Directions of Use encevis

Manufacturer:
AIT - Austrian Institute of Technology GmbH;
Giefinggasse 4; 1210 Vienna; Austria

Date of manufacture: 2022

SN Serial number:
encevis 1.11.6

Use-by date:
Windows 10: 10/2025

CE 0297 Notified Body:
DQS Medizinprodukte GmbH; August-Schanz-Straße 2; 60433 Frankfurt am Main; Germany

⚠ Caution: Please read paragraphs marked with this symbol carefully as they contain important safety information.

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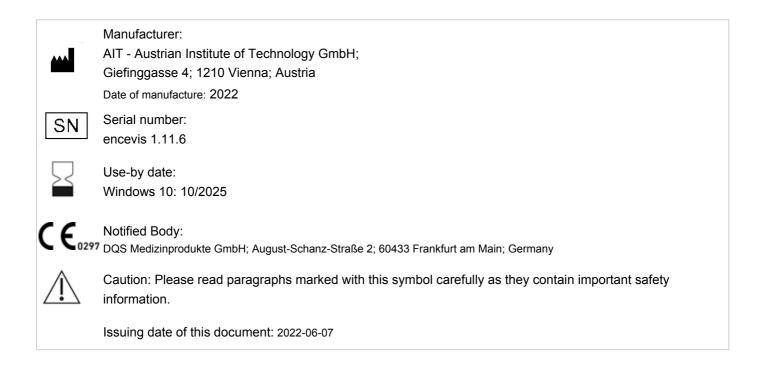## 1 Who should read this document?

This document is directed to physicians, medical technicians and nursing staff, who are familiar with the EEG and the interpretation of it. It ensures them a safe use of the system.

2 Who can use encevis?

encevis is intended to be used by qualified physicians, qualified medical technicians and qualified nursing staff.

3 What can encevis be used for?

encevis aids the qualified user in the analysis and review of EEG data recorded with an electroencephalography device using scalp or subcutaneous electrodes. encevis offers two different user interfaces for reviewing EEG recordings. One EEG viewer is optimized for a multi electrode setup, the other is optimized to display a low number of electrodes. Both EEG viewers can start modules that automatically analyze the EEG. The analysis results are presented in graphical user interfaces which shall aid the user in the examination of EEG recordings. The availability of analysis features and viewers depends on the license installed.

3.1 EEG viewer for multi electrode setup

The EEG viewer for multi-electrode setup is optimized to display EEG signals for up to 256 electrodes. It includes frequency filtering of the data, the scaling of the data in x and y direction, display of video to the EEG data, the visualization in different montages and artifact reduction. The EEG viewers can also start additional modules that automatically analyze the EEG. The availability of analysis features depends on the installed license.

3.2 EEG viewer for low-electrode setup

The EEG viewer for low-electrode setup is optimized to display EEG signals for a low number of electrodes only. It includes frequency filtering of the data, the scaling of the data in x and y direction and the visualization in different montages. The EEG viewers can also start an automatic analysis of the EEG signal. The analysis results are presented in the EEG viewer which shall aid the user in the examination of EEG recordings. The analysis includes the seizure detection, detection of rhythmic pattern, background frequency, spectrogram and aEEG.

3.3 Artifact Reduction

The encevis artifact reduction is an analysis module that automatically recognizes and reduces artifacts in the EEG-data which come from EMG, electrode artifacts and optionally from eye movements. encevis artifact reduction can be used in online- and offline mode. It is available in the EEG viewer for multi-electrode setup, only.

3.4 Seizure Detection

The encevis seizure detection allows the automatic detection of areas in EEG recordings that may correspond to electrographically recognizable epileptic seizures and displays these markings for review. This can be done online during recording or offline after recording is complete.

3.5 Spike detection

The encevis spike detection is a module for the automatic marking of areas in the EEG that could correspond to spikes or spike-waves. A graphical user interface presents the results to the user. The user interface contains a time line per channel, a list of spike clusters that contain spikes and a list of spikes contained in a selected cluster. In addition, either the EEG or the averaged EEG 0.5 seconds before the spike maximum to 0,5 seconds after spike maximum for all spikes in a selected cluster is shown. Processing can take place online during the recording or offline after the recording. The spike detection can be operated directly by the EEG manufacturer via the external interface "AITInterfaceDLL".

3.6 Source localization

encevis Source Localization calculates the source of EEG activity and visualizes the results. Individual spikes as well as rhythmic activity can be localized. It serves as a support for the qualified physician and qualified medical-technical assistants (MTA) in the evaluation of EEG recordings. It allows the clinician to quickly and reliably perform a localization of EEG activity. The EEG data should contain at least the full 10/20 configuration of surface electrodes. The encevis source location can be operated directly by the EEG manufacturer via the external interface "AITInterfaceDLL".

3.7 Detection of rhythmic and periodic pattern

encevis pattern detection automatically detects EEG-patterns defined in the Standardized Critical Care EEG Terminology of the American Clinical Neurophysiology Society (Hirsch, L.J., et al., 2013. American Clinical Neurophysiology Society's Standardized Critical Care EEG Terminology: 2012 version. J. Clin. Neurophysiol. 30, 1–27) and graphically presents the results to the user. Additionally, it detects and visualizes rhythmic patterns with frequencies of up to 12Hz. It serves as a support during the examination of EEG-recordings in the ICU and EMU. This can take place online during the recording or offline after the recording.

3.8 Background frequency

The background frequency in encevis analyses the dominant background frequencies of the EEG. These are displayed for the four frequency ranges beta band, alpha band, theta band and delta band.

3.9 aEEG

The aEEG in encevis presents the amplitude-integrated EEG according to "Zhang, D., Ding, H., 2013. Calculation of compact amplitude-integrated EEG tracing and upper and lower margins using raw EEG data. Health (N. Y.) 05, 885–891"

3.10 Burst-Suppression

The burst suppression detection in encevis automatically marks areas in EEG recordings that are burst-suppression patterns according to the definition of "Hirsch, L. J., et al, 2013. American Clinical Neurophysiology Society's Standardized Critical Care EEG Terminology: 2012 version. J. Clin. Neurophysiol. 30,1-27" and displays the results in a graphical user interface.

3.11 Heart rate

The display of the heart rate in encevis displays the patient's heart rate as long as an ECG measurement was registered in the EEG file. The display of the heart rate in encevis is only intended as an additional information that can help in the interpretation of the EEG and cannot replace the monitoring of the heart by ECG monitors.

3.12 Spectrogram

The encevis spectrogram graphically provides the user with a spectrogram for all or a selected number of EEG channels within a defined time range.

4 Life Span

The life span of this version of encevis ends on Windows 10 64 bit operating systems on 2025-10-14 (October 14th 2025). As of these dates, no more error corrections will be performed for encevis on the named operating systems and this version of encevis may no longer be used.

5 For which patients can encevis be used?

encevis can be used in adults over the age of 18 years. There are no restrictions on weight, health, gender, or nationality. The use in children is not recommended since specificity and sensitivity are not sufficiently defined due to the low amount of available EEG data from children during clinical validation.

6 Are there restrictions of use?

⚠️ This version of encevis is CE-certified as a medical device. If your country requires any other approval for medical devices you must not use this version of encevis. If you are located in a country that requires FDA approval for medical devices please contact you local distributor to receive an FDA approved version of encevis. For all other countries please contact your local distributor to receive a version of encevis that is not certified as a medical device and can be used outside countries that accept the CE or FDA mark.

⚠️ The modules from encevis for the automatic analysis of EEG cannot replace the examination by the physician. As for any other automatic procedure there can be inaccuracies during the analysis with encevis. The original EEG still needs to be used for the evaluation and the results of encevis need to be confirmed based on the unaltered raw EEG trace.

⚠️ encevis does not provide any diagnosis or diagnostic recommendations or predictions of the patient's state. It remains the responsibility of the physician to decide over the diagnosis or to induce treatment.

⚠️ The use of the software cannot replace the real-time surveillance by medical staff particularly of the vital functions. The patient's safety remains the responsibility of the medical professional.

encevis artifact reduction, spike detection, source localization, detection of periodic pattern and burst-suppression detection requires EEG recorded from at least a 10/20 standard set of scalp electrodes. For seizure detection, detection of rhythmic pattern, aEEG and background frequency the EEG must be available from at least three scalp or three subcutaneous electrodes.

The maximum length for on continuous EEG recording with a 10/20 set of scalp electrodes that can be reviewed and analyzed with encevis EEG viewer for multi electrode setup is 10 days. If a recording is longer than 10 days encevis will stop processing.

The maximum length for continuous EEG recording that can be reviewed and analyzed with encevis EEG viewer for low electrode setup is one year. If a recording is longer than one year encevis will stop processing.

encevis artifact reduction does not remove all interference and reduces only interference coming from EMG, electrode artifacts or optionally eye artifacts. It can change areas of the EEG that show cerebral activity. encevis artifact reduction works only with electrodes defined in the 10/10 system and additional T1-, T2-, SP1-, SP2-, SQ_C-, SQ_P-, SQ_D-electrodes. encevis artifact reduction is only available in the encevis EEG viewer for multi electrode.

encevis seizure detection cannot be used as an alarm system, since there may be a delay of several minutes between the clinical onset of a seizure and the display of the detected pattern. Some EEG-events with epileptic seizures that have an electrographic correlate might be missed. For this reason encevis can only support but can not replace the qualified expert in the real-time monitoring.

Some EEG-events where spikes occur might not be detected with encevis spike detection. The detection of such events with the encevis spike detection cannot replace the analysis by a qualified expert.

> ⚠ encevis detection of rhythmic and periodic pattern, burst suppression, aEEG or any other module included in encevis should not be used as an alarm system, since the visualization of patterns could be delayed by up to several minutes.

Some events, where patterns defined in the Standardized Critical Care EEG Terminology of the American Clinical Neurophysiology Society including Burst Suppression Detection are visible in the EEG, might be missed. It can happen that the localization of patterns is not correct. All measures of encevis must be evaluated in combination with the original raw EEG and must not be the only basis for a diagnosis, treatment or change of treatment.
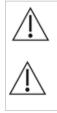
> ⚠ The heart rate trace shown in encevis can never replace an ECG monitor. The trace shown in encevis is only intended to provide additional information that can help in the interpretation of the EEG. It must never be used to monitor the heart function of the patient. It must always be verified based on the original raw ECG trace.

encevis source localization may only be used with electrodes defined in the 10/10 electrode system configuration. The use of electrodes other than those included in the 10/10 system may lead to an error message. The results of a source localization are never unambiguous and may differ from the actual position of the source of the EEG activity. The use of a standard head model can lead to deviations in the localization of the EEG activity. The results of encevis source localization can only support the location based on the analysis of the original EEG by a qualified expert, but not replace it.

7 How is encevis installed and launched?

encevis is delivered with an installation program that guides the user through the installation process and installs the software on the user's PC. The user needs administrator rights to install the software and to license it. The user should therefore contact the IT-department.

> ⚠ When configuring encevis with a remote distributor for calculation on a second PC it must be ensured that both PCs are running on the same system time. Difference of more than 1,5 minutes might interfere with the encevis system
>
> ⚠ When using a database server it is the responsibility of the administrator of this database server to ensure that the database is properly secured against unauthorized usage. This includes strong passwords and enabling SSL encryption for accessing the database.

8 How is encevis started?

To review and analyze EEG data of a multi electrode setup the program "encevis.exe" must be started by the user. After the start of "encevis.exe" the EEG viewer for multi electrode setup will open.

To review and analyze EEG data of a low electrode setup, the program "encevis EpiSight.exe" must be started by the user. After the start of "encevis EpiSight.exe" the EEG viewer for low-electrode setup will open.

9 Is additional help for encevis available?

Additional help for encevis can be found in the electronic help system inside the software under the menu item „Help". Adobe Acrobat Reader is required for using the help. It can be downloaded directly from the Adobe webpage free of charge (https://get.adobe.com/reader).

10 Which EEG-data can encevis read?

A list of the supported data formats can be found at http://www.encevis.com/support/dataformats.

11 Which EEG-systems support encevis online?

All encevis modules can be operated online directly from the EEG-devices. For this, the manufacturer of the EEG-device has to integrate the interface to encevis. A list of the manufacturers that have encevis integrated can be found at http://www.encevis.com/support/listOfIntegrations.

12 Which service and maintenance measures are prescribed?

encevis does not require any particular service. The manufacturer has nevertheless the possibility to issue updates in irregular intervals. The manufacturer or the distributor will inform the user about these updates. It is recommended to promptly install these updates. Although the computer hardware is not part of encevis it is recommended to service the computer hardware running encevis in regular intervals. Particular attention should be given to ensure that sufficient free storage space is available for the operating system to run faultless. The user needs to ensure that the hardware of the computer system fulfills the minimum requirements that are listed in this document.

> ⚠ We strongly recommend that you back up the database used for encevis on a daily basis to prevent data loss. If the database is lost, all results are irretrievably lost.
>
> ⚠ If encevis is connected to a UNEEG ProConnect we recommed to back up the cache file path on a regular basis.

13 Can encevis be combined with other medical products?

encevis is a stand-alone EEG analysis software. Third party EEG manufacturer can interface to encevis. A list of the manufacturers that integrate with encevis can be found at http://www.encevis.com/support/listOfIntegrations. encevis can be used to download EEG-data from a certified UNEEG ProConnect system. Please contact your EEG vendor or encevis@ait.ac.at for further information.

14 Which application environment is necessary?

The medical device is a supplement to an EEG recording device and can be used wherever EEG data are recorded and evaluated. This can be done within a hospital or a doctor's office. Also mobile use on a laptop outside a doctor's office or a hospital is possible. The medical device can be used wherever the proper use of the required computer hardware is ensured. encevis is not intended to be used outside closed rooms.

15 What are the encevis system components?

The system is made of the software encevis with the functions described above. The software includes additional executables that are required for the online-use of the analysis modules and to download EEG data. The LicenseTool licenses encevis and is not required for later use. The installer installs and de-installs the system and is not required for later use.

16 How is encevis disposed?

Encevis can be completely removed by the uninstall mechanisms that are provided by the operating system. Alternatively, encevis can be removed using the Installer. This tool is a component of the encevis software.

17 Technical Data

Supported operating systems	Windows 10 64 bit (supported until 2025-10-14)
Minimum requirements for Hardware	Intel® i5-3230M,2.6 GHz Dual Core 4 GB RAM Intel® HD-Grafik 4000 10 GB free hard disk space
Minimum requirements for real-time processing	Intel Core™ i5, CoreQuad 2.8 GHz, 4 GB RAM Intel HD 3000 10 GB free hard disk space
Recommended hardware	Intel Core™ i5, CoreQuad 2.8 GHz, 4 GB RAM Intel HD 3000 40 GB free hard disk space
Requirements for graphics driver	OpenGL 2.0 or higher
Maximum number of modules running simultaneously (online)	4
Allowed biosignals	EEG, ECG
Power frequency	50Hz, 60Hz
EEG sampling frequency	100Hz or higher
Type of recording	referential, bipolar

18 How can feedback and problems be reported?

The user can report feedback and problems with encevis to the distributor that has provided the software or directly to the manufacturer using the email address encevis@ait.ac.at.

19 Where are printed versions of the directions of use available?

A printed version of the directions of use is available from the manufacturer.

20 Cyber Security measures important for the safety of encevis

Please follow these advises carefully to minimize any security issue due to cyber security:

- Do not enable the guest account on this computer
- Use the database export function for regular backups
- Keep your operating system, firewall and anti-virus software up-to-date
- Do not run this software on Windows operating systems for which the support has been discontinued by Microsoft
- Ensure that access to your computer is restricted to authorized personnel