

# *Nidec*

## NVS-07

### Pugmill/Mixer Instruction Manual



Please make sure to read the entire instruction manual thoroughly before initial set-up, operation, maintenance and inspection to ensure proper use.

Please keep this instruction manual in a location that is available to the user.

**NIDEC-SHIMPO CORPORATION**

# Unit description/Function description

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## Unit description

The NVS-07, deairing pugmill / mixer, is designed to mix and pug clay to make it suitable for use.

## Function description

- Both wet and dry clay components can be mixed and pugged in this unit.
- The auger screw speed can be adjusted to accommodate various consistencies of clay.  
Also, mixing/pugging and extruding can be performed by changing the direction of the auger screw.
- The main barrel of this pugmill/ mixer is stainless steel and is resistant to corrosion. Porcelain clay can be used in this unit.
- The vacuum pump is used to de-air the clay while mixing and pugging.
- A safety limit switch sensor shuts off the pugmill when the hopper cover is open.
- Both the nozzle and the auger screw are removeable for easy cleaning.

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# Safety Precautions

Be sure to observe

Before installing, operating or servicing this unit, please read the instruction manual carefully and follow it for proper use. Start using only after you have read about the equipment's functions, safety information and precautions.

This instruction manual provides two grades of safety warnings: "Warning" and "Caution". Each of them is an important description related to safety. Be sure to follow them.



This indicates the possibility of severe injury or even death, and fire if a user disregards the instruction and operates the unit improperly.



This indicates the possibility of injury or damage if a user operates the unit improperly. However, depending on the circumstances, there is still the possibility that severe injury may result.

**We categorize the type of those precautions using the following symbols throughout the manual.**



**A prohibited action you must not do.**



**A reminder to pay close attention.**



**An action you must always do.**

## **Warning**

### Malfunctions

 **In the event of any malfunction, stop using the unit immediately.**

When a malfunction occurs, unplug the power cord. Failure to follow this could result in fire and/or injury due to electric shock and/or leakage.

- Smoke and/or abnormal smell/sound is detected.
- The unit has become deformed and/or parts are damaged.
- The auger screw continues to run even when the hopper cover is opened.

### Installation

 **Install the unit on a level surface.**

Installing the unit on an uneven or sloped surface could cause the unit to fall, which may result in injury.

 **Avoid installing the unit in places exposed to rain, standing water and/or high humidity.**

Insulation failure could result in fire and/or injury due to electric shock and/or leakage.

### Power Cord and Plug

 **Do not use the unit if the power cord or plug is damaged.**

If the power cord or plug is damaged, or does not fit securely in the outlet, do not use the unit. Failure to follow this could result in fire due to electric shock and/or short circuit.

\* If the power cord is damaged, please contact your dealer or our office.

 **Do not overload the electric circuit.**

If you share the outlet with other electric units, an overload could result in fire.

 **Do not use the unit a voltage other than AC 115V.**

Doing so could result in electric shock and/or fire.

 **Do not take any actions that could result in damage to the power cord.**

Do not pull, break, fabricate, and/or forcibly bend the power cord. Do not move it close to any heating source, or place heavy materials on it. Failure to follow this could result in electric shock and/or fire.

## **Warning**

### **Power cord and plug**

 **Periodically remove dust on the power cord.**

Accumulated dust could result in insulation failure due to moisture, which could result in fire.

 **Ground the unit.**

Be sure to ground the unit to avoid electric shock.

 **Do not touch switches and plugs with wet hands.**

Operating switches, plugging and unplugging the power cord with wet hands could result in electric shock. If there is any clay on them, remove it.

### **Foreign materials**

 **Do not put metals and/or other flammable materials inside the unit.**

Doing so could result in electric shock and/or fire.

### **Operation**

 **Do not modify the unit. Do not use it for purposes other than pottery making.**

Do not use a modified unit. Do not use the unit for other purposes than mixing or pugging pottery clay. Failure to follow this could result in malfunction and/or accident.

 **User limitation**

In facilities where multiple people use this unit, designate a person to supervise the pugmill's use. Never allow anyone who is unfamiliar with this unit to operate it. Everyone who has access to use the pug mill should have a complete understanding of the instruction manual.

 **Do not put hands into the clay extruding slot.**

Never put fingers or hands into the nozzle end of the pugmill. Failure to do so could cause fingers and hands to get caught, and result in injury.

## **CAUTION**

### **Installation**

 **This unit is heavy. Pay attention when handling.**

Do not attempt to unpack this unit by yourself. Have three or more people help unpack and/or move this unit. Excess strain could cause injury. This unit is heavy, dropping it could result in injury.

### **Operation**

 **Pay attention to loose fitting clothing, accessories, and/or long hair.**

Before operating this unit, be sure to remove or secure dangling items such as loose clothing, jewelry, scarves, etc. Long hair should be tied in back as well. Failure to do so may result in getting caught in moving parts during operation.

 **Be careful when handling the hopper cover.**

Be careful not to get fingers, hands and/or arms caught in the hopper cover. Securely hold the handle, and slowly open/close the cover. Do not remove your hand from the handle while opening/closing.

 **When the unit is not being used, open up the vacuum pressure relief valve.**

When the unit is not in use or when the vacuum is not needed during the mixing process, be sure to open the pressure relief valve. If any gases are generated during the processes of mixing and pugging, pressure can build up inside the hopper.

### **Power cord and plug**

 **Do not obstruct access to the power cord or plug.**

Failure to follow this could prevent you from easily unplugging the power cord or plug in an emergency.

 **When the unit is not being used, turn the power OFF.**

When the unit is not being used for an extended period of time, or there is a possibility of lighting, turn OFF the power as well as unplugging the unit from the outlet.

### **Maintenance**

 **Turn the power OFF and unplug the unit before inspection or other relevant circumstances.**

Before cleaning, inspecting, adjusting or other replacement procedures, turn OFF the power as well as unplug the unit from the outlet.

 **Never pour water direct on the unit to clean.**

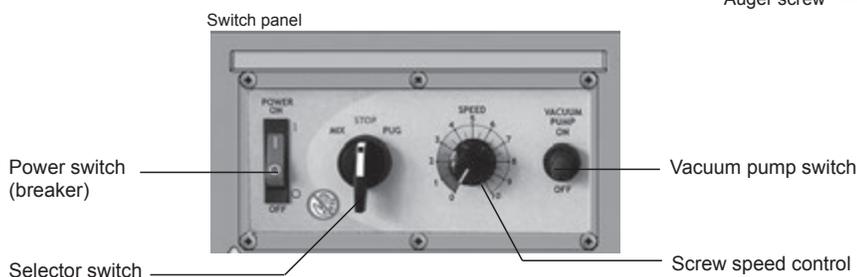
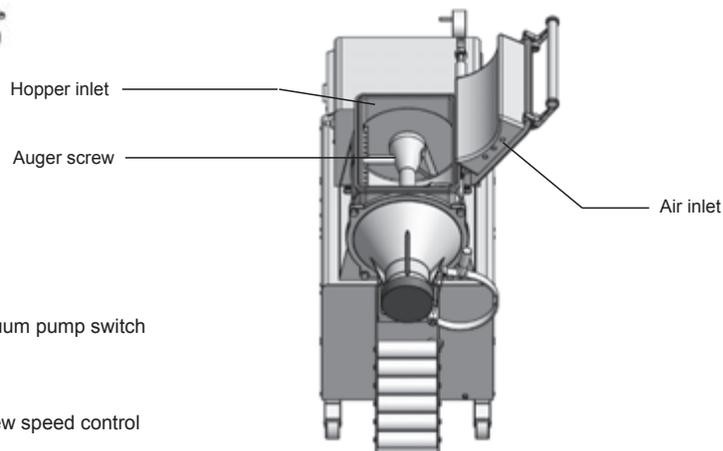
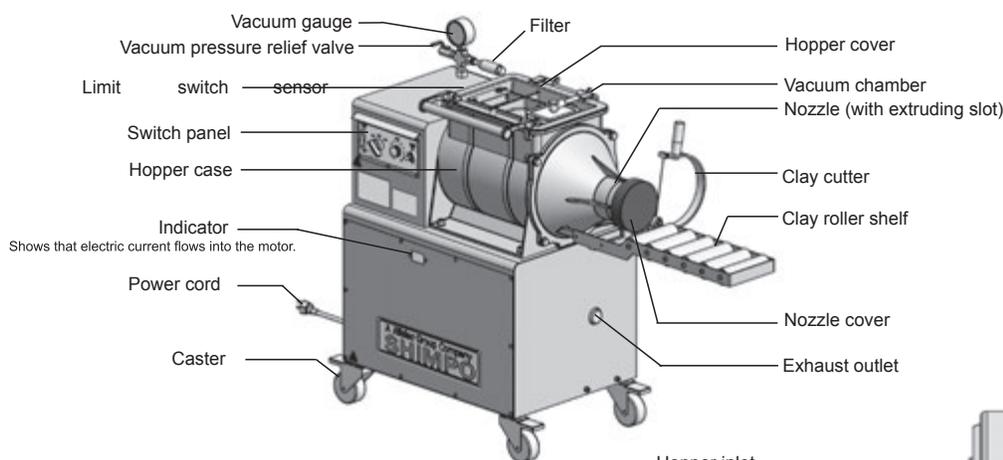
Never pour water directly on the pugmill to clean it. Doing so could result in electric leakage and/or malfunction. To clean, wipe off the unit with a damp sponge, towel, etc.

\* Only the auger screw and nozzle can be cleaned directly with water after being fully disassembled.

# Specification

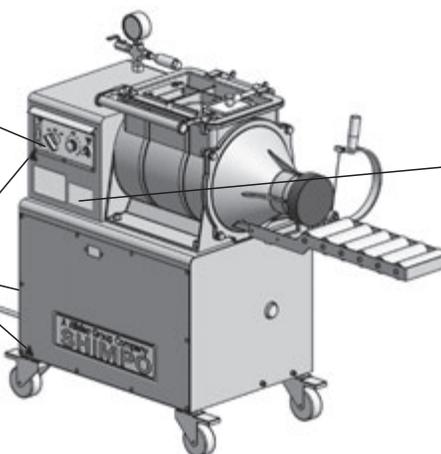
Model	NVS-07
Power	AC115V, 60Hz
Motor capacity	750 W
Vacuum pump	250 W
Ambient temperature	+50 °F to 104 °F
Ambient humidity	85% or less (no condensation)
Altitude	3280 ft or less
External dimensions	48 in (including the supporting plate) x 17 in x 35 in
Weight	309 lbs
Diameter of the extruding slot	Φ3.5 in
Supply of clay	approx. 45 lbs
Extruding capacity	720 lbs/hr (pugging only)

# Parts List



 Do not touch with wet hand.  
 Cause electric shock and breakdown.

 **ELECTRIC HAZARD**  
 Disconnect power before servicing.



    
**CAUTION**  
 Keep your hands out of the mill at all times unless cord is unplugged

## Items included

Item	Quantity	Remarks
Main unit	1	
Supporting plate	1	
Front cover	1	
Double-end wrench	2	17 x 13; used to tighten or loosen the nozzle and screws
Allen wrench	1	M2.5; used to replace stainless steel wire for clay cutter
Instruction manual	1	
Warranty card	1	

## Installation and preparation

- Since the NVS-07 is very heavy, exercise sufficient care when unpacking so the unit does not drop.

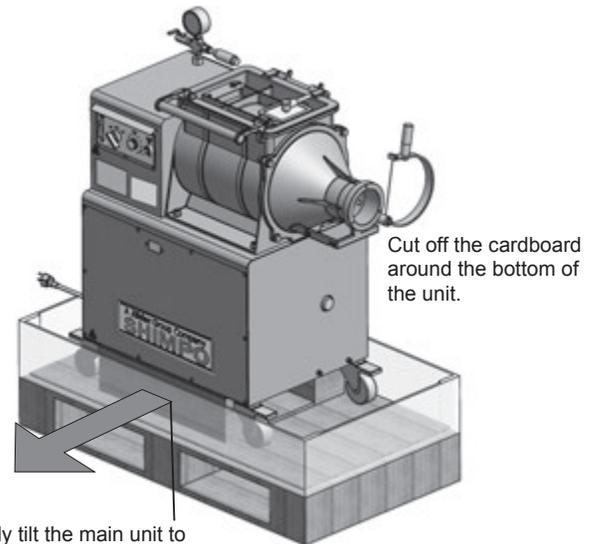


### Danger

The unit weight is approximately 309 lbs.  
Have three or more people unpack this unit.

### (Unpacking procedure)

- Remove the cardboards and cushioning materials around the unit.
  - Cut off the cardboard around the bottom of the unit.
  - Slightly tilt the unit to remove two bases that support the unit.
  - Unlock all four wheels.
  - Slowly push the unit forward while holding it securely. Then unload it from the pallet.
- The toolbox contains the clay roller shelf, tools, instruction manual, and warranty card.

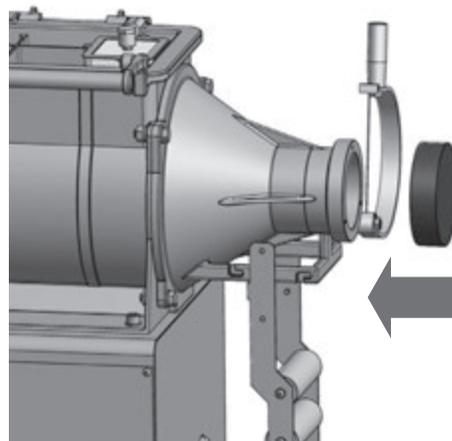


Slightly tilt the main unit to remove the base (also the opposite one).

Slowly unload the unit from the pallet.

### (Installation)

- Install the unit. In a flat location for rattle-free operation and lock the casters.
- Place the clay roller shelf in the groove and support below the nozzle.
- Fit the front cover to the nozzle

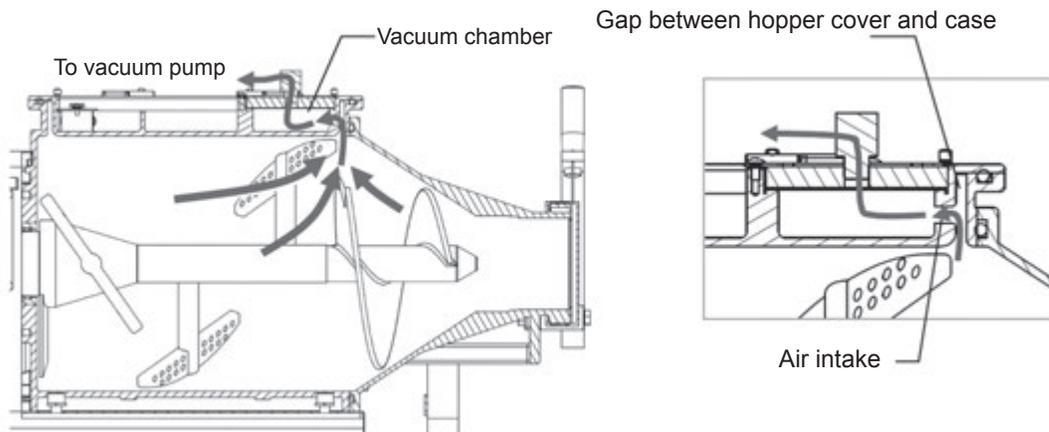


## Before use

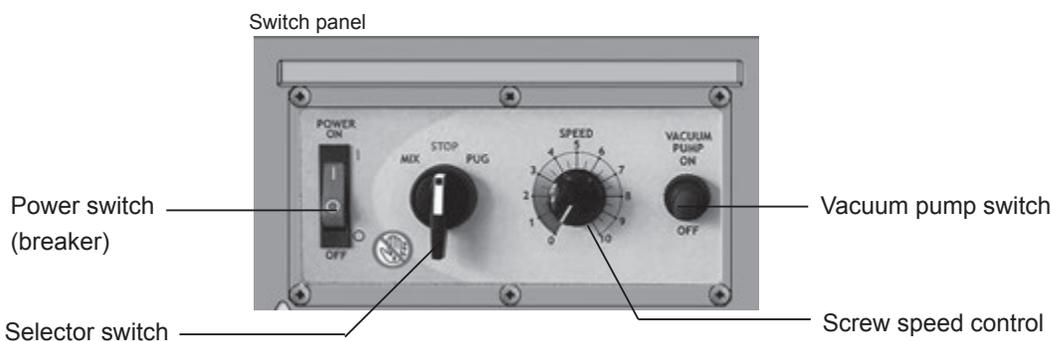
Mixing conditions vary depending on the type of clay, its hardness as well as the amount of water added. To recycle clay properly, familiarize yourself with this unit's operations. Carefully read the instruction manual before use.

## Principle for recycling of clay

Mixing conditions vary depending on the type of clay, its hardness as well as the amount of water added. To recycle clay properly, familiarize yourself with this unit's operations. Carefully read the instruction manual before use.



## Operation



Function of each switch	
Power switch (breaker)	Turns the power ON/OFF. Automatically turns OFF in the event of an electrical overload or the like.
Selector switch	MIX   Mixes clay with water.
	STOP   Stops the auger screw; resets any current error
	PUG   Extrudes clay
Screw speed control	Controls the screw speed.
Vacuum pump switch	Turns ON/OFF the vacuum pump. (When the case is vacuum inside, the vacuum pump may be inoperable. To turn OFF the vacuum pump after the vacuum operation and then turn it ON again, open the vacuum stopcock to achieve normal pressure and then turn ON the vacuum pump.

Unplug the power cord from the outlet in an emergency. The power cord also works as a breaker.

\* Install the unit properly so you can access the power cord immediately in an emergency.

\* Always start with the selector switch in the STOP position when turning ON the unit. The auger screw will not turn if the selector switch is set at MIX or PUG. If it is in either position, set the selector back to STOP, then set to either MIX or PUG.

\* If the unit shuts down due to overload or the indicator is showing an error (e.g., OL1), set the selector switch to STOP. This will reset the error, allowing you to restart the operation.

# Preparation for use



**Warning** Do not operate any switches with wet hands.

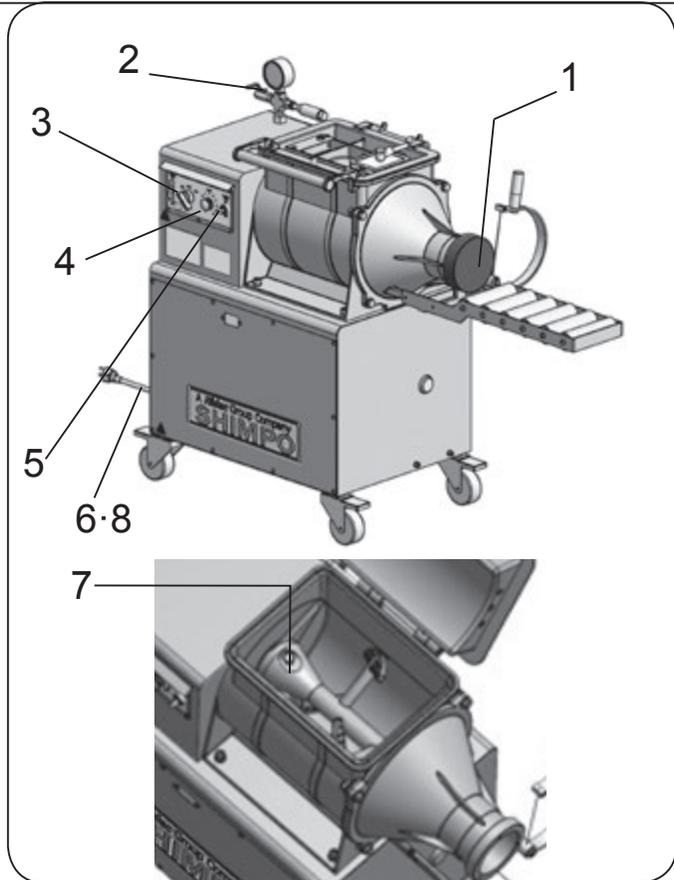
1. Close the hopper cover.
2. Open the pressure relief valve.
3. Check that the power switch is OFF.
4. Check that the selector switch is set to STOP.
5. Check that the vacuum pump switch is OFF.
6. Check that the power cord is unplugged.
7. Check that the auger screw fixing bolts are securely tightened.

\* Be sure to check each time before use. If the screw becomes detached, the unit could become damaged.

Possible unintended issues while operating:

- If the power cord and the limit switch sensor are damaged, there is the potential danger of electric shock and/or short circuit.
- The limit switch sensor and its cord are damaged, as such, “the screw does not rotating” or “the auger screw does not rotate”, regardless of opening/closing the door.
- If the internal circuits are damaged, “the direction of rotation could not be switched” or “the rotating speed could not be adjusted”.

If these issues arise while operating, stop using the unit and contact your dealer or our office.



# Operation procedure

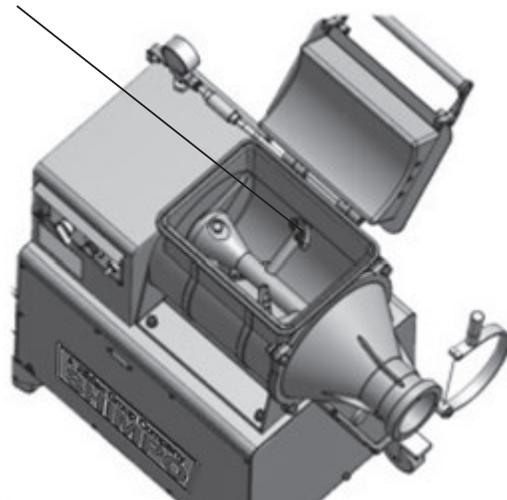
## 1. Supply clay.

- About 45 lbs of clay can be mixed at one time. If the amount is too small, it will take longer for the clay to be recycled or the clay will not extrude. It is necessary to fill the barrel to the appropriate level.
- If the clay is in large clumps, break them down to an appropriate size first. Very wet clay cannot be recycled by itself. To recycle really wet clay, either dry it out some, first then recycle it or add dry clay to the mixture.

## 2. Feed clay.

- Do not add too much clay into the hopper at once, otherwise the hopper cover may not shut. Add enough clay to see the top of the auger screw.
- While mixing, more room may be created as the mixture compacts, After a short mixing time, add additional clay to fill back up to the top of the auger screw.

Feed clay to a level that allows you to view the top of the screw.



Make it smaller than your fist.

## Operation procedure

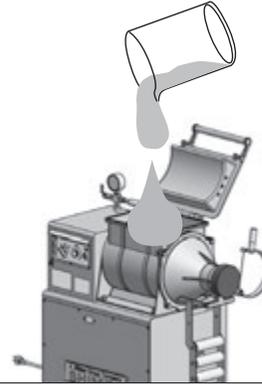
### 3. Add water.

- Add an appropriate amount of water.
- If the amount of water is not enough, an overload may occur, causing the auger screw to stop. If the amount of water is too much, the clay will become too soft, preventing the clay from being mixed and extruded. If you do not know how much water to add, add water in gradually while keeping note.

#### Note)

Do not operate the vacuum pump until the clay has the proper amount of water. Powdered components may clog the vacuum chamber if the vacuum is turned on too soon.

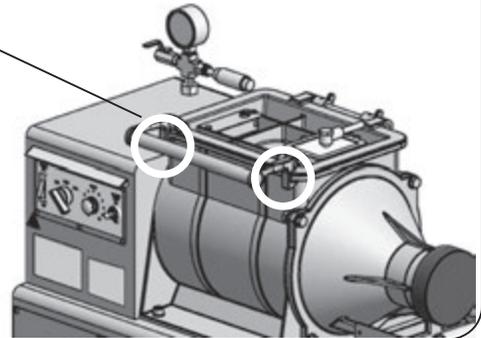
Add an appropriate amount of water.



### 4. Close the hopper cover.

- Close the hopper cover. If there clay on either rim surface of the case or hopper cover, wipe it off. Both surfaces must be clean to create a good seal. Push down on the handle so the hopper cover can properly lock into the case.

Push down on the handle so the hopper cover can properly lock into the case.



### 5. Mixing process

Turn ON the power switch and set the selector switch to MIX. Slowly turn the screw speed control to select 6 to 8.

- If there is not enough clay in the hopper, stop the auger screw and add more clay and water. To stop the auger, return the speed control to 0, set the selector to STOP, then turn OFF the power switch.
- Continue mixing for a while. If the electric current of the motor exceeds 3.0 A, add water.

#### Note)

Do not set the speed control between 0 to 3.5. If the auger screw is turns at too low a speed, too much current will flow to the motor, triggering the auger screw to stop.

#### Note)

The hopper cover has a limit switch sensor that detects when the cover is open or closed. If too much vibration is generated due to too large of clay chunks, the limit switch sensor may be triggered, causing the screw to stop. If the limit switch sensor gets trigger too frequently, the motor may shut down due to overload.



#### Warning

Do not access any switch with wet hand.



- ① Turn ON the power switch
- ② Set the selector switch to MIX
- ③ screw speed control to select 6 to 8.

#### Note)

The auger screw automatically stops after 2 hours of continuous running, to prevent the mixed clay from generating too much heat. When the auger screw is stopped by the timer, "END" will appear in the indicator box. Should this occur, return the selector switch back to "STOP" to restart the operation.

# Operation procedure

## 6. Checking the mixed state

- Carry out mixing for a while and when the electric current value of the motor becomes stable, check the state of clay. If the clay is too hard, added water; if it is too soft, add hard clay.

Note)

Clay becomes harder as it is de-aired.  
Therefore, the mixed clay should be softer than what is desired for use.

## 7. Vacuuming (de-airing) process

- When the clay reaches the appropriate consistency, remove any clay that might be clogging the air inlet. If clay covers the air inlets, the readings on the vacuum gauge will increase, but the inside of the may not be de-aired.
- Make sure the nozzle cover is clean, then place it over the nozzle.
- Close the vacuum's pressure relief valve, then turn ON the vacuum pump. The reading on the vacuum gauge will gradually increase. The gauge should reach a minimum of 0.09 Mpa.
- Set the selector switch to MIX. Slowly set the speed control to 6 to 8.

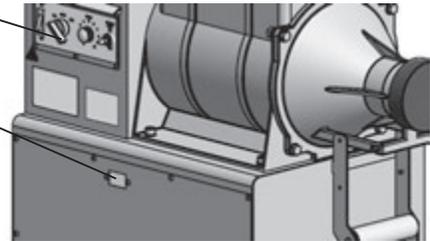
Note)

If the vacuum pressure suddenly increases, the gap between the door, near the air inlet, and the case might be clogged with clay. Remove the clay in that gap. If this does not fix the issue, there might be too much clay being mixed. Decrease the amount of clay.

- Mix clay with water and then continue the operation of the vacuum pump and the screw for about three minutes.

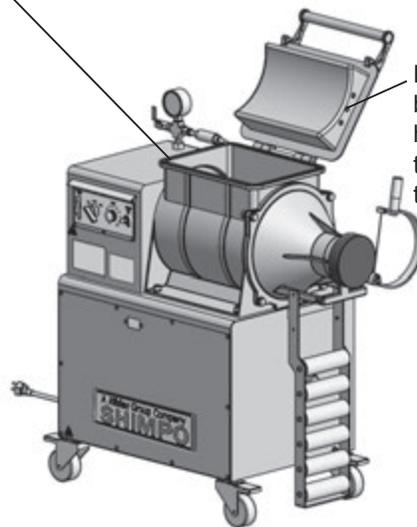
Set the selector switch to STOP

Confirm the electric current value showed in the indicator

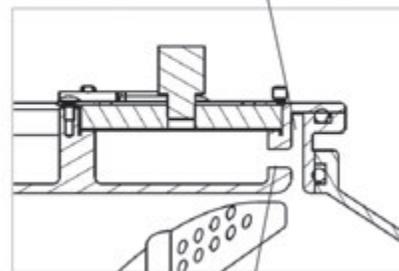


Clean both surfaces of the hopper cover and the case (including the gasket).

Remove clay between the hopper cover and the case and from the air inlet.



Gap between hopper cover and case



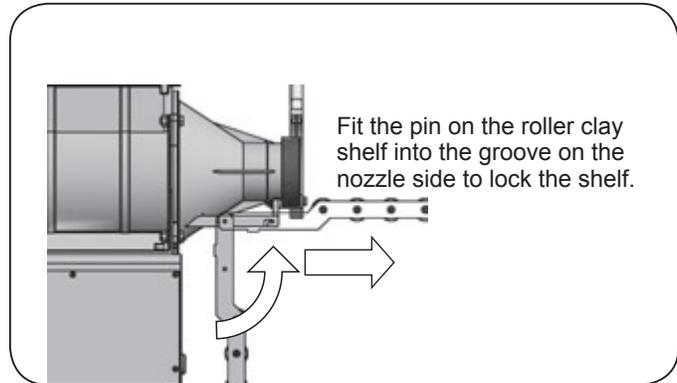
Air inlet

If the gap between the hopper cover, near the air inlet, and the case are clogged with clay, do de-airing will occur.

## Operation procedure

### 8. Extruding process

- Install the roller clay shelf.
- After about three minutes of mixing with the vacuum, change the selector switch from MIX to PUG. Continue to de-air during this time.
- When clay comes out of the nozzle, remove the front cover.
- Cut the clay into appropriate length.



### 9. When Pugging is complete

- When no more clay comes out of the nozzle, open the pressure relief valve and stop the auger screw.
- In order to dry the inside of the vacuum pump, continue to operate the vacuum pump for about one minute.

Note)

If the vacuum pump is left with its inside wet, it may malfunction over time.

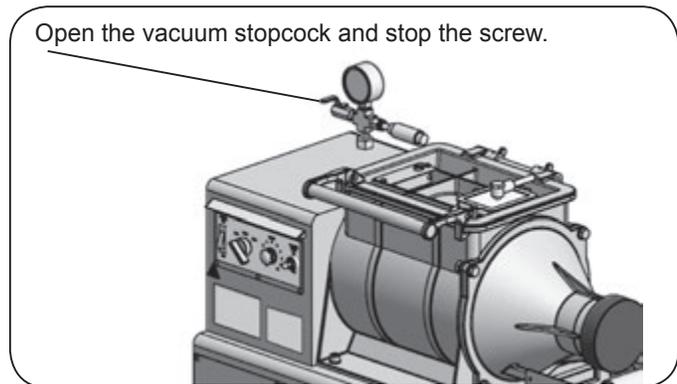
- After the vacuum pump has operated without clay, stop it, turn OFF the power switch, and then disconnect the power plug.
- Securely fit the nozzle cover so the clay inside will not dry out.
- If you do not plan on using the unit for an extended period of time, clean out the unit before letting it sit.

Note)

If the clay in the nozzle becomes hard, no clay will be extruded when the NVS-07 is used.

Note)

To close the roller clay shelf, slowly do so without releasing your hands until the shelf becomes vertical.



## ● Tips for successfully recycling clay ●

1. Immediately after water has been added, the screw and clay stick to each other, causing the screw to idle away. However, as mixing is continued in the idling state, the clay will be homogeneously mixed with water.
2. If not enough clay is added, it will take a longer time to mix and extrude the clay successfully.
3. If too much clay is added, the gap near the air inlet may get clogged with clay, preventing de-airing. If this occurs remove some of the clay to reach the desired amount.
4. If the clay is too hard after de-airing, begin de-airing when the clay is softer.

## Display and description of indicators

- Display of indicator

Display	Description	Remarks
0.00A	Shows the electric current output to the motor. It is different from the consumption current of the NVS-07.	See the following table for electric current values vs. clay states.
OL1	Overload error: Displayed when the clay is hard or there is too much clay in the hopper.	Add water or decrease clay and then restart the NVS-07. The displayed error can be reset by pressing the selector switch once.
Er6	Start check error:Displayed when the selector switch is set to MIX or PUG.	Temporarily change the selector switch to STOP and then set it again to MIX or PUG.
LU	This will start the operation. Displayed if the power supply voltage is insufficient or if the power is turned OFF and then immediately turned ON again.	After all the display of the indicator has disappeared, turn ON the power.

- Electric current values vs. clay states

Electric current value	Clay state
2.0 A or less	Clay sticks to the screw, which is therefore idling away.
2.0 - 2.3 A	Clay is slightly soft.
2.3 - 3.0 A	Clay is appropriately hard.
3.0 - 3.2 A	Clay is slightly hard.
3.2 A or more	The screw is overloaded;it stops during continuous operation.

## Troubleshooting

Symptom	Cause	Remedial action
No clay is extruded.	There is not enough clay.	Add clay until the case is filled with that clay.
	The clay in the case is too soft.	Since the clay is soft, add slightly hard clay.
	The clay in the nozzle is hard.	Remove the clay in the nozzle.
Rough-surfaced clay comes out of the extruding slot.	Dry clay is stuck inside the nozzle.	Clean the inside of the nozzle.
Clay is extruded as it rotates. The extruded clay has holes.	Clay is soft.	Add slightly hard clay.
The screw stops.The circuit breaker trips.	Clay is hard during mixing.	Add water to make the clay softer.
	A large clay lump is caught between the screw and the case.	Remove the clay lump.
	There is too much clay.	Remove some clay
The clay in the nozzle becomes hard.	The clay in the nozzle is dried.	Clean the nozzle by removing it.
The vacuum pressure is low.The degree of vacuum does not increase.	The gap between the hopper cover and the case becomes larger.	Use wet cloth or the like to clean the mating surfaces of the case and the hopper cover.
	The filter is clogged.	Clean the filter.
Clay is not de-aired.	The air inlet is clogged with clay.	Before de-airing, clean the air inlet and its peripheral area. If the air inlet is still clogged with clay during mixing, there is too much clay. Remove some clay.
	De-airing time was too short.	Extend the mixing time in vacuum.
Clay comes up to the vacuum chamber.	There is too much clay.	Remove the vacuum chamber cover (acrylic plate) and remove clay.
The vacuum pump is not operating properly.	The hopper case is already vacuumed, preventing the pump valve from being actuated.	The vacuum pump may stop working when the hopper case is already vacuumed. Open the pressure relief valve to pressurize the hopper then start the operating the vacuum.
The hopper cover will not open even if the pressure relief valve is opened.	The air inlet is clogged with clay, keeping the hopper case vacuumed.	Insert a thin rod or the like from the nozzle end to allow air to flow into the hopper case.

# Maintenance

## Disassembling

1. Set the selector switch to MIX and rotate the auger screw until the check bolt is positioned at the top.
2. Unplug the power cord from the electric outlet.
3. Remove the roller clay shelf.
4. Remove the nozzle and clean its insides thoroughly. Since the nozzle is heavy, handle it with care.
5. Remove the auger screw.
  - Loosen the check bolt on the auger screw and pull it out.
  - Clean the auger screw thoroughly. Carefully clean the motor shaft mounting holes in the auger screw. Remove any clay on the motor shaft with a wet cloth or sponge.
6. Clean the inside of the hopper case thoroughly. Do not clean the inside of the hopper by flushing it with water. This may cause electric devices to get water on them.

## Reassembling

1. Clean the motor shaft and the auger screw mounting holes. If any clay remains, the auger screw should not be installed; damage may occur, preventing future assembly and disassembly.
2. Install the auger screw on the motor shaft and securely tighten the auger screw mounting bolts.
3. Carefully clean the nozzle mounting surface of the hopper case as well as the O-ring mounting surface of the nozzle.
4. Attach the O-ring to the nozzle and mount the nozzle back on to the hopper case.

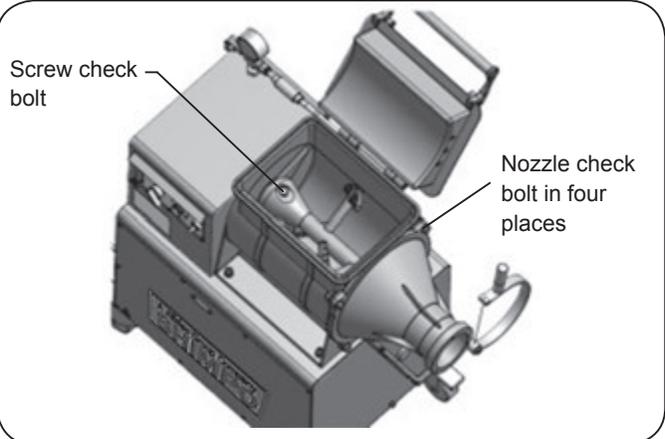
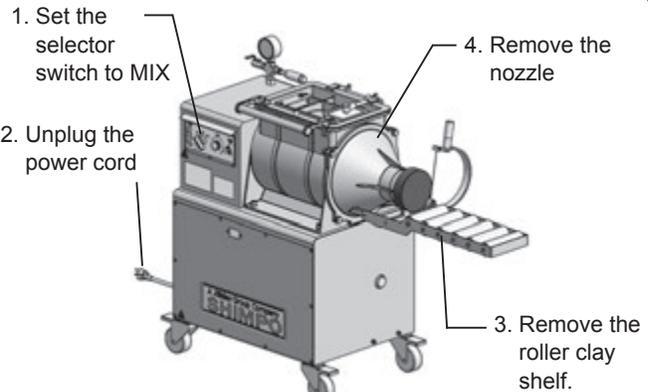
## Test operation

1. Plug the power cord into the electric outlet. Start test operation without adding clay.
2. Close the hopper cover.
3. Turn ON the power switch.
4. Set the selector switch to MIX and listen for rotating sound of the auger screw.
5. Make sure that there is no vibration, rattling, and abnormal noise in the main unit.
6. Check that the auger screw stops when the hopper cover is opened.



### Caution

Be sure to unplug the power cord before starting work. Do not access the power plug with wet hand.



## Replacing the filter

If the filter is clogged, preventing the hopper case from vacuuming properly, replace the filter.

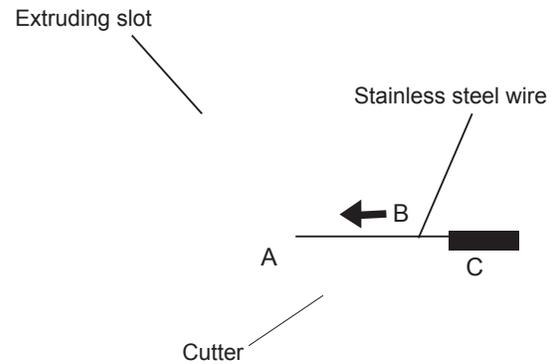
## Maintenance

Replacing the stainless steel wire (to cut clay)

If the stainless steel wire is broken, replace it as follows:

- ① Remove the broken stainless steel wire.
- ② Secure the wire to point A.
- ③ Slightly bend the cutter in direction B and then secure the wire to point C.

- Purchase a commercially available stainless steel welding rod  $\Phi 0.045$  gauge.



## Disposal method

- Contact your local government as the disposal method differs depending on local governments.
- Do not disassemble the NVS-07 when disposing of it.



**MANUFACTURED BY**  
**NIDEC-SHIMPO CORPORATION**  
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