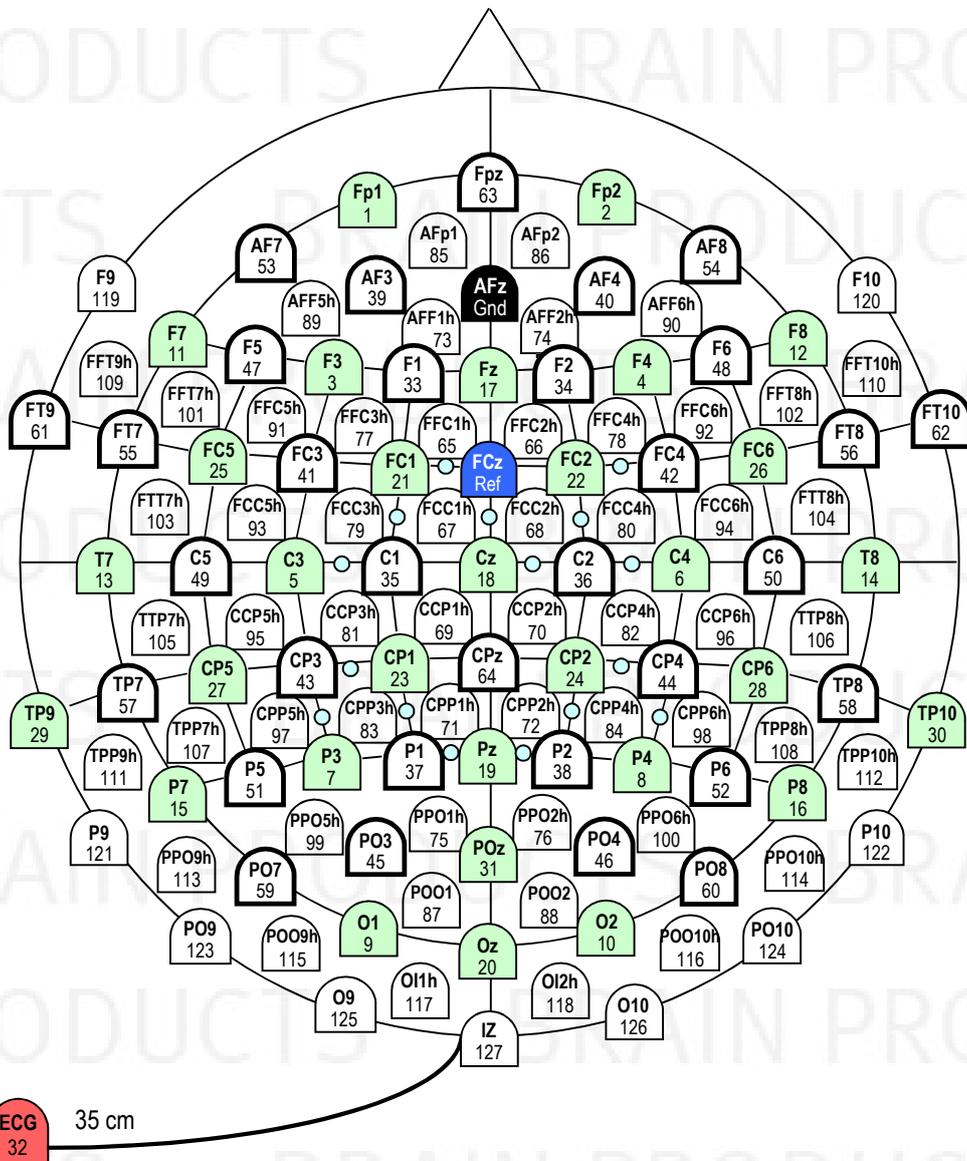




128Ch Standard BrainCap-MR with Multitrodes

Electrode Layout and Channel Assignment

- Green: Channels 1-31
- Red: Channel 32, ECG
- White bold: Channels 33-64
- White: Channels 65-127



Electrode Nomenclature according to:
Oostenveld, R. & Praamstra, P. The five percent electrode system for high-resolution EEG and ERP measurements. *Clinical Neurophysiology* 2001; 112: 713-719

Details for Users

Ordering Information

For ordering please give **Article Number, Cap Cut, and Size**
(e.g. *BC-MR-128, Caucasian, 56*):

- Article Number: **BC-MR-128**
- 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: **52** (5-10 years), **54** (11-14 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

White Subtemporal Cap with integrated chin belt
Sizes 52-64 made from High Precision Fabric
Options: *Caucasian* or *Asian*, *Size*

Electrodes

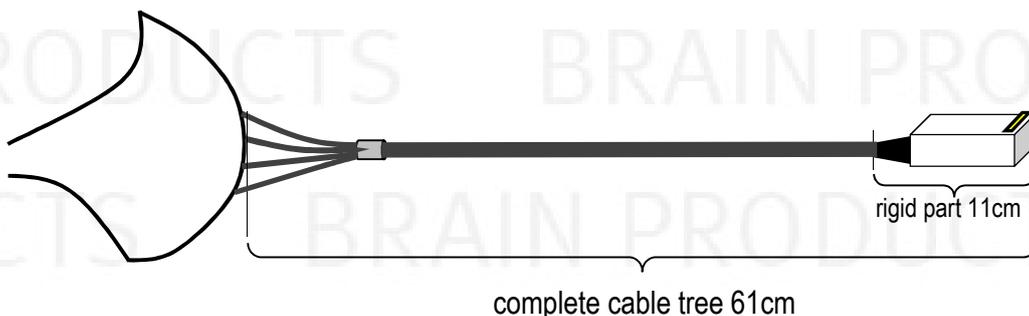
All electrodes are Multitrodes for MR with sintered Ag/AgCl sensors. They are buttoned directly into the cap (total height less than 3,5 mm) or can be attached to the skin with washers (= double-sided adhesive rings).

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. Ref and Gnd come with 4 cables each, one for each amplifier.

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

All cables are led on the outside of the cap directly to the leaving points to 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 for each 32 electrodes continues to the BrainCap-connector-boxes. The overall length of the cable trees is approx. 61 cm.



Termination

Each 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 labeled "BrainCap-MR". The bottom side label states

- 10k Ω in cap electrodes (5k Ω : tip + 5k Ω : box)
- 20k Ω at ECG (15k Ω : tip + 5k Ω : box)
- Amp1, Amp2, Amp3, Amp4



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-128

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	-	-
33	F1	-49	-68
34	F2	49	68
35	C1	-23	0
36	C2	23	0
37	P1	-49	68
38	P2	49	-68
39	AF3	-74	-68
40	AF4	74	68
41	FC3	-49	-29
42	FC4	49	29
43	CP3	-49	29
44	CP4	49	-29
45	PO3	-74	68
46	PO4	74	-68
47	F5	-74	-41
48	F6	74	41
49	C5	-68	0

Channel-Number	Name	Theta	Phi
50	C6	68	0
51	P5	-74	41
52	P6	74	-41
53	AF7	-90	-54
54	AF8	90	54
55	FT7	-90	-18
56	FT8	90	18
57	TP7	-90	18
58	TP8	90	-18
59	PO7	-90	54
60	PO8	90	-54
61	FT9	-113	-18
62	FT10	113	18
63	Fpz	90	90
64	CPz	22	-90
65	FFC1h	-35	-73
66	FFC2h	35	73
67	FCC1h	-16	-45
68	FCC2h	16	45
69	CCP1h	-16	45
70	CCP2h	16	-45
71	CPP1h	-35	73
72	CPP2h	35	-73
73	AFF1h	-57	-82
74	AFF2h	57	82
75	PPO1h	-57	82
76	PPO2h	57	-82
77	FFC3h	-46	-48
78	FFC4h	46	48
79	FCC3h	-35	-19
80	FCC4h	35	19
81	CCP3h	-35	19
82	CCP4h	35	-19
83	CPP3h	-46	48
84	CPP4h	46	-48
85	AFp1	-79	-82
86	AFp2	79	82
87	POO1	-79	82
88	POO2	79	-82
89	AFF5h	-72	-55
90	AFF6h	72	55
91	FFC5h	-62	-35
92	FFC6h	62	35
93	FCC5h	-57	-12
94	FCC6h	57	12
95	CCP5h	-57	12
96	CCP6h	57	-12
97	CPP5h	-62	35
98	CPP6h	62	-35

99	PPO5h	-72	55
100	PPO6h	72	-55
101	FFT7h	-81	-29
102	FFT8h	81	29
103	FTT7h	-79	-10
104	FTT8h	79	10
105	TTP7h	-79	10
106	TTP8h	79	-10
107	TPP7h	-81	29
108	TPP8h	81	-29
109	FFT9h	-101	-27
110	FFT10h	101	27
111	TPP9h	-101	27
112	TPP10h	101	-27
113	PPO9h	-101	45
114	PPO10h	101	-45
115	POO9h	-101	63
116	POO10h	101	-63
117	OI1h	-101	81
118	OI2h	101	-81
119	F9	-113	-36
120	F10	113	36
121	P9	-113	36
122	P10	113	-36
123	PO9	-113	54
124	PO10	113	-54
125	O9	-112	72
126	O10	112	-72
127	Iz	112	-90
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:

