Cochlear®
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Cochlear™ CP1110S Surgical Processor

User Guide

For Professionals

Symbols used in this document

	**Note:** Important information or advice.
	**Tip:** Time saving hint.
	**Caution (no harm):** Special care to be taken to ensure safety and effectiveness. Could cause damage to equipment.
	**Warning (harm):** Potential safety hazards and serious adverse reactions. Could cause harm to person.

Contents

Introduction

The Cochlear® Surgical Processor (CP1110S Surgical Processor) is for use by surgeons and healthcare professionals in combination with Nucleus® SmartNav, Cochlear Objective Measures, or the Cochlear Research Platform Software to provide intraoperative surgical diagnostic information from a Cochlear Nucleus implant during a cochlear implant surgical procedure.

The CP1110S Surgical Processor consists of:

- Cochlear Surgical Processing Unit (CP1110S)
- Cochlear Power Extend Battery Module, Rechargeable
- Cochlear CP1110S Surgical Coil
- Cochlear CP1110S Surgical Coil (2m).

Note: The Cochlear CP1110S Surgical Coil (2m) is for use with the Cochlear Research Platform Software and is not required for use with Nucleus SmartNav.

Compatibility

The CP1110S Surgical Processor is designed to be used with following intraoperative application software: Nucleus SmartNav (version 3 or later), Cochlear Objective Measures.

The CP1110S Surgical Processor is compatible with the following Cochlear Nucleus implants:

- CI1000 Series Implants: CI1012, CI1022, CI1024, CI1032.

The Cochlear CP1110S Surgical Processor:

1. Cochlear CP1110S Surgical Coil (2m)
2. Cochlear CP1110S Surgical Coil
3. Cochlear Surgical Processing Unit (CP1110S)
4. Cochlear Power Extend Battery Module, rechargeable

Note: The battery module is not required when using the Cochlear Wired Programming Pod.

Surgical considerations before performing measurements

Surgical materials, such as surgical staples and the thickness of draping, can affect the quality of communication between the surgical processor and the implant. This impacts the connection quality and accuracy of intraoperative measurements.

To ensure the best possible connection:

- minimise draping to reduce the coil-to-coil distance between the surgical processor and the implant
- consider interference from surgical materials when placing the surgical coil. For example, do not place the surgical coil over surgical staples.

Use the surgical processor

The surgical processor can become hot if it is placed in a hot area for a prolonged period. Do not leave the surgical processor in a hot area.

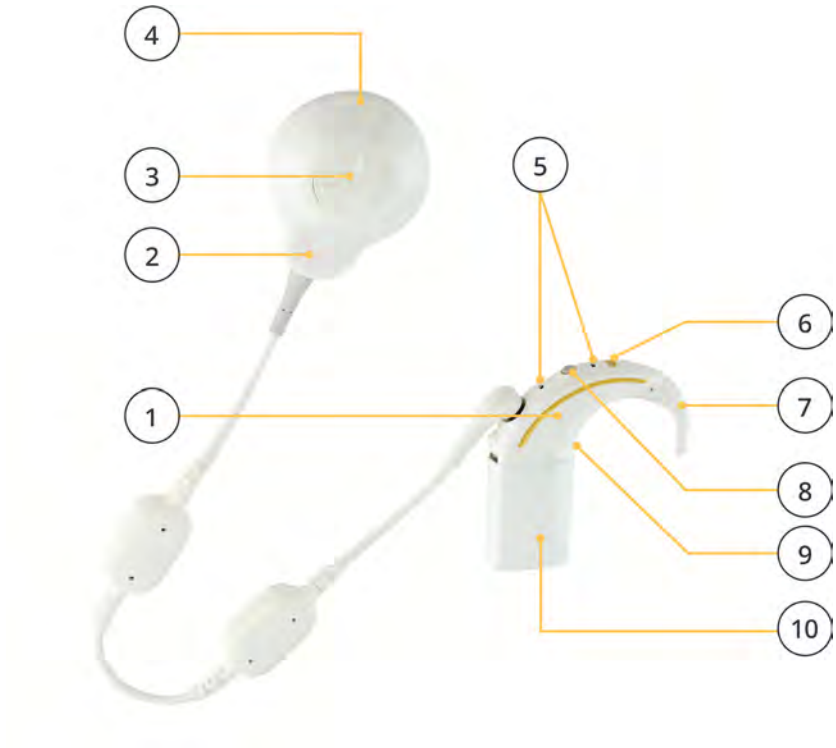
Warning: The surgical processor is not sterile.
Place the surgical processor in a sterile bag before use in the sterile field.

Warning: Non-sterile components or equipment that are not in a sterile bag must be kept outside of the sterile field.

Warning: Check the surgical processor for damage before use.

Warning: Do not use the surgical processor if it becomes unusually warm or hot.
Check the processor for signs of overheating when in use.
Remove the device immediately if it becomes hot.

Warning: Do not attempt the stimulation of unsupported implants with the surgical processor.



1. Surgical processing unit
2. Surgical coil
3. Cochlear 5(i) Magnet
4. Cochlear 5(i) Magnet Cover
5. Microphones
6. Indicator light
7. Earhook
8. Control button
9. Serial number
10. Battery module

Battery

The surgical processor uses the Cochlear Power Extend Battery Module. This battery is rechargeable and needs to be charged regularly.

Note: The surgical processor battery must be charged before first use.

The Cochlear Power Extend Battery Module

Battery lifespan

Batteries should be replaced as needed just as you would with any other electronic device. A completely empty rechargeable battery will typically take up to four hours to fully recharge.

The amount of charge a battery holds naturally diminishes over time. To maintain good condition of the rechargeable battery and extend its lifespan, it is important to know how to charge, maintain and store the battery:

- Charge battery before storing. The optimum storage environment is a cool, dry place.
- It is not recommended to store the battery for extended periods of time without using or charging. If you have more than one battery, rotate the batteries through usage.
- Avoid exposure to temperature extremes and humidity in storage and use.

Charge the battery

The Cochlear Y Battery Charger is used to charge the surgical processor rechargeable battery module (refer to *Use the Y Battery Charger* on page 12).

Before you start

The rechargeable battery module has built-in safety and monitoring features. Read this section before using your battery charger.

New batteries

You need to charge new batteries before first use.

What should I do?

- Before using a new battery module, you need to connect it to a charger until it is fully charged.

Charging temperature

The battery chargers have a built-in temperature sensor. Batteries must be charged at 0° C – +40° C (+32° F – +104° F). If battery module temperature is outside this range, the LED will flash orange (error).

What should I do?

- Charge rechargeable battery modules at a room temperature of 0° C – +40° C (+32° F – +104° F).

Battery turns off

If a charged battery detects a problem, it will turn the surgical processor off. If the problem is fixed, it will turn back on again.

What should I do?

- If a battery turns off, disconnect and reconnect it to your surgical processor. If this does not restore power, contact your Cochlear representative.

Completely flat battery

After many uses, or being stored too long, a rechargeable battery module may be too flat to allow recharging.

What should I do?

- If a rechargeable battery module is too flat to charge, the LED will flash orange (error). Replace the battery module.

Battery storage

Your rechargeable battery module will lose some power if you do not use it for a period of time.

What should I do?

- Charge your battery module before storing it.

Use the Y Battery Charger

The Y Battery Charger can charge two rechargeable battery modules at once.

It uses the supplied USB cable to plug into:

- a wall power outlet using the Cochlear USB Power Adaptor,
  or
- a USB port (for example, computer)[1].

1. USB cable
2. Rechargeable battery module connector
3. LED indicator

[1] USB ports must be high power USB 1.0 or higher. If you use a USB hub to connect more than one USB device to a port, we recommend you use a powered hub.

1. Fit the rechargeable battery module to the charger at a slight angle. Twist to connect.

2. Plug the USB cable into a power outlet or USB port.
   The LED flashes green while charging.

Note: If you use a power outlet, plug the USB cable into the power adaptor first, then plug the adaptor into the power outlet.

3. The LED changes to steady green when the module is fully charged.

Replace the battery module

Attach the battery module

The battery module has a marking that indicates the correct orientation for attaching it to the surgical processing unit.

1. Align the raised marker and arrow on the battery module towards the back of the surgical processing unit.

2. Fit the parts together with the battery module at a slight angle to the processing unit socket.

3. Twist the battery module as shown to attach the parts.
   The surgical processor will turn on automatically.

Remove the battery module

1. Twist the battery module as shown to release it from the processing unit.

2. Pull the battery module from the processing unit.

Caution: Always check the battery lock is unlocked before removing the battery module. For more information, refer to *Battery lock* on page 17.

Battery lock

The battery lock will lock the battery to the processing unit. You must check that it is unlocked before attaching or removing the battery module.

To disengage the battery lock:

- Push the lock to the far right to unlock the battery module.

Caution: Always check the battery lock is unlocked before attaching or removing the battery module.

Change the surgical coil

The surgical processor is compatible with the following surgical coils:

- Cochlear CP1110S Surgical Coil
- Cochlear CP1110S Surgical Coil (2m).

Note: The Cochlear CP1110S Surgical Coil (2m) is for use with the Cochlear Research Platform Software and is not required for use with Nucleus SmartNav.

Change the surgical coil as required.

To change the surgical coil:

1. Hold the coil cable grip and firmly pull it straight out of the processing unit.
   Do not pull on the flexible part of the coil cable.

   Note: Do not twist the coil cable when you pull it out of the processing unit.

2. Push the new coil cable into the processing unit until it clicks into place. Do not twist.

Note: Avoid twists and kinks in the coil cable.

Turn on and off

1. To turn on the surgical processor, either:
   - connect the battery (refer to *Replace the battery module* on page 14),

     or
   - if the battery is already connected, short-press the button.

     The light will change to green as the surgical processor turns on.

2. To turn off the surgical processor:
   - disconnect the battery (refer to *Replace the battery module* on page 14),
     or
   - press and hold the button for 5 seconds.

     The light will change to steady orange as the surgical processor turns off.

Note: If the surgical processor is not connected to the implant, it will turn off automatically after 60 minutes.

Indicator lights

Surgical processor

Indicator lights	What it means
Green flash	Surgical processor is turning on.
Long flash of orange	Surgical processor is turning off.
Briefly flashes blue	Initial pairing of the surgical processor to Nucleus SmartNav successful.

Implant detection

Indicator Light	What it means
Green flashes	Implant detected.
Orange flashes	No implant detected.

Surgical processor alert status

Indicator lights	What it means
Orange flashes	Battery flat alert.
Steady orange	General fault alert.

Wired programming mode

Indicator lights	What it means
Steady orange	Surgical processor is on but there is no connection to the software.
Steady green	Surgical processor connected to the software.
Green flashes	Live stimulation is active.

Programming mode

Indicator lights	What it means
 Steady orange	Surgical processor is on, no connection to software.
 Steady green	Surgical processor is on and connected to software.
 ... Green flashes	Live stimulation active.

Battery charging

Light	What it means
 ...	Battery module is charging.
	Battery module is fully charged.
 ...	Error (refer to *Troubleshoot* on page 32).

Nucleus SmartNav

Before use, you need to pair your surgical processor with Nucleus SmartNav running on a compatible iPad®. Once paired, you can use Nucleus SmartNav to perform intraoperative measurements related to the placement and function of the electrodes in the cochlea.

Keep the surgical processor within 10 m of the iPad to ensure the Bluetooth® connection is maintained.

For information on how to pair the surgical processor with Nucleus SmartNav, refer to Nucleus SmartNav and the *SmartNav User Guide* for details.

Warning: Consider security when connecting your surgical processor to devices such as tablets. Only connect to devices that are protected, for example, password or PIN access control. Do not connect to devices that have had their operating system altered.

Place the surgical coil

When performing intraoperative tests, ensure the surgical coil is placed on the implant to obtain measurements. If the surgical coil is removed from the implant during a measurement, replace the surgical coil and resume testing. If you are using Nucleus SmartNav, follow the on-screen prompts in Nucleus SmartNav to resume the intraoperative tests.

Warning: Do not use excessive force on the surgical coil when in contact with the implant. Use of excessive force interferes with the surgical placement of the implant.

When placing the surgical coil, avoid sliding the coil sideways onto the implant. This could cause the coil magnet to misalign with the implant. Always place the surgical coil down onto the implant.

To place the surgical coil on the implant:

1. Hold the surgical coil slightly above the implant location.

2. Rotate the surgical coil slightly in both directions (clockwise and anti-clockwise). When you feel a strong pull, place the surgical coil on the implant.
3. Rotate the surgical coil to change the position as required.

Care

After surgery, ensure the surgical processor is not contaminated by blood or other contaminants as it is removed from the sterile bag.

Note: If the surgical processor is contaminated by blood or other bodily fluids, contact your Cochlear representative for guidance.

Clean the surgical processor

Caution:
Do not use cleaning agents or alcohol to clean your processor.
Only use cleaning products as described in the cleaning procedure.

Warning:
The surgical processor cannot be sterilised.
Turn your processor off before cleaning or performing maintenance.

To clean the surgical processor:

- wipe the processing unit, coil, cable and earhook with a soft dry cloth
- check all parts for dirt or moisture
- remove the battery module and make sure all the contacts are clean
- wipe battery contacts with a soft dry cloth.

If the surgical processor gets wet:

- dry the processing unit, battery and the contacts with a soft cloth
- remove the battery module
- replace the battery.

Change the surgical coil magnet

The CP1110S Surgical Processor uses a Cochlear Magnet strength 5(I) and coil cover.

Note: Do not use the 5(I) strength magnet with standard coils.

To change the magnet:

1. Lift the Cochlear 5(I) Magnet Cover from the bottom edge, then lift it up to remove.

2. With finger grips facing up, unscrew the magnet anticlockwise.

3. Remove the magnet.

4. Insert the new magnet and turn clockwise until it stops.
5. Turn the magnet a little more until you feel a click.

Tip: The tamper-resistant lock marker aligns with the cable when locked.

6. Align the cover on the magnet and press until you feel a click.

Change the earhook

The surgical processor uses a medium Cochlear Earhook. Change the earhook as required.

Note: Remove the earhook only when necessary. It may become loose if it is removed too often.

1. Pull up on the earhook to remove it.

2. Click the new earhook into place.

Change microphone cover

Microphone protectors are built into the Cochlear Microphone Cover, which can be replaced. Change the microphone covers as required. For example, if the microphone cover is lost or damaged.

Note: Microphone covers do not need to be replaced if they get wet.

1. Microphone protectors
2. Microphone cover

Step 1: Remove old microphone cover

1. Hold the coil cable grip and firmly pull it straight out of the processing unit (refer to *Change the surgical coil* on page 18).

   Caution: Do not tug on the flexible part of the coil cable.

2. Lift the microphone cover from the bottom edge, then lift it up to remove.

Step 2: Attach new microphone cover

1. Fit the replacement microphone cover onto the processing unit.

2. Press down firmly with a finger on each end and the middle of the microphone cover until you feel a click.

Storage

Store your surgical processor in a dry place. For security you should store the surgical processor in a safe place when unattended.

Battery charger care

Regularly check that the battery charger is clean. If you notice any dust or dirt:

1. Disconnect the battery charger from the power source and remove any battery modules.
2. Hold the battery charger upside down and tap it gently to remove any dirt from the battery charger sockets.

   Carefully blowing on the sockets may also help remove dirt.
3. Wipe the battery charger sockets with a soft dry cloth.

Note: Use a different charger socket on the Y battery charger each time you charge to wear the sockets evenly.

If the charger gets wet:

- carefully shake out the liquid
- dry the battery charger for 24 hours
- do not use the battery charger until it is dry.

Troubleshoot

Contact your Cochlear representative if you have any concerns regarding the operation or safety of your surgical processor.

Surgical processor

Problem	Resolution
Surgical processor will not turn on/button will not respond	1. Make sure the surgical processor has sufficient charge before every surgery. Refer to *Charge the battery* on page 11. 2. Try turning the surgical processor on again. Refer to *Turn on and off* on page 20. 3. Change the battery. Refer to *Replace the battery module* on page 14, or Charge the battery. Refer to *Charge the battery* on page 11. 4. If you are using a new rechargeable battery, that has not been charged it may still be in 'Sleep Mode'. Refer to *Charge the battery* on page 11. 5. Check the battery contacts are clean. Refer to *Care* on page 25. 6. If the problem continues, contact your Cochlear representative.
Surgical processor switches off	1. Try turning the surgical processor on again. Refer to *Turn on and off* on page 20. If the surgical processor has not been connected to the implant for more than 60 minutes it will switch off automatically. 2. Change the battery. Refer to *Replace the battery module* on page 14, or Charge the battery Refer to *Charge the battery* on page 11.

Problem	Resolution
Surgical processor battery too low to complete the surgical session	• Change the battery. Refer to *Replace the battery module* on page 14, or • Charge the battery. Refer to *Charge the battery* on page 11
Surgical processor will not turn off	• Remove the battery module from the processing unit. Refer to *Replace the battery module* on page 14.
Surgical processor gets wet	• Dry the surgical processor with a soft cloth and change the microphone protector. Refer to *Care* on page 25.

Battery

Problem	Resolution
Battery is not lasting as long as usual	1. Clean all connections and parts of the battery module. 2. Clean all connections on the processing unit. 3. Try replacing the surgical coil with a new surgical coil. 4. If the problem continues, contact your Cochlear representative.
You place a fully charged battery on the charger and the indicator light on the battery charger shows that the battery is charging	• This will not cause any damage to the battery as the charge cycle on a fully charged battery is very short.
The indicator light on the battery charger does not light	1. The rechargeable battery module is not properly connected. Check the connection. 2. The rechargeable battery module is over-discharged. Try a different battery module. 3. The rechargeable battery module is faulty. Try a different battery module. 4. There is no power to the USB port. Check the power supply.

Problem	Resolution
The safety indicator light on the battery charger is flashing orange	1. If the indicator light flashes orange immediately, it could be due to the wrong battery type connected to the charger, or the battery has reached its end of life and needs replacing. 2. The room temperature may be outside the operating range of the charger. Try using the charger at a room temperature of 0°C - +40°C (+32°F - +104°F). Battery charging will automatically resume once placed in the correct temperature range. 3. Charge timeout is reached, if charging time becomes excessive after 5 hours. Do not attempt to charge the battery again. The battery should no longer be used and should be replaced. 4. The USB port or adaptor may not be the correct type. Try another USB port or adaptor. 5. If using a USB hub, too many devices may be connected to the hub. Try removing some devices from the hub. 6. If using a USB hub, it may not be the correct type. Use a powered hub. 7. Try a different or new rechargeable battery module. Aged batteries may be due for replacement if the charge can no longer be attained.