E-EEGX, N-EEGX

Service Manual

Host software version 3
E-EEGX version MJD101, N-EEGX version MJS101

Due to continuing product innovation, specifications in this manual are subject to change without notice.

For technical documentation purposes, the abbreviation GE is used for the legal entity names, GE Medical Systems *Information Technologies*, Inc. and GE Healthcare Finland Oy.

Contents

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About this manual

Intended use of this manual

This manual contains instructions for the planned and corrective maintenance of the acquisition module. This manual must be used together with the monitor's service manual for important safety and installation information.

Use the manual as a guide for maintenance procedures and repairs considered field repairable. Where necessary the manual identifies additional sources of relevant information and technical assistance.

See the monitor's service manual for an overview of the patient monitoring system, information needed for system installation and for planned and corrective maintenance of the monitor.

See the monitor's supplemental information manual for the technical specifications, default settings and compatibility information, including electromagnetic compatibility.

See the monitor's user manual for the instructions necessary to operate the device safely in accordance with its function and intended use.

Intended audience of this manual

This manual is intended for service representatives and technical personnel who maintain, troubleshoot, or repair this device.

Manual conventions

This manual uses the following styles to emphasize text or indicate an action. Also note the terminology conventions.

Item	Description
bold	Indicates hardware keys and connectors.
bold italic	Indicates menu options, software keys and messages.
italic	Indicates terms for emphasis.
>	Indicates menu options to select consecutively.
select	The word select means choosing and confirming.
NOTE	Note statements provide application tips or other useful information.

Illustrations and names

This manual uses illustrations as examples only. Illustrations in this manual may not necessarily reflect all system settings, features, configurations, or displayed data.

Names of persons, institutions, and places and related information are fictitious; any similarity to actual persons, entities, or places is purely coincidental.

Related documents

- CARESCAPE monitor's service manual
- CARESCAPE monitor's user manual
- CARESCAPE monitor's supplemental information manual

Product availability

NOTE   Due to continual product innovation, design and specifications for these products are subject to change without notice.

Some of the products mentioned in this manual may not be available in all countries. Please consult your local representative for the availability.

Trademarks

GE, GE Monogram, and CARESCAPE are trademarks of General Electric Company.

Third party trademarks

All third party product and company names are the property of their respective owners.

Manufacturer responsibility

GE is responsible for the effects on safety, reliability, and performance of the equipment only if:

- Assembly operations, extensions, readjustments, modifications, servicing, or repairs are carried out by authorized service personnel.
- The electrical installation of the relevant room complies with the requirements of the appropriate regulations.
- The equipment is used in accordance with the instructions for use.
- The equipment is installed, maintained and serviced in accordance with the instructions provided in the related service manuals.

WARNING   SAFETY HAZARD. To avoid risks to personnel and patient, or damage to the equipment, only perform maintenance procedures described in this manual. Unauthorized modifications can lead to safety hazards.

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Module introduction

EEG module introduction

This document provides information for the maintenance and service of the EEG module, E-EEGX and EEG headbox, N-EEGX.

The EEG module and the EEG headbox together measure:

- Electroencephalography, EEG
- Spontaneous facial muscular activity with frontal electromyography, FEMG
- Auditory evoked potentials, AEP

The EEG headbox takes care of EEG and FEMG signal amplification, filtering and digitization, and electrode impedance measurement. It is situated close to the patient's head. The headbox has connectors for the EEG leads, either for a referential or a bipolar montage, and for the AEP stimulation earphones.

The EEG module creates auditory stimulus pulses and takes care of AEP signal processing. It has one connector for the EEG headbox.

Module compatibility

For detailed information regarding module, monitor, and accessory compatibility, see the supplemental information manual.

EEG measurement limitations

- This measurement is not available in the NICU software package.
- E-modules used for this measurement are not suitable for use with neonatal patients.
- External radiating devices may disturb the measurement.

EEG equipment to patient connection
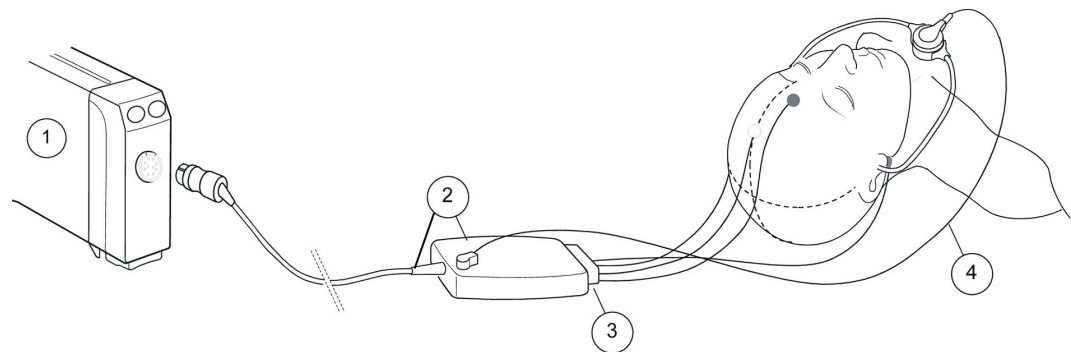
1. E-EEGX with EEG, AEP and FEMG measurement capability
2. EEG headbox and cable, N-EEGX
3. EEG leadset
4. Earphones are required for AEP (auditory evoked potentials)

NOTE   When measuring both AEP and BIS or Entropy be aware of possible interference issues. Familiarize yourself with all of these measurements and their safety statements.

Controls and connectors

Front panel and the back of EEG module, E-EEGX, and front panel of EEG headbox, N-EEGX:
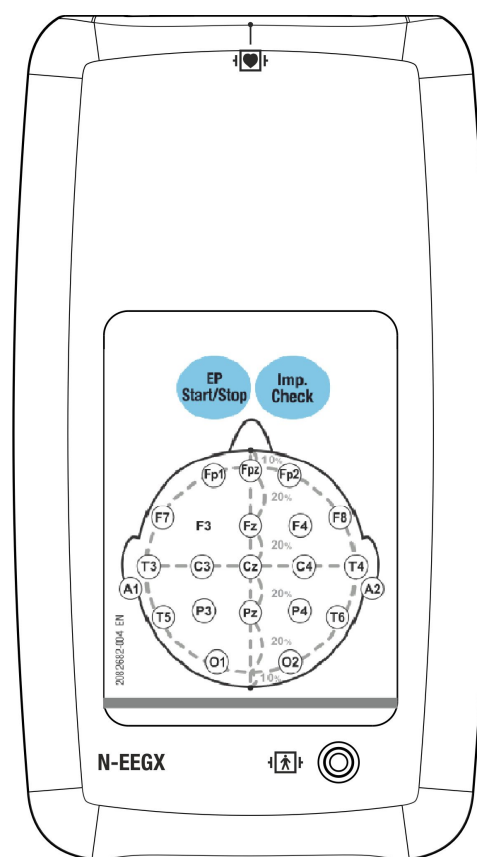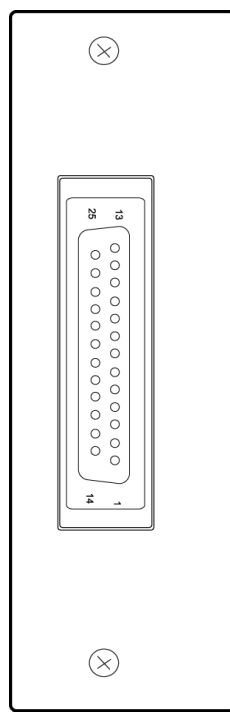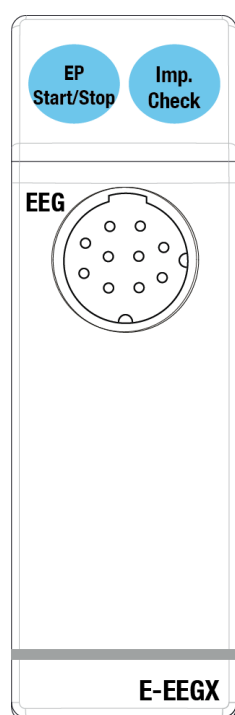
N-EEGX headbox:
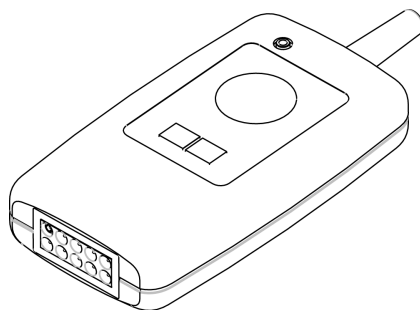
Connector	Module	Description
EEG	E-EEGX	Connector for EEG headbox, N-EEGX
D25 connector	E-EEGX	Module bus connector
AEP	N-EEGX	Connector for AEP earphone set
Headbox input connector	N-EEGX	Connector for EEG leads

EEG module keys

There are two keys on the module:

EP Start/Stop	Starts and stops auditory evoked potential measurement with the defined settings.
Imp. Check	Starts the manual measuring of the electrode impedance.

The same keys can be found on the headbox.

Measurement principles

EEG measurement principle

EEG is a differential voltage signal measured from electrodes attached to the patient's skin. EEG measures the spontaneous electrical activity of the brain. This electrical activity reflects the state of the brain.

Electrode connections can be made with two different principles: bipolar or referential montage. In bipolar montage, every channel has two electrodes and the signal is the potential difference between these two electrodes. In referential montage, the referential electrode delivers its potential to every channel's minus-input. The signal is the potential difference between this common reference electrode and the electrode connected to the plus input. The purpose of the ground electrode is to reduce common mode noise. It cannot be used as a referential electrode.

The following illustrates the EEG measuring principle:

Bipolar connection   Referential connection
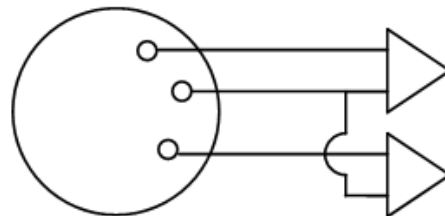
The EEG signal is amplified, digitized and filtered. After that the EEG signal is displayed on the screen and various characteristics are calculated from it. These include spectrum, RMS amplitude, spectral edge frequency, median freq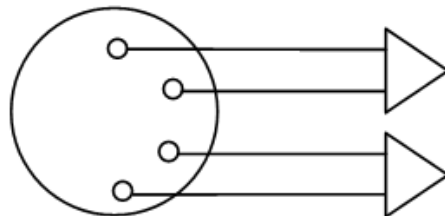uency, burst-suppression ratio and percentage of total power in four different bands: delta (0.5 to 4 Hz), theta (4 to 8 Hz), alpha (8 to 13 Hz) and beta (13 to 30 Hz).

FEMG measurement principle

FEMG is an electrical signal originating from facial muscles. In the headbox, the signal of channel 1 is divided into two different amplification and filtering paths. One is the EEG path and the other is the FEMG path. The FEMG signal has a much broader spectrum than the EEG and it overlaps with the EEG at low frequencies. Because of this, the RMS amplitude of FEMG signal is calculated from the frequency band 60 to 300 Hz. The mains power frequency and its harmonics are digitally filtered away to reject noise interference from the power lines.

AEP measurement principle

AEP is an electrical response of the central nervous system to an external auditory stimulus. It is measured using the same electrodes as in the EEG measurement, but

the sampling frequency and bandwidth are different. The electrical signal resulting from one stimulus is weaker than the spontaneous activity of the brain. To overcome this, the stimulus is repeated several times (100 to 2000), and an average of all responses is calculated. Responses containing large artefacts are removed from the average to improve the signal to noise ratio.

Impedance measurement

The impedance measurement is performed for one channel at a time and the EEG or EP measurement is stopped during the impedance measurement.

Differences in electrode impedance cause common mode noise coupling to the measured signal. To minimize this, the electrode impedance is measured, and a warning of unsatisfactory impedance level is generated when necessary. The impedance of an electrode is measured by applying a known current through the electrode and measuring the voltage drop over the electrode. This way the impedance of a single electrode can be resolved instead of a sum impedance of an electrode pair.

Main components

EEG board

The EEG board is inside the EEG module and it consists of the following functional sections:

- audio stimulator
- microprocessor for stimulation and measurement control and for counting the measurement results
- two serial communication drivers

The serial bus speed to the monitor is 500 kbps and the bus itself is half duplex, i.e. data can be transferred to both directions but only one way at a time.

The serial bus speed to the headbox is 500 kbps and the bus is full duplex i.e. data can be transferred to both directions at the same time.

The following illustrates the EEG board block diagram:
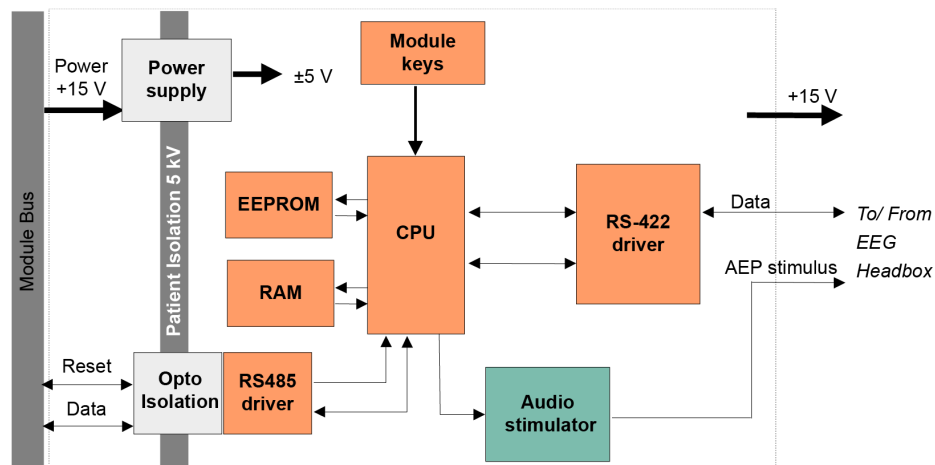
The following illustrates the audio stimulator circuitry:
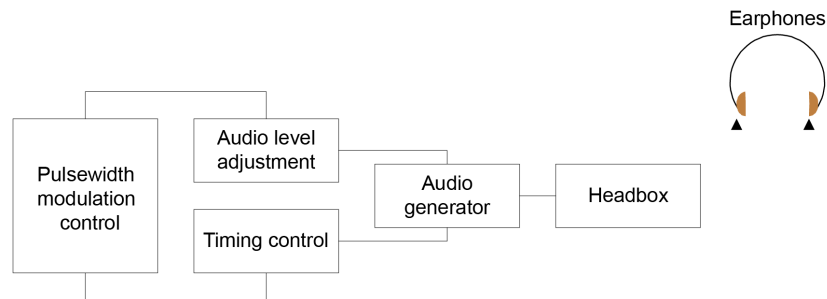
EEG headbox board

The EEG headbox board is inside the EEG headbox and it consists of the following functional sections:

- input protection
- EEG amplifiers and filters
- FEMG amplifier and filter
- current feeding circuitry and amplifiers for impedance measurement
- microprocessor
- serial communication

The following illustrates the EEG headbox board block diagram:
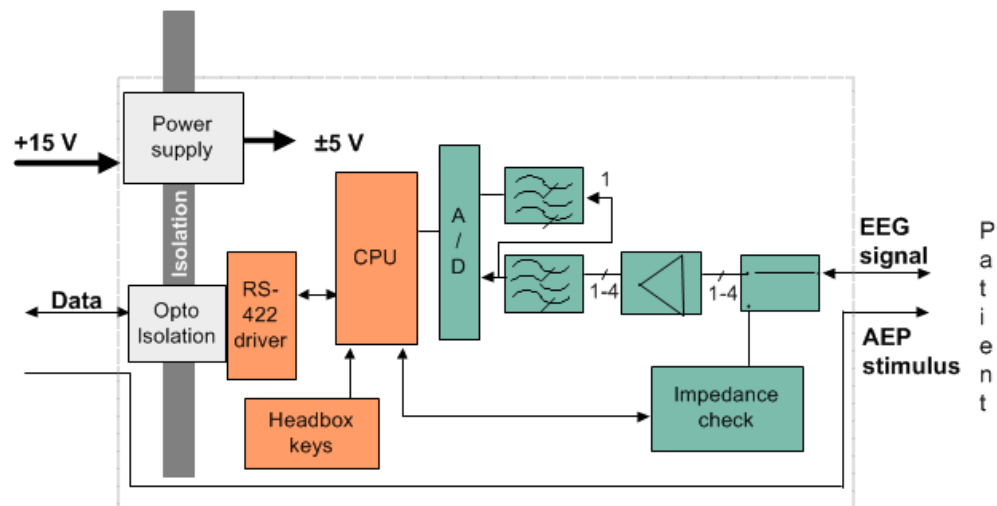
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Planned and corrective maintenance

About the maintenance check procedures

This chapter describes the planned and corrective maintenance check procedures for the product. To help ensure the equipment remains in proper operational and functional order and maintains its essential performance and basic safety, follow the corrective and planned maintenance recommendations. The tests that are related to the essential performance and basic safety are marked with the *.

The cleaning precautions, cleaning requirements, cleaning procedures, and recommended cleaning solutions are described in the monitor's user manual.

For details about cleaning, disinfecting and sterilizing the accessories, see the instructions for use in the accessory package.

Record the results of the planned and the corrective maintenance check procedures to the eCheckforms delivered in the electronic manual media.

WARNING   SAFETY HAZARD. To avoid risks to personnel and patient, or damage to the equipment, only perform maintenance procedures described in this manual. Unauthorized modifications can lead to safety hazards.

Planned maintenance

WARNING   Planned maintenance should be carried out at recommended interval. Failure to implement the recommended maintenance schedule may cause equipment failure and possible health hazards.

Perform the planned maintenance procedure completely every 2 years after installation. Perform the procedure in the following order:

1. Visual inspection
2. Electrical safety tests *
3. Functional check

Corrective maintenance

Perform the following check procedure after any corrective maintenance, before taking the product back into clinical use:

Performed service activity	Required checkout procedure		
	Visual inspection	Electrical safety test	Functional check
Product casing opened either for troubleshooting purpose or for replacing any of the internal parts.	All steps	All steps	All steps
Front cover, or an other external part, replaced.	All steps	Not applicable	Not applicable

Performing visual inspection

1. Remove the module and check that:

    a. The front cover is intact.

    b. All connectors are intact, clean and attached properly.

    c. The module casing and the latch are clean and intact.

2. Check the headbox to ensure that:

    a. The cover and the base of the headbox are intact.

    b. The headbox sticker is intact.

    c. Connectors are intact and attached properly.

    d. The headbox and the applied parts are clean.

Performing electrical safety tests *

Perform the electrical safety tests described in the monitor's service manual, Checkout procedures chapter. Perform the following tests:

1. Patient (source) leakage current test

2. Patient (sink) leakage current test

Performing functional check

Required tools for EEG module functional check

For a list of compatible accessories, see the supplemental information manual.

- EEG simulator or signal generator (capable to output a 2 Hz sine waveform with 100V peak-to-peak amplitude]

- P/N 898050 Preconfigured EEG Lead Set 1, Basic

- Standard earphones with a 3.5 mm phone plug

Making connections for the functional check

1. Turn on or restart the monitor and wait until the normal screen appears.

2. Ensure that the module is connected to the monitor.

3. Connect the EEG headbox to the EEG module.

4. Connect the EEG leadset to the EEG headbox.

5. Connect the leads (ch1+, ch1-, ch2+, ch2- and ground) of the EEG leadset to the simulator.

6. Plug in the earphones to the EEG headbox.

Configuring monitor for EEG module functional check

1. Configure *EEG Num* parameter window to the screen with adequate priority.

2. Select *Monitor Setup* > *Parameter Setup* > *EEG*.

3. In *Setup* tab select *Scale µV*: 100.

4. In *Montage* tab select *Select Montage*: Basic.

5. In *View* tab select *Numerical*.

6. Select *AEP* > *Setup* tab, and select *Stimulus Intensity*: 80 dB.

Configuring simulator for EEG module functional check

For instructions on how to use and configure the simulators, refer to the simulators' documentation.

1. Turn the simulator on.

2. Configure the simulator to output a 2 Hz sine waveform with 100 µV peak-to-peak amplitude to the EEG1 and EEG2 channels.

Testing EEG measurement

1. Check the impedance:

   a. On the EEG module press the *Imp. Check* key to start a manual electrode impedance check.

      Checking electrodes message appears in the EEG1 and EEG2 parameter windows.

   b. Wait until the electrodes are checked and check that *Electrodes Ok* message appears.

2. Check the EEG measurement:

   a. Check that a sine waveform appears in the EEG1 and EEG2 waveform fields.

   b. In *EEG View* tab select *Numerical* and check that numerical values appear to the following fields:

      • *MF*

      • *Delta%*

      • *Amp*

3. Check the AEP stimulation:

   a. On the EEG headbox press the ***EP Start/Stop*** key to start a manual AEP stimulation sequence.

   b. Check that you can hear a clicking sound from the earphones.

   c. On the EEG headbox press the ***EP Start/Stop*** key to stop the AEP stimulation sequence.

Completing the functional check

1. Select ***Discharge Patient*** or ***Reset Case*** to discard any changes made to the monitor configuration during the functional check.

2. Disconnect the test setup.

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Configuration and calibration

Configuration

There is no service configuration for this module.

Calibration and adjustments

No calibration or adjustments are needed for this module.

Configuration and calibration

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Troubleshooting

Troubleshooting guidelines

This chapter focuses on troubleshooting technical problems. Refer to the user manual for troubleshooting monitoring problems and clinical configuration issues.

If a problem remains, contact technical support for service. To ensure accurate problem solving, please be prepared to provide the following information:

- Product name and serial number or UDI
- Hardware and software versions
- Detailed problem description
- Error messages, if any
- Configuration information (or settings file)
- Service Logs
- The troubleshooting you have done so far

Perform the specified corrective maintenance check after any corrective maintenance to the product.

Performing visual inspection

Before any detailed troubleshooting, complete a thorough visual inspection for the module and for the EEG headbox.

1. Remove the module and check that:
   a. The front cover is intact.
   b. All the connectors are intact, clean, and attached properly.
   c. The module casing and the latch are clean and intact.
2. Check the EEG headbox to ensure that:
   a. The headbox cover and base are intact.
   b. The headbox stickers are intact.
   c. The connectors are intact and attached properly.
   d. The applied parts are clean and intact.

3. If you suspect that there are loose parts or cable connections inside the module, remove the two screws from the back of the module to detach the module box, and check that:

    a. All the screws are tightened properly.

    b. All the cables are connected properly.

    c. There are no loose objects inside the module.

4. If you suspect that there are loose parts or cable connections inside the EEG headbox, remove the four screws from the bottom of the headbox to detach the cover of the EEG headbox. Be careful with the two wired connectors in the circuit board attached to the cover. Check that:

    a. All the screws are tightened properly.

    b. All the cables are connected properly.

    c. There are no loose objects inside the headbox.

Troubleshooting module functionality

Follow these instructions to identify the unit causing the functional problem.

Before you begin, ensure that the monitor is turned on, and all the modules are connected.

1. Check if there are any error messages shown in the message field.

    For a list of possible causes and solutions, see Messages related to the measurement.

2. Check the compatibility of each system component.

    For a list of the compatible monitors, modules, and accessories, see the supplemental information manual.

3. Check that there are no identical modules connected to the monitor.

    For a list of identical modules, see the supplemental information manual.

4. Visually check the accessories in use. Replace them, if necessary.

    For a list of compatible accessories, see the supplemental information manual.

5. Connect the accessories with a simulator to the module. Check that the parameters measured by the module are configured to the display with adequate priority.

6. Press one of the module keys.

7. Check that the correct menu opens or the activity starts. If nothing happens, check if there is a loose keypad cable or other problem in the module.

Viewing device information

To view the hardware, software and configuration information of the monitor, modules and/or connected devices:

1. Ensure that the module is connected to the monitor.

2. Log in to the service interface.

3. Select *Information*.

4. Select an item on the side navigation menu or scroll down the page to view the information.

Service log files

The monitor collects information about different system events, errors and alarms to log files to help troubleshoot equipment problems. The following service logs may contain related useful information:

- *System Logs* records different system events, messages, clinical alarms, user interactions and internal communication events.

- *EMBC Logs* records module communication events and errors for E-series acquisition modules.

Viewing log files

1. Log in to the service interface.

2. Select *Diagnostics* > *View Logs*.

3. Select the log you want to view. The contents of the selected log file are shown on the screen.

Downloading log files

For security reasons, the contents of the log file(s) will be encrypted with a user-selectable password before the download. Provide the password in a secure way only for the authorized receiver of the log file. Use 7-Zip open-source file archiver (http://7-zip.org/) and the password to decrypt the downloaded log file.

1. Log in to the service interface.

2. Select *Diagnostics* > *Download Logs*.

3. Select the log(s) you want to download.

4. Provide a password to encrypt the contents of the log file. This password is user-selectable.

5. Depending on your access to the service interface:

   a. If you are using a service PC, you can save the log file to any storage device connected to the service PC.

      i. Select *Download*.

      ii. Save the log file according to the instructions provided by the web browser.

      The steps to download the log file to a service PC depend on the web browser used. The web browser may also notify you about security issues. Refer to the web browser documentation for details.

   b. If you are using the local, integrated service interface, you can save the log file to a USB flash drive that is connected to one of the monitor's USB ports:

      i. Select *Save to USB storage* to save the log file to the USB flash drive.

      The log file is saved always to the root directory of the USB flash drive.

      NOTE   Do not disconnect the USB flash drive until downloading is complete.

6. Send the log file and the password in a secure way to GE Service for further investigation.

Messages related to EEG and AEP measurements

For information regarding alarm priorities and escalation times, see the supplemental information provided.

Make sure you are familiar with the generic layout of the screen. This will help you identify where on screen the following messages appear. The message location is indicated with the following abbreviations:

- al. area = alarm area
- param. = parameter window
- wavef. = waveform area

Message	Location	Possible causes	Suggested actions
• *AEP stimulation on*	• param.	The measurement is being performed and clicks are being delivered to the headphones.	• Wait until the stimulation is completed.
• *Artifacts*	• param.	Electrodes are poorly connected, or electrical interference is coupling to electrode cables.	• Check the electrodes and their impedances. • Remove the sources of noise, if necessary.
• *Big contact difference*	• param.	The electrode impedance check fails due to an impedance difference of >2.5 kOhm.	• Check the individual impedances of the EEG electrodes through **EEG** > **View** > **Numerical** and try to make the electrode impedances closer to each other. • Select **Check Electrodes** to perform a new electrode impedance check.
• *Check EEG referential montage*	• al. area	Lead 2–, 3–, or 4– is connected during referential measurement.	• Disconnect lead 2–, 3–, or 4– and start an electrode impedance check.
• *Check GND electrode*	• param.	Electrode check has failed for the ground electrode. The impedance is over 5 kOhm.	• Press the ground electrode to improve connection. • Replace the electrode if necessary. • Select **Check Electrodes** to perform a new electrode impedance check.
• *Checking electrodes*	• param.	Electrode impedance is being measured and EEG analysis is stopped for a few seconds.	• Wait until the electrode impedance check is completed.
• *EEG AEP stopped*	• al. area	AEP measurement stops when you change a profile, or when factory default settings are loaded to a profile.	• Acknowledge the alarm. • Restart the AEP measurement.

Message	Location	Possible causes	Suggested actions
• *EEG Headbox overheated Shutting down*	• al. area	EEG headbox temperature has exceeded the allowed temperature limit and it is being shut down.	• Remove the headbox and let it cool down. • Reconnect the headbox and make sure that it is not covered by anything. • If the problem persists, replace the headbox. • Contact qualified service personnel.
• *EEG Headbox temperature high*	• al. area	EEG headbox temperature is getting too high.	• Check the headbox location and make sure that it is not covered by anything. • If the problem persists, replace the headbox.
• *EEG leads off* • *Leads off*	• al. area • param.	Leads are not connected.	• Reconnect the disconnected headbox leads.
• *EEG measurement off*	• param.	All EEG leads are disconnected.	• Reconnect the leads to continue measurement, or wait a few seconds.
• *EEG measurement removed*	• al. area	Acquisition module has been removed.	• Connect the module if you want to restart the measurement.
• *EEG module error: Call service*	• al. area	There is an error with the module.	• Disconnect and reconnect the module. • Replace the module. • If the problem persists, contact qualified service personnel.
• *Electrodes OK*	• param.	Electrode check was completed successfully. Electrode impedance is below 5 kOhm.	• No action.
• *Headbox off*	• param.	EEG headbox cable is not connected to the module.	• Connect the EEG headbox cable to the module.
• *High FEMG*	• param.	High frontal muscle activity may disturb the EEG measurement. Noise from some equipment is coupling to the electrode cables.	• The message will disappear when the FEMG is below 10 µV. • Remove noise sources if possible.
• *Identical EEG modules*	• al. area	There are two or more EEG modules in the system.	• Remove all but one EEG module.
• *Incompatible device: EEG module*	• al. area	The module is not compatible.	• Replace with a compatible EEG module. For a list of compatible devices, refer to the supplemental information provided.

Message	Location	Possible causes	Suggested actions
• *EEG Incompatible headbox* • *Incompatible headbox*	• al.area • param.	The headbox is not compatible with module.	• Make sure you are using a GE approved headbox.
• *Poor electr. contact*	• param.	Electrode impedance is over 5 kOhm.	• To check the individual impedances of the EEG electrodes, select *EEG* > *View* > *Numerical*. • Press the electrode with high impedance to improve the connection. • Replace the electrode if necessary.

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Disassembly and reassembly

Disassembly guidelines

Field repair of the device is limited to replacing field replaceable units (FRUs).

NOTE   Only qualified service personnel should perform field replacement procedures.

NOTE   Perform the specified corrective maintenance check after any corrective maintenance to the product.

ESD precautions

All external connectors of the device are designed with protection from ESD damage. However, if the device requires service, exposed components and assemblies inside are susceptible to ESD damage. This includes human hands, non-ESD protected work stations or improperly grounded test equipment. The following guidelines may not guarantee a 100% static-free workstation, but can greatly reduce the potential for failure of any electronic assemblies being serviced:

- Discharge any static charge you may have built up before handling semiconductors or assemblies containing semiconductors.
- Wear a grounded, antistatic wristband or heel strap at all times while handling or repairing assemblies containing semiconductors.
- Use properly grounded test equipment.
- Use a static-free work surface while handling or working on assemblies containing semiconductors.
- Do not remove semiconductors or assemblies containing semiconductors from antistatic containers until absolutely necessary.
- Do not slide semiconductors or electrical/electronic assemblies across any surface.
- Do not touch semiconductor leads unless absolutely necessary.
- Store the semiconductors and electronic assemblies only in antistatic bags or boxes.
- Handle all PCB assemblies by their edges.
- Do not flex or twist a circuit board.

Before disassembly

- Note the positions of any wires or cables. Mark them if necessary to ensure that they are re-assembled correctly.
- Save and set aside all hardware for reassembly.

Required tools

- Flat blade screwdriver
- Pozidrive screwdriver
- Spanner head screwdriver, size #14
- Antistatic wristband

Disassembly procedures

Disassemble the module in the order described in this section.

For reference, see the exploded view in Service parts chapter.

Detaching the front cover

1. Detach the front cover of the module by releasing the snaps that hold the front cover to the front chassis unit by using a small flat blade screwdriver. There are 2 snaps on both sides of the module and 1 snap on the top.

Detaching the E-EEGX board or E-EEGX front chassis unit

1. Detach the front cover of the module by releasing the snaps that hold the front cover to the front chassis unit by using a small flat blade screwdriver. There are 2 snaps on both sides of the module and 1 snap on the top.

2. Remove the two screws (T10) from the back of the module.

3. While pressing the release latch, pull the module casing slowly backwards and remove it from the main body.

4. Disconnect the membrane keypad connector from the E-EEGX board.

5. Remove the two screws that attach the front chassis unit to the E-EEGX board.

6. Disconnect the front chassis unit from the E-EEGX board.

Reassembling the module

1. Reassemble in reverse order. Make sure that you:

   a. Tighten all the screws properly.

   b. Connect all the cables properly.

   c. Check that there are no loose objects inside the module.

Opening the N-EEGX headbox enclosure

For an exploded view of the headbox, see the Service parts chapter.

1. Remove the four screws from the bottom of the headbox.

2. Carefully detach the electrode sticker, that is located around the headbox input unit, from the bottom unit. Leave the sticker attached to the top cover.

   NOTE   Be very careful when you lift the top cover off from the bottom cover. The N-EEGX module-headbox cable has two short wires that are soldered to the terminals of the audio socket attached to the top cover. These two wires can easily break or loose when detaching the top cover or replacing any parts inside the N-EEGX headbox enclosure.

3. Carefully lift the top cover only a few centimeters. Disconnect the membrane keypad connector from the N-EEGX headbox board.

4. Before you continue disassembly, do one of the following:

   a. Support the front cover firmly against the bottom cover in a 90 degree angle all the time when you detach any part inside the enclosure.

   b. Detach the audio socket from the top cover by using the spanner head screwdriver (#14). The audio socket has a screw-type coupling to the top cover. Be careful not to twist the wires when you loosen the audio socket.

Detaching the N-EEGX headbox board or N-EEGX headbox input unit

For an exploded view of the headbox, see the Service parts chapter.

1. Open the N-EEGX headbox enclosure.

2. Detach the module-headbox cable connector from the N-EEGX headbox board.

3. Remove the two screws that attach the N-EEGX headbox board to the bottom cover.

4. Remove the two screws that attach the N-EEGX headbox input unit to the bottom cover.

5. Lift the N-EEGX headbox board and N-EEGX headbox input unit assembly up, and detach them carefully from each other.

Detaching the N-EEGX module- headbox cable

For an exploded view of the headbox, see the Service parts chapter.

1. Open the N-EEGX headbox enclosure.

2. Detach the N-EEGX headbox board and N-EEGX headbox input unit.

3. Remove the screw and the washer that attach the strain relief yarn to the bottom cover.

4. Detach the audio socket from the top cover by using the spanner head screwdriver (#14). The audio socket has a screw-type coupling to the top cover. Be careful not to twist the wires when you loosen the audio socket.

5. Lift up the EMC shield and remove the screw, the washer and the nut that attach the ring connector of the cable to the bottom cover.
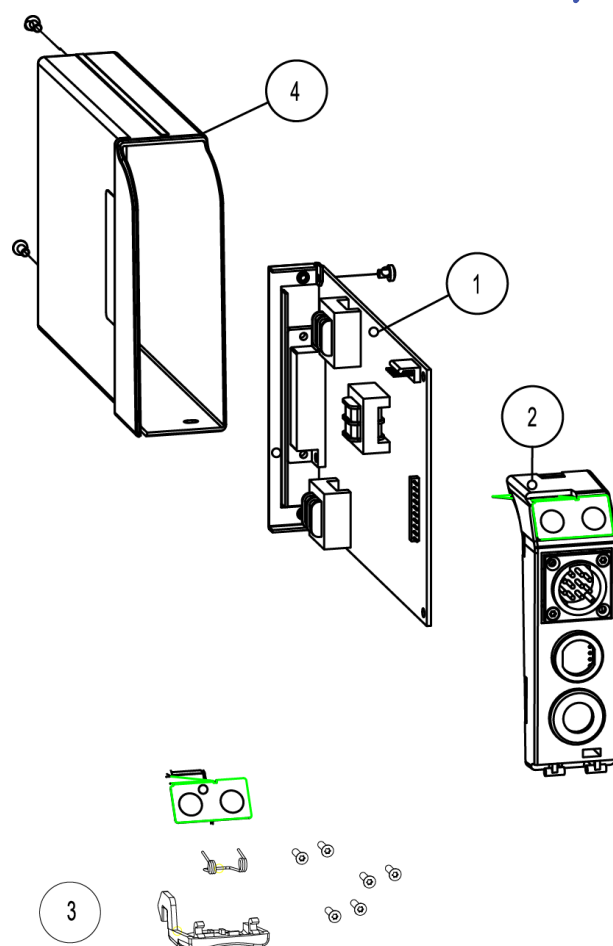
Reassembling the N-EEGX headbox

1. Reassemble in reverse order. Make sure the following:

   - Screws and washers are tightened properly.

   - Connect all the cables properly.

   - Check that there are no loose objects inside the headbox.

   - Place the bending shelter of the cable properly in its groove on the lower casing.

   - Twirl the strain relief yarn counterclockwise around the screw and tighten the screw properly. Make sure the wires are not under the screw head.

   - Place the Input unit carefully in its groove.

   - Be careful not to twist the wires of the stereo jacket when you tighten the nut.

7

Service parts

Ordering parts

To order parts, contact your local GE representative. Contact information is available at www.gehealthcare.com. Make sure you have all necessary information at hand.
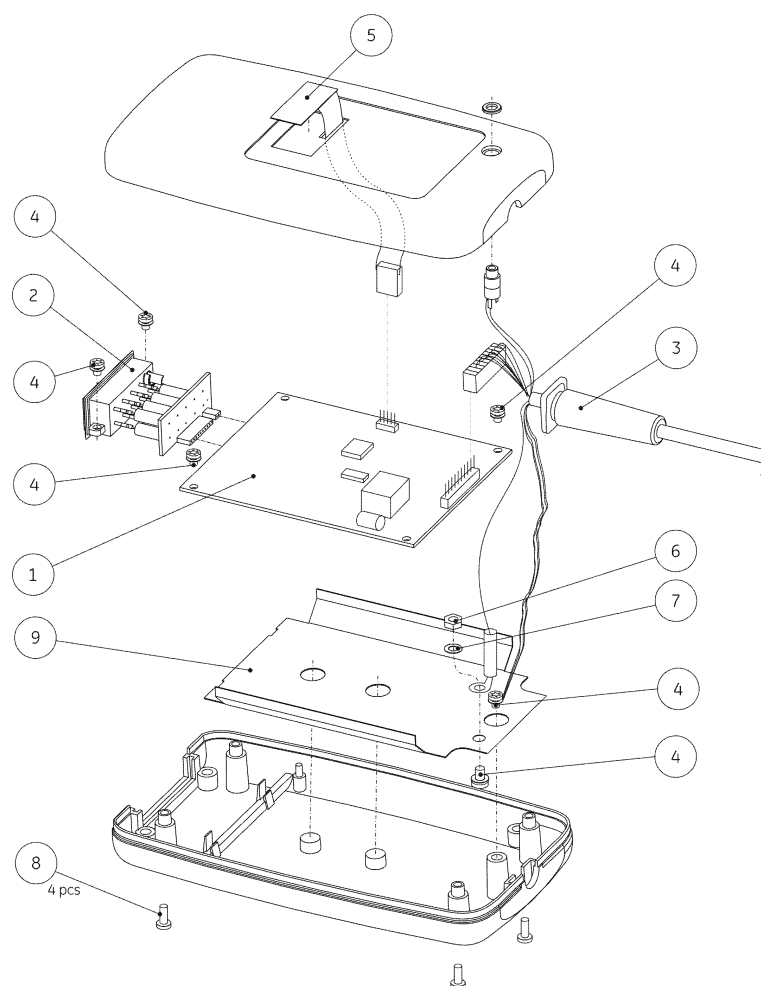
Exploded view of EEG module, E-EEGX

List of FRUs for E-EEGX

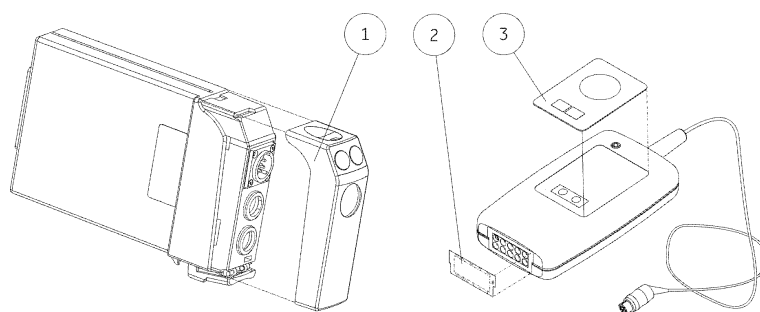| Part number	Description
2083816-001	FRU, EEG BOARD, E-EEGX (#1) • EEG board • Metal frame • 2 mounting screws
2099911-001	FRU, Front chassis unit, E-EEGX (#2) • Front chassis • Membrane keypad • Connector unit • Latch • Torsion spring
M1206392	FRU, Module Hardware Kit (#3) • 2 mounting screws for metal frame • 2 mounting screws for front chassis unit • 2 mounting screws for module casing • Latch • Torsion spring • Membrane keypad
NOTE: In case you need E-EEGX module casing (#4), contact your authorized service representative.	

Exploded view of EEG headbox, N-EEGX

List of FRUs for N-EEGX Headbox

Part number	Description
2083829–001	FRU, Headbox Board, N-EEGX (#1)
2083839–001	FRU, EEG Headbox Input Unit, N-EEGX (#2)
2080309–001	FRU, Module-headbox cable, N-EEG(X) (#3)
2097207–001	FRU, EEG Headbox HW Kit, N-EEGX • Screw, kombi, M3x6mm, torx head, 6 pcs (#4) • Membrane keypad, 1 pcs (#5) • Nut, M3, 1 pcs (#6) • Washer, M3, steel, flat, 1 pcs (#7) • Screw, machine, M3x12mm, pozidrive, pan head, 4 pcs (#8) • EMC cover, sheet metal, 1 pcs (#9)
NOTE: In case you need N-EEGX enclosure parts; the front cover or the bottom cover, contact your authorized service representative.	

Exploded view of E-EEGX and N-EEGX labeling kit

Labeling kits for E-EEGX Module and N-EEGX Headbox

Part number	Description
2083841-001	FRU, Label Kit, Czech, E-EEGX & N-EEGX: • E-EEGX Front Cover, CS (#1) • N-EEGX Electrode Sticker, CS (#2) • N-EEGX Headbox Sticker, CS (#3)
2083842-001	FRU, Label Kit, Danish, E-EEGX & N-EEGX: • E-EEGX Front Cover, DA (#1) • N-EEGX Electrode Sticker, DA(#2) • N-EEGX Headbox Sticker, DA(#3)
2083843-001	FRU, Label Kit, German, E-EEGX & N-EEGX: • E-EEGX Front Cover, DE (#1) • N-EEGX Electrode Sticker, DE (#2) • N-EEGX Headbox Sticker, DE (#3)
2083844-001	FRU, Label Kit, English, E-EEGX & N-EEGX: • E-EEGX Front Cover, EN (#1) • N-EEGX Electrode Sticker, EN (#2) • N-EEGX Headbox Sticker, EN (#3)
2083845-001	FRU, Label Kit, Spanish, E-EEGX & N-EEGX: • E-EEGX Front Cover, ES (#1) • N-EEGX Electrode Sticker, ES (#2) • N-EEGX Headbox Sticker, ES (#3)
2083847-001	FRU, Label Kit, Finnish, E-EEGX & N-EEGX: • E-EEGX Front Cover, FI (#1) • N-EEGX Electrode Sticker, FI (#2) • N-EEGX Headbox Sticker, FI (#3)

Part number	Description
2083848-001	FRU, Label Kit, French, E-EEGX & N-EEGX: • E-EEGX Front Cover, FR (#1) • N-EEGX Electrode Sticker, FR (#2) • N-EEGX Headbox Sticker, FR (#3)
2083849-001	FRU, Label Kit, Hungarian, E-EEGX & N-EEGX: • E-EEGX Front Cover, HU (#1) • N-EEGX Electrode Sticker, HU (#2) • N-EEGX Headbox Sticker, HU (#3)
2083850-001	FRU, Label Kit, Italian, E-EEGX & N-EEGX: • E-EEGX Front Cover, IT (#1) • N-EEGX Electrode Sticker, IT (#2) • N-EEGX Headbox Sticker, IT (#3)
2083851-001	FRU, Label Kit, Japanese, E-EEGX & N-EEGX: • E-EEGX Front Cover, JA (#1) • N-EEGX Electrode Sticker, JA (#2) • N-EEGX Headbox Sticker, JA (#3)
2083852-001	FRU, Label Kit, Dutch, E-EEGX & N-EEGX: • E-EEGX Front Cover, NL (#1) • N-EEGX Electrode Sticker, NL (#2) • N-EEGX Headbox Sticker, NL (#3)
2083853-001	FRU, Label Kit, Norwegian, E-EEGX & N-EEGX: • E-EEGX Front Cover, NO (#1) • N-EEGX Electrode Sticker, NO (#2) • N-EEGX Headbox Sticker, NO (#3)
2083854-001	FRU, Label Kit, Polish, E-EEGX & N-EEGX: • E-EEGX Front Cover, PL (#1) • N-EEGX Electrode Sticker, PL (#2) • N-EEGX Headbox Sticker, PL (#3)
2083855-001	FRU, Label Kit, Portuguese, E-EEGX & N-EEGX: • E-EEGX Front Cover, PT (#1) • N-EEGX Electrode Sticker, PT (#2) • N-EEGX Headbox Sticker, PT (#3)
2083856-001	FRU, Label Kit, Swedish, E-EEGX & N-EEGX: • E-EEGX Front Cover, SV (#1) • N-EEGX Electrode Sticker, SV (#2) • N-EEGX Headbox Sticker, SV (#3)

Part number	Description
2083857-001	FRU, Label Kit, Chinese, E-EEGX & N-EEGX: • E-EEGX Front Cover, ZH (#1) • N-EEGX Electrode Sticker, ZH (#2) • N-EEGX Headbox Sticker, ZH (#3)
2083867-001	FRU, Label Kit, Russian, E-EEGX & N-EEGX: • E-EEGX Front Cover, RU (#1) • N-EEGX Electrode Sticker, RU (#2) • N-EEGX Headbox Sticker, RU (#3)

E-EEGX, N-EEGX

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