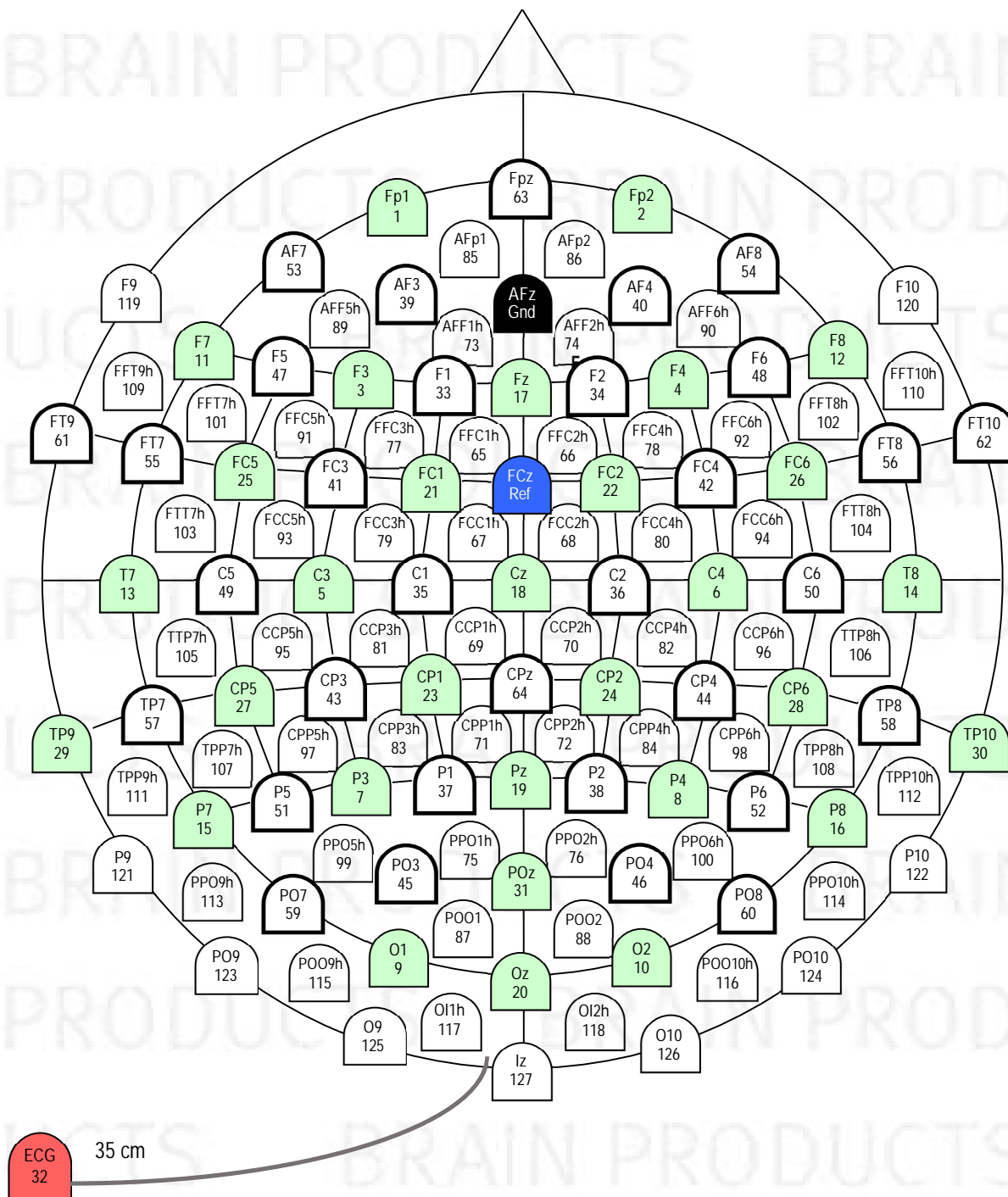




128Ch Standard BrainCap-MR for 3T

Electrode Layout and Channel Assignment



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 ordering please give Article Number, Cap Cut, Exit Point, and Size
(e.g. *BC-MR3-128, C-Cut, Exit FFCz, 56*):

- Article Number: *BC-MR3-128*
- Cap Cut: *C-Cut or A-Cut*
- Exit Point: *Cable Tree Exiting at FFCz or Cable Tree Exiting at CPz*
- Size (head circumference, given in cm):
 - Adult caps: *54, 56, 58, 60, 62, 64* (average male: 58, average female: 56)
 - Children caps: *52 (5-10 years), 54 (11-14 years)*

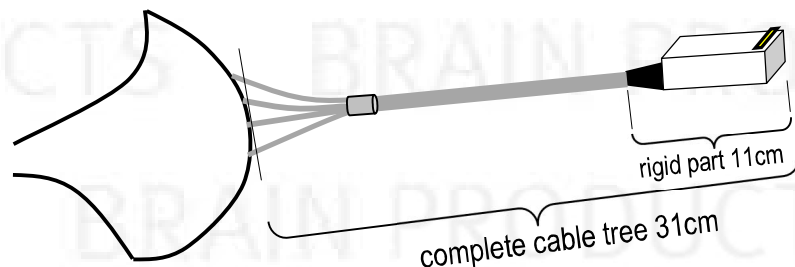
The catalogue-number comprises the cap as described. For further information about accessories or consumables, please visit our website or contact our local distributor.

Cap

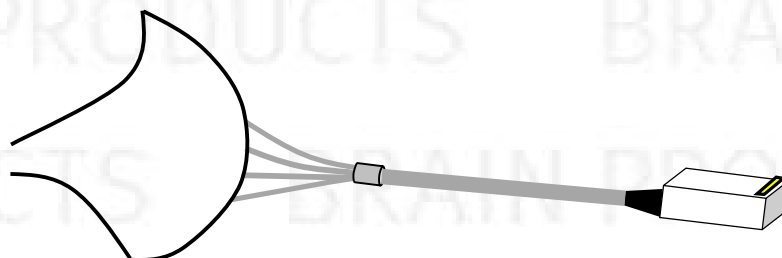
Standard: SubUnion Cap with integrated chin belt, white
Sizes 52 – 64 made from High Precision Fabric
Options: C-Cut or A-Cut, Size. For further variations, contact us.

Exit Point of Cable Tree

In MR caps, depending on the headcoil being used, the optimal exit point of the cable tree can be either
fronto-central around FFCz



or centro-parietal around CPz.



Please choose one of these options when ordering, depending on the headcoil being used.
Options: Exit FFCz, Exit CPz

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 come with current-limiting resistors on both ends; sensor and connector. Drop-down electrodes are made from resistive carbon leadwire. This results in the following overall resistor values for each electrode:

- Ch1-31,33-127 10 kOhm
- Ch32 (ECG) 20 kOhm
- Ref 15 kOhm
- Gnd 15 kOhm

The electrode housing colours are according to the above figure. All cables are white, except Ch32 (red sensor and carbon leadwire), 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 wherever possible in silicone - or if more suitable in a spiral tube - to avoid direct contact with the skin.

All cables are led on the outside of the cap directly to the exit point of the cable tree. Cables are fixed with double-T-nylon threads. The cables leave radially from the area around FFCz or CPz in small branches, leading straight to a uniting point after approx. 5 cm. After the uniting point, one cable tree continues to each BrainCap-connector-box. The overall length of the cable trees is approx. 31 cm.

Termination

Each cable tree leads to a Connector box. From here the caps are connected to BrainAmp-MR with 10 cm round ribbon-cables. The 10 cm round ribbon-cables can be re-ordered from BrainProducts (Cat-No. BP-345-2000) or from Easycap (Cat.-No. KB-P50F-P50F-R-10).

Further Options with Surcharge

- Carbon Wire Loops

The BrainCap MR can be equipped with additional carbon wire loops (CWL) for better artefact correction. Carbon wire loops will terminate into a BrainAmp ExG.

For ordering, please add "with CWL", e.g. *BC-MR3-128, C-Cut, Exit FFCz, 56, with CWL*.

- KRIOS Compatibility

KRIOS by Northern Digital Instruments NDI is an infrared camera system including software to digitize individual, real-life electrode positions. In order to work with the KRIOS system, the electrodes will be equipped with permanent reflectors in a high quality and precise manner.

To order this please add "KRIOS", e.g. *BC-MR3-128, C-Cut, Exit FFCz, 56, KRIOS*

Theta/Phi Coordinates for BC-MR3-128

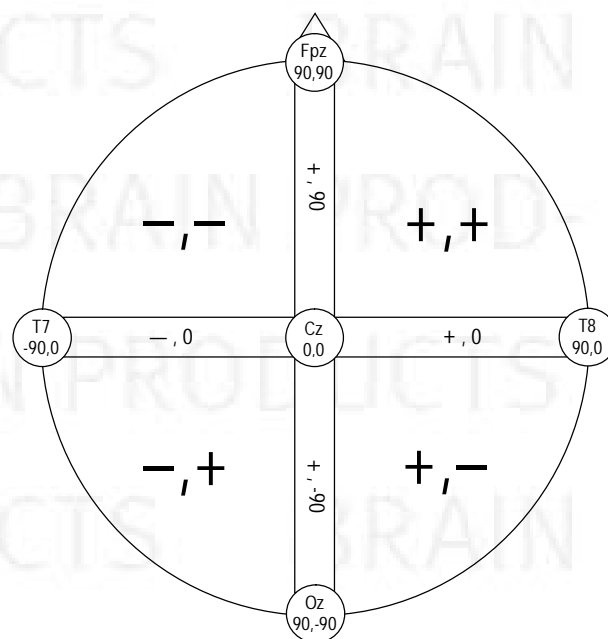
Channel-Number	Name	Theta	Phi
1	Fp1	-90	-72
2	Fp2	90	72
3	F3	-60	-51
4	F4	60	51
5	C3	-45	0
6	C4	45	0
7	P3	-60	51
8	P4	60	-51
9	O1	-90	72
10	O2	90	-72
11	F7	-90	-36
12	F8	90	36
13	T7	-90	0
14	T8	90	0
15	P7	-90	36
16	P8	90	-36
17	Fz	45	90
18	Cz	0	0
19	Pz	45	-90
20	Oz	90	-90
21	FC1	-31	-46
22	FC2	31	46
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:



Summary of Safety Rules for BrainCap-MR3

Together, the BrainCap MR and the BrainAmp MR / MR plus form a MR-conditional system according to ASTM 2503-20 and IEC 62570:2014.



In this context, the term MR-conditional means that restrictions from the manufacturer regarding field strength and imaging sequences apply to the product. A detailed explanation of the conditions for use can be found in the document '*Performing simultaneous EEG-fMRI measurements - Conditions for the safe use of BrainAmp MR amplifiers and accessories in the MR environment*'. A hard copy can be ordered from Brain Products (BP-265-4000) or it can be downloaded from the Brain Products website.

A summary of the main safety related points can be found below.

Any safety rules stipulated by the manufacturer of the MRI-Scanner and the local scanning facility must also be followed.

Scanner field strength and MR-sequences:

The BrainCap MR is designed and approved for field strengths up to 3T.

For MRI sequences used with the BrainCap MR there is a maximum allowed RF power; at 3 T B1+rms must not exceed 1.5 μ T. Note that a 10 cm round ribbon-cable must be used to attach the BrainCap MR to the BrainAmp MR / MR plus. If a longer cable is used a B1+rms limit of 1 μ T applies.

All other conditions specified in the BrainAmp MR user manual must also be met.

Cable Routing:

No loops in connection cables or electrode leads are allowed. When recording in the MR environment all cables between the BrainCap MR and the BrainAmp MR / MR plus must be routed as straight as possible and must never form loops or similar (e.g. meander).

Amplifier protection:

To protect amplifiers from RF overload it is important that all connected electrodes have low impedance values during measurements in the MR scanner. Impedance values can be verified by means of the impedance mode in BrainVision Recorder.

This also applies if the BrainCap MR is used for measurements on imaging phantoms; all electrodes must be connected and have a low impedance. This can be achieved by covering the entire phantom surface with electrode gel and filling all electrodes with gel. Never perform phantom measurements with the BrainCap MR connected to the amplifier with unterminated electrodes.

Repair:

The cap may not be altered by the customer. For any repair the cap must be sent to Brain Products via the local Brain Products distributor.