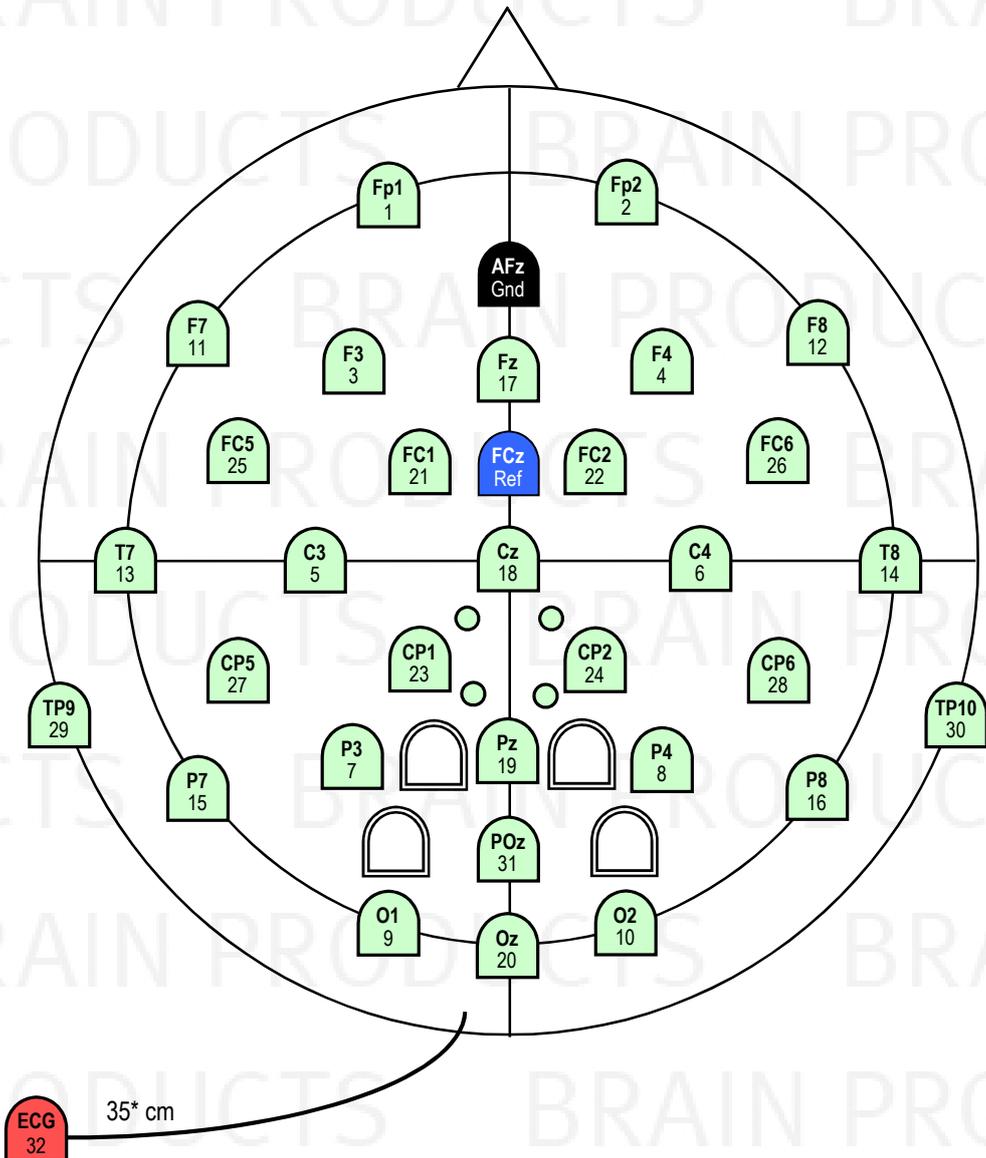




## 32Ch Standard BrainCap-MR with Multitrodes

Electrode Layout and Channel Assignment:



## Details for Users

### Ordering Information

For ordering please give **Article Number, Cap Cut, and Size**

(e.g. *BC-MR-32, Caucasian, 56*):

- Article Number: **BC-MR-32**
- Cap Cut: **Caucasian** or **Asian**
- Size (given in cm head circumference):
  - Adult caps: **54, 56, 58, 60, 62, 64** (average male: 58, average female: 56)
  - Children caps: **50** (3-4 years), **52** (5-10 years), **54** (11-14 years)
  - Infant caps: **36** (*newborn*), **38, 40** (*3 months*), **42, 44** (*7 month*), **46, 48** (*2 years*)

The catalogue-number comprises the cap as described, serial number, and this document; all packed in a labelled cardboard box. For further information about accessories or consumables, please visit our website or contact our local distributor.

### Cap

Standard: Subtemporal Cap with integrated chin belt, white

Sizes 52 – 64 made from High Precision Fabric, Sizes 50 and smaller made from High Comfort Fabric

Options: *Caucasian or Asian, Size*

### Electrodes

All electrodes are Multitrodes for MR with sintered Ag/AgCl sensors. They are buttoned directly into the cap (total height less than 3,5 mm) or can be attached to the skin with washers (= double-sided adhesive rings). In the parieto-occipital area, empty electrode housings (double border lines in the layout) provide more comfort.

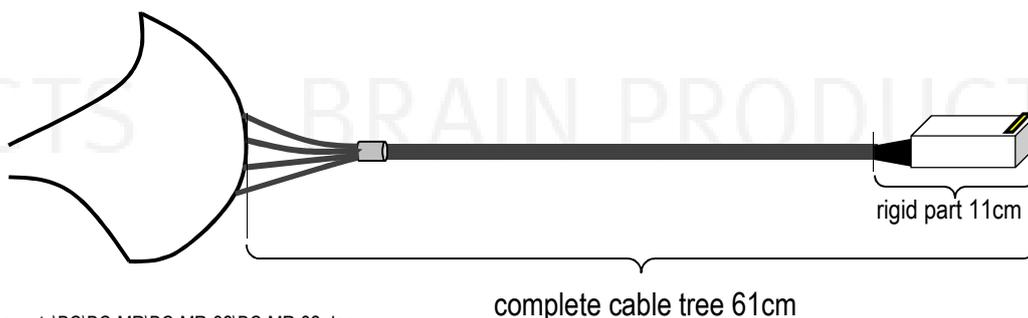
All electrodes in the cap come with 5 kOhm-resistors directly after the sensor, the ECG-electrode with 15 kOhm resistor.

The electrode housing colours are according to the above figure. All cables are white, except Ch32 = red cable, Ref = blue cable, and Gnd = black cable. All electrodes are name-labelled (Fp1, Fp2, ...) near sensor.

The ECG electrode cable part outside the cap is covered waterproof wherever possible in silicone - or if more suitable in spiral tube - to avoid direct contact to skin.

\* ECG cable length dependent on cap size, will be reduced for children caps

All cables are led on the outside of the cap directly to the leaving point of the cable tree. Cables are fixed with double-T-nylon threads. The cables part from the cap in branches of approx. 8 cables. These branches leave radially from the area around CPz and straight/tight to a uniting point after approx. 5 cm. After the uniting point, one cable tree continues to the BrainCap-connector-box. The overall length of the cable tree is approx. 61 cm.



## Termination

The cable tree is led into a Connector box. From here the caps are connected to BrainAmp-MR with 30 cm-flat-ribbon-cables. These flat ribbon cables come with the BrainAmps. They can be re-ordered from BrainProducts (Cat-No. BP-02400-NN) or from Easycap (Cat.-No. E80).

Inside the connector box there is another 5 kOhm-resistor on each channel, Ref, Gnd.

The top side of the connector box is labelled "BrainCap-MR". The bottom side label states

- 10k $\Omega$  in cap electrodes (5k $\Omega$ : tip + 5k $\Omega$ : box)
- 20k $\Omega$  at ECG (15k $\Omega$ : tip + 5k $\Omega$ : box)



MR Conditional

### **This cap can be used inside MR if you follow these rules:**

- **Scanner sequences**  
The BrainCap MR with Multitrodes can be used for combined EEG & fMRI recordings. That is, the intended use is for "functional" studies, but NOT for anatomical studies.  
GRE-EPI sequences are allowed.  
MP Rage is allowed.  
Localizer is allowed.  
  
All other sequences e.g. FSE, TSE, FLAIR etc. are NOT allowed.  
All sequences with more than one activation pulses (Multi Shot) or even inverted activation pulses other than "Single Shot GRE-EPI" are not allowed.
- **Positioning**  
No cable loops are allowed. While recording, all wires must never create loops or similar (e.g. meander). Wires must never touch the subject's skin directly. If no plastic tubes are available, place towels or similar between wire and skin. This rule applies also to the cable tree(s).
- **Amplifiers safety**  
Please never do phantom scanning with the cap connected to the amp without covering the whole phantom with electrolyte gel AND inserting gel into all electrodes. All electrodes must be shortened (electrically) to each other that way.
- All electrodes must have one fixed site. Flexible re-buttoning of electrodes into different sites is not allowed.
- All electrode sites must be in the cap, except one ECG electrode. If more drop-down electrodes are used, the cables must be inside a plastic tube. Quality of the MR-pictures may be degraded from dropdown electrodes. Cables may never touch the subject's skin. For polygraphic electrodes we recommend not to go through the cap. Instead, a BrainAmp-EXG with bipolar channels should be used.
- Total cable length from sensor tip to amplifier may not exceed 150 cm.
- **Repair**  
The cap may not be altered by the customer himself. For any repair the cap must be sent to us.
- The BrainCap-MR and the BrainAmp-MR together constitute one system. Please also consult the chapter about safety measures in the BrainAmp-MR-Manual.

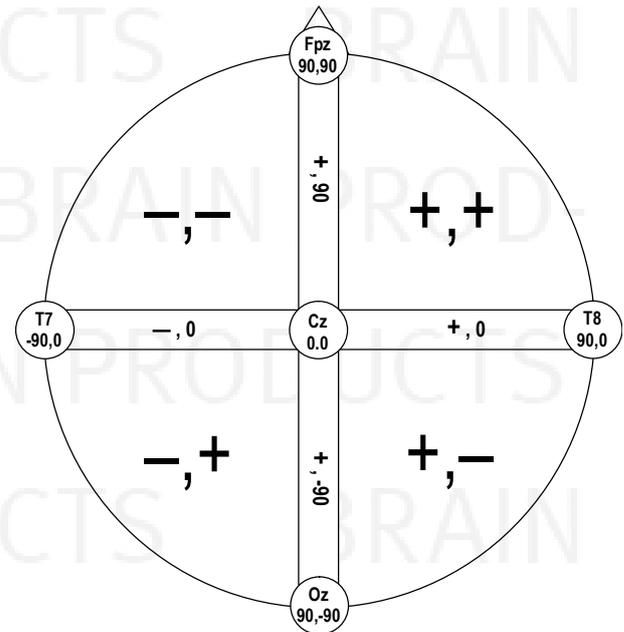
Beside the above any safety rules by the manufacturer of the MRI-Scanner must be followed

## Theta / Phi Coordinates for BC-MR-32

Channel-Number	Name	Theta	Phi
1	Fp1	-90	-72
2	Fp2	90	72
3	F3	-60	-51
4	F4	60	51
5	C3	-45	0
6	C4	45	0
7	P3	-60	51
8	P4	60	-51
9	O1	-90	72
10	O2	90	-72
11	F7	-90	-36
12	F8	90	36
13	T7	-90	0
14	T8	90	0
15	P7	-90	36
16	P8	90	-36
17	Fz	45	90
18	Cz	0	0
19	Pz	45	-90
20	Oz	90	-90
21	FC1	-31	-46
22	FC2	31	46
23	CP1	-31	46
24	CP2	31	-46
25	FC5	-69	-21
26	FC6	69	21
27	CP5	-69	21
28	CP6	69	-21
29	TP9	-113	18
30	TP10	113	-18
31	POz	67	-90
32	ECG		
Ref	FCz	23	90
Gnd	AFz	67	90

These values are standardized to a Theta of 90° for the plane through Fpz, T7, T8, Oz.

The signs follow this convention:



**Table of ECG cable lengths**

head circumference	length of ECG cable
64-52	35
50	30
48	28
46	26
44	24
42	22
40	20
38	18
36	16
34	14
32	12
30	10
29	9
28	8
26	7
24	6
22	5