

NEUROWERK EEG34 / EEG58 / EEG80



digital EEG System



manufactured by
SIGMA Medizin-Technik GmbH

Gewerbepark Am Gruendel 2
D-09423 Gelenau – Germany

Tel.: +49 (0) 37297 – 825 – 0
Fax: +49 (0) 37297 – 825 – 23

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General Information:

Computer:

Desktop

- Case Silverstone Desktop, Power ATX Major Low Noise, CPU Intel Core i3-9100 3.6 GHz, RAM DDR4 4 GB, HD 1 TB S-ATA II WD (or equivalent), DVD R/W,
- WINDOWS 10 Professional OEM DVD
- Mouse, mouse pad, keyboard.
- Display 23" DELL FHD high resolution or equivalent
- **Optional** MS Office
- PC according to EN 55011, EN 61000-3-2 und EN 61000-3-3.
- HI-FI audio by using professional loudspeakers
- High speed local area network connection (1 GB/sec) and easy connectivity to existing Hospital networks or to a review station.
- Trolley with accessory, footswitch and head cap holders and 4 anti-static castors with locking brake.
- Dimensions: (L)60 X (W)58 X (H) 82 approx.
- **Optional** High Definition Laser printer or Colour Inkjet printer.
- Power supply: 220 V / 110 / 100, 50/60Hz



Laptop

- Notebook, Intel® Core™ i5-8250HQ (up to 3.4 Ghz), Dual-Core
- 17.3" HD (1920x1080) 16:9 LED display, webcam,
- 4 GB RAM, 500 GB hard drive, DVD+/-R/RW, USB, HDMI, WLAN-n, Audio/Micro, 3.0 kg,
- Windows 10 Professional, power supply
- device software pre-installed
- (rights for changes according to the technical progress are reserved.)
- Notebook accord. EMC standards EN 55011, EN 61000-3-2 and EN 61000-3-3



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NEUROWERK EEG Hardware Characterise:

Amplifire:

- EEG26+, 26EEG channels + 1x ECG, 1x EOG, 1x EMG, 1x RESP, ambient light.
- EEG40+, 40XEEG channels+ 1x ECG, 2x EOG, 3x EMG, 3x RESP, position sensor, snore sensor, ambient light
- EEG80+, 80EEG channels + 1x ECG, 1x EOG, 1x EMG, 1x RESP
- **Optional channels** for both amplifiers:
 - Auxiliary Channel Temperature
 - Auxiliary Channel SaO2 (Saturation, heart rate, pulse curve).
 - Auxiliary Channel etCO2 (EtCO2, Respiratory rate, respiratory curve)
- 24 bit A/D converter with resolution 3nV/Bit and Input voltage up to 50mV P-P,
- Sampling rate 256, 512, 1024, 2048 Sps selectable for each channel, for EEG26+ and EEG40+
- Sampling rate 256, 512, 1024 Sps selectable for each channel, EEG80+
- Input impedance: more than 20GΩ for EEG
- The common-mode rejection ratio (CMRR) of a differential amplifier > 129 dB, noise less than 1.5 µV pp.
- Autonomous calibration of the amplifiers and of the traces on the display by means of square waves of 100 microVolt pp at 0.5/1 Hz.
- Compatible with accessories for neonates/pediatric and adults
- LED Display for Impedance Threshold at each Input Socket, Impedance Thresholds Directly Adjustable on Head Box 2, 5, 10, 20, 50 kΩ
- Transfer Method ETHERNET up to 100m Distance between PC and Amplifier
- Classification Class IIa
- Possibility to connect prewired CAP to the amplifier through DBAA adapter.



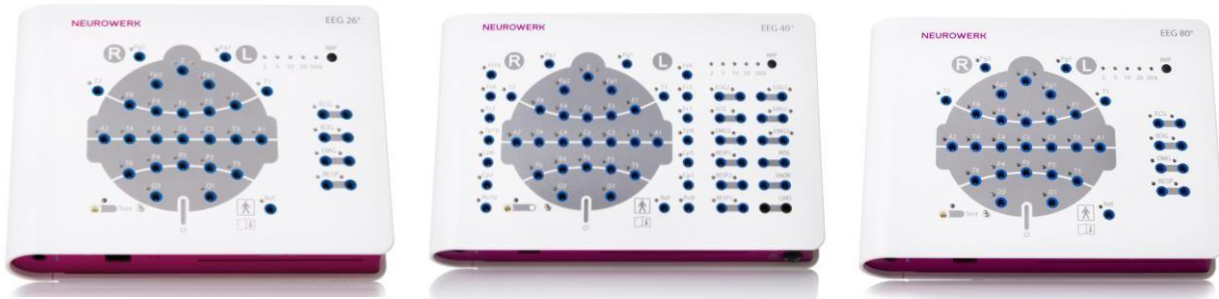
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EEG Headbox:



Connector Box for EEG40+ and EEG80+



Photic Stimulator (Optional):

- Supply voltage 12 VDC
- Flash period 2 ms
- Flash frequency 0...60 Hz
- Light discharge opening 123 x 31 mm
- Luminous intensity
- Measuring distance 10 cm: 30 Hz: 1.0 kLux 60 Hz: 1.9 kLux
- Measuring distance 20 cm: 30 Hz: 0.6 kLux 60 Hz: 1.1 kLux
- LED: ML5FW13H-CEF
- Holding Arm with (Optional) Stand and wheels.
- Manual and programmer setup



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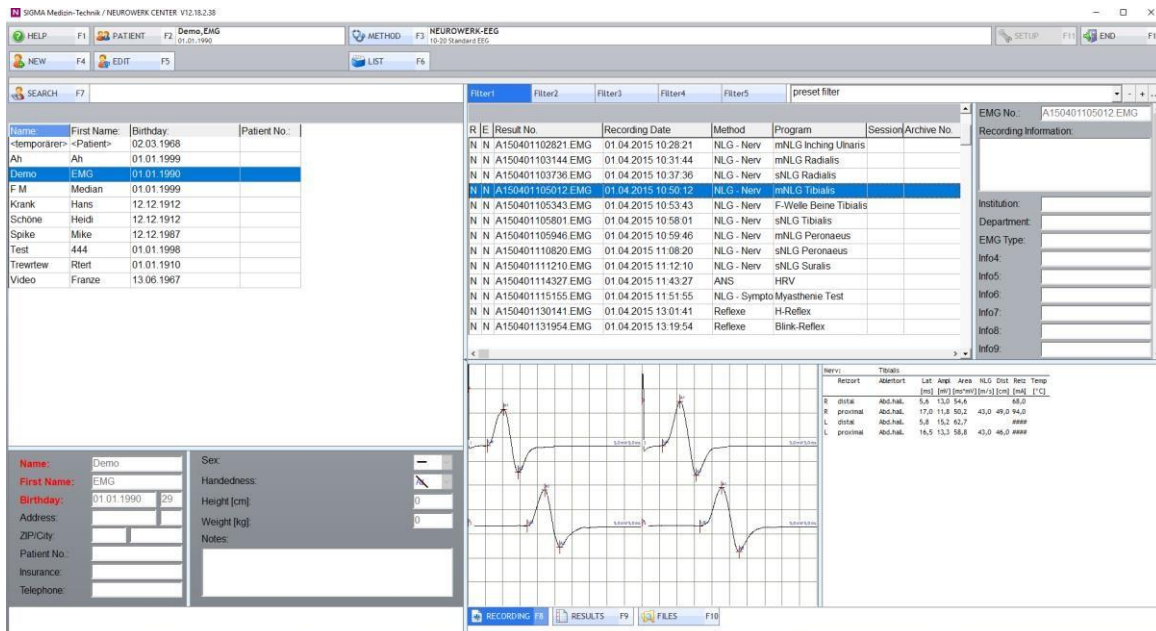
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Archiving, Reporting, Distribution of Information through the Network

ARCHIVING FEATURES

- Archiving of patient and EEG / EMG recordings independent from the archiving support: Hard Disk, Floppy Disk, CD/DVD ROM are all managed in the same standard way. Advanced backup feature fully programming,
- Multilevel archiving structure with advanced management of Resources, Patients, Recordings and Reports using industry standard Microsoft SQL Server,
- Automatic research of patients already archived; fields to characterize the patient and possibility of multiple researches by means of selective filtering on patient fields,
- Advanced multilevel statistical features,
- Template based report with possibility to easily define new custom reports.
- Patient ID and Date/time
- Search by Last Name, First Name, patient ID, date of exam and more...



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1. User management set up possibility for different evaluators (to allocate specific EEG record to specific doctor)

2. Optic, graphic and numeric impedance measurement presentation

3. Simultaneous presentation of recording and recorded record part

4. Event markers (for data entry, removing and marker changing)

5. Possibility to add sound to each marker

6. Automatic manual photic stimulation, hyperventilation indication with a timer

7. Additional information entry possibility at record finish: technician and doctor name, patient drugs, patient height and weight, sleeping duration (sleeping EEG)

8. Recording in split screen showing real time record and recorded record with 1 sec dilation.

9. Recording in split screen showing part of record in real time in two different montages

10. Recording & Reviewing with DSA analysis display

11. Possibility of adding markers with real time record on screen displaying in JPEG format

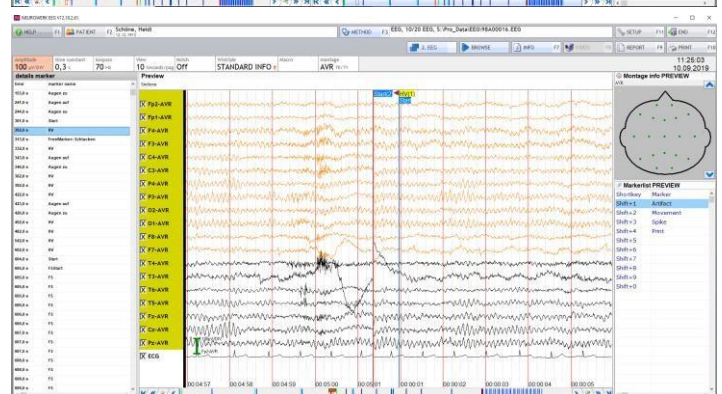
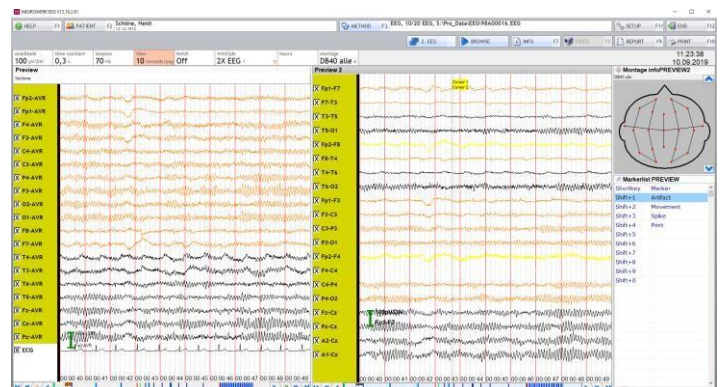
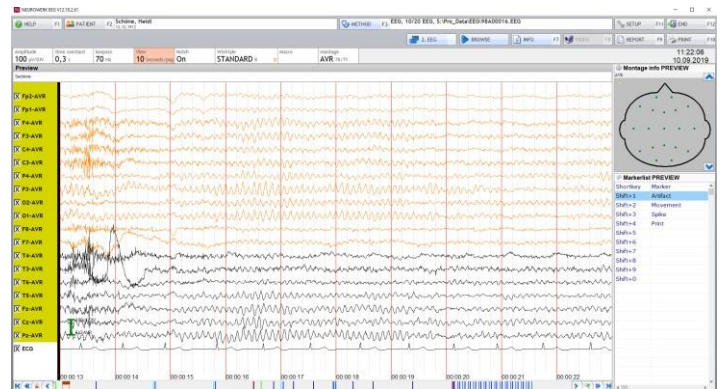
12. Possibility of automatic recording stop after defined period

13. All recording parameters on line /offline setting

14. Sensitivity 1.5, 2, 5, 10, 20, 50, 70, 100, 200, 500, 1000 μ V possibility to change this range with unlimited n. of steps

15. Upper cut off frequency: 0.1 Hz to 200 Hz customized range/steps with unlimited n. of steps OR any value

16. Time constant: 0.03, 0.1, 0.3, 1, 2s or any value, possibility to use low cut filter with a customized range/steps with unlimited n. of steps



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- 17. Time base: second / page or mm/ second, any of them with any range with unlimited number of steps.
- 18. Record speed: 3, 6, 10, 30, 60s per page, 15, 30, 60, 90 mm/s, with possibility to setup your own range with unlimited n. of steps
- 19. Creation and presentation of unlimited EEG montages number and parameters display
- 20. Markers, events, notes and time searching
- 21. Automatic record display in different speeds
- 22. Date , time, time of recording start, record longitude display
- 23. Two EEG patient records matching or matching specific record in 2 different montages in split screen



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DSA (Density Spectral Array)

The DSA (density spectral array) serves for quick detection of events in the EEG. EEG channels which can be selected represent the frequencies with their amplitudes graphically.

The DSA representation is a traditional representation mapping the frequencies and spectral power of an EEG signal as a function of the time.

The frequency range is applied to a colour spectrum, with warm colours (e.g. red and orange) representing more dominant frequencies, and cold colours (e.g. blue and green) the less dominant frequencies.

The frequencies and spectral powers of EEG data can be represented as a function of the time.

DSA is giving very fast overview for EEG signal with a possibility to jump to the abnormal EEG waves, so it is helpful in long term monitoring applications.



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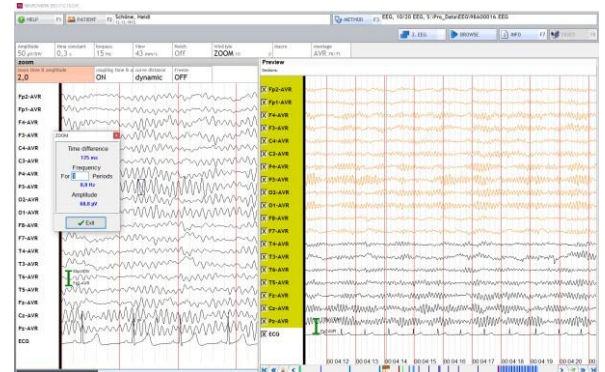
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EEG Zoom-Function

Available in review mode up to 100X with the following functions:

- Possibility to ZOOM with time & Amplitude or separately.
- Dynamic mode to adjust the distance between the traces automatically to avoid overlaps between lines
- Measure any signal anytime with our measure tool.

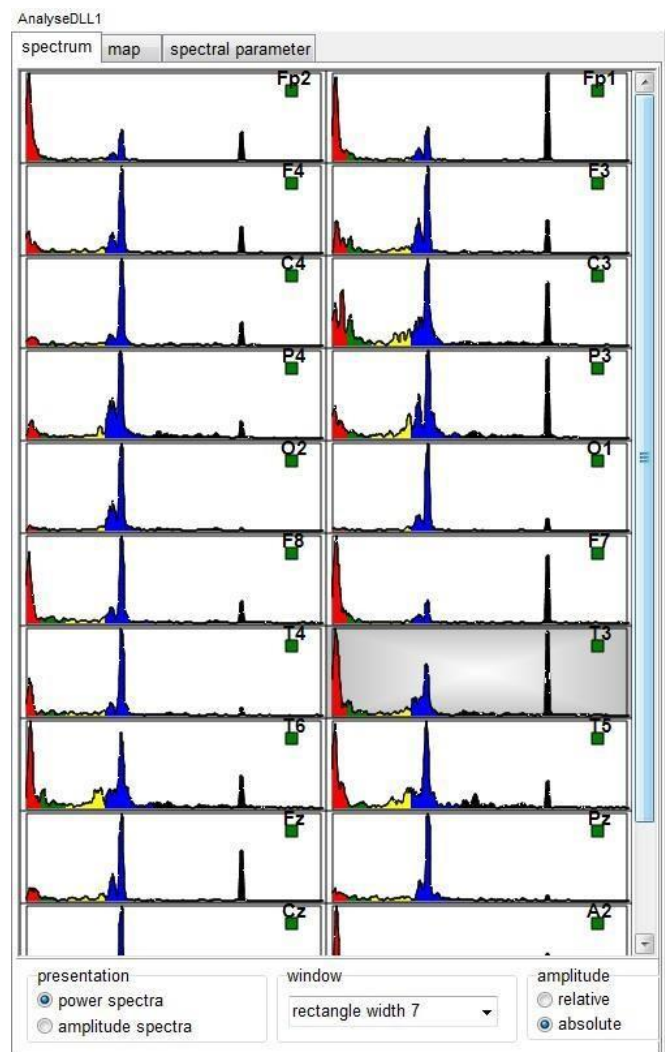
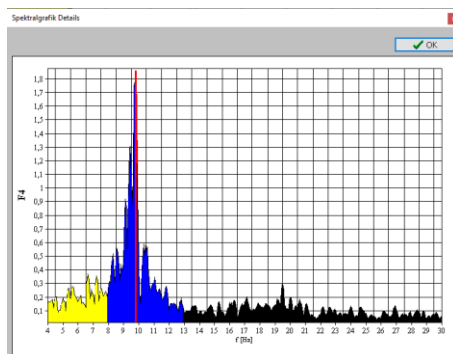


Spectral analysis

The spectral analysis is only designed to be used for short artifact-free sections. It is not possible to evaluate the whole EEG with this analysis function.

Spectrum - as a line, surface or bar diagram
Autoscale - the largest peak determines the display of the amplitude scaling

- X axis from - frequency display from x Hz
- X axis to - frequency display up to x Hz
- Number of columns - number of spectrum displays next to the other
- Amplitude - height of amplitude display (inactive with Autoscale)
- Height of graphic - height of the spectrum display



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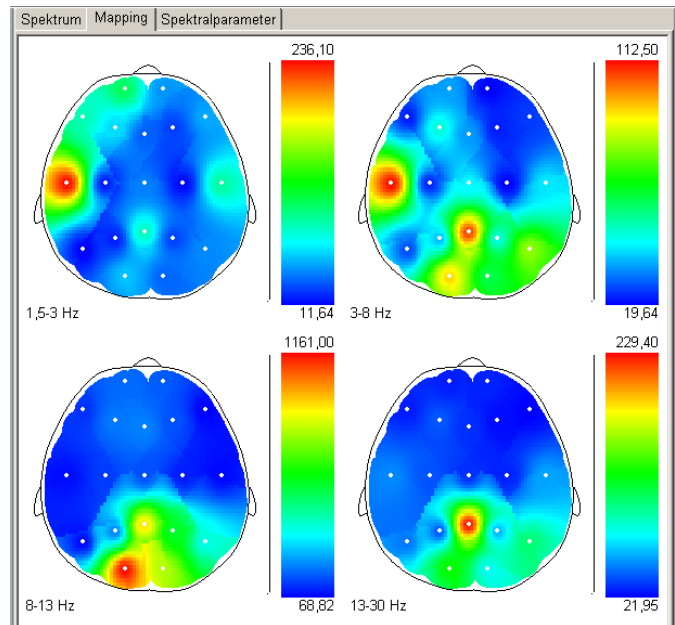
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Mapping

For the mapping there is, similar to the sequence map, a head map generated from the data selected in the EEG. But this map is divided into four different, preset frequency bands. There the different spectral powers between 1.5-3, 3-8, 8-13 and 13-30Hz are displayed in a color spectrum. The corresponding maximum and minimum spectral power values can be different for each band (depends on settings) and are updated automatically.



Spectral parameters

The determined parameters of all electrodes are displayed in a table for each selected range. Each further analysis is inserted into the table with indication of the start time (start time of the selection in the EEG). The following parameters can be determined: - Absolute power of the spectral range - Relative power of the spectral range - Median frequency - Edge frequency (95%) - Peak frequency - Mean frequency.

	spectrum	map	spectral parameter		
	abs. power	rel. power	median frequency	edge frequency (95%)	
	abs. power	1,5-3 Hz	3-8 Hz	8-13 Hz	13-20 Hz
Fp2		1101	398,1	141,8	13,44
Fp1		1130	224,2	110,3	12,12
F4		52,04	48,19	175,2	14,07
F3		34,12	33,59	115,7	10,11
C4		35,91	67,40	130,8	21,49
C3		26,84	42,97	63,96	20,34
P4		43,34	69,55	110,9	15,87
P3		40,35	72,94	217,2	26,95
O2		109,4	89,38	619,6	44,99
O1		100,2	177,2	1022	70,84
F8		150,6	48,27	91,52	10,66
F7		231,6	49,72	43,44	12,96
T4		102,4	36,80	79,06	10,66
T3		57,16	30,95	21,21	9,94
T6		70,23	36,95	59,51	11,69
T5		36,55	44,91	43,74	8,50
Fz		37,61	51,13	192,9	12,59
Pz		36,01	54,18	313,2	32,52
Cz		26,52	63,46	141,0	14,94
A2		147,4	72,10	60,19	16,49
A1		57,89	102,3	66,31	18,57
EKG		702,2	4527	1299	1983




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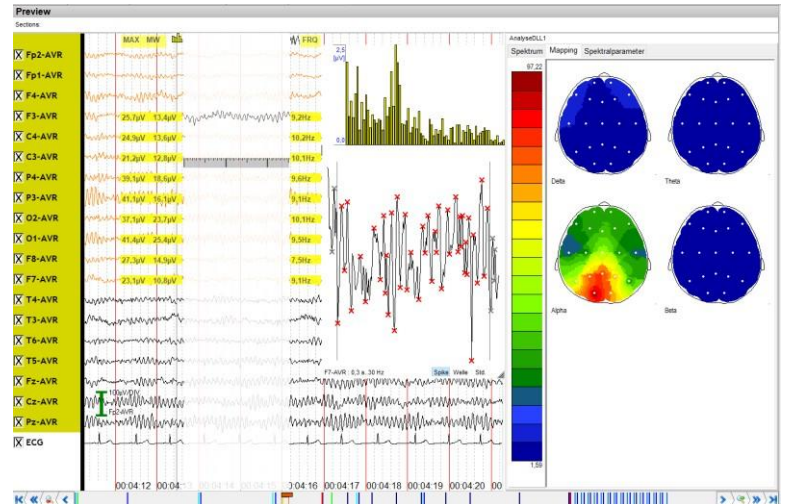
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Measuring an EEG (areas)

- By pressing the [Shift] key and moving the left mouse button over the desired channel, holding down the left mouse button. The measured values are displayed in the yellow area on the right and on the left.
- By clicking on another channel in the measurement area with the [Shift] key held down, its measured values are also displayed.
- Possibility to move the whole measurement area by clicking onto the ruler
- Possibility to switch between three modes spectrum, reversing points and spectrum + reversing points.
- By moving the mouse over the measured values, the spectrum or the measured characteristic is displayed with the determined reversing points.
- It is possible to specify different filter functions to determine the optimum reversing point. [] can be used to zoom out the window.
- When changing the montage the measurement window is deleted automatically.



Measurement


To activate the measurement, click with the mouse into the EEG. Now you can perform a measurement in the EEG by clicking onto the beginning of the section you want to measure and dragging the pointer to the end of the range to be measured with the left mouse button held down. During the horizontal measurement of an EEG curve (start - end), the frequency and time difference are determined. If you wish to determine a mean value over several periods, then enter the number of periods. The vertical measurement (amplitude) includes measurement of the voltage.

EEG ✕

Time difference
242 ms

Frequency
For Periods
4,1 Hz

Amplitude
75,2 µV

 **Exit**



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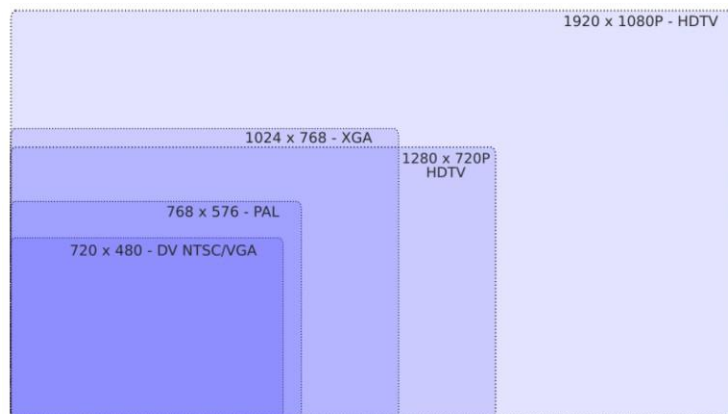
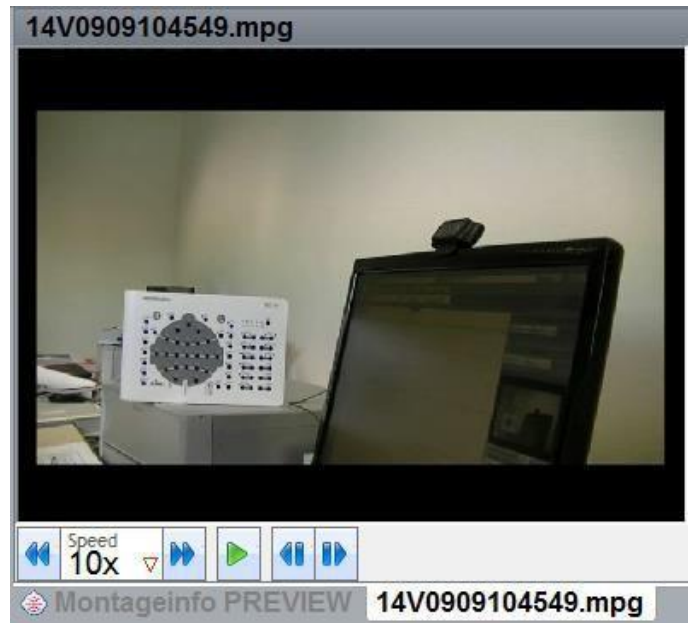
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Video EEG (Optional)

- The video sections are displayed beneath the marker bar.
- HD & FullHD depending on the camera model and the settings
- The video is opened automatically during the normal sequence.
- The EEG is displayed synchronously.
- "Stop" stops the video.
- "Play", the video is shown from this point.
- "Forward" button to page up an image in the video (40 ms).
- "Reverse" button to page down an image in the video (40 ms).
- "Speed" button to page up/down quickly, the speed for paging up/down can be selected up to 20X
- The zoom in the video is possible if activated (done by the service team). With several clicks the zoom selection may be operated:
 - Generate zoom selection: Press and hold left mouse key and pull a rectangle.
 - Move zoom selection: Press and hold left mouse key
 - Stop zoom: Right mouse key click
- No need for online zooming, image is acquired with such a high definition to easily allow offline zooming,
- Dedicated timer synchronous to the video frame,
- Possibility to create CD-ROM/DVD containing Video EEG recordings readable from any PC without extra software licences,
- Separate management of EEG and video data
- Possibility to integrate video in external applications like PowerPoint for presentations
- Digital stereo or Surround audio recording perfectly synchronized with video signal,
- Integration with analysis applications for dedicated research monitorings.
- Split Screen review of video and EEG during the acquisition.



Comparison between standard PAL definition and HDTV Full-HD.

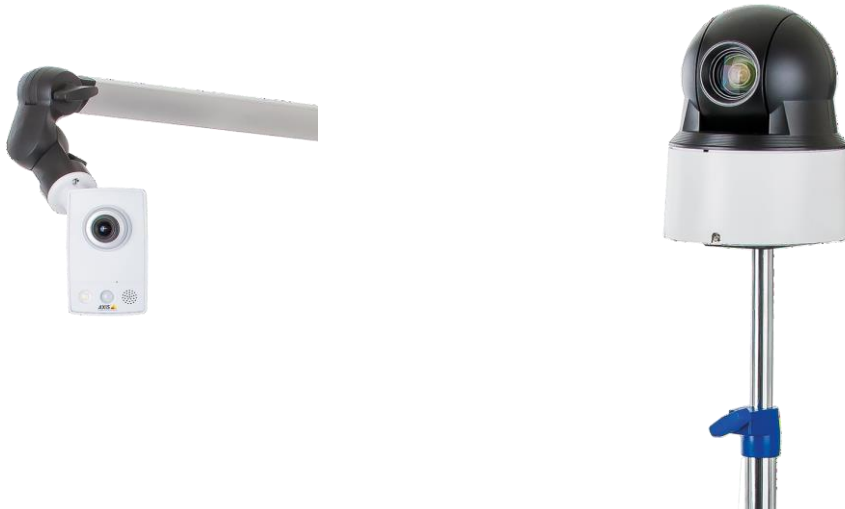


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Full HD IP cameras Axis / SONY with Digital / Optical ZOOM

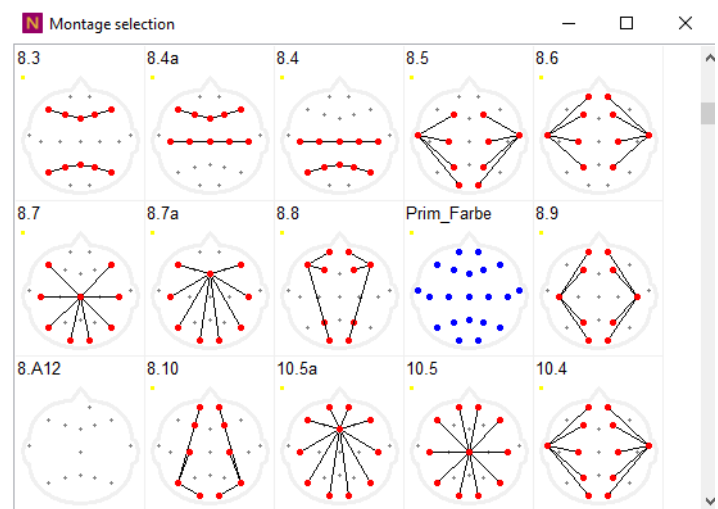
Montages

Unlimited number of montages

Graphic menu to show the montages

Possibility to transfer the montages to the
review portable viewer

Show the montage in graphic on the paper



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Report

Neurology Clinic
Chief physician Prof. Dr. med. SIGMA
Neurologic functional diagnostics: EEG

NEUROWERK®
diagnostic devices made in germany

- Report in EEG is compatible with MS WORD and Wordpad, the patient data are inserted into the report sheet automatically.
- The template can be designed individually for each evaluator.
- Ability to add most of the values that are available in SQL database.
- The report will be saved in the database, this gives the possibility to re-open it to modify it

EEG Report

Patient Information		
Patient Name:	Schöne, Heidi	No.:
Date of birth:	12.12.1912	
Date:	Tuesday, 10 September 2019	

Notes:

EEG Information		
EEG No.:	98A00016.EEG	
Station:		
Examination Date:	24.09.1998 18:21:25	
Assistant:	Sr. Eva	Evaluator:

Recording Info.:

Conclusion:



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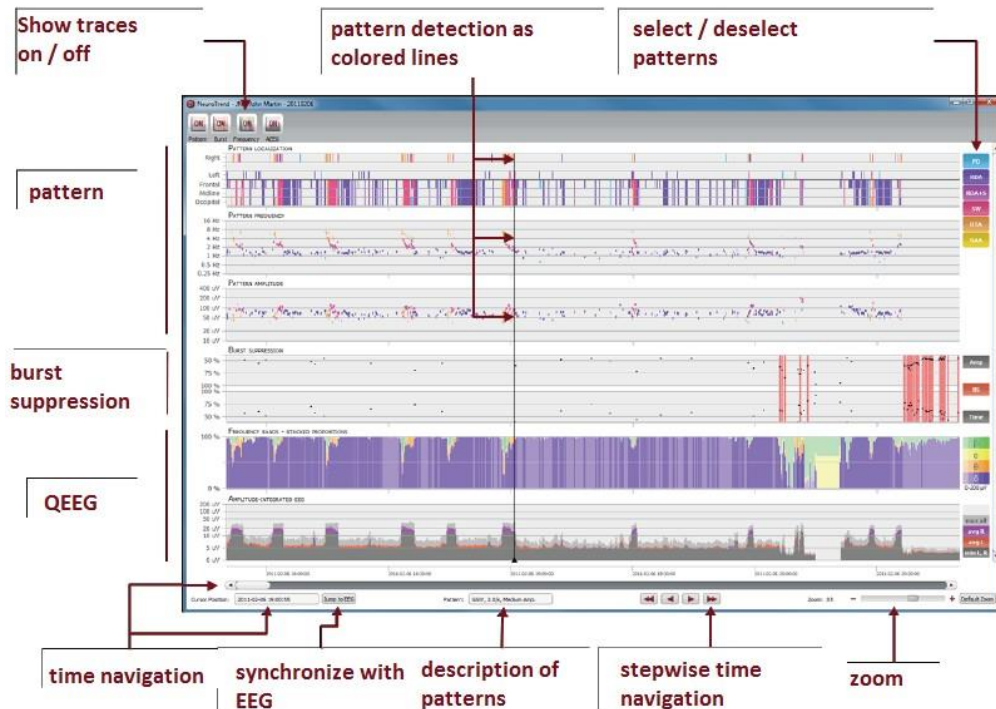
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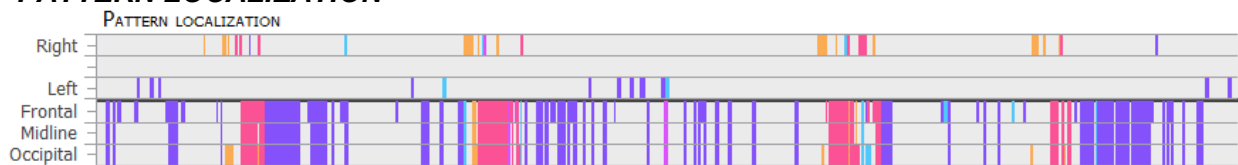
Online analysis with encevis NeuroTrend (Optional)

The optional available analysis software NeuroTrend is used for neurologic monitoring at emergency units typically. Like this, different patterns in the EEG can be detected and the visualization of qEEG and aEEG can take place online during the EEG tracing.



Trace

“PATTERN LOCALIZATION”



The localization of the patterns is displayed in the first trace:

The upper part shows whether the pattern was lateralized or not:

- Right or
- Left

If there was no lateralization the lower part shows the dominance:

- Frontally predominant or
- Midline predominant or
- Occipitally predominant or
- Generalized if the line comprises frontal, midline and occipital.



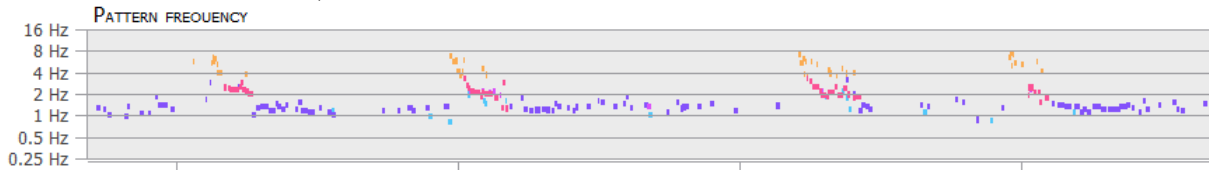
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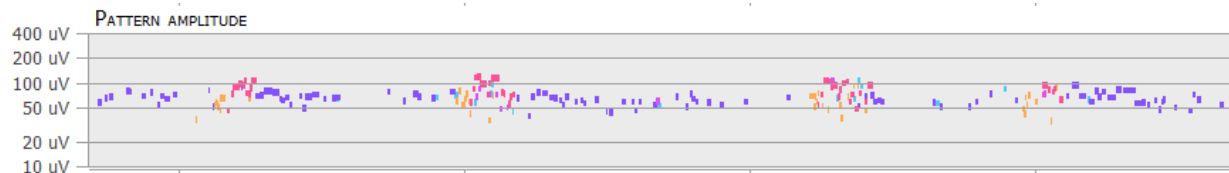
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Trace "PATTERN FREQUENCY"



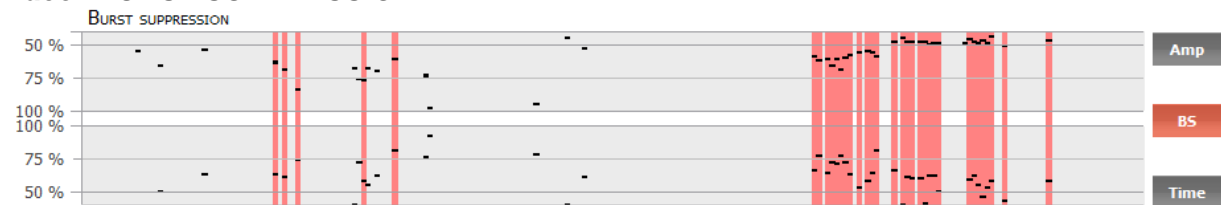
The pattern frequency is displayed on a logarithmic scale from 0.25 to 16Hz.

Trace "PATTERN AMPLITUDE"



The pattern amplitude is displayed on a logarithmic scale from 10 to 400µV.

Trace "BURST SUPPRESSION"



This trace shows with red lines detections of burst suppression. Black dots show burst attenuations. In the upper part the relative amplitude reduction is shown and in the lower part the suppression time. Both are displayed on scales from 50 to 100%.

Trace "FREQUENCY BANDS - STACKED PROPORTIONS"



The proportions of the frequency bands are displayed stacked in a range of 0-100%. The frequency bands are displayed with the following color code:



The brighter the color the lower the amplitude.



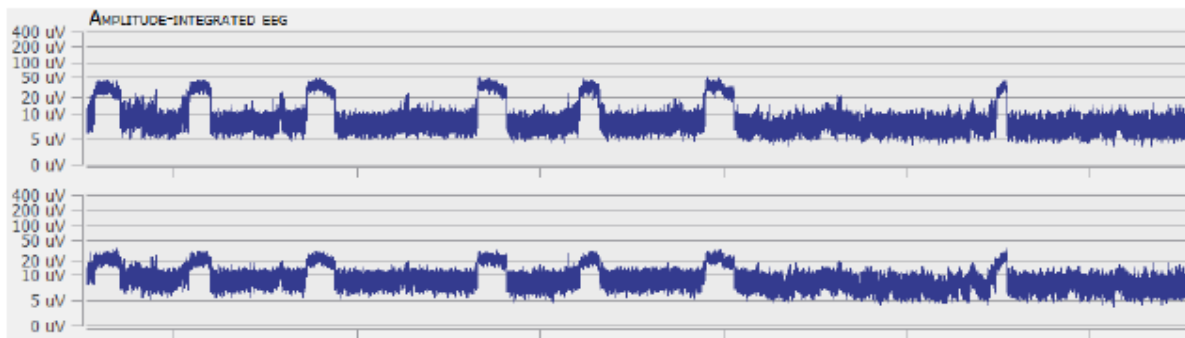
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Trace “AMPLITUDE-INTEGRATED EEG” (CFM)



The amplitude integrated EEG is displayed on a combined logarithmic linear scale from 0 to 200µV.



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Trolley (Optional)

Type E

- Space-saving wooden/plastic trolley with 4 movable castors and locking brake (Castors: 75mm or 100mm)
- Trolley dimensions: 508mm (W), 540mm (D), starting from 780mm (H) *
- With integrated isolating transformer
- and trolley keyboard leaf
- With back for cable cover

OPTIONS:

- With NEUROWERK EEG and/or EMG equipment
- With swivel arm (EMG) or mounted stand (EEG)
- With desktop PC and TFT monitor or with laptop
- Expandable with printer or drawer and side
- metal basket and various accessories
- Individually and flexibly configurable



Type H

The Flexible One

- Metal/plastic trolley with 4 movable castors and locking brake (Castors: 100mm and 75mm)
- Trolley dimensions: 550mm (W), 650mm (D), 1000mm (H)*
- With sliding handle, storage area and built-in socket strip, integrated connection for potential compensation cable
- MBT holder for swivel arm or stand
- With bracket for isolating transformer

OPTIONS:

- With NEUROWERK EEG and/or EMG equipment
- With desktop PC or mini PC with TFT monitor (rotating and swivelling) or with laptop
- Expandable with additional shelves, metal baskets (front/back) as well as various accessories
- Individually and flexibly configurable



Isolation Transformer (Optional)

- 400VA: with temperature protecting switch EN 60601-compatible
- 1000VA: with temperature protecting switch, for 8 plugs EN 60601-1 compatible



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