

INSTALLATION MANUAL

The manuals for maintenance are comprised of the following manuals including this manual:
MAINTENANCE MANUAL, MAINTENANCE INFORMATION,
INSTALLATION MANUAL and DRAWINGS.

■ Applicable Model ■

NZ-S1500

■ Applicable NC Unit ■

MSC-700
MSC-701

Before starting operation, maintenance, or programming, carefully read the manuals supplied by Mori Seiki, the NC unit manufacturer, and equipment manufacturers so that you fully understand the information they contain.
Keep the manuals carefully so that they will not be lost.

MORI SEIKI
THE MACHINE TOOL COMPANY



- The contents of this manual are subject to change without notice due to improvements to the machine or in order to improve the manual. Consequently, please bear in mind that there may be slight discrepancies between the contents of the manual and the actual machine. Changes to the instruction manual are made in revised editions which are distinguished from each other by updating the instruction manual number.
- Should you discover any discrepancies between the contents of the manual and the actual machine, or if any part of the manual is unclear, please contact Mori Seiki and clarify these points before using the machine. Mori Seiki will not be liable for any damages occurring as a direct or indirect consequence of using the machine without clarifying these points.
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Check with the government agency for authorization.

SIGNAL WORD DEFINITION

A variety of symbols are used to indicate different types of warning information and advice.

Learn the meanings of these symbols and carefully read the explanation to ensure safe operation while using this manual.

<Symbols related with warning>

The warning information is classified into three categories, DANGER, WARNING, and CAUTION. The following symbols are used to indicate the level of danger.



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

The information described in the DANGER frame must be strictly observed.



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

The information described in the WARNING frame must be strictly observed.



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

The information described following the caution symbol must be strictly observed.

<Other symbols>



Indicates the items that must be taken into consideration.



Indicates useful guidance relating to operations.



Indicates the page number or manual to be referred to.
The number in () indicates the section number.

FOREWORD

This manual describes items to be understood and prepared before the machine is installed. Therefore, users are urged to read this manual before the machine is installed.

When the machine is delivered, MORI SEIKI's servicemen install the machine at the specified place. The information in this manual should be referred to when the machine is moved by the user to make sure the necessary procedures and items to be checked are executed.

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1. ENVIRONMENTAL REQUIREMENTS

Consider the following requirements when selecting a site to install the machine.

<Ambient temperature, humidity, and altitude>



Install the machine at a site where the ambient temperature remains within the range 10 to 35°C, the humidity does not exceed 75% RH (with no condensation), and the altitude is lower than 1000 m. Failure to comply with these conditions could cause trouble in the electrical systems of the NC unit and peripheral devices and lead to machine failure.



Install the machine at a site where neither it nor the NC unit is subject to direct sunlight. Direct sunlight will raise the temperature and cause thermal displacement, adversely affecting machining accuracy.

<Vibration>



The machine must not be installed at a site subject to excessive vibration (greater than 4.9 m/s²). Excessive vibration could lead to machine failure and will adversely affect machining accuracy.

<Dust>



- (1) Choose an installation site that is as free as possible from dirt, dust, and mist. If dirt and dust adhere to the cooling fan fitted inside the machine its cooling capability will be impaired and this could lead to machine failure.
- (2) Install the machine at a site where it will not be reached by chips, water, and oil scattered from other machines. These could cause machine failure.

<Installation ground>



Make sure the floor is strong enough to support the machine. The floor must not be sloped or irregular in any way. Twisting or other distortion of the machine will adversely affect machining accuracy.

<Maintenance area>



When installing the machine, refer to the installation drawing and other instructions and provide sufficient maintenance area to allow the chip conveyor (if featured) and coolant tank to be removed, and the electrical cabinet door to be opened and closed, without difficulty. If you do not provide sufficient maintenance area it will not be possible to carry out maintenance work properly and the life of the machine will be shortened.



Refer to the INSTALLATION DRAWING in the DRAWINGS published separately.

2. RECOMMENDED INSTALLATION CONDITIONS

<Weight and estimated bearing stress>

		NZ-S1500
Mass of machine	(kg)	3000
Maximum workpiece weight (× 2)	(kg)	12
Foundation concrete weight	(kg)	4092
Average bearing stress at the bottom of foundation concrete	(kPa)	20.4
Required soil bearing capacity	(kPa)	30.6



- (1) This drawing shows a standard foundation. Depending on the soil condition of the installation site, increase or decrease the concrete thickness.
- (2) Use concrete of σ_{28} (strength of 28 days after application) = 20.6 MPa.
- (3) Dig the installation site 100 mm wider than the foundation outline of the machine (to enable insertion of 100-mm-wide styrofoam).
- (4) Place a pit cover (steel plate, etc.) on the styrofoam inserted along the foundation outline to allow the casters of tanks to pass over.

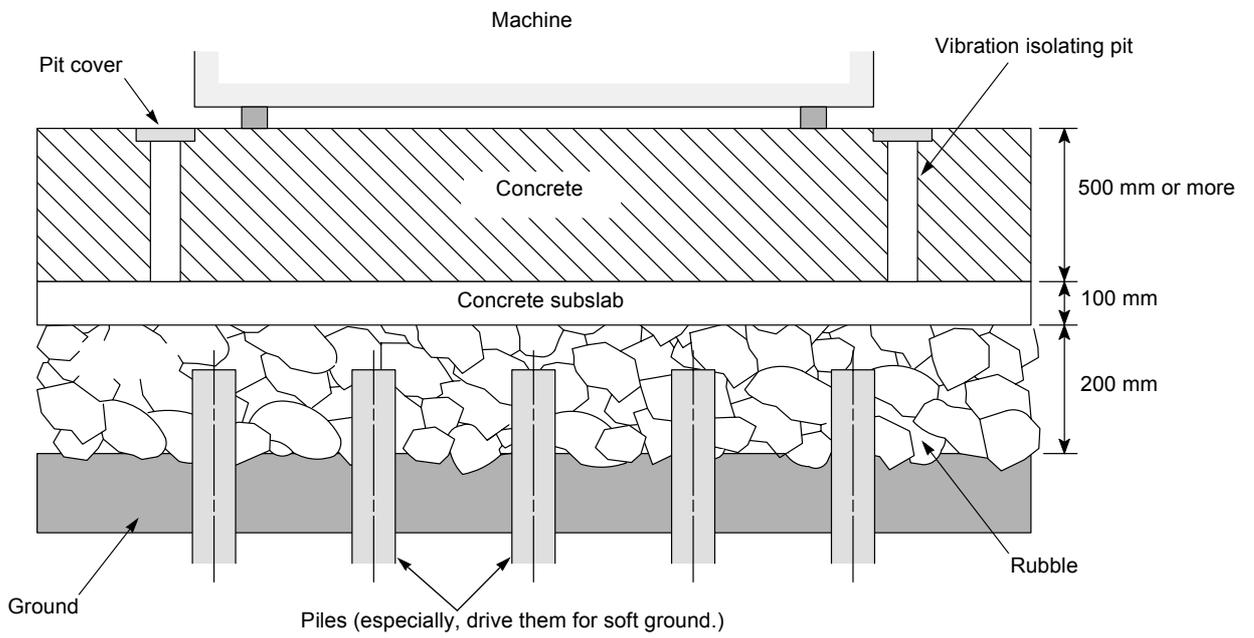
Normally, it is good enough to support the machine if the thickness of the floor concrete is 500 mm or more. However, if the ground does not have sufficient strength and is not capable of absorbing the vibrations of other machines, the foundation work for absorbing the vibration is necessary.

Consult a civil engineer to determine the number and depth of piles and concrete thickness because they differ according to the ground condition.



To achieve and keep the machine accuracy and performance for a long time, construct the foundation and install the machine with careful attention.

<Vibration-absorbing foundation diagram>



3. PREPARATION FOR INSTALLATION

Mori Seiki service technicians will visit the customer to install the machine at the customer's plant. To carry out installation smoothly, the following items should be prepared by the customer.



The items to be prepared must comply with the local regulations and the specifications of the machine to be installed.

Item to be Prepared	Reference Information	Check
Power requirements	3.1	
Power cable	3.2	
Grounding cable	3.3	
Main breaker for the shop power distribution board	3.4	
Air source*	3.5	
Air connection hoses*	3.6	



* Some machine specifications do not use pneumatic actuators.

For machines of these specifications, it is not necessary to prepare these items. If you do not know whether or not your machine requires the air source and connection hoses, please consult Mori Seiki.

3.1 Power Requirements

The power source must satisfy all of the requirements indicated below.



Power source work must be entrusted to an electrician with a license to carry out electrical work. If a person without knowledge of electrical safety practices attempts this work, he or she could be electrocuted.



- (1) For the power supply, provide isolated wiring directly from the input power supply. If there is an excessive voltage drop, for example due to insufficient capacity of the factory power supply, the machine may malfunction, causing accidents involving serious injuries or damage to the machine.

Item	Range
Nominal power source voltage fluctuation range (200/220 VAC)	+10%/-15%*
Voltage drop	Within 15% of normal voltage for 0.5 seconds
Frequency fluctuation range (50/60 Hz)	±1 Hz
Momentary power failure	Less than 10 msec.
Voltage impulse	The peak value is 200% or less of the effective value (rms value) of the line voltage with pulse duration of 1.5 msec.
Waveform distortion of AC voltage	7% or less
Imbalance in line voltages	5% or less, or within 10 V

Select a primary power cable by accurately calculating the power supply capacity at the supply side. Using an inappropriate cable could lead to fire, injury, or damage to the machine.

- (2) Do not install the machine close to major sources of electrical noise, such as electric welders and electrical discharge machines. If the voltage supply is not stable, the machine may malfunction, leading to accidents involving serious injuries or damage to the machine. If noise is continually entering the machine through power cables, it can cause breakage or burning of electrical or electronic devices inside the electrical control panel and this can lead to fire.



* Voltage fluctuation (drop) during spindle or servo system acceleration must be less than 7%.

If voltage is lower than 200 V during servo system acceleration/deceleration, actual acceleration/deceleration time may be elongated than the theoretical time.

3.2 Power Cable

Prepare a power cable that can supply the total power capacity required by the machine.



For the power capacity required by the machine, refer to APPENDIX 2 "POWER CAPACITY TABLE".

The cable type, wire thickness, and other cable specifications vary according to the insulation class, ambient temperature, temperature correction coefficient, and wire laying conditions. For advice on cable selection, consult the cable dealer.

Examples of cable selection are given below.

Conditions:							
Insulation class PVC							
Ambient temperature 55°C							
Coefficient of temperature correction and wire laying or bundling conditions 0.51							
Laying conditions 3-phase wires + grounding wire inside the flexible conduit							
							
Wire Thickness		Total Electric Capacity at 200 V (kVA)	Total Electric Capacity at 380 V (kVA)	Wire Thickness		Total Electric Capacity at 200 V (kVA)	Total Electric Capacity at 380 V (kVA)
(kcmil)	(mm ²)			(kcmil)	(mm ²)		
10	5.3	8.3	15.8	250	127.0	70.6	134.2
8	8.4	13.8	26.3	300	152.0	79.0	150.0
6	13.3	18.0	34.2	350	177.0	85.9	163.2
4	21.2	23.5	44.7	400	203.0	92.8	176.4
3	26.7	27.7	52.6	500	253.0	105.3	200.0
2	33.6	31.8	60.5	600	304.0	116.4	221.1
1	42.4	36.0	68.4	700	354.0	127.4	242.2
1/0	53.5	41.5	79.0	750	380.0	131.6	250.1
2/0	57.4	48.5	92.1	800	405.0	135.8	258.0
3/0	85.0	55.4	105.3	900	456.0	144.1	273.8
4/0	107.2	63.7	121.1	1000	508.0	151.0	287.0
				1250	635.0	163.5	310.6

3.3 Grounding Cable

For the grounding cable, consult the cable manufacturer to select the one which is sufficient to take earth for the machine to be installed.

When selecting the grounding cable, observe the applicable local regulations where the machine is installed.



- (1) ***Be sure to carry out the grounding work. If the grounding work is not done, there will be a danger of electrocution.***
- (2) ***The grounding wire should be as short as possible and should have the same thickness as the power wires. Perform class D grounding work with the grounding resistance of 100 Ω or less. If the grounding is ineffective, there will be a danger of electrocution.***
- (3) ***Check for earth faults and short circuits after completing the grounding work.***



Do not connect any other grounding wire to the ground. If a machine such as an electric welder or electric discharge machine is grounded to the steel reinforcing rods in the reinforced concrete structure of the plant, do not connect the grounding wire of the machine to the reinforcing rods too. Unless the grounding wire is connected to an independent ground, the machine could malfunction due to noise from other machines, leading to accidents involving serious injuries or damage to the machine.



Meaning of "Leak Current"

Indoor electrical wiring and equipment are "insulated" in order to prevent current leakage. However, when the insulation becomes old or damaged, or when the wires/equipment are exposed to water, current leaks out and a "leak current" is generated.

Since leak currents can cause accidents that endanger human life, such as electric shock and fire, due care is required. Particular care is necessary when using electrical equipment in locations where there is exposure to water (where coolant is used, for example).



Meaning of "Electric Shock"

When a person touches wiring or electrical equipment from which current is leaking, electricity flows through that person's body to the ground. This is an "electric shock."

If the current is weak, the result is nothing more than a "shock" in the commonly understood sense, but if it is strong, the life of the affected person may be endangered.

Be sure to ground electrical equipment properly by connecting a grounding cable.

Note also that water on the body of the person subject to the shock will allow the electricity to be conducted more easily, and for this reason you must take particular care not to touch electrical equipment with wet hands.

3.4 Main Breaker for the Shop Power Distribution Board

Use a breaker for an AC inverter as the main breaker on the shop power distribution board. If another type of breaker is used, it may be actuated by the high-frequency leak current specific to AC inverters.



High-frequency leak current will not adversely affect operators.



Meaning of "Breaker"

This is a device that automatically shuts off the current within 0.1 seconds in the event of an abnormal current flow such as a leak current.

By installing a breaker in the distribution panel, it is possible to prevent accidents due to current leakage from electrical equipment and devices.

Since machine tools use many AC inverters, you must select a breaker of a type that will not be erroneously actuated by the high-frequency leak current from the inverters.

Select the correct circuit breaker and power distribution board capacities by consulting the electric part manufacturer based on the current consumption calculated by the following formula.

$$\text{Current (A)} = \frac{\text{Total Electric Capacity (kVA)} \times 1000}{\sqrt{3} \times 200 \text{ (V)}} \times 1.25^*$$

* Allowance for selection



For the power capacity required by the machine, refer to APPENDIX 2 "POWER CAPACITY TABLE".

3.5 Compressed Air Supply

Item	Service Condition
Compressor air pressure	0.5 - 1.0 MPa
Pressure dew point	10°C or less at 0.7 MPa
Working pressure	0.5 MPa
Flow rate	200L/min ^{*1} <ANR> ^{*2}



^{*1} Applied to steady rest specification only.

^{*2} Air at conditions of temperature 20°C, absolute pressure 101.3 kPa, relative humidity 65%.



- (1) Consult a compressor manufacturer and select the one that can sufficiently supply the pressure required for the machine.
- (2) Use clean, dry air that satisfies the above conditions.
- (3) If the compressed air contains water or oil content and does not reach the specified pressure range, install a line filter or dryer between the machine and the compressed air source.
- (4) The air pressure setting of the compressor must not exceed 1.0 MPa.

3.6 Hoses for Supplying Compressed Air

Select hoses for supplying compressed air that can comfortably withstand the compressed air pressure. For advice on the selection, consult the hose manufacturer.

Compressed air supply port size: Rc 3/8

4. AFTER RECEIVING THE MACHINE



When transporting the machine or if the machine is not installed immediately after its delivery, store it in a place where the ambient temperature remains within the range -20 to 60°C and the humidity does not exceed 75% RH (with no condensation). Failure to comply with these conditions could cause troubles in the electrical systems of the NC unit and peripheral devices and lead to machine faults.

When the machine is delivered, pay attention to the following points.

If the machine is delivered in a package, check the external frame of the package. If the machine is delivered without a package, check the external appearance of the machine.



If the package frame is damaged, contact Mori Seiki before unpacking the machine. If the machine appearance shows damage, contact Mori Seiki, leaving the damage as it is.



If the machine is not moved to the installation site immediately after its delivery, keep it in a location not exposed to the elements and not subject to dust, dirt, or mist.

Leaving the machine in such places will cause rusting or corrosion.

5. CARRYING THE MACHINE

When the machine is delivered to your shop, Mori Seiki's service technicians will install the machine at the designated place. Refer to the information below if you move the machine after initial installation, for example due to a floor layout change.

If it becomes necessary to carry the machine due to relocation of the plant or selling of the machine, contact Mori Seiki.

5.1 Preparation

Make the following preparations before moving the machine.

1) Before turning off the power, move each axis to the position where it should be fixed.

2) Turn off the main switch on the electrical cabinet. 

3) Turn off the main breaker on the shop power distribution board. 

4) Disconnect the power cable and the grounding wire.

5) Fix the machine units with transit clamps.



Refer to APPENDIX 1.1 "Hoisting the Machine".

6) Turn off the compressed air.

7) Remove the compressed air supply hose.

8) Disconnect the cables of the coolant motor and chip conveyor motor.

9) Disconnect the cables and pipes of the oil temperature controller (fan cooler).

10) Remove the coolant tank and the chip conveyor from the machine.

11) Drain the coolant from the coolant tank.

12) Remove the jack bolts.

5.2 Carrying the Machine by Hoisting

Observe the following cautions when carrying the machine by hoisting.



- (1) Only a qualified technician should perform machine hoisting work. Operation of the crane or forklift by a person unfamiliar with safe operation practices could lead to accidents involving serious injuries or damage to the machine.
- (2) Use only wires, shackles and jigs of the dimensions specified in the manual. They must be strong enough to support the mass of the machine. Check the mass of the machine by referring to the specifications in this manual. If the machine is hoisted using equipment that cannot bear its mass it will fall, causing serious injuries or damage to the machine.
- (3) When hoisting the machine, always pay attention to the location of the center of gravity for the machine and make sure that the machine is well balanced in both the crosswise and lengthwise directions by hoisting it a little above the floor. If you continue to hoist the machine although it is not properly balanced, it will fall, causing serious injuries or damage to the machine.
- (4) If two or more people work together to lift the machine, they must work carefully while exchanging signals. If someone operates the machine or the crane inadvertently when other people are working inside or close to the machine, it could cause serious injuries.
- (5) Before hoisting the machine, check that no tools, rags, etc., have been left inside it. When the machine is lifted, these articles could fall out and injure plant personnel or damage the machine.
- (6) Before hoisting the machine, check that all of its parts are clamped. Lifting the machine while any of the parts is not clamped adequately could damage the machine.
- (7) If a crane is used to hoist the machine, do not carry the machine while it is lifted to an excessive height. Lifting the machine excessively high when carrying it will create more potential hazards than when carrying it at a lower height.
- (8) When moving the machine with a forklift, do not lift it high above the ground. If it is moved in this condition, it may become unbalanced and fall, or the forklift may topple over, causing serious injuries or damage to the machine.
- (9) Use a crane or forklift that can comfortably bear the mass of the machine. If a crane or forklift without sufficient capacity to lift the machine is used, the machine will fall, causing serious injuries or damage to the machine.



- (1) When moving the machine with rollers, set the number of rollers, and the material that they are made of, so as to ensure that they can support the mass of the machine. Also use skid and leading boards that can support the mass of the machine. If they cannot support the mass of the machine the rollers, skid, or leading board may be distorted, making it impossible to move the machine.
- (2) After the machine has been installed, it must be leveled. Adjust the machine's crown and distortion values according to the Accuracy Test Results Chart delivered with the machine. If this adjustment is not carried out properly, machining accuracy will be adversely affected.

6. CONNECTING THE POWER CABLE

This section explains the connection of power cable from the shop power distribution board to the transformer and then to the machine.



(1) **Power source work must be entrusted to an electrician with a license to carry out electrical work. If a person without knowledge of electrical safety practices attempts this work, he or she could be electrocuted.**

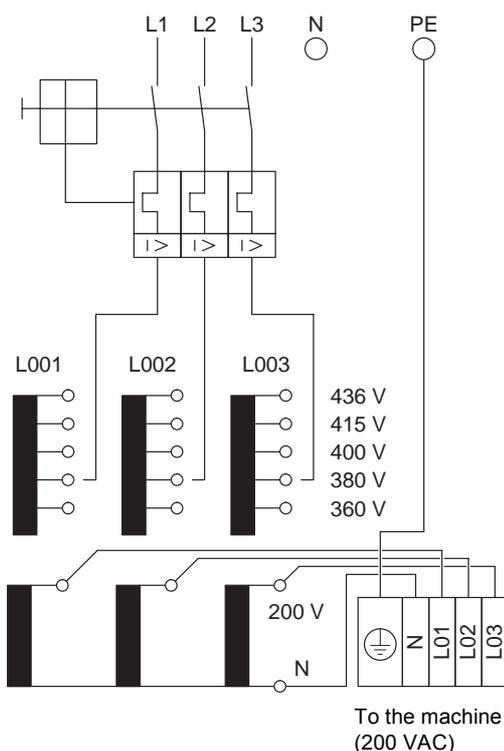
(2) **Be sure to carry out the grounding work. If the grounding work is not done, there will be a danger of electrocution.**



Do not connect any other grounding wire to the ground. If a machine such as an electric welder or electric discharge machine is grounded to the steel reinforcing rods in the reinforced concrete structure of the plant, do not connect the grounding wire of the machine to the reinforcing rods too. Unless the grounding wire is connected to an independent ground, the machine could malfunction due to noise from other machines, leading to accidents involving serious injuries or damage to the machine.

<Cable connection procedure>

Shop power source (360 - 436 VAC)



- 1) Turn off the main breaker on the shop power distribution board. 
- 2) Turn off the breaker of the transformer. 
- 3) Connect the power cable from the terminal blocks L01, L02, L03 and  in the electrical cabinet to the terminal blocks (secondary) L01, L02, L03 and  of the transformer.
- 4) Connect the power cable from the terminal blocks (primary) L1, L2 and L3 of the transformer to the breaker on the shop power distribution board.



- (1) Terminal blocks L1, L2, and L3 are for 400 VAC system (360 - 436 VAC) and those L01, L02, and L03 are for 200 VAC system. Never connect the cable to wrong terminal blocks, otherwise the machine will be damaged.
- (2) If the cable is run through the punched hole in the transformer circuit breaker box, take proper cable protection means conforming to IP54.



For the transformer of 24.5 kVA or 34.64 kVA, connect the power cable from L1, L2, and L3 to the primary side of the breaker. The transformers with larger capacity have terminal blocks, therefore, connection should be made to the terminal blocks.

- 5) Connect the ground cable to the terminal block PE in the transformer for grounding the machine.
- 6) Check the grounding resistance of the grounding wire.
- 7) Turn on the main breaker on the shop power distribution board. 
- 8) Turn on the breaker of the transformer. 
- 9) Check the input voltage.
- 10) Check the phase order with a phase rotation indicator.



If a phase rotation indicator is not available, check the phase order by checking the direction of rotation of the hydraulic pump motor.



Check the overall phase order of the input voltages L1, L2, L3 (R, S, T) using a phase rotation indicator. If the phase order is incorrect, the machine will malfunction, causing serious injury or damage to the machine.

7. CONNECTION OF COMPRESSED AIR SUPPLY HOSE

Follow the procedure below to connect the compressed air supply hose.

- 1) Turn off the power. 
- 2) Connect the compressed air supply hose from the air source to the air supply port (Rc 3/8) in the air panel of the machine.
- 3) Start the compressor to supply the compressed air to the machine.
- 4) Make sure that there is no air leak at hose joints and pneumatic actuators.
- 5) Adjust the compressed air pressure to the specified value with the regulator in the air panel.



For the correct air pressure, refer to MACHINE SPECIFICATIONS in the MAINTENANCE INFORMATION published separately.

8. REMOVING TRANSIT CLAMPS

After carrying the machine to the required place, remove all transit clamps before turning on the power.



- (1) The transit clamps that cannot be removed before turning on the power should be removed immediately after turning on the power, in the handle mode with the chuck in the unclamped state. Attempting axis feed while the transit clamps are in place will damage the machine.
- (2) If a rust-preventive coating is applied to the slideway surfaces, it must be removed completely. Attempting axis feed while rust-preventive coating remains on the slideways could cause machine failure.

Keep the removed transit clamps so that they will not be lost.

9. MOUNTING ACCESSORIES

If accessories such as the chip conveyor or the coolant tank are provided with the machine, mount them as a part of the machine installation process.



- (1) When installing the machine, mount the coolant tank and the chip conveyor by pushing them into an appropriate position. Otherwise, coolant may be splashed around the machine causing the operator or persons around the machine to topple down and get injured.
- (2) Check that all necessary covers are mounted.

10. LEVEL ADJUSTMENT

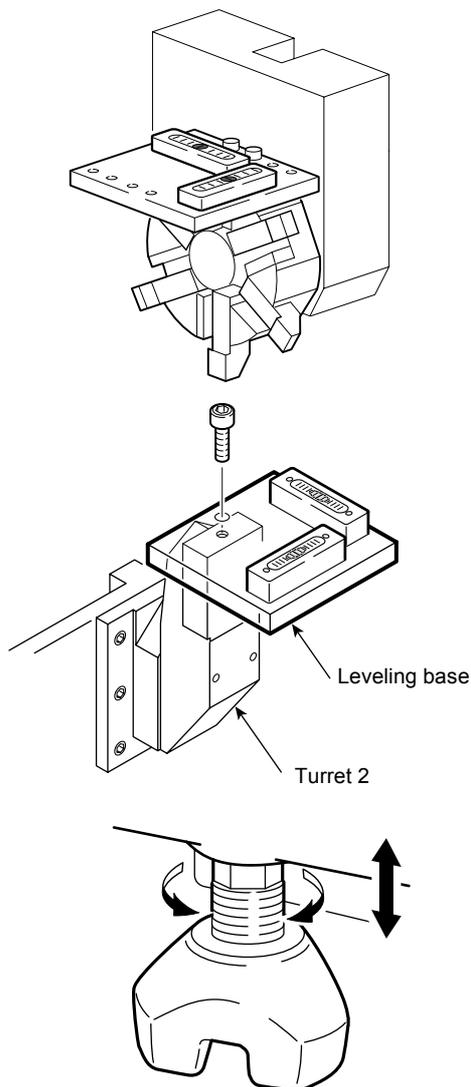
Carry out level adjustment to level the machine.



After installing the machine, always check the machine level.

If the machine level is not adjusted correctly, the machine will be tilted or twisted after installation. This will result in uneven wear of the bed and slideway surfaces and machining defects.

<Adjusting procedure>



1) Turn off the power.



2) Mount the leveling base to the turret head.



For headstock 2 specifications (gang type turret specification) machines, mount a leveling base on the upper part of turret 2.

3) Place a level on the leveling base.

4) Turn two jack bolts at the bottom toward the rear of the machine until the machine height is adjusted to the specified distance from the floor to the bottom of the machine. Check the machine level with spirit levels.



For the setting value, refer to GENERAL VIEW or FOUNDATION DIAGRAM in the DRAWINGS published separately.

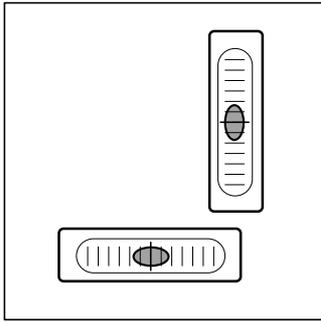


Bring the distance between the floor and the bottom of the machine to within the setting value.

If the setting value is exceeded, the machine will vibrate, adversely affecting machining accuracy.



Make sure that the jack bolts are not raised clear of the floor or inclined, so that they do not function correctly.



5) Adjust the machine level to achieve the condition shown in the illustration to the left.



After adjusting the machine level, read the level to check and adjust twisting and crowning of the machine.

APPENDIX 1 INSTALLATION DATA

Prepare for installation of the machine by referring to the data presented here.

1.1 Hoisting the Machine

Instructions on hoisting the machine in order to move it are given below.

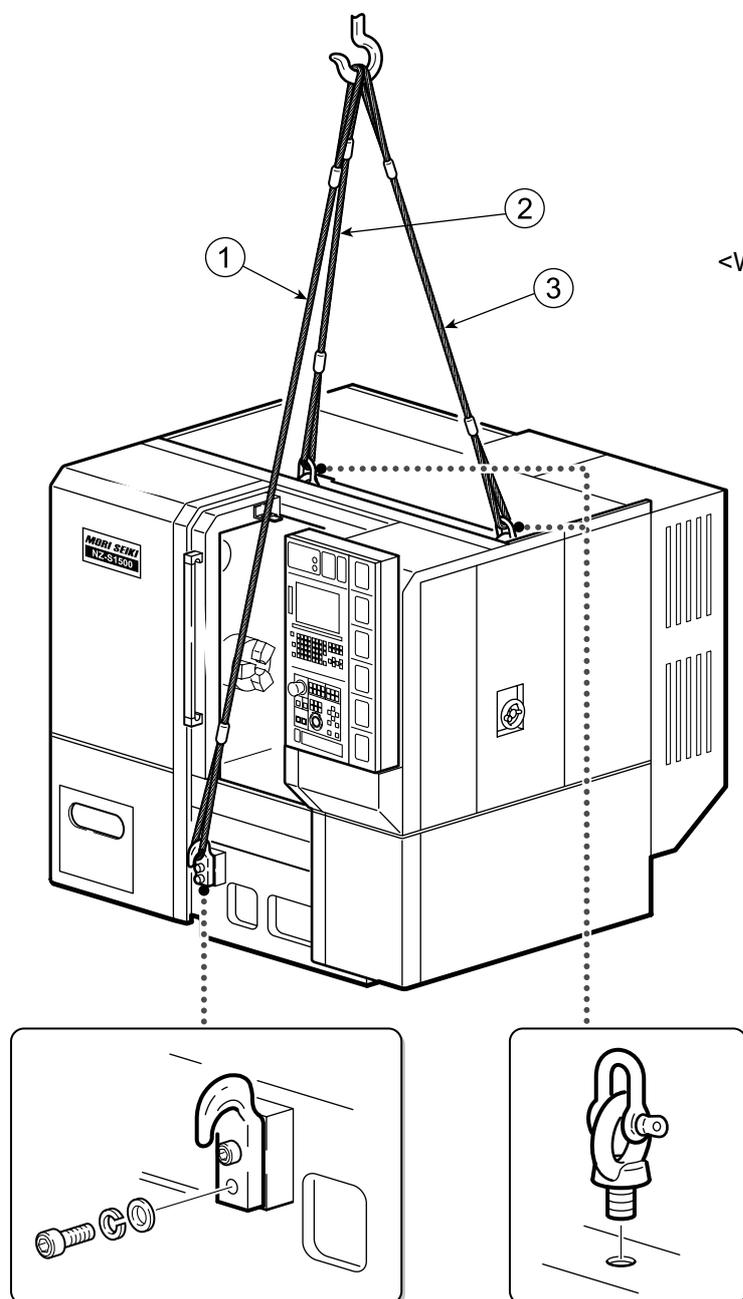
1.1.1 NZ-S1500/500, NZ-S1500/1000

<Wire rope dimensions for NZ-S1500/500>

Symbol	Diameter (mm)	Length (mm)
①	φ16	2800
②	φ16	1600
③	φ16	1600
Mass of machine (kg)		3000

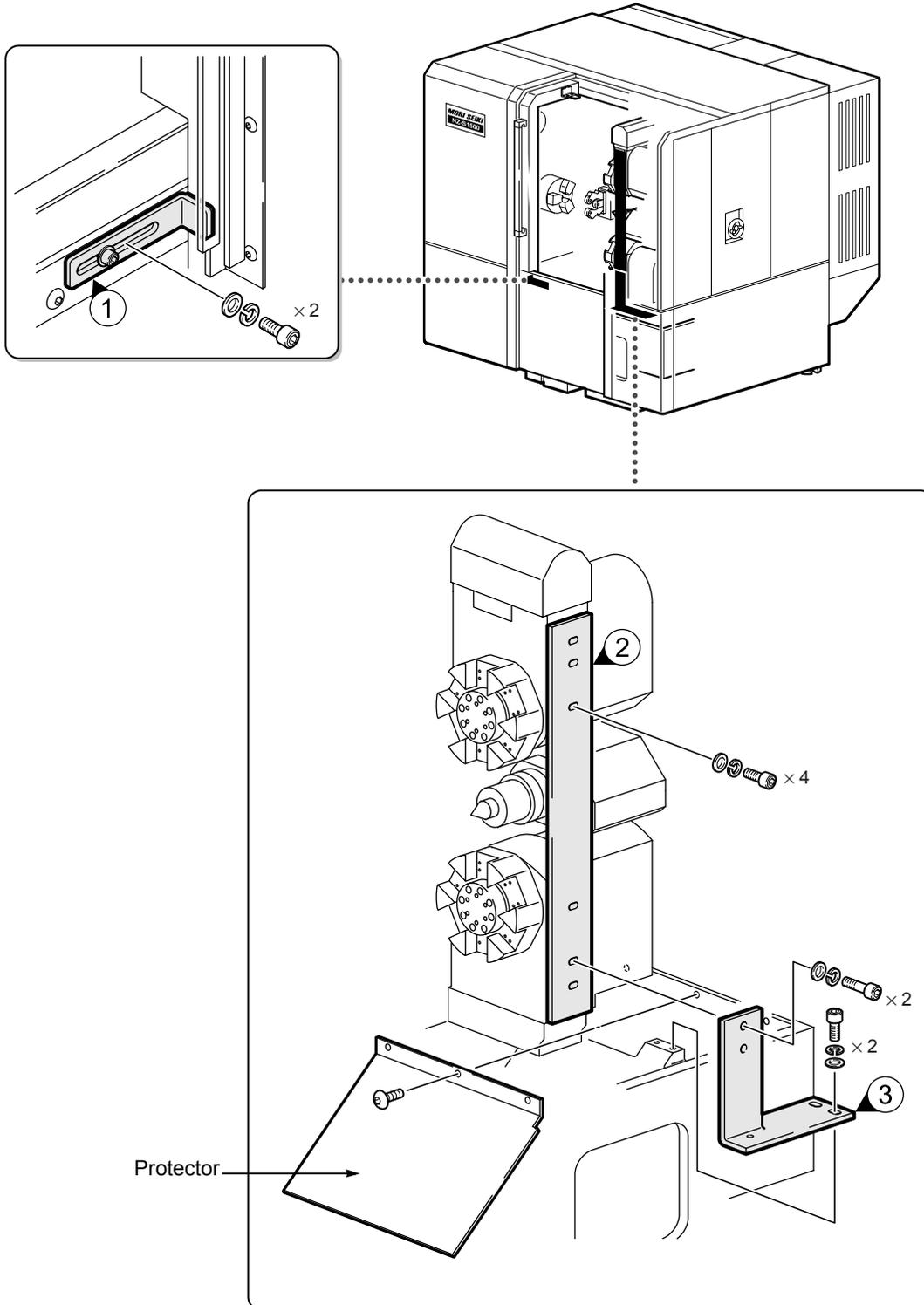
<Wire rope dimensions for NZ-S1500/1000>

Symbol	Diameter (mm)	Length (mm)
①	φ18	2680
②	φ18	1350
③	φ18	1450
Mass of machine (kg)		5200



1.2 Positions of Transit Clamps

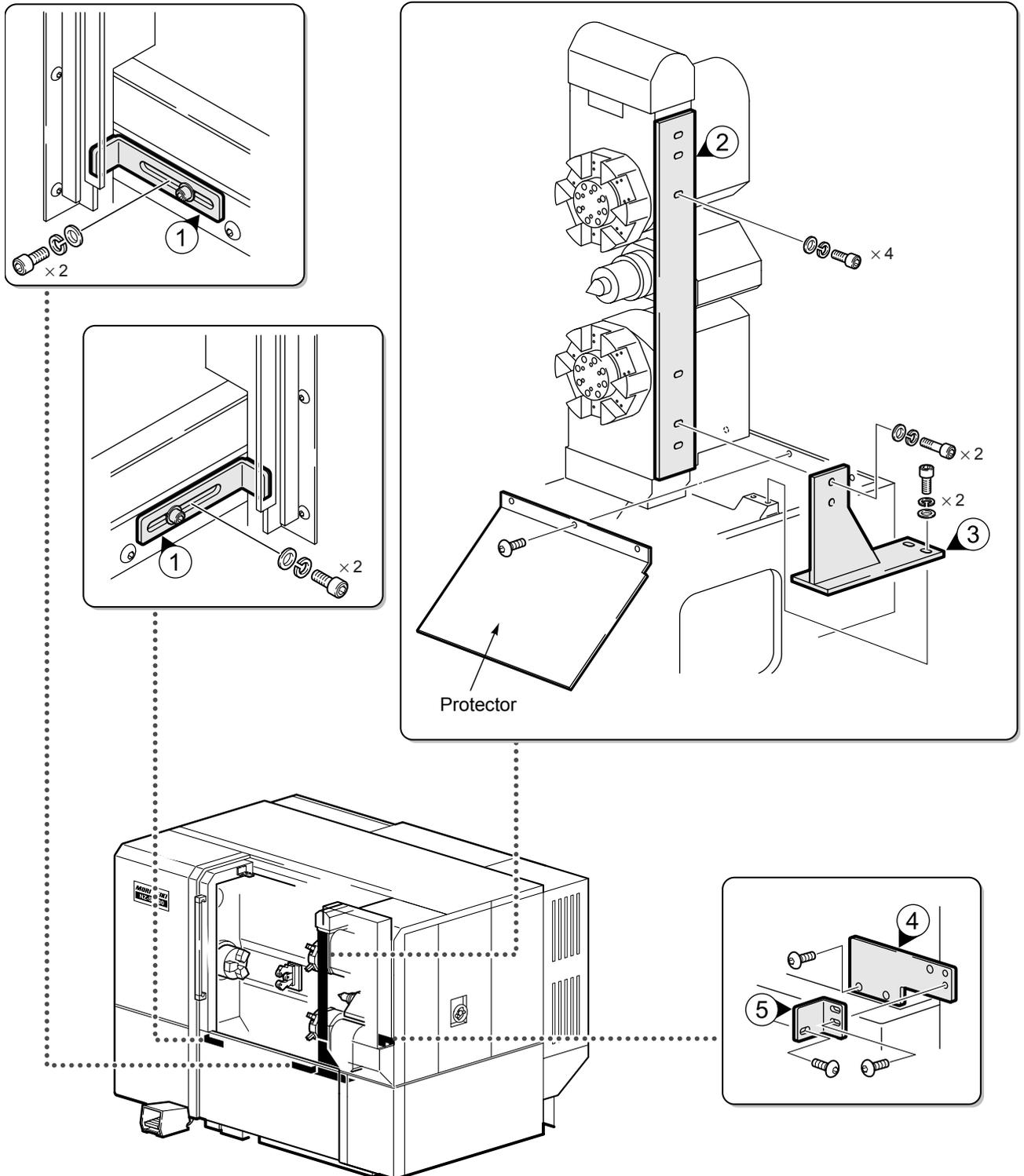
1.2.1 NZ-S1500/500



(1) Before mounting transit clamp ③, remove the protector.

(2) When transit clamp ③ has been removed, mount the protector in the original position.

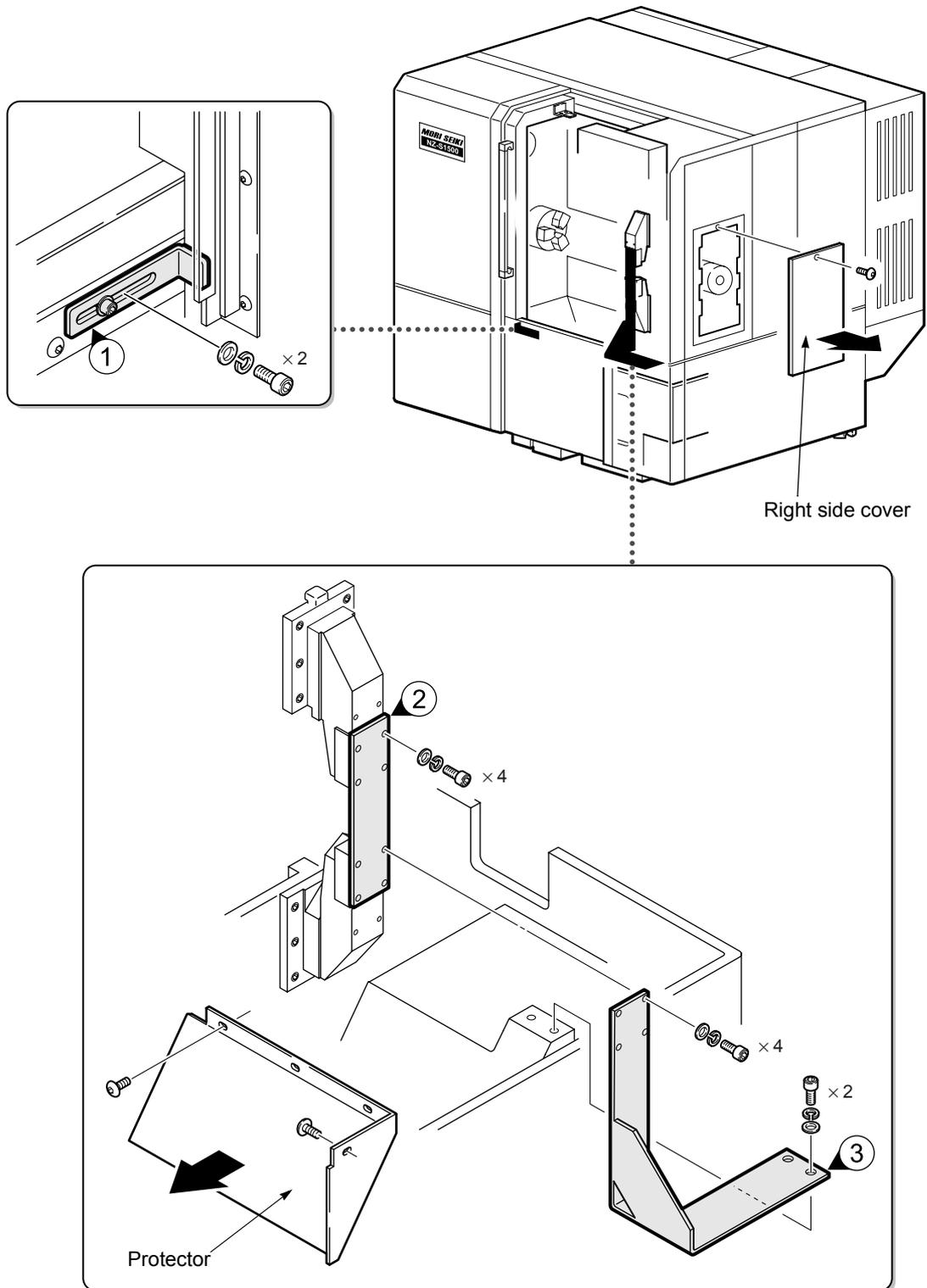
1.2.2 NZ-S1500/1000



(1) Before mounting transit clamp (3), remove the protector.

(2) When transit clamp (3) has been removed, mount the protector in the original position.

1.2.3 Headstock 2 specifications (gang type turret specification)



<Transit clamp mounting procedure>

- 1) Remove the protector and the right side cover.
- 2) Insert your hand through the right side face and finger tighten the bolts of transit clamp ③ at the positions shown in the figure.
- 3) Feed turret 2 to the position where transit clamp ③ can be mounted on it.
- 4) Feed turret 1 to the position where transit clamp ② can be mounted on it.
- 5) From the front of the machine, insert transit clamp ② between turret 1 and turret 2.
- 6) Tighten the four bolts of transit clamp ②, the four bolts of transit clamps ② and ③ (to be tightened together) and the two finger tightened bolts of transit clamp ③.
- 7) Mount the right side cover.

<Transit clamp removal procedure>

- 1) Remove the right side cover.
- 2) Insert your hand through the right side face and remove the bolts of transit clamp ③.
- 3) From the front of the machine, remove the bolts of transit clamps ② and ③ on the turret side.
- 4) Mount the protector and the right side cover.

APPENDIX 2 POWER CAPACITY TABLE



Breaker and power distribution board capacities are determined using the current calculated by the following formula.

$$\text{Current (A)} = \frac{\text{Total Electric Capacity (kVA)} \times 1000}{\sqrt{3} \times 200 \text{ (V)}} \times 1.25^*$$

* Allowance for selection

2.1 Standard Specifications

(194071 A03)

Machine Model			NZ-S1500			
NC Model			MSC-700, MSC-701			
Spindle output			Standard			
Power supply module	Manufacturer		FANUC			
	Model		[PSM-11i] A06B-6140-H011			
	Servomotor	Motor model	X1 [β4/4000iS] A06B-0063-B003	T1 [β4/4000iS] A06B-0063-B003	Z1 [β12/3000iS] A06B-0078-B103	
		Amplifier module	[SVM3-20/20/40i] A06B-6117-H304			
		Motor model	X2 [β4/4000iS] A06B-0063-B003	T2 [β4/4000iS] A06B-0063-B003	Z2 [β12/3000iS] A06B-0078-B103	
		Amplifier module	[SVM3-20/20/40i] A06B-6117-H304			
	Spindle	Motor model	[β3/10000i] A06B-1444-B101			
		Output (30 min./ continuous rating) (kW)	5.5/3.7			
		Amplifier module	[SPM-5.5i] A06B-6112-H006#H570			
	1	Amplifier capacity (Continuous rating) (kVA)		8.86 [16.86]		
2	Electrical cabinet + NC (kVA)		0.63 + 0.44 = 1.07			
3	Other unit motor (kW)	Hydraulic unit motor	2.80			
		Coolant pump motor	0.52			
		Chip conveyor	0.2			
	Total of auxiliary units [Power factor 0.8] (standard) (kVA)		4.40			
Total capacity (standard) 1 + 2 + 3		Continuous rating (kVA)	14.3 [22.3]			

Machine Model	NZ-S1500
NC Model	MSC-700, MSC-701
Spindle output	Standard
220 V 50 Hz transformer (kVA)	5



Values in [] are those for loader specification.

2.2 High Output (Rank 1)/High Torque (Rank 1) Specifications

(194071 A03)

Machine Model			NZ-S1500		
NC Model			MSC-700, MSC-701		
Spindle output			High output (rank 1)/High torque (rank 1)		
Power supply module	Manufacturer		FANUC		
	Model		[PSM-15i] A06B-6140-H015		
	Servomotor	Motor model	X1 [β4/4000iS] A06B-0063-B003	T1 [β4/4000iS] A06B-0063-B003	Z1 [β12/3000iS] A06B-0078-B103
		Amplifier module	[SVM3-20/20/40i] A06B-6117-H304		
		Motor model	X2 [β4/4000iS] A06B-0063-B003	T2 [β4/4000iS] A06B-0063-B003	Z2 [β12/3000iS] A06B-0078-B103
		Amplifier module	[SVM3-20/20/40i] A06B-6117-H304		
	Spindle	Motor model	[β6/10000i] A06B-1445-B101		
		Output (15 min/cont.) (kW)	7.5/5.5		
		Amplifier module	[SPM-11i] A06B-6112-H011#H570		
1	Amplifier capacity (Continuous rating) (kVA)		10.98 [18.98]		
2	Electrical cabinet + NC (kVA)		0.63 + 0.44 = 1.07		
3	Other unit motor (kW)	Hydraulic unit motor	2.80		
		Coolant pump motor	0.52		
		Chip conveyor	0.2		
	Total of auxiliary units [Power factor 0.8] (standard) (kVA)		4.40		
Total capacity (standard) 1 + 2 + 3		Continuous rating (kVA)	16.5 [24.5]		
220 V 50 Hz transformer (kVA)		5			



Values in [] are those for loader specification.

2.3 High Output (Rank 2)/High Torque (Rank 2) Specifications

(I94071 A03)

Machine Model			NZ-S1500			
NC Model			MSC-700, MSC-701			
Spindle output			High output (rank 2)/High torque (rank 2)			
Power supply module	Manufacturer		FANUC			
	Model		[PSM-15i] A06B-6140-H015			
	Servomotor	Motor model	X1 [β4/4000iS] A06B-0063-B003	T1 [β4/4000iS] A06B-0063-B003	Z1 [β12/3000iS] A06B-0078-B103	
		Amplifier module	[SVM3-20/20/40i] A06B-6117-H304			
		Motor model	X2 [β4/4000iS] A06B-0063-B003	T2 [β4/4000iS] A06B-0063-B003	Z2 [β12/3000iS] A06B-0078-B103	
		Amplifier module	[SVM3-20/20/40i] A06B-6117-H304			
	Spindle	Manufacturer		FANUC		
		Motor model		[β6/10000i] A06B-1445-B101#H0502		
		Output (1 min/15 min/cont.) (kW)		11/7.5/5.5		
		Amplifier module		[SPM-15i] A06B-6112-H015#H570		
1	Amplifier capacity (Continuous rating) (kVA)		10.98 [18.98]			
2	Electrical cabinet + NC (kVA)		0.63 + 0.44 = 1.07			
3	Other unit motor (kW)	Hydraulic unit motor	2.80			
		Coolant pump motor	0.52			
		Chip conveyor	0.2			
	Total of auxiliary units [Power factor 0.8] (standard) (kVA)		4.40			
Total capacity (standard) 1 + 2 + 3		Continuous rating (kVA)	16.5 [24.5]			
220 V 50 Hz transformer (kVA)		5				



Values in [] are those for loader specification.

2.4 High Output (Rank 3)/High Torque (Rank 3) Specifications

(194071 A03)

Machine Model			NZ-S1500			
NC Model			MSC-700, MSC-701			
Spindle output			High output (rank 3)/High torque (rank 3)			
Power supply module	Manufacturer		FANUC			
	Model		[PSM-26i] A06B-6140-H026			
	Servomotor	Motor model	X1 [β4/4000iS] A06B-0063-B003	T1 [β4/4000iS] A06B-0063-B003	Z1 [β12/3000iS] A06B-0078-B103	
		Amplifier module	[SVM3-20/20/40i] A06B-6117-H304			
		Motor model	X2 [β4/4000iS] A06B-0063-B003	T2 [β4/4000iS] A06B-0063-B003	Z2 [β12/3000iS] A06B-0078-B103	
		Amplifier module	[SVM3-20/20/40i] A06B-6117-H304			
	Spindle	Motor model	[β12/7000i] A06B-1447-B101			
		Output (15 min/cont.) (kW)	15/11			
		Amplifier module	[SPM-15i] A06B-6112-H015#H570			
1	Amplifier capacity (Continuous rating) (kVA)		16.96 [24.96]			
2	Electrical cabinet + NC (kVA)		0.63 + 0.44 = 1.07			
3	Other unit motor (kW)	Hydraulic unit motor	2.80			
		Coolant pump motor	0.52			
		Chip conveyor	0.2			
	Total of auxiliary units [Power factor 0.8] (standard) (kVA)		4.40			
Total capacity (standard) 1 + 2 + 3		Continuous rating (kVA)	22.4 [30.4]			
220 V 50 Hz transformer		(kVA)	5			



Values in [] are those for loader specification.

APPENDIX 3 POWER CABLE SIZE AND SCREW TIGHTENING TORQUE

The table below shows the cable size of the input power cord connected to the primary side terminals in the main breaker and also the torque needed to tighten the cables at the terminals.

3.1 Power Cable Size (Specified According to Breaker Capacity)

Frame Size	Current Rating	Main Breaker		Earth Leakage Breaker	
		Mori Seiki Part No.	Manufacturer's Type	Mori Seiki Part No.	Manufacturer's Type
100AF (15 A - 100 A)	50 A	E57658	BU3EDG050FMA-02155	E58170	SG103CUL/50-30MA-FMA-02745
	60 A	E57659	BU3EDG060FMA-02155	E58171	SG103CUL/60-30MA-FMA-02745
	75 A	E57660	BU3EDG075FMA-02155	E58172	SG103CUL/75-30MA-FMA-02745
	100 A	E57661	BU3EDG100FMA-02155	E58173	SG103CUL/100-30MA-FMA-02745
225AF (125 A - 225 A)	125 A	E57662	BU3GDG125FMA-02155	E58174	SG203CUL/125-30MA-FMA-02745
	150 A	E57663	BU3GDG150FMA-02155	E58175	SG203CUL/150-30MA-FMA-02745
	175 A	E57664	BU3GDG175FMA-02155	E58176	SG203CUL/175-30MA-FMA-02745
	200 A	E57588	BU3GDG200FMA-02155	E58177	SG203CUL/200-30MA-FMA-02745
	225 A	E57665	BU3GDG225FMA-02155	E58178	SG203CUL/225-30MA-FMA-02745
400AF (250 A - 400 A)	250 A	E57666	BU3KDG250FRA- 02155	E57848	SG403CUL/250-30MA-FMA-02745
	300 A	E57667	BU3KDG300FRA- 02155	E57849	SG403CUL/300-30MA-FMA-02745
	350 A	E57668	BU3KDG350FRA- 02155	E57850	SG403CUL/350-30MA-FMA-02745
	400 A	E57669	BU3KDG400FRA- 02155	E57851	SG403CUL/400-30MA-FMA-02745



- (1) The information above applies only to machines compatible with UL standards.
- (2) Use the UL486 (UL-approved) input terminal when connecting to the power supply source.

<Adaptive terminal>

Frame Size	Current Rating (FAB)	Pressure Terminal		Allowable Power Cable Size
		Manufacturer	Max. Connectable Format	
100AF	15 A - 100 A	FUJI TERMINAL INDUSTRY CO., LTD.	22-8	AWG size: 14 - 3 (AWG) mm ² size: 2.1 - 26.7 (mm ²)
		AIKOKU KOGYO KK.		
		DAIDO SOLDERLESS TERMINAL MFG. CO., LTD.		
		NICHIFU Co.,ltd.		
		JST Mfg. Co., Ltd.	R22-8	
225AF	125 A - 225 A	FUJI TERMINAL INDUSTRY CO., LTD.	100-8	AWG size: 1 (AWG) - 4/0 (AWG) mm ² size: 42.4 - 107.2 (mm ²)
		JST Mfg. Co., Ltd.		
		AIKOKU KOGYO KK.		
		DAIDO SOLDERLESS TERMINAL MFG. CO., LTD.		
		NICHIFU Co.,ltd.	R100-8	
400AF	250 A - 400 A	JST Mfg. Co., Ltd.	325-12	AWG size: 3/0 (AWG) - 500 (MCM) mm ² size: 85 - 253 (mm ²)
		DAIDO SOLDERLESS TERMINAL MFG. CO., LTD.		
		NICHIFU Co.,ltd.	R325-12S	

3.2 Tightening Torque

Cable Size		Tightening Torque
AWG	mm ²	N·m
14	2.1	5.8
12	3.3	
10	5.3	
8	8.4	
6	13.3	
4	21.2	
3	26.7	
1	42.4	
1/0	53.5	
2/0	67.4	
3/0	85	
4/0	107.2	

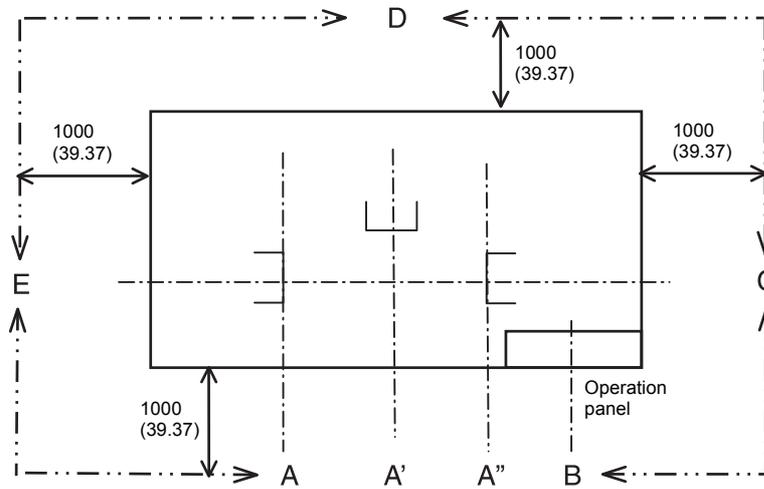
Cable Size		Tightening Torque
MCM	mm ²	N·m
250	127	43.5
350	177	
500	253	



The information above applies only to the UL standard compatible machines.

APPENDIX 4 MACHINE NOISE DATA

Unit: mm (in.)



Model	NZ-S1500		Serial No.	NS151EL0006	Date	08. 01. 2006	
Specifications	Max. Spindle Speed	Spindle 1		3500 min ⁻¹			
	Rapid Traverse Rate	X1, X2		20 m/min			
		Z1, Z2		30 m/min			
Person	Department: Design Quality Section Section: Value Performance Iga Team Name: Yuki Kitora						
Place	Development Testing Center						
Meas. Instrument	ONO SOKKI LA-4350						
Level	Active Character of Indicator			Fast			
Default Value	Background Noise			49.9 dB			
Radiated Sound Pressure (dB)							
Measuring Point*1			A	B	C	D	E
Machine Power ON			57.7	57.4	58.6	59.3	55.8
Spindle 1 (No-Load Running)	(80%)	2800 min ⁻¹	60.4	59.3	61.4	59.3	58.4
	(100%)	3500 min ⁻¹	62.6	61.0	63.4	64.4	59.4

Measuring Point ^{*1}			A	B	C	D	E
During Axis Movement ^{*2}	X1-Axis		62.9				
	X2-Axis		59.0				
	Z1-Axis		68.4				
	Z2-Axis		66.6				
During Turret Head Rotation	Turret 1	Tool Call	59.5				
	Turret 2	Tool Call	59.5				



*1 Measuring point is 1 m from machine, and 1.55 ± 0.75 m from floor.

*2 Axis travel at 100% rapid traverse rate.

*3 The chip conveyor is operated with the machine running (with the spindle running and the axes traveling).

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APPENDIX CONVERSION TABLE OF UNITS

This manual uses SI unit system and metric system.

If inch system is required, please convert the values to inch system by referring to the following table.

Quantity	Metric	SI	Yard/Pound	Remarks
Length	1 mm	1 mm	0.0394 in.	
	1 m	1 m	3.281 ft	
Velocity	1 mm/min	1 mm/min (0.017 mm/s)	0.0394 in./min	
	1 m/min	1 m/min (0.017 m/s)	3.281 ft/min	
Area	1 m ²	1 m ²	10.764 ft ²	
	1 mm ²	1 mm ²	0.0016 in. ²	
Volume	1 L (liter)	1 L (liter) (1 × 10 ⁻³ m ³)	0.264 gal.	gal.: US gallon
Volumetric flow rate	1 L/min	1 L/min (1.66666 × 10 ⁻⁵ m ³ /s)	0.264 gpm	gal.: US gallon
Mass	1 kg	1 kg	2.2 lb.	
Force	1 kgf	9.80665 N	2.2 lbf	
Torque	1 kgf·m	9.80665 N·m	7.233 ft·lbf	
Pressure	1 kgf/cm ²	9.80665 × 10 ⁻² MPa	14.22 psi (14.22 lbf/in. ²)	1 MPa = 1000 kPa 1 kPa = 1000 Pa
	1 ton/m ²	9.80665 × 10 ³ Pa	204.4 lb./ft ²	ton: metric ton
Output	1 kW	1 kW	1.34 HP	
Temperature	1°C	1°C (274.16 K)	33.8°F °F = (1.8 × °C) + 32	Temperature difference: 1°C = 1 K
Kinematic viscosity	1 cSt	1 × 10 ⁻⁶ m ² /s	1.076 × 10 ⁻⁵ ft ² /s	1 St = 100 cSt
Rotational speed	1 min ⁻¹ (rpm)	1 min ⁻¹ (1/60 s ⁻¹)	1 rpm	
Angle	1°	1° (π/180 rad)	1° (deg)	Degrees, minutes, and seconds may also be used.
Work	1 kcal	4.186 × 10 ³ J	1 kcal	
	1 kgf·m	9.80665 J	7.233 ft·lbf	Different from torque
Power	1 kcal/h	1.16 W	1 kcal/h	
Acceleration	1 G	9.80665 m/s ²	1 G	



In the texts and drawings in this manual, there are dimensions and other values specific to inch specification machines. In the case of these specific dimensions and values, converting the corresponding values for the metric specification machines into inch system dimensions or values using the conversion table will not give the correct dimensions or values.

<Example>

The dimensions and values specific to the inch system machines include cutting feedrate per spindle revolution, manual jog feed rate, tool dimensions, zero point (NC lathe only), and T-slot and pallet dimensions (machining center only).

For these values, refer to the values specified in the machine specification table. If the required value is not found in the table, contact Mori Seiki.



Units and numerical values in () in the SI column indicate the formal expression of the SI unit system.

However, they are not used usually and the units described above the expression in () are used instead of the formal SI unit expression. These units are also approved as SI unit system expression.

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