Elekta Neuromag® TRIUX Patient Positioning

Instructions for Use

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Acknowledgment of other trademarks

Elekta acknowledges the trademarks and registered trademarks of other manufacturers that we use in this document.

Referenced documents

Elekta does not supply all the documents that we refer to in this document with the equipment. Elekta reserves the right to make the decision on which of the documents we supply with the equipment.

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Elekta Neuromag® TRIUX complies with the requirements of the Medical Device Directive 93/42/EEC amended by Directive 2007/47/EEC.

1. Safety and regulations

1.1. Safety symbols

1.1.1. Warning, caution and note symbols

The following are samples of how warnings, cautions and notes appear throughout this document. The text within the samples explains their meaning.

WARNING 1.1

Warnings are directions which, if ignored, can constitute a health hazard, cause fatal or serious injury, or lead to erroneous clinical diagnosis and, possibly, to clinical mistreatment.

CAUTION 1.1

Cautions are directions which you must obey to ensure safe and efficient operation and to avoid damage to the system.

Note: *Notes give you advice and recommendations for safe and efficient use of the product as well as highlight unusual points.*

1.1.2. Symbols on the equipment

The following symbols are used on the equipment. Familiarize yourself with each symbol and its meaning before you operate the equipment.

Table 1.1 List of symbols on the equipment

Label	Meaning
	Caution. Parts of the system are marked with this label when it is necessary for the user to draw attention to avoiding a potential hazard or to ensure safe, correct or improved operation and to avoid damage.
	Refer to the instruction manual. Parts of the system are marked with this symbol when it is *mandatory* for the user to refer to instructions given in the manuals accompanying the system to ensure safe operation. In the manuals, it also calls attention to these instructions.
	Consult instructions for use. Parts of the system are marked with this symbol when it is necessary for the user to refer to instructions given in the manuals accompanying the system. In the manuals, it also calls attention to these instructions. They intend to ensure correct or improved operation and/or increased safety and to avoid damage.
	Type BF (body floating) equipment symbol. The applied parts (parts in direct contact with the person being investigated with the system) and the type plate are marked with this symbol to indicate that they fulfill the leakage current requirements of the safety standard IEC 60601-1.
	Static electricity symbol. The parts of the system marked with this symbol indicate the presence of components susceptible to static electricity and require the use of special static-electricity preventing techniques.

1.2. Safety precautions

Elekta products are designed to meet stringent safety standards. Every reasonable precaution has been taken during manufacture to safeguard the health and safety of patients and persons who will operate this equipment.

All medical electrical equipment requires proper installation, operation and maintenance, particularly with regard to safety.

It is vital that the user read, understand, and where applicable strictly obey, all safety directions, warnings, cautions, notes, and safety markings within this document and on the equipment.

WARNING 1.2

This section contains important information concerning the safe use of the product and maintaining reliable operation. Read the safety instructions entirely before you use the product.

In addition, read and obey the complete safety instructions for Elekta Neuromag® TRIUX in *Elekta Neuromag® TRIUX User's Manual*. The manual contains important safety instructions not included in this manual.

Changes to the product

Any changes to the equipment provided by Elekta may only be performed by persons expressly authorized to do so by Elekta. Such changes must comply with best engineering practices and effective laws and regulations.

CAUTION 1.2

Changes, additions, or maintenance to the equipment performed by persons without appropriate knowledge, qualifications, and training may cause risks of serious injury and/or damage to the equipment. Furthermore, such alterations may void the warranty. No modification of this equipment is allowed without authorization from Elekta.

Third party devices and other auxiliary user-supplied equipment

Elekta assumes responsibility only for third-party equipment or components that are expressly recognized as compatible by Elekta. Elekta assumes no responsibility for the compatibility, fitness for use, or safety of third-party equipment not expressly recognized as compatible by Elekta.

1.3. Safe operation of the equipment

WARNING 1.3

Do not change the gantry position while a patient is under the gantry.

WARNING 1.4

Do not put a patient under the gantry except when the green OK light on the position indicator display is continuously lit. A blinking green OK light means that the gantry is in the liquefaction position. The liquefaction position is not intended to be used for patient measurements.

WARNING 1.5

Do not leave anybody alone inside a closed magnetically shielded room (MSR) without the presence of another person outside the room.

Note: *In case of studying patients or small children, an accompanying person in the room is highly advisable, particularly if it is likely that the patient cannot call for help or get out in case of emergency. Audio and video monitoring is also recommended. Test the monitoring before measurement.*

CAUTION 1.3

Care should be excercised to prevent limbs, fingers, or toes being left between the moving parts of the couch or chair and the gantry or doorway. Instruct the patient to keep hands on the table, armrests or on his/her lap.

2. Introduction

2.1. Function of this manual

This manual applies to the Elekta Neuromag® TRIUX MEG system.

This manual is intended to instruct users in the safe and effective operation and maintenance of the equipment described. The term 'user' includes the responsible organization with authority over the equipment and those persons who actually handle the equipment.

Before attempting to work with this equipment, the user must:

- Thoroughly read and completely understand this manual
- Keep this manual with the equipment for easy access.

2.2. Intended audience

This manual is written for trained users of an Elekta Neuromag® TRIUX MEG system. The user groups are defined below.

Table 2.2 User definitions

User	Definition
MEG user	A person trained to use the MEG system and who operates the system for MEG measurements.
MEG key user	A person trained to use the MEG system and who is technically responsible for the day-to-day operations of the system. Trained to monitor the operation of the MEG system and to resolve minor temporary problems that arise from local circumstances. Assesses whether problem escalation to Elekta service is needed.

2.3. Accompanying documentation

The accompanying documentation is a list of other documents related to the product. Contact your Elekta representative for more information.

Table 2.3 Accompanying documentation

Manual	Neuromag p/n
User Manuals	
Elekta Neuromag® TRIUX User's Manual	NM24131A-*
Elekta Neuromag® TRIUX Data Acquisition Software Release 6.0 User's Manual	NM23732A-*
Elekta Neuromag® TRIUX Internal Helium Recycler Instructions for Use	NM25233A-*
Other Manuals	
Elekta Neuromag® TRIUX Technical Manual	NM24132A-*

2.4. Disclaimer

- Elekta assumes no liability for use of this document if any unauthorized changes to the content or format have been made.
- Every care has been taken to ensure the accuracy of the information in this document. However, Elekta assumes no responsibility or liability for errors, inaccuracies, or omissions that may appear in this document.
- Elekta reserves the right to change the product without further notice to improve reliability, function or design.
- This document is provided without warranty of any kind, either implied or expressed, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

2.5. Directional conventions

Unless explicitly stated otherwise, the directions left, right, front, and rear used in this manual are given as viewed by the patient laying on the couch in supine position or sitting in the chair in seated position.

2.6. Glossary of terms

The following terms have this specific signification throughout this document.

For the terms related to the MEG system in general, see *Elekta Neuromag® TRIUX User's Manual*.

Table 2.4 Terms

Term	Definition
Bioamplifier	An instrument for measuring bioelectrical signals from body surface potentials, for example, an electro-oculogram. Also known as a polygraphic amplifier.
Dewar	A thermally insulated vessel for cryogenic liquids. It has a vacuum-insulated double-wall structure. The vacuum space also houses thermal radiation shields.
Electroencephalograph	An instrument for performing electroencephalography
Electroencephalography (EEG)	The recording of electrical activity along the scalp produced by the simultaneous firing of neurons within the brain
Gantry	A scanner assembly used to hold the dewar and sensor array inside the dewar
Internal helium recycler (IHR)	A closed-loop helium reliquefaction system designed to be integrated into and used with an Elekta Neuromag® TRIUX MEG system.
Liquefaction	Process during which the cryocooler cold head reliquefies helium gas from the helium storage tanks back into the Dewar
Magnetically shielded room (MSR)	A special enclosure whose walls, floor, and ceiling made of plates of high-permeability alloy and of high-conductivity metal (typically aluminium). Typically, the magnetically shielded room has 2-3 such concentric shells, separated by a few hundreds of millimeters. The room distorts the external magnetic field in such a way that the magnetic field inside is substantially weaker. The shielding efficacy increases with frequency.
Magnetoencephalograph	An instrument for performing magnetoencephalography
Magnetoencephalography (MEG)	An imaging technique used to measure the magnetic fields produced by electrical activity in the brain
Magnetometer	A flux transformer coupling external magnetic signal to the SQUID detector, making the SQUID to respond to the external magnetic field. A magnetometer comprises a single pickup coil and a signal coil coupling the signal to the SQUID.

Table 2.4 Terms

Term	Definition
MEG service engineer	Qualified person from Elekta who installs, assembles, maintains and repairs the MEG system. A MEG service engineer is capable of performing any required installation, monitoring, maintenance and repair of the internal helium recycler and the MEG system.
Sensor array	An assembly of two or more sensors. See also sensor helmet.
Sensor helmet	A room-temperature surface that covers the sensor array in a magnetoencephalograph
SQUID	Superconducting QUantum Interference Device. SQUID is an ultrasensitive magnetic flux detector based on superconductivity and so-called Josephson effect. It operates at cryogenic temperatures.

2.7. Abbreviations

The following abbreviations may be found in this document.

Table 2.5 Abbreviations

Abbreviation	Term
EEG	Electroencephalography
HPI	Head Position Indicator
MEG	Magnetoencephalography
MSR	Magnetically Shielded Room

3. Product description

3.1. Product overview

The Elekta Neuromag® TRIUX patient positioning system consists of a probe unit, couch, chair, chair fine-adjustment system, and pediatric comfort set. The chair fine-adjustment system and pediatric comfort set are optional.

The probe unit is motor driven and enables three different measurement positions for patients and research participants.

The patient couch is used for a supine measurement position. The supine position is a preferable position for infants, sleeping patients, and in extended recordings. For the supine position, the probe unit is set to the lowest position with the tilting angle of 0°.

The patient chair is used for seated measurement positions, reclined and upright. For the reclined seated position, the tilting angle of the probe unit is set to 60° with respect to the supine position, and the upright seated position to 68°.

The optional chair fine-adjustment system is used for horizontal positioning of the patient chair and reclining of the chair backrest.

The optional pediatric comfort set enhances the positioning of pediatric patients and pediatric research participants.

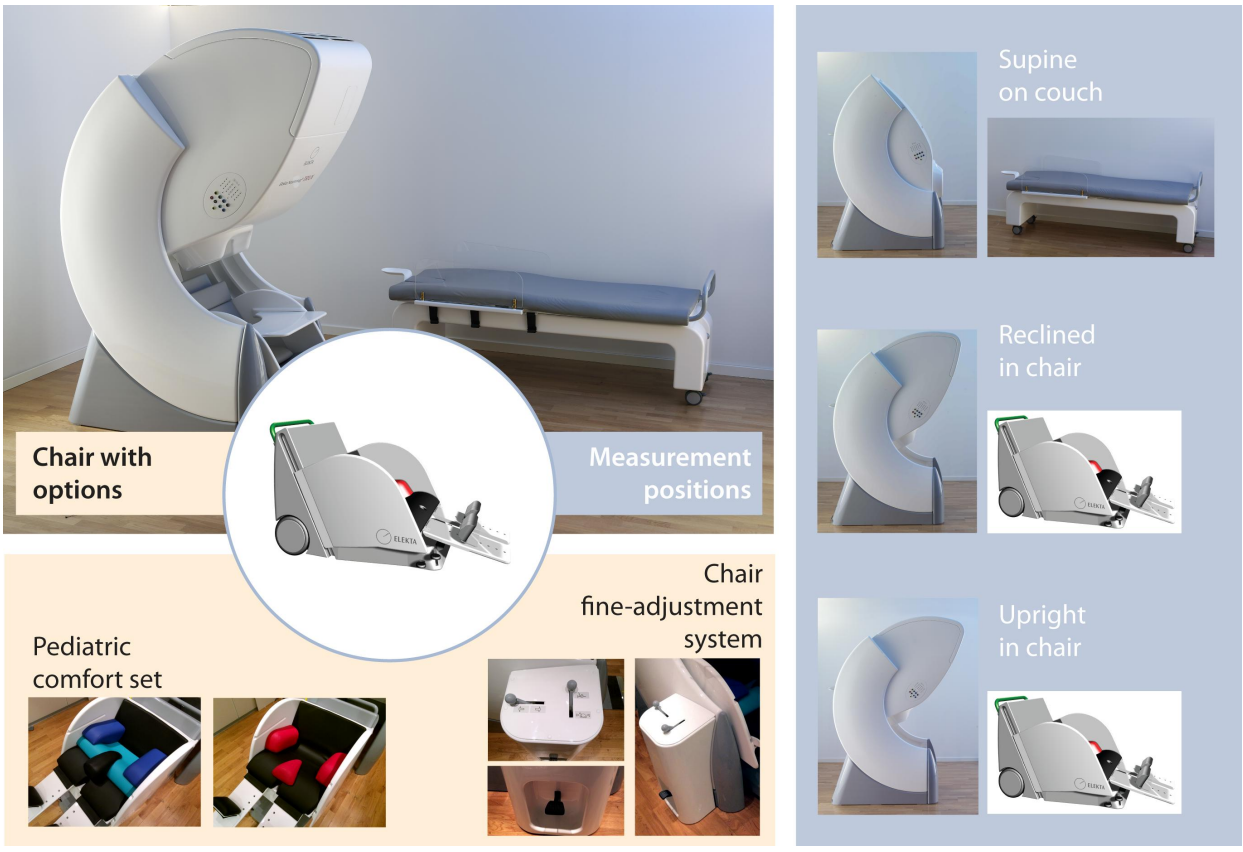

Figure 3.1 Overview of the patient positioning system

Note: *The probe unit can only be used when it is securely positioned in one of the three measurement positions.*

If the internal helium recycler is installed, the probe unit also has a special liquefaction position, where re-liquefaction of helium is optimal. The liquefaction position is not intended to be used for MEG measurements.

For a technical description of the MEG system, see *Elekta Neuromag® TRIUX Technical Manual*.

3.2. Probe unit

The probe unit consists of a gantry, dewar and insert.

The gantry consists of

- Fixed base unit
- Rotating cradle
- Sensor helmet.

The dewar is a cryogenic helium container mounted inside the rotating cradle of the gantry.

The insert is located inside the dewar and consists of the sensor array, electronics and wires. For more details, see *Elekta Neuromag® TRIUX Technical Manual*.

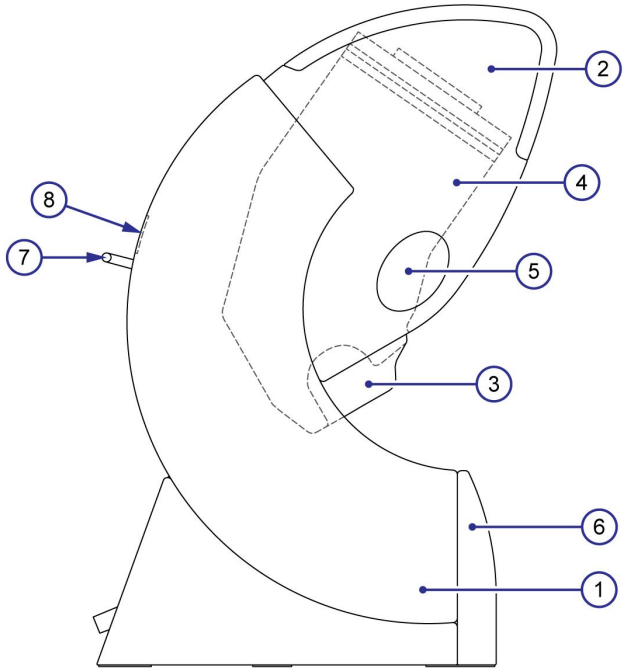

Figure 3.2 Probe unit

(1) Fixed base unit
(2) Rotating cradle
(3) Sensor helmet
(4) Dewar, inside the cradle
(5) Side panel
(6) Bumpers
(7) Latch release bar
(8) Lifting mechanism control buttons

The HPI connectors, and also the electrode and audio interfaces are located on the side panel housing of the rotating cradle. Depending on the configuration, they may be located on the right or left side of the cradle.

3.2.1. Lifting mechanism and the position indicator display

Pull down the latch release bar on the back side of the gantry to release the latches for changing the gantry position. The position of the gantry is changed by using the control buttons beside the latch release bar.

Note: *Make sure the couch or chair are moved away from the gantry before changing the gantry position.*

Figure 3.3 Latch release bar

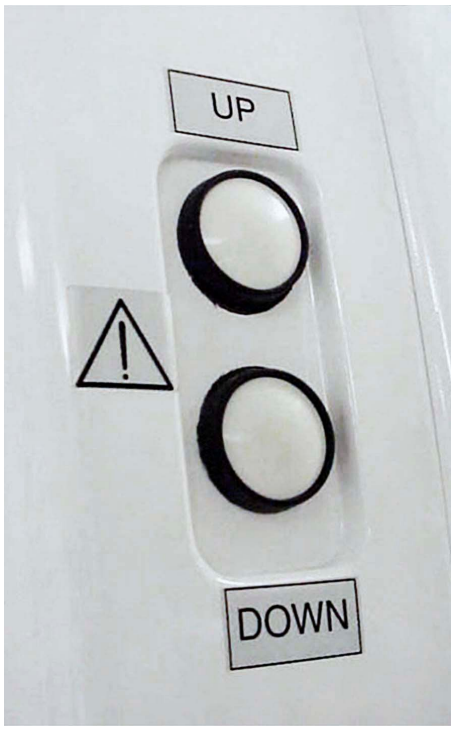

Figure 3.4 Lifting mechanism control buttons

You can monitor the operation of the lifting mechanism with the help of the position indicator display on the wall behind the probe unit.

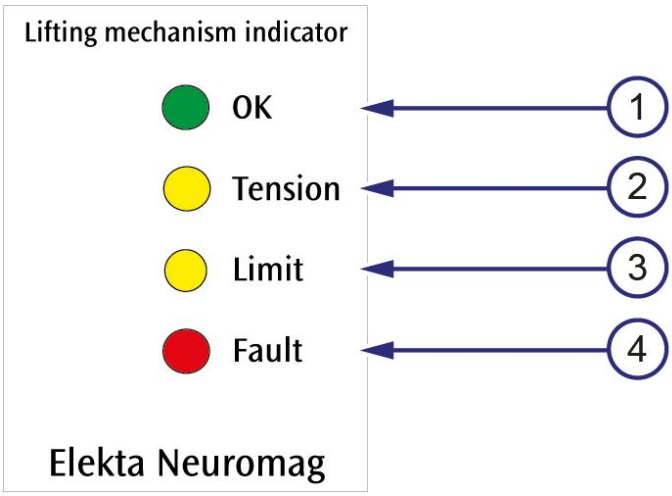

Figure 3.5 Position indicator display

No	Indicator	Meaning
1	Green light **OK**, continuous	Allowed measurement position (supine, reclined seated or upright seated). Gantry position secured.
1	Green light **OK**, blinking	Liquefaction position. Not intended to be used for patient measurements.
2	Amber light **Tension**	Gantry position not secured. The weight of the rotating cradle causes tension to the ropes of the lifting mechanism. This is normal during up and down movement.
3	Amber light **Limit**	Rotating cradle is at the upper limit of the upward movement.
4	Red light **Fault**	Abnormal condition because of malfunction in the lifting mechanism and/or the fiber optic sensors that monitor the position. Contact Elekta service.

WARNING 3.6

Do not put a patient under the gantry except when the green OK light on the position indicator display is continuously lit. If the green OK light is still blinking, the gantry is in the liquefaction position. The liquefaction position is not intended to be used for patient measurements.

3.2.2. Gantry positions

WARNING 3.7

Do not change the gantry position while a patient is under the gantry.

Note: *Make sure the couch or chair are moved away from the gantry before changing the gantry position.*

The gantry can be set to three fixed measurement positions, the supine position for measurements with the couch, and reclined and upright positions for measurements with the chair. The sensor array inside the sensor helmet is horizontal (0°) in the supine position and tilted by 60° or 68° in the reclined and upright seated positions.

If the internal helium recycler is installed, the gantry also has a special liquefaction position, where reliquefaction of helium is optimal. The liquefaction position is not intended to be used for MEG measurements.

Figure 3.6 Supine measurement position on the couch. The gantry tilting angle is 0°.

Figure 3.7 Reclined seated measurement position in the chair. The gantry tilting angle is 60° in respect to the supine position.

Figure 3.8 Upright seated measurement position in the chair. The gantry tilting angle is 68° in respect to the supine position.

Note: *If Elekta Neuromag® TRIUX is not used for some time, for example, during weekends, it is recommended to keep the gantry in the supine measurement position to minimize helium boiloff.*

If the internal helium recycler is installed, the gantry should be kept in the liquefaction position overnight and during periods of inactivity.

For instructions on changing between the measurement positions and the liquefaction position, see *Elekta Neuromag® TRIUX Internal Helium Recycler Instructions for Use*.

Note: *Do not change the gantry position immediately after the liquid helium transfer as the thermal insulation on the exhaust lines is very cold and might break easily. Allow 1 hour before changing the position.*

3.3. Patient couch

Figure 3.9 Supine measurement position on the patient couch

The patient couch is equipped with wheels, a movable upper bed and a head support to help positioning the head of the patient inside the sensor helmet. Transparent side guards and safety belts are provided for the safety of the patients during measurement.

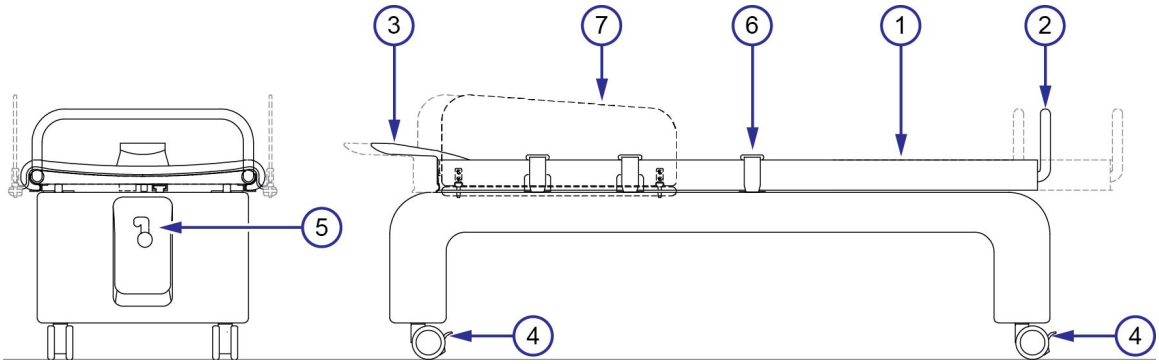

Figure 3.10 Patient couch

(1) Upper bed
(2) Handle
(3) Head support
(4) Wheel brakes
(5) Upper bed lock
(6) Safety belts
(7) Transparent side guards

Both the wheels and the upper bed can be locked. With the locks of the wheels open and the upper bed locked, the patient couch can be moved in and out of and inside the magnetically shielded room. The easiest way to move the couch is by pushing or pulling it from the handle which is located in the rear end of the upper bed.

For the measurement, the couch is docked between the bumpers of the gantry and the wheels are locked.

3.4. Patient chair

Figure 3.11 Seated measurement position in the patient chair

The patient chair is equipped with a removable T-bar handle, legrests, two table plates, a washable non-slip silicone mat, a removable standard cushion seat, and a support pillow set.

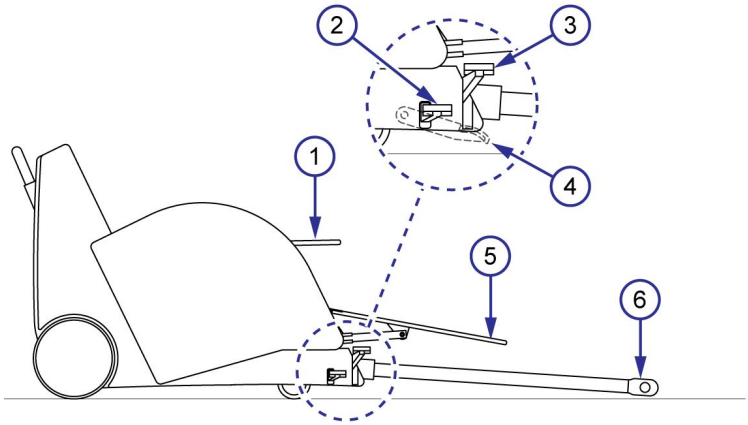

Figure 3.12 Patient chair

(1) Table
(2) Release pedal
(3) Elevation pedal
(4) Brake pedal
(5) Legrests
(6) T-bar handle

The height of the seat is adjusted using the pedals on the right-hand side of the chair. The higher pedal is the elevation pedal and the lower pedal is the release pedal. To elevate the seat the elevation pedal is pumped. To lower the seat, the release pedal is pushed down. There is a scale on the back of the chair body that can be used to record the exact height used during each measurement.

Note: *Do not use force or stand on the elevation pedal after the maximum height of the seat is reached to prevent the pedal from breaking.*

The chair is moved using the handle on the back of the chair or the T-bar handle which can be attached at the front, between the legrests.

The T-bar handle is installed by inserting the end of the bar to the mounting hole while keeping the T-bar in a vertical position, and once the shaft is properly inside the mounting hole, turning the T-bar clockwise. The mounting hole may need to be lowered down a little for inserting the shaft. The handle can be lowered down on the floor or removed when not in use.

Note: *When the handle is lowered down on the floor, be careful not to stumble on the handle.*

The T-bar handle is removed by turning the handle counterclockwise and pulling along the shaft of the handle.

Note: *Place the T-bar handle away from the feet once removed to prevent anyone from stumbling on it.*

Figure 3.13 Removing and installing the T-bar handle

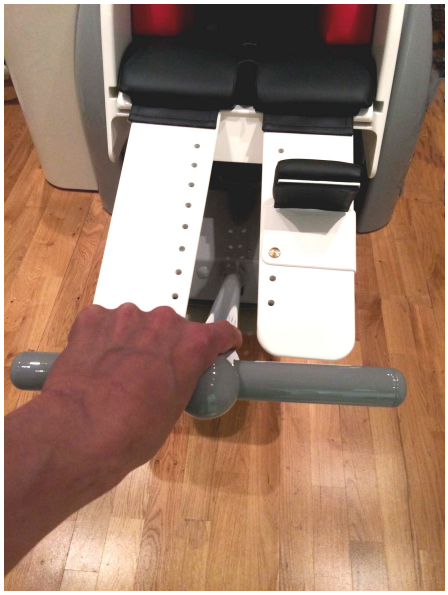

Figure 3.14 The T-bar handle installed

The brake pedal is located on the left-hand side of the chair. To activate the brake, the pedal is pushed down. To release the brake, the pedal is elevated.

Note: *Always activate the brake before the patient sits down or gets out of the chair.*

The legrests can be elevated one by one using hand or foot. The legrests will lock automatically, and will be released when lifted again.

Note: *The legrests should always be supported by hand when lowered down.*

Weight should not be put on the legrests. Always lower the legrests before assisting the patient in or out of the chair.

Figure 3.15 Legrests and a patient table with a silicone mat

Two table plates are included in the delivery to enable height adjustment of the table. The straight table plate enables the standard height for the table. Using the table plate with bent edges enables higher and lower position of the table depending on the side of the table used. The separate, washable non-slip silicone mat is used to protect the table surface and to make it less slippery.

Figure 3.16 Standard cushion seat

A support pillow set is delivered together with the standard cushion seat. The pillows are used, as needed, behind the patient's back. A special back support extension pillow can be installed behind the shoulders for tall patients.

3.5. Chair fine-adjustment system (option)

3.5.1. Side console

The side console is used to fine-adjust the backrest recline and the horizontal position of the chair.

Figure 3.17 Side console

The function is chosen using the lever on the right, and the direction of movement with the lever on the left. The driving force of the movement is delivered by repeatedly pumping the pedal in the lower part of the console until the desired position is reached. When the right-hand side lever in the console is up, the pedal adjusts the backrest recline. When the lever on the right-hand side is down, this moves the chair forwards and backwards. The pedal moves the chair to the direction shown by the lever on the left.

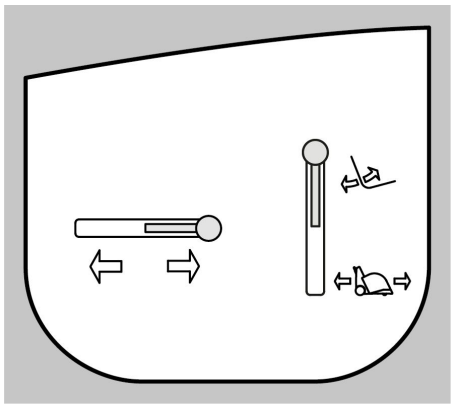

Figure 3.18 Increase the backrest recline

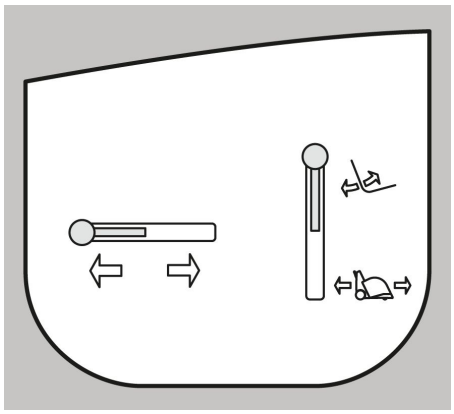

Figure 3.19 Decrease the backrest recline

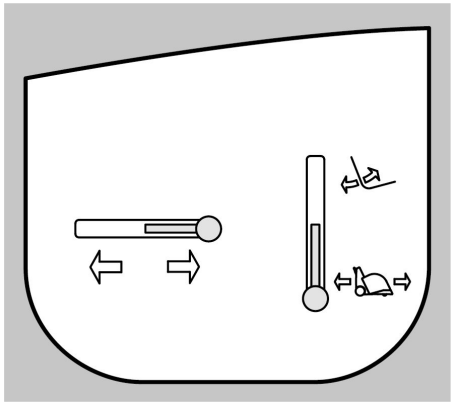

Figure 3.20 Move the chair forwards

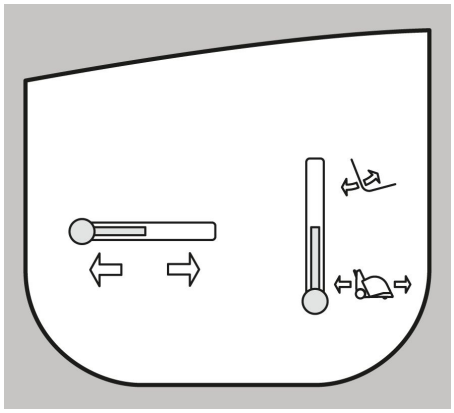

Figure 3.21 Move the chair backwards

There is a scale on the right hand side of the seat that can be used to record the exact backrest recline position used during each measurement, if needed.

3.5.2. Horizontal movement plate

The side console uses the horizontal movement plate under the gantry to move the chair backwards and forwards. To make it as easy as possible to seat the patient, it is recommended to move the horizontal actuator to, or close to the foremost position before pushing the chair under the gantry.

There is a scale on the movement plate that can be used to record the exact horizontal position of the chair used during each measurement, if needed.

Figure 3.22 Horizontal movement plate

3.5.3. Hydraulic hoses

To enable the backrest recline for the patient chair, the two hydraulic hoses mounted in the gantry have to be connected to the chair. For connecting the hoses the gantry has to be in a seated position. The connectors are fed under the strain relief bar on the back of the chair and pushed to the mating connectors in the back of the chair.

Note: *Make sure the hoses are always fed under the strain relief bar to minimise any unnecessary strain on the connectors.*

The connectors are designed to make a cross-connection impossible. The connectors are self sealing but they might leak a few drops of water when connected or disconnected. As the hydraulic fluid is water, it is sufficient to wipe the drops away with a clean cloth.

Figure 3.23 Hydraulic hoses fed under the strain relief bar and connected in the back of the chair

The connectors are released by pushing the release key on the side of the connector and pulling out the connector in a vertical direction.

Note: *Make sure the hydraulic hoses are not stretched when pulling the chair from under the gantry. The hoses have to be detached if the chair is pulled further than the length of the hoses allow.*

3.6. Pediatric comfort set (option)

The pediatric comfort set consists of

- Pediatric cushion seat
- Cushion set 1 (red) including
  - Pair of armrests
  - Saddle piece
- Cushion set 2 (blue) including
  - Additional cushion seat for smaller children
  - Pair of armrests
  - Saddle piece
- Adjustable footrests.

3.6.1. Cushion sets

Figure 3.24 Cushion set 1 (red)

Figure 3.25 Cushion set 2 (blue)

The cushions are attached to the chair with velcro tape. The armrests and saddle pieces are pushed in the openings in the cushions. The pediatric cushion seat does not have cushions on the legrests as this permits the use of the footrests.

3.6.2. Footrests

Footrests can be used with the pediatric cushion sets. The footrests are attached by placing the hook-shaped edge of the footrest around the edge of the legrest, and turning the footrest to insert the brass pin to the legrest. Multiple holes are provided for adjusting the footrests according to the height of the patient.

The footrests are removed by lifting the brass pin from the hole by turning the footrest around the outer edge of the legrest, and pushing it sideways to release the hook-shaped edge from the legrest.

Figure 3.26 Attaching and removing the footrest

4. Getting started

4.1. Measurement workflow of the Elekta Neuromag® TRIUX MEG system

This section gives an overview of the recommended Elekta Neuromag® TRIUX measurement workflow. This workflow is meant to offer guidance for the main steps. It follows the logical path taken by several MEG users.

Note:

The order of the workflow steps may vary at different sites.

Some of the described steps may also be unnecessary. For example, the 'Attach EEG' step is performed only if you measure with EEG. The 'Connect stimulus system' step is performed only when external stimulation is involved in the measurement setup.

Some of the workflow steps may be repeated if you perform multiple measurements, for example, one spontaneous data measurement and one evoked response measurement during the same measurement session.

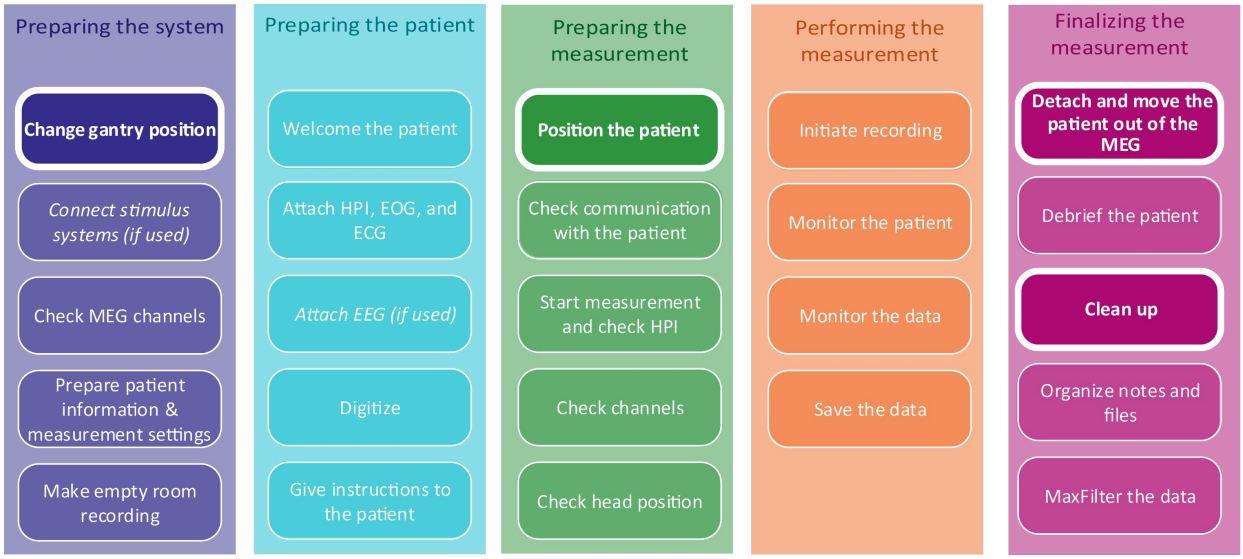

Figure 4.27 Measurement workflow of the Elekta Neuromag® TRIUX MEG system. The highlighted steps are described in this manual.

The workflow is divided into five main steps:

- Preparing the system before the arrival of the patient
  - Includes the steps to prepare the system for the measurement.
  - The steps are performed in the magnetically shielded room (MSR) and/or with the measurement software.
- Preparing the patient
  - Includes the steps to prepare the patient for the measurement.
  - The steps are performed outside the MSR and/or with the measurement software.
- Preparing the measurement
  - Includes the steps to move the patient in the MSR and prepare the system for optimal measurement.
  - The steps are performed in the MSR and/or with the measurement software.

- Performing the measurement
    - Includes the steps to capture data and notes from the measurement.
    - The steps are performed with the measurement software.
- Finalizing the measurement
    - Includes the steps to send the patient away from the site, to clean up the system, and to make sure all the data and notes are prepared and finalized properly for analysis.
    - The steps are performed in the MSR and/or with the measurement software.

This manual describes the steps highlighted in figure 4.27. For information on the other workflow steps, see *Elekta Neuromag® TRIUX User's Manual* and *Elekta Neuromag® TRIUX Data Acquisition Software Release 6.0 User's Manual*.

4.2. Getting the patient out in case of emergency

CAUTION 4.4

Care should be excercised to prevent limbs, fingers, or toes being left between the moving parts of the couch or chair and the gantry or doorway. Instruct the patient to keep hands on the table, armrests or on his/her lap.

Note: *Make sure all Bioamplifier/EEG and HPI cable connectors are disconnected in prior to moving the patient, if possible.*

4.2.1. Getting the patient out in case of emergency when measured using the couch

1. Disconnect the Bioamplifier/EEG and HPI connectors from the gantry.
2. Unlock the wheels and move the couch, if needed.
3. Remove the safety belts, if used.
4. Lock the wheels again.
5. Assist the patient from the couch.

4.2.2. Getting the patient out in case of emergency when measured using the chair

1. Disconnect the Bioamplifier/EEG and HPI connectors from the gantry.
2. Lower the seat down.
3. Release the brake.
4. Pull the chair from underneath the gantry.
5. Disconnect the hydraulic hoses from the back of the chair, if the chair fine-adjustment system is in use.
6. Remove the table, if used.
7. Lower the legrests.
8. Activate the brake of the chair.
9. Assist the patient out of the chair.

5. Using Elekta Neuromag® TRIUX Patient Positioning

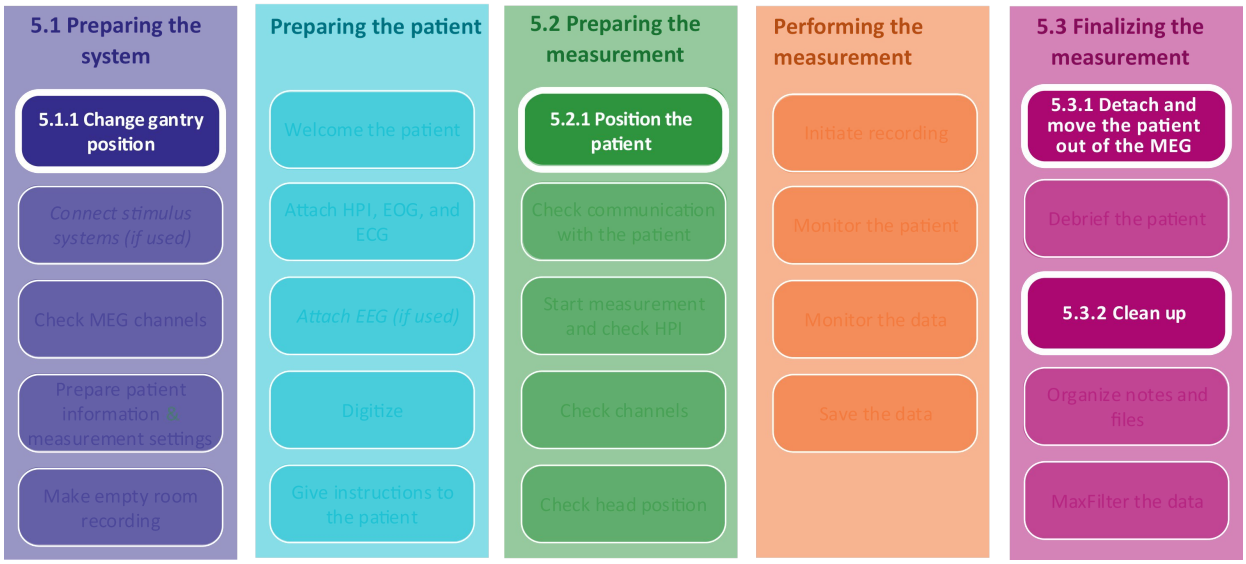

Figure 5.28 Measurement workflow. The patient positioning steps are highlighted.

5.1. Preparing the system

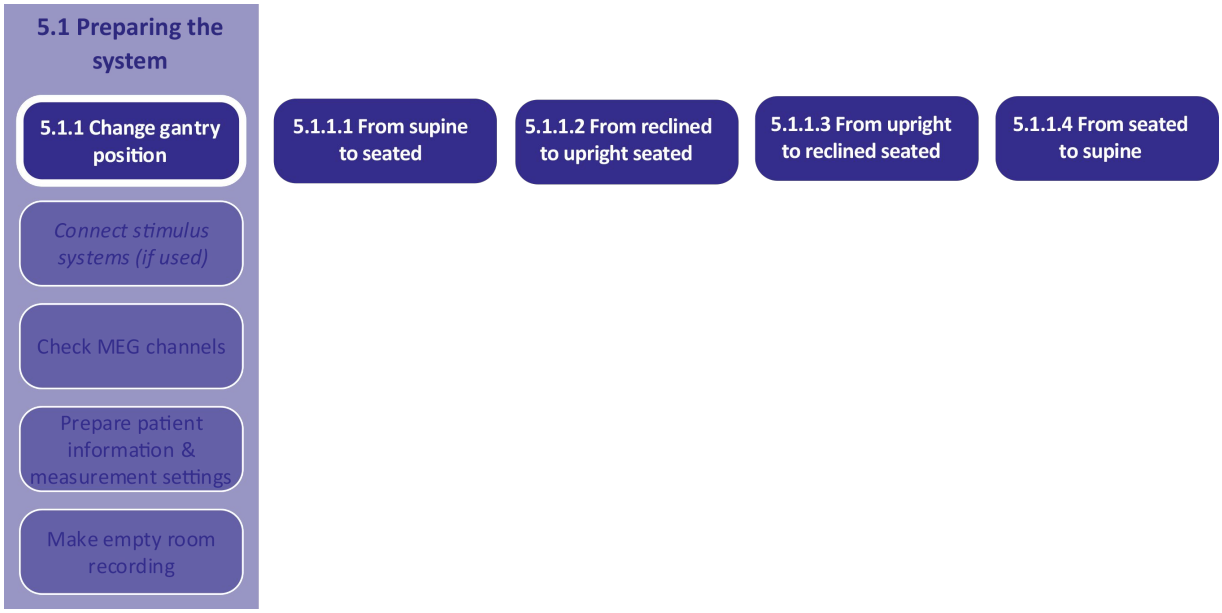

Figure 5.29 Preparing the system

5.1.1. Changing the gantry position

WARNING 5.8

Do not change the gantry position while a patient is under the gantry.

5.1.1.1. Changing the gantry position from supine to seated

Before you start

- Make sure that the patient couch is moved away from the gantry.
- Make sure that no one is under the gantry during position change.

Procedure

1. Press the **UP** button located on the back side of the gantry.
    - The cradle starts moving up.
    - On the position indicator display the green **OK** light goes off and the amber **Tension** lights up.
    - Once the cradle reaches the reclined seated position, you will hear the latches to lock.
    - Once the cradle reaches the upright seated position, you will hear the latches to lock the second time.
    - *Note: If the internal helium recycler is installed, there will be an additional locking sound when the cradle passes the liquefaction position before the reclined seated position.*
2. Stop the movement by releasing the **UP** button immediately after you hear the latches to lock at the desired seated position.
    - If the cradle reaches the uppermost position after passing the upright seated position latches, the amber **Limit** light on the position indicator display lights up.
3. Press the **DOWN** button shortly until the cradle stops over the latches.
    - This movement is very short.
    - The weight of the cradle is now carried by two locking latches.
    - The green **OK** lights up to show that the gantry is ready for use. All the other lights should be off.
4. For best results, wait 30 minutes for stabilization of the system before starting measurements in the new gantry position.

5.1.1.2. Changing the gantry position from reclined to upright seated

Before you start

- Make sure that the patient chair is moved away from the gantry.
- Make sure that no one is under the gantry during position change.

Procedure

1. Press the **UP** button located on the back side of the gantry.
    - The cradle starts moving up.
    - On the position indicator display the green **OK** light goes off and the amber **Tension** lights up.

2. Keep pressing the **UP** button until the cradle has reached the uppermost position and the movement stops.
    - The amber **Limit** lights up.
3. Press the **DOWN** button shortly until the cradle stops over the latches.
    - This movement is very short.
    - The weight of the cradle is now carried by two locking latches.
    - The green **OK** lights up to show that the gantry is ready for use. All the other lights should be off.
4. For best results, wait 5 minutes for stabilization of the system before starting measurements in the new gantry position.

5.1.1.3. Changing the gantry position from upright to reclined seated

Before you start

- Make sure that the patient chair is moved away from the gantry.
- Make sure that no one is under the gantry during position change.

Procedure

1. Press the **UP** button located on the back side of the gantry until the cradle has reached the uppermost position and the movement stops.
    - The amber **Limit** light on the position indicator display lights up.
2. Take hold of the latch release bar on the back side of the gantry and pull it down.
    - This will disable the locking latches of the gantry.
3. Press the **DOWN** button and keep it pressed while you hold the latch release bar down. After the cradle has moved downwards approximately 60 mm and passed the upright position latch position, release your hand from the latch release bar without releasing your other hand from the **DOWN** button.
4. Keep pressing the **DOWN** button until the cradle stops over the reclined seated position latches.
    - The weight of the cradle is now carried by two locking latches.
    - The green **OK** lights up to show that the gantry is ready for use. All other lights should be off.
    - If the latch release bar is kept down too long while the **DOWN** button is pressed, the cradle will pass the reclined seated position. If this happens, stop the movement by releasing the **DOWN** button and proceed as if you were starting from the supine position.
5. For best results, wait 5 minutes for stabilization of the system before starting measurements in the new gantry position.

5.1.1.4. Changing the gantry position from seated to supine

Before you start

- Make sure that the patient chair is moved away from the gantry.
- Make sure that no one is under the gantry during position change.

Procedure

1. To move the cradle up slightly, press the **UP** button located on the back side of the gantry 1-2 seconds to relieve the weight of the cradle from the latches.
    - The amber **Tension** light on the position indicator display lights up.

2. Take hold of the latch release bar on the back side of the gantry and pull it down.
    - This will disable the locking latches of the gantry.
3. Press the **DOWN** button and keep it pressed while you hold the latch release bar down. After the cradle has moved downwards and passed the seated latch positions, release your hand from the latch release bar without releasing your other hand from the **DOWN** button.
    - *Note: If the internal helium recycler is installed, there will be an additional liquefaction latch position after the reclined seated position.*
4. Keep pressing the **DOWN** button until the cradle stops in the supine position.
    - The weight of the cradle is now carried by end stoppers.
    - The green **OK** lights up to show that the gantry is ready for use. All other lights should be off.
5. For best results, wait 30 minutes for stabilization of the system before starting measurements in the new gantry position.

5.2. Preparing the measurement

Figure 5.30 Preparing the measurement

5.2.1. Positioning the patient in the MEG system

WARNING 5.9

Do not put a patient under the gantry except when the green OK light on the position indicator display is continuously lit.

CAUTION 5.5

Care should be excercised to prevent limbs, fingers, or toes being left between the moving parts of the couch or chair and the gantry or doorway. Instruct the patient to keep hands on the table, armrests or on his/her lap.

WARNING 5.10

Do not leave anybody alone inside a closed magnetically shielded room (MSR) without the presence of another person outside the room.

Note: *In case of studying patients or small children, an accompanying person in the room is highly advisable, particularly if it is likely that the patient cannot call for help or get out in case of emergency. Audio and video monitoring is also recommended. Test the monitoring before measurement.*

5.2.1.1. Positioning the patient in supine position

Before you start

- Change the gantry position to supine, if needed.
- Make sure that no one is under the gantry during position change.
- Make sure that you have the patient couch available for the measurement.

Procedure

1. Align the patient couch with the gantry and the bumpers.
2. Lock the wheels of the couch.
3. Lock the upper bed, if not locked.
4. Assist the patient on the couch.
5. Instruct the patient to rest his/her head on the head support.
    - Assist the patient to the correct position, if needed.
6. Attach the safety belts, if necessary.
7. Attach the side guards, if necessary.
8. Unlock the wheels.
9. Push the couch slowly between the bumbers of the gantry.
10. After docking the couch into the gantry, lock the wheels again.
11. Connect the HPI coils and electrodes to the side panel of the gantry.
12. Connect the stimulators to the patient, if used.
13. Unlock the upper bed and push it towards the gantry until the head of the patient is covered by the sensor helmet.
14. Lock the upper bed for the measurement.

5.2.1.2. Positioning the patient in seated position in the patient chair

Note: *Always activate the brake before the patient sits down or gets out of the chair.*

Before you start

- Change the gantry position to reclined or upright seated, if needed.
- Make sure that no one is under the gantry during position change.
- Make sure that you have the patient chair available for the measurement.

Procedure

1. Move the chair close to the gantry.
2. Activate the brake of the chair.

3. Elevate the patient chair seat to half of the maximum height, at least, and release the legrests to make it easier for the patient to sit down.
    - *Note: The legrests should always be supported by hand when lowered down.*
    - *Note: Weight should not be put on the legrests. Always lower the legrests before assisting the patient in or out of the chair.*
    - For patients with limited movement capacity, it is recommended to lift the chair to the uppermost position and detach the T-bar handle.
4. Assist the patient into the chair.
5. Lower the seat down.
6. Lock the legrests up, if desired.
7. Arrange the support pillows behind the back of the patient to enable a comfortable sitting position.
    - Install the special back support extension pillow behind the shoulders of tall patients.
8. Install a table and cover it with the silicone mat, if used.
9. Attach the T-bar handle, if detached earlier.
10. Release the brake.
11. Push the chair under the gantry.
    - *Note: Advise the patient to mind his/her head.*
12. Activate the brake again.
13. Detach the T-bar or lower it on the floor.
    - *Note: Place the T-bar handle away from the feet once removed to prevent anyone from stumbling on it.*
    - *Note: When the handle is lowered down on the floor, be careful not to stumble on the handle.*
14. Connect the HPI coils and electrodes to the side panel of the gantry.
15. Connect the stimulators to the patient, if used.
16. Elevate the seat until the head of the patient is covered by the sensor helmet.
    - *Note: Advise the patient to mind his/her head.*
    - Ask the patient to give feedback during elevating the seat and adjust the height according to the feedback.
17. If needed, write down the position settings from the adjustment scales once the most comfortable position has been found.

5.2.1.3. Positioning the patient in seated position using chair fine-adjustment system (option)

Note: *Always activate the brake before the patient sits down or gets out of the chair.*

Before you start

- Change the gantry position to reclined or upright seated, if needed.
- Make sure that no one is under the gantry during position change.
- Make sure that the horizontal movement plate is in the foremost position.
- Make sure that you have the patient chair available for the measurement.

Procedure

1. Move the chair close to the gantry.
2. Connect the hydraulic hoses.

3. Push the chair carefully under the gantry until it meets the stopper in the horizontal movement plate.
4. Activate the brake of the chair.
5. Detach the T-bar or lower it on the floor.
    - *Note: Place the T-bar handle away from the feet once removed to prevent anyone from stumbling on it.*
    - *Note: When the handle is lowered down on the floor, be careful not to stumble on the handle.*
6. Elevate the patient chair seat to half of the maximum height, at least, and release the legrests to make it easier for the patient to sit down.
    - *Note: The legrests should always be supported by hand when lowered down.*
    - *Note: Weight should not be put on the legrests. Always lower the legrests before assisting the patient in or out of the chair.*
    - For patients with limited movement capacity, it is recommended to lift the chair to the uppermost position and detach the T-bar handle.
7. Assist the patient into the chair.
    - *Note: Advise the patient to mind his/her head.*
8. Lower the seat down.
9. Lock the legrests up, if desired.
10. Arrange the support pillows behind the back of the patient to enable a comfortable sitting position.
    - Install the special back support extension pillow behind the shoulders of tall patients.
11. Install a table and cover it with the silicone mat, if used.
12. Connect the HPI coils and electrodes to the side panel of the gantry.
13. Connect the stimulators to the patient, if used.
14. Move the horizontal position of the chair approximately to the correct location using the horizontal adjustment levers on the side console.
    - *Note: Advise the patient to mind his/her head.*
15. Elevate the seat until the head of the patient is covered by the sensor helmet.
    - *Note: Advise the patient to mind his/her head.*
    - Ask the patient to give feedback during elevating the seat and adjust the height according to the feedback.
16. Fine-adjust the horizontal position of the patient and the backrest recline using the side console.
17. If needed, write down the position settings from the adjustment scales once the most comfortable position has been found.

5.2.1.4. Positioning the patient in seated position using pediatric comfort set (option)

Note: *Always activate the brake before the patient sits down or gets out of the chair.*

Before you start

- Change the gantry position to the reclined or upright seated, if needed.
- Make sure that no one is under the gantry during position change.
- Make sure that you have the patient chair available for the measurement.
- Make sure that the standard cushion seat is removed from the chair.
- Make sure that you have the correct sized pediatric cushion set available.

Procedure

1. Move the chair close to the gantry.
2. Activate the brake of the chair.
3. Detach the T-bar handle or lower it on the floor, if attached.
    - *Note: Place the T-bar handle away from the feet once removed to prevent anyone from stumbling on it.*
    - *Note: When the handle is lowered down on the floor, be careful not to stumble on the handle.*
4. Release the legrests.
    - *Note: The legrests should always be supported by hand when lowered down.*
    - *Note: Weight should not be put on the legrests. Always lower the legrests before assisting the patient in or out of the chair.*
5. Attach the pediatric cushion seat to the chair.
    - For smaller patients using cushion set 2 (blue), attach both seats.
6. Install the armrests and saddle piece into the openings of the cushions.
7. Adjust the height of the seat according to the height of the patient to make it easier for the patient to sit down.
8. Assist the patient into the chair.
9. Install a table and cover it with the silicone mat, if used.
10. Lock the legrests up.
11. Attach the footrests, if necessary.
12. Attach the T-bar handle, if detached earlier.
13. Lower the seat down.
14. Release the brake.
15. Push the chair under the gantry.
    - *Note: Advise the patient to mind his/her head.*
16. Activate the brake again.
17. Detach the T-bar or lower it on the floor.
    - *Note: Place the T-bar handle away from the feet once removed to prevent anyone from stumbling on it.*
    - *Note: When the handle is lowered down on the floor, be careful not to stumble on the handle.*
18. Connect the HPI coils and electrodes to the side panel of the gantry.
19. Connect the stimulators to the patient, if used.
20. Elevate the seat until the head of the patient is covered by the sensor helmet.
    - *Note: Advise the patient to mind his/her head.*
    - Ask the patient to give feedback during elevating the seat, if possible, and adjust the height according to the feedback.
21. If needed, write down the position settings from the adjustment scales once the most comfortable position has been found.

5.2.1.5. Positioning the patient in seated position using chair fine-adjustment system (option) and pediatric comfort set (option)

Note: *Always activate the brake before the patient sits down or gets out of the chair.*

Before you start

- Change the gantry position to reclined or upright seated, if needed.
- Make sure that no one is under the gantry during position change.
- Make sure that the horizontal movement plate is in the foremost position.
- Make sure that you have the patient chair available for the measurement.
- Make sure that the standard cushion seat is removed from the chair.
- Make sure that you have the correct sized pediatric cushion set available.

Procedure

1. Move the chair close to the gantry.
2. Connect the hydraulic hoses.
3. Push the chair carefully under the gantry until it meets the stopper in the horizontal movement plate.
4. Activate the brake of the chair.
5. Detach the T-bar or lower it on the floor.
    - *Note: Place the T-bar handle away from the feet once removed to prevent anyone from stumbling on it.*
    - *Note: When the handle is lowered down on the floor, be careful not to stumble on the handle.*
6. Release the legrests, if not released.
    - *Note: The legrests should always be supported by hand when lowered down.*
    - *Note: Weight should not be put on the legrests. Always lower the legrests before assisting the patient in or out of the chair.*
7. Attach the pediatric cushion seat to the chair.
    - For smaller patients using cushion set 2 (blue), attach both seats.
8. Install the armrests and saddle piece into the openings of the cushions.
9. Adjust the height of the seat according to the height of the patient to make it easier for the patient to sit down.
10. Assist the patient into the chair.
    - *Note: Advise the patient to mind his/her head.*
11. Install a table and cover it with the silicone mat, if used.
12. Lock the legrests up.
13. Attach the footrests, if necessary.
14. Lower the seat down.
15. Connect the HPI coils and electrodes to the side panel of the gantry.
16. Connect the stimulators to the patient, if used.
17. Move the horizontal position of the chair approximately to the correct location using the horizontal adjustment levers on the side console.
    - *Note: Advise the patient to mind his/her head.*
18. Elevate the seat until the head of the patient is covered by the sensor helmet.
    - *Note: Advise the patient to mind his/her head.*
    - Ask the patient to give feedback during elevating the seat and adjust the height according to the feedback.
19. Fine-adjust the horizontal position of the patient and the backrest recline using the side console.
20. If needed, write down the position settings from the adjustment scales once the most comfortable position has been found.

5.3. Finalizing the measurement

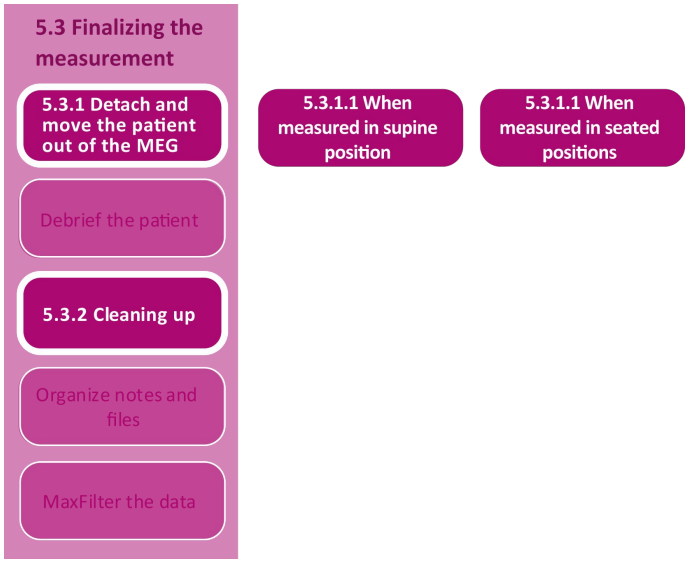

Figure 5.31 Finalizing the measurement

5.3.1. Detaching and moving the patient out of the MEG system

CAUTION 5.6

Care should be excercised to prevent limbs, fingers, or toes being left between the moving parts of the couch or chair and the gantry or doorway. Instruct the patient to keep hands on the table, armrests or on his/her lap.

5.3.1.1. Detaching and moving the patient out when measured in supine position

Procedure

1. Disconnect the Bioamplifier/EEG and HPI connectors from the gantry.
2. Disconnect the stimulators from the patient, if used.
3. Unlock the upper bed.
4. Pull the upper bed outwards.
5. Lock the upper bed again.
6. Unlock the wheels for moving the couch.
7. If you moved the couch, lock the wheels again.
8. Remove the side guards, if used.
9. Remove the safety belts, if used.
10. Assist the patient from the couch.

5.3.1.2. Detaching and moving the patient out when measured in seated positions

Procedure

1. Disconnect the Bioamplifier/EEG and HPI connectors from the gantry.

2. Disconnect the stimulators from the patient, if used.
3. Lower the patient chair.
4. Release the brake.
5. Attach the T-bar, if detached earlier.
6. Pull the chair carefully out from the gantry.
    - *Note: Advise the patient to mind his/her head when pulling the chair out.*
7. Activate the brake.
8. Detach the T-bar or lower it on the floor.
    - *Note: Place the T-bar handle away from the feet once removed to prevent anyone from stumbling on it.*
    - *Note: When the handle is lowered down on the floor, be careful not to stumble on the handle.*
9. Remove the table, if used.
10. Lower the legrests.
    - *Note: The legrests should always be supported by hand when lowered down.*
11. Assist the patient up from the chair.
    - For patients with limited movement capacity, it is recommended to lift the chair to the uppermost position and detach the T-bar handle to make it easier for the patient to get up from the chair.

5.3.2. Cleaning after the measurement procedure

After measurement, wipe the upper bed or the used cushion set and the sensor helmet with a damp cloth and mild detergent.

6. Maintenance

6.1. Checking the hydraulic water level of the chair fine-adjustment system

The chair fine-adjustment system uses water for hydraulic operation. Check the water level every three months and add water to the system, when necessary.

Figure 6.32 Water tank fill port on the side console.

Procedure

1. Pull out the water tank fill port cover on the left-hand side of the side console.
2. Remove the rubber plug.
3. Test the water level with your finger
    - If you can reach the water with a finger, there is enough water in the system.
4. If necessary, fill the tank with water.
    - Use a plastic container equipped with a narrow tube to pour the water in, for example, a watering can.
5. Insert the rubber plug.
6. Attach the water tank fill port cover.

Note: *If the hydraulic reservoir has been depleted, after re-filling the tank, pump the hydraulic pedal 10 - 20 times to get water through the system.*

6.2. Cleaning the patient couch and chair

In addition to the daily cleaning procedure, it is recommended to clean the patient couch and chair more thoroughly every three months.

Note: *Use a damp cloth and mild detergent for cleaning.*

Procedure

1. Remove the mattress from the upper bed and wipe the base of the mattress and the upper bed.
2. Remove the cushion seat from the patient chair and wipe the base of the seat and the chair.

7. Troubleshooting

7.1. Changing gantry position is not possible

If you cannot change the gantry position

- No lights in the position indicator display are lit
    1. Check the power supply to the system, check also fuses and power switches.
    2. If the problem persists, contact Elekta service.
- When moving the gantry downwards, the movement stops and the gantry gets stuck
    1. Try moving the the gantry upwards and pull the latch release bar properly down.
    2. If the problem persists, contact Elekta service.

7.2. Chair fine-adjustment system does not work

If the chair fine-adjustment system does not work properly

- Both horizontal movement and backrest reclining functions do not work properly
    1. Check the hydraulic water level of the console.
    2. Fill the water tank, if necessary.
    3. If the problem persists, contact Elekta service.
- The horizontal movement is not working properly
    1. Move the horizontal movement plate outwards as far as possible.
    2. Apply PTFE lubricant to the exposed parts of the movement plate.
    3. If the problem persists, contact Elekta service.

8. Technical data

For the complete technical data of the Elekta Neuromag® TRIUX MEG system, see *Elekta Neuromag® TRIUX Technical Manual*.

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Human Care Makes the Future Possible

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