

User Guide

qEEG NeXus-32

This user guide has been created to educate and inform the reader about doing qEEG measurements with the NeXus-32

For more information about NeXus, our BioTrace+ software, please visit our website or contact us.

www.mindmedia.com

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Introduction

This manual provides a step-by-step review of how to do (q)EEG measurements with the NeXus-32. The manual provides information about the required hardware, preparation and measurement steps, background information on artefacts, and care of materials.

Required Equipment

The following equipment is required to perform (q)EEG measurements:

- NeXus-32
- NeXus EEG Cap (Small/Medium/Large)
- EEG Cap Adapter
- Conductive (electro)gel
- Syringe with blunt needle
- Cotton swab
- Measuring tape

qEEG measurement setup

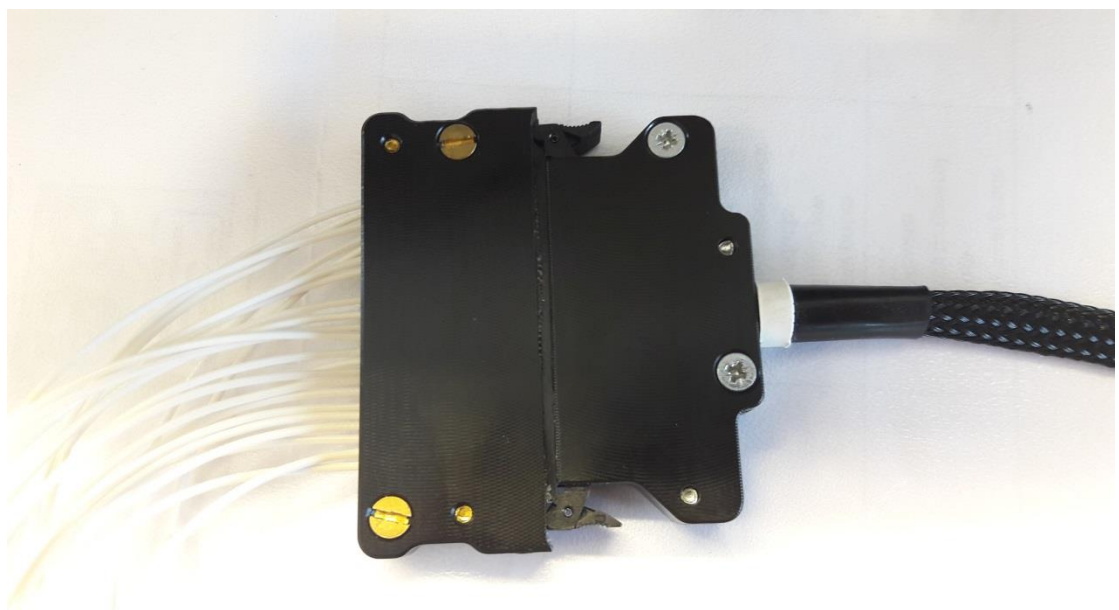
Before the actual measurement can start, the equipment has to be connected. Detailed information on setting up the NeXus-32 can be found in the NeXus-32 User Manual or Quick Start. Minimum of 50/60 Hz interference will be accomplished by powering by batteries.

Plug the 21 numbered connectors of the NeXus EEG adapter into the corresponding unipolar inputs (labeled 1 till 21) of the NeXus-32.

Plug the black ground connector labeled Gnd in to the ground of the NeXus-32, in the upper left corner.



Snap the NeXus EEG cap in to NeXus EEG Cap Adapter. The connectors will only fit one way.



Measure the circumference of the head to determine the cap size:

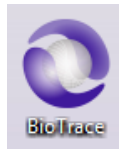
- Small (50-54 cm)
- Medium (54-58 cm)
- Large (58-62 cm)

Place the NeXus EEG Cap on the clients head. Place the ears of the client through the openings on the sides. Make sure Fp1 and Fp2 electrodes are placed correctly on the front side of the clients head. Do a short check by using some measuring tape and measuring the correct position of e.g. Cz. Fasten the velcro straps and make sure the cap is not strapped too tight around the chin.

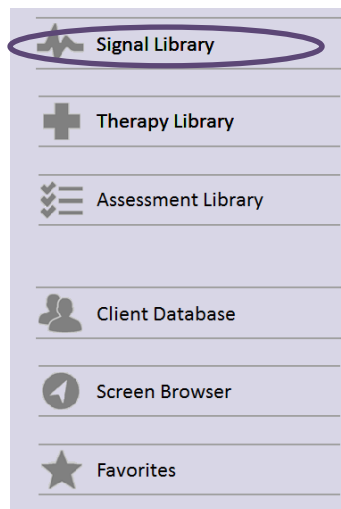


BioTrace+

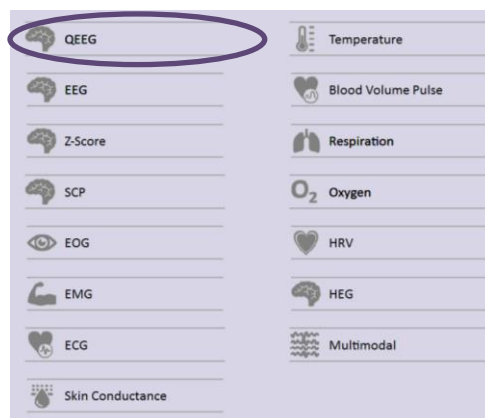
Start the BioTrace+ Software.



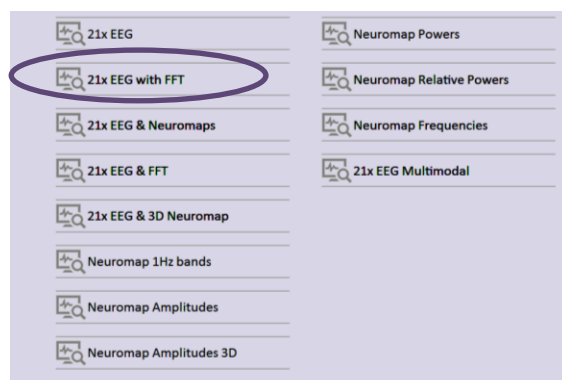
Select **Signal Library**.



Select **QEEG**.



Select your preferred measurement screen (e.g. 21 EEG with FFT).



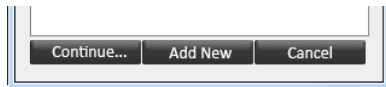
Make sure the person sits comfortable, preferably in a slight recline with feet elevated. A rolled towel can be used to support the neck.

Switch the NeXus on.

Click the **recording** button.

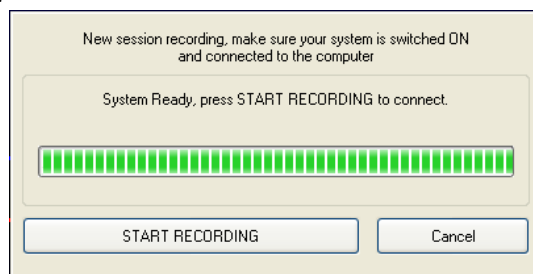


The *select a client* dialog box will appear.

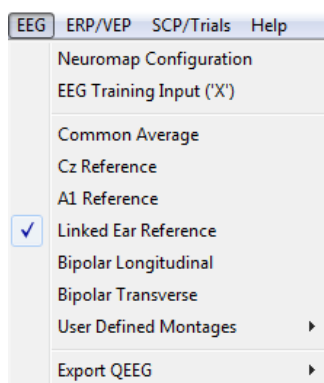


Select a client and click **Continue...** or click **Add New** for adding a new client.

The *New session recording* screen will appear. Click **Start recording** to start recording a session.



Click **EEG** and select the reference (e.g. *Linked Ear Reference*).

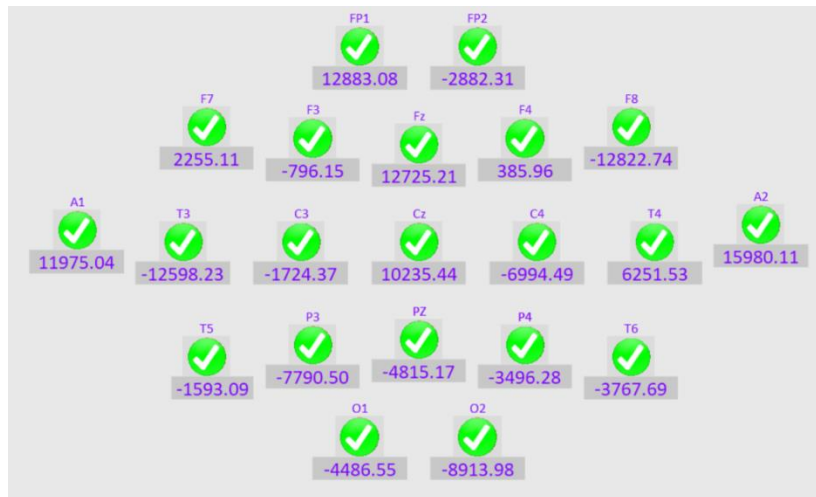


Click the **signal check** button.



A screen with an overview of all electrodes will appear.

Now fill the syringe with conductive gel and start filling up the electrodes with gel, starting off with the ground electrode (GND) and the two reference electrodes (M1 and M2). Slowly retract the syringe while filling up the electrodes with gel, thereby creating a “column of gel” and ensuring a connection between scalp and electrode. After the ground and reference electrode are filled, the numerical values beneath each checkmark will start to show values constantly changing.



The electrode contact values supply an indication of signal quality.

Between -25000 mV and +25000 mV



Between ± 25000 mV and ± 50000 mV



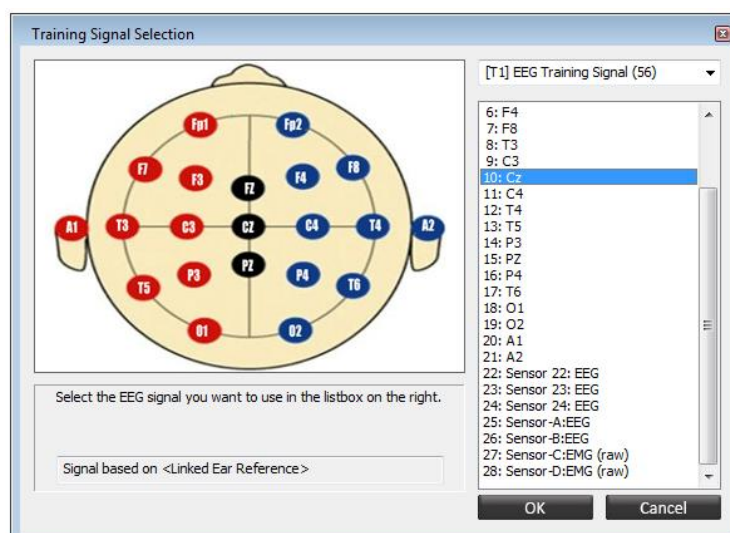
Above ± 50000



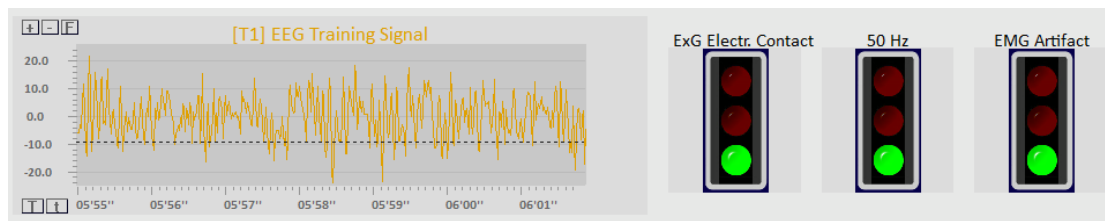
Click **page 2** to go to the second signal check screen.

2

Press the “X” on the keyboard to open the *Training Signal Selection* screen. Choose Training Signal(s) in the right top and choose the position to check (e.g. Cz) for 50/60 Hz and muscle tension (EMG) interference. Click **OK**.



50/60 Hz and muscle tension (EMG) interference can be checked for the selected position



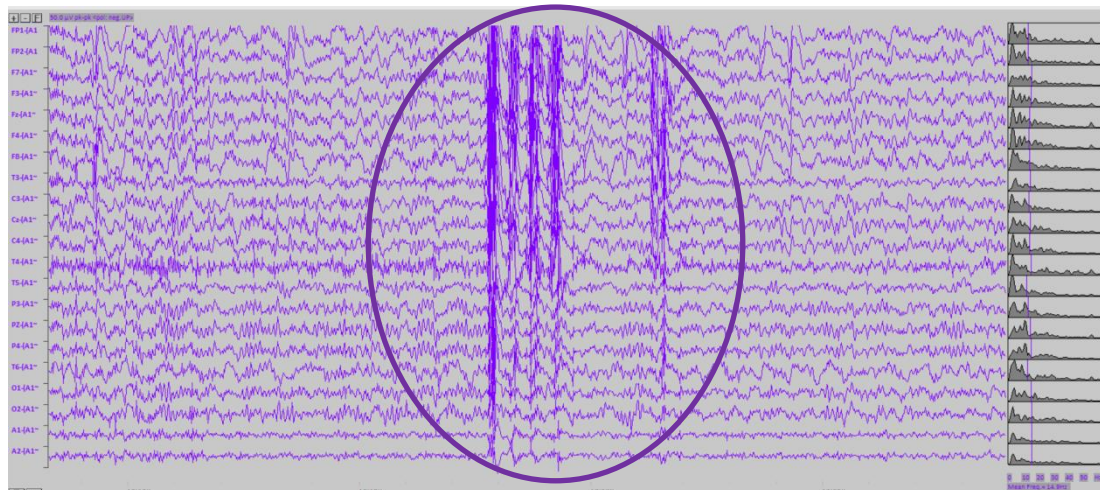
Click the **back** button.



Visually inspect the EEG to pinpoint and possibly reduce artifacts. Prevention is better than to cure and prevents having to mark and remove artifacts afterwards. For more details about the following artifacts, see the Appendix 1: Artifacts.

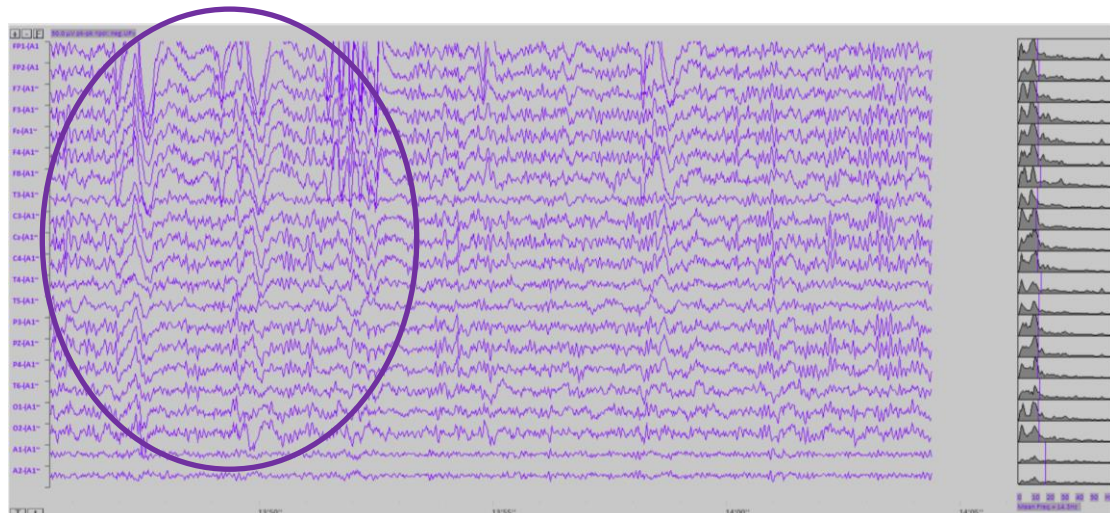
- **Muscle tension**

Electrical activity of the muscles occurs (head, shoulders, tongue, jaws, etc.)



- **Eye movement**

Blinking or looking up or down (e.g. in SCP).



- **Cardiac signals**

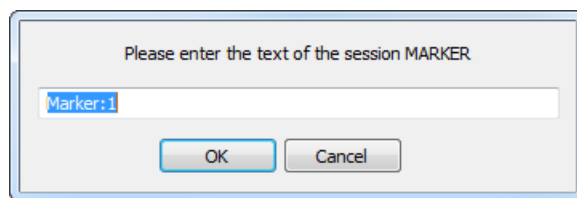
In some cases the electrical signal of the heart (ECG) can show up in the EEG. The pulsation of veins below an electrode can also cause artifacts in the EEG.

After having checked signal quality, the actual measurement can be started.

Markers can define a certain event during a recording. These markers can be added manually by pressing *the marker symbol* in *Session controls* in the *left bottom corner* (or by pressing **Enter**):



A dialog box to enter the text of the session marker will appear.



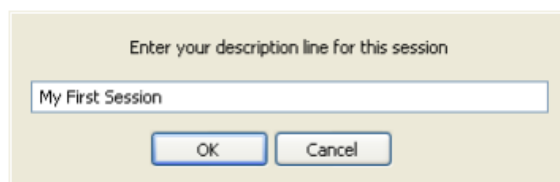
In order to stop the recording, click the **stop** button.



An alert box will appear.



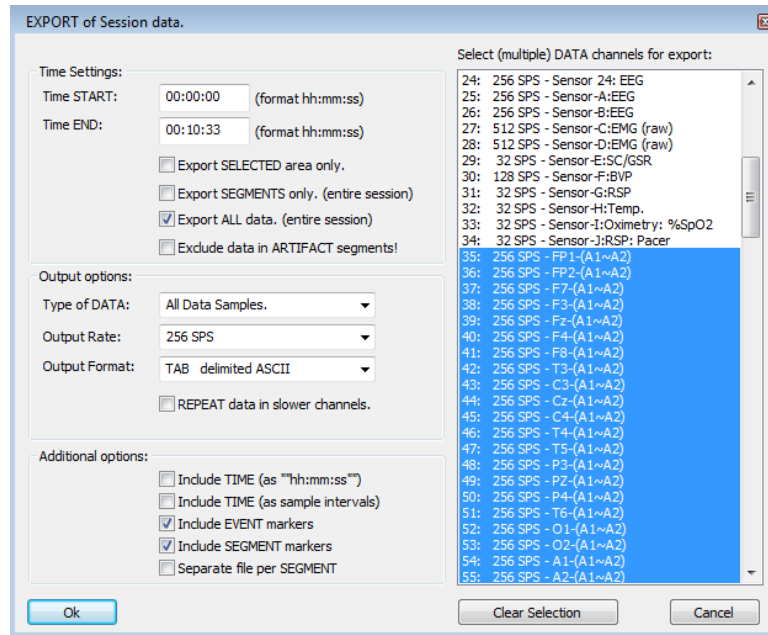
Click **Yes** and save the session and enter a description of the session.



Confirm by clicking **OK**, the session is now saved.

Exporting data

Select *File > Export Session Data*. This will open the *Export of Session data* screen. Alternatively, select data in the session overview screen, and choose *Export selected data* from the drop down menu.



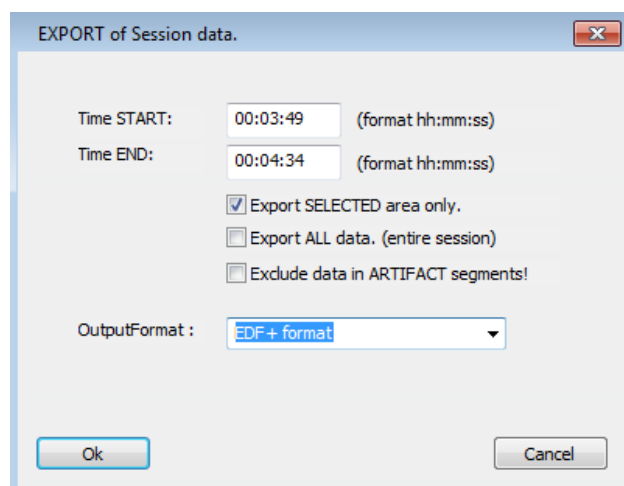
Different output formats can be selected. Click **OK** and **Save** session.

Exporting data to NeuroGuide

There are two ways to export data to NeuroGuide.

Exporting data by selecting data in session overview screen

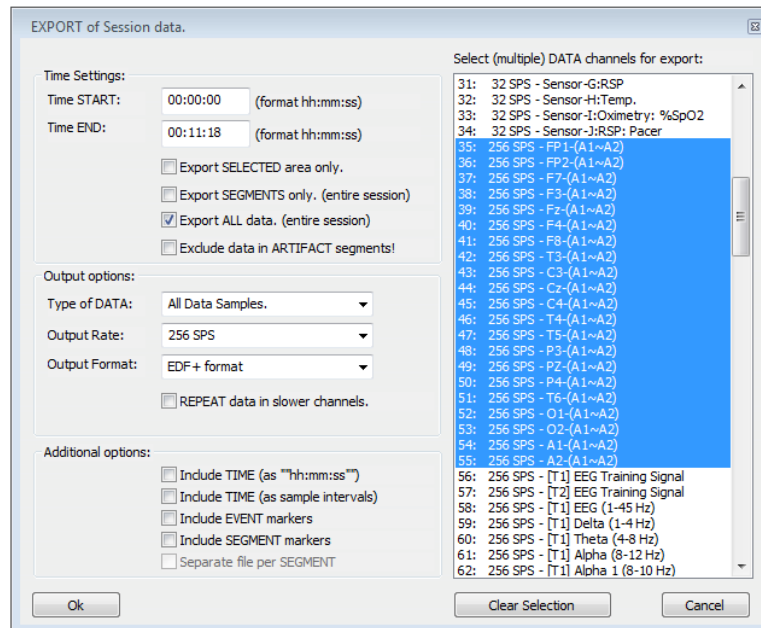
Select data in the session overview screen, and choose *Export QEEG > Neuroguide* from the drop down menu.



Click **OK** and **Save** session.

Exporting data from Export of Session data overview screen

Select **File > Export Session Data**. This will open the *Export of Session data* screen.

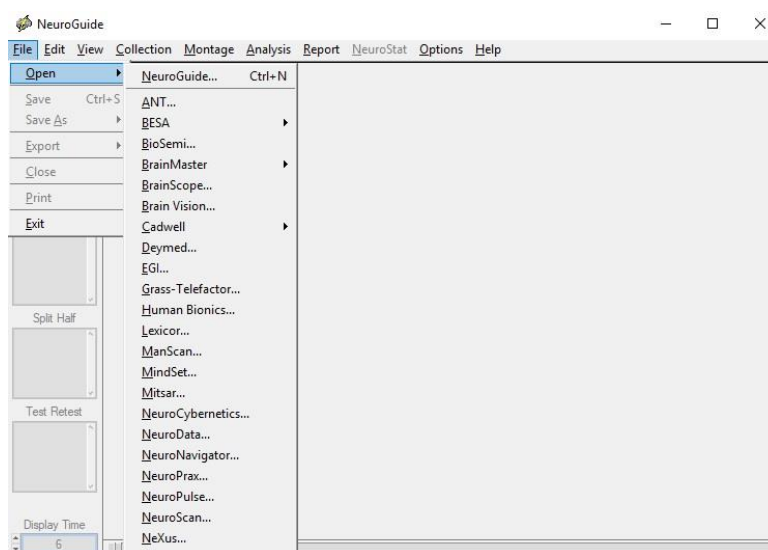


Select the measured data channel(s) to export (35-55). Change *Output Format* to *EDF+ format*. Click **OK** and **Save** session.

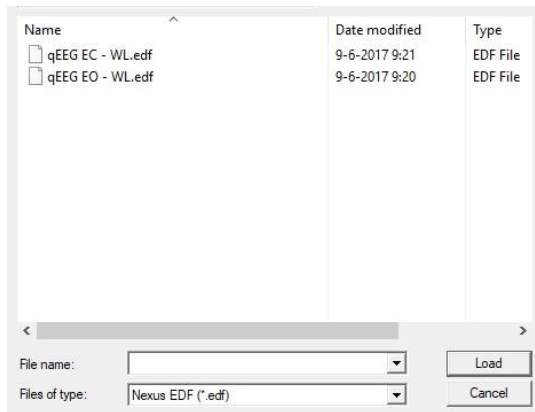
Import data in NeuroGuide

Open NeuroGuide.

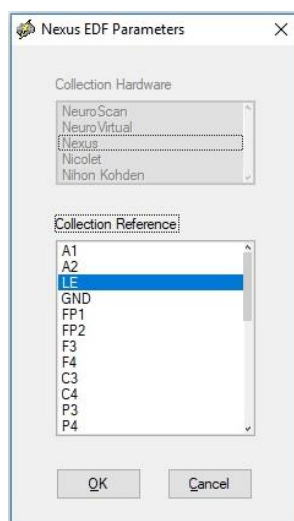
Select **File > Open > NeXus...**



Select the session data and click **Load**.



Select *linked ear* (LE) reference and click **OK**.



Fill in the *Subject Information*. Make sure to fill in at least the age and eye condition. Click **OK**.

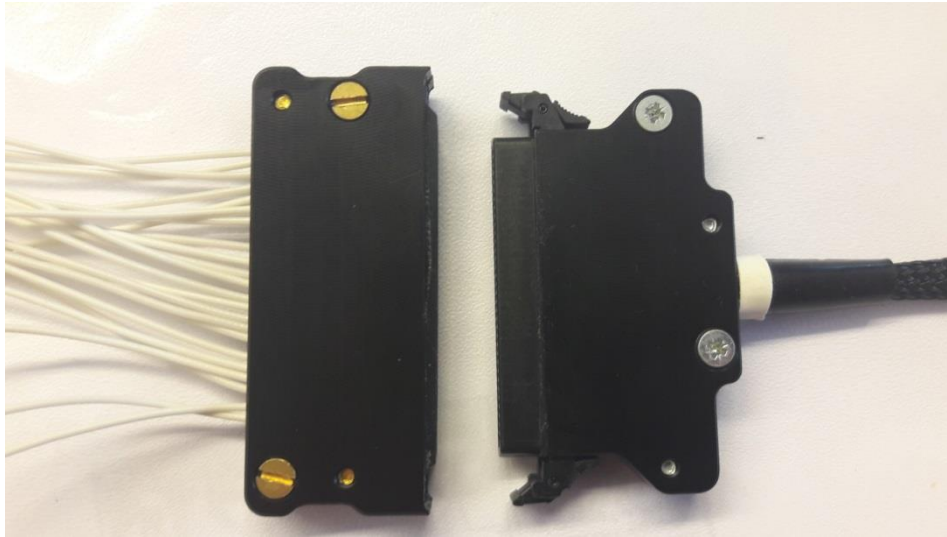
The 'Subject Information' dialog box. It contains several input fields and radio buttons. The first section has fields for Name, Subject ID, Date of Birth, Age, Gender, and Handedness. The second section has fields for EEG ID, Date of Test, Time of Test, and Technician, along with radio buttons for 'Eyes Closed' and 'Eyes Open'. The third section has fields for Clinician and Medication. The bottom section has a large text area for Comments. At the bottom are 'OK' and 'Cancel' buttons.

Appendix 1: Artifacts

- 50/60 Hz interference** The EEG activity has very low voltages, expressed in microvolts. Electrical interference can arise from electrical devices, lighting, etc. Electrical devices and cables transport electrical power at a level of 110-230 Volts AC. This power is alternating 50 or 60 times per second and therefore called “alternating current” or AC. This 50 or 60 Hertz activity can show up in the EEG, especially where the electrode doesn’t make good contact, or where there are simply too many cables and electrical devices around. This is a very common artifact. The quality and design of the hardware also strongly influences the presence of 50/60 Hz.
- Muscle tension** Electrical activity of the muscles (head, shoulders, jaws, tongue, etc) can interfere with the EEG. EMG activity can reach amplitudes of more than 100 microvolts. Thus the EMG is more powerful than the EEG signal. Too much muscle tension can completely contaminate the EEG. Make someone aware of EMG artifacts by instructing them to clench teeth, chewing, frown, raise eyebrows, move the head side to side, up and down and swallow to produce artefacts while looking to their EEG signals. Pay close attention to the temporal electrodes T3, T4, T5 and T6 (modified combinatorial nomenclature or 10-10 system- T7, T8, P7 and P8) to identify muscle artifact from the masseter muscles. EMG may also be observed quite strongly in the frontal and occipital electrodes.
- Eye movement** Eye movement, both slower (looking up or down) and faster (blinking the eye) can cause artifacts, which are larger than the actual EEG signals. These artifact are very frequent. Eye blinks are most visible in the frontal locations (Fp1, Fp2, F3, F4, F7, F8). Make someone aware of eye movement artifacts by instructing them to blink, move eyes up, down, right and left while looking at their EEG signals.
- Cardiac signals** In some cases the electrical signal of the heart (ECG) can show up in the EEG. The pulsation of veins below an electrode can also cause short spike in the EEG. This artifact is relatively rare.

Appendix 2: Care of materials

Disconnect the NeXus EEG cap from the EEG Cap Adapter.



The full EEG cap and electrodes of the cap can be rinsed out by flushing with lukewarm water. Use a cotton swab to clean the individual electrodes. Gel leftovers in the “cup openings” can be removed by stabbing the backside cotton swab through the cups. Make sure the connector of the EEG cap doesn’t get wet. Also make sure there are no residues of gel as dried up gel might lead to bad signals.



When drying the cap, make sure the connector of the cap doesn’t hang beneath the wet cap to prevent the connector getting wet. To speed up drying a hair blower can be used. Make sure not to hold the hair blower too close to the cap.

Appendix 3: EEG cap electrodes input connections

An overview of which NeXus input corresponds to which EEG cap electrode position:

Electrode position	NeXus input
FP1	1
FP2	2
F7	3
F3	4
FZ	5
F4	6
F8	7
A1	20
T3	8
C3	9
CZ	10
C4	11
T4	12
A2	21
T5	13
P3	14
PZ	15
P4	16
T6	17
O1	18
O2	19
GND	GND