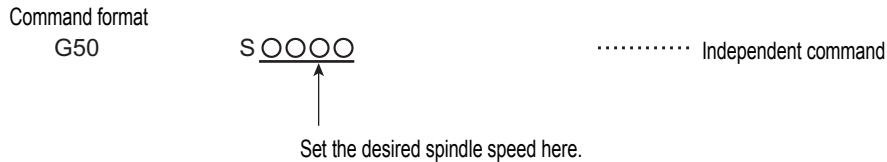
1	Valve for adjusting the hydraulic chuck pressure	3	Valve for adjusting the hydraulic chuck pressure
2	Pressure gauge for the hydraulic chuck pressure	4	Pressure gauge for the hydraulic chuck pressure

LE12016R1600700690003

5-17-6. Setting Maximum Spindle Speed

Setting in NC Program

The maximum spindle speed to which spindle speed is to be limited due to chuck specifications, influence of centrifugal force on chuck gripping force, imbalance of workpiece, etc. can be set by NC program.



LE12016R1600700700001

Fig. 5-88

Programmed maximum spindle speed is effective until another spindle speed is designated.

Setting by Parameter

Set the parameters in the [MC USER PARAMETER] screen in [PARAMETER].

It is possible to set the parameters in [1ST SPINDLE] and [2ND SPINDLE] separately. ([2ND SPINDLE] is optional.)

Limit the following parameters.

- (1) No.1 "Allowable chuck rotation speed"
- (2) No.2 "Inching speed"

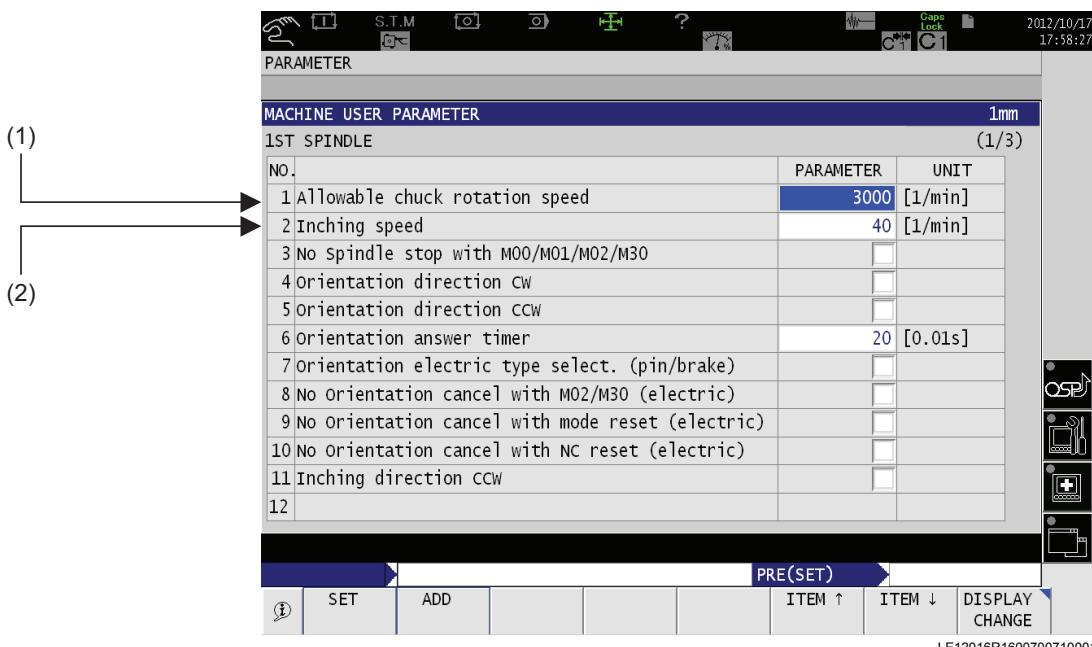


Fig. 5-89

1	Enter the "Allowable chuck rotation speed" in No.1.
2	In No.2, change "Inching speed" to 40.

Allowable spindle speed

Model	Specifications	Spindle	Chuck	MPa (psi)	min⁻¹	Cylinder	Max. rotation speed of cylinder single unit (min⁻¹)	
LB2000EXII	L/M/MY	Main	B-206-01	3.1 (449.8)	6,000	SR1146C01	6,000	
			N-06-LB	2.4 (348.2)	5,000	Y1020R	6,000	
	W/MW	Main	B-208A601	3.4 (493.3)	5,000	SR1453C01	6,000	
			N-06-LB	2.4 (348.2)	5,000	Y1020R	6,000	
		Sub	B-210A601	4.1 (594.9)	4,200	SR1453C01	6,000	
	LB2500EXII	L	Main	B-208A601	3.4 (493.3)	5,000	SR1453C01	6,000
			B-210A601	4.1 (594.9)	4,200			
			B210A801D	3.1 (449.8)	3,800	SR1670C01	4,500	
			N-08A601A	2.4 (348.2)	4,760	RNKP120-25-07	5,500	
			N-10A601A	2.8 (406.2)	4,010			
		M	Main	B-208A601	3.4 (493.3)	5,000	SR1453C01	6,000
			B-210A601	4.1 (594.9)	4,200			
			N-08A601A	2.4 (348.2)	4,760	RNKP120-25-07	5,500	
			N-10A601A	2.8 (406.2)	4,010			
LB3000EXII	L/M/MY	Main	B-208A601	3.4 (493.3)	5,000	SR1453C01	6,000	
			B-210A601	4.1 (594.9)	4,200			
			B210A801D	3.1 (449.8)	3,800	SR1670C01	4,500	
			N-08A0601	2.5 (362.8)	4,760	Y1225R	6,000	
			N-10A0601	2.8 (406.3)	4,010			
			N-12A0801B	1.9 (275.6)	3,800	Y1530R	5,500	
	W/MW/MYW	Main	B-208A601	3.4 (493.3)	5,000	SR1453C01	6,000	
			B-210A601	4.1 (594.9)	4,200			
			B210A801D	3.1 (449.8)	3,800	SR1670C01	4,500	
			N-08A601A	2.5 (362.8)	4,760	Y1225R	6,000	
			N-10A601A	2.8 (406.3)	4,010			
			N-12A0801B	1.9 (275.6)	3,800	Y1530R	5,500	
		Sub	B-206-01	3.1 (449.8)	6,000	SR1146C01	6,000	
	LB4000EXII	Main	B-210A801	3.3 (478.8)	4,200	SR1670C01	4,500	
			B-212A801	4.0 (580.4)	3,300			
			B215A101	3.2 (464.3)	2,800	F2596H-01	2,800	
			N-10A0801	2.8 (406.3)	4,010	Y1225R	6,000	
			N-12A0801	2.7 (391.8)	3,380	Y1530R	5,500	

Table 5-74



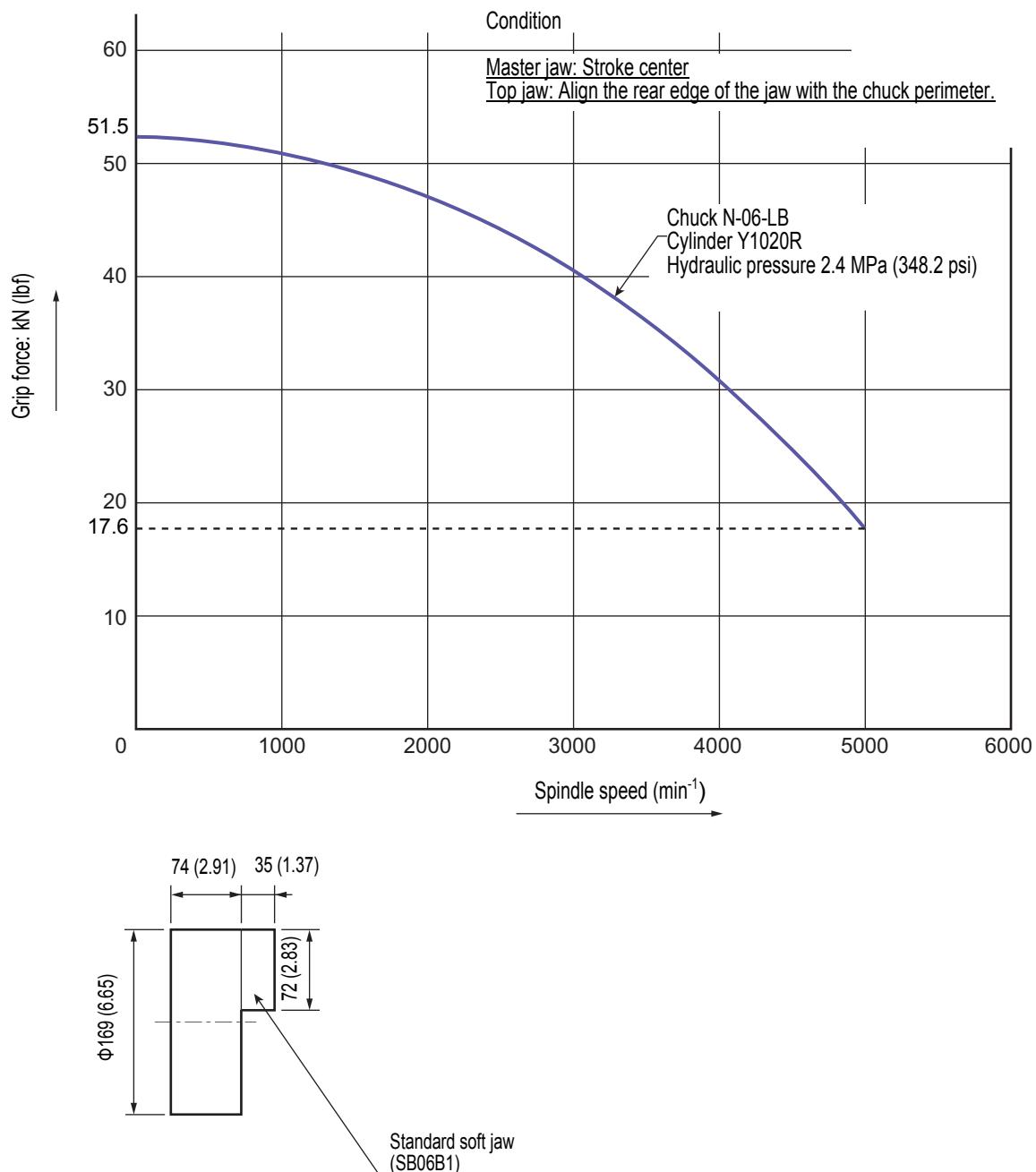
Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

This table indicates the permissible spindle speed for standard chuck. If a chuck other than those indicated above is used, follow the instruction on the name plate at the front cover of the machine.

5-17-7.Hydraulic Chuck Clamping Force Characteristics Diagram

LB2000EXII

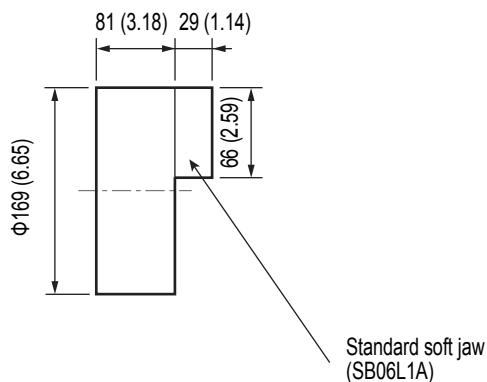
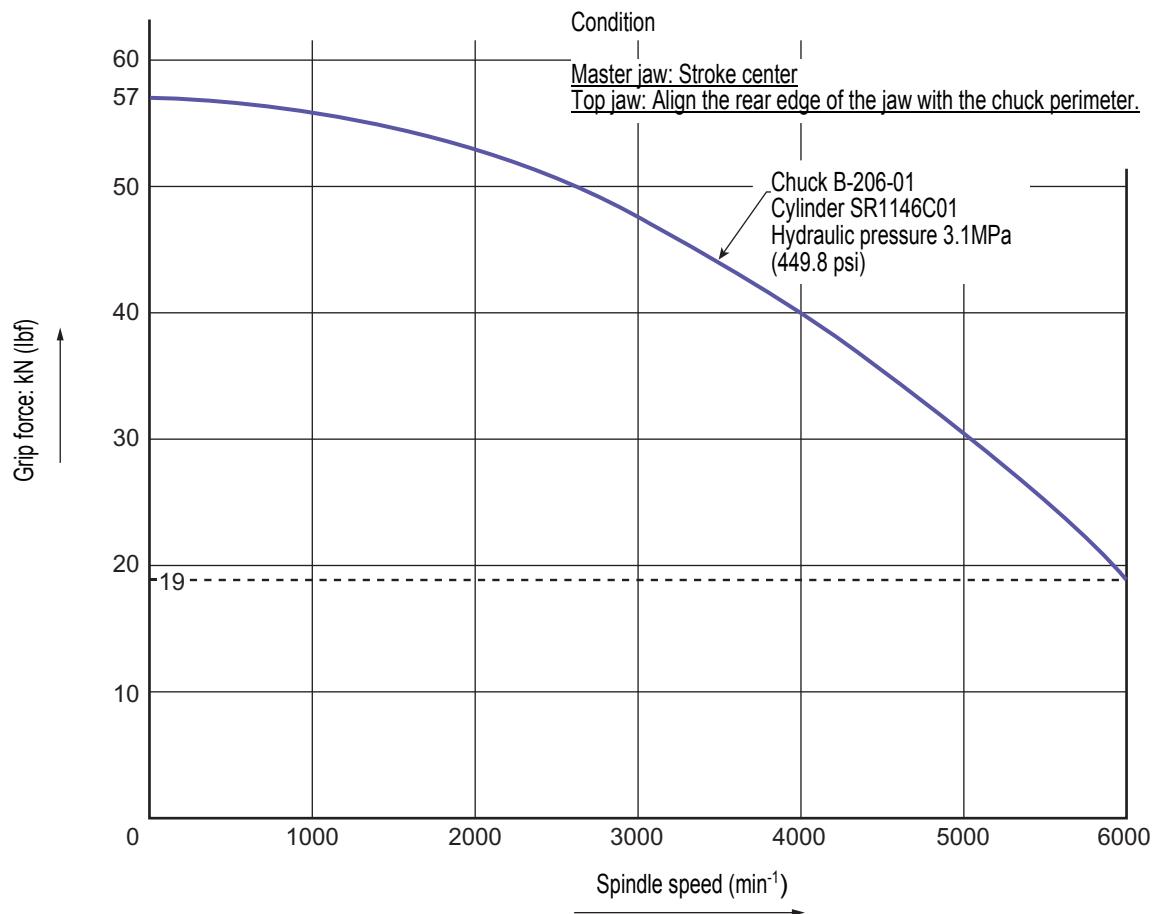
Solid chucks - Spindle speed - Grip force



LE12016R1600700730001

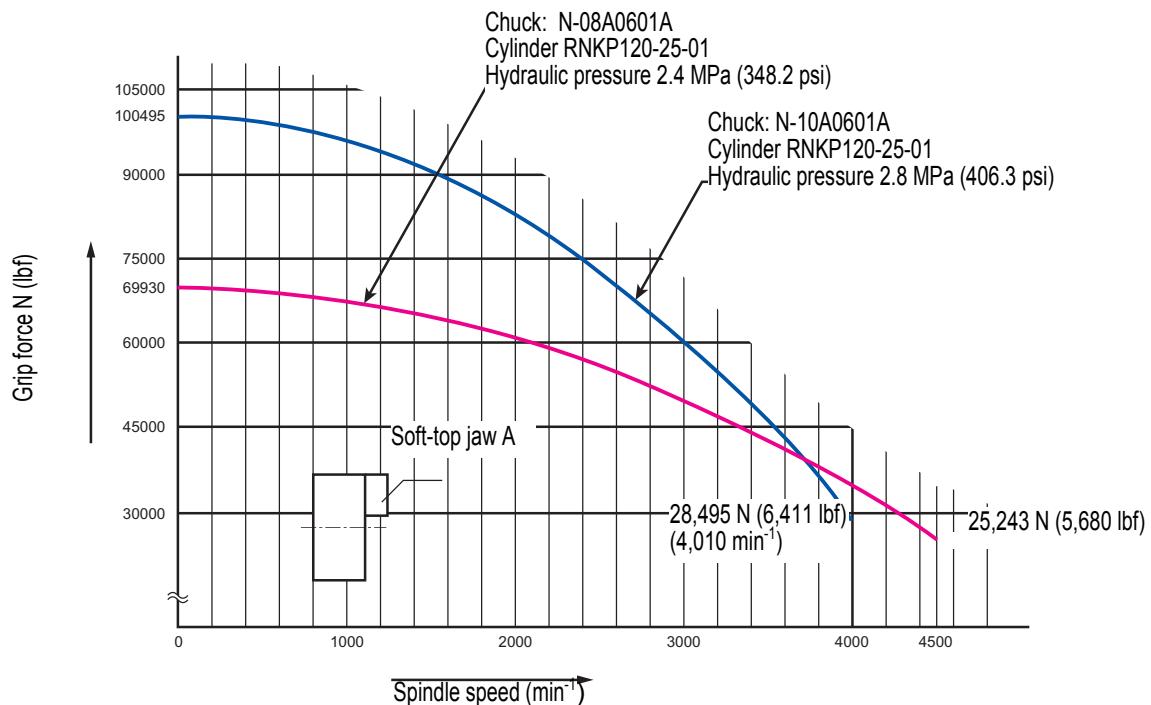
Fig. 5-90

Hollow chucks - Spindle speed - Grip force



LE12016R1600700740001

Fig. 5-91

LB2500EXII**Solid chucks - Spindle speed - Grip force**

LE12016R1600700750001

Fig. 5-92

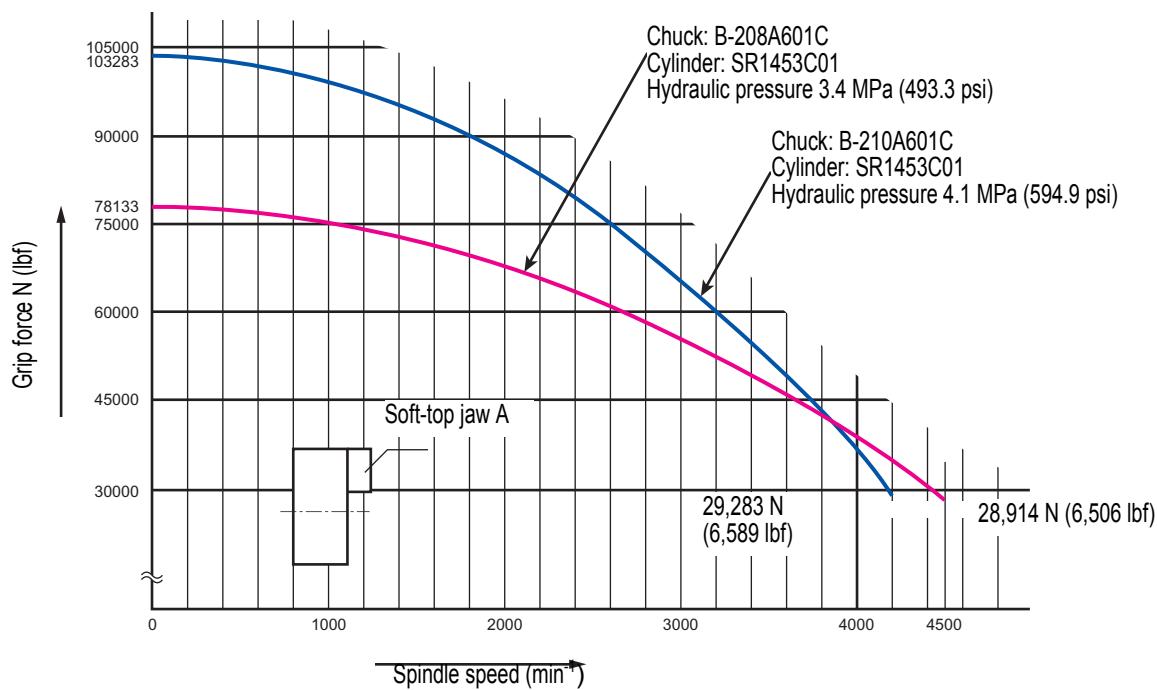
Hollow chucks - Spindle speed - Grip force

Fig. 5-93

LE12016R1600700760001

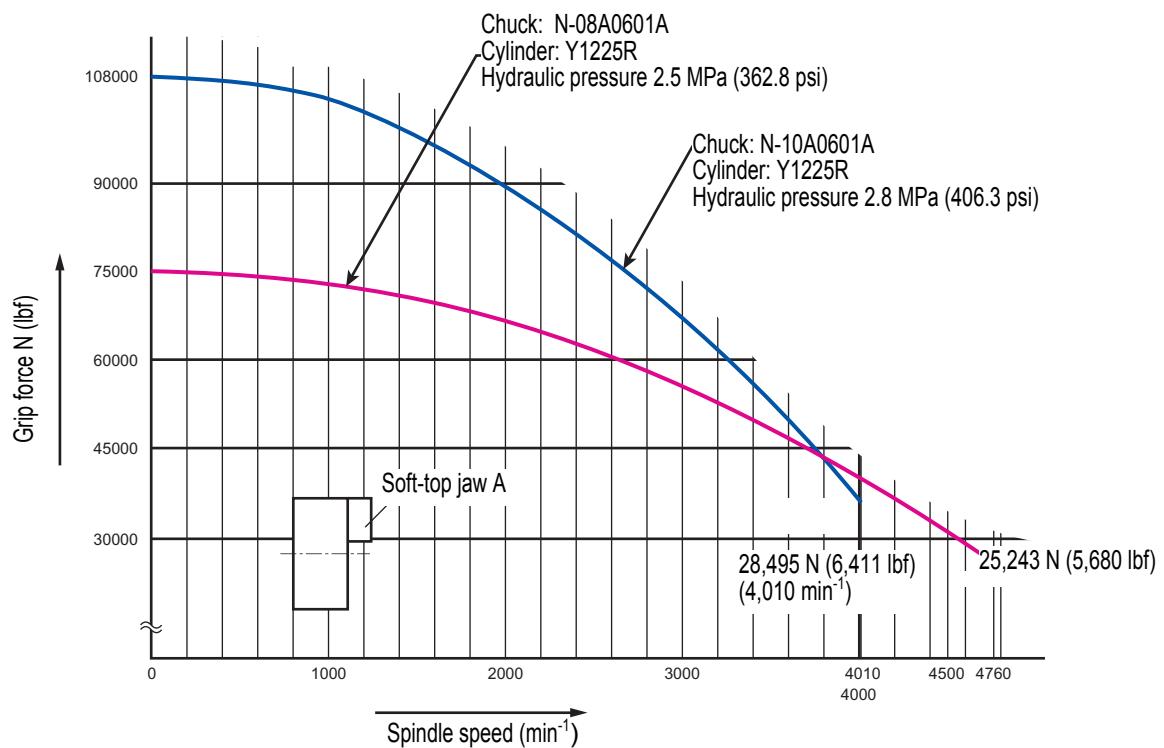
LB3000EXII**Solid chucks - Spindle speed - Grip force**

Fig. 5-94

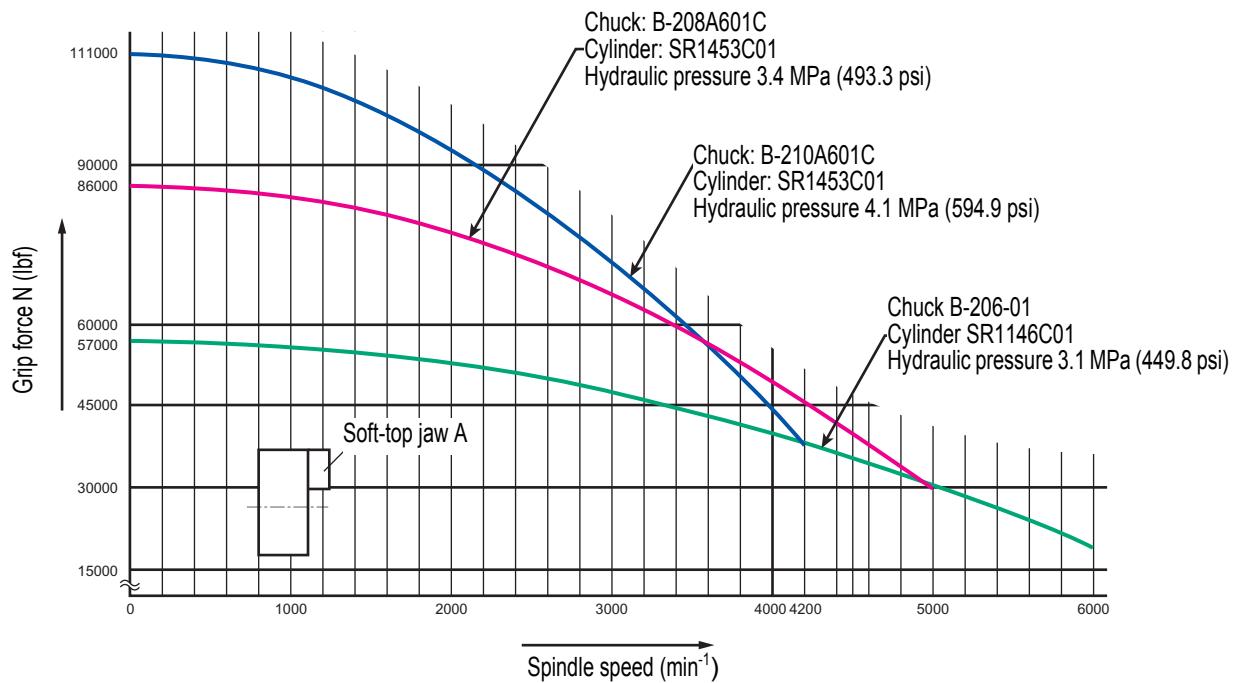
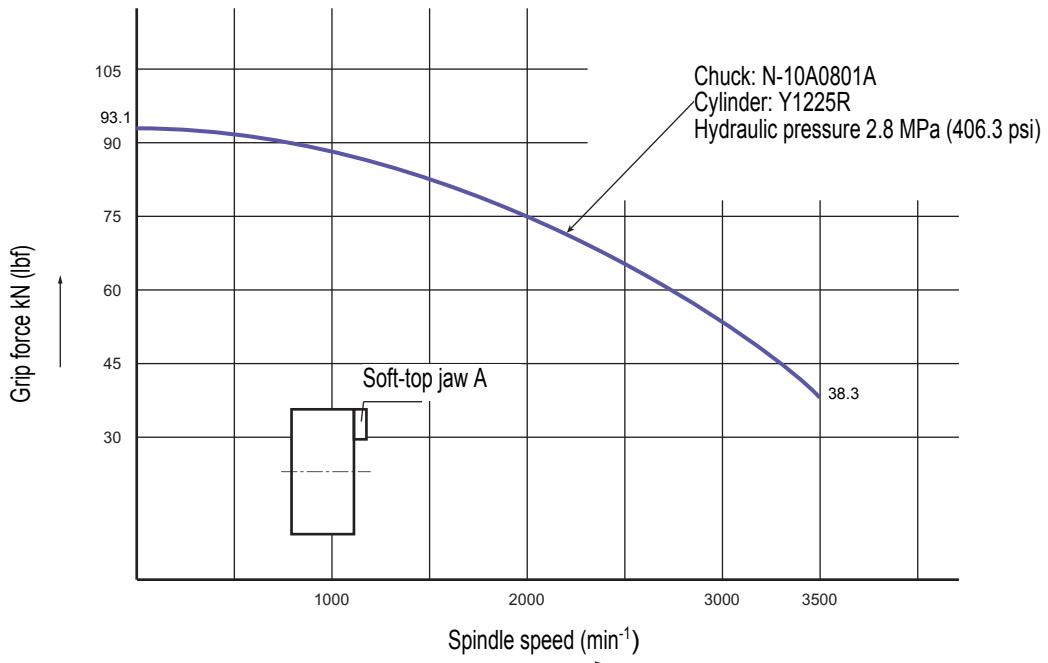
Hollow chucks - Spindle speed - Grip force

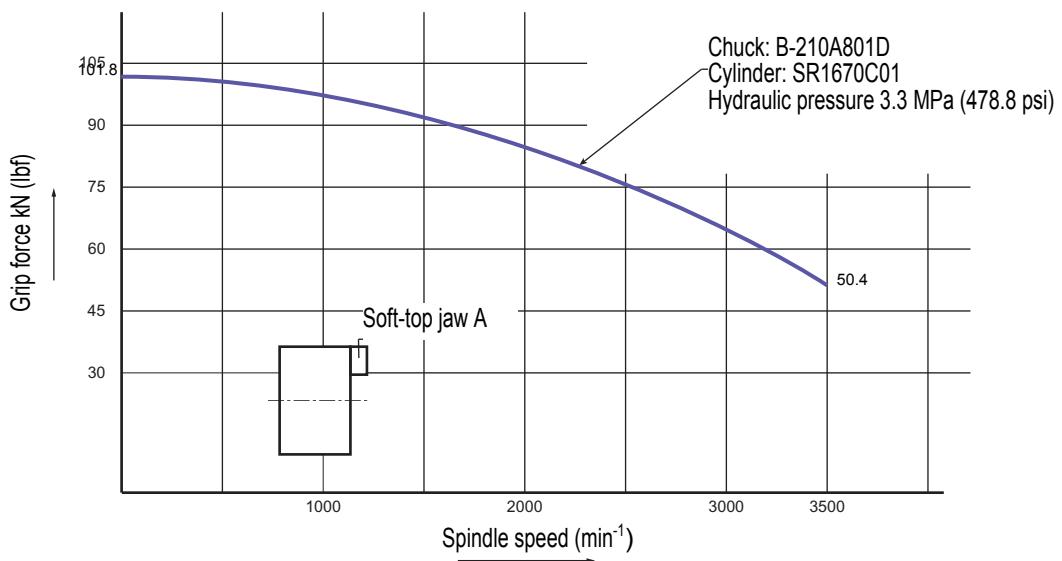
Fig. 5-95

LE12016R1600700780001

LB4000EXII**Solid chucks - Spindle speed - Grip force**

LE12016R1600700790001

Fig. 5-96

Hollow chucks - Spindle speed - Grip force

LE12016R1600700800001

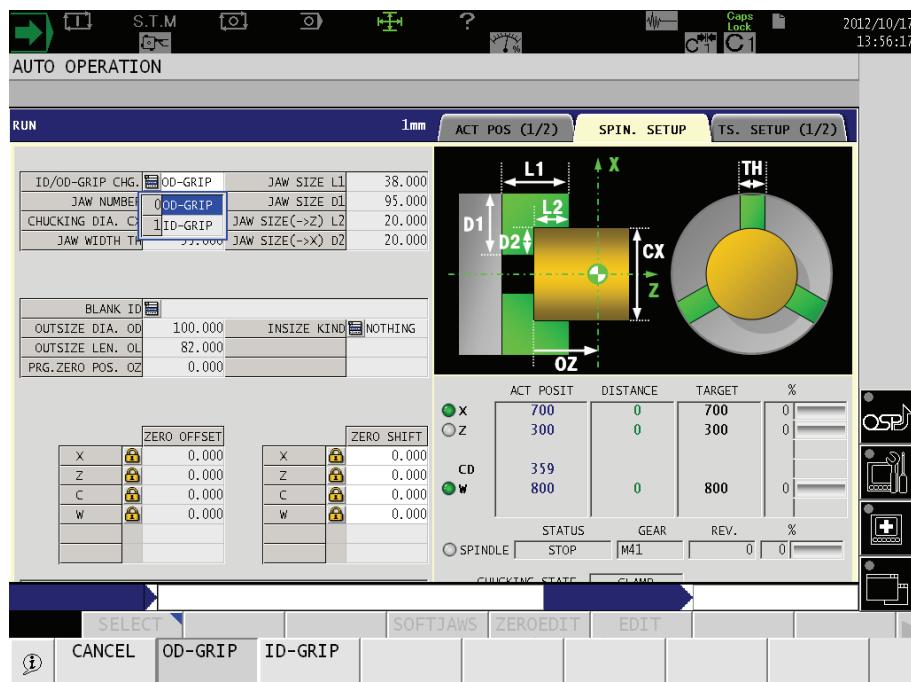
Fig. 5-97

5-17-8.Changing the grip direction of the chuck

By reversing the operation direction (open/close) of the jaw, it is possible to change the gripping direction of the inside and outside diameter of the power chuck. Set the gripping direction in the [SPIN. SETUP] sheet in the [RUN] screen.

The direction can be changed by touching [ID/OD-GRIP CHG.] and then pressing [F1] (SELECT ON).

[PARAMETER]→ [CHUCK]→ [1ST SPINDLE] - Main spindle
 [2ND SPINDLE] - Sub-spindle (Type "W" specification only)



LE12016R1600700810001

Fig. 5-98



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

There is danger that the workpiece may hit and protrude the front safety door. When machining a new workpiece after workpiece clamping conditions and chucking conditions have been changed, go through the following list to check that all safety items are cleared.

- Adherence to safety requirements.
- The workpiece clamp and chuck are in a safe and secure state.
- The chuck grip force setting.
- The rotation speed control parameter settings.
- Jaw shapes that match the workpiece form.
- The weight of the workpiece is well balanced when it is clamped or gripped by the chuck.

5-17-9.Attaching the Chuck

Procedure : —

- 1-** Turn on the operational power and step on the chuck operation foot pedal. Advance the connecting rod. (Advance the draw tube.)
- 2-** Fasten the draw screws to the connecting rod within the spindle bore. (Connect the draw tube and chuck within the spindle bore.) Use the Allen wrench furnished with the machine. Refer to [5-17-3. Construction of Hydraulic Chuck].
- 3-** Secure the chuck body onto the spindle end, using mounting bolts.
- 4-** Make sure the drive pin on the main spindle face is in correct position and fix those pins. The drive pins are supposed to fit into the check body holes.
- 5-** Adjust the draw screw so that the outer ends of the master jaws become flush with the peripheral surface of the chuck body while the chuck left open.

The individual chuck jaws can be moved in the opening direction as the draw screw is turned in the counterclockwise direction.

Removal of the hydraulic chuck from the spindle is the reverse of installation in steps from "3-" to "2-".



Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

When changing parts such as chuck, jaws, or stopper block inside the chip and coolant shield, keep the following in mind:

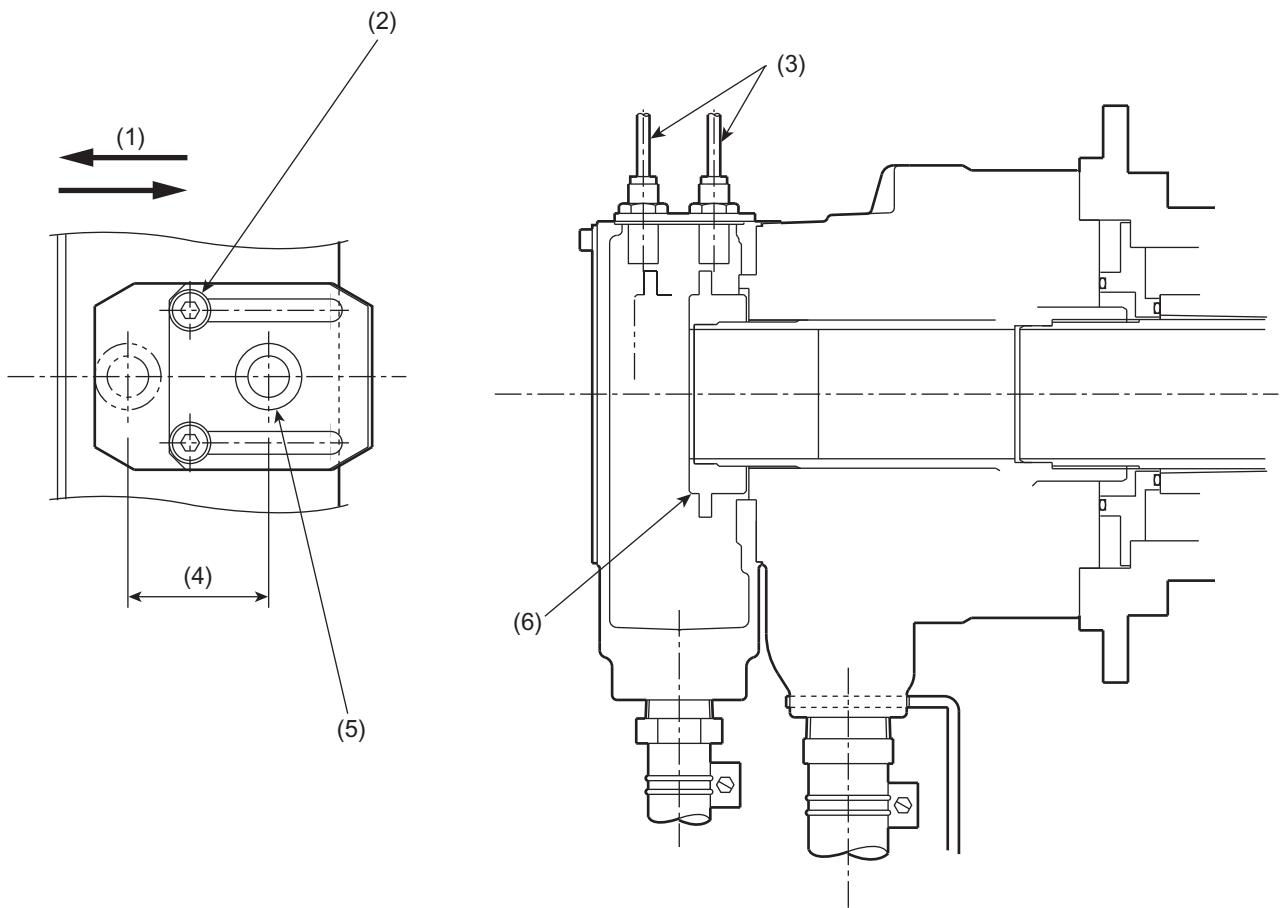
- Always shut off the power source before changing parts.
- Never issue M19 (spindle orientation) or M110 (C-axis joint) command while changing parts.

Adjustment and Setting

Method of adjusting proximity switch position in longitudinal direction

For hollow cylinder

Loosen the two screws clamping each of the two proximity switch plates, turn the adjust screw to slide them with the proximity switch to determine the position. After determining the position, tighten the proximity switch plate clamping screws so that the position is not displaced.



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Fig. 5-99

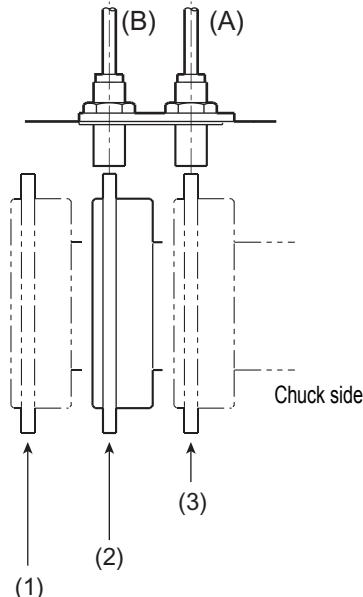
1	Slide	4	Operation
2	Proximity switch plate clamping screws (x 2 each)	5	Proximity switch
3	Proximity switch	6	Dog

Setting proximity switches (except for CE, GB specification)

For OD chucking:

Set the two proximity switches to the following positions:

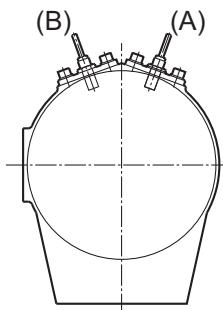
- (A) Piston advance end
- (B) Chuck gripping position



LE12016R1600700850001

Fig. 5-100

1	Piston retract end (close)	3	Piston advance end (open)
2	Chuck gripping position		



LE12016R1600700850002

Fig. 5-101



Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

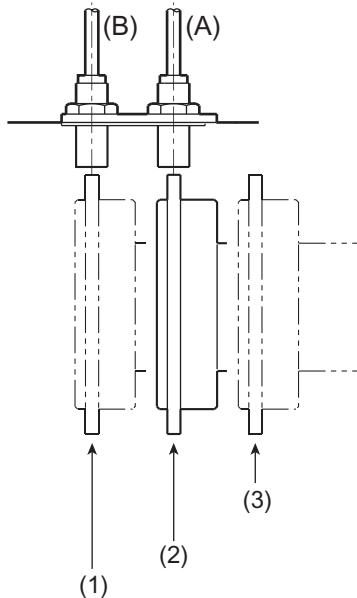
Always actually clamp the workpiece to set the proximity switch in the chuck gripping position. Failure to do so can result in grip confirmation not being performed properly, which can lead to danger of the workpiece flying out.

For ID chucking:

Set the two proximity switches to the following positions:

- (B) Piston retract end
- (A) Chuck gripping position

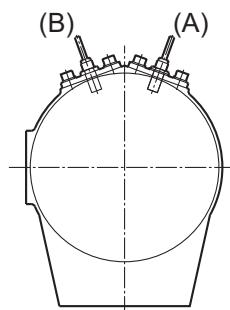
When ID and OD chucking, the proximity switch at the chuck gripping position changes.



LE12016R1600700860001

Fig. 5-102

1	Piston retract end (close)	3	Piston advance end (open)
2	Chuck gripping position		



LE12016R1600700860002

Fig. 5-103



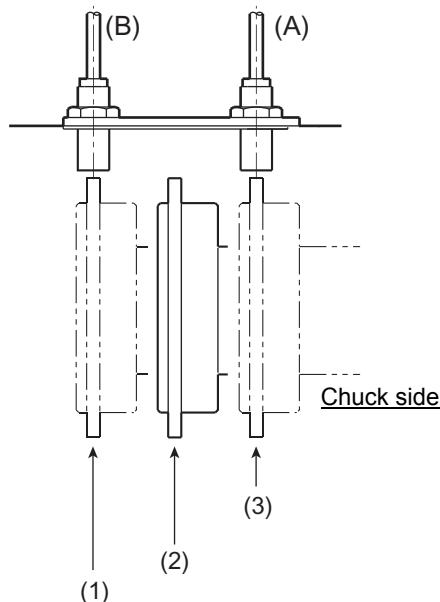
Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

Always actually clamp the workpiece to set the proximity switch in the chuck gripping position. Failure to do so can result in grip confirmation not being performed properly, which can lead to danger of the workpiece flying out.

Setting proximity switches (CE, GB specification)

Set the two proximity switches to the following positions:

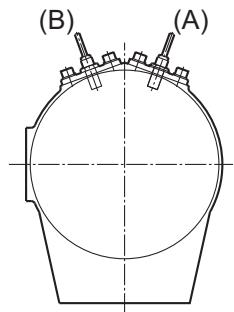
- (A) Piston advance end
- (B) Piston retract end



LE12016R1600700610001

Fig. 5-104

1	Piston retract end	3	Piston advance end
2	Chuck gripping position		



LE12016R1600700610002

Fig. 5-105



Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

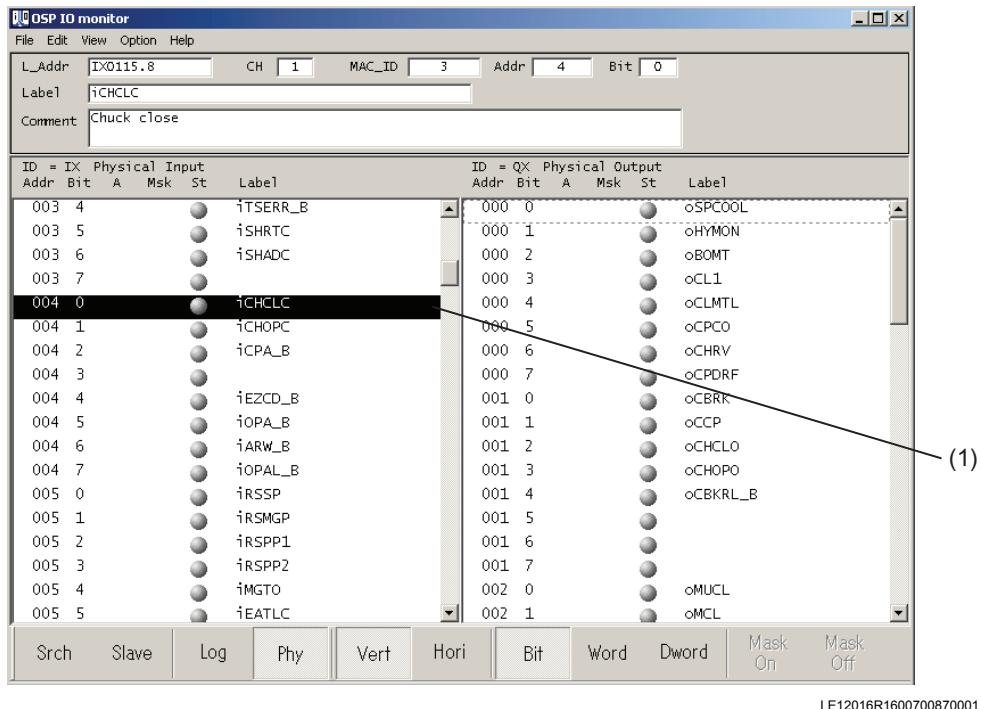
Always actually clamp the workpiece to set the proximity switch in the chuck gripping position. Failure to do so can result in grip confirmation not being performed properly, which can lead to danger of the workpiece flying out.

Confirmation signals

Signal input status display

Whether the proximity switches are correctly set or not and the corresponding signals are on or off can be checked on the check [IO monitor] screen.

For the procedure to display the [IO monitor] screen, refer to the [OSP-P300L MAINTENANCE MANUAL].



LE12016R1600700870001

Fig. 5-106

- | | |
|---|---|
| 1 | The input location of proximity limit is shown. When proximity switches have been input, they are highlighted in the display. |
|---|---|

Checking input signals

When the proximity switches are set in the proper position, their signal status changes as indicated below according to the chuck status.

Except for CE, GB specification

For OD chucking

	Chuck-open confirmation LS(iCHOPC)	Chuck-close confirmation LS(iCHCLC)
In chuck gripping position	0	1
In piston advance end	1	0

Table 5-75

For ID chucking

	Chuck-open confirmation LS(iCHOPC)	Chuck-close confirmation LS(iCHCLC)
In chuck gripping position	1	0
In piston retract end	0	1

Table 5-76

CE, GB specification

For OD chucking

	Chuck-open confirmation LS(iCHOPC)	Chuck-close confirmation LS(iCHCLC)
In chuck gripping position	1	1
In piston advance end	0	1

	Chuck-open confirmation PS(iCECHOPP)	Chuck-close confirmation PS(iCECHCLP)
In chuck gripping position	0	1
In piston advance end	1	0

Table 5-77

For ID chucking

	Chuck-open confirmation LS(iCHOPC)	Chuck-close confirmation LS(iCHCLC)
In chuck gripping position	1	1
In piston retract end	1	0

	Chuck-open confirmation PS(iCECHOPP)	Chuck-close confirmation PS(iCECHCLP)
In chuck gripping position	1	0
In piston retract end	0	1

Table 5-78

Chuck clamp/unclamp confirmation timer

There may be cases in which the chuck open/close is not completed even if the corresponding signal is input.

For such cases, timer function can be used to delay the confirmation of the chuck operation after the input of the signal.

The timer is set using the following parameters.

- "MC USER PARA: (CHUCK)"→"1st spindle (2nd spindle) chuck clamp answer timer"
This timer operates on receiving the signal from the proximity switch at the chuck gripping position until the chuck clamping is completed.
- "MC USER PARA: (CHUCK)"→"1st spindle (2nd spindle) chuck unclamp answer timer"
This timer operates on receiving the signal from the proximity switch at the piston advance end (for OD gripping) or the proximity switch at the piston retract end (for ID gripping) until the chuck unclamping is completed.

Set both timers in units of 0.01 sec. The default "1st spindle (2nd spindle) chuck clamp answer timer" is 100 (1 sec.) and the default "1st spindle (2nd spindle) chuck unclamp answer timer" is 0. For the procedure for setting machine user parameters, refer to the [OSP-P300L OPERATION MANUAL].

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

The machine should only be operated and serviced by personnel trained and authorised for this purpose. Designate a responsible party for operation, service, and maintenance of the machine and follow the instructions given by such responsible party.

The following steps should be done:

- Clean the machine.
- Before entering the machine, remove the M-spindle tool.
- Turn off the control switch, before turning off the main power disconnect switch.
- Make sure all power switches are turned off.



**Shut off the machine's main breaker while servicing the machine.
Lock the main breaker to ensure that the power is not inadvertently turned back on.**

Note the 4 safety rules before the work.

- Switch off.
- Lock the main breaker to ensure that the power is not inadvertently turned back on.
- Even with the main breaker turned off, electrical potential may still be left in the MCS drive unit (for axes and spindle), so no one except service personnel should touch these units.
- Adjacent energized parts should be covered or fenced off. Parts in the switch cabinet can be energized when the main switch is deactivated. These parts must be specially marked!

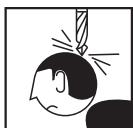
Electricity is flowing through components in the electrical system even if the main switch is turned OFF.

When service personnel are inside the machine, the safety door may not be reopened.

The safety door can be closed without electricity flowing, but to open it, the machine control switch must be turned ON.

Check that the door is not inadvertently closed.

The inside of the machine is slippery with coolant and oil. Be cautious as to where you stand and take precautions such as using a rubber mat.



Be careful with the tool or workpiece attached to the machine. There is a risk of injury.

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

Maintenance inspection of this machine may be performed only by personnel thoroughly familiar with machine operation and properly trained in maintenance inspection.

If maintenance inspection is performed by individuals without such proper skills, they may not be able to properly handle any accidents that may occur during maintenance work, resulting in serious injury or death. Also, improper maintenance work may result in detrimental impact on the machine or its accuracy.

OKUMA assumes no responsibility, and extends no product warranty related to accidents or damage to the machine that may occur as a result of not following these instructions.

6-1. General Information

Maintenance and repair work may be performed only by persons specially trained for the type of work involved.

The setting, maintenance and inspection work and the intervals for replacing operating materials and worn parts specified in these operating instructions must be observed!

Inform the operating staff before beginning special work and maintenance. Appoint the supervisory staff!

When replacing large subassemblies, carefully fasten them to the lifting gear and make sure they are secured.

When performing installation work above head height, use climbing aids and working platforms which are intended for such purpose or designed to ensure safety.

Do not use machine parts as climbing aids! When performing maintenance in high places, take measures to prevent objects from falling.

Keep all handles, treads, railings, pedestals, platforms and ladders free from dirt and lubricants!

Secure sufficient work space and protective equipment necessary for maintenance work.

After finishing maintenance and repair work, always tighten the loosened screw fittings!

If you disassemble the protective cover or safety unit as part of the maintenance work, reassemble them as soon as maintenance and repair work is complete. Upon reassembly of these covers and units, confirm that they are functioning normally.

6-2. Cleaning agents

Do not use any cleaning agents which could damage resin, seals or paint (e.g. agents containing alcohol or solvents). These can damage hoses (hydraulic, pneumatic), cables, seals and other resin parts.

Cleaning agents can contain health-damaging substances. Keep in mind instructions from the cleaning agent manufacturer.

Do not use compressed air for cleaning.

We recommend cleaning the entire machine once a week, or more frequently if it is prone to getting dirty sooner.

Never use alcohol-containing cleaning agents for cleaning the safety window glass of the front door.

6-3. Periodical Inspection Schedule

This section deals with the maintenance requirements which must be met by every user in order to insure excellent, trouble free performance and prolonged life. It also outlines troubleshooting hints in case of machine failure.

Generally, NC lathes are used at three to four times higher utilization rates than general-purpose lathes. To insure maximum production time, periodically inspect and service your machine according to the inspection items described below.

Interval	Inspection items	Check point				Check
		LB2000EXII	LB2500EXII	LB3000EXII	LB4000EXII	
Every day	Hydraulic unit oil level gauge	Machine back side	Machine back side	Machine back side	Machine back side	
	Slideway lubricant tank oil level gauge	Machine front side, right				
	Spindle cooling unit oil level gauge	Machine left side	Machine left side	Machine left side	Machine left side	
	Hydraulic unit source pressure	Machine back side	Machine back side	Machine back side	Machine back side	
	Chuck pressure (main spindle)	Machine front side, left				
	Chuck pressure (sub-spindle)	Machine front side, right				
	Tailstock thrust	Machine back side	Machine back side	Machine back side	Machine back side	
	Apply grease to the hydraulic chuck master jaws	Chuck	Chuck	Chuck	Chuck	
1 month	Bed levelness check (only in one month after installation of the machine)	Bed	Bed	Bed	Bed	
	Hydraulic unit oil replacement (only in one month after installation of the machine)	Machine back side	Machine back side	Machine back side	Machine back side	
	Change the spindle cooling unit oil (only in one month after installation of the machine)	Machine left side	Machine left side	Machine left side	Machine left side	
6 months	Change the hydraulic unit oil.	Machine back side	Machine back side	Machine back side	Machine back side	
	Lubricate the chip conveyor	Chip conveyor	Chip conveyor	Chip conveyor	Chip conveyor	
	Change the spindle cooling unit oil.	Machine left side	Machine left side	Machine left side	Machine left side	

Table 6-1

In addition to the above periodical inspections, there are inspection and maintenance items which should be carried out whenever necessary.

6-3-1. Check wipers (MNTKEY0710)

Wiper for the slide cover is a consumable item. Replacement cycle is approximately 8,000 Hr or 3 years, but depending on machine use, the cycle may be shorter. Visually check the wiper on a regular basis and if any tears, curled lips, uneven wears are detected, replace it immediately. (For the part number of the wiper, see the consumables section in the spare parts list.)



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



When replacing the wiper, use caution, as there is danger of cutting your finger.

The wiper has a thin metal edge.

6-3-2. Precautions when cleaning the safety window glass on the front door

- (1) Use a soft cloth for cleaning.
Do not use a scourer or hard cloth.
- (2) Use cold or warm water when removing dirt. If it is difficult to remove dirt, use a neutral detergent (for example, a kitchen detergent) by diluting it.
- (3) Do not use organic solvents, such as thinner and benzene, or strong alkali detergents.

6-4. Adjusting Centralized Lubrication Unit

6-4-1. Adjusting Pump Delivery

The delivery amount to each lubrication point is controlled by the metering type distribution valve, and no further adjustment is necessary.

Check the consumed amount of lubrication oil tank (approx. 2 mL/time).

6-4-2. Maintenance and Countermeasures

When no lubricating oil is delivered:

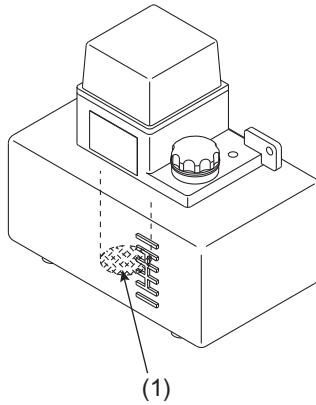
- Oil level is low.
Replenish the lubricating oil of the same brand.
- The pump is at a rest: The pump operates intermittently.
The pump operation interval is set as shown in the following table.
- The suction filter is clogged.
Clean the suction filter at least every six months.
- The motor does not rotate.
Check wiring.

Model	Specifications	Pumping interval [min.]
LB2000EXII	L	5.5
LB2000EXII	M	5
LB2000EXII	MY	5
LB2000EXII	W	5
LB2000EXII	MW	5
LB2500EXII	L	5.5
LB2500EXII	M	5
LB3000EXII	L	5.5
LB3000EXII	M	5
LB3000EXII	MY	5.5
LB3000EXII	W	5.5
LB3000EXII	MW	5.5
LB3000EXII	MYW	5.5
LB4000EXII	L	5
LB4000EXII	M	5
LB4000EXII	MY	5

Table 6-2

6-4-3. Others (MNTKEY0441)

- The lubricating oil to be replenished must be clean and it must be of the same brand as currently used.
- When cleaning the tank and the filter, never use thinner or trichlen (trichloroethylene) showing high volatile characteristics.
- Specified oil: G68 (ISO)



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Fig. 6-1

1	Suction filter
---	----------------

- Suction filter cleaning procedure:
 - a. Remove the pump. (Bolts M5 x 2 pc.)
 - b. Take out the pump and clean the suction filter provided at the end of the suction pipe.
 - c. Reinstall the pump.

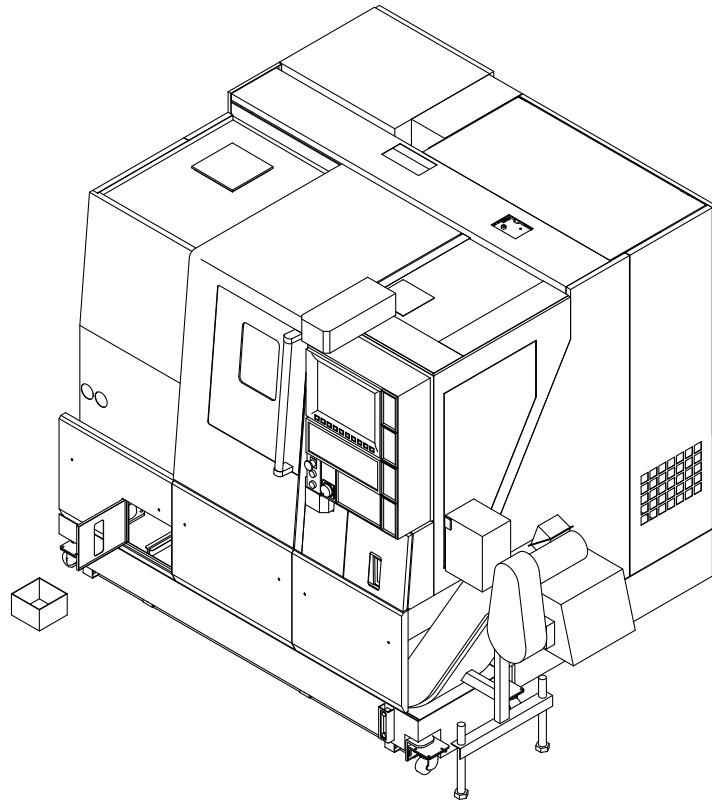
6-5. Collecting used lubrication oil (MNTKEY0490)

Part of used lubricating oil is collected to the tanks shown in the following chart. Drain the tank as necessary. Note that the oil that overflows from this tank enters the coolant tank.

6-5-1. Where lubrication oil tanks located

LB2000EXII (300 between centers) (L/M/MY) LB2500EXII (L/M)

- When chips are discharged from the side

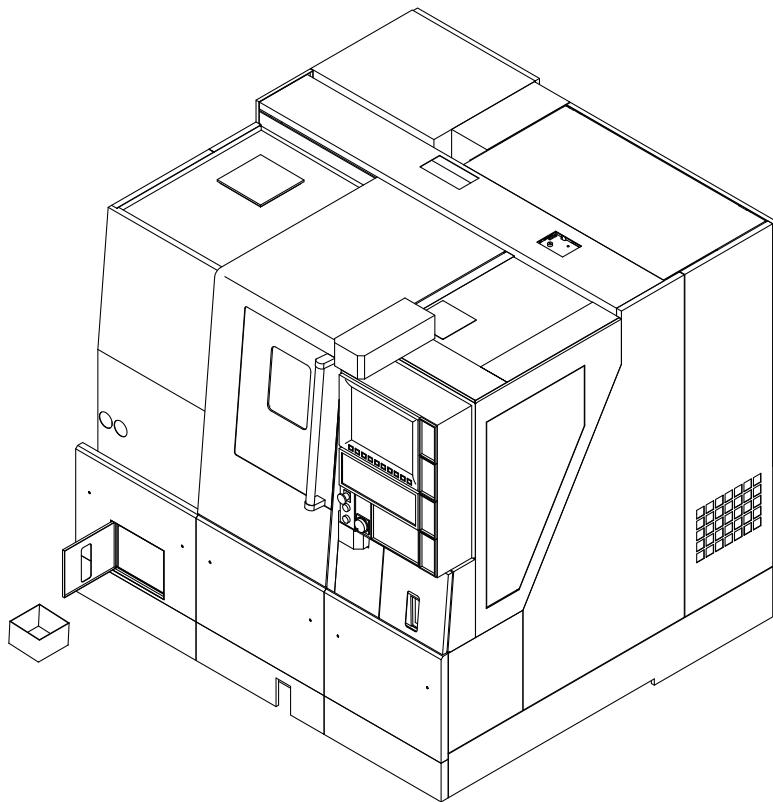


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Fig. 6-2

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

- When chips are discharged from the back

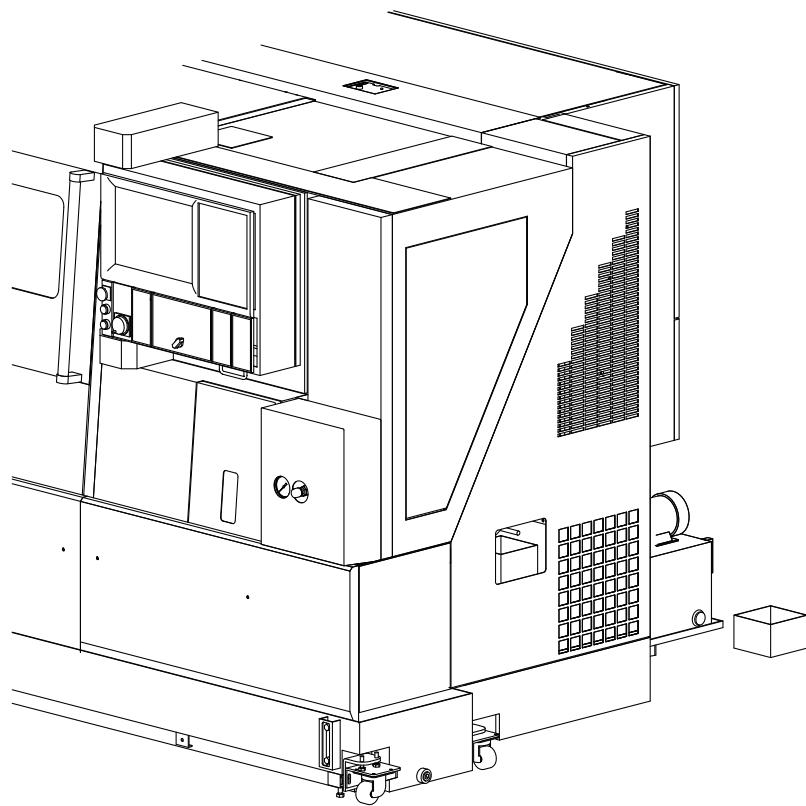


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Fig. 6-3

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS**LB2000EXII (500 between centers) (L/M/MY) LB2000EXII (W/MW) LB3000EXII
(L/M/W/MW/MY/MYW) LB4000EXII (L/M/MY)**

- When chips are discharged from the side

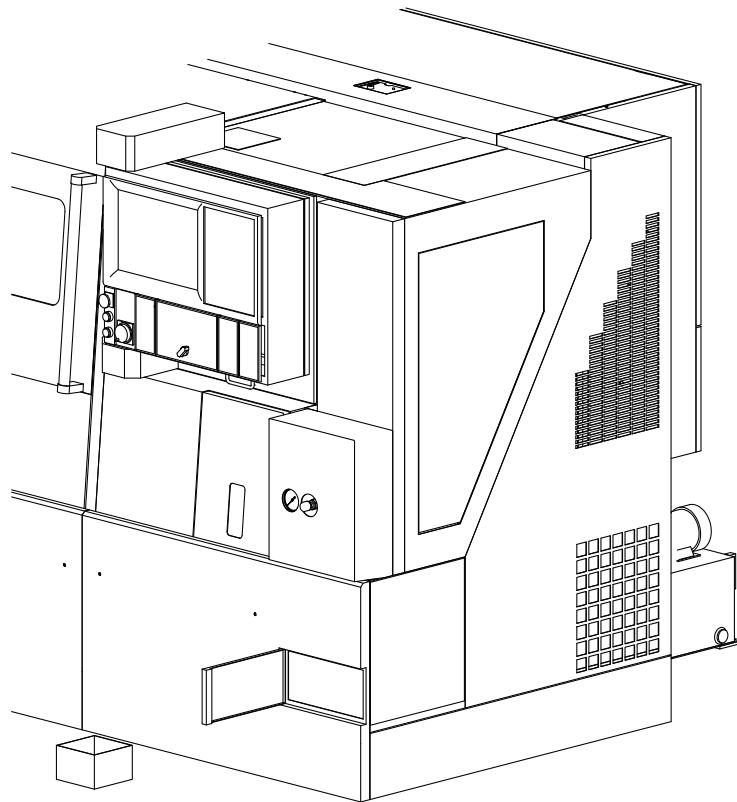


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Fig. 6-4

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

- When chips are discharged from the back

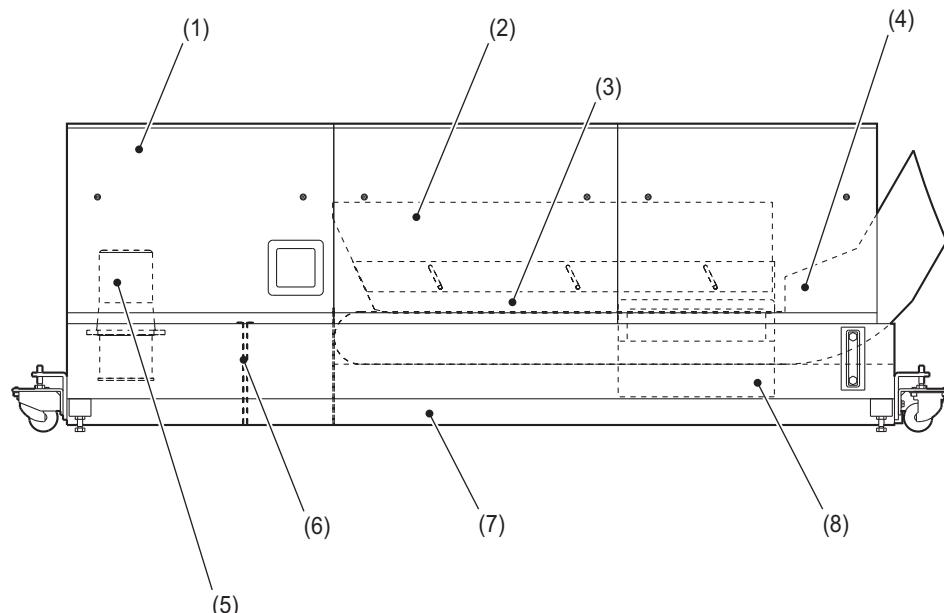


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Fig. 6-5

6-6. Cleaning the coolant unit (MNTKEY0580)

6-6-1. Cleaning the separately located coolant tank



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Fig. 6-6

1	Front cover	5	Coolant pump
2	On the chip guide	6	Filter
3	Under the chip guide	7	Separately located coolant tank
4	Chip conveyor or the chip pan	8	Box

Procedure :

- 1-** Remove the cover on the front. (3 points)
- 2-** Drain the coolant (by operating the coolant pump).
- 3-** Tighten mounting bolts under the chip guide and raise them by the size of long hole to fix them.
- 4-** Pull out the tank forward.
- 5-** Clean the box (pan).
- 6-** Clean inside of the tank.
- 7-** Clean the filter.
- 8-** After cleaning the tank, return it to its original place. Make sure to press it against legs, otherwise it may lead to coolant leakage.

6-6-2. Cleaning the Filter

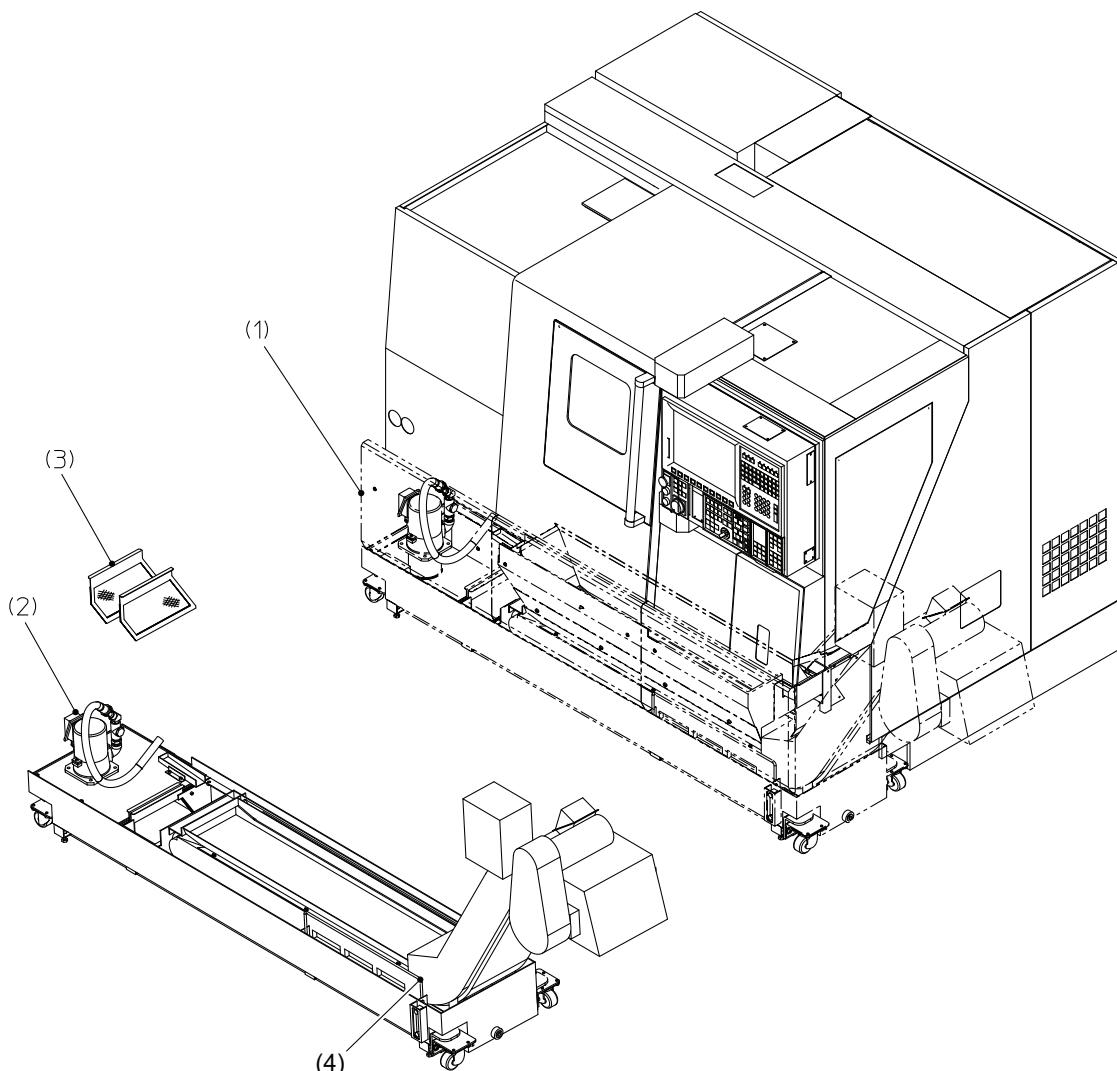
The filter can be pulled up without pulling out the tank.

Clean the clogs on two filters one by one and place them back in to minimize the risk that chip would flow into the clean layer where the pump is.

Clogged filter may remarkably reduce the coolant discharge amount. Clean the filters whenever necessary. During this task, if sludge is deposited at the bottom of the tank, clean the tank per instructions in the previous section.

6-6-3. Cleaning coolant tank filters (Discharging from the side) (MNTKEY0581)

Inspection intervals: 1 week or when a warning is given

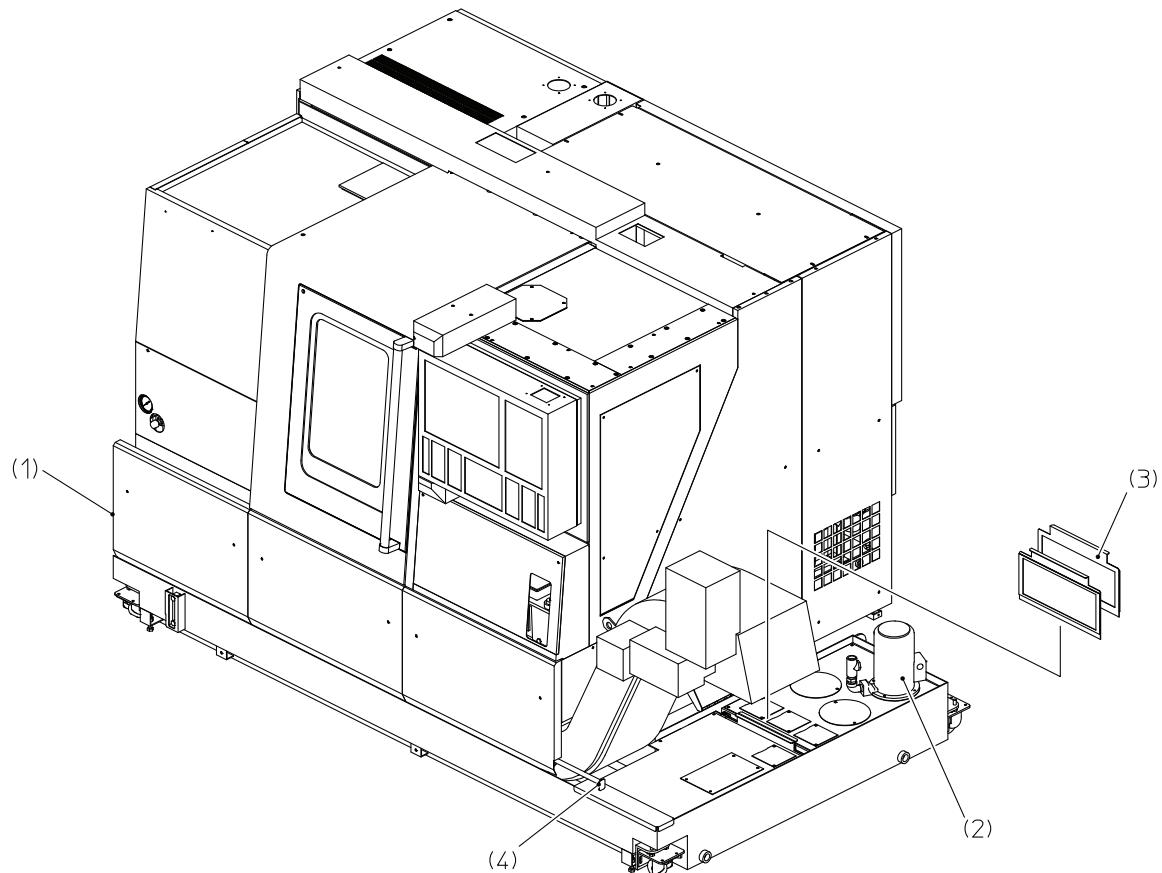


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LB3000EXII Side, type I tank

Fig. 6-7

1	Machine front cover	3	Filter
2	Coolant pump	4	Fine chips collection bucket (Hinge type conveyor spec.)

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

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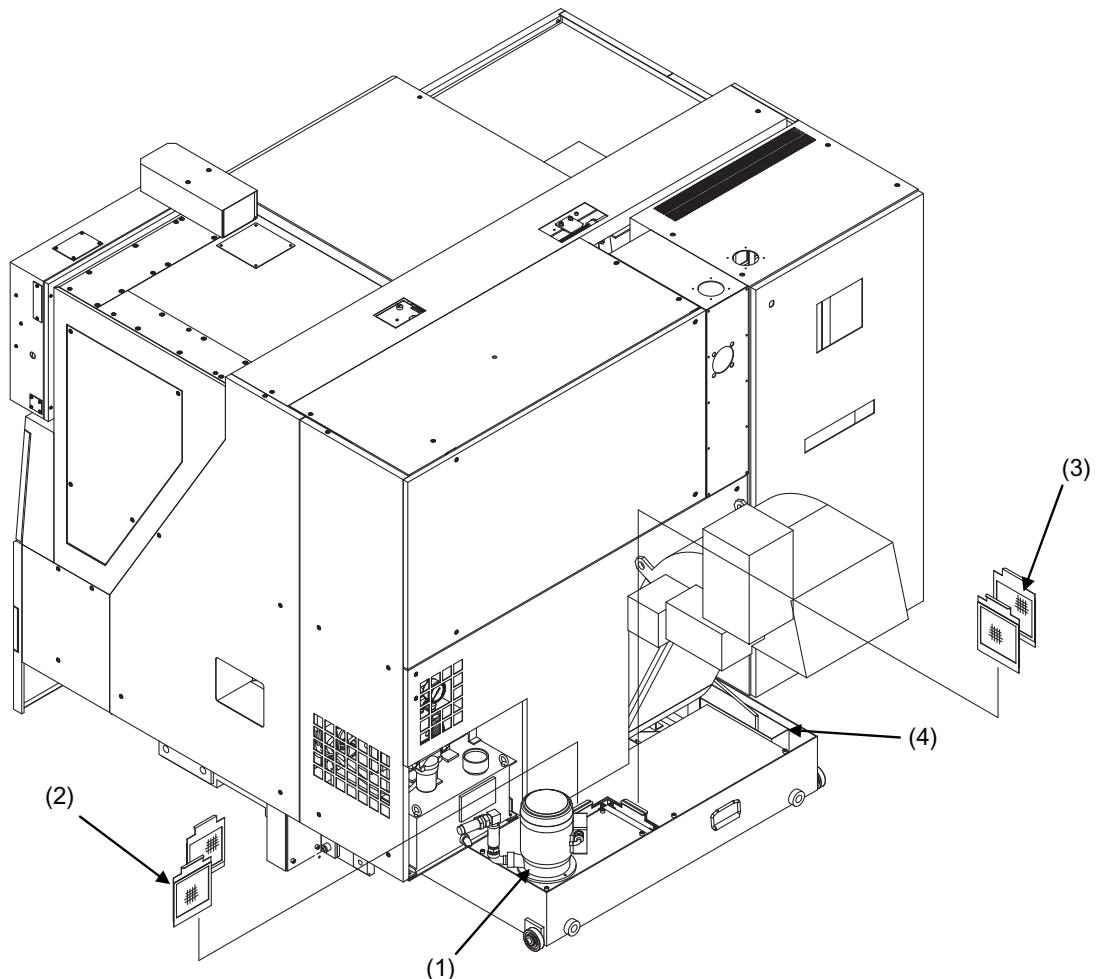
LB3000EXII Side, type L tank

Fig. 6-8

1	Machine front cover	3	Filter
2	Coolant pump	4	Fine chips collection bucket (Hinge type conveyor spec.)

6-6-4. Cleaning coolant tank filters (Discharging from the back)

Inspection intervals: 1 week or when a warning is given



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LB3000EXII Back

Fig. 6-9

1	Coolant pump	3	Filter
2	Filter	4	Pan

6-7. Procured Parts

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.



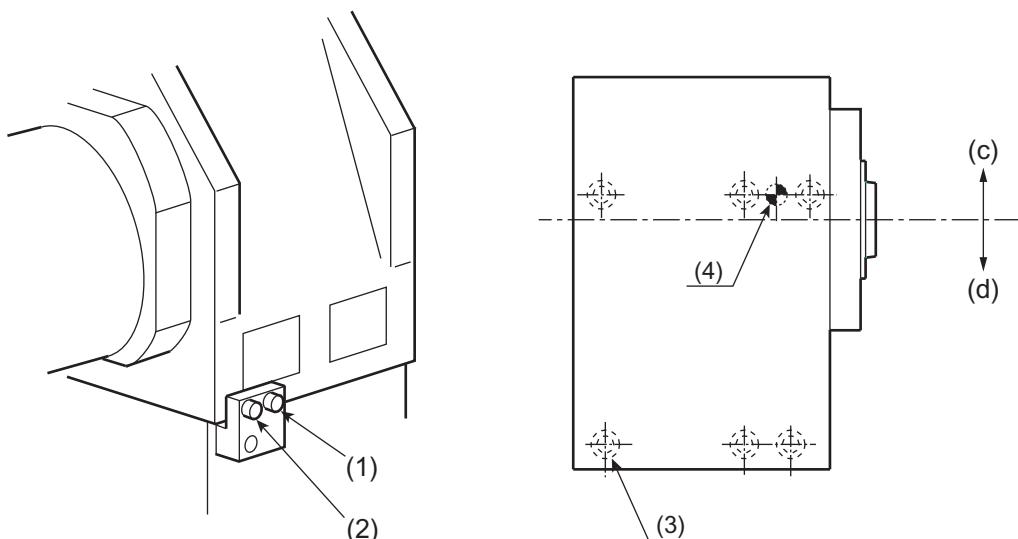
On this machine, parts not listed on the spare parts list may be used from procured parts.

For information on such procured parts, refer to the instruction manual or technical documents provided by the parts suppliers.

When using procured parts, follow instructions given by OKUMA.

6-8. Alignment of Headstock

If taper is generated on the turned workpiece in the chuck work operation, proceed with the alignment of the headstock as follows:



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Fig. 6-10

1	(a) Pull side	3	Headstock securing bolt (M24)
2	(b) Push side	4	Pin

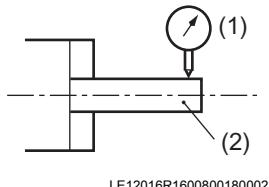
Procedure : —————

- 1- Loosen headstock securing bolts (M24 x 6 pcs.).
- 2- Adjust the headstock by swinging it around the pin in the direction (c) or (d).
For this purpose, use the adjust screw (a) or (b) to push or pull the headstock.
During adjustment, apply a dial gauge to the tip of the test piece and check the readings.

The Japanese Industrial Standard (JIS) specifies that the lathe should turn cylindrically to within 0.015 mm (0.00059 in.) per 225 mm (8.86 in.) of finishing length of work held in a chuck to hold the work (without using the tailstock).

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

- 3-** When a required accuracy is obtained, tighten the seven headstock securing bolts using caution not to move the dial gauge needle.



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Fig. 6-11

1	Dial gauge	2	Test piece
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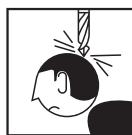
CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

When performing headstock alignment, be sure to switch off the power and confirm the safety before performing the task.

6-9. Measures to Be Taken when Inspecting X-axis Ball Screw

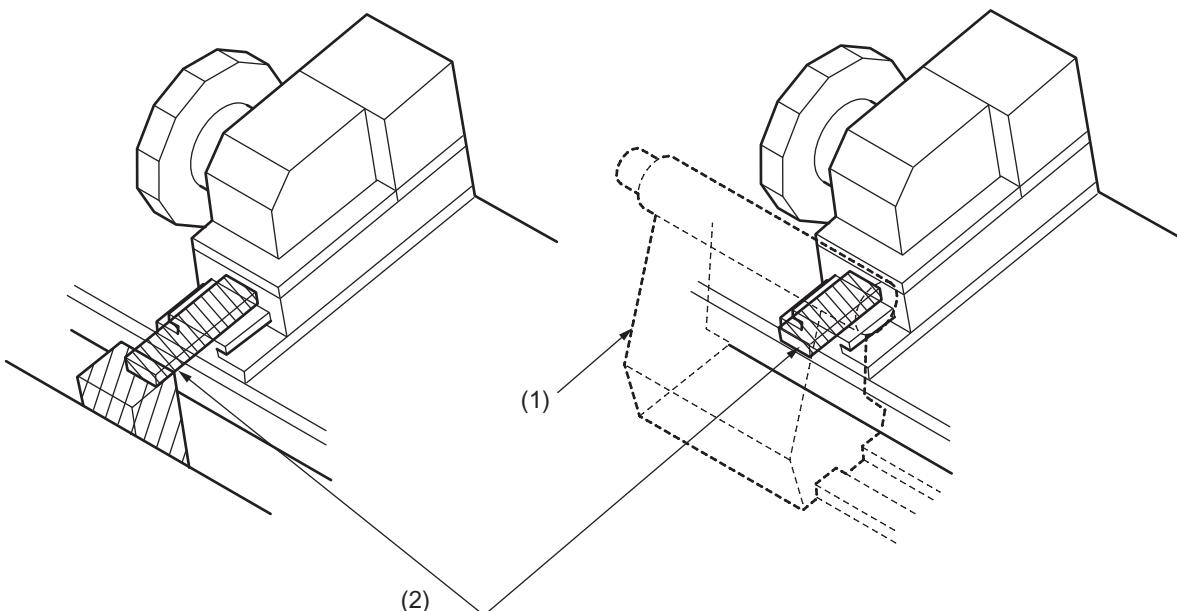


Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Before removing the X-axis servomotor to perform maintenance inspection of the X-axis ball screws, servomotor, or the other X-axis-related parts, support the turret with a wood block or the like to prevent the turret from dropping.

Turret drop preventive measure (example)



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Fig. 6-12

1	Tailstock	2	Prevent the turret from falling down by using a wood block, etc..
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6-10. Safety window glass for front door



Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

Scattered chips may collide with the window.

To prevent irreversible situations such as life-threatening injuries, serious health hazards, or considerable property damage, strictly observe instructions when replacing the window. Old polycarbonate may be penetrated when collided with parts, etc. Operators may be exposed to the danger.

The safety window glass is made of polycarbonate.

Over time, polycarbonate is affected by the coolants and cleaning agents, and may not be able to hold up to being hit by scattered chips. The safety window glass is subject to wear over time.

6-10-1. Replacement Interval



Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**

Safety window glass performance gradually deteriorates due to coolant corrosion. Accordingly, scattering chips and workpiece may fly out breaking the safety window glass. The safety window glass must be replaced every two years.

Also, if the safety window glass is broken or cracked, immediately stop using the machine and replace the safety window glass.

6-10-2. Precautions for Lifting the Machine



Indicates a potentially hazardous situation which, if not avoided, **could result in death or serious injury.**



- 1) When hoisting the door, keep it level and lift it gently so it does not run into the machine. When lowering it, do so slowly and carefully so it does not hit the floor with high impact. Make sure the side with the safety window glass faces the front, and place it on a protective sheet to prevent it from getting scratched.
- 2) Use a hoisting wire that is sufficiently long so the lifting angle of the wires at the hoisting hook is not too large.
- 3) Lift the machine carefully while balancing it.
- 4) When lowering the machine, use care not to hit the machine against the floor.

6-10-3. Replacement Procedure

Detach the front door from the machine and change the safety window glass.

The following section explains how to detach the front door and change the safety window glass.

- * The figure in the steps indicates the LB3000EXII standard machine with 500 between centers. Cover shapes and the number of doors may vary according to other specification.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

If two or more people are working together, make sure to communicate with each other to ensure safe work.

6-10-4. Replacement of safety window glass for front door

Procedure : _____

- 1- Loosen and remove the four bolts [C] on the bottom covers [A] and [B].(Fig. 6-12)

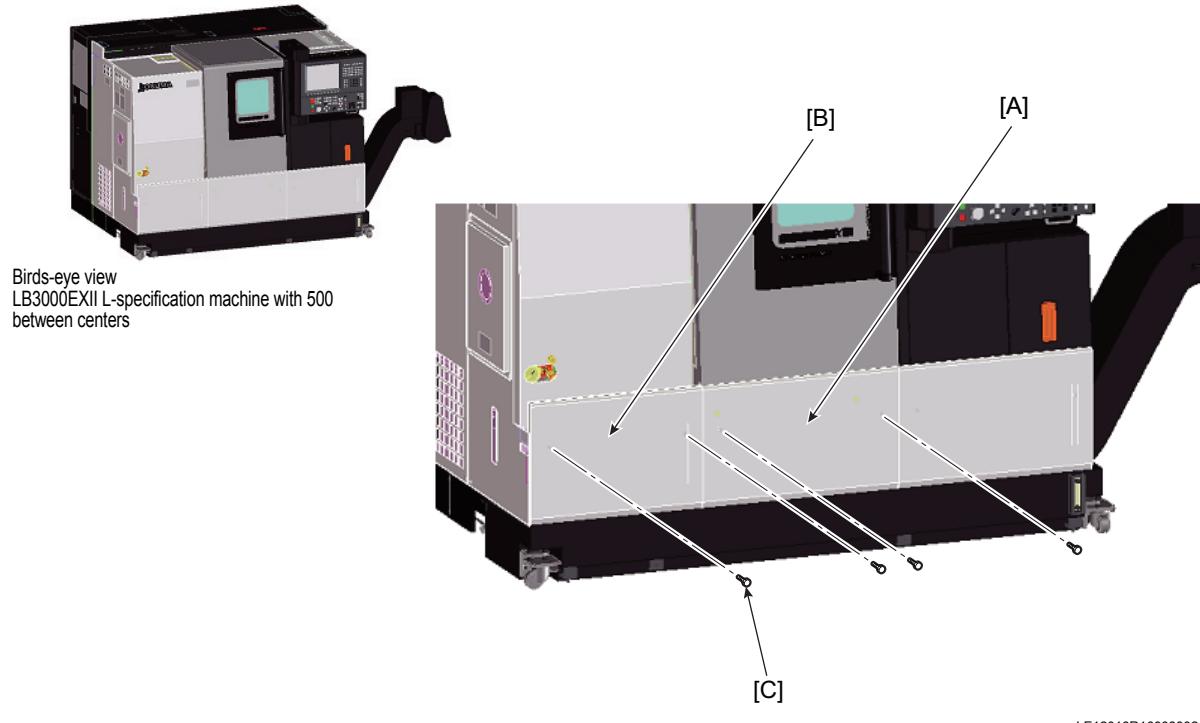
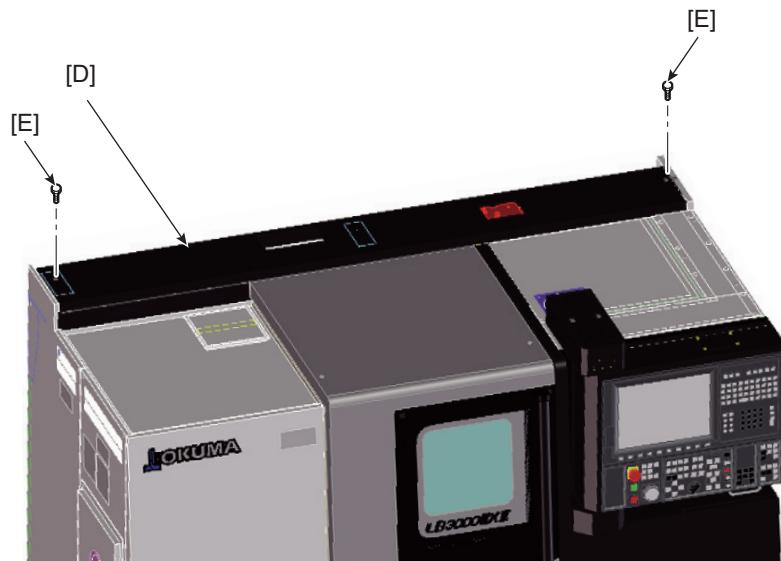


Fig. 6-13

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

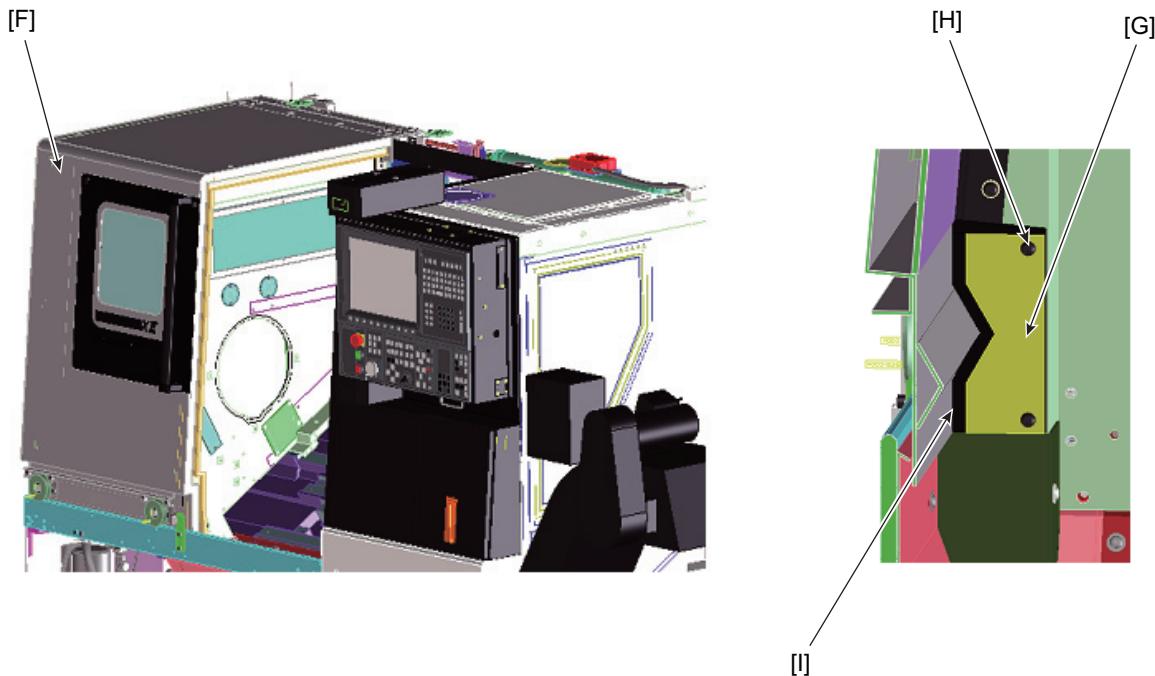
- 2-** Loosen and remove the two bolts [E] on the upper covers [D]. (Fig. 6-13)



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Fig. 6-14

- 3-** Open the front door [F], loosen the two bolts [H] on the wiper holding plate [G], then remove the wiper [I] and the holding plate [F].(Fig. 6-14)

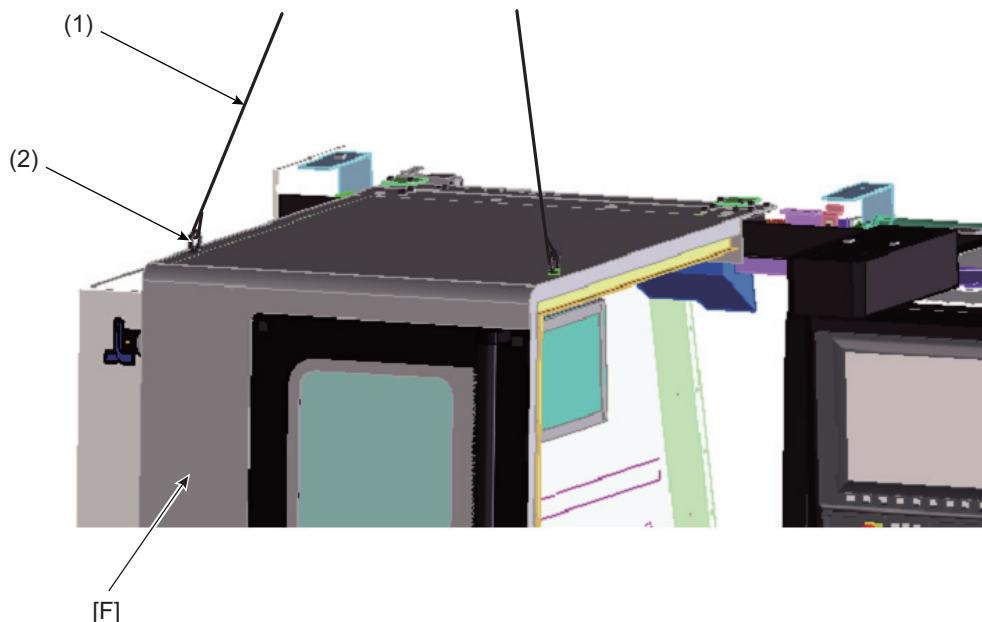


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Fig. 6-15

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

- 4-** Attach the two hoisting bolts (M10 x2) on the top of the front door [F] (Approx. 80 kg (176 lb)) and tighten the wire rope enough to prevent the cover from falling. (Fig. 6-15)

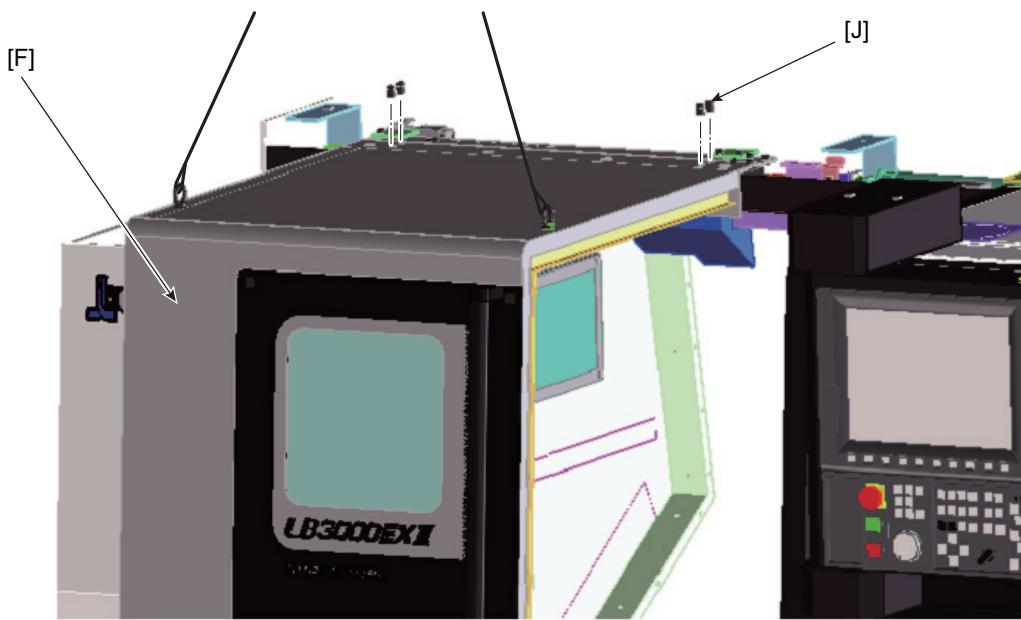


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Fig. 6-16

1	Wire rope	2	Hoisting bolts
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- 5-** Loosen and remove the four bolts [J] with liner guide blocks being attached on the upper half of the front door [F].(Fig. 6-16)



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Fig. 6-17

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

- 6-** Raise the front door [F] 100 mm (3.94 in.) above the floor, move it forward as is, and remove the door.(Fig. 6-17)

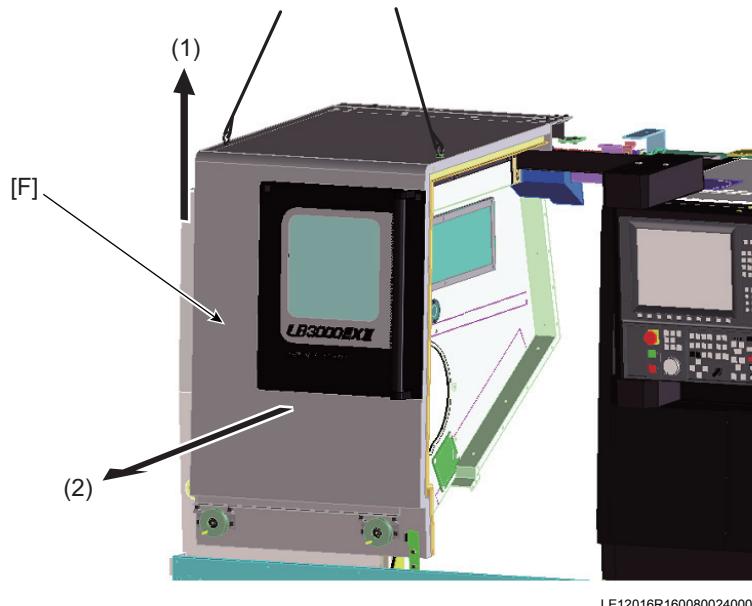


Fig. 6-18

1 Upward

2 Forward

- 7-** Place soft cloth, etc. on the floor, place it on its side as shown in Fig. 6-18 so as not to damage the front door [F].

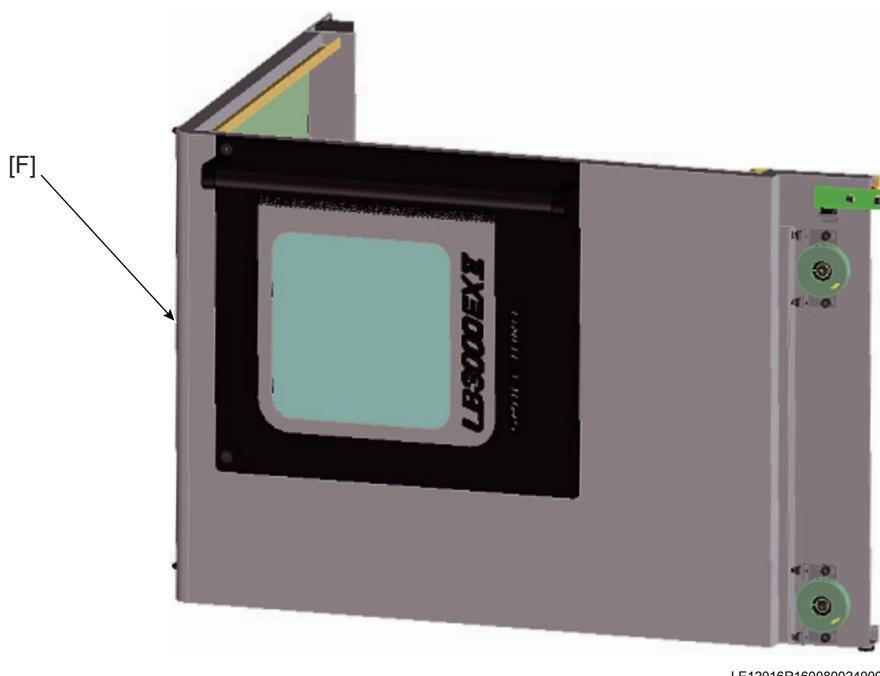


Fig. 6-19

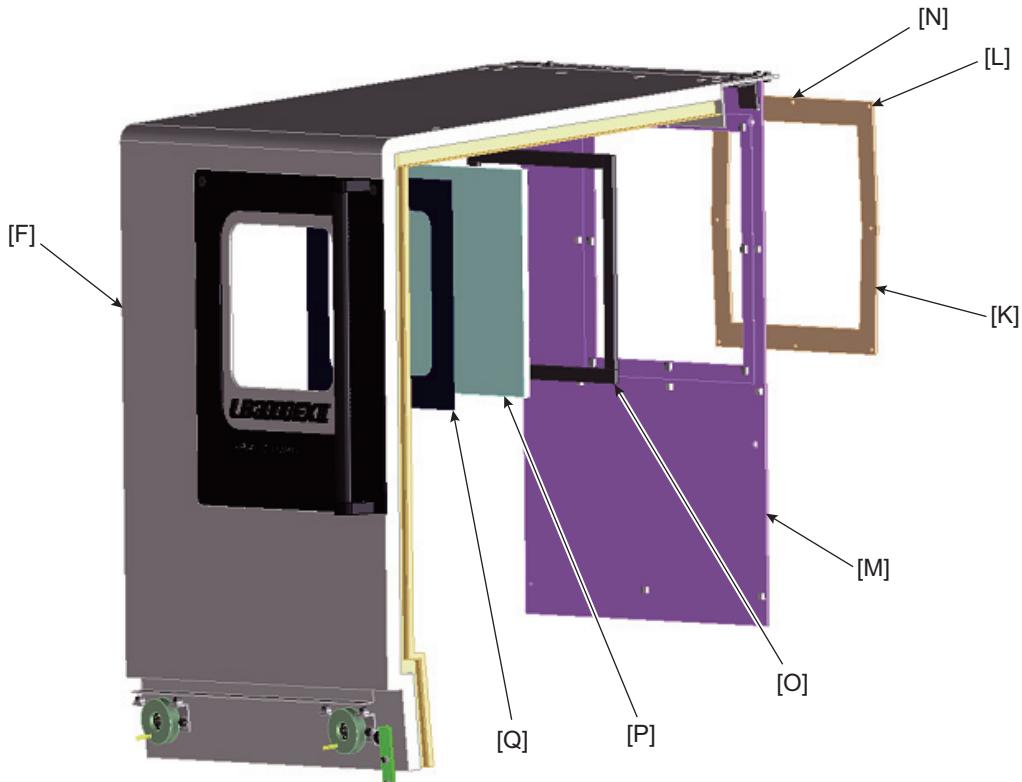
SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

- 8-** Loosen and remove the six bolts [L] on the cover [K]. (Fig. 6-19)
- 9-** Loosen and remove the 13 bolts [N] on the door's inner cover [M]. (Fig. 6-19)
- 10-** Remove the packings [O] and [Q] and replace them with new ones. (Fig. 6-19)

[Supplement]

Thoroughly remove the sealing agents remained in every parts.

- 11-** Replace the safety window glass [P] with new one. (Fig. 6-19)



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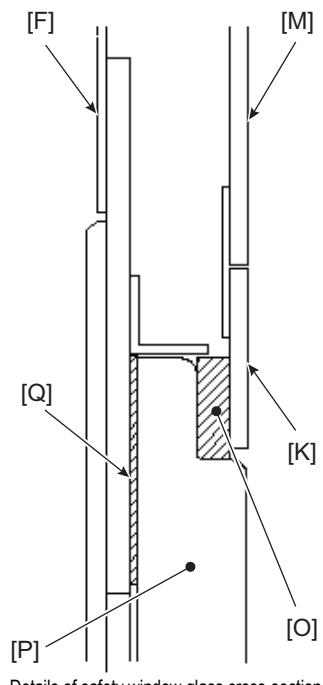
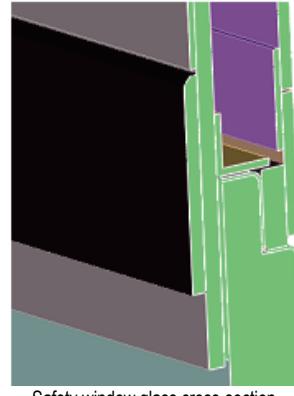
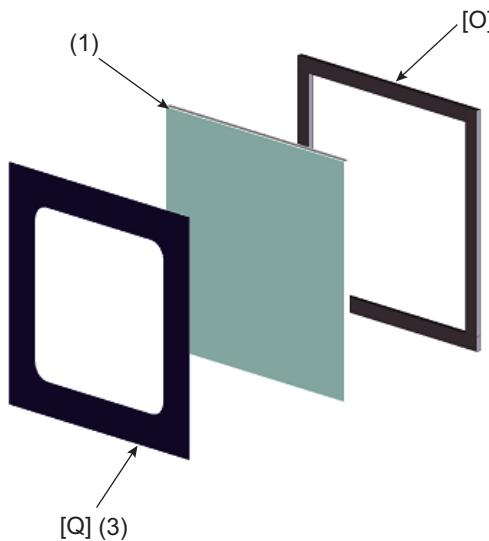
Fig. 6-20

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.

When replacing the safety window glass, be sure to apply sealing agent to the glass side of the inner packing [O] and both sides of the outer packing [Q]. (Fig. 6-20)

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS



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Fig. 6-21

1	Safety window glass	3	Apply sealing agent on both sides
2	Applying sealing agents to one side of the glass side		

- 12-** Install the door, following the disassembly steps in reverse. (Do not install the cover yet.)
- 13-** Make sure that the open/close confirmation signals are outputted correctly without error.
- 14-** Make sure that the door lock/unlock confirmation signals are outputted correctly without error.
- 15-** Verify no leakage is observed and attach the cover back on.

6-11. Troubleshooting

The actual procedures are as follows:

6-11-1.Trouble with Headstock

Spindle does not rotate

- (1) Make sure if hydraulic chuck is securely closed.
- (2) In the case of tailstock machine, if the user parameter at "Center Work/Chuck Work" is;
 - Set to Center Work, find out if the NC tailstock is at the advancing edge.
 - Set to Chuck Work, find out if the NC tailstock is at the retracting edge.

No Chuck Jaw Movement

STEP	CASE	YES	NO
1	Is the hydraulic oil pressure below the required level?	Adjust the system pressure. (Refer to [SECTION 5, 5-17-9. Attaching the Chuck].)	STEP2
2	Does the rod connecting position need adjustment?	Adjust the draw screw setting. (Refer to [SECTION 5, 5-17-9. Attaching the Chuck].)	STEP3
3	Is there something wrong with master jaw movements?	Remove chips and apply machine oil.	

6-11-2.Trouble with Turret

No Turret Indexing

STEP	CASE	YES	NO
1	Is the turret located in other than the turret index position?	Locate the turret to the turret indexing position manually.	STEP2
2	Have chips accumulated under the turret?	Cleaning	STEP3
3	Is the turret in unclamped state?	Check the I/O signals by displaying the check data screen on the operation panel. (Refer to the [OSP-P300L MAINTENANCE MANUAL].)	

Weak Turret Clamping Pressure

STEP	CASE	YES	NO
1	Is the hydraulic oil pressure below the required level?	Adjust the system pressure. (Refer to [SECTION 5, 5-17-5. Chuck pressure adjustment].)	

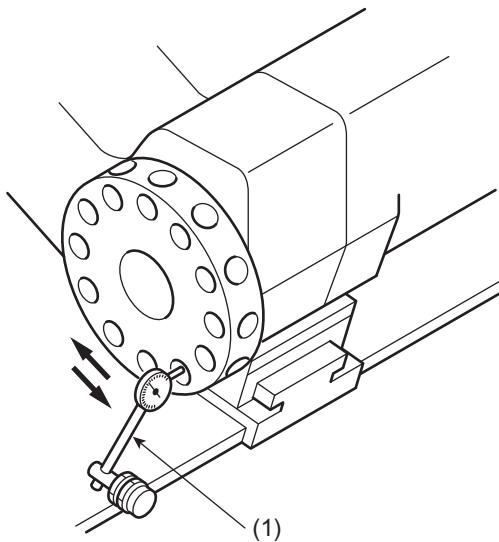
When the turret collides

Inspection method (when the turret collides)

When the turret collides with a chuck or a workpiece in rapid feed , or when excess force is applied to the turret because feeding starts with the tip of the turning tool missing, due to malfunctioning or programming mistake caused by misconception, the accuracy of the turret or spindle may be damaged. How to check the machines in these cases are described here.

- * The figure in the checking steps indicates the LB3000EXII M turret. The turret face shape may vary according to other specification.
- Checking the turret
 - a. Checking the turret inclination
Set the dial gauge as shown in the following figure, move the Z-axis by manual pulse feeding and check the inclination of the turret tool holder mounting face. Modification is necessary if the inclination is 0.02 mm (0.0008 in.) or more. For how to modify the inclination, refer to the [How to modify the turret inclination].

Axial turret



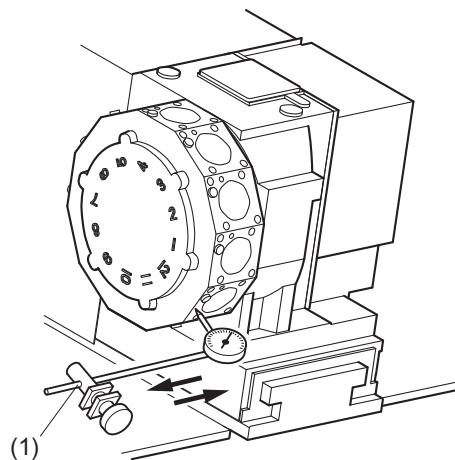
LE12016R1600800300001

Fig. 6-22

1	Dial gauge
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SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

Radial turret



LE12016R1600800300002

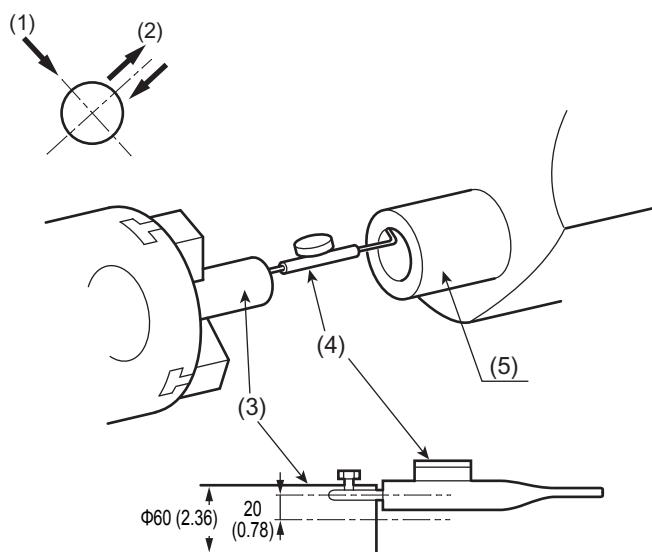
Fig. 6-23

1	Dial gauge
---	------------

b. Checking the turret misalignment

Mount the turret inside base as shown in the following figure, sway the inside base hole with the pick tester mounted to the chuck for checking the center core difference from the spindle. For the X-axis direction, align the spindle center line with the inside base center core. (Center core difference must be within 1/2 of sway error.)

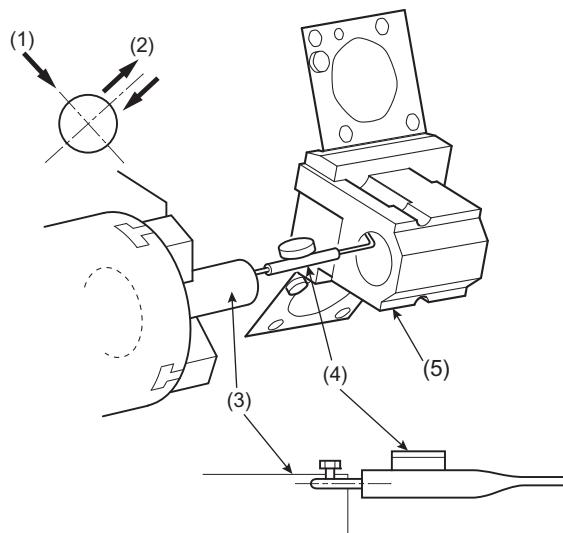
When the center core difference is 0.05 mm (0.002 in.) or more, modify it according to the [How to modify the turret center core difference].



LE12016R1600800300003

Fig. 6-24

1	X-axis direction	4	Pick tester
2	Center core difference	5	Inside base
3	Round bar		

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

LE12016R1600800300004

Fig. 6-25

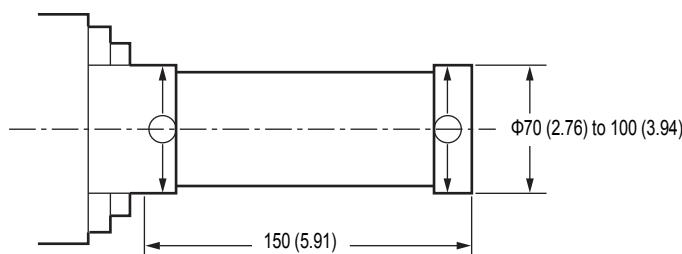
1	X-axis direction	4	Pick tester
2	Center core difference	5	Inside base
3	Round bar		

- Checking the accuracy of the spindle

Finish cutting the test piece as shown in the following figure for checking its cylindricality. (To be done by MDI mode.)

If that cylindricality is 0.015 mm (0.00059 in.)/225 mm (8.86 in.) or more, modify the spindle accuracy.

For details on the correction procedure, refer to [6-8. Alignment of Headstock]. (Note the relation to the center core difference at [Checking the turret misalignment] for this adjustment.)



LE12016R1600800300005

Fig. 6-26

Cutting condition

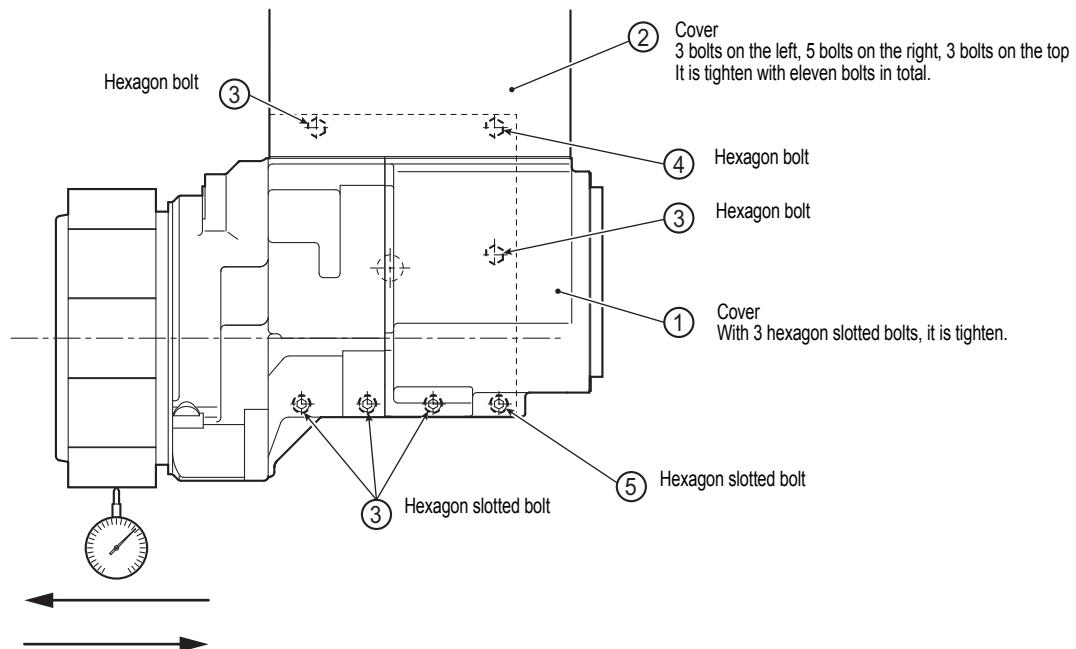
- Material: S45C or FC
- Cutout: $\Phi 0.2$ (0.008)
- Feed: 0.1 mm/rev (0.004 ipr)

- If accuracy modification is necessary, follow the following steps.

The turret inclination modification - The spindle accuracy modification - The turret center core difference modification

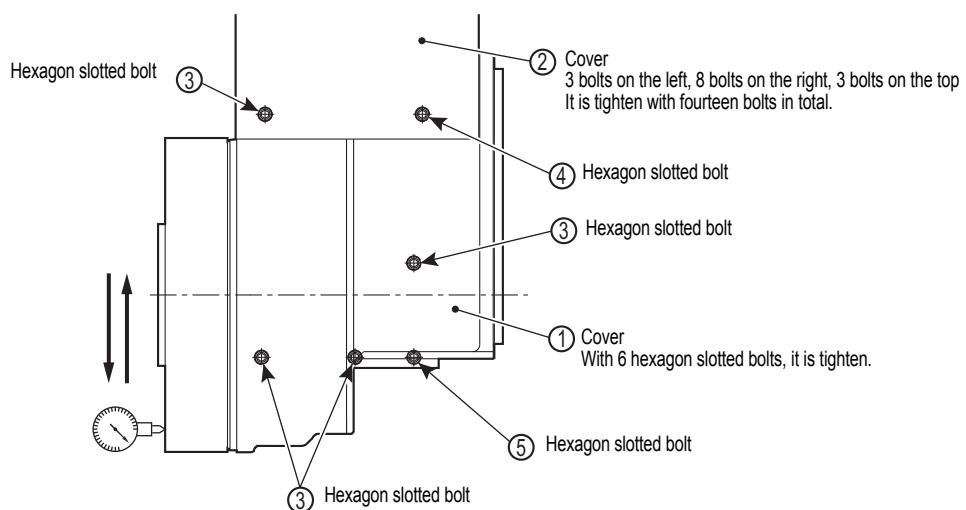
SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS**How to modify the turret inclination**

When the turret inclination is found 0.02 mm (0.0008 in.) or more when checked with the [Checking the turret inclination], modify the inclination by following steps.



LE12016R1600800310001

Fig. 6-27



LE12016R1600800310002

Fig. 6-28

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS**Procedure :** —

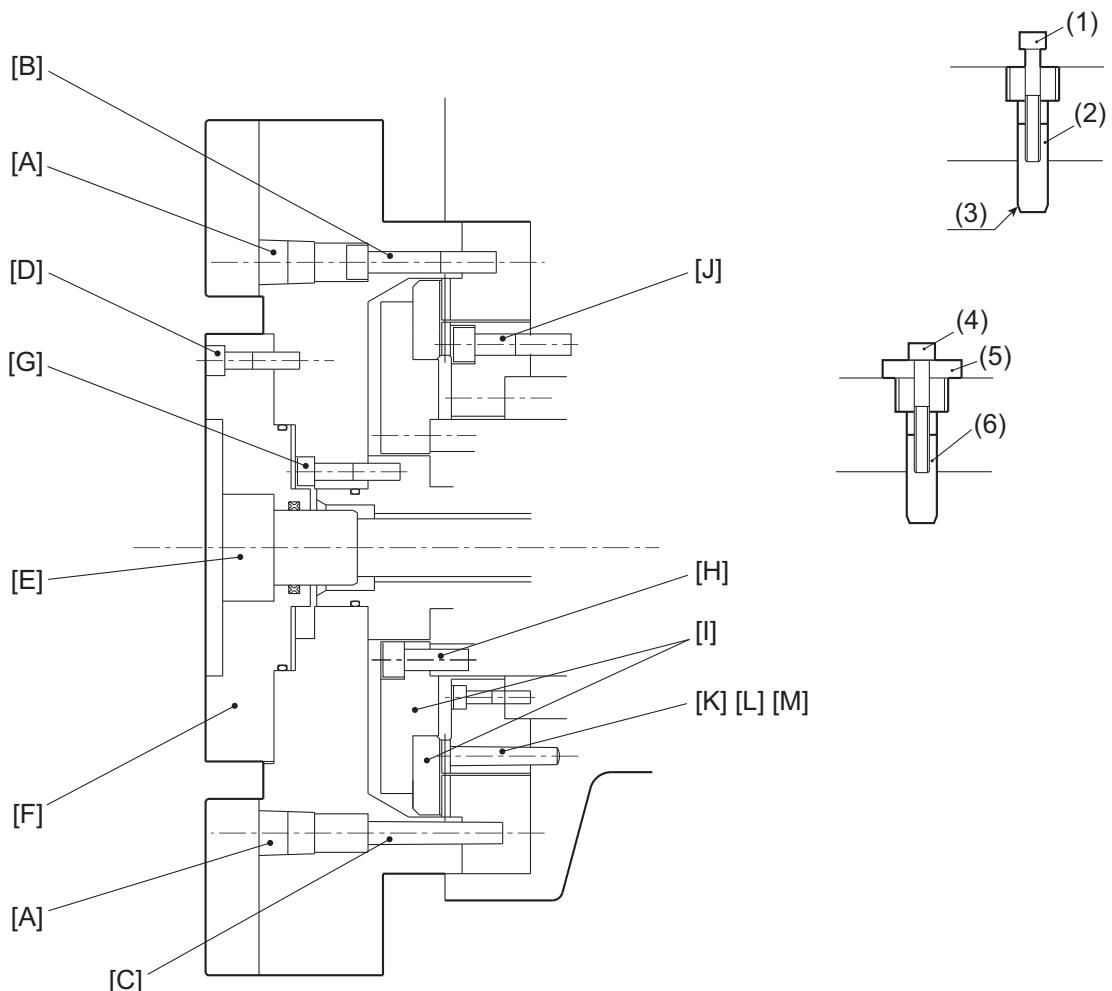
- 1-** Remove the cover (1) and (2).
- 2-** Loosen five (3) bolts of turret tightening bolts. (Leave (4) and (5) being tightened.)
- 3-** Loosen turret tightening bolts (4) and (5) halfway and tap the turret as necessary with a soft hammer while checking the turret's inclination as described in [Checking the turret inclination].
- 4-** When the inclination is correct, tighten all of the hexagon bolts (3), (4) and (5).
- 5-** Attach the covers (1) and (2). Apply sealing agents to the cover mounting face.

All of the works are now complete.

How to modify the turret center core difference

Radial turret (L specification)

When the turret center core difference is 0.05 mm (0.002 in.) or more when checked with the [Checking the turret misalignment], modify it by following steps.



LE12016R1600800430001

Fig. 6-29

1	Bolt	4	Turn the bolt and remove the tapered pin.
2	Tapered pin	5	Washer
3	Deburring in advance is preferable.	6	Tapered pin

* [L] is located in the position of which phase is shifted by 60° from [K].

Procedure :

- 1- Turn OFF power supply and its main switch.
- 2- Remove the blanking plug [A] and loosen the bolt [B].

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

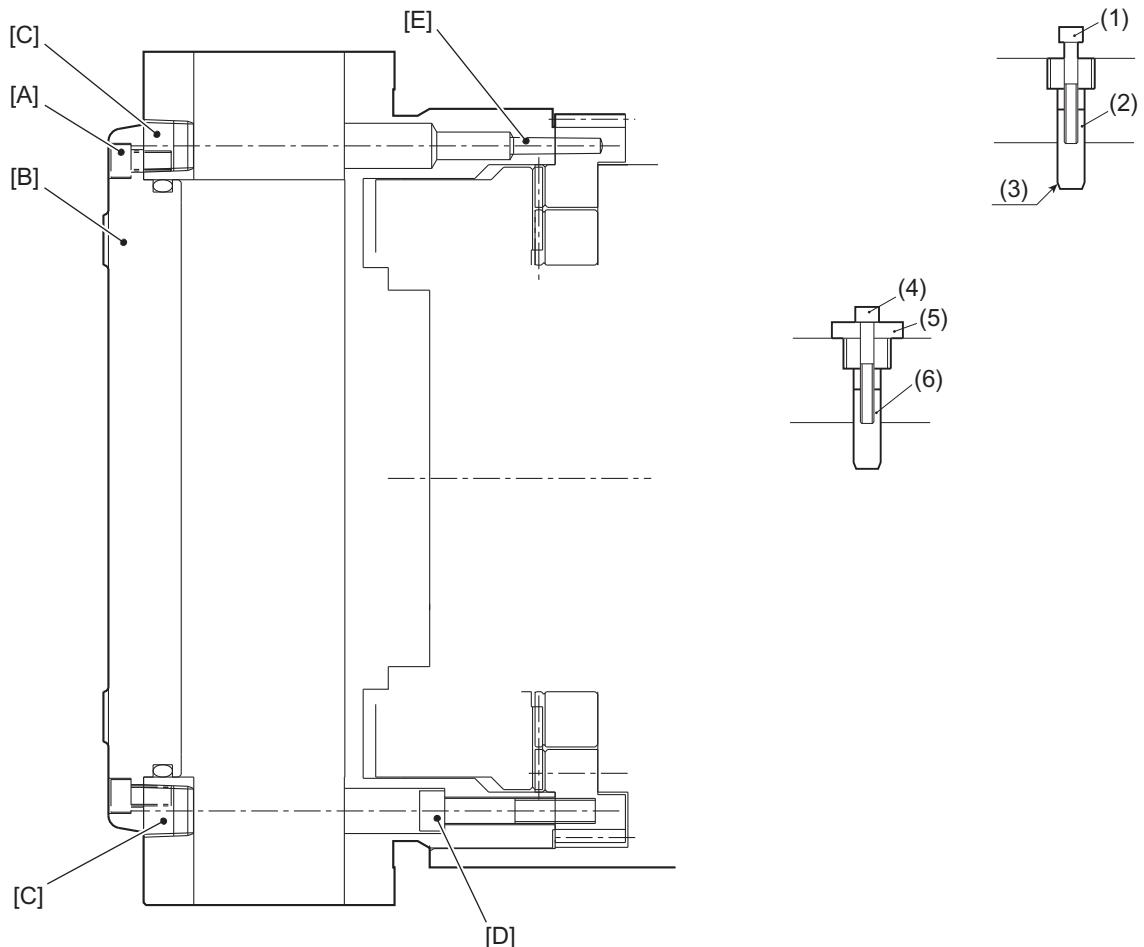
- 3-** Prepare two tapered pins with female screws of which $\Phi 10$ (0.39) x 63 [C]. Gently pat the turret with a soft hammer to knock in those tapered pins. Drive a bolt, which can be fitted to the female screw, into the tapered pin in advance for smooth knocking.
- 4-** With both of two tapered pin in, tighten the turret tightening bolt [B].
- 5-** Power ON.
- 6-** Check the center core difference just like the [Checking the turret misalignment].
- 7-** Remove the tapered pin [C] and mount the blanking plug [A] after the modification.
- 8-** If modification was not complete even after the above "1-" to "7-" steps are done, additional following steps are necessary.
- 9-** Make the turret unclamp. Refer to [OSP-P300L OPERATION MANUAL].
- 10-** Turn OFF NC power supply and its main switch.
(After this operation, do not turn it on until the turret re-installation is done.)
- 11-** Remove the bolt [D] and then remove the lid [F] along with the center axis [E].
(Put marks so that its tool number can be easily recognized.)
- 12-** Hoist the turret and remove the bolt [G] by using jib cranes, etc.
- 13-** Pull out the turret. (Put marks so that its tool number can be easily recognized for this operation as well.)
- 14-** Remove the bolt [H] and then the clutch [I]. (Put marks so that its tool number can be easily recognized for this operation as well.)
- 15-** Loosen the bolt [J] and then remove the tapered pin [K].
- 16-** Prepare two tapered pin with female screws ($\Phi 6$ (0.24) x 36) and drive them into two tapered pin holes [L].
- 17-** Securely tighten the clutch tightening bolt [J].
- 18-** Roughly align the two tapered pin holes [M] with tapered reamer and drive in tapered pin ($\Phi 8$ (0.31) x 50). If any tiers or curves are found in the central part of the tapered pin which was removed at "17-", replace it with a new one.
- 19-** Remove the tapered pins [C] and [L] which have just been driven into.
- 20-** Mount the turret in the reverse order of the "11-" to "14-" steps.
(Do not forget to insert O-rings in each part. Apply a light coating of grease to the clutch teeth face in a thin layer.)
- 21-** Power ON.
- 22-** Return the setting to the standard values. Refer to [OSP-P300L OPERATION MANUAL].
- 23-** Switch to the MANUAL mode and check its indexing with the TURRET ROTATION key.

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

- 24-** Check the turret center core difference as described in the [Checking the turret misalignment].

Radial turret (M specification)

When the turret center core difference is 0.05 mm (0.002 in.) or more when checked with the [Checking the turret misalignment], modify it by following steps.



LE12016R1600800330001

Fig. 6-30

1	Bolt	4	Turn the bolt and remove the tapered pin.
2	Tapered pin	5	Washer
3	Deburring in advance is preferable.	6	Tapered pin

Procedure :

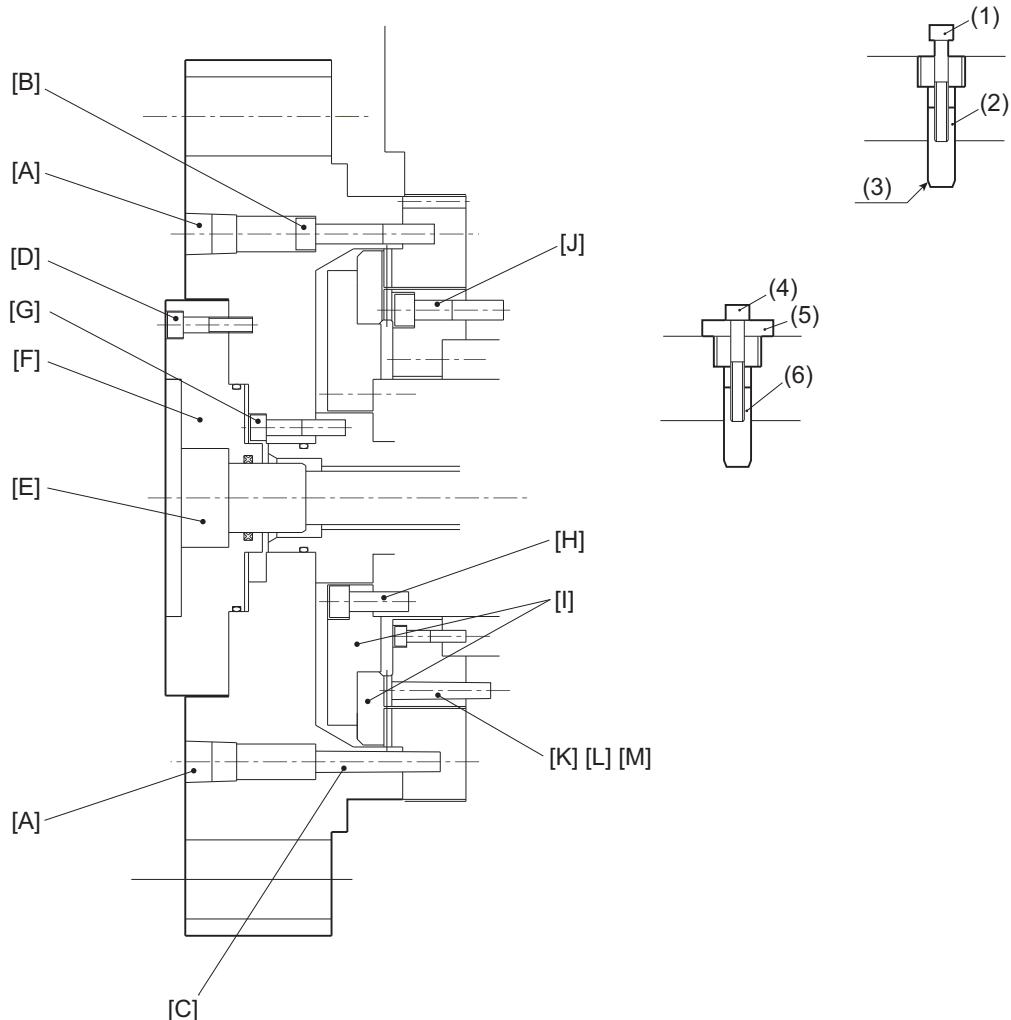
- 1-** Turn OFF power supply and its main switch.
- 2-** Remove the bolt [A] and then the lid [B].
- 3-** Remove the blanking plug [C] and loosen the bolt [D].
- 4-** Prepare two tapered pins with female screws of which $\Phi 6$ (0.24) x 36 [E]. Gently pat the turret with a soft hammer to knock in those tapered pins. Drive a bolt, which can be fitted to the female screw, into the tapered pin in advance for smooth knocking.

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

- 5-** With both of two tapered pin in, tighten the turret tightening bolt [D].
- 6-** Power ON.
- 7-** Check the center core difference just like the [Checking the turret misalignment].
- 8-** Remove the tapered pin [E] and mount the blanking plug [C] and the lid [B] after the modification is done.
- 9-** If modification was not complete even after the above "1-" to "8-" steps are done, contact OKUMA.

VDI turret

When the turret center core difference is 0.05 mm (0.002 in.) or more when checked with the [Checking the turret misalignment], modify it by following steps.



LE12016R1600800340001

Fig. 6-31

1	Bolt	4	Turn the bolt and remove the tapered pin.
2	Tapered pin	5	Washer
3	Deburring in advance is preferable.	6	Tapered pin

* [L] is located in the position of which phase is shifted by 90° from [K].

Procedure :

- 1-** Turn OFF power supply and its main switch.
- 2-** Remove the blanking plug [A] and loosen the bolt [B].

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

- 3-** Prepare two tapered pins with female screws of which $\Phi 10$ (0.39) x 63 [C]. Gently pat the turret with a soft hammer to knock in those tapered pins. Drive a bolt, which can be fitted to the female screw, into the tapered pin in advance for smooth knocking.
- 4-** With both of two tapered pin in, tighten the turret tightening bolt [B].
- 5-** Power ON.
- 6-** Check the center core difference just like the [Checking the turret misalignment].
- 7-** Remove the tapered pin [C] and mount the blanking plug [A] after the modification.
- 8-** If modification was not complete even after the above "1-" to "7-" steps are done, additional following steps are necessary.
- 9-** Make the turret unclamp. Refer to [OSP-P300L OPERATION MANUAL].
- 10-** Turn OFF NC power supply and its main switch.
(After this operation, do not turn it on until the turret re-installation is done.)
- 11-** Remove the bolt [D] and then remove the lid [F] along with the center axis [E].
(Put marks so that its tool number can be easily recognized.)
- 12-** Hoist the turret and remove the bolt [G] by using jib cranes, etc.
- 13-** Pull out the turret. (Put marks so that its tool number can be easily recognized for this operation as well.)
- 14-** Remove the bolt [H] and then the clutch [I]. (Put marks so that its tool number can be easily recognized for this operation as well.)
- 15-** Loosen the bolt [J] and then remove the tapered pin [K].
- 16-** Prepare two tapered pin with female screws ($\Phi 6$ (0.24) x 36) and drive them into two tapered pin holes [L].
- 17-** Securely tighten the clutch tightening bolt [J].
- 18-** Roughly align the two tapered pin holes [M] with tapered reamer and drive in tapered pin ($\Phi 8$ (0.31) x 50). If any tiers or curves are found in the central part of the tapered pin which was removed at "17-", replace it with a new one.
- 19-** Remove the tapered pins [C] and [L] which have just been driven into.
- 20-** Mount the turret in the reverse order of the "11-" to "14-" steps.
(Do not forget to insert O-rings in each part. Apply a light coating of grease to the clutch teeth face in a thin layer.)
- 21-** Power ON.
- 22-** Return the setting to the standard values. Refer to [OSP-P300L OPERATION MANUAL].
- 23-** Switch to the MANUAL mode and check its indexing with the TURRET ROTATION key.

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS

- 24-** Check the turret center core difference as described in the [Checking the turret misalignment].

6-11-3.Others**No Lubricating Oil Flow to X-, Z- and W-axes Slideways**

STEP	CASE	YES	NO
1	Lubricating oil is not consumed in one to two days.	STEP2	
2	Lubrication pump is faulty.	Adjust the centralized lubrication unit. (Refer to [6-4. Adjusting Centralized Lubrication Unit].)	STEP3
3	Distribution valve is not operating.	Change	

No Coolant Supply

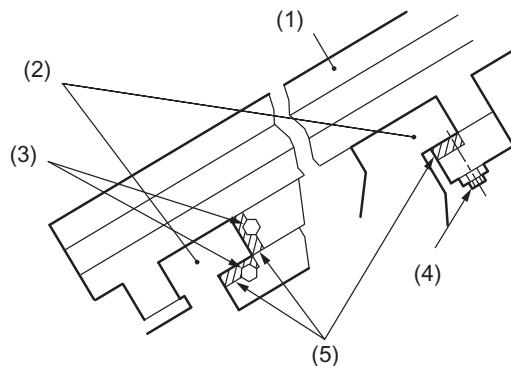
STEP	CASE	YES	NO
1	Coolant pump motor is not operating.	Check if the overload relay in the control box (4) is tripped.	STEP2
2	The filter is clogged.	Clean it. (Refer to [6-6. Cleaning the coolant unit].)	STEP3
3	Coolant tank is not filled to the specified level.	Replenish the coolant.	

No Pressure Building-up of Hydraulic Power Unit

STEP	CASE	YES	NO
1	Hydraulic power unit pump motor is not operating.	Check if the overload relay is tripped.	STEP2
2	The filter is clogged.	Clean it. (Refer to [SECTION 5, 5-15-3. Replacing Oil and Filter].)	STEP3
3	Hydraulic oil tank is not filled to the specified level.	Replenishment cycle	

6-11-4.How to modify jibs on the saddle cross-slide slideway

Generally, the jib has been adjusted before shipment, so adjustment is not necessary. If jib wearing or loosening occurs during operation and its unstable feeding adversely effects cutting accuracy, adjustment is necessary.



LE12016R1600800380001

Fig. 6-32

1	Saddle	4	Jib adjusting bolt
2	Bed gap target: 0.01 mm (0.0004 in.)	5	Jib
3	Jib adjusting bolt		

Remove the saddle covers on the left and right, and adjust them with the adjusting bolt on both saddle sides.

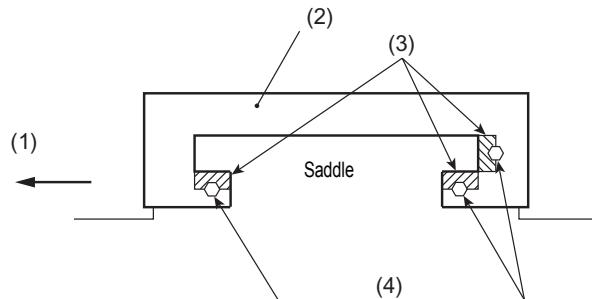
How to modify jib

Procedure : _____

- 1- Loosen the jib spindle side (left side).
- 2- Tighten the jib tailstock side (right side) firmly and then ease it by 1/2 rotation.
- 3- Tighten the jib spindle side (left side).
Gap target: 0.01 mm (0.0004 in.)

SECTION 6 MAINTENANCE, INSPECTION AND ADJUSTMENTS**Adjusting the jib on the cross-slide slideway.**

Just like the jib adjustment, follow the saddle's "1-" to "3-" steps.



LE12016R1600800400001

Fig. 6-33

1	Headstock	3	Jib
2	Cross-slide slideway	4	Jib adjusting bolt

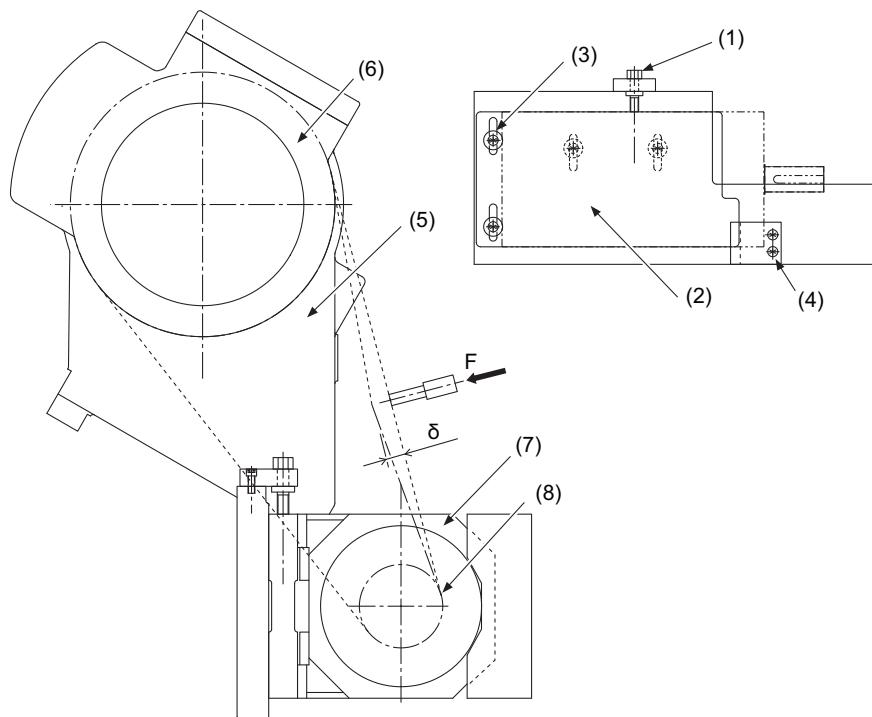
6-12. Adjusting belt tension (MNTKEY0210)



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

When adjusting belt tension or replacing the belt, always shut off machine power for your safety.

6-12-1. Spindle driving belt



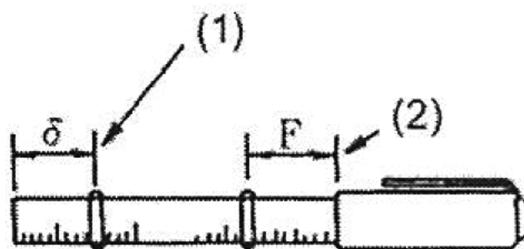
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Fig. 6-34

1	Adjustment axis	5	Headstock
2	Motor base	6	Headstock input pulley
3	Motor base clamping bolts	7	Spindle motor
4	Block clamping bolts	8	Motor pulley

Adjusting belt tension

Using the belt tension meter (optional) is the most convenient and accurate method.



LE12016R1600800420001

Fig. 6-35

1	Belt deflection is shown here.	2	Belt load is shown here.
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Read the belt tension load F when deflection δ is applied midway along the belt span. Tension is adjusted by loosening the 4 motor base clamping bolts and the 2 block clamping bolts, and then turning the adjustment axis. When the belt is replaced or when it requires adjustment, adjust the tension according to values in the table below.

LB4000EXII

Maker Belt product name	Model size (OKUMA part number)	No. of belts	F N (lbf)	δ mm (in.)	Headstock specification	Between centers
Bando POWER ACE	3V-950 (M119-0024-32)	14	34.2 (7.7) (*1) 29.8 (6.7) (*2) 23.2 (5.2) (*3)	11.1 (0.437)	B7 spindle 37 kW/30 kW (50 hp/40 hp)	1,500
Bando POWER ACE	3V-1000 (M119-0024-30)	14	34.2 (7.7) (*1) 29.8 (6.7) (*2) 23.2 (5.2) (*3)	12.2 (0.480)	B7 spindle 37 kW/30 kW (50 hp/40 hp)	2,000

Table 6-3

*1 New

*2 Tension adjustment (first time)

*3 Tension adjustment (second time and after)

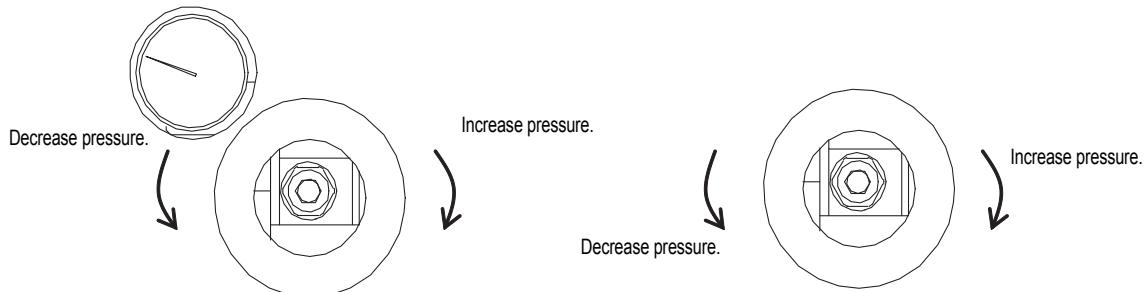
SECTION 7 OPTIONS

7-1. Switching high-low pressure on the chuck

7-1-1. Outline

When working with thin workpieces that are sensitive to warping in the chuck, use high pressure for rough machining, and low pressure for finishing work to minimize warping.

- High and low pressure adjustment (Not required under normal operation.)



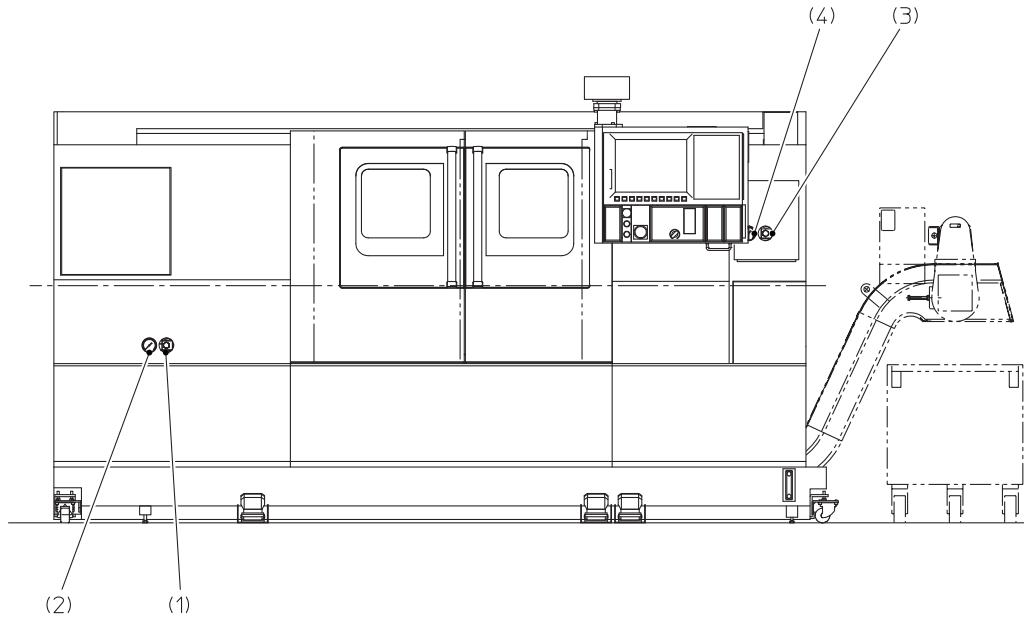
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Chuck pressure high/low switching valve

Fig. 7-1

- Pressure adjustment for main spindle chuck
(Refer to [SECTION 5, 5-17-5. Chuck pressure adjustment])
- Pressure adjustment for sub-spindle chuck
Adjust using the pressure adjustment valve with high-low pressure switch for sub-spindle chuck.

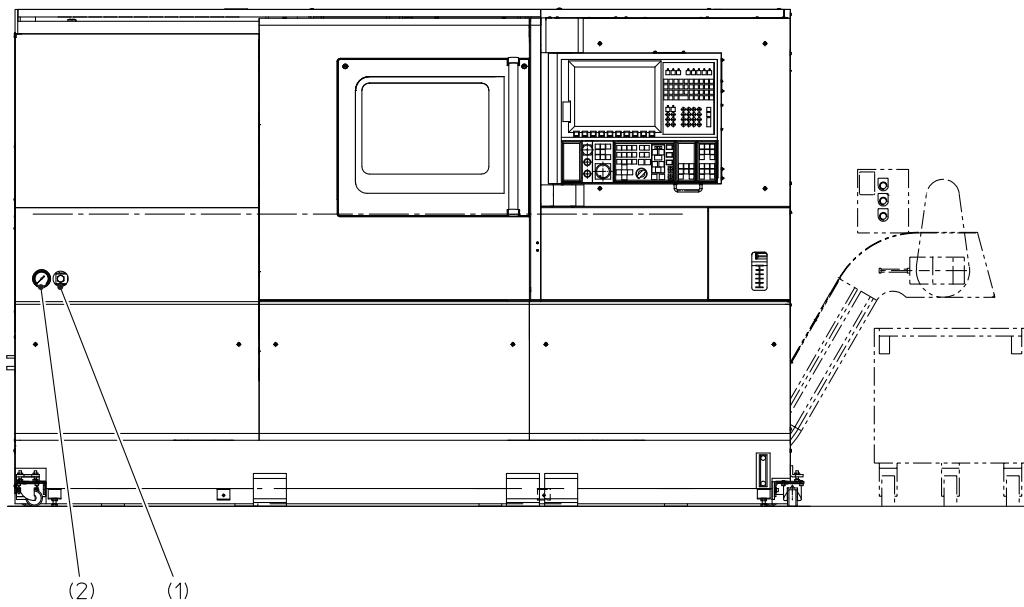
**LB3000EXII L/M 1,000 between centers, LB3000EXII MY 950 between centers,
LB3000EXII L/M-W 800 between centers, LB3000EXII MYW 800 between
centers, LB3000EXII L/M 1,300 between centers, LB3000EXII MY 1,250
between centers**



LE12016R1600900020001

Fig. 7-2

1	Pressure adjusting valve for the hydraulic chuck of the main spindle	3	Pressure adjusting valve for the hydraulic chuck of the sub-spindle
2	Pressure gauge for the hydraulic chuck of the main spindle	4	Pressure gauge for the hydraulic chuck of the sub-spindle

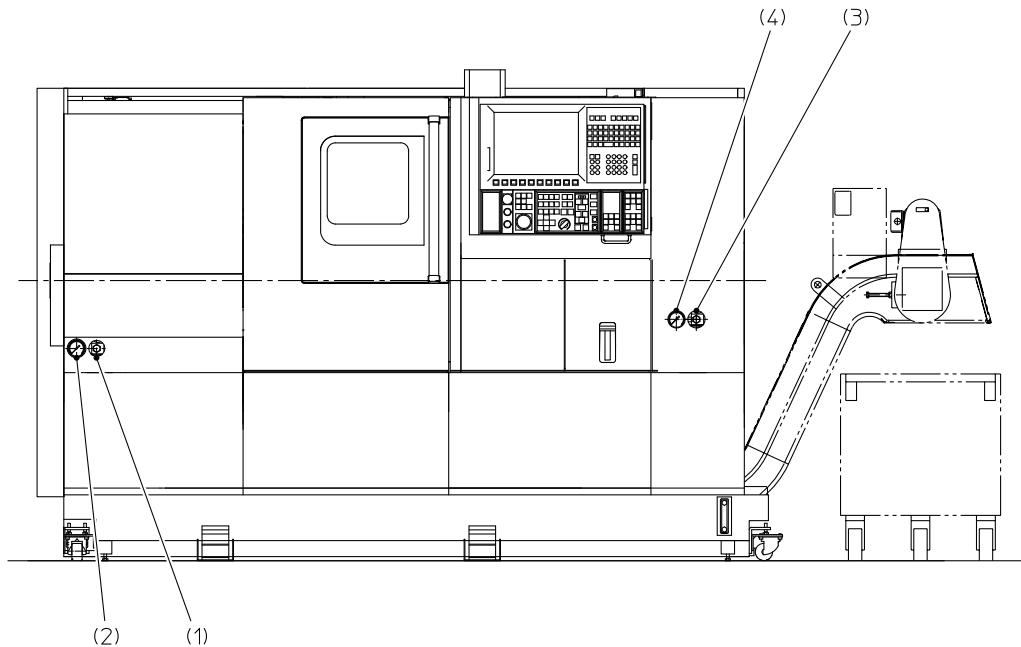
LB2000EXII L/M/MY, LB2500EXII L/M, LB4000EXII L/M/MY 750 between centers

LE12016R1600900030001

Fig. 7-3

1	Pressure adjusting valve for the hydraulic chuck of the main spindle	2	Pressure gauge for the hydraulic chuck of the main spindle
---	--	---	--

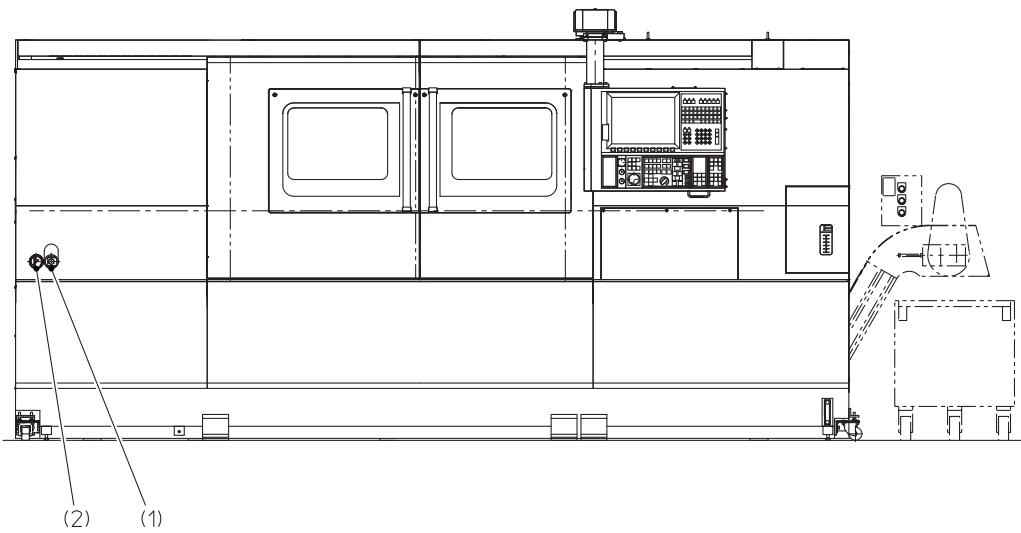
LB2000EXII L/M-W, LB3000EXII L/M 500 between centers, LB3000EXII L/M-W 500 between centers, LB3000EXII MY 450 between centers, LB3000EXII MYW 450 between centers



LE12016R1600900040001

Fig. 7-4

1	Pressure adjusting valve for the hydraulic chuck of the main spindle	3	Pressure adjusting valve for the hydraulic chuck of the sub-spindle
2	Pressure gauge for the hydraulic chuck of the main spindle	4	Pressure gauge for the hydraulic chuck of the sub-spindle

LB4000EXII L/M/MY 1,500 between centers

LE12016R1600900050001

Fig. 7-5

1	Pressure adjusting valve for the hydraulic chuck of the main spindle	2	Pressure gauge for the hydraulic chuck of the main spindle
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7-1-2. Hydraulic Circuit Diagram (Example)

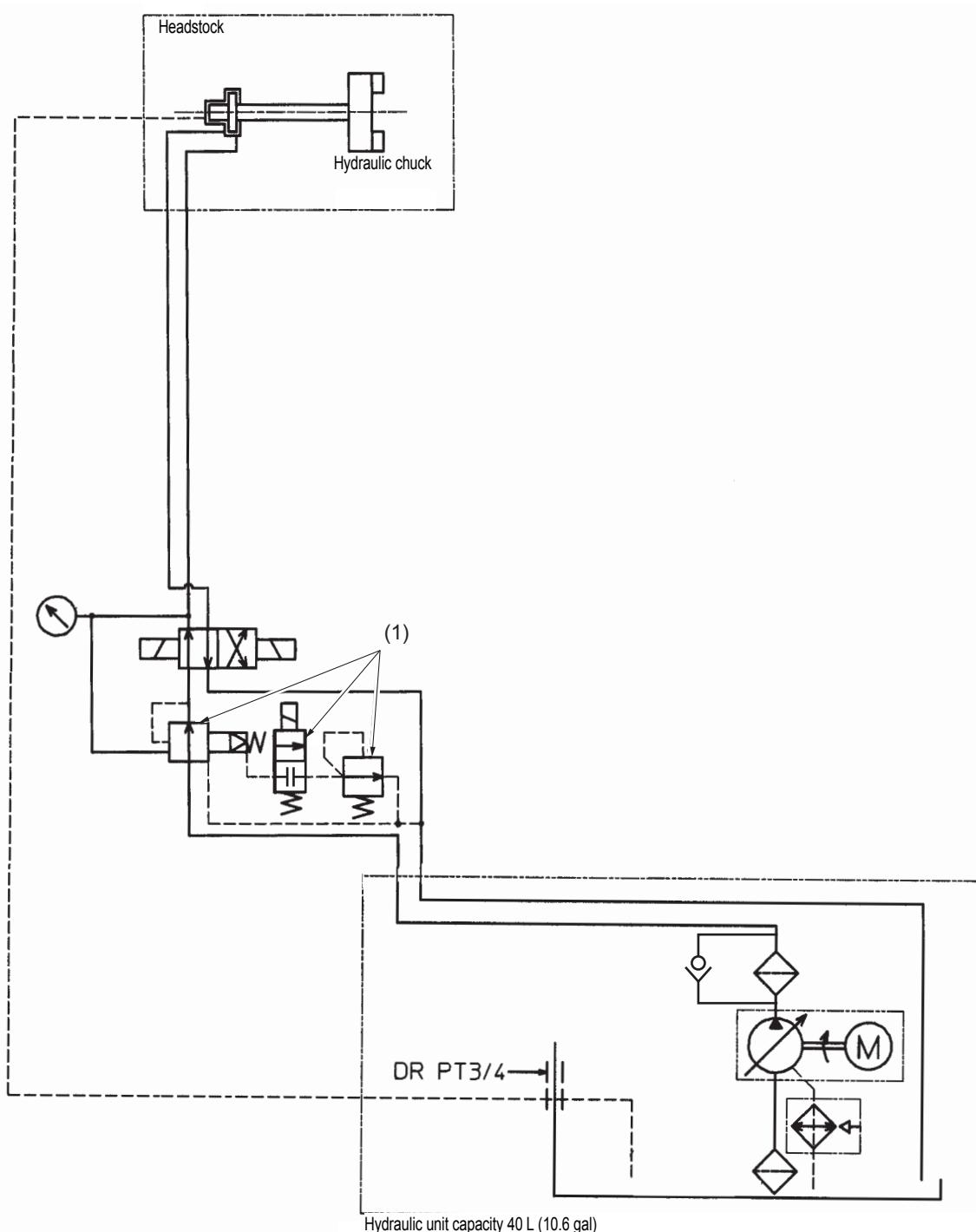


Fig. 7-6

1

- High-Low pressure switching is possible for both chuck opening and closing.
- Chuck pressure adjustment dual-pressure reducing valve

LE12016R1600900060001

7-1-3. Operating method

Procedure : _____

- 1-** Operable with program command and MDI mode.
High pressure M59
Low pressure M58
- 2-** When there is no M command at the time of the program command, it becomes high pressure. When power is turned on or when there is no low pressure command (M58), it becomes high pressure.
- 3-** To change the chuck pressure from high to low, it is necessary to re-clamp the workpiece (chuck open and close).
To prevent the workpiece from falling, it is necessary to support it with the workpiece pusher attached to the turret.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Precautions concerning workpiece fall

Before re-clamping the workpiece, verify that it is supported by the workpiece pusher attached to the turret. Failing to do so may result in damage to the machined workpiece or to the machine.

7-2. Oil Skimmer

7-2-1. Outline

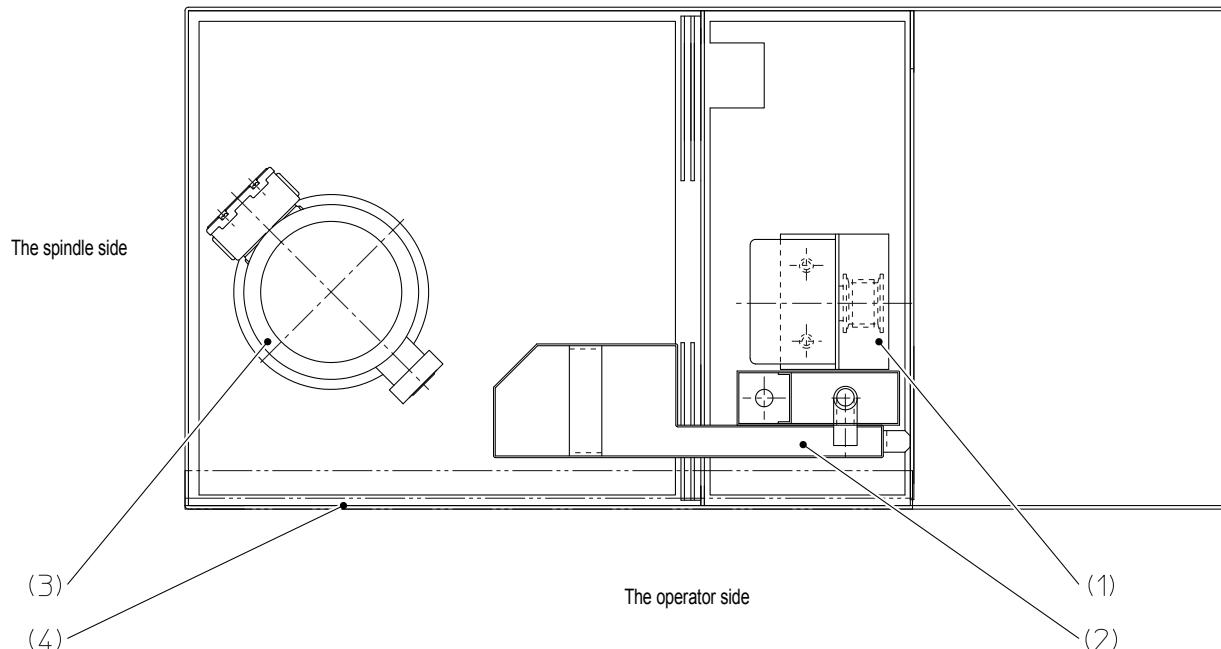
Separates and removes oil that is mixed into and/or floating in the coolant tank, thereby reducing coolant decomposition or deterioration.

SAFETY INSTRUCTIONS

Indicates general instructions for safe operation.

Oil separated by the oil skimmer is collected in the waste oil bucket.
Dispose of the collected waste oil regularly.

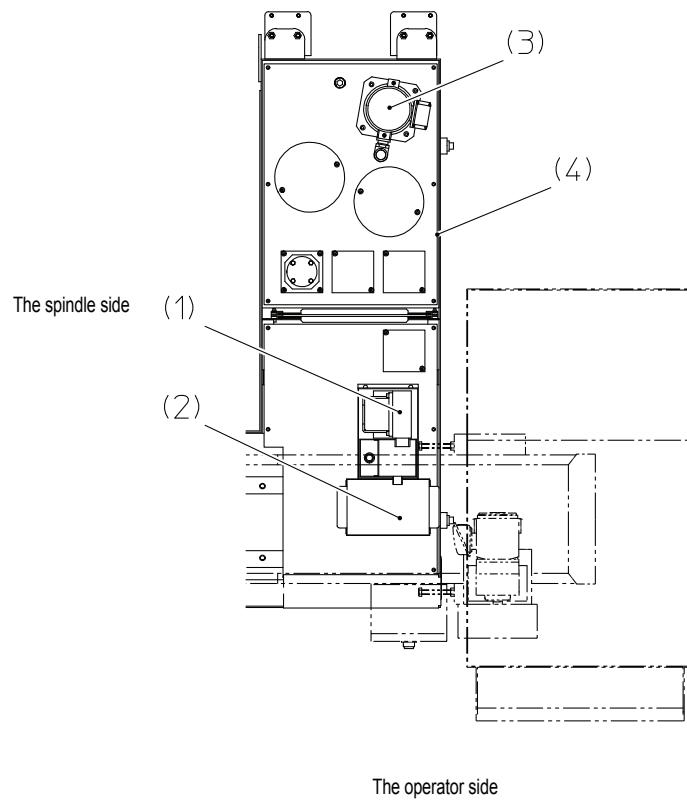
Discharging from the side



LE12016R1600900090001

Fig. 7-7

1	Oil skimmer	3	Coolant pump
2	Oil discharging bucket	4	Tank

Discharging from the side (Type L tank)

LE12016R1600900120001

Fig. 7-8

1	Oil skimmer	3	Coolant pump
2	Oil discharging bucket	4	Tank

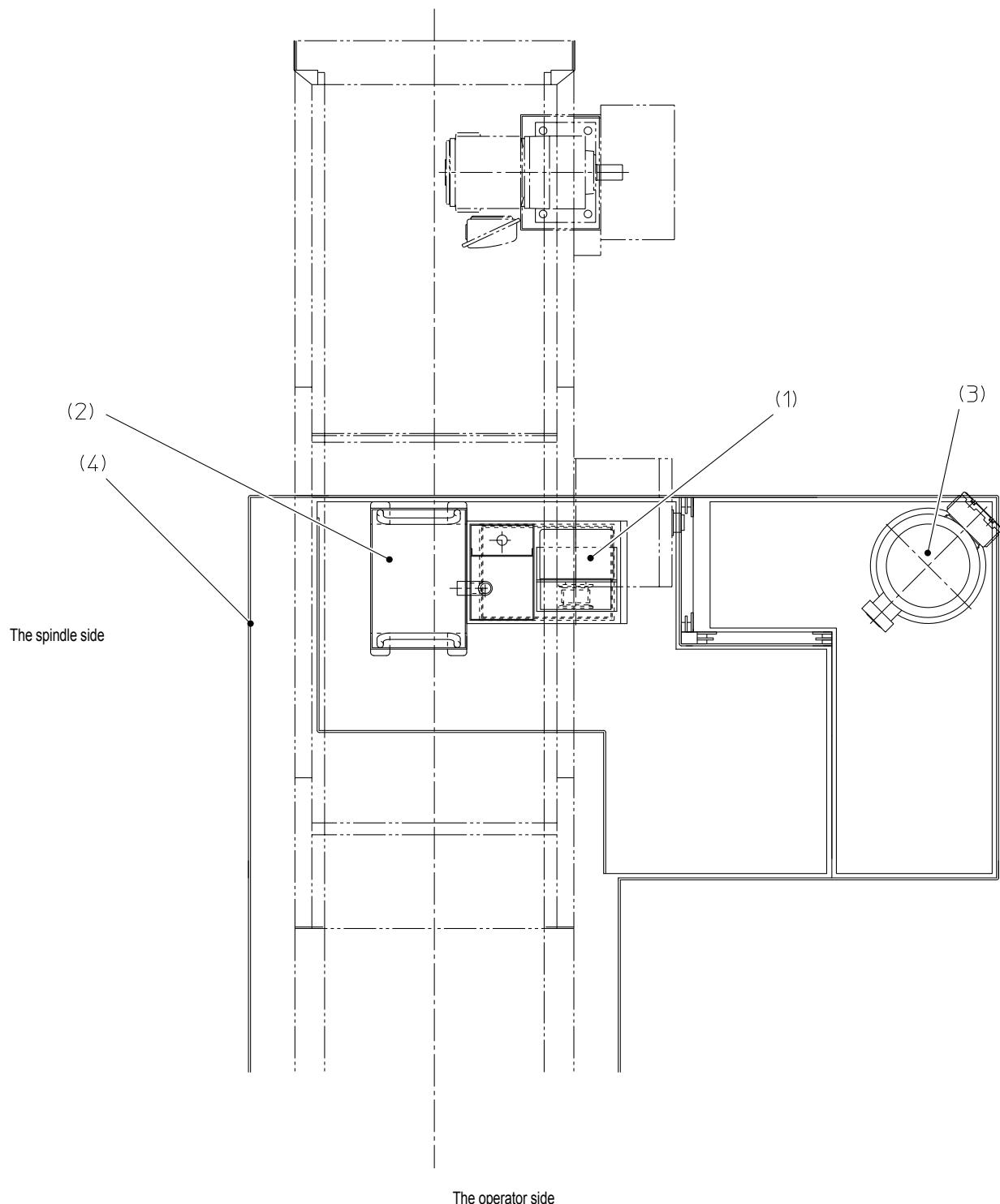
Discharging from the back

Fig. 7-9

LE12016R1600900100001

1	Oil skimmer	3	Coolant pump
2	Oil discharging bucket	4	Tank

7-3. Touch setter

7-3-1. Outline

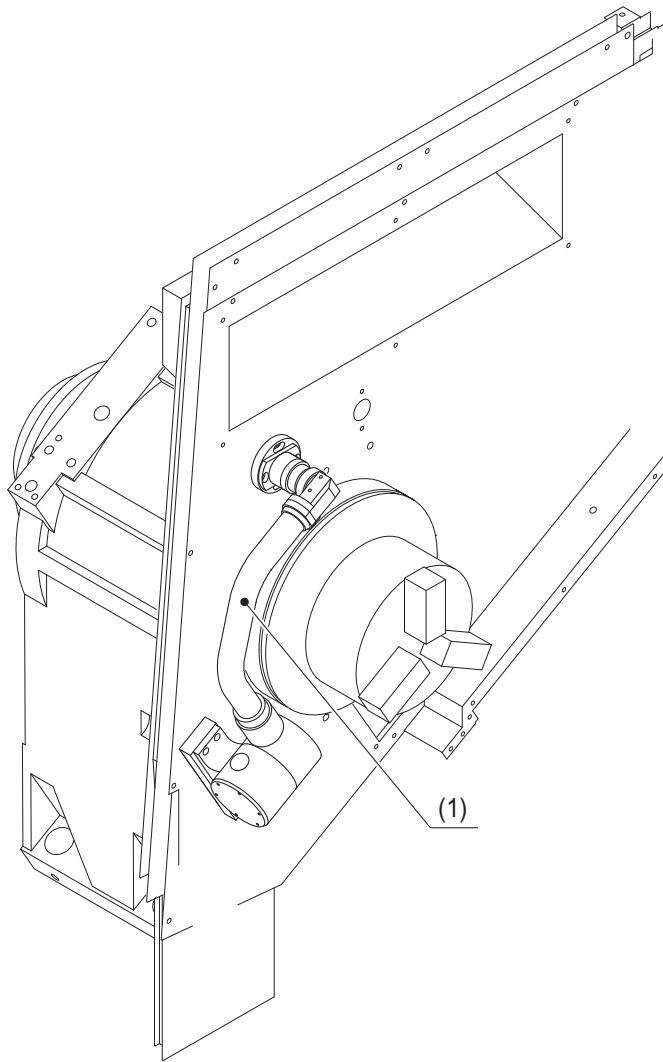
Touch setter M

When the tool tip comes into contact with the end of the manual swing arm, the touch setter automatically performs tool offset. (Correction value read operation)

Touch setter A

Tool offset is performed automatically when the tool tip touches the tip of the automatic swing arm. It can perform each of the measurement cycles such as correction value read operation in AUTO mode and deficiency detection.

Also, if it includes tool life management function, the measurement cycle can be performed even after the spare tool is indexed.



LE12016R1600900130001

Fig. 7-10

7-3-2. Operating method

Tool correction measurement

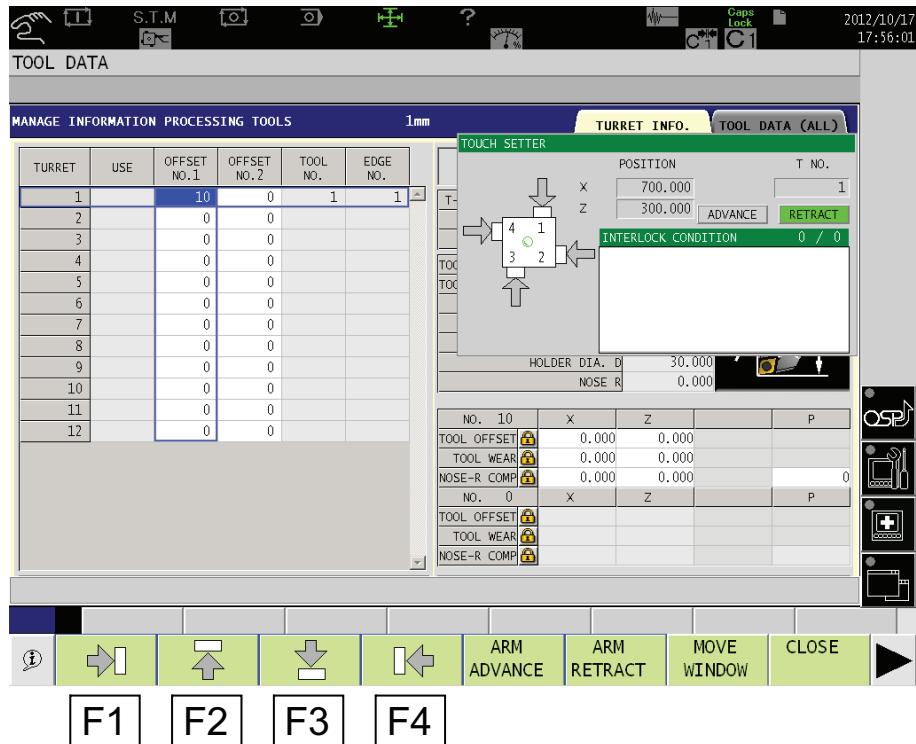


Fig. 7-11

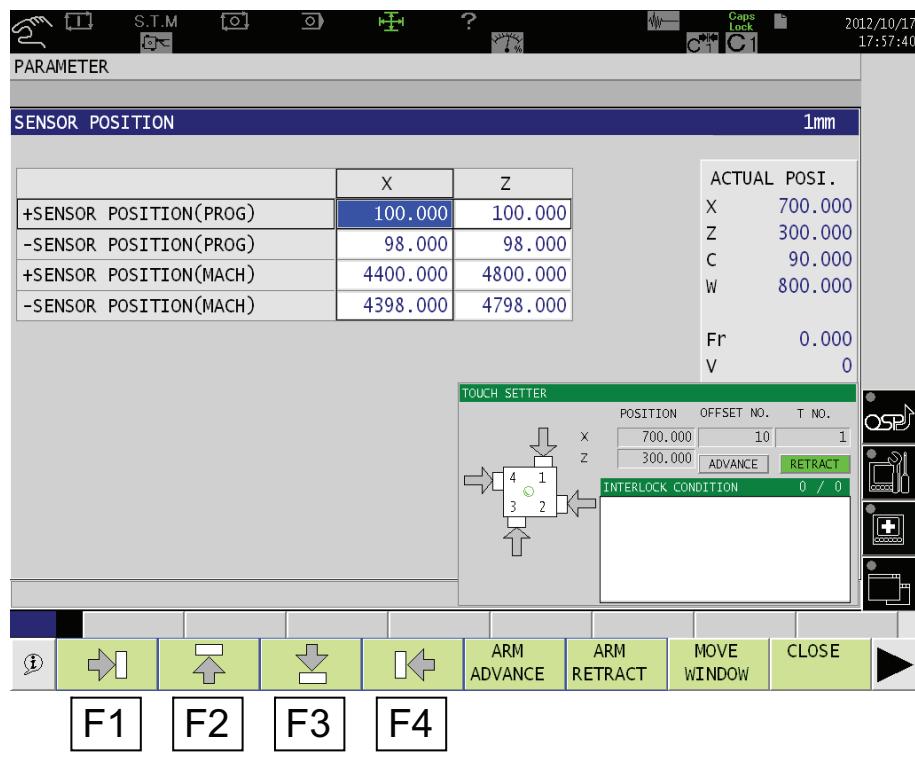
Procedure :

- 1- Display the screen above by pressing the [F5] (TOUCH SETTER) key on the [TURRET INFO.] sheet in [MANAGE INFORMATION PROCESSING TOOLS].
- 2- With the touch setter M, pull out the arm manually. With the touch setter A, pull out the arm by pressing the [F5] (ARM ADVANCE) key.
- 3- Manually feed the tool tip until it comes close to the sensor, then press the [F1] through [F4] keys to specify the feed direction.
The tool will automatically touch the sensor and the correction value will be set.

[Supplement]

Tool correction is automatically set according to the four tool attachment patterns of the selected offset number.

Setting the touch setter sensor reference position



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Fig. 7-12

The sensor reference position can be set by bringing the tool with which the tool offset is properly set at the turret reference position into contact with the sensor.

Procedure :

- 1-** Call the tool with which the offset has been properly set.
(This can be performed only with tools in the turret in its reference position.)
- 2-** Pull out the touch setter arm.
- 3-** Display the "SENSOR POSITION" screen in [PARAMETER], and press the [F5] (TOUCH SETTER) key to display the screen above.
- 4-** Manually feed the tool tip until it comes close to the sensor, then press the [F1] through [F4] keys to specify the feed direction.
The tool will automatically touch the sensor and the correction value will be set.
- 5-** Set for each direction in the same manner.

[Supplement]

- When a function key between [F1] and [F4] is pressed, the cursor automatically moves to the setting location.
- When letting the tool tip touch the sensor, first set feed override to "0", press one of the function keys [F1] through [F4], adjust feed override, let it touch, and after confirming that the motion is normal, let it touch again at normal speed to perform an accurate measurement.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in damage to your property.



When pulling out the arm by manual operation, move the turret, tailstock, and sub-spindle to the end of Z+.

Maximum chuck size with a touch setter

Note

Size of the maximum chuck when touch setter is installed

- *1

It is a size of the chuck when the jaw does not dash out to the chuck outer and it does not interfere when a high standard jaw is installed.

Interference of other chuck sizes needs to be examined when necessary.

When a special jaw is installed, it is necessary to examine it separately.

- *2

It risks it for special so that the touch setter interference area may change by the installation chuck.

Maximum chuck size with a touch setter

Model	Spindle size	Maximum chuck size with a touch setter (mm (in.))
LB2000EXII	Standard spindle Φ140 (5.51) flat	B-206 (Φ169 (6.65))
	Big-bore spindle A2-6	B-208 (Φ210 (8.27))
LB2500EXII	Standard spindle A2-6	B-208 (Φ210 (8.27))
LB3000EXII	Standard spindle A2-6	B-212 (Φ304 (11.97))
	Big-bore spindle A2-8	B-212 (Φ304 (11.97))
LB4000EXII	Standard spindle A2-8	B-212 (Φ304 (11.97))
	Big-bore spindle A2-11	B-215 (Φ381 (15))

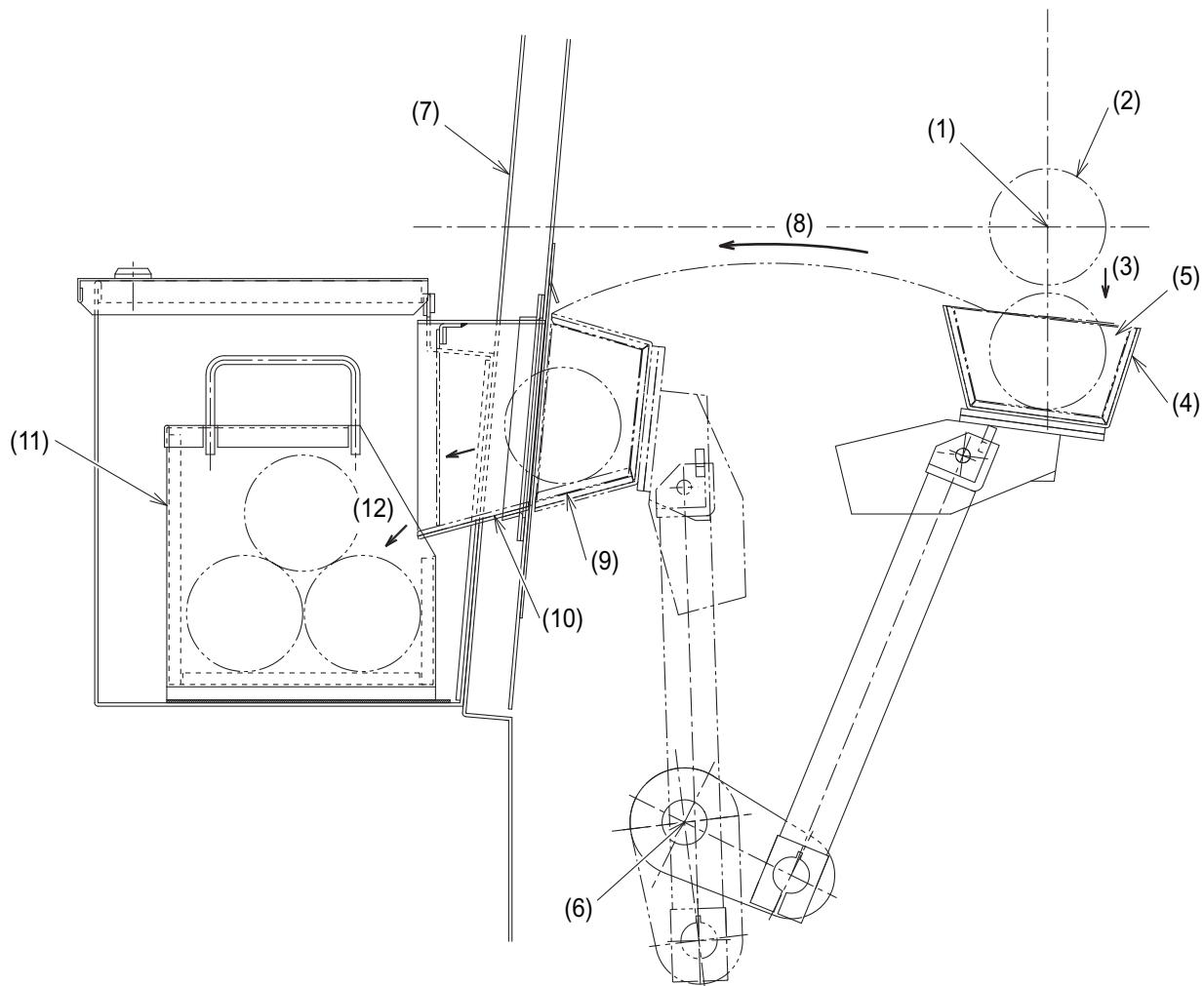
Table 7-1

7-4. Parts catcher

7-4-1. Outline

The parts catcher is an automation function that delivers the workpiece to the outside of the machine by a swinging bucket.

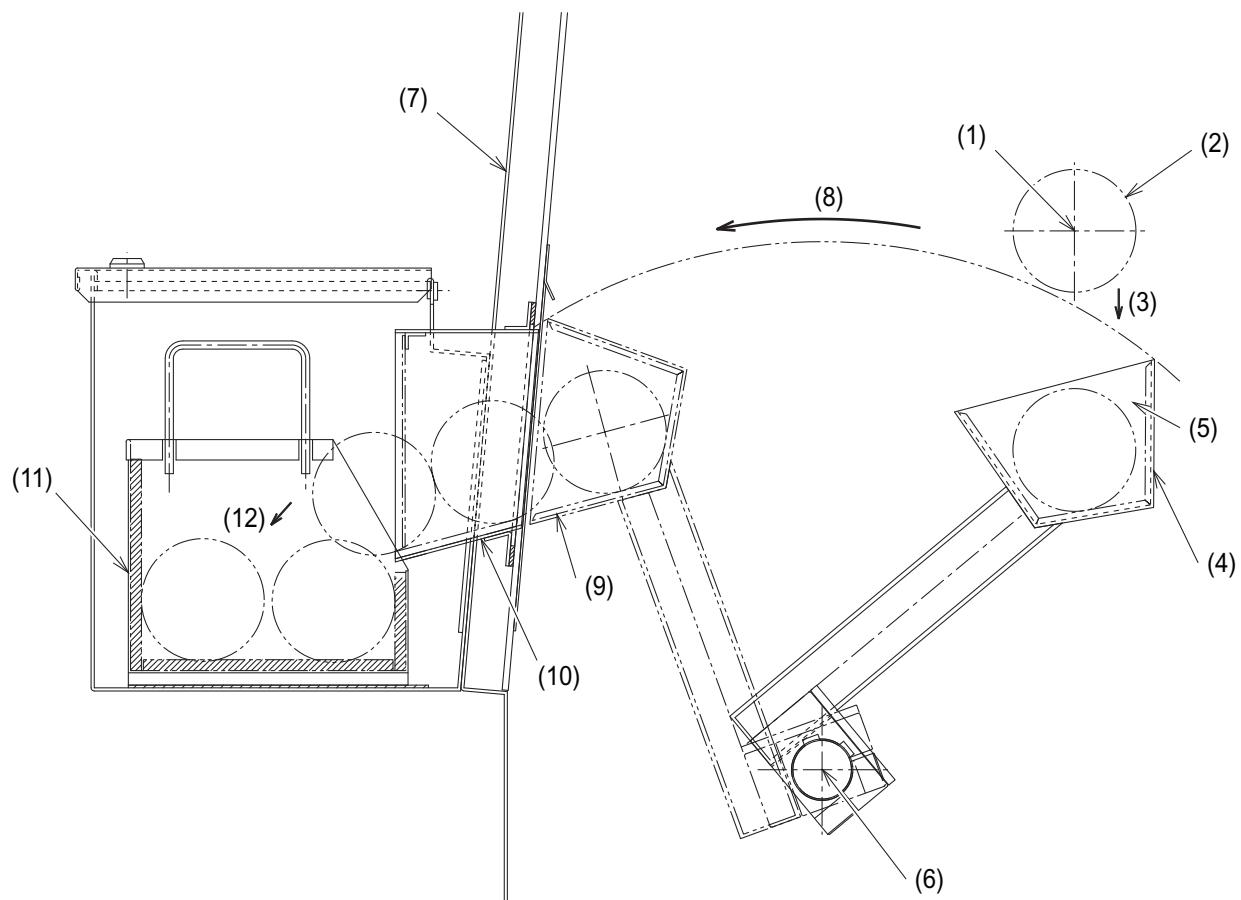
LB2000EXII, 2500EXII, 3000EXII, 4000EXII (Oscillating type)



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Fig. 7-13

1	Spindle center	7	Front door
2	Workpiece	8	To the delivery position while changing the bucket attitude.
3	Drop	9	Product delivery position
4	Bucket	10	Chute
5	Product receiving position (advance position).	11	External bucket
6	Parts catcher drive axis center	12	Drop

LB4000EXII (Swing type)

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Fig. 7-14

1	Spindle center	7	Front door
2	Workpiece	8	To the delivery position while changing the bucket attitude.
3	Drop	9	The bucket in the product delivery position (retreat position) also acts as a cover during machining.
4	Bucket	10	Chute
5	Product receiving position (advance position).	11	External bucket
6	Parts catcher drive axis center	12	Drop

7-4-2. Acceptable workpiece size

Model	Acceptable workpiece size	
	Diameter x Length	Weight
LB2000EXII	Φ80 (3.15) x 150	5.8 kg (12.8 lb)
LB2500EXII	Φ80 (3.15) x 150	5.8 kg (12.8 lb)
LB3000EXII	Φ80 (3.15) x 150	5.8 kg (12.8 lb)
LB4000EXII	Φ90 (3.54) x 200	10 kg (22 lb)

Table 7-2

Acceptable workpiece size and weight are determined based on bucket size and maximum swingable weight.

*1 Theoretically, the arm can handle up to 10 kg (22 lb), but the weight is limited to the above due to potential influence on surrounding equipment such as the conveyor.

7-4-3. Precautions when removing the workpiece



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



Do not put your hand in the external bucket when a workpiece is being delivered.
Otherwise, your hand may get pinched between workpieces.

7-4-4. Advancing the bucket

The bucket also acts as a cover to the opening of the front cover. As such, do not advance the bucket until immediately before the workpiece is being cut off.

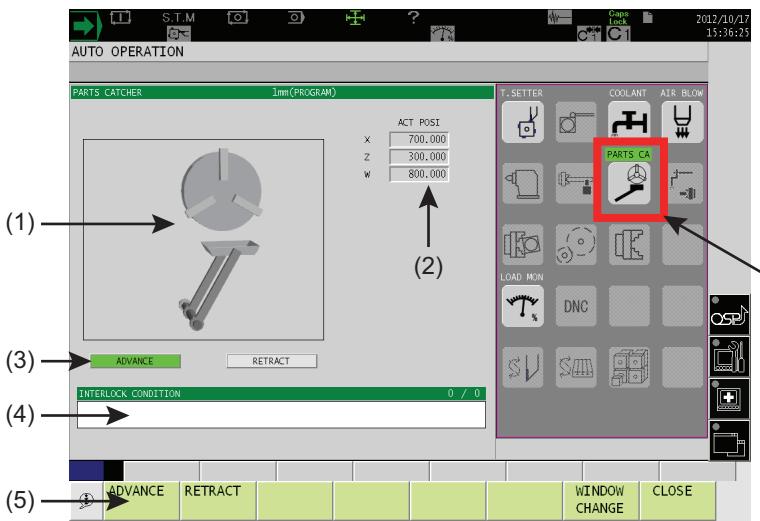
7-4-5. Manual operation

The operation screen can be displayed by pressing the MACHINE OPERATION key on the operation panel, and touching the "PARTS CA" key. In the MANUAL mode, the operation signal is output when the [F1] (ADVANCE) and [F2] (RETRACT) are selected.

If not in MANUAL mode, ignore the function menu selections.



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Fig. 7-15

1	Schematic display	4	Diagnostics display
2	"ACT POSI" display	5	Function menu
3	Displaying the "ADVANCE"/"RETRACT" status		

(1) Schematic display

Displays a schematic showing the relative position of the parts catcher and workpiece.

(2) "ACT POSI" display

Displays the current position of each axis. For 1-saddle machines, the X-, Z- and W-axes are displayed. For 2-saddle machines, depending on the turret selection, the XA-, ZA- and WA-axes or the XB-, ZB- and WB-axes are displayed.

(3) Displaying the "ADVANCE"/"RETRACT" status

Shows the advance/retract status of the parts catcher with lights.

(4) Diagnostics display

When a function menu item is selected, if operational conditions are not met, interlock prevents the operation from starting. In this case, a diagnostics display provides the operational conditions that are in violation.

(5) Function menu

The following manual operations are possible by making a selection for the function menu in this display.

- [F1] (ADVANCE)

Press this key to advance the parts catcher.

- [F2] (RETRACT)
Press this key to retract the parts catcher.
- [F8] (CLOSE)
Press this key to close the pop-up display.

SECTION 8 PRESERVATION

8-1. Preservation during transportation and storage

The machine can be damaged permanently by corrosion. Rust removal and cleaning are extremely expensive and time consuming. The machine should therefore be protected against corrosion when shut down for long periods (storage) or during transportation.

The machine is prepared and protected in the following manner by OKUMA for transportation ex. works.

8-2. Cleaning before preservation

The clamping surface, jig, spindle tube, telescopic covers, guide rails and other machined surfaces are particularly sensitive to corrosion. These parts should be cleaned well prior to preserving. Ensure that coolant lines and hoses are blown out carefully so as to prevent any subsequent emergence of residual coolant.

8-3. Truck transportation and warehouse storage

Machines transported by truck are treated with preservative oil (if transportation and any necessary intermediate storage does not take longer than 4 weeks). For the preservative oil, any oil-based product that is suitable for the purpose can be used. Ensure that all exposed polished and burnished parts and surfaces of the machine are absolutely clean. Residual coolant must be removed with particular care, as oil cannot infiltrate this and it forms stains after a short period of time. Oil must be applied twice, the second application should be 15 to 20 minutes after the first one.

8-4. Removing preservation

The preservation must be removed using any commercially available machine cleaning concentrate in a solution ratio of 10:1.

8-5. Machine transportation

All NC axes of the machine have to be fixed with the transportation fixtures before moving or lifting the machine.

SECTION 9 DISPOSAL OF THE MACHINE

When disposing of this machine, comply with municipal disposal ordinances and regulations concerning environmental compatibility, health hazards, and disposal.

For detailed information, check with your local municipality.

9-1. Material groups

Separate metals, non-metals, composite materials and auxiliary materials by material type and dispose of them in an environmentally friendly manner.

9-2. Operating materials

All operating materials must be disposed of in compliance with applicable waste disposal regulations.

9-3. Disposal of electronic components

Electronic components (primary parts, drive systems, wires, etc.) are to be disposed of properly as electronic scrap.

9-4. Disposal of the packaging

The packaging and packing material used by OKUMA do not contain any problematic substances. They are all recyclable with the exception of wood materials, and should be fundamentally disposed of in the recycling bin. Wood should be disposed of in compliance with local ordinances.

LIST OF PUBLICATIONS

Publication No.	Date	Edition
6142-E-R4	January 2014	5th
6142-E-R5	June 2014	6th
6142-E-R6	August 2014	7th
6142-E-R7	January 2015	8th
6142-E-R8	April 2015	9th
6142-E-R9	June 2015	10th
6142-E-R10	July 2015	11th
6142-E-R11	November 2015	12th
6142-E-R12	February 2016	13th
6142-E-R13	May 2016	14th
6142-E-R14	November 2016	15th
6142-E-R15	September 2017	16th

Original Instruction Manual

This manual may be at variance with the actual product due to specification or design changes.

Please also note that specifications are subject to change without notice.

If you require clarification or further explanation of any point in this manual, please contact your OKUMA representative.