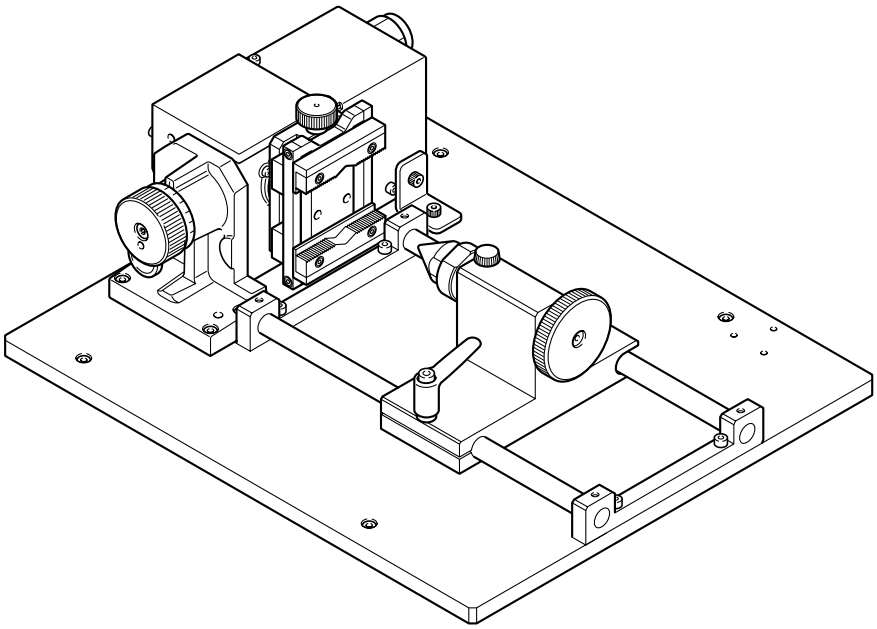
Roland

Rotary Axis Unit for MDX-40

ZCL-40
User's Manual



Thank you very much for purchasing this product.

- To ensure correct and safe usage with a full understanding of this product's performance, please be sure to read through this manual completely and store it in a safe location.
- Unauthorized copying or transferral, in whole or in part, of this manual is prohibited.
- The contents of this operation manual and the specifications of this product are subject to change without notice.
- The operation manual and the product have been prepared and tested as much as possible. If you find any misprint or error, please inform us.
- Roland DG Corp. assumes no responsibility for any direct or indirect loss or damage which may occur through use of this product, regardless of any failure to perform on the part of this product.
- Roland DG Corp. assumes no responsibility for any direct or indirect loss or damage which may occur with respect to any article made using this product.

Roland DG Corporation

Contents

http://www.rolanddg.com/

⚠To Ensure Safe Use

Improper handling or operation of this machine may result in injury or damage to property. Points which must be observed to prevent such injury or damage are described as follows.
***Please also read the important safety information in the user's manual for the modeling machine.**

About ⚠WARNING and ⚠CAUTION Notices

⚠WARNING	Used for instructions intended to alert the user to the risk of death or severe injury should the unit be used improperly.
⚠CAUTION	Used for instructions intended to alert the user to the risk of injury or material damage should the unit be used improperly. * Material damage refers to damage or other adverse effects caused with respect to the home and all its furnishings, as well to domestic animals or pets.

About the Symbols

	The △ symbol alerts the user to important instructions or warnings. The specific meaning of the symbol is determined by the design contained within the triangle. The symbol at left means "danger of electrocution."
	The ⃠ symbol alerts the user to items that must never be carried out (are forbidden). The specific thing that must not be done is indicated by the design contained within the circle. The symbol at left means the unit must never be disassembled.
	The ● symbol alerts the user to things that must be carried out. The specific thing that must be done is indicated by the design contained within the circle. The symbol at left means the power-cord plug must be unplugged from the outlet.

⚠ Incorrect operation may cause injury

⚠WARNING

Be sure to follow the operation procedures described in this manual.
Failure to follow the procedures may cause sudden operation or the like of the machine, which may result in unexpected injury.

Never allow anyone unfamiliar with the usage or handling of the machine to touch the machine.
Touching a dangerous location may cause sudden operation or the like of the machine, which may lead to an unexpected accident.

Never allow children near the machine.
The machine includes locations and components that pose a danger to children, and major accident, including injury, blindness, or choking, may occur.

Do not disassemble, repair, or modify.
Doing so may lead to fire or abnormal operation resulting in injury.

⚠ Danger of electrical short, shock, electrocution, or fire

⚠WARNING

In the event of an abnormal state (such as smoke or sparks, odor or burning or unusual noise), immediately unplug the power cord.
Failure to do so may result in fire, electrical shock, or electrocution. Immediately disconnect the power cord and contact your Roland DG Corp. service center.

⚠ Important Notes on Cutting

⚠CAUTION

Do not touch the tip of the cutting tool with your fingers.
Doing so may result in injury.

Fasten the spindle, tool, and workpiece securely in place.
Otherwise they may come loose during cutting, resulting in injury.

Never attempt operation while wearing a necktie, necklace, loose clothing, or the like.
Such articles may get caught on the rotary axis, causing injury.

Do not insert the fingers between the rotary axis unit and the workpiece.
The fingers may be pinched, resulting in injury.

⚠ Pour utiliser en toute sécurité

La manipulation ou l'utilisation inadéquates de cet appareil peuvent causer des blessures ou des dommages matériels. Les précautions à prendre pour prévenir les blessures ou les dommages sont décrites ci-dessous.
*** Lire sans faute les importants renseignements sur la sécurité dans le guide de l'utilisateur de la machine à modeler.**

Avis sur les avertissements

⚠ATTENTION	Utilisé pour avertir l'utilisateur d'un risque de décès ou de blessure grave en cas de mauvaise utilisation de l'appareil.
⚠PRUDENCE	Utilisé pour avertir l'utilisateur d'un risque de blessure ou de dommage matériel en cas de mauvaise utilisation de l'appareil. * Par dommage matériel, il est entendu dommage ou tout autre effet indésirable sur la maison, tous les meubles et même les animaux domestiques.

À propos des symboles

	Le symbole △ attire l'attention de l'utilisateur sur les instructions importantes ou les avertissements. Le sens précis du symbole est déterminé par le dessin à l'intérieur du triangle. Le symbole à gauche signifie "danger d'électrocution".
	Le symbole ⃠ avertit l'utilisateur de ce qu'il ne doit pas faire, ce qui est interdit. La chose spécifique à ne pas faire est indiquée par le dessin à l'intérieur du cercle. Le symbole à gauche signifie que l'appareil ne doit jamais être démonté.
	Le symbole ● prévient l'utilisateur sur ce qu'il doit faire. La chose spécifique à faire est indiquée par le dessin à l'intérieur du cercle. Le symbole à gauche signifie que le fil électrique doit être débranché de la prise.

⚠ L'utilisation incorrecte peut causer des blessures

⚠ATTENTION

S'assurer de suivre les procédures d'utilisation décrites dans ce manuel.
Si les procédures indiquées ne sont pas suivies, le fonctionnement de l'appareil peut être déclenché soudainement, ce qui risque de causer des blessures.

Ne jamais permettre à quiconque de toucher l'appareil s'il ou si elle n'en connaçò pas le fonctionnement ou la manutention.
Toucher l'appareil à certains points dangereux peut en déclencher le fonctionnement, ce qui risque de causer un accident imprévu.

Ne jamais laisser d'enfants s'approcher de l'appareil.
Des éléments et des surfaces de l'appareil présentent des risques pour les enfants. Il pourrait se produire un accident grave qui causerait des blessures, ou créerait un risque de cécité ou de suffocation.

Ne pas démonter, réparer ni modifier.
Démonter, réparer ou modifier l'appareil risque de provoquer un incendie ou de causer un fonctionnement anormal entraînant des blessures.

⚠ Risque de décharge ou de choc électrique, d'électrocution ou d'incendie

⚠ATTENTION

S'il se produit quoi que ce soit d'anormal (fumée, étincelles, odeur, combustion ou bruit inhabituel), débrancher immédiatement le câble d'alimentation.
Le défaut de ce faire peut entraîner un incendie, un choc électrique ou l'électrocution. Débrancher immédiatement le câble d'alimentation et communiquer avec le Centre de services Roland DG.

⚠ Remarques importantes sur la coupe

⚠PRUDENCE

Ne pas toucher à l'extrémité de la lame avec vos doigts.
Vous risqueriez de vous blesser en y touchant.

Fixer fermement le mandrin, l'outil et le matériel à leur place.
Sinon, ces éléments risquent d'avoir du jeu lors des coupes, ce qui entraînerait des blessures.

Ne jamais faire fonctionner l'appareil si on porte une cravate, un collier, des vêtements amples ou autres du même genre car ils peuvent se coincer dans l'axe de rotation, ce qui entraînerait des blessures.

Ne jamais glisser les doigts entre l'axe de rotation et la pièce car ils pourraient être coincés, ce qui causerait des blessures.

Chapter 1
Introduction

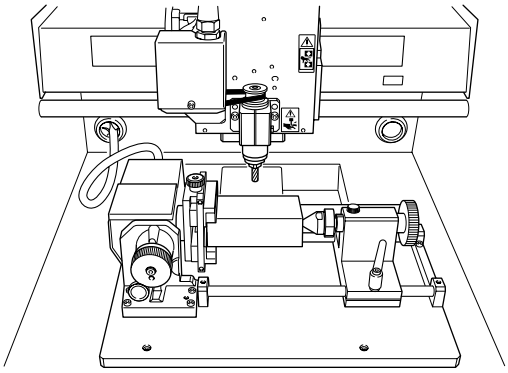
1-1 About This Manual

This document is the user's manual for the ZCL-40 (rotary axis unit). It describes how to install the rotary axis unit, and how to carry out cutting using the unit. For information on operations such as how to switch the power on and off, how to start the operation-panel screen, and how to start and stop cutting, read the user's manual for the cutting machine.

1-2 About This Machine

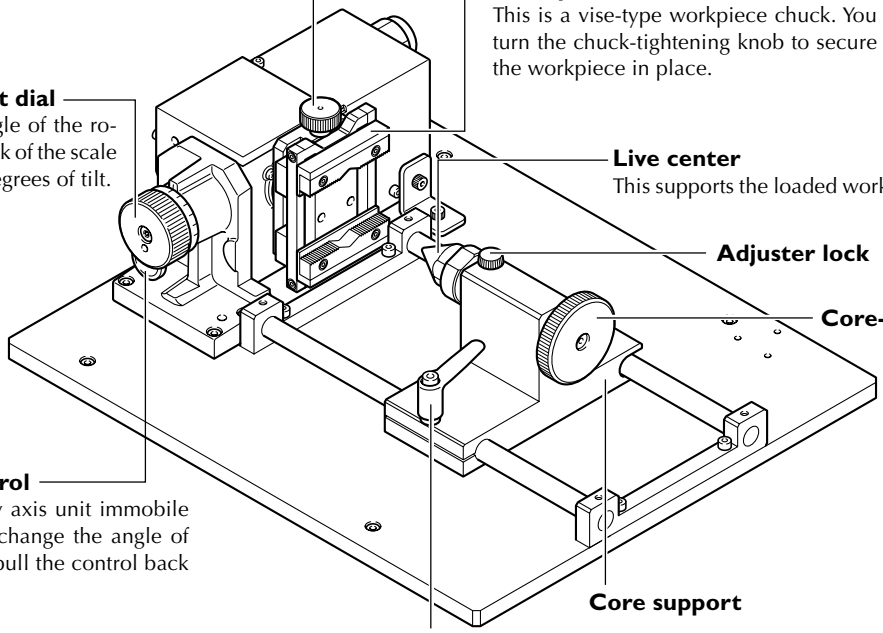
What You Can Do with This Machine

This is a rotary axis unit compatible with the MDX-40. By adding an axis of rotation (A axis) to the MDX-40, it makes it possible to perform four-axis machining operations such as multiple-surface cutting.



Part Names and Functions

Rotary axis unit



Chuck-tightening knob

Workpiece chuck
This is a vise-type workpiece chuck. You turn the chuck-tightening knob to secure the workpiece in place.

Angle-adjustment dial
This changes the angle of the rotary axis unit. Each tick of the scale corresponds to 15 degrees of tilt.

Live center
This supports the loaded workpiece.

Adjuster lock

Core-support adjuster

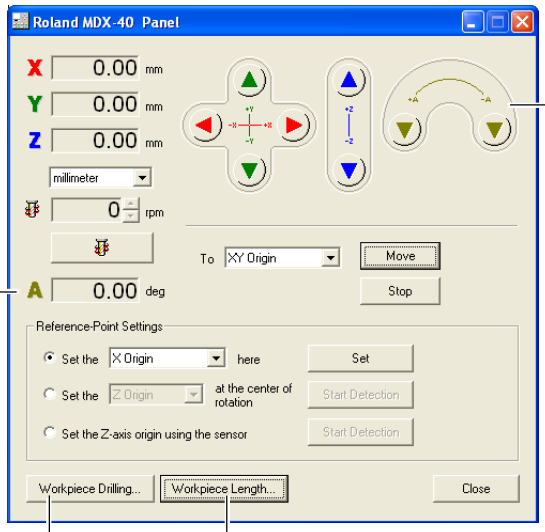
Angle-fixing control
This keeps the rotary axis unit immobile at the set angle. To change the angle of the rotary axis unit, pull the control back toward you.

Core support

Core-support retaining lever
This secures the location of the core support in place to match the length of the workpiece.

Operation panel screen

When the rotary axis unit is installed, the operation-panel screen shows the following items.



A-axis rotation buttons
This display the present coordinate value (workpiece coordinate system) for the A axis.

A-axis coordinate
This displays the present coordinate value for the A axis.

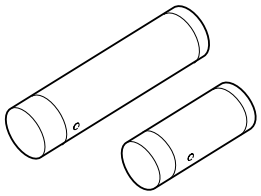
Workpiece Drilling
This displays a dialog box for drilling a hole to support the workpiece.
☞ P.26 "3-1 Loading a Workpiece"

Workpiece Length
This displays a dialog box for entering the length.
☞ P.26 "3-1 Loading a Workpiece"

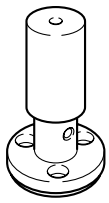
Chapter 2
Preparation

2-1 Included Items

The following items are included with the machine. Make sure they are all present and accounted for.

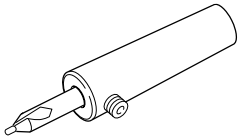


Y-origin sensors
(large and small)

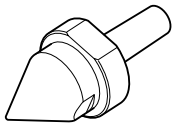


Z-origin sensor

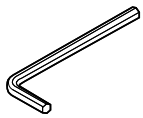
Y-origin detection pin
(ø 6 mm)



Center drill

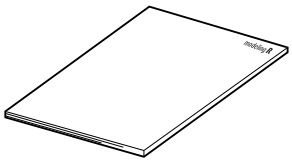


Live center



Hexagonal wrench

Cap screws
(for securing Z-origin sensor)



User's manual

2-2 Installing the Rotary Axis Unit

Installing the Rotary Axis Unit

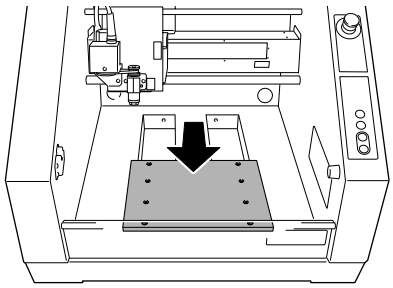
⚠CAUTION **Before you carry out this operation, switch off the power to the cutting machine.** Failing to do so may result in sudden movement of the cutting machine, causing the hands or fingers to become caught and resulting in injury.

⚠CAUTION **When installing the rotary axis unit, be careful not to let it drop or fall.** Doing so may result in injury.

Procedure

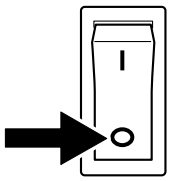
❶ If a tool is installed, then remove it.

❷



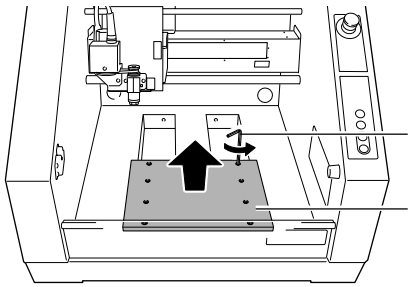
Switch on the power to the cutting machine to start it.
The VIEW light illuminates and the table moves back toward the front.

❸



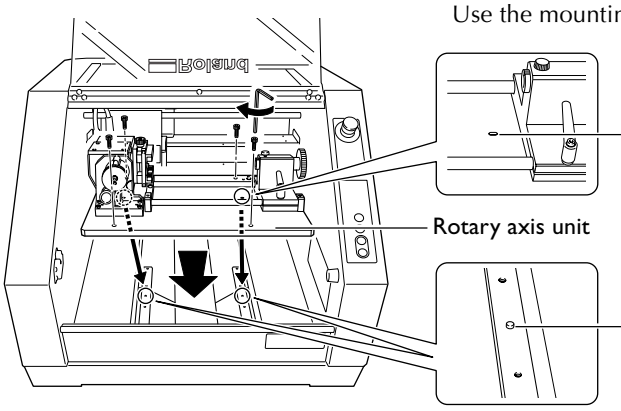
Turn off the processing machine and unplug the power cord.

❹



Remove the table from the cutting machine.

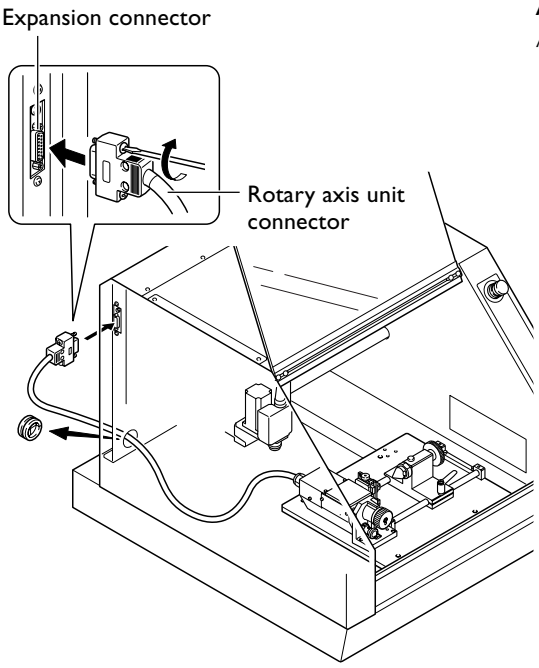
❺



Attach the rotary axis unit.
Use the mounting screws for the table to secure it in place.

Line up the holes on the rotary axis unit shown in the figure with the holes on the cutting machine also shown in the figure, then attach.

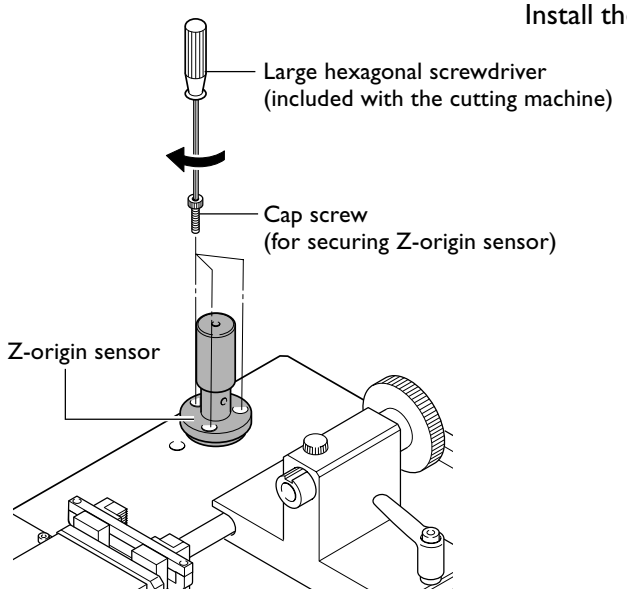
Connecting the Connector



Attach to the expansion connector on the cutting machine.
Attach it securely, so that it will not come loose.

Installing the Z-origin Sensor

Install the Z-origin sensor.



2-3 Setting the Y-axis Origin Point for the Center of Rotation

Setting the Y-axis Origin Point

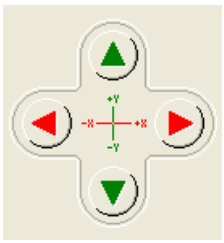
⚠CAUTION **Do not touch the tip of the live center and center drill with your fingers.**
Doing so may result in injury.

To perform cutting using the rotary axis unit, you need to set the Y-axis origin point at the center of rotation.
Be sure to make this setting whenever you install or reinstall the rotary axis unit. We also recommend periodically redoing the setting for the Y-axis origin to correct for deviation of the Y axis due to seasonal changes in temperature.

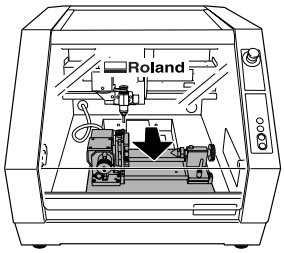
1. Install the small Y-origin sensor.

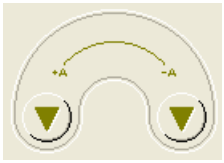
❶ Start the machine.
Press the VIEW button to make the VIEW light go out.

❷ Start the operation panel screen.

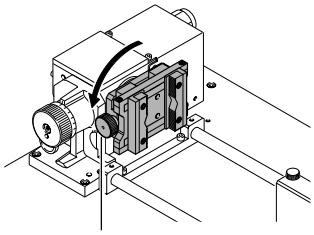
❸ 

Use the operation-panel screen to move the table back toward the front.

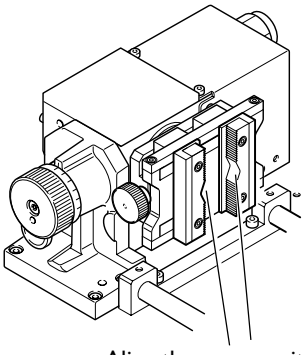


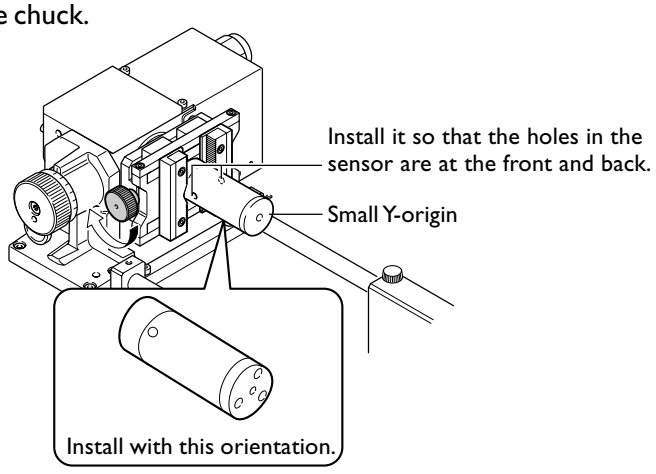
❹ 

Use the operation-panel screen to turn the chuck-tightening knob until it is positioned directly to the side.



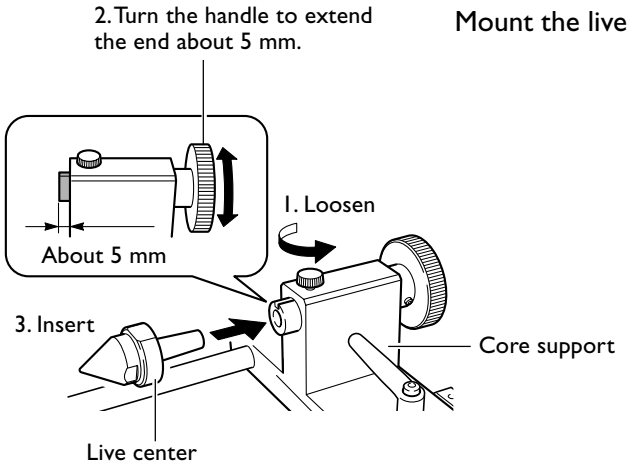
❺ Open the front cover and install the small Y-origin sensor on the workpiece chuck.





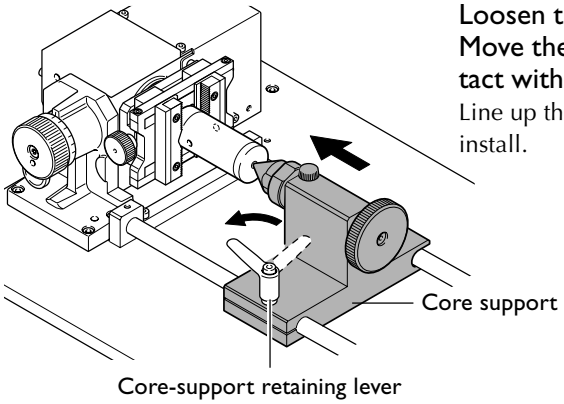
2. Use the live center to secure the sensor.

❶



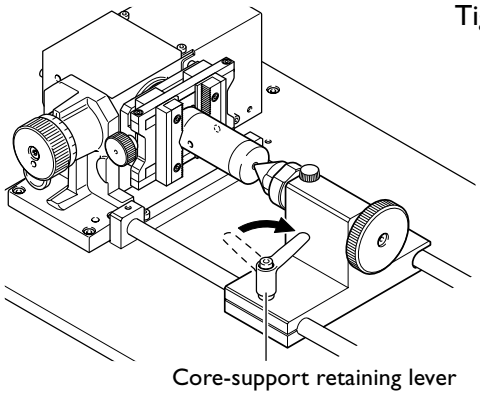
Mount the live center on the core support.

❷



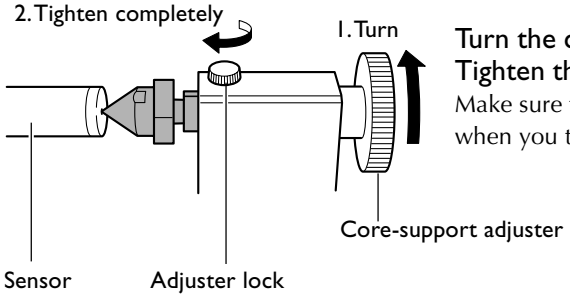
Loosen the core-support retaining lever.
Move the core support and bring the live center into contact with the small Y-origin sensor.
Line up the center hole of sensor and the tip of the live center and install.

❸



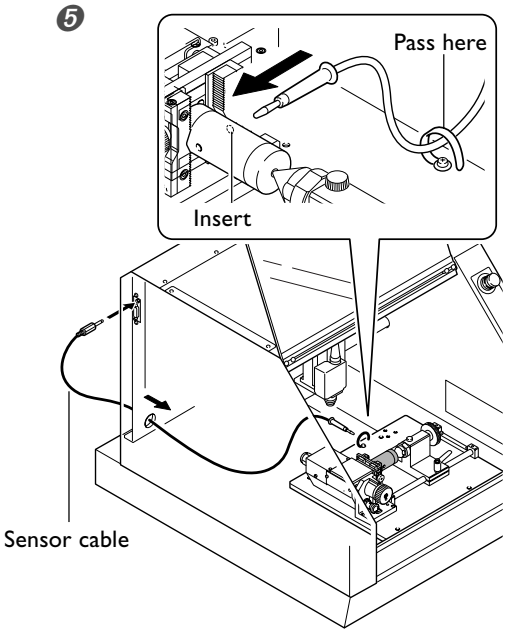
Tighten the core-support retaining lever.

❹



Turn the core-support adjuster half a turn.
Tighten the adjuster lock completely.
Make sure the sensor is attached securely and shows no looseness when you try to move it by hand.

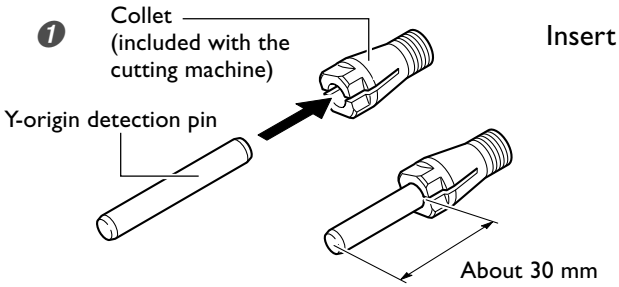
❺



Run the sensor cable from the back to a location over the table.
Insert the sensor cable into the hole on the back of the sensor.

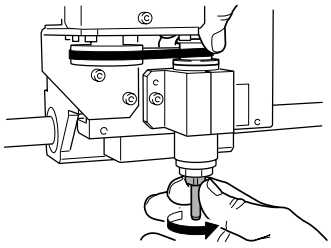
3. Install the Y-origin detection pin.

❶



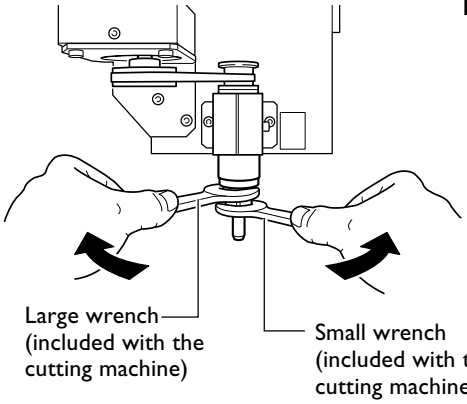
Insert the Y-origin detection pin into the collet.

❷



Insert the collet and tool from underneath.
While supporting the pin to keep it from falling, turn the collet to secure it in place.

❸

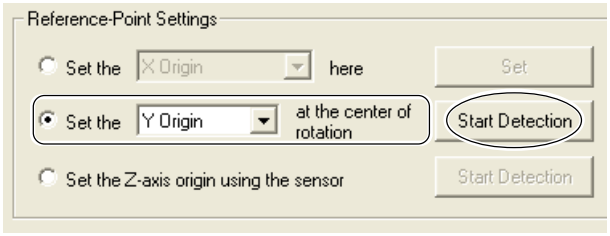


Tighten the collet using spanners.

4. Use the operation-panel screen for make the setting for the Y-axis origin point.

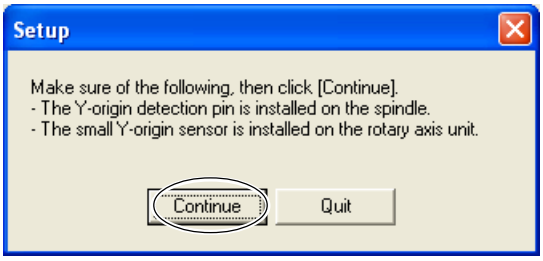
❶ Close the front cover.
Press the VIEW button to make the VIEW light go out.

❷



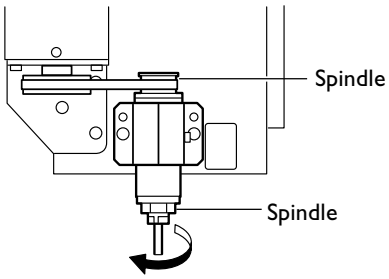
Use the operation panel screen to select [Set the Y origin at the center of rotation].
Select [Start Detection].

❸

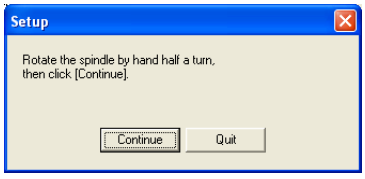


Click [Continue].
The Y-origin detection pin automatically makes contact with the sensor.

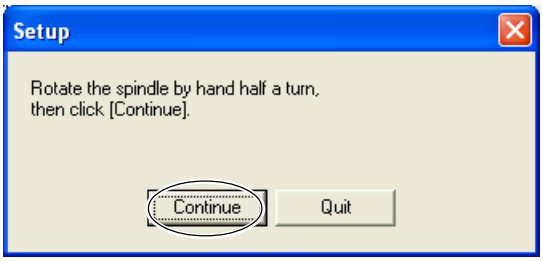
❹



When the screen appears, open the front cover.
Rotate the spindle half a turn.

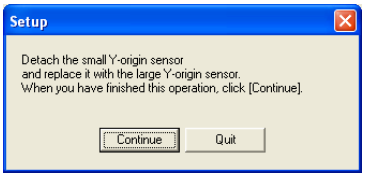


❺

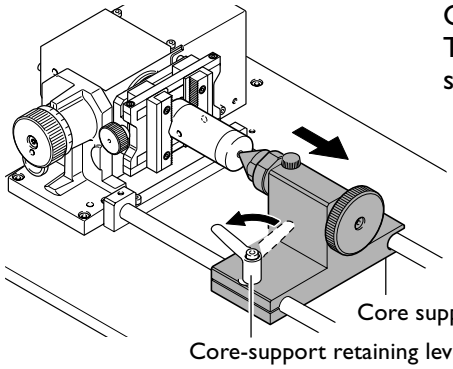


Close the front cover.
Click [Continue].
The Y-origin detection pin automatically makes contact with the sensor, and the Y origin point for the rotary axis unit is set, again.

Next, the screen shown in the figure appears.
Here, do not click [Continue] yet.

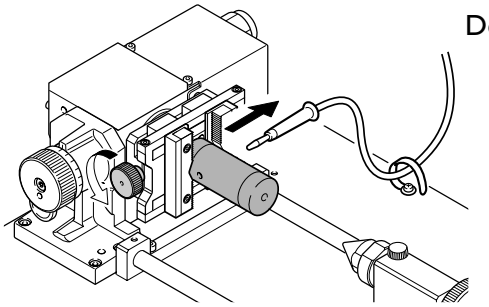


❻



Open the front cover.
Turn the core-support retaining lever to move the core support

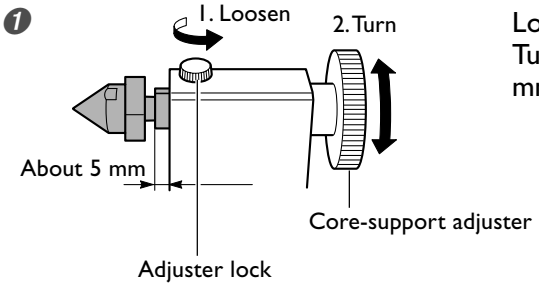
❼



Detach the sensor cable and the small Y-origin sensor.

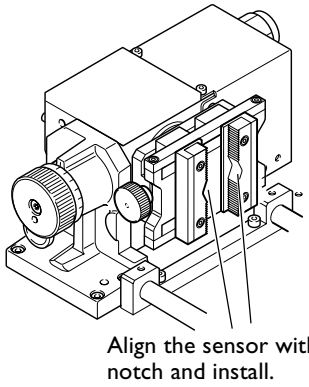
5. Install the large Y-origin sensor.

❶

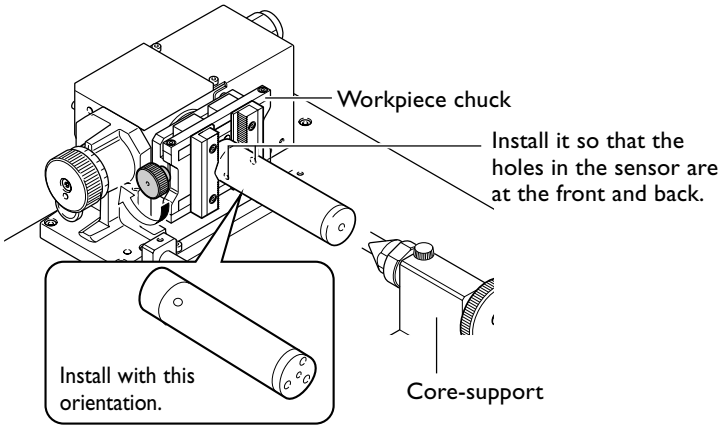


Loosen the adjuster lock.
Turn the core-support adjuster to extend the end about 5 mm.

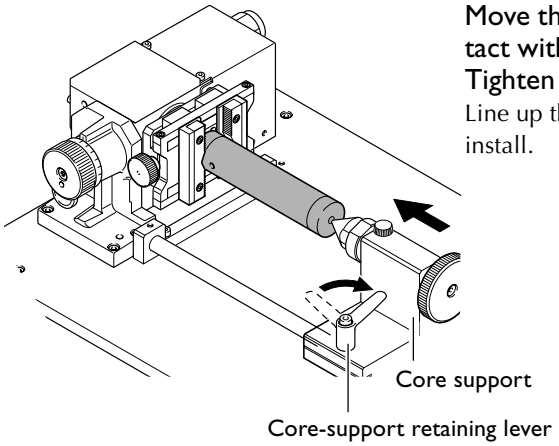
❷



Install the large Y-origin sensor on the workpiece chuck.
Move the core support, expand the workpiece chuck, then install the large Y-origin sensor.

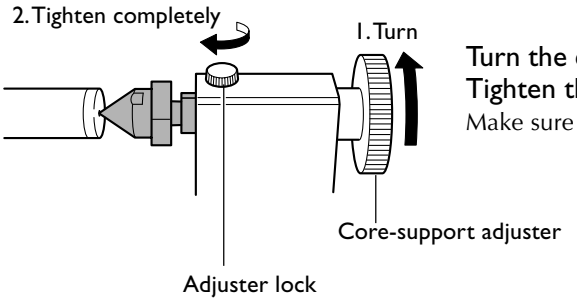


❸



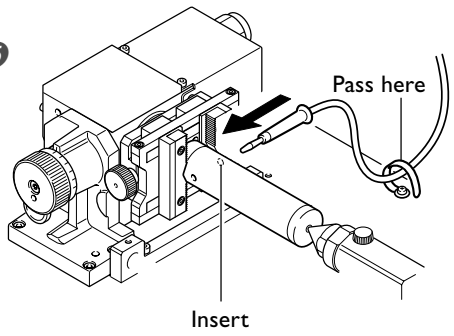
Move the core support and bring the live center into contact with the large Y-origin sensor.
Tighten the core-support retaining lever.
Line up the center hole of sensor and the tip of the live center and install.

❹



Turn the core-support adjuster half a turn.
Tighten the adjuster lock completely.
Make sure to fasten the sensor securely.

❺

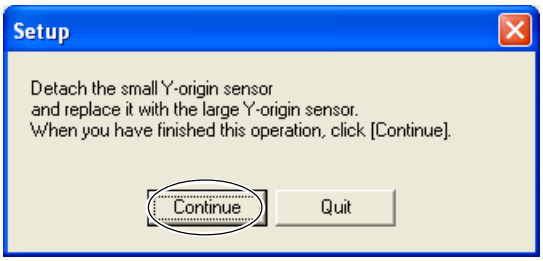


Insert the sensor cable into the hole on the back of the sensor.

❻ Close the front cover.

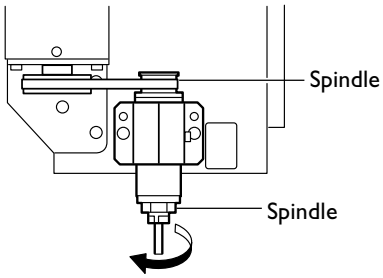
6. Use the operation-panel screen for make the setting for the Y-axis origin point.

❶

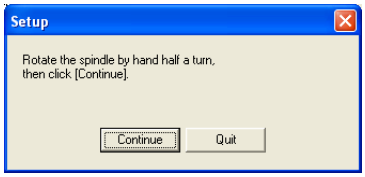


Click [Continue].
The Y-origin detection pin automatically makes contact with the sensor.

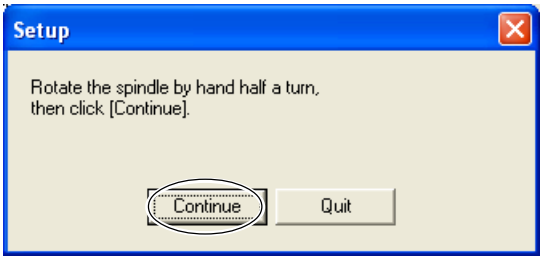
❷



When the screen appears, open the front cover.
Rotate the spindle half a turn.

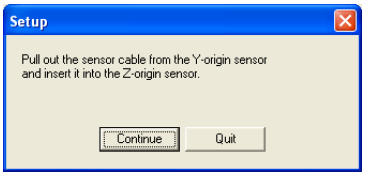


❸

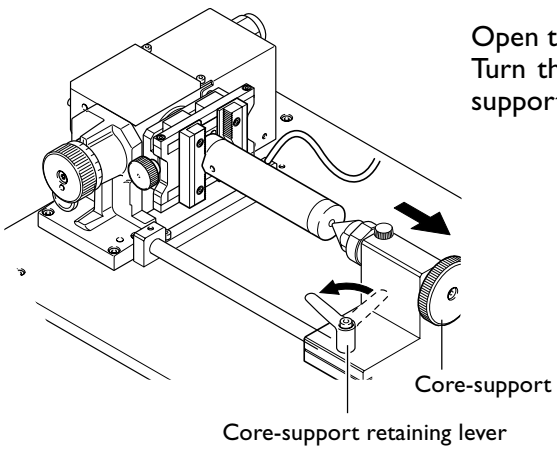


Close the front cover.
Click [Continue].
The Y-origin detection pin automatically makes contact with the sensor, and the Y origin point for the rotary axis unit is set, again.

Next, the screen shown in the figure appears.
Here, do not click [Continue] yet.

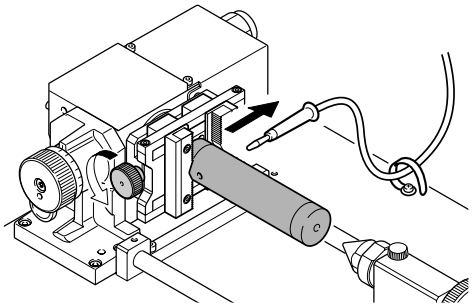


❹



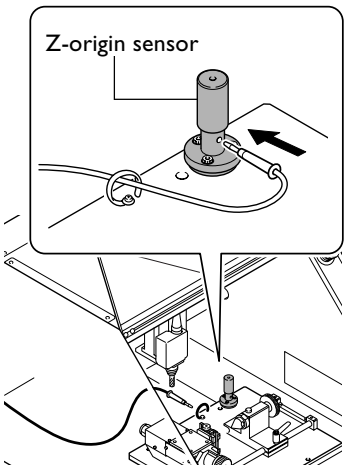
Open the front cover.
Turn the core-support retaining lever to move the core support.

❺



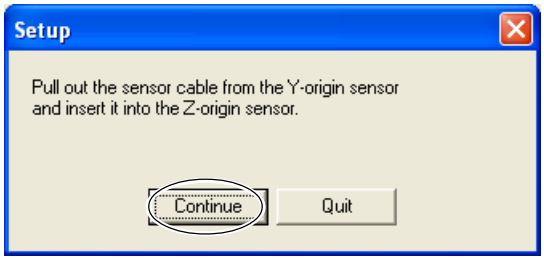
Detach the sensor cable and the large Y-origin sensor.

❻



Insert the sensor cable into the Z-origin sensor.
Close the front cover.

❼

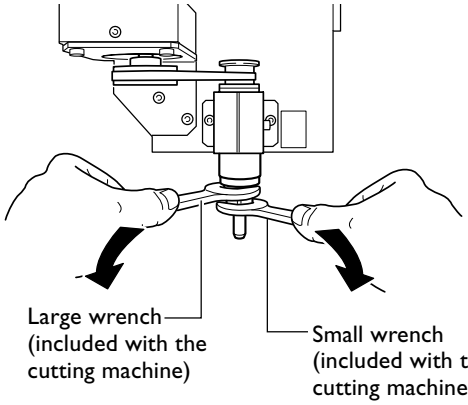


Click [Continue].
The Y-origin detection pin automatically makes contact with the Z-origin sensor.

7. Detach the Y-origin detection pin, collet, live center.

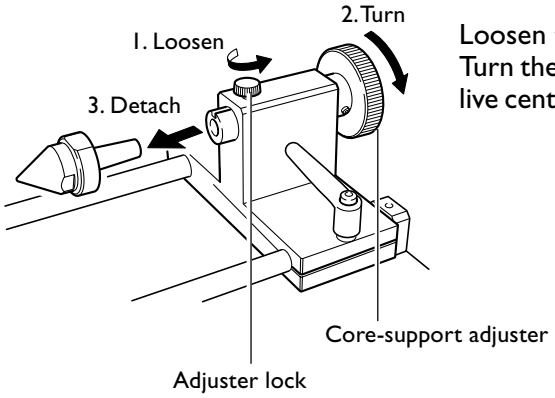
❶ Open the front cover.

❷



Detach the Y-origin detection pin, and collet.

❸



Loosen the adjuster lock.
Turn the core-support adjuster all the way, then detach the live center.

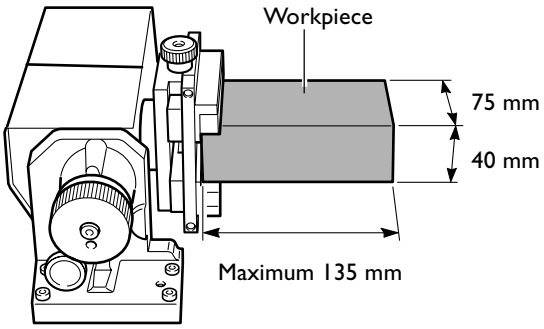
Chapter 3
Operation

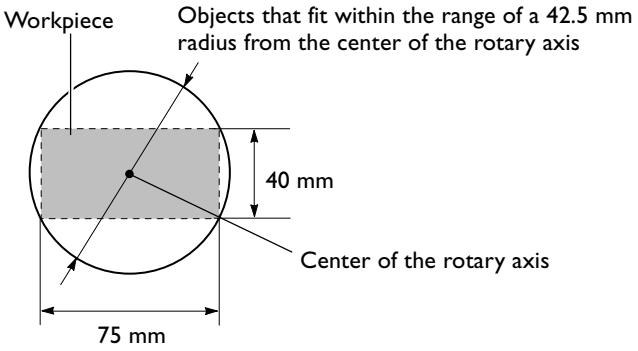
3-1 Loading a Workpiece

Dimensions of Workpieces Installable and Start Location

Example : Loading a Square Block

A workpiece that fits within the range of a 42.5 mm radius from the center of the rotary axis by 135 mm long can be loaded.
The figure shows the maximum size when loading a workpiece that is 40 mm thick.





➢ Maximum width when loading a workpiece measuring 40 mm thick : 75 mm
(The maximum width varies according to the thickness of the workpiece.)
➢ Workpiece thickness that can be held by the workpiece chuck : 12 to 40 mm
➢ Loadable workpiece length : Maximum 135 mm

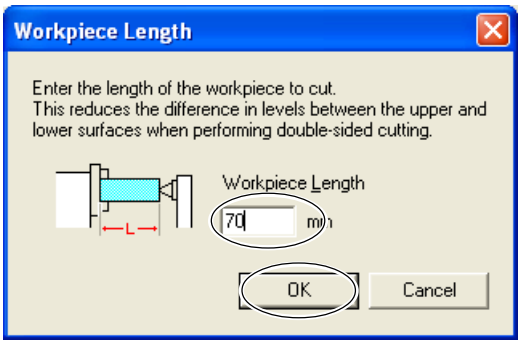
Loading a Workpiece Less Than 120 mm in Length

The mounting method varies according to the length of the workpiece you're loading. When you're loading a workpiece measuring less than 120 mm, follow the steps below.

1. Entering the length of the workpiece at the operation panel screen.

❶ 

Click [Workpiece Length].

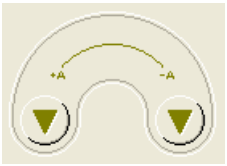
❷ 

Enter the length of the mounted workpiece.
Click [OK].

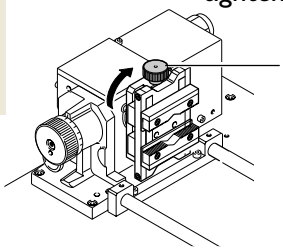
2. Carry out the preparations for securing the workpiece in place.

❶ Close the front cover.
Press the VIEW button to make the VIEW light go out.

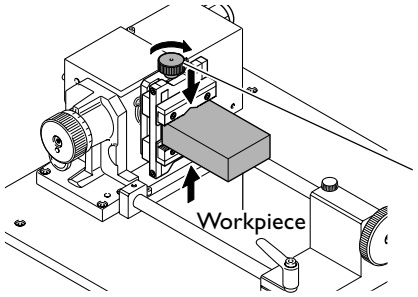
❷



Turn the workpiece chuck to a position where the chuck-tightening knob is facing upward.



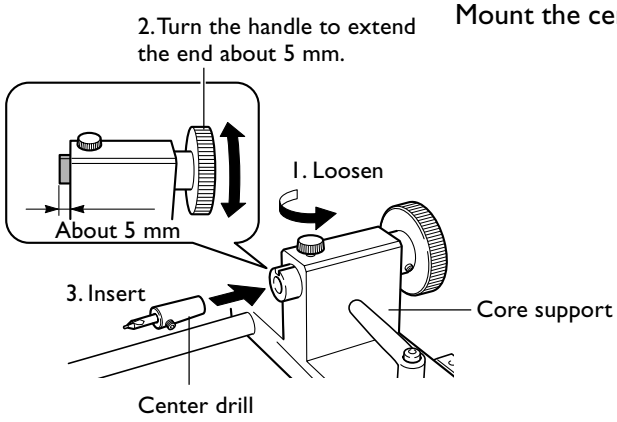
❸



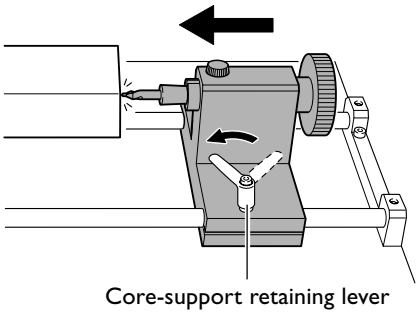
Open the front cover.
Secure the workpiece in place on the workpiece chuck.
Fasten the workpiece securely, so that it will not fall.

❹

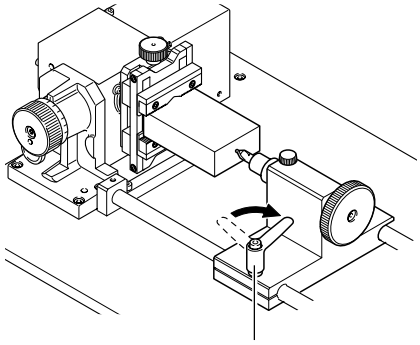
Mount the center drill on the core support.



❺

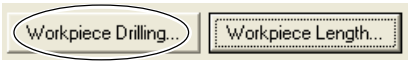


Loosen the core-support retaining lever.
Move the core support and bring the tip of the center drill into contact with the workpiece.

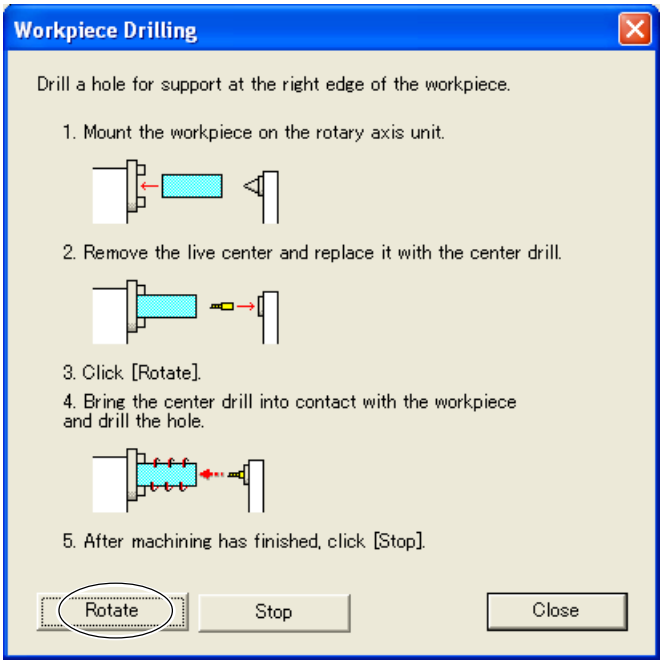
❻ 

Tighten the core-support retaining lever.

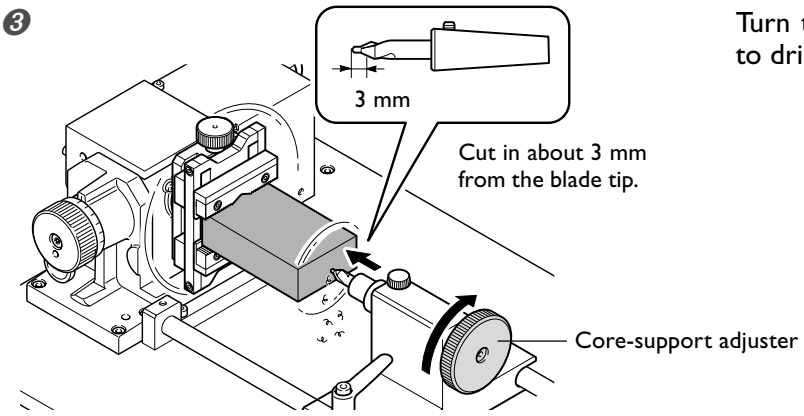
3. Drill a hole for retaining the workpiece.

❶ 

At the operation-panel screen, click [Workpiece Drilling].

❷ 

Click [Rotate].
The rotary axis starts to turn.

❸ 

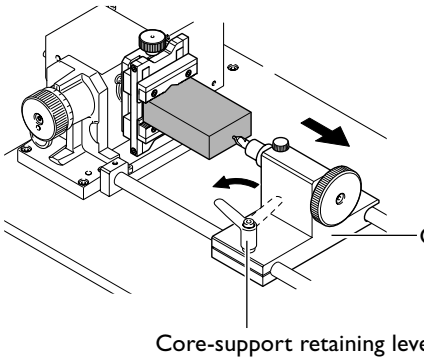
Turn the core-support adjuster slowly to drill the hole by center drill.

❹ 

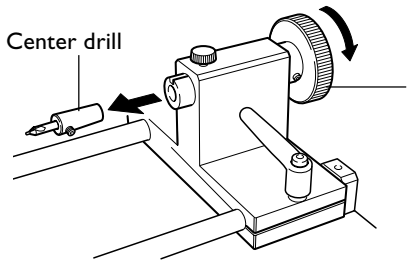
Click [Stop].
The rotation stops.

❺ 

Click [Close].

❻ 

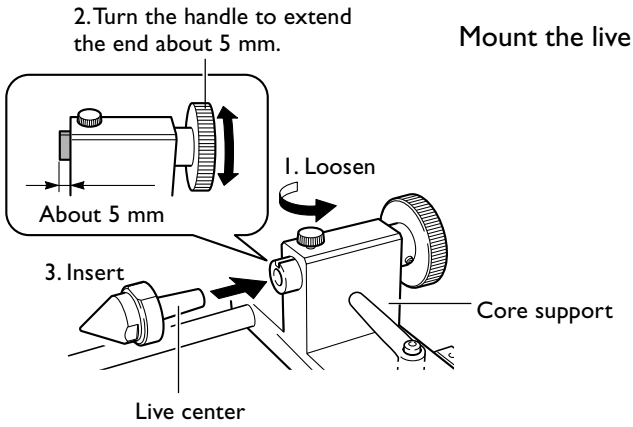
Loosen the core-support retaining lever to move the core support.

❼ 

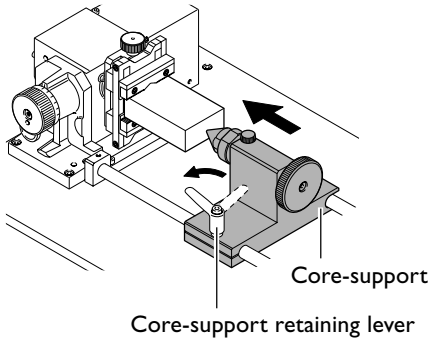
Turn the core-support adjuster all the way, then detach the center drill.

4. Use the live center to secure the workpiece in place.

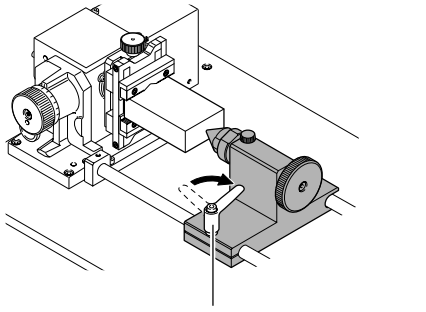
❶ Mount the live center on the core support.



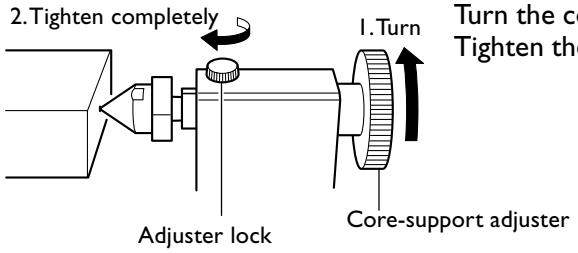
❷ Loosen the core-support retaining lever.
Move the core support and bring the live center into contact with the workpiece.



❸ Tighten the core-support retaining lever.



❹ Turn the core-support adjuster half a turn.
Tighten the adjuster lock completely.



Securing the Workpiece in Place

After securing the workpiece in place using the live center, go to the operation-panel screen and rotate the A axis. If the workpiece and the live center turn together, the workpiece is fastened securely. If the live center does not turn, loosen the adjuster lock, turn the core-support adjuster, then secure the control in place again with the adjuster lock.

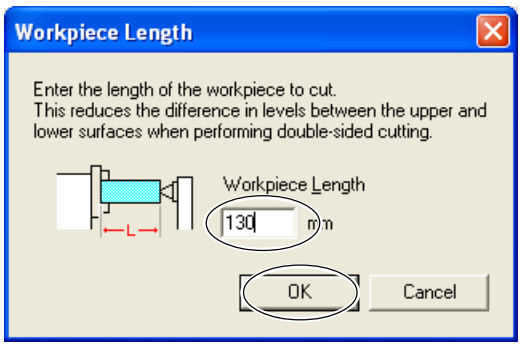
Loading a Workpiece 120 mm or Longer in Length

When you're loading a workpiece measuring 120 mm or longer, follow the steps below.

1. Entering the length of the workpiece at the operation panel screen.

❶ 

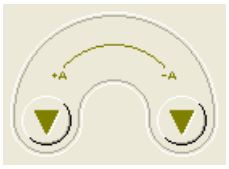
Click [Workpiece Length].

❷ 

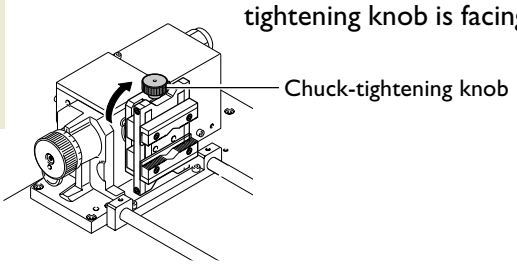
Enter the length of the mounted workpiece.
Click [OK].

2. Carry out the preparations for securing the workpiece in place.

❶ Close the front cover.
Press the VIEW button to make the VIEW light go out.

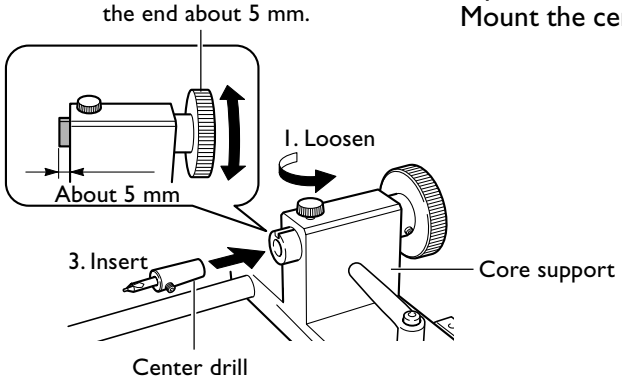
❷ 

Turn the workpiece chuck to a position where the chuck-tightening knob is facing upward.

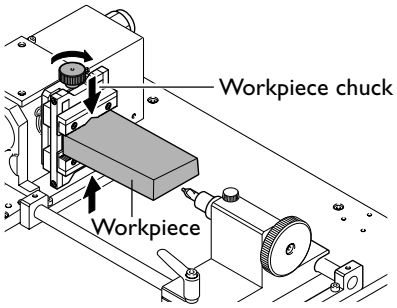


❸ 2. Turn the handle to extend the end about 5 mm.

Open the front cover.
Mount the center drill on the core support.

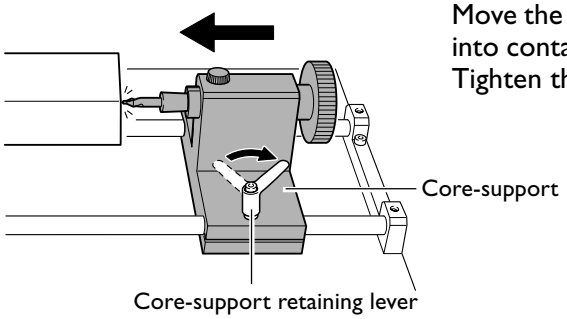


❹



Secure the workpiece in place on the workpiece chuck.
Fasten the workpiece securely, so that it will not fall.

❺

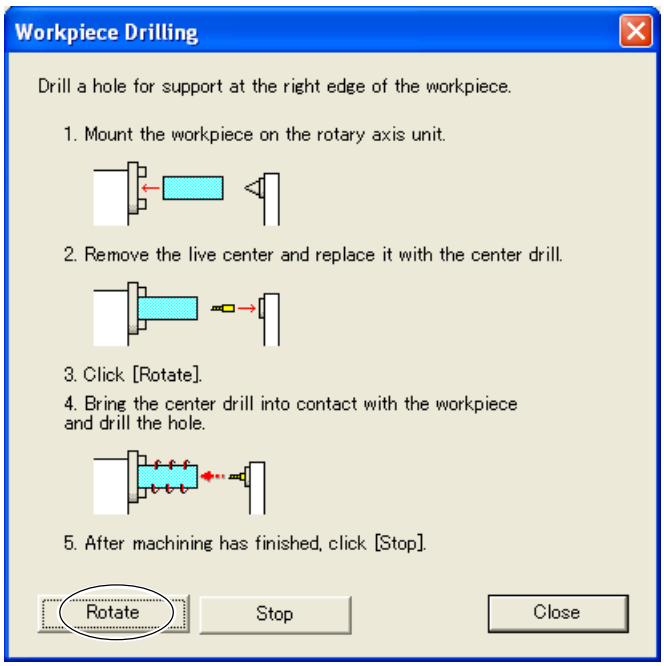


Move the core support and bring the tip of the center drill into contact with the workpiece.
Tighten the core-support retaining lever.

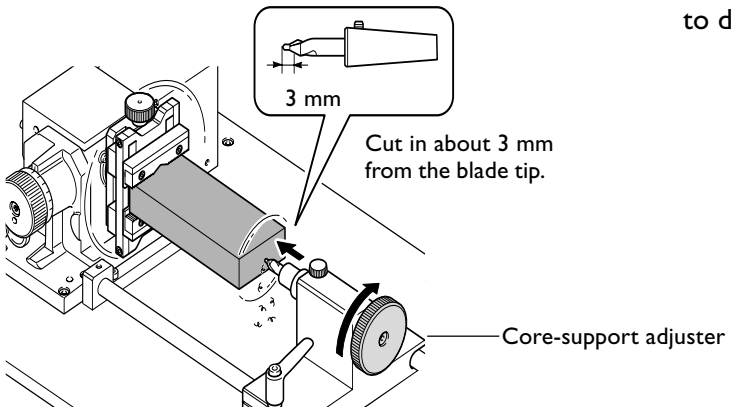
3. Drill a hole for retaining the workpiece.

❶ 

At the operation-panel screen, click [Workpiece Drilling].

❷ 

Click [Rotate].
The rotary axis starts to turn.

❸ 

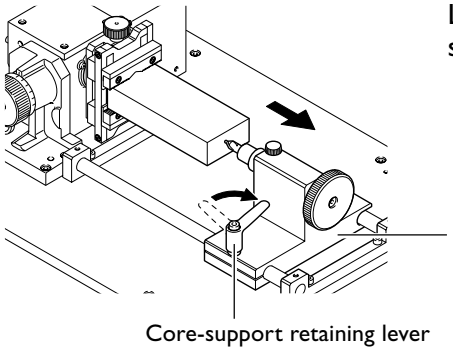
Turn the core-support adjuster slowly to drill the hole by center drill.

❹ 

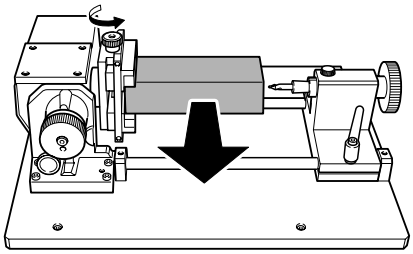
Click [Stop].
The rotation stops.

❺ 

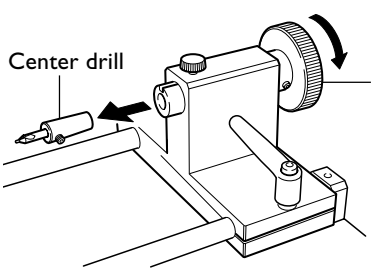
Click [Close].

❻ 

Loosen the core-support retaining lever to move the core support.

❼ 

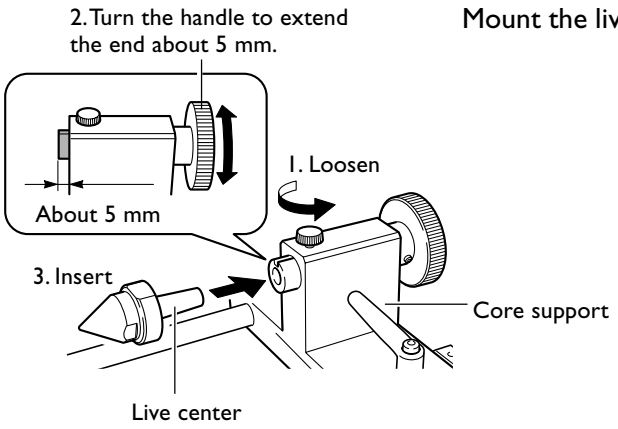
Detach the workpiece once.

❽ 

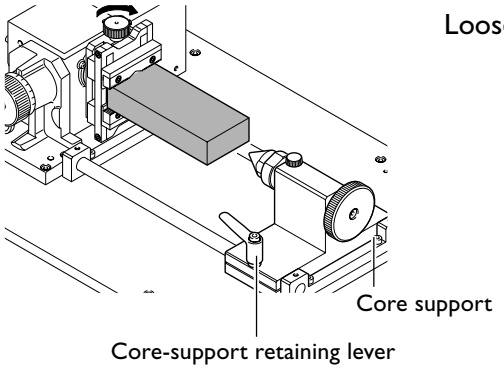
Turn the core-support adjuster all the way, then detach the center drill.

4. Use the live center to secure the workpiece in place.

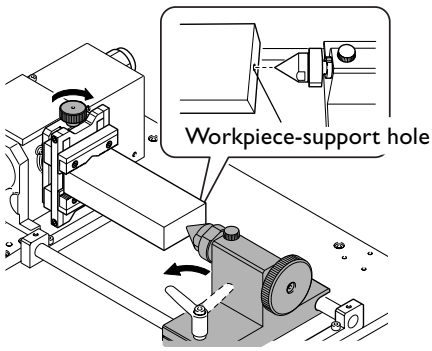
❶ Mount the live center on the core support.



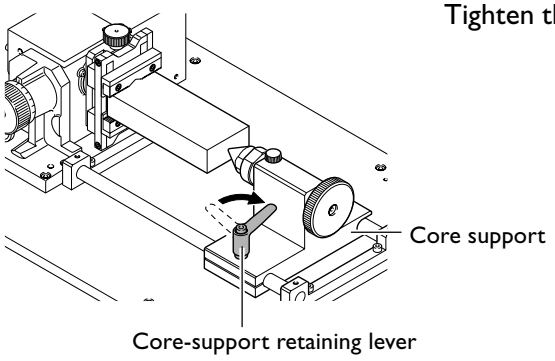
❷ Loosely mount the workpiece.



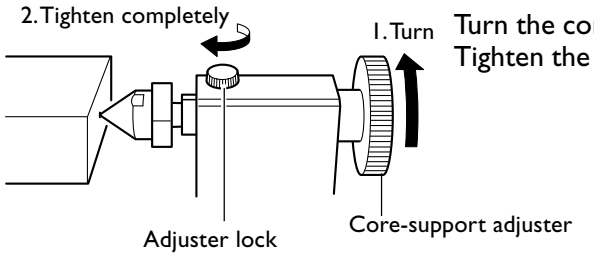
❸ Loosen the core-support retaining lever.
Move the core support and bring the live center into contact with the workpiece.
Adjust the positioning of the workpiece to line up the workpiece-support hole and the tip of the live center, then secure in place.



❹ Tighten the core-support retaining lever.



❺ Turn the core-support adjuster half a turn.
Tighten the adjuster lock completely.



Securing the Workpiece in Place

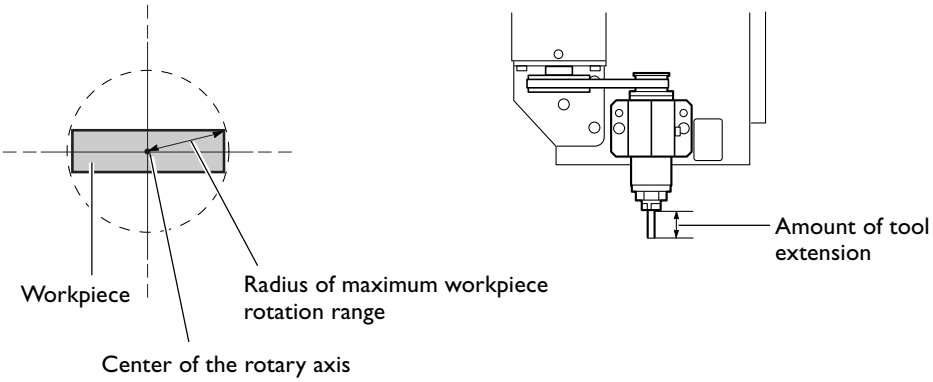
After securing the workpiece in place using the live center, go to the operation-panel screen and rotate the A axis. If the workpiece and the live center turn together, the workpiece is fastened securely. If the live center does not turn, loosen the adjuster lock, turn the core-support adjuster, then secure the control in place again with the adjuster lock.

3-2 Installing a Tool

Interference Between the Tool and the Rotary Axis Unit or Workpiece

Depending on the amount of tool extension, the tool may strike the rotary axis unit, the workpiece or other areas, which can cause the tool to break or damage the machine. This poses a danger not only during cutting operations, but also when the power has been turned on and when the [VIEW] button has been pressed.
To avoid this, be sure to adjust the amount of tool extension as described below.

➢ Amount of tool extension ≤ (58 - radius of maximum workpiece rotation range) mm
➢ Note, however, that the value must not exceed 33 mm.



It is also necessary to check the tool path, regardless of the amount of tool extension. Depending on the cutting data and the location of the origin point, collision with the rotary axis unit or the like may occur.

Installing a Tool

⚠CAUTION **Do not touch the tip of the blade with your fingers.**
Doing so may result in injury.

Procedure

Follow the instructions in the manual for the cutting machine to install a tool.
Adjust the amount of tool extension to match the size of the workpiece and the cutting depth. Depending on the amount of tool extension, the tool may encounter interference with the rotary axis unit or the workpiece. Exercise caution.

☞ P.37 "Interference Between the Tool and the Rotary Axis Unit or Workpiece"

3-3 Setting the Cutting-start Location

The Locations of the Origin Points

When you perform cutting using the rotary axis, you make the respective settings for the X-axis, Y-axis, Z-axis, and A-axis origin points. The X-axis origin becomes the start location for cutting. Make the setting to match the workpiece, so that the workpiece does not strike the rotary axis unit during cutting. Align the Y and Z origins with the center of the rotary axis. The Z-axis origin is to be set so as to match the length of the tool. Set the A-axis origin when you want to specify the start location for the direction of rotation.

To perform cutting using the rotary axis, you need to set the Y-axis origin at the center of rotation. Be sure to make this setting when you install the rotary axis unit for the first time, and whenever you reinstall it. Make the setting again whenever displacement of the Y origin becomes a concern during continuous use.

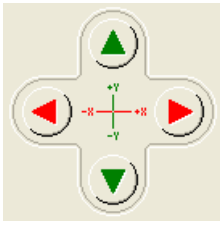
☞ P.15 "Setting the Y-axis Origin Point for the Center of Rotation"

Setting the Cutting-start Location

1. Make the setting for X origin point.

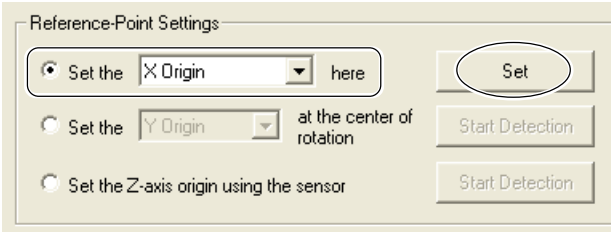
❶ Close the front cover.
Press the VIEW button to make the VIEW light go out.

❷



Use the operation panel screen to move the spindle to the cutting-start location.
Set the cutting-start location so that the neither the tool nor the spindle strikes the workpiece chuck during cutting.

❸

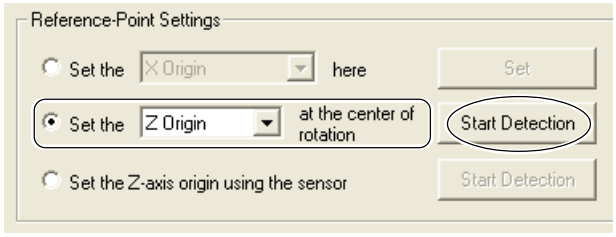


Select [Set the X origin here].
Click [Set].
The start location in the X origin has now been set.

2. Make the setting for Z origin point.

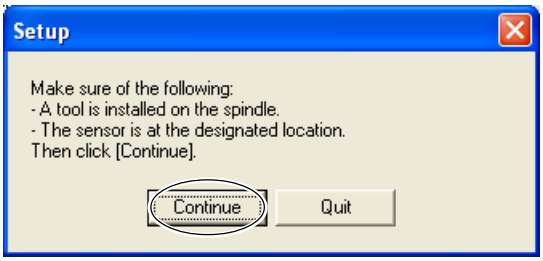
❶ Make sure to insert the sensor cable to Z-origin sensor.

❷



Using the operation panel screen, select [Set the Z origin at the center of rotation].
Select [Start Detection].

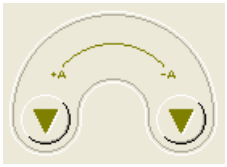
❸



Click [Continue].
The tool automatically makes contact with the sensor, and the Z-axis origin point is set.

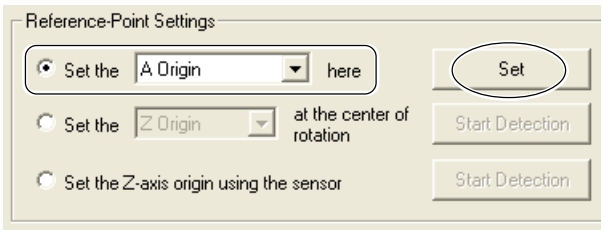
3. Make the setting for A origin point.

❶



Use the operation-panel screen to rotate the workpiece to the cutting-start location.

❷



Select [Set the A origin here].
Click [Set].
The start location in the A origin has now been set.

3-4 The Cutting Area

Important Points About the Cutting Area

The range that can actually be cut is limited by the following factors, which make it narrower than the loadable workpiece size.

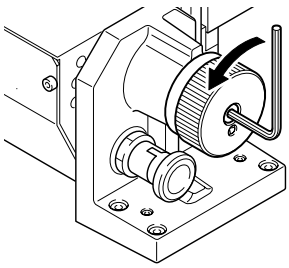
- ➢ Amount of tool extension
- ➢ Interference between the rotary axis unit and the tool or spindle
- ➢ Interference between the loaded workpiece and the tool or spindle

The maximum cutting depth along the Z axis ordinarily does not exceed the amount of tool extension.

3-5 Changing the Angle of Cutting

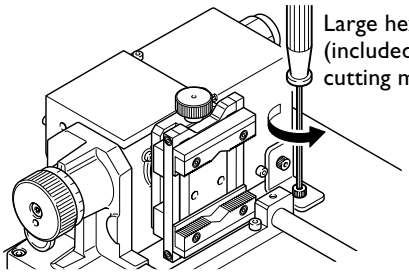
❶ If the cutter installed, detach it.

❷



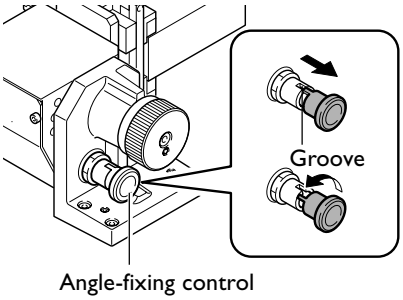
Loosen the screws shown in the figure.

❸



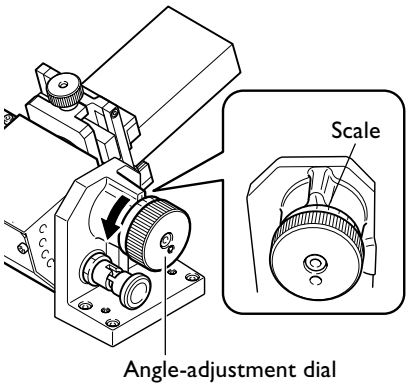
Detach the screw shown in the figure.

❹



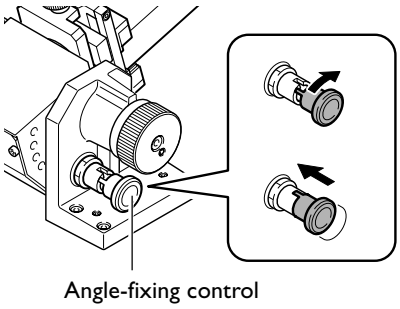
Pull the angle-fixing control.
Turn to a position not lined up with the groove.

❺



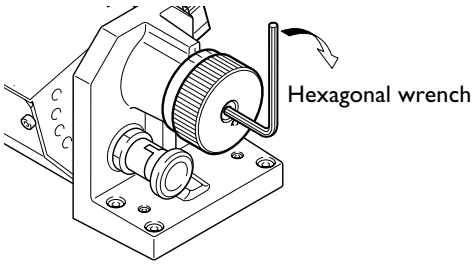
Turn to align with the scale on the angle-adjustment dial.
Each tick of the scale corresponds to 15 degrees of tilt.

❻



Press the angle-fixing control.
When it clicks into place, the rotary axis is secured in position.

❼



Tighten the screws shown in the figure.

Chapter 4
Appendix

4-1 Maintenance

Daily Care

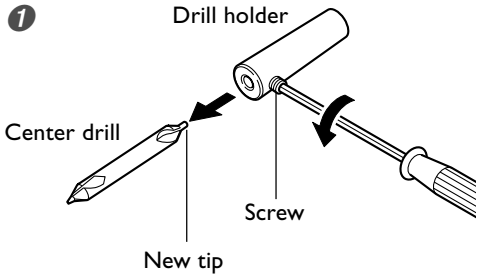
➢ This machine is a precision device, and is sensitive to dust and dirt. Perform cleaning on a daily basis.
➢ Never use a solvent such as thinner or benzine.
➢ Clean cuttings carefully.
➢ To clean the cover, use a dry cloth to wipe it.
➢ Never attempt to oil or lubricate the machine.

Replacing the Center Drill

If the tip of the center drill becomes worn, change the orientation of the tip.

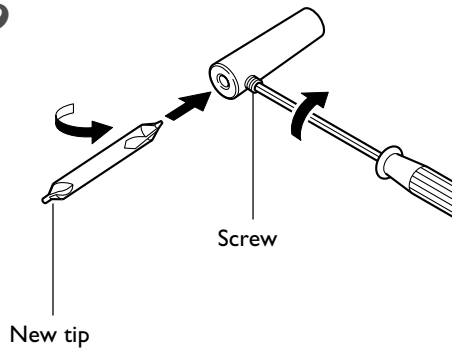
Replacement

❶



Loosen the screw for the drill holder and take out the center drill.

❷



Reverse the orientation, reinsert, then tighten the screw securely.
Insert fully, until the inserted end touches the bottom of the drill holder.

4-2 What to Do If

The machine doesn't run.

Is the rotary axis unit cable connected?
Connect the rotary axis unit cable securely.

The cutting results are not attractive.

Has correction of the origin point for the rotary axis been performed?
If the origin point for the rotary axis unit is displaced, the cutting results may show seams or differences in level, or the shape may be irregular. Also, overall thickness may be uneven, or uncut areas may remain. If this happens, then redo the setting for the rotary-axis origin point.

☞ P.15 "Setting the Y-axis Origin Point for the Center of Rotation"

What to Do If an Error Message Appears

[A-axis limit-switch error. Please switch off machine power.]

An error occurred during initialization of the machine.
This message may appear if head movement is obstructed during initialization at startup. Switch the power off, then back on.

Redo the setting the Y origin point at the center of rotation

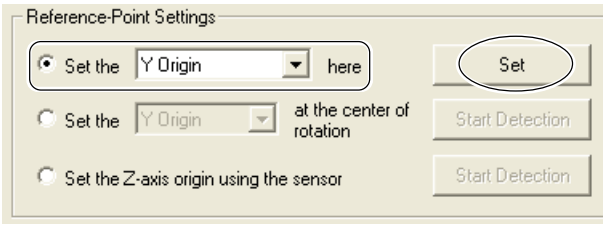
When the Y-axis origin point is not aligned with the center of rotation, use the method below to redo the setting.

Setting the Y-axis origin at the center of the rotary axis.

1. Close the front cover.
Press the VIEW button to make the VIEW light go out.

2. Use the operation panel screen to select [To Y Center].
Click [Move].
The spindle moves to the center of the rotary axis.

3. Select [Set the Y origin here].
Click [Set].



4-3 Specifications

Main Unit Specifications

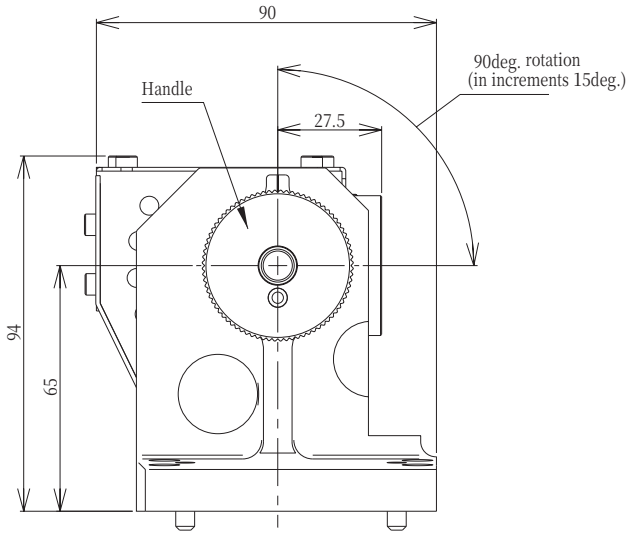
	ZCL-40
Maximum angle of rotation	$\pm 18 \times 10^{5}$° (± 5000 rotations)
Loadable workpiece size*	Items within the range of a 42.5 mm (1-11/16 in.) radius from the center of the rotary axis by long 135 mm (5-3/8 in.)
Workpiece thickness holdable by workpiece chuck	12 to 40 mm (1/2 to 1-5/8 in.)
Loadable workpiece weight	0.5 Kg (1.1 lb) (Maximum workpiece moment of inertia 6×10^{-4} kgm^2)
Control methods	4-axis control (3-axis simultaneous control)
Feed rate	0.02 to 11.79 rpm
Mechanical resolution	0.0225 deg.
Rotary-axis tilt angle	0 deg. to 90 deg. (in increments of 15 deg.)
Dimensions	357 (W) x 305 (D) x 129 (H) mm (14-1/16 (W) x 12 (D) x 5-1/8 (H) in.)
Weight	6.2 Kg (13.7 lb)
Packed dimensions	490 (W) x 440 (D) x 260 (H) mm (19-3/8 (W) x 17-3/8 (D) x 10-1/4 (H) in.)
Packed weight	9 Kg (20 lb)
Accessories	Y-origin sensors (large and small), Z-origin sensor, Y-origin detection pin (ø 6 mm), center drill, live center, hexagonal wrench, cap screws (for securing Z-origin sensor), user's manual

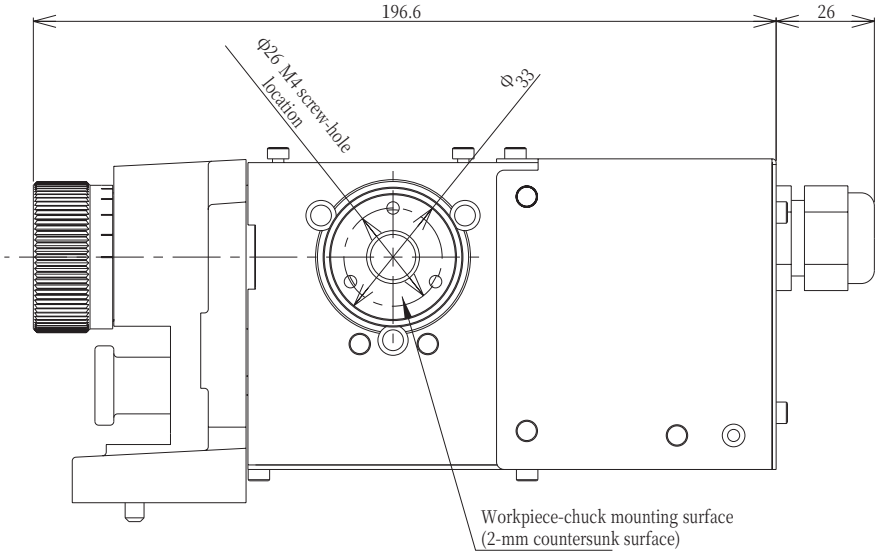
The operation strokes of the MDX-40 when installed with ZCL-40 rotary axis unit is as follows.
189.5 (X) x 305 (Y) x 60 (Z) mm
(7-1/2 (X) x 12 (Y) x 2-3/8 (Z) in.)

*The range that can actually be cut is limited by the following factors.
• Amount of tool extension
• Interference between the rotary axis unit and the tool or spindle
• Interference between the loaded workpiece and the tool or spindle

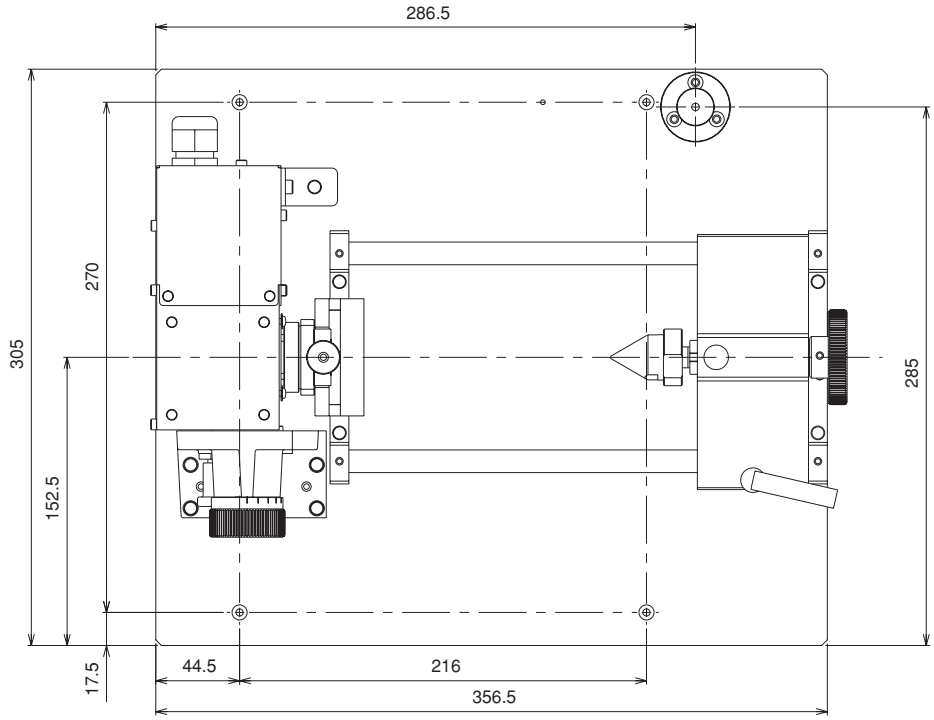
Rotary Axis Unit Schematic

Unit : mm

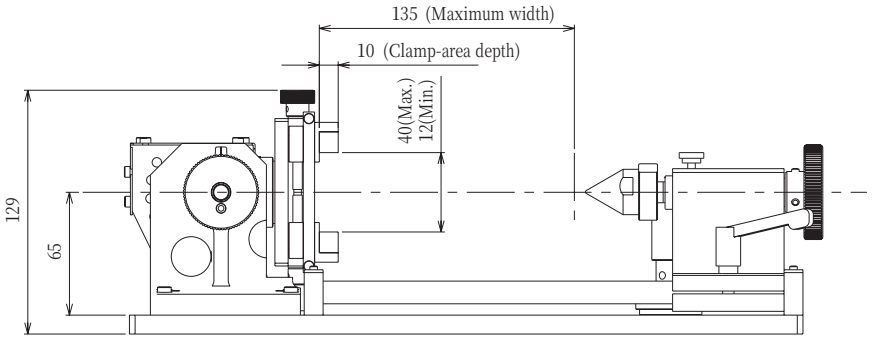




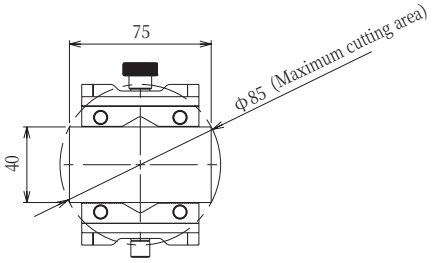
Rotary Axis Unit Schematic (Top View)



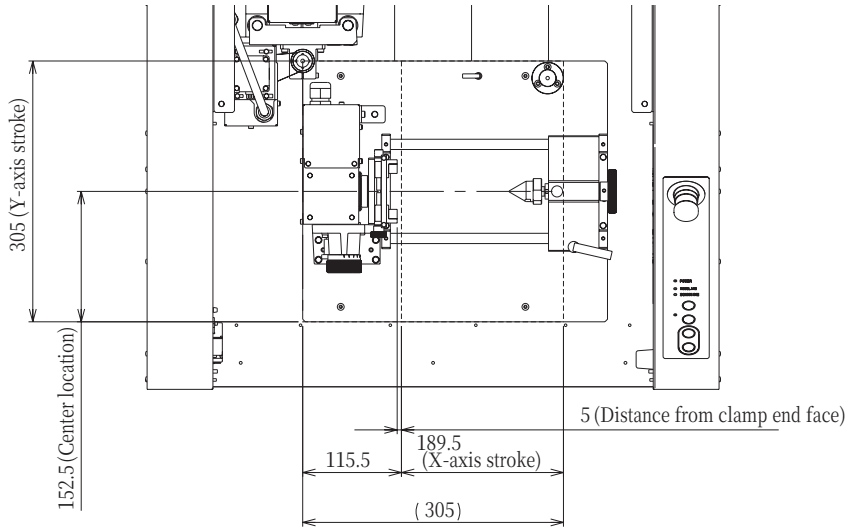
Rotary Axis Unit Schematic (Front View)



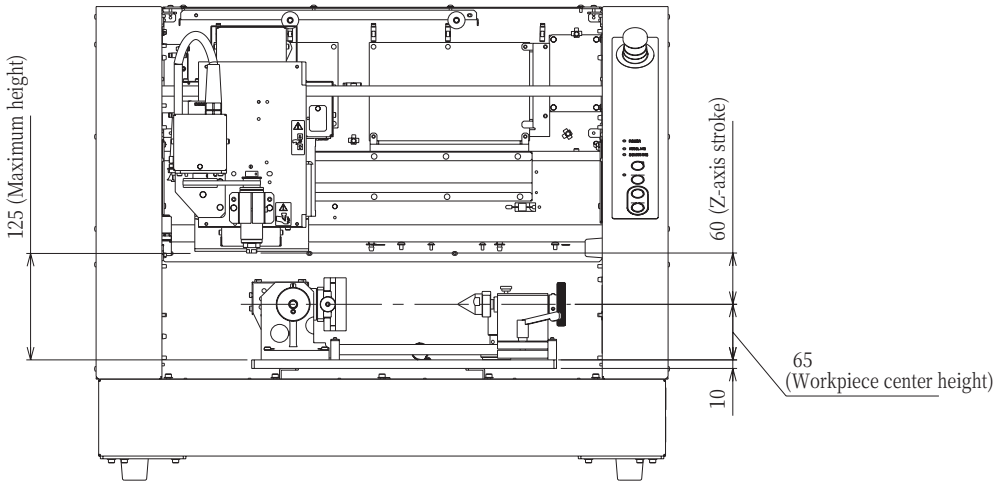
Clamp area



Installed on the MDX-40 (Top View)



Installed on the MDX-40 (Front View)



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