

# BRAINRT EEG system

## Technical specifications

### 29/40-channel EEG amplifier

#### Channel configuration and full scale input range

	29 channels	40 channels
EEG/EXG	25 referential	33 referential
	1 bipolar	3 bipolar
	2 unipolar	3 unipolar
	1 SpO2	1 SpO2
Referential & bipolar inputs (except ECG)	5.050 mV / 21.21 mV / 166.7 mV (software selectable)	
ECG (bipolar)	ECG input: 166.7 mV	
Unipolar inputs	47.6 mV	

### Analog to Digital conversion

Range	1 Vpp
Resolution	20-bits
Acquisition rates	125, 200, 250, 500, 1k, 2k, 5k, 10k, 20k, 40k samples/s/channel (software selectable)

### Input impedance

50 MΩ per input (♦100 MΩ per channel)

### Noise (referred to input)

Referential inputs	<2μVpp
Bipolar inputs	<10μVpp

### CMRR

≥100 dB at 50/60 Hz

### Filters

#### HW High Pass Filters

AC coupling	HP = 0.0713 Hz (first order; 6 dB/oct) LP = 23.8 kHz (first order; 6 dB/oct)
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#### DSP High Pass Filters

Software selectable	Off or 0.07 Hz (first order; 6 dB/oct)
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#### DSP Low Pass Filters

User selectable	~ at 1/3 of software selected sampling frequency 2 x second order butterworth type, 2 x 12 dB/oct
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#### DSP Notch Filter

Software selectable	50 or 60 Hz first order butterworth type, quality factor = 2.5
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### Triggers

In	16 bits parallel (♦65346 different values) + 4 bits parallel (♦16 different values)
Out	4 bits parallel (♦16 different values)

### LED Photic stimulator (Optional)

Frequency	0-60 Hz (in steps of 1 Hz)
Light Color	White
Radiometric power	320 mW per pulse (6.4 Joules)
Pulse duration	5 ms

### EEG Mini-headbox (Optional)

Channels	23 EEG, 2 ECG, 2 EOG, 12 monopolar, 3 monopolar (ISO ground)
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### Computer

CPU	Intel Core 2 Duo
OS	Windows XP Pro / Windows Vista Ready
Memory	1 GB
Storage	80 GB SATA Harddrive
Archive	DVD+/-RW Drive
Connectivity	NIC 10/100/1000 MBit/sec Firewire IEEE1394 USB 2.0 port
Monitor (Optional)	17" / 19" TFT Flat panel (1280*1024) 20" TFT Flat panel (1600*1200) 24" TFT Flat panel (1920*1200) 30" TFT Flat panel (2560*1600)

### Digital Video (Optional)

Video Input	Recording format
DV	WMV
IP camera	MPEG-4
Analog	WMV
Web camera	WMV
Video size	
	320*240 (Half): ± 150 Mb/Hour
	640*480 (Full): ± 450 Mb/Hour

### Isolation transformer

400 VA; Primary: 230 VAC, 1 phase, 50/60 Hz; Secondary: 230 VAC; Conform NEN-EN 60601-1

### Environment

#### Operation (in use)

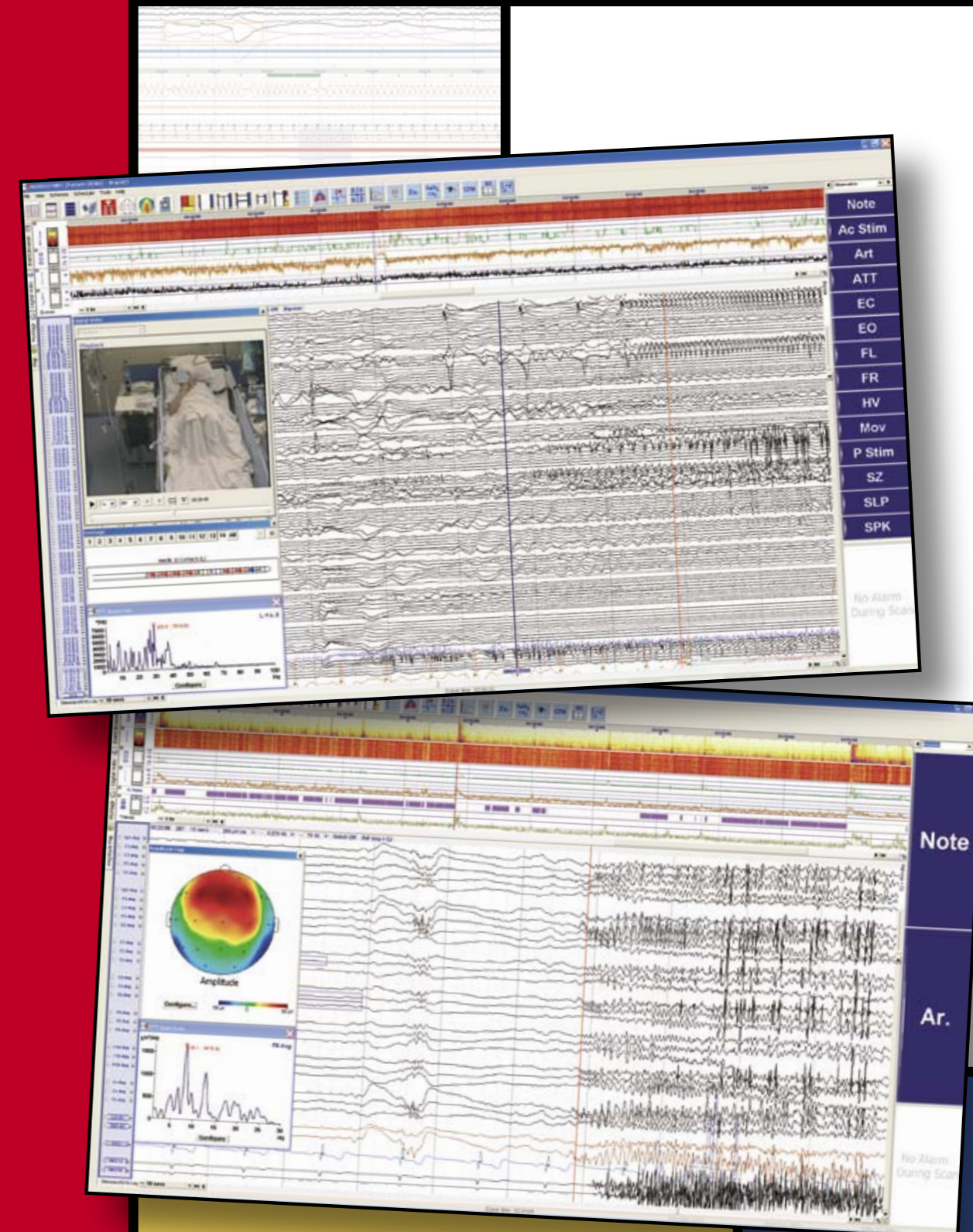
Temperature Range	10°C to 40°C
Relative Humidity Range	20% – 80%, no condensation, height: 0-3 km

#### Transport & storage

Temperature Range	-20°C to 60°C
Relative Humidity Range	20% – 80%, no condensation, height: 0-12 km

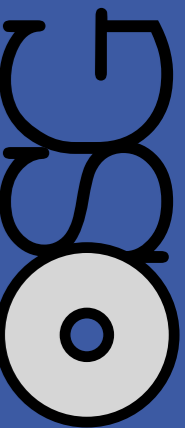
### BrainRT Quality system

Certification: ISO 13485:2003 and ISO 9001:2000 **CE 1639**  
Standards: IEC 60601-1 and 60601-2-2 (electrical safety, EMC)



Bussestraat 17  
2840 Rumst  
Belgium

tel. +32 (0) 15 32 13 73  
fax +32 (0) 15 32 13 93  
e-mail info@osg.be  
www.osg.be  
www.brainrt.com





BRAINRT® is the successor of BrainlaB, the successful software that has been used for many years in hundreds of Clinical Neurophysiology Labs in Europe. Year-long experience, continuous research and the useful contribution of customers have aided OSG to offer now even more efficient, precise and practical tools to help the clinician with his busy work.

BRAINRT® is available in various configurations; from EEG amplifiers with 29 or 40 channels up to electro-corticography systems with 128 channels. BRAINRT® supports sampling rates up to 40 kHz. External triggers can be recorded together with the signals. All this provides a flexibility which makes BRAINRT® suitable for Routine EEG, Long Term Monitoring with synchronized video in ICU and Epilepsy Clinics and Event Related EEG research. BRAINRT® is developed for adult, pediatric and neonatal diagnostics. A scheduled impedance measurement allows signal quality surveillance in Long Term Monitoring.

BRAINRT® gives you 'live' access to different operations and features *at the time of the registration*. This Real Time (RT) character of BRAINRT® maximizes the system's performance, enhances the productivity and ensures a high level of patient care. This way, technicians, doctors and patients can benefit from the BRAINRT® software solutions.



Signals, trends, events and video can be viewed during recording on any remote computer of the workgroup.



Detailed reports in Microsoft Word can be made during the registration, with a combination of graphs, tables and texts, according to your needs.



Auditory and visual alarm for Seizure Candidates and other alarm events allow prompt and quick intervention in case of risk situations.

### Compatibility – Import – Export

BrainlaB signals, events and video can be read with BRAINRT®. The BrainlaB patient database and archive are transformed into the SHELL+ SQL database. The user has direct access to all registrations of a patient; those of BRAINRT® and BrainlaB.

You can import EDF files from other recorders. All rich possibilities of BRAINRT® can be applied to these files. This way you can work with EDF registrations the same way you work with BRAINRT® registrations.

Exporting registrations in EDF format is another possibility, which gives you the opportunity to exchange data with other centers. Export to MatLAB®, EEGLAB and ASCII facilitates in-depth Electrophysiological research.

It is possible to extend BRAINRT® with SLEEPRT features and vice versa. The applications are 100% compatible.

Several multi-timebase displayers form a powerful visualizer that helps to find relationships between different phenomena. Displayers, event browsers, event panels and video playback all work synchronically. Positioning the cursor in one displayer results in an automatic display of the corresponding signals in other displayers, and in a repositioning of the event browser and the video.

Displayers, event browser, panels and video can form several different screen organizations. The user defines a combination of trends, according to his needs. This way, the trends become part of the screen organization. A click on one of these Mondrian icons changes the way the registration is presented.



### The following trends, events and alarms are the result of 'live' analyses:



#### Spectral and Hilbert Analysis on EEG channels

Trends: Spectrogram, Relative and Absolute Power, Alpha to Delta, Fast to Slow, Fast - Slow/Fast + Slow, Average Amplitude and Dominant Frequency, Brain Symmetry Index, Mean Phase Coherence  
Seizure candidate event detection



#### Cerebral Function Monitoring

CFM trace of multiple channels



#### ECG Analysis

Detection of RRs, Artefacts, Tachy- and Bradycardia  
Trends: Heart rate, Heart Rate Variability



#### EEG Rhythm Analysis

Detection of Delta and Alpha events and Spindles  
Trends: % Alpha, % Delta, Number of Spindles/Page



#### Analysis of chin EMG and left/right leg movements

Detection of the Background EMG  
Detection of LMs (Leg Movement) and PLMs (Periodic Leg Movement)



#### Burst Suppression Analysis

Entropy percentage, Burst Suppression Ratio, Inter Burst Interval, Suppression duration



#### EOG Analysis

Detection of REMs, SEMs and Blinks

