

Primado2

Primado2

Total Surgical System



This product is a surgical system used for bone operations (removal, cutting, perforation and formation), or cutting implants. Prior to using this system, read the Operation Manual thoroughly in order to understand the instructions and directions for use, how to handle the equipment and reprocessing matters, so that you can use this system properly for many years to come. Keep this Operation Manual within easy reach.

In this operation manual, Bur, Drill, Blade and Disk are collectively called Cutting Accessory(ies).

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Precautions for handling and operation

- Read these precautions carefully and use only as intended or instructed.
- Safety instructions are intended to avoid potential hazards that could result in personal injury or damage to the device. Safety instructions are classified as follows in accordance with the seriousness of the risk.

Class	Degree of Risk
 DANGER	Hazard that could result in personal death or serious injury if the safety instructions are not correctly followed.
 WARNING	Hazard that could result in serious injury or damage to the device if the safety instructions are not correctly followed.
 CAUTION	Hazard that could result in light or moderate injury or damage to the device if the safety instructions are not correctly followed.
NOTICE	General product specification information highlighted to avoid product malfunction and performance reduction.

Before use, read carefully the Operation Manual of the Motor and the Attachments/Handpieces.

Intended Use

The Primado 2 is an AC-electrically powered total surgical system that is intended for cutting, drilling, sawing, and otherwise manipulating soft tissue, hard tissue, bone, bone cement, prosthesis, implant, and other bone related tissue in a variety of surgical procedures, including but not limited to Cranial(Craniofacial/Maxillofacial), ENT, Endoscopic/Arthroscopic, Neuro, Orthopedic, Spinal, and General surgical procedures.

⚠ DANGER

- Do not use this system in a room where there is danger of explosion or in the vicinity of flammable substances. It is especially important not to use this system on a patient to whom a flammable anesthetic agent (dinitrogen monoxide) has been administered.
- Should a short circuit occur inside this product, an electric shock or fire may result if the product is not connected to properly grounded electric supply.
- Never disassemble or modify the product. Personal injury, electric shock or fire may result.

⚠ WARNING

- When operating the product always consider the safety of the patient.
- This is a medical system; do not allow anybody to use it other than surgeons who are familiar with the procedures. Use this system in accordance with its intended use and proper method of use.
- This product may be affected when used in rooms with electromagnetic interference and portable or mobile RF communication equipments. Do not use this product around any equipment that generates electromagnetic waves such as an ultrasonic generator and electrical scalpel. In case equipment generating electromagnetic waves are used around this product, turn off the Control Unit.
- Do not directly spray detergent/liquid on the LCD Touch Panel of the Control Unit when cleaning the Control Unit. Breakdown of the Control Unit may be caused due to the short circuit.
- Except for the Foot Control, this system is not designed to be water-proof. Handle the Control Unit and Motor with care so that they will not be exposed to water or sterile water (saline solution). An electric shock may result due to a short circuit.

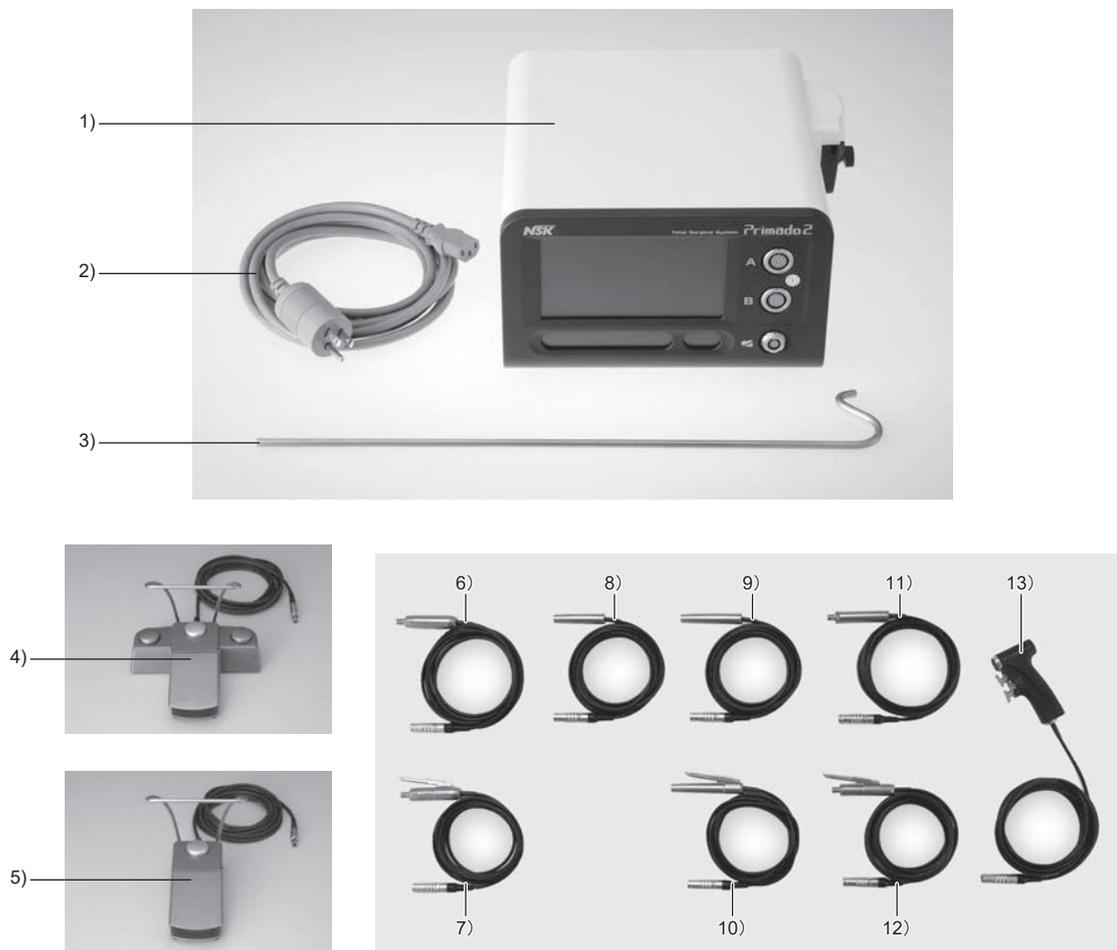
⚠ CAUTION

- U.S. Federal law restricts this device to sale by or on the order of a licensed physician.
- The applicable Attachment/Handpiece for cutting implants is Metal Cutting Handpiece 200.
- Be sure to read this manual prior to use to become completely familiar with the function of each part.
- Connect the product to an electrical outlet for medical use or a properly grounded outlet.
- The Motor and the Attachment/Handpiece (separately sold) are not sterilized before delivery. So, be sure to sterilize them prior to use.
- Operate and inspect the Attachment/Handpiece prior to use. Even if only a slightly abnormal condition is detected, immediately stop using it and contact your dealer.
- Even if only a slightly abnormal condition such as vibration, noise, or heat generation is detected during operation or prior to use, stop using it and contact your dealer.
- Do not subject this unit to strong impacts, such as dropping it on the floor. Personal injury, abnormal heating and fire may result caused by the internal damage.
- Do not bend or kink the Irrigation Tube while the Irrigation Pump is operating. Damage or disconnection of the Irrigation Tube may result.
- Turn off the power when mounting or removing the Motor and Attachment/Handpiece. Mounting or removing with the power on may cause personal injury due to an unexpected rotation.
- When the Control Unit and Foot Control are stained with blood, turn off the power and wipe the stains off using a lint-free cloth moistened with neutral detergent for medical use. Then, remove the detergent using a lint-free cloth moistened with distilled, deionized or demineralized water.
- Do not lubricate the Motor. It may result in an abnormal heating and failure.
- Do not disconnect the Motor Cord from the Motor. It may cause failure.
- Do not clean the product with solvents such as thinner or benzene solution. Discoloration or deformation may result.
- Dispose of the Irrigation Tube after use as medical waste.
- This product needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information.
- The use of accessories, Attachments/Handpieces and cords other than those specified, with the exception of accessories, Attachments/Handpieces and cords sold by the manufacturer of this product as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of this product.
- This product should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, observe this product and other equipments in order to verify a normal operation prior to use.
- Regarding the operation time of the Motor, follow specification table in step "11. Specifications". Continuous use of the Motor for a prolonged period might cause overheating, which can cause an accident.
- The temperature of the Motor and Control Unit mounting parts may reach up to 60°C depending on the environment.

NOTICE

- After use, turn OFF the Power Switch. If the unit is not being used for a prolonged period, disconnect the Power Plug from the outlet. If the unit is left plugged in and unattended for too long, the dust or deteriorated insulation might cause electric shock or fire.
- The user shall be responsible for maintenance and operation.
- Only use irrigation tubes recommended by NSK.

1 Component Names



No.	Model	Name of Component
1		Primado2 Control Unit (120V)
2	P200-CU-120	Power Cord
3		Irrigation Pole
4	FC-74	Primado2 Multi Foot Control
5	FC-73	Primado2 Single Foot Control
6	P200-HMH	Primado2 High Torque Motor
7	P200-HMH-HS	Primado2 High Torque Motor (Motor with Hand Control)
8	P200-SMH-S	Primado2 Slim Motor Short
9	P200-SMH	Primado2 Slim Motor
10	P200-SMH-HS	Primado2 Slim Motor (Motor with Hand Control)
11	P200-BMH	Primado2 Micro Bone Saw Motor
12	P200-BMH-HS	Primado2 Micro Bone Saw Motor (Motor with Hand Control)
13	P200-WPD	Primado2 Wire Pin Driver

These components are sold separately, according to the client's specific needs.

2 Part Names

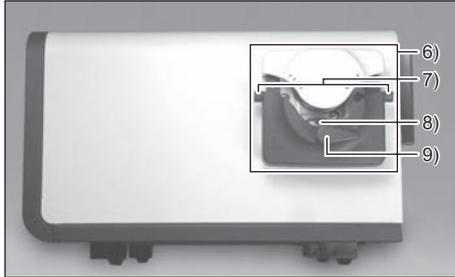
2-1 Control Unit

Front Side of the Control Unit



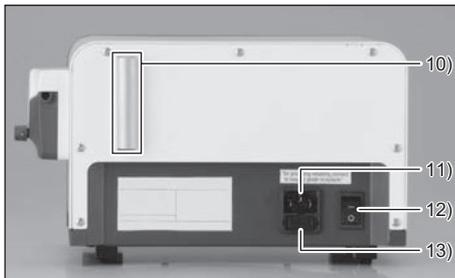
- 1) Front Panel
- 2) Motor Connector A
- 3) Motor Connector B
- 4) LCD Touch Panel
- 5) Foot Control Connector

Right-hand Side of the Control Unit



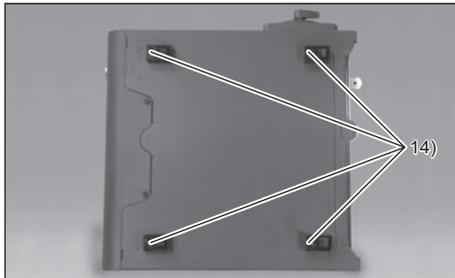
- 6) Irrigation Pump
- 7) Guide Parts
- 8) Roller
- 9) Knob

Back Side of the Control Unit



- 10) Irrigation Pole Stand
- 11) Inlet Box
- 12) Power Switch
- 13) Fuse Box

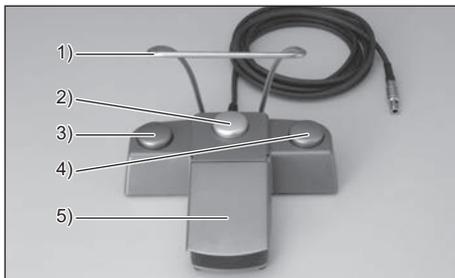
Bottom Side of the Control Unit



- 14) Rubber Pads

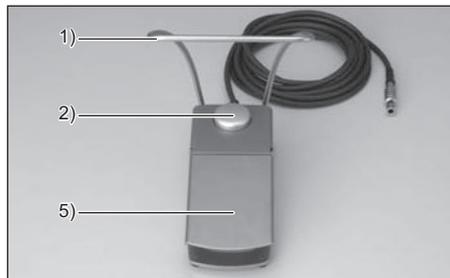
2-2 Foot Control

Multi Foot Control



- 1) Foot Control Guard
- 2) Foot Control Button (Sliver)
- 3) Foot Control Button (Blue)
- 4) Foot Control Button (Green)
- 5) Pedal

Single Foot Control

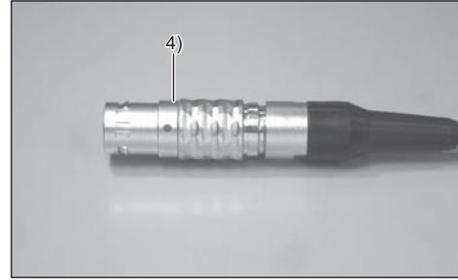
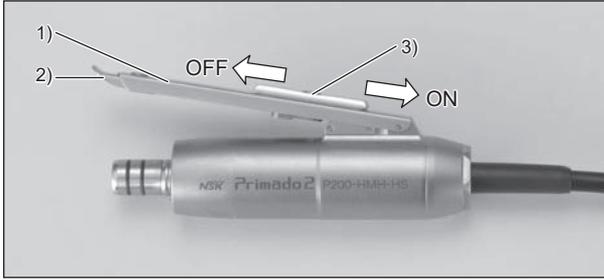


- 1) Cable
- 2) Pedal Housing
- 5) Pedal

2-3 Motor

P200-HMH, P200-SMH-S, P200-SMH, P200-BMH

P200-HMH-HS, P200-SMH-HS, P200-BMH-HS (Motor with Hand Control)

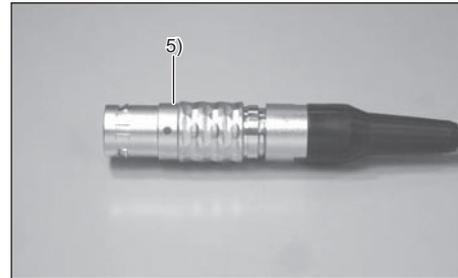
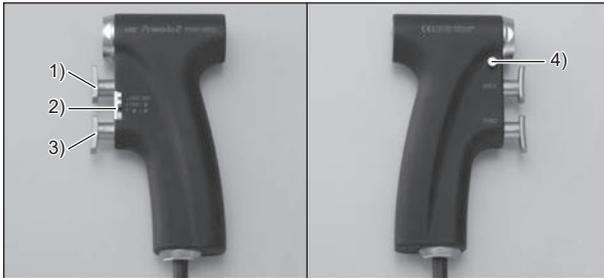


- 1) Hand Switch*
- 3) Safety Lock*

- 2) Adjustable Lever*
- 4) Motor Cord Plug

*Motor with Hand Control only.

P200-WPD



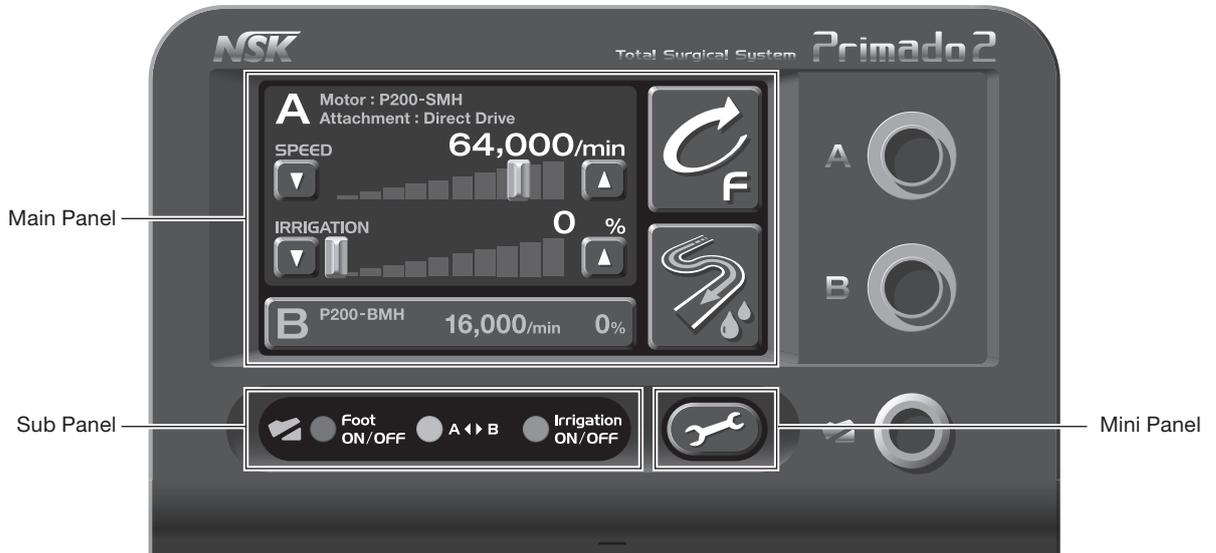
- 1) Trigger (Upper) (A)
- 4) Mounting/Removal Button

- 2) Safety Lock
- 5) Motor Cord Plug

- 3) Trigger (Lower) (B)

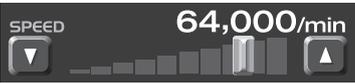
2-4 LCD Touch Panel: Operation Key

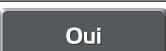
HOME screen



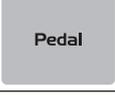
NOTICE • Whenever the icon  is touched, the HOME screen appears, regardless of the current screen.

2-5 Buttons & Icons

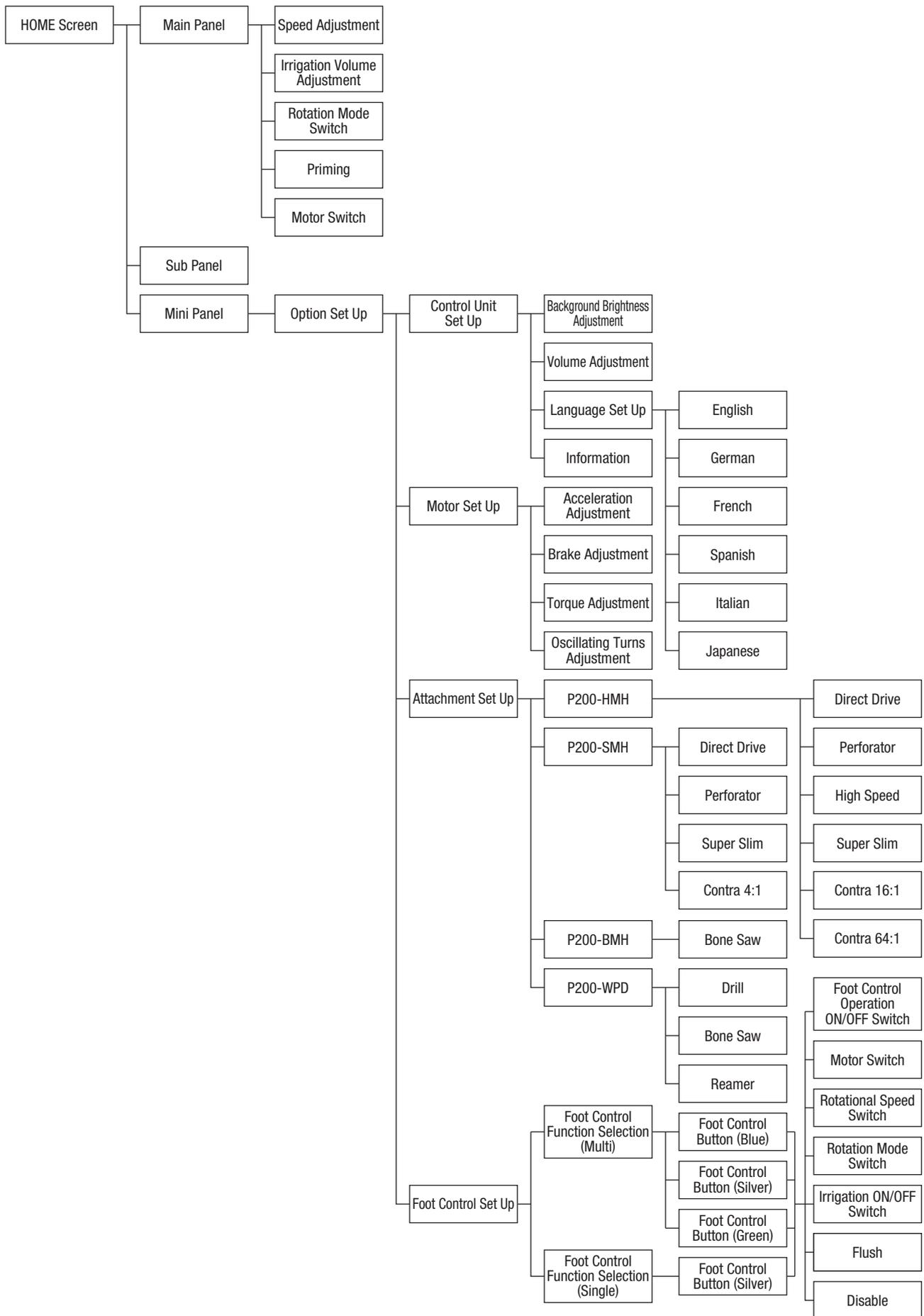
		Icon	Name	Descriptions
HOME Screen	Main Panel		Motor Select Button A	Selects the Motor which is connected to Motor Connector A. If the Motor is not connected, “Disconnection” is displayed.
			Motor Select Button B	Selects the Motor which is connected to Motor Connector B. If the Motor is not connected, “Disconnection” is displayed.
			Speed Adjustment Area	Rotational speed can be adjusted by the Track Bar and UP/DOWN Button.
			Irrigation Volume Adjustment Area	The irrigation volume can be adjusted by the Track Bar and UP/DOWN Button.
			Irrigation ON/OFF Button	Irrigation is OFF by default. Irrigation is turned ON by touching the button.
			Track Bar	The rotational speed or irrigation volume can be adjusted by moving the Track Bar to the left or right.
			UP Button	Increases the rotational speed or irrigation volume.
			DOWN Button	Decreases the rotational speed or irrigation volume.
			Rotation Mode Select Button	Changes the Rotation Mode of the Motor connected to Motor A or B between Forward, Reverse and Oscillate (P200-WPD only).
			“Rotating” display	Shows that the Motor is rotating.
		Priming Button	Whether the Irrigation Mode at ON or OFF, as long as the Priming Button is kept pushed, the irrigation volume is at 100% capacity.	
	Sub Panel		Foot Control Panel	Displays the function set up by the individual buttons of the Foot Control Panel. If the Foot Control is not connected, only  is displayed.
			Foot Control ON/OFF Button	Default setting : OFF. The Foot Control is turned ON by pressing the button (see Figure above).
Mini Panel		Option Set Up Button	Displays the “Option Set Up” screen.	

		Icon	Name	Descriptions
Option Set Up Screen	Main Panel		Control Unit Set Up Button	Displays the "Control Unit Set Up" screen.
			Motor Set Up Button	Displays the "Motor Set Up" screen.
			Attachment Set Up Button	Displays the "Attachment Set Up" screen.
			Foot Control Set Up Button	Displays "Foot Control Set Up" screen.
	Sub Panel		Back Button	Displays previous screen.
Mini Panel		HOME Button	Displays the HOME screen regardless of the current screen.	
Control Unit Set Up Screen	Main Panel		Background Brightness Adjustment Area	By using the Track Bar and the UP/DOWN Button, the brightness of the back light can be adjusted.
			Volume Adjustment Area	By using the Track Bar and the UP/DOWN Button, the volume can be adjusted.
			Language Set Up Button	Displays the "Language Set Up" screen.
			Information Button	Shows the version of the hardware and software of the Control Unit.
Language Set Up Screen	Main Panel		Language Select Button (English)	The language in which message alerts are to be displayed.
			Language Select Button (German)	
			Language Select Button (French)	
			Language Select Button (Spanish)	
			Language Select Button (Italian)	
			Language Select Button (Japanese)	
Language Set Up Confirmation Screen	Main Panel		"Yes" Button English/German French/Spanish/Italian Japanese	The language selected in the Language Set Up screen is set as the main language.
				
				
				
				
			"No" Button English/Italian/Spanish German/French Japanese	
				
				
				
				

		Icon	Name	Descriptions
Motor Set Up Screen	Main Panel		Acceleration Area	The acceleration time for the Motor to reach its maximum rotational speed can be adjusted by the UP/DOWN Button (10%~100%).
			Brake Area	The braking time for the Motor to stop can be adjusted by the UP/DOWN Button (10%~100%).
			Torque Area	The torque of the Motor can be adjusted by the UP/DOWN Button (30%~100%).
			Oscillating Turns Area	The Oscillating Turns can be adjusted by the UP/DOWN Button (1~5) (P200-WPD only).
			Factory Default Button	Returns the settings back to the original factory setting made before delivery.
			Motor Select Button	Changes the connection of the Motor between Motor Connector A and B.
Attachment Set Up Screen	Main Panel		Attachment Select Button (Direct Drive)	Indicates the rotational speed suited for the Constant Speed Attachment/Handpiece.
			Attachment Select Button (Perforator)	Indicates the rotational speed suited for the Perforator Handpiece.
			Attachment Select Button (High Speed)	Indicates the rotational speed suited for the High Speed Handpiece.
			Attachment Select Button (Super Slim)	Indicates the rotational speed suited for the Super Slim Handpiece.
			Attachment Select Button (Contra 4:1)	Indicates the rotational speed suited for the 4:1 Speed-Reduction Contra Angle Handpiece.
			Attachment Select Button (Contra 16:1)	Indicates the rotational speed suited for the 16:1 Speed-Reduction Contra Angle Handpiece.
			Attachment Select Button (Contra 64:1)	Indicates the rotational speed suited for the 64:1 Speed-Reduction Contra Angle Handpiece.
			Attachment Select Button (Drill)	Indicates the rotational speed suited for the Constant Speed Attachment.
			Attachment Select Button (Bone Saw)	Indicates the rotational speed suited for the Bone Saw Attachment.
			Attachment Select Button (Reamer)	Indicates the rotational speed suited for the Reamer Attachment.

		Icon	Name	Descriptions
Foot Control Set Up Screen	Main Panel		Foot Control Button (Blue) (Only for the Multi Foot Control)	Displays the "Foot Control Set Up" screen.
			Foot Control Button (Silver)	
			Foot Control Button (Green) (Only for the Multi Foot Control)	
			Foot Control Pedal	
			ON/OFF Select	Turns ON/OFF the operation of the Foot Control by the Foot Control. When turned OFF, the operation of the Foot Control becomes unavailable.
			Motor Select	Sets up the Motor connected to Motor Connector A or B so that it can be switched over to another Connector by the Foot Control.
			Speed Select	Sets up the rotational speed of the Motor connected to Motor Connector A or B so that it can be switched over to another speed (30%→Default, Value→100%) by the Foot Control.
			Rotation Mode Select	Sets up the Rotation Mode of the Motor connected to Motor Connector A or B so that it can be switched over to another by the Foot Control.
			Irrigation ON/OFF Select	Sets up the Irrigation so that it can be turned ON/OFF by the Foot Control.
			Flush	Makes 100% irrigation available as long as this button is pressed.
			Disable	Sets the status as no function.
			"Foot Control Button" Display (Only for the Multiple Model)	Highlights the Function Button currently used.
		Error Code Display Screen	Sub Panel	
	Motor			When an error has occurred in the Motor, this indicates which Connector is connected to the Motor.
Mini Panel			Close Button	Closes the Error display.

2-6 Flow Chart of the LCD Touch Panel



3 How to Connect Each Component

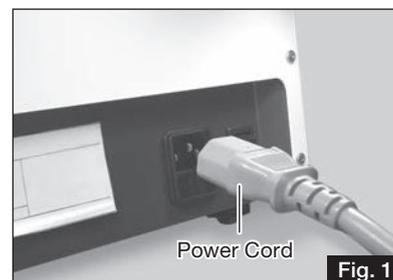


CAUTION

- Do not remove the Power Cord or Motor Cord by holding the cord portion or failure might occur. Hold the plug.
- Connect or disconnect the Power Cord or Motor Cord only after turning OFF the Power Switch. Otherwise, personal injury may result caused by an unexpected rotation.

3-1 Connection of the Power Cord

1) Connect the Power Cord into the end into the Inlet Box located at the back of the Control Unit.



2) Plug the Power Cord to the medical-use outlet.

Power Supply plug type to be used in North America area.



Plug Type NEMA 5-15P
(Hospital Grade Type)



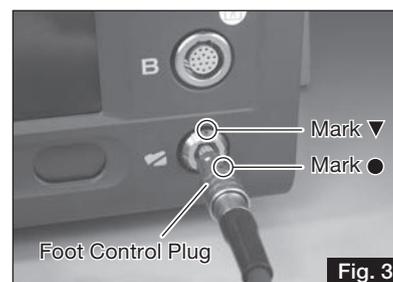
CAUTION

- Be sure to connect the Power Cord into the medical-use outlet.
- Be sure to confirm that the grounding is established. Should a short circuit occur inside this product, an electric shock or fire may result.
- Do not connect/disconnect the Power Cord with wet hands: an electric shock might occur.
- If the Power Cord cannot be plugged into the outlet easily, do not insist. A foreign substance might be obstructing the outlet or a deformation of the connection portion may be present. Contact your dealer immediately.
- If you have any suspicion that the connection portion might be deformed, the connector might be cracked or otherwise damaged, or the wire in the Power Cord might be broken, do not plug the Power Cord into the wall outlet. Contact your dealer immediately.

3-2 Connection of the Foot Control

By matching the mark ● on the Foot Control Plug and the mark ▼ on the Foot Control Connector at the front of the Control Unit, plug the Foot Control into the Connector all the way until you hear a clicking sound.

To disconnect the Foot Control, hold the Foot Control Plug and pull it out with a straight movement.



CAUTION

- When connecting/disconnecting the Foot Control, do not turn the Foot Control Plug. Otherwise, the inside pins might become damaged, leading to failure.

3-3 Connection of the Motor

By matching the mark ● on the Motor Cord Plug and the mark ● on the Motor Connector (A or B) at the front of the Control Unit, plug the Motor into the Connector all the way.

There are two Motor Connectors. By connecting two Motors to the two connectors, you can select the one you want to use by the Motor Select Button (however, both Motors cannot be operated simultaneously). The selected Motor can be confirmed in the Main Panel.

To disconnect the Motor, hold the Motor Cord Plug and pull it out with a straight movement.

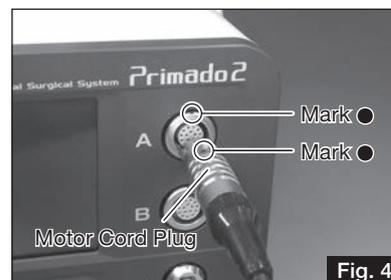


Fig. 4

CAUTION

- Whenever you use two Motor Connectors alternately, be sure to confirm which Motor is under operation.
- Do not connect anything else other than the Motor exclusively used for this system. Otherwise, the Motor Connector might become deformed or failure could occur.
- If the Motor Cord cannot be connected to the Control Unit easily, do not insist. Deformation or cracks might occur. A foreign substance might be obstructing the connection or the connection portion might be deformed. Contact your dealer.
- Whenever connecting/disconnecting the Motor with Hand Control and Wire Pin Driver, be sure to switch OFF the Safety Lock.
- When connecting/disconnecting the Motor, do not turn the Motor Cord Plug. Otherwise, the inside pins might become damaged, leading to failure.
- Prevent the Motor Cord Plug from falling onto the floor or receiving a strong impact; otherwise, deformation might occur and it might become impossible to establish a proper connection.
- Do not connect/disconnect the Motor Cord with wet hands; otherwise, electric shock might occur.
- Be sure to hold the Motor Cord Plug when disconnecting the Motor from the Control Unit to prevent failure caused by breaking wires.

3-4 Mounting of the Attachment/Handpiece

CAUTION

- Whenever mounting/removing the Attachment/Handpiece, be sure to switch OFF the Safety Lock of the Wire Pin Driver/Motor with Hand Control.
- Prior to mounting/removing the Attachment/Handpiece, remove the Bur or Blade. Otherwise, injury might occur.
- After mounting the Attachment/Handpiece, confirm that the Attachment/Handpiece and Motor are connected properly.

◆ P200-HMH and P200-HMH-HS Attachments/Handpieces

<Mounting>

- 1) Push the Attachment/Handpiece into the Motor straight.
- 2) Turn the Attachment/Handpiece rightward or leftward so that the Alignment Pin of the Motor matches the hole of the Attachment/Handpiece with a clicking sound to connect firmly.

<Removing>

Pull out the Attachment/Handpiece from the Motor straight.

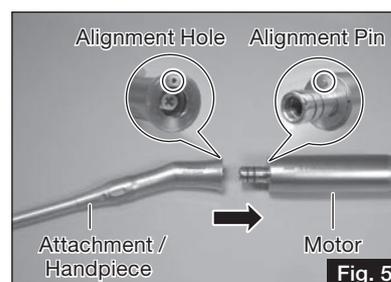


Fig. 5

◆ P200-SMH-S, P200-SMH and P200-SMH-HS Attachments/Handpieces

<Mounting>

- 1) Push the Attachment/Handpiece into the Motor straight.
- 2) Align the '▼' Symbol of the Attachment/Handpiece and '●' Symbol of the Motor, then push the Attachment/Handpiece in until it clicks to connect firmly.

<Removing>

Pull out the Attachment/Handpiece from the Motor straight.

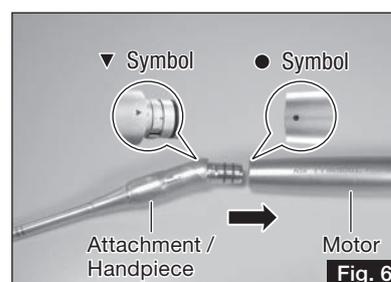
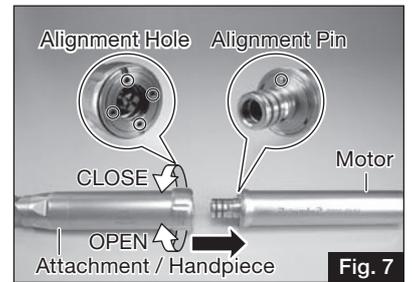


Fig. 6

◆ P200-BMH and P200-BMH-HS Attachments/Handpieces

<Mounting>

- 1) Push the Attachment/Handpiece into the Motor straight.
- 2) Turn the Attachment/Handpiece rightward or leftward so that the Alignment Pin of the Motor matches the hole of the Attachment/Handpiece with a clicking sound to connect firmly.
- 3) Tighten the Removal Ring of the Attachment/Handpiece manually to fix it firmly.



<Removing>

Loosen the Removal Ring and pull out the Attachment/Handpiece from the Motor straight.

◆ P200-WPD Attachment/Handpiece

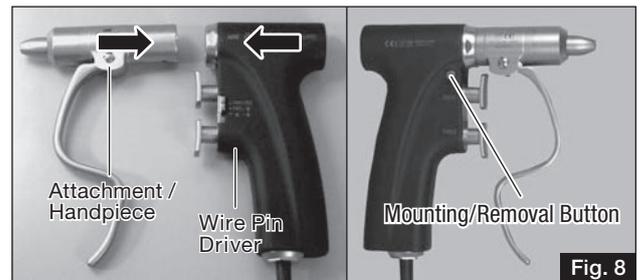
<Mounting>

Insert the Attachment/Handpiece straight into the Wire Pin Driver until it clicks.

* Wire Collet or Pin Collet should be mounted with the Attachment/Handpiece Lever facing down (Motor Cord side).

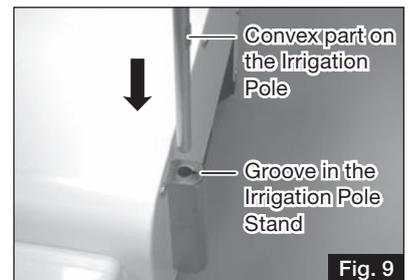
<Removing>

Pull the Attachment/Handpiece straight out while pressing the Mounting/Removal Button of the Wire Pin Driver.



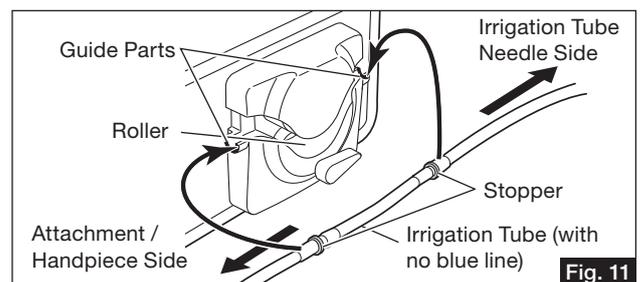
3-5 Mounting of the Irrigation Pole

Match the position of the convex part on the Irrigation Pole with the position of the groove in the Irrigation Pole Stand located at the back of the Control Unit, and insert the Irrigation Pole into the hole.

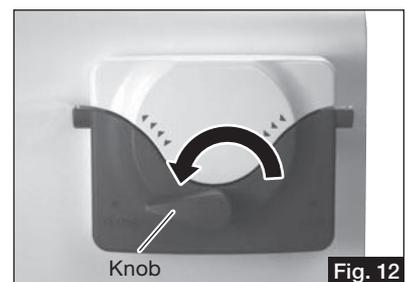


3-6 Mounting of the Irrigation Tube

- 1) By rotating the Knob towards OPEN, open the Pump Cover.
- 2) Insert the Irrigation Tube (part with no blue line) into the Irrigation Pump in such a manner that the needle side of the Irrigation Tube is positioned on the right-hand side of the Pump, and securely place the stopper of the Irrigation Tube into the Guide Parts located at both ends.

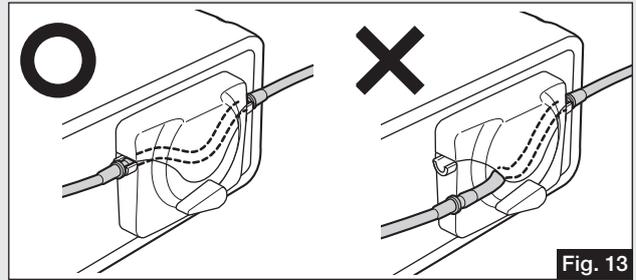


- 3) Rotate the Knob towards CLOSE to close the Pump Cover.



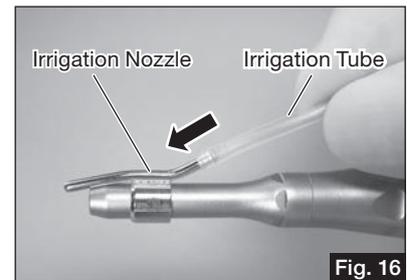
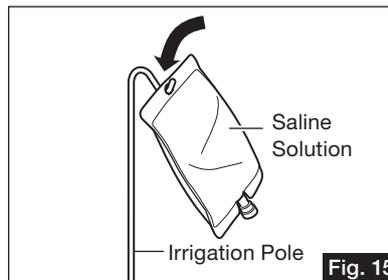
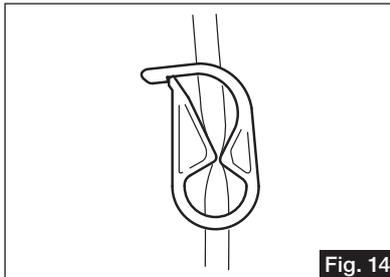
 **CAUTION**

- After having confirmed that the Irrigation Tube is properly set on the roller, CLOSE the Knob of the Irrigation Pump. If the Knob is turned to CLOSE with the Irrigation Tube displaced from the proper position, the Irrigation Tube might become damaged (Fig. 13).
- Do not mount the Irrigation Tube in the opposite direction. The saline solution bottle might burst if the Control Unit keeps operating with the Irrigation Tube mounted opposite.
- Prior to inserting the Irrigation Tube into the Irrigation Pump, confirm that there is no foreign substance in the roller portion. When closing the Pump Cover, do not force the Knob excessively and be careful not to get your fingers caught.
- Use only Irrigation Tube (Order Code: PD-IT-S) recommended by NSK. Non-NSK-genuine irrigation tubes could cause failure.



3-7 Mounting the Saline Solution

- 1) Close the Tube Clamp located between the Irrigation Tube Needle and the Irrigation Pump (Fig. 14).
- 2) Hang a saline solution on the Irrigation Pole, remove the cover of the Irrigation Tube Needle and insert the Needle into the bottle outlet (Fig. 15).
- 3) Mount an Irrigation Nozzle for the Attachment/Handpiece onto the other end of the Irrigation Tube (Fig. 16).
- 4) Open the Tube Clamp before operating the Control Unit.



 **CAUTION**

- If the Tube Clamp is opened while the Pump Cover is open, the saline solution might flow out from the end of the Irrigation Tube. Therefore, prior to opening the Tube Clamp, confirm that the Knob of the Irrigation Pump is in the CLOSE position.
- If using an Irrigation Tube which is bent or kinked or if operating the Irrigation Pump in a state where the saline solution cannot flow out of the bottle properly, the Irrigation Tube might become damaged or the Irrigation Tube Needle might become disconnected from the bottle.

4 Check before Operation

Follow the check list below, before use. If any abnormalities are found, stop using the product immediately and contact your dealer.

4-1 Control Unit

- 1) Check for any abnormalities or damage on the outer surface.
- 2) Check that the Power Cord can be securely connected to the Control Unit and the medical-use outlet.
- 3) Turn the power ON and check for any abnormalities on the LCD display.
- 4) Touch the LCD display to check each setup can be customized.
- 5) Check that the Irrigation Pole can be securely inserted into the Pole Stand of the Control Unit.
- 6) Adjust the Irrigation Volume. Open the Pump Cover and check that the Roller operates normally.
- 7) Check that the Irrigation Tube can be securely mounted to the Irrigation Pump.

4-2 Foot Control

- 1) Check for any abnormalities or damage on the outer surface and for any damage or deformation on the Pins in the Foot Control Plug.
- 2) Connect the Foot Control to the Control Unit to check its secure connection.
- 3) Depress the Pedal and Buttons of the Foot Control to check that they operate normally.

4-3 Motor

- 1) Check for any abnormalities or damage on the outer surface and for any damage or deformation on the Pins in the Motor Cord Plug.
- 2) Check that the Motor can be securely connected to the Control Unit.
- 3) Depress the Pedal of the Foot Control to check for any abnormal vibration, noise or heating in the Motor. Check in the Main Panel of the Control Unit that the rotational speed can reach the maximum speed you have set.
- 4) Check that Forward, Reverse, and Oscillate (P200-WPD only) Modes operate normally.
- 5) Mount the Attachment/Handpiece to the Motor to check its secure connection.

* If any abnormalities are found, stop using the product immediately and contact your dealer.

* Operate the product if none of the above abnormalities are present.

* When checking Attachments/Handpieces before treatment, refer to the Operation Manual of each Attachment/Handpiece.

5 Operation



CAUTION

- The LCD Display of this product is a touch panel. Refrain from doing the following, which might result in failure or malfunction of the touch panel.
 - Operating the touch panel using a sharp object, such as a ballpoint pen.
 - Operating the touch panel with wet hands.
- Do not push the touch panel with force, otherwise failure might occur.
- Refer to the Operation Manuals of the Motor and Attachment/Handpiece to be mounted.

5-1 How to turn on the power

Turn ON the Power Switch. The HOME screen is displayed after the startup screen appears and the Control Unit finishes an automatic self-check of the system.



CAUTION

- Do not turn OFF the Power Switch when the startup screen appears, because the Control Unit is conducting an automatic self-check of the system.
- If the Power Switch is turned ON while the Hand Switch/Trigger or Foot Control is depressed, the Motor does not start for safety reasons, and a message alert is displayed in the Main Panel. In order to deactivate the message, release the Hand Switch/Trigger or Foot Control.

5-2 Operation of the Main Panel

5-2-1 How to set the rotational speed and irrigation volume

Push the UP/DOWN Button or move the Track Bar to set the speed or volume.

(The Track Bar moves to the position which you have touched, within the adjustment area. Since it is rather difficult to accomplish a fine setting, use the UP/DOWN button for fine tuning.)

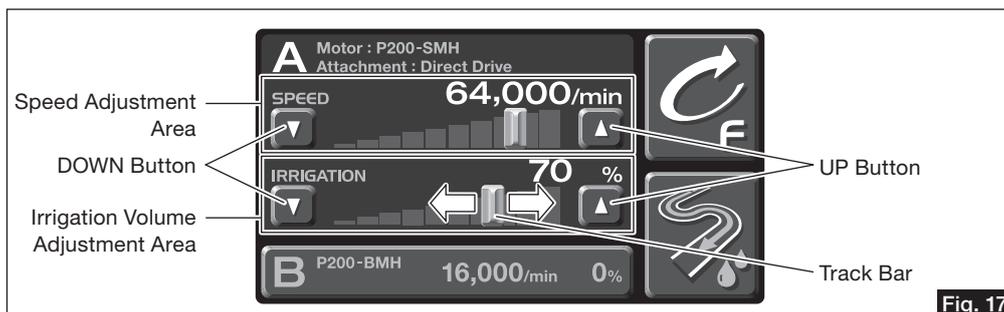


Fig. 17

5-2-2 How to set the rotation mode

Touch the Rotation Mode Select Button to change the rotation mode sequentially.

Forward (clockwise)

Reverse (counterclockwise)

Oscillate (Clockwise and counterclockwise rotations are alternately repeated) Available only when P200-WPD is mounted.

5-2-3 Switching between Motor A and B

Touch Motor Select Button A or B to switch to the desired Motor.

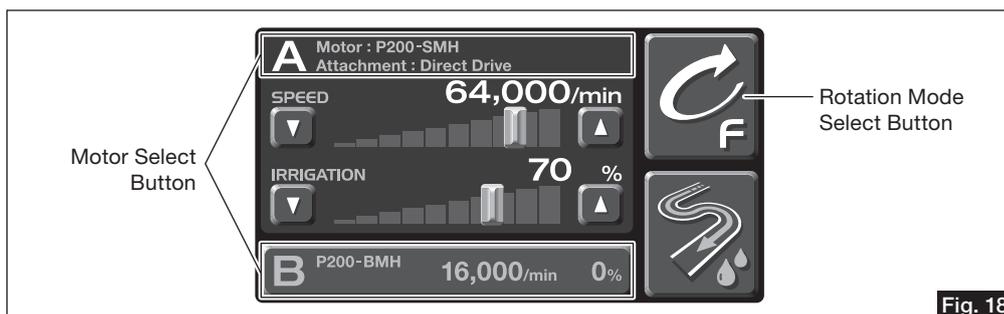


Fig. 18

5-2-4 Priming Button

While holding the Motor, keep the Priming Button pushed, and confirm that the saline solution is being fed from the Irrigation Nozzle of the Attachment/Handpiece.

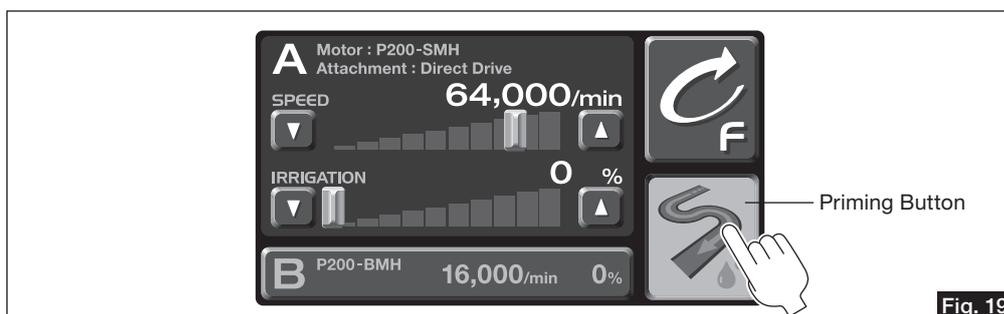


Fig. 19

5-3 How to operate the Motor

This can be done in three ways: by the Motor with Hand Control, the Primado2 Wire Pin Driver or the Foot Control.

CAUTION

- The Motor with Hand Control and the Primado2 Wire Pin Driver can also be operated by the Foot Control. Connect it with the Foot Control and depress the Pedal. The Motor will work in the normal mode of the Foot Control, regardless of the Hand Control.
- If operating the Motor only with the Motor with Hand Control and the Primado2 Wire Pin Driver, it is recommended to disconnect the Foot Control from the Control Unit. Alternatively, set the Foot Control to OFF by the Foot Control ON/OFF Button (to disable the Foot Control).
- The Hand Switch of the Motor with Hand Control and the Pedal of the Foot Control are variable. The rotational speed increases/decreases within the preset rotation range, depending on the extent/duration of depressing.

◆ When using the Motor with Hand Control (P200-HMH-HS, P200-SMH-HS, P200-BMH-HS)

- 1) Confirm that the Safety Lock of the Hand Control is OFF.
- 2) Slide the Adjustable Lever to the desired length.
- 3) Hold the Hand Switch and slide the Safety Lock to ON (Fig. 20).
- 4) Depress the Hand Switch to start the Motor. When the Hand Switch is depressed or released, there is a short alarm sound.
When the Reverse Mode has been selected, the Bur rotates in reverse. During the reverse rotation in this Mode, the alarm continues to sound.

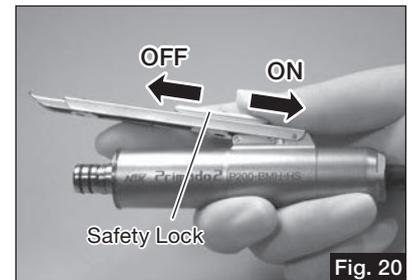


Fig. 20

CAUTION

- When operating the Safety Lock, be sure to hold the lever with your finger. If operating it without holding the lever, the lever might inadvertently be depressed when the Safety Lock is being turned ON/OFF, thereby triggering a rotation of the Motor. This might cause an accident.

◆ When using the Primado2 Wire Pin Driver (P200-WPD)

- 1) Confirm that the Safety Lock is working. (/)
 - 2) Release the Safety Lock of the Wire Pin Driver from LOCK (/) and switch it to Reverse OFF (FWD/) or Both ON (FWD/REV).
- In the Reverse OFF (FWD/) Mode, when depressing the lower Trigger (B) of the Wire Pin Driver, the Attachment/Handpiece rotates forward. When depressing the Trigger or releasing it, a short alarm sounds. In this Mode, the upper Trigger (A) is locked, and therefore the Trigger cannot be depressed (i.e. it cannot be put into operation).
 - In the Both ON (FWD/REV) Mode, when depressing the lower Trigger (B), the Attachment/Handpiece rotates forward. When depressing the Trigger or releasing it, a short alarm sounds. When depressing the upper Trigger (A), the Attachment/Handpiece rotates in reverse. During the reverse rotation, the alarm continues to sound.
 - In the Both ON (FWD/REV) Mode, when depressing both the upper(A) and lower(B) Triggers simultaneously, the forward and reverse rotations of the Attachment/Handpiece are repeated alternately (i.e., the rotation direction oscillates). The rotation direction changes at every 360 degrees of rotation. If one of the Triggers has been depressed earlier, it will take priority in the function and rotation direction. When the other Trigger is depressed with the first Trigger already functioning, the forward and reverse rotations will start to alternate: namely, Oscillate Mode will start.

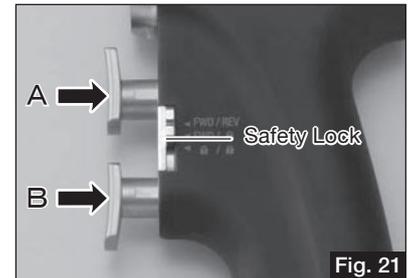


Fig. 21

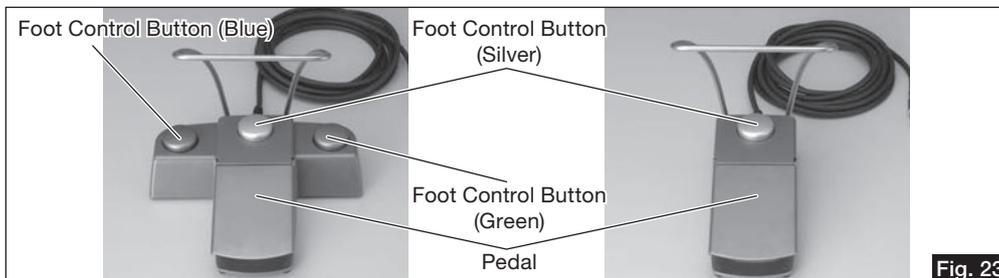
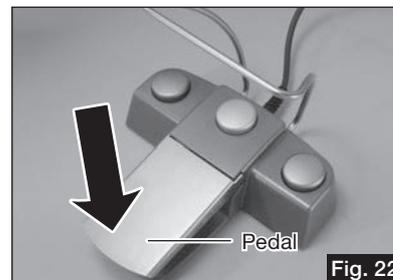
Trigger	Rotation Direction
Upper (A)	Reverse Rotation
Lower (B)	Forward Rotation
Upper and Lower depressed simultaneously (A B)	Oscillation (Forward and reverse rotations are repeated alternately)

CAUTION

- The Wire Pin Driver operates in the rotation direction set not by the Control Unit but by the Wire Pin Driver.

◆ When Using the Foot Control (FC-73, FC-74)

- 1) When depressing the Pedal of the Foot Control, the Motor starts to operate. When depressing the Pedal or releasing it, a short alarm sounds.
- 2) In the Reverse Mode, the Bur starts rotating in reverse. During this reverse rotation, the alarm continues to sound.
- 3) Push the Foot Control Button (Multi Foot Control: blue, silver and green buttons ; Single Foot Control: silver button) to set the Control Unit to the pre-determined function. For any further information, refer to Step “6-4 Setting the Foot Control”.

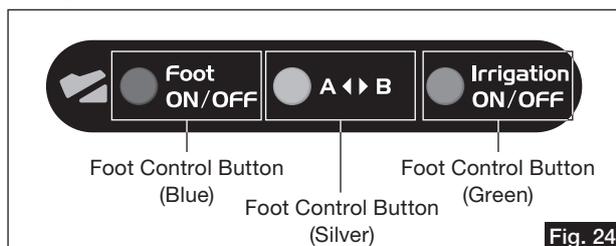


CAUTION

- Before using the Foot Control Button, be sure to confirm what function is assigned to that Button in the Sub Panel.

How to confirm the Sub Panel

<Multiple Model>



<Single Model>

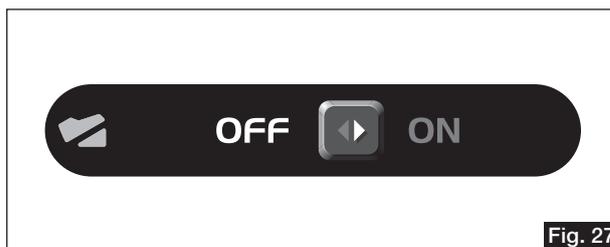


The function setting done by each Button is displayed. For more information on these functions, refer to Step “6-4 Setting the Foot Control”.

<Foot Control not connected>



<Foot Control OFF>



This shows that the Motor is switched OFF by the ON/OFF switching function operated from the Foot Control. Operation by the Foot Control is not available in this case. In order to operate it by the Foot Control, touch the Sub Panel  or turn the Foot Control ON by the Foot Control Button.

6 Option Set Up

It is possible to change the setting of the Control Unit and Motor by setting up the options.

The components which can be set up are as follows:

- Control Unit
- Motor
- Attachment
- Foot Control

- 1) Touch the Option Set Up Button in the Mini Panel in the HOME screen to display the Option Set Up screen.
- 2) Touch the Set Up Button for each component to display the Set Up screen.
- 3) Touch the HOME Button or BACK Button to return to the HOME screen.

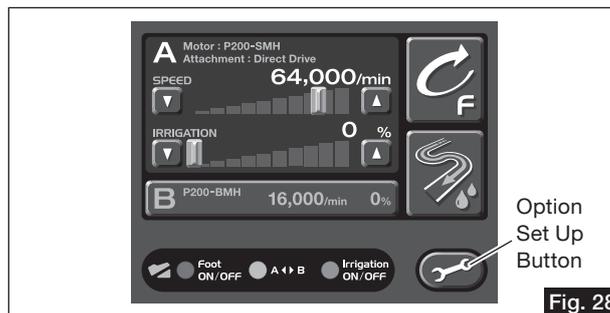


Fig. 28

Option Set Up Screen



Fig. 29

CAUTION

- The individual settings made for the Control Unit, Motor and Foot Control in the Option Set Up screen are stored in the internal memory. Therefore, even after turning OFF the power, the settings will remain. Exception: the Attachment settings are reset whenever the power is turned OFF or the Motor is disconnected from the Control Unit. Therefore, prior to use, be sure to confirm the settings of the Attachment.
- If the Motor or the Foot Control is not connected and the Option Set Up is attempted, a message alert will be displayed announcing that connection is not made.

6-1 Setting the Control Unit

Touch the Control Unit Set Up Button in the Option Set Up screen to display the Control Unit Set Up screen.

Control Unit Set Up Screen

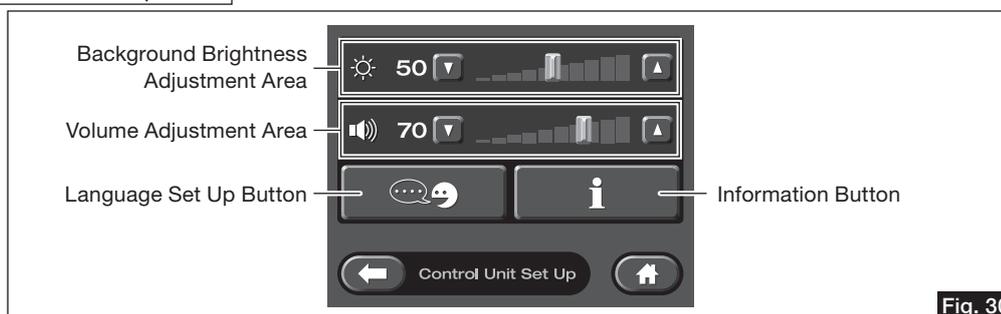


Fig. 30

6-1-1 Adjusting the background brightness and volume

The background brightness and volume level can be adjusted by either touching the UP/DOWN Button, or by moving the Track Bar to the desired level (Touch a position within the Adjustment Area to move the Track Bar to that position. For fine tuning, use the UP/DOWN Button).



Fig. 31

6-1-2 Selecting the language

The language used for message alerts can be selected from amongst several choices.

- 1) Touch the Language Set Up Button in the Control Unit Set Up screen to display the Language Set Up screen.
- 2) Touch the button labeled with the desired language.
- 3) The Language Set Up Confirmation screen is displayed.
 - Touch the YES Button in the Language Set Up Confirmation screen to set the selected language as the main language ; the Language Set Up screen will be displayed.
 - Touch the NO Button to cancel the selected language ; the Language Set Up screen will be displayed.

Language Unit Set Up Screen



Fig. 32

Language Set Up Confirmation Screen



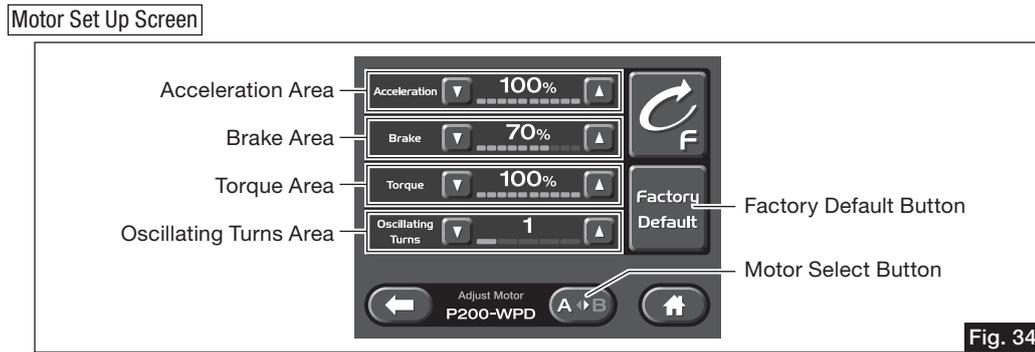
Fig. 33

6-1-3 Information display

Information on the version of the Control Unit is displayed.

6-2 Adjusting the Motor

Touch the Motor Set Up Button in the Option Set Up screen to display the Motor Set Up screen.



6-2-1 Setting methods for Acceleration, Brake, Torque and Oscillating Turns

Push the UP/DOWN Button to set the desired value.

When two Motors are connected to Motor Connector A and B, the Motor to be set up can be selected by the Motor Select Button in the Sub Panel.

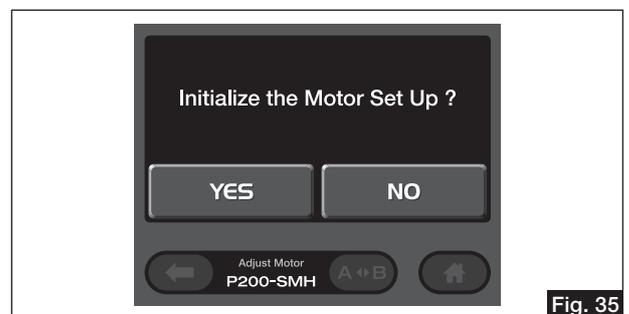
- Acceleration adjustment:
The acceleration time for the Motor to reach its maximum rotational speed can be set at any level between 10% and 100%.
- Brake adjustment:
The time it takes for the Motor to stop can be set at any level between 10% and 100%.
- Torque adjustment:
The torque level of the Motor can be set between 30% and 100%.
- Oscillating turns adjustment:
The oscillating turns can be set between 1 and 5 (This is available only when the P200-WPD Wire Pin Driver is connected).

CAUTION

- While the Motor Set Up screen is displayed, the Motor can be started. Prior to using the Motor, be sure to return to the HOME screen.

6-2-2 How to return to the Factory Default settings

Touch the Factory Default Button and then the YES Button to return to the Factory Default settings provided before delivery.
Touch the NO Button to keep the current settings.



6-3 Setting Up the Attachment

By setting up the connected Attachment/Handpiece, the optimal rotational speed for the particular Attachment/Handpiece becomes available. After setting up the Attachment/Handpiece in the Attachment Set Up screen, return to the HOME screen to adjust the rotational speed and the Irrigation volume.

When two Motor are connected to Motor Connector A and B, the Attachment/Handpiece to be set up can be selected by the Motor Select Button in the Sub Panel.

Touch the Attachment Set Up Button in the Option Set Up screen to display the Attachment Set Up screen.

CAUTION

- The settings of the Attachment/Handpiece are reset whenever the power is turned off or the Motor is disconnected from the Control Unit. Prior to using the Attachment/Handpiece, be sure to confirm the current settings.
- If the Motor is not connected, a message alert announcing that the connection is not made will be displayed in the Main Panel.

Attachment Set Up Screen

Since the Attachment/Handpieces available differ depending on the type of the Motor used, the Attachment Set Up screen matching the connected Motor is displayed.

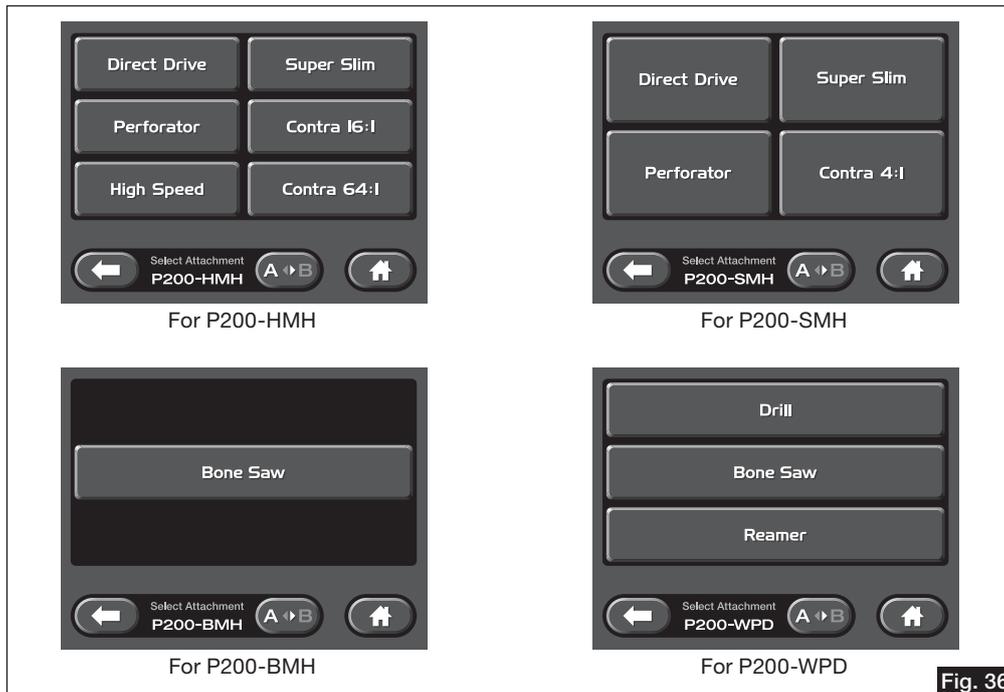


Fig. 36

Compatible Attachments/Handpieces

Motor	Attachment/Handpiece	Compatible Attachments/Handpieces
P200-HMH	Direct Drive	PD-1A135, PD-1A155, PD-1A175, PD-2AES, PD-2AS, PD-2AM, PD-2AL, PD-2SES, PD-2SS, PD-2SM, PD-2SD, PD-2SDM, PD-2AD, PD-2ADM, PD-CRA
	Perforator	PD-PER
	High Speed	P200-3GAS, P200-3GAM, P200-3GAL
	Super Slim	PD-RA330, PD-RA330-L
	Contra 16:1	PD-CA-16
	Contra 64:1	PD-CA-64
P200-SMH	Direct Drive	P200-1A135, P200-1A155, P200-1A155-C, P200-1A175, P200-1A175-C, P200-2AMS, P200-2AES, P200-2AS, P200-2AM, P200-2AL, P200-2SMS, P200-2SES, P200-2SS, P200-2SM, P200-2SL, P200-2SD, P200-CRA, P200-3MC
	Perforator	P200-PER
	Super Slim	P200-RA330, P200-RA330-L
	Contra 4 : 1	P200-CA-4
P200-BMH	Bone Saw	P200-REC, P200-SAG, P200-OSC
P200-WPD	Drill	PD-DA-J4, PD-DA-J6, PD-DA-A, PD-DA-K, PD-DA-W, PD-DA-P
	Bone Saw*	PD-SA-S, PD-SA-R
	Reamer	PD-RA-M, PD-RA-H, PD-RA-T, PD-RA-A



* P200-WPD is compatible with the Oscillating Mode, but the Mode does not start when this type of Attachment/Handpiece is mounted.

6-4 Setting Up the Foot Control

- 1) Touch the Foot Control Set Up Button in the Option Set Up screen to display the Foot Control Set Up screen.

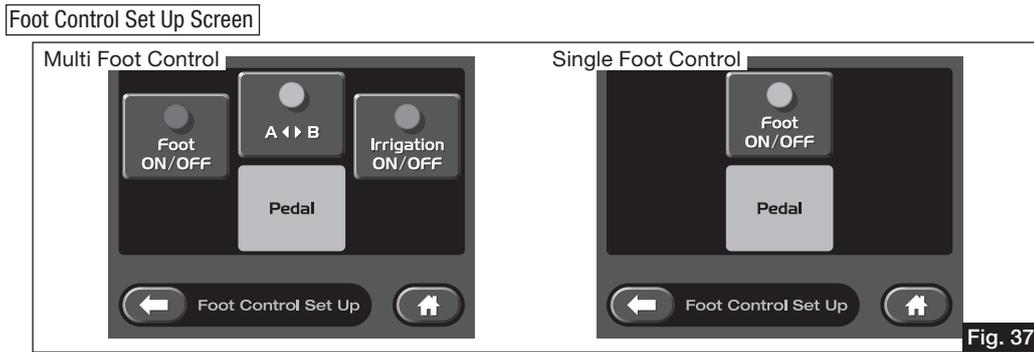


Fig. 37

- 2) Touch the Foot Control Button (Multi Foot Control: blue, silver and green buttons ; Single Foot Control: silver button) which you want to set up to display the Foot Control Set Up screen. Select the desired functional Button ; then, that Button will be assigned to the selected function, and the Foot Control Set Up screen will be displayed.



Fig. 38

- ON/OFF Select:
The ON/OFF selection of operations by the Foot Control can be set up. Touch the OFF Button to cancel operation by the Foot Control ; the ON/OFF selection itself remains.
- Motor Select:
Switching between the two Motors connected to Motor Connector A and B can be done.
- Speed Select:
The rotational speed of the Motor can be switched from 30% to the default value, then to 100%.



CAUTION

- Beware that previous rotational speed is not stored.

- Rotation Mode Select:
The rotation mode of the Motor can be switched.
- Irrigation ON/OFF Select:
Irrigation can be switched ON/OFF.
- Flush:
Push the Foot Control Button continuously to keep the irrigation at 100% capacity.
- Disable:
Disables function to the Foot Control Button.
- “Foot Control Button” Display (only for the Multi Foot Control):
The Button which is being set up is highlighted.

7 Fuse Replacement

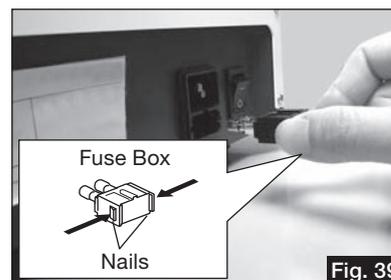
- 1) Remove the Fuse Box located in the Inlet Box at the back of the Control Unit, while keeping the nails at both ends pushed inward.
- 2) Replace the fuses (2 pcs) with a new one and push the Fuse Box into the Inlet Box until you hear a clicking sound.

CAUTION

- Do not use any type of fuse other than ones NSK recommends. Otherwise, failure might occur.

Electrical fuses		Order Code
120V	T3.15AL/250V	D1200131510

- If the reason for the fuse burning is unknown, contact your dealer.



8 Reprocessing (Sterilization is for Motor only)

CAUTION

- Perform cleansing and sterilization after every use.
- Be sure to clean and sterilize the Motor after use. Remaining blood may result in product failure due to internal blood coagulation.
- In order to prevent infection, put on a mask, rubber gloves and a pair of protection goggles.
- Sterilize only the Motor.
- When cleaning or sterilizing Attachments/Handpieces or Motor, refer to the Operation Manual of each Attachment/Handpiece or Motor.

8-1 Cleaning the Control Unit and Foot Control

8-1-1 Preparation before cleaning

- Disconnect the Motor Cord, Foot Control Cord and Power Cord from the Control Unit.
- Check for any damage or deterioration on the outer surface of each component or each cord, and for any deformation or loss of each connector pin.

8-1-2 Cleaning

- Clean the surface of each component product, using a lint-free cloth moistened with neutral detergent for medical use.
- Remove the detergent from the surface using a lint-free cloth moistened with distilled water, deionized water, or demineralized water.

CAUTION

- Do not soak the Control Unit and the Foot Control into water.
- Prevent water from entering the Connector portion.
- Do not attempt to sterilize the Control Unit and the Foot Control.

8-2 Cleaning and Sterilization of the Motor

8-2-1 Preparation prior to washing

- Remove the Attachment/Handpiece from each Motor.
- Check for any damage or deterioration on the outer surface of each Motor or Motor Cord, and for any deformation or loss of each connector pin.

8-2-2 Cleaning

- Wipe stains off the surface of the Motor (including the Motor Cord) thoroughly using a lint-free cloth moistened with neutral detergent for medical use or a non-metallic brush.
- Remove the detergent solution using a lint-free cloth moistened with distilled, deionized or demineralized water.

8-2-3 Washing and disinfecting

 The Motor can be washed via washer-disinfector.

If a washer-disinfector is not available, proceed to 8-2-4 Sterilization below.

The following conditions are recommended for washer-disinfector:

(It is recommended to use a washer-disinfector compatible with ISO 15883)

- a. Cleaning: at 45°C for 3 minutes
- b. Intermediate rinse: At least 1 minute (using distilled, deionized or demineralized water)
- c. Thermal disinfecting: at 93°C for 5 minutes (using distilled, deionized or demineralized water)
- d. Drying: at least 10 minutes

 **CAUTION**

- Prior to use of a washer-disinfector, read the washer-disinfector Operation Manual carefully.
- After cleaning and prior to sterilization, check the Motor in the same method as in Step “4. Check before Operation”.
- Do not use a chlorinated cleaner.
- Do not clean the Motor by an ultrasonic cleaning apparatus.
- The P200-WPD is made out of aluminum, therefore take special precaution to always use a PH neutral detergent compatible with aluminum, when washing it in a washer-disinfector.

8-2-4 Sterilization

We verify the validity of sterilization in the following conditions.

- 1) Place it in a Primado Sterilization Cassette
- 2) Autoclave under the following conditions;
 - Pre-vacuum Autoclave: at 134°C for 3 minutes or longer
 - Gravity-displacement Autoclave: at 132°C for 15 minutes or longer

 **CAUTION**

- The sterilization parameters are indicated for sterilization and immediate use only.
- Do not soak the Motor into water, or failure might occur.
- The Motor is not suitable for EOG sterilization.
- Sterilize the Motor after each patient.
- Do not clean Motor by a washer sterilizer.
- The Motors do not require lubrication. Never lubricate them.

8-3 Storage

Store the sterilized Motor in a place where it can be kept sterile until the next use.

9 Error Codes

When the Motor has stopped operating due to failure, overloading, breaking of a wire, misuse etc., the Control Unit displays Error Codes. Then, an error code is displayed in the Mini Panel. If an error code is displayed, follow the check and measure steps shown in the display to resolve the error. Touch the Close Button in the Sub Panel or operate the Motor or the Foot Control after resolving the error to close the error display.

In case the error is unresolved, contact your dealer for repair.



NOTICE

- If two or more error codes are involved, the error code displayed in the Mini Panel will blink. Touch the Mini Panel to display the other error codes in sequence.

Error codes	Error contents	Causes	Checks and measures
E00	Error of the Control Unit.	Abnormality or failure of the internal memory of the Control Unit.	Turn ON the power source again. If the Control Unit operates normally, there is no problem.
E01	Error of the Motor Handpiece.	Poor connection of the Motor Handpiece.	Fasten the Twist Collet of the Attachment to lock the Bur. If the Motor Handpiece works normally, there is no problem. Re-connect the Motor Handpiece to the Control Unit. If the Motor Handpiece works normally, there is no problem.
		Use under high load for a long period (excessive electric current - hardware).	Re-start. If it works normally, the error was caused by temporary overloading.
		Failure of the Motor Handpiece.	Replace with a spare Motor Handpiece to check whether or not it works normally. If the spare Motor Handpiece works normally, this means that the original one is damaged. Contact your dealer for repair.
		Failure of the internal circuits in the Control Unit.	Turn ON the power source again. If the Motor Handpiece operates normally, there is no problem.
E02	Error of the Motor Handpiece.	Poor connection of the Motor Handpiece.	Re-connect the Motor Handpiece to the Control Unit. If the Motor Handpiece works normally, there is no problem.
		Failure of the Motor Handpiece (excessive voltage).	Replace with a spare Motor Handpiece to check whether or not it works normally. If the spare Motor Handpiece works normally, this means that the original one is damaged. Contact your dealer for repair.
		Failure of the internal circuits in the Control Unit.	Turn ON the power source again. If the Motor Handpiece operates normally, there is no problem.
E03	Error of the Motor Handpiece.	Poor connection of the Motor Handpiece.	Re-connect the Motor Handpiece to the Control Unit. If the Motor Handpiece works normally, there is no problem.
		Failure of the Motor Handpiece (sensor signals).	Replace with a spare Motor Handpiece to check whether or not it works normally. If the spare Motor Handpiece works normally, this means that the original one is damaged. Contact your dealer for repair.
		Failure of the internal circuits in the Control Unit.	Turn ON the power source again. If the Motor Handpiece operates normally, there is no problem.
E04	Error of the Control Unit.	Temperature rise in the Control Unit under high load for a long period.	After letting the Control Unit rest in a cooler place for approximately 10 minutes, confirm the operation. If the Control Unit works normally, there is no problem. Check whether or not the environment where the Control Unit is used or the installation place has a high temperature.
		Failure of the internal circuits in the Control Unit.	Turn ON the power source again. If the Control Unit operates normally, there is no problem.
		Occurrence of abnormal voltage in or failure of the startup/stop circuits of the Control Unit.	Turn ON the power source again and start-stop several times. If the Control Unit works normally, there is no problem.
E06	Error of the Motor Handpiece.	Poor connection of the Motor Handpiece.	Fasten the Twist Collet of the Attachment to lock the Bur. If the Motor Handpiece works normally, there is no problem. Re-connect the Motor Handpiece to the Control Unit. If the Motor Handpiece works normally, there is no problem.
		Use under high load for a long period (rotor lock).	If the re-starting proceeds normally, the error was caused by temporary overloading. There is no problem.
		Failure of the Motor Handpiece.	Replace with a spare Motor Handpiece to check whether or not it works normally. If the spare Motor Handpiece works normally, this means that the original one is damaged. Contact your dealer for repair.
		Failure of the internal circuits of the Control Unit.	Turn ON the power source again. If the Motor Handpiece operates normally, there is no problem.

Error codes	Error contents	Causes	Checks and measures
E07	Error of the Motor Handpiece.	Poor connection of the Motor Handpiece.	Fasten the Twist Collet of the Attachment to lock the Bur. If the Motor Handpiece works normally, there is no problem.
			Re-connect the Motor Handpiece to the Control Unit. If the Motor Handpiece works normally, there is no problem.
		Use under high load for a long period (excessive electric current - hardware).	Re-start. If it works normally, the error was caused by temporary overloading. There is no problem.
		Failure of the Motor Handpiece.	Replace with a spare Motor Handpiece to check whether or not it works normally. If the spare Motor Handpiece works normally, this means that the original one is damaged. Contact your dealer for repair.
		Failure of the internal circuits of the Control Unit.	Turn ON the power source again. If the Motor Handpiece operates normally, there is no problem.
E08	Error of the Motor Handpiece.	Poor connection of the Motor Handpiece.	Fasten the Twist Collet of the Attachment to lock the Bur. If the Motor Handpiece works normally, there is no problem.
			Re-connect the Motor Handpiece to the Control Unit. If the Motor Handpiece works normally, there is no problem.
		Use under high load for a long period (excessive electric current – software).	Re-start. If it works normally, the error was caused by temporary overloading. There is no problem.
		Failure of the Motor Handpiece.	Replace with a spare Motor Handpiece to check whether or not it works normally. If the spare Motor Handpiece works normally, this means that the original one is damaged. Contact your dealer for repair.
		Failure of the internal circuits of the Control Unit.	Turn ON the power source again. If the Motor Handpiece operates normally, there is no problem.
E09	Error of the Motor Handpiece.	Poor connection of the Motor Handpiece.	Re-connect the Motor Handpiece to the Control Unit to check whether or not the Hand Switch/Trigger works normally. If it works normally, there is no problem.
		Failure of the Motor Handpiece (Hand Switch/Trigger).	Replace with a spare Motor Handpiece to check whether or not the Hand Switch/Trigger works normally. If the Hand Switch/Trigger works normally, this means that the original Motor Handpiece is damaged. Contact your dealer for repair.
		Failure of the internal circuits of the Control Unit.	Turn ON the power source again. If the Motor Handpiece operates normally, there is no problem.
E10	Error of the Foot Control.	Poor connection of the Foot Control.	Re-connect the Foot Control to the Control Unit to check whether or not the Foot Control works normally. If it works normally, there is no problem.
		Failure of the Foot Control.	If you have a spare Foot Control, replace the Foot Control with the spare one to check whether or not the spare one works. If it works, the original Foot Control is damaged. Contact your dealer for repair.
		Failure of the internal circuits of the Control Unit.	Turn ON the power source again. If the Foot Control operates normally, there is no problem.
E11	Error of the Irrigation Pump.	Foreign substance caught in the Irrigation Pump.	Check whether or not any foreign substance is caught in the Irrigation Pump. If any, remove it. Re-mount the Irrigation Tube. If the Irrigation Pump works normally, there is no problem.
		Failure of the Irrigation Pump (excessive electric current).	Turn ON the power source again. If the same error code is displayed, the Irrigation Pump might be damaged. Contact your dealer for repair of the Control Unit.
		Failure of the internal circuits of the Control Unit.	Turn ON the power source again. If the Irrigation Pump works normally, there is no problem.

Error codes	Error contents	Causes	Checks and measures
E12	Error of the Irrigation Pump.	Failure of the Irrigation Pump (excessive voltage).	Turn ON the power source again. If the same error code is displayed, the Irrigation Pump might be damaged. Contact your dealer for repair of the Control Unit.
		Failure of the internal circuits of the Control Unit.	Turn ON the power source again. If the Irrigation Pump works normally, there is no problem.
E13	Error of the Control Unit.	Signal communication abnormality or failure of the Display.	Turn ON the power source again. If the Control Unit works normally, there is no problem.
		Failure of the internal circuits of the Control Unit.	Turn ON the power source again. If the Control Unit works normally, there is no problem.
E14	Error of the Foot Control.	Poor connection of the Foot Control.	Re-connect the Foot Control to the Control Unit. If the Foot Control works normally, there is no problem.
		Failure of the Foot Control.	If you have a spare Foot Control, replace the Foot Control with the spare one to check whether or not the spare one works. If it works, the original Foot Control is damaged. Contact your dealer for repair.
		Failure of the internal circuits of the Control Unit.	Turn ON the power source again. If the Foot Control works normally, there is no problem.
E15	Error of the Motor Handpiece.	Poor connection of the Motor Handpiece.	Re-connect the Motor Handpiece to the Control Unit. If the Motor Handpiece is recognized and displayed normally, there is no problem.
		Failure of the Motor Handpiece (recognition of the Motor Handpiece).	Replace the Motor Handpiece with a spare one to check whether or not the spare one works normally. If it works normally, the original Motor Handpiece is damaged. Contact your dealer for repair.
		Failure of the internal circuits in the Control Unit.	Turn ON the power source to check whether or not the Motor Handpiece works normally. If it does, there is no problem.
E16	Error of the Motor Handpiece.	Poor connection of the Motor Handpiece.	Re-connect the Motor Handpiece to the Control Unit. If the Motor Handpiece works normally, there is no problem.
		Failure of the Motor Handpiece (speed of the Motor Handpiece).	Replace the Motor Handpiece with a spare one to check whether or not the spare one works normally. If it works normally, the original Motor Handpiece is damaged. Contact your dealer for repair.
		Failure of the internal circuits in the Control Unit.	Turn ON the power source to check whether or not the Motor Handpiece works normally. If it does, there is no problem.
E17	Error of the Control Unit.	Abnormality or failure of the internal memory of the Control Unit.	Turn ON the power source to check whether or not the Control Unit works normally. If it does, there is no problem.
E18	Error of the Motor Handpiece.	Poor connection of the Motor Handpiece.	Re-connect the Motor Handpiece to the Control Unit. If the Motor Handpiece works normally, there is no problem.
		Failure of the Motor Handpiece (Sensor signals).	Replace the Motor Handpiece with a spare one to check whether or not the spare one works normally. If it works normally, the original Motor Handpiece is damaged. Contact your dealer for repair.
		Failure of the internal circuits in the Control Unit.	Turn ON the power source to check whether or not the Control Unit works normally. If it does, there is no problem.
E19	Error of the Control Unit.	Signal communication abnormality or failure of the Display.	Turn ON the power source to check whether or not the Control Unit works normally. If it does, there is no problem.
		Failure of the internal circuits in the Control Unit.	

10 Troubleshooting

If you are suspecting any faults, check the following once again prior to asking for repair work. If none of these cases is applicable or if the situation does not improve despite your efforts or measures, the damage could be serious; call your dealer to fix the problem.

<Control Unit>

Symptoms	Causes/Points of checking	Countermeasures
The HOME screen does not appear.	Is the power plug disconnected?	Connect the power plug to the wall outlet properly (Refer to 3-1). * If the screen still does not appear, contact your dealer.
	Is the fuse blown out?	Replace it with the fuse specified by us (Refer to 7). * Be sure to replace it with a fuse specified by us.
	Failure of the Power Switch	Contact your dealer.
An error code appears.	Refer to "9. Error Codes".	Refer to the column of Checks and measures.
The Motor does not rotate.	Is the Foot Control Cord disconnected?	Plug the Cord into the Connector of the Control Unit properly (Refer to 3-2, 3-3).
	Is the Motor Cord disconnected?	* If it still does not function, contact your dealer.
	Is the Safety Lock of the Motor with Hand Control/Wire Pin Driver set to OFF?	If the Safety Lock of the Motor with Hand Control/Wire Pin Driver is set to OFF, release the Safety Lock (Refer to 5-3).
	Is the Foot Control set to OFF?	If the Foot Control is set to OFF, cancel that setting (Refer to 5-3). * If the Motor still does not function, contact your dealer.
	Is the load too high?	If excessively loaded by the Attachment/Handpiece or the Cutting Accessories, the Control Unit activates the safety mechanism to stop the Motor from rotating. Remove the root cause, and then depress the Pedal of the Foot Control or re-push the Hand Switch/Trigger. * If the Motor still does not function, contact your dealer.
Cannot increase the rotational speed.	Is the rotational speed restricted?	Adjust the Speed Adjustment Area in the Main Panel to set the desired rotational speed (Refer to 5-2).
Cannot reverse the rotation.	Is the setting for Forward?	Select the Rotation Mode Select Button in the Main Panel or the Foot Control Button to switch (Refer to 5-2, 6-4). * If the rotation direction does not change, contact your dealer.
Cannot irrigate.	Are there kinks, signs of plugging or cracks in the Irrigation Tube?	Fix the kinks in the Irrigation Tube first and then use it. If there are signs of plugging or cracks, replace the Tube with a new one (Refer to 3-6, 3-7).
	Is the irrigation setting at 0% or OFF?	Set the desired irrigation level at the Irrigation Volume Adjustment Area in the Main Panel of the Control Unit (Refer to 5-2). If the irrigation is set to OFF, push the ON Button displayed in the Main Panel of the Control Unit or push the Foot Control Button to cancel that setting.
	Is the Irrigation Tube mounted in the wrong direction?	Re-check the mounting orientation of the Irrigation Tube installed in the Irrigation Pump. If the Tube is mounted in the wrong direction, remove it and re-install (Refer to 3-6).
Weak torque ; slow responsiveness in rotation ; takes time to stop rotating.	Is the Motor set at a low value?	Re-check the setting of the Motor in the Option Set Up screen. If the set value is low, adjust it. Alternatively, return the setting of the Motor to the factory default (Refer to 6-2).
Dark screen.	Is the Control Unit set to a low value?	Adjust the brightness of the background by setting up the Control Unit in the Option Set Up screen (Refer to 6-1-1).
No sound.	Is the Volume set at 0?	Adjust the sound volume by setting the Control Unit in the Option Set Up screen (Refer to 6-1-1).

<Motor (without Hand Control)>

Symptoms	Causes/Points of checking	Countermeasures
No rotation after a Cutting Accessories has been attached.	The Twist Collet on the Attachment/Handpiece is OPEN.	After inserting the Cutting Accessories, fasten the Twist Collet. (Turn it in the direction of '🔒')
	<ul style="list-style-type: none"> · The bearing has seized. · Foreign substance inside the bearing. · The bearing is worn out. 	Contact your dealer.
Abnormal heating during rotation.	Continuous use over a long period.	Stop operating the Attachment/Handpiece and Motor immediately. Wait until the Attachment/Handpiece and Motor cool down before continuing to operate.
	<ul style="list-style-type: none"> · The bearing has seized. · Foreign substance inside the bearing. · The bearing is worn out. 	Contact your dealer.
Abnormal vibration and noise. Cutting Accessory run-out.	<ul style="list-style-type: none"> · The bearing has seized. · Foreign substance inside the bearing. · The bearing is worn out. 	

<Motor (with Hand Control)>

Symptoms	Causes/Points of checking	Countermeasures
No rotation when the Hand Switch is depressed.	Twist Collet of the Attachment/Handpiece is OPEN.	After inserting the Cutting Accessories, fasten the Twist Collet. (Turn it in the direction of '🔒')
	Safety Lock is "ON".	Release the safety Lock.
	Safety Lock is "OFF".	Contact your dealer.
Rotation when the Hand Switch is not depressed.	The Hand Switch cannot get back to the specified position due to foreign substances.	
No rotation even after the Twist Collet of the Attachment/Handpiece has been fastened.	The bearing has seized ; Foreign substances are obstructing the bearing.	
Abnormal heating during rotation.	Continuous use over a long period.	Stop operating the Attachment/Handpiece and Motor immediately. Wait until the Attachment/Handpiece and Motor cool down before continuing to operate.
	<ul style="list-style-type: none"> · The bearing has seized. · Foreign substance inside the bearing. · The bearing is worn out. 	Contact your dealer.
Abnormal vibration and noise. Cutting Accessory run-out.	<ul style="list-style-type: none"> · The bearing has seized. · Foreign substance inside the bearing. · The bearing is worn out. 	

<Wire Pin Driver>

Symptoms	Causes/Points of checking	Countermeasures
No rotation when the Trigger is depressed.	The Safety Lock is "ON".	Release the Safety Lock.
	The Safety Lock is "OFF".	Contact your dealer.
Rotation when the Trigger is not depressed.	The Trigger cannot get back to the specified position due to foreign substances.	
The Attachment/Handpiece cannot be mounted.	The insertion is deformed.	
Abnormal heating during rotation.	Continuous use over a long period.	Stop operating the Attachment/Handpiece and Motor immediately. Wait until the Attachment/Handpiece and Motor cool down before continuing to operate.
	<ul style="list-style-type: none"> · The bearing has seized. · Foreign substance inside the bearing. · The bearing is worn out. 	Contact your dealer.
Abnormal vibration and noise. Cutting Accessory run-out.	<ul style="list-style-type: none"> · The bearing has seized. · Foreign substance inside the bearing. · The bearing is worn out. 	

11 Specifications

<Control Unit>

Model	P200-CU-120
Power source	AC 120V 50/60 Hz
Electricity consumption	65 VA
Maximum feed rate of Irrigation Pump	75 ml/min
Dimensions	W278×D268×H160 mm
Weight	6.9Kg
Length of Power Cord	3.6 m

<Motor>

Model	P200-HMH	P200-HMH-HS	P200-SMH-S	P200-SMH	P200-SMH-HS
Rotational speed	60,000min ⁻¹		80,000min ⁻¹		
Rated input	DC 39.5V		DC 23.7V		
Dimensions	Ø23×L98.9mm	Ø23×L98.9mm	Ø18×L84.2mm	Ø18×L102.7mm	Ø19.4×L120.5mm
Weight	361g	390g	289g	305g	340g
Operation time	3 min. ON / 10 min. OFF				
Length of Motor Cord	3.5m				

Model	P200-BMH	P200-BMH-HS	P200-WPD
Rotational speed	48,000min ⁻¹		1,200min ⁻¹
Rated input	DC 21.8V		DC 39.1V
Dimensions	Ø18 x L100.8mm	Ø20.4x L102.3mm	W74.9 x D28 x H143.1mm
Weight	302g	359g	790g
Operation time	1 min. ON / 15 min. OFF		1 min. ON / 10 min. OFF
Length of Motor Cord	3.5m		

<Foot Control>

Model	FC-73	FC-74
Dimensions	W153×D223×H175.5mm	W220×D223×H175.5mm
Weight	1.4Kg	2.0Kg
Length of Foot Control Cord	3.5 m	

	Temperature	Humidity	Atmospheric pressure
Use Environment	0-40°C (no condensation)	30-75% RH	700-1,060hPa
Store and Transportation Environment	-10-50°C	10-85% RH	500-1,060hPa

Classifications of equipment

- Type of protection against electric shock:
 - Class I equipment
- Degree of protection against electric shock:
 - Type BF applied part (A) : Motor, Attachment
- Method of sterilization or disinfection recommended by the manufacture:
 - See 8. Sterilization
- Degree of protection against ingress of water as detailed in the current edition of IEC 60529:
 - Foot Control: IPX8 (Protected against immersion in water)
- Degree of safety of application in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide:
 - Foot Control: AP Equipment (AP)
- Mode of operation:
 - Intermittent operation

Operation Principal

This system is composed of the Control Unit, the Foot Control, the Motor and the Attachment.

Power is supplied from the Control Unit to the Motor by operating the Foot Control or the Hand Switch of the Motor. Due to the motor rotary, the Cutting Accessory attached to the Attachment rotates.

12 Disposing Product

In order to avoid the health risks of operators handling the disposal of medical equipment, as well as the risks of environmental contamination caused thereof, a surgeon is required to confirm the equipment is sterile. Ask specialist firms who are licensed to dispose of specially controlled industrial wastes, to dispose the product for you.

13 Warranty

Our products are subjected to rigorous quality control and inspections. In the unlikely event of a product proving to be faulty within the guarantee period when it has been used normally, it will be repaired free of charge subject to terms and conditions below. For such repair requests, please contact your dealer.

Guarantee period ··· One year

- In the following cases, the repair has to be paid for even if it is within the guarantee period.
 - Fault and damage caused by misuse, or inappropriate repair or modification.
 - Fault and damage caused during transit or dropping the product after it was purchased.
 - Fault and damage attributable to fire, earthquake, flooding, power surge, environmental pollution or other act of providence.
 - Fault and damage caused by the use of consumables, or methods other than those specified by us.
 - When the product has been repaired using components other than genuine components supplied by us.
- For repairs after the guarantee period, too, please contact your dealer.

14 Symbols

	Manufacturer		See operation manual
	TÜV Rheinland of North America is a Nationally Recognized Testing Laboratory (NRTL) in the United States and is accredited by the Standards Council of Canada to certify electro-medical products with Canadian National Standards		Caution, Consult operation instructions.
	This product is designed not to become an ignition source in flammable air and anesthetic gas environment		This product can be sterilized in a steam sterilizer at 135°C. For detail see "8. Reprocessing (Sterilization is for Motor only)"
	Protected against the effects of continuous immersion in dust and water		This product can be cleaned using a washer-disinfector
	Type BF applied part		Catalog number
	GS1 DataMatrix for Unique Device Identifier		Serial No.
	Rx Only Caution: U.S. Federal law restricts this device to sale by or on the order of a licensed physician.		Temperature limitation
	Marking on the outside of equipment or equipment parts that include RF transmitters or that apply RF electromagnetic energy for diagnosis or treatment.		Humidity limitation
	Dispose of this device and its accessories via methods approved for electronic device and in compliance with the Directive 2012/19/EU		atmospheric pressure limitation
	The EU directive 93/42/EEC was applied in the design and production of this medical device.		"ON" state of Main Power Switch
		○	"OFF" state of Main Power Switch

15 EMC Information

Guidance and manufacturer's declaration - electromagnetic emissions		
The Primado2 is intended for use in the electromagnetic environment specified below. The customer or the user of the Primado2 should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR11/ EN55011	Group 1 Class B	The Primado2 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR11/ EN55011	Group 1 Class B	The Primado2 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions EN/IEC61000-3-2	Not Applicable	
Voltage fluctuations/flicker emissions EN/IEC61000-3-3	Not Applicable	

Guidance and manufacturer's declaration - electromagnetic immunity			
The Primado2 is intended for use in the electromagnetic environment specified below. The customer or the user of the Primado2 should assure that it is used in such an environment.			
Immunity test	EN/IEC60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) EN/IEC61000-4-2	±6kV contact ±8kV air	±6kV contact ±8kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst EN/IEC61000-4-4	± 2kV for power supply lines ± 1kV for input/output lines	± 2kV for power supply lines ± 1kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge EN/IEC61000-4-5	±1kV line(s) to line(s) ±2kV line(s) to earth	±1kV line(s) to line(s) ±2kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment
Voltage dips, short interruptions and voltage variations on power supply input lines EN/IEC61000-4-11	<5% Ut (>95% dip in Ut) for 0.5 cycle 40% Ut (60% dip in Ut) for 5 cycles 70% Ut (30% dip in Ut) for 25 cycles <5% Ut (>95% dip in Ut) for 5 secs	<5% Ut (>95% dip in Ut) for 0.5 cycle 40% Ut (60% dip in Ut) for 5 cycles 70% Ut (30% dip in Ut) for 25 cycles <5% Ut (>95% dip in Ut) for 5 secs	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Primado2 requires continued operation during power mains interruptions, it is recommended that the Primado2 be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field EN/IEC61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE 'Ut' is the AC mains voltage prior to application of the test level			

Guidance and manufacturer's declaration - electromagnetic immunity.			
The Primado2 is intended for use in the electromagnetic environment specified below. The customer or the user of the Primado2 should assure that it is used in such an environment.			
Immunity test	EN/IEC60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF EN/IEC61000-4-6	3Vrms 150kHz to 80MHz	3Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the Primado2, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2 \cdot \sqrt{P}$ $d = 1.2 \cdot \sqrt{P}$ 80MHz to 800MHz $d = 2.3 \cdot \sqrt{P}$ 800MHz to 2.5GHz
Radiated RF EN/IEC61000-4-3	3V/m 80MHz to 2.5GHz	3V/m	Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters as determined by an electromagnetic site survey ^(a) , should be less than the compliance level in each frequency range ^(b) . Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1 At 80MHz and 800MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobiles radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Primado2 is used exceeds the applicable RF compliance level above, the Primado2 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Primado2.

b Over the frequency range 150kHz to 80MHz, field strengths should be less than 3 V/m.

Cables and accessories	Maximum length	Complies with	
Motor Cord	3.5m (Unshielded)	RF emissions, CISPR11 :	Class B/Group 1
Foot Control Cord	3.5m (Unshielded)	Electrostatic discharge (ESD) :	EN/IEC61000-4-2
Power Cord	3.6m (Unshielded)	Electric fast transient/burst :	EN/IEC61000-4-4
		Surge :	EN/IEC61000-4-5
		Voltage dips, short interruptions and voltage variations on power supply input lines :	EN/IEC61000-4-11
		Power frequency (50/60Hz) magnetic field :	EN/IEC61000-4-8
		Conducted RF :	EN/IEC61000-4-6
		Radiated RF :	EN/IEC61000-4-3

Recommended separation distances between portable and mobile RF communications equipment and the Primado2.			
The Primado 2 is intended for use in an electromagnetic environment in which radiated RF disturbances are control LCD. The customer or the user of the Primado 2 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Primado 2 as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150kHz to 80MHz $d=1.2\sqrt{P}$	80MHz to 800MHz $d=1.2\sqrt{P}$	800MHz to 2.5GHz $d=2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
For transmitters rated at a maximum output power not listed above, the recommended separation distance (d) in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where (P) is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.			
NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.			
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

Manufacturer

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Specification are subject to change without notice.

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