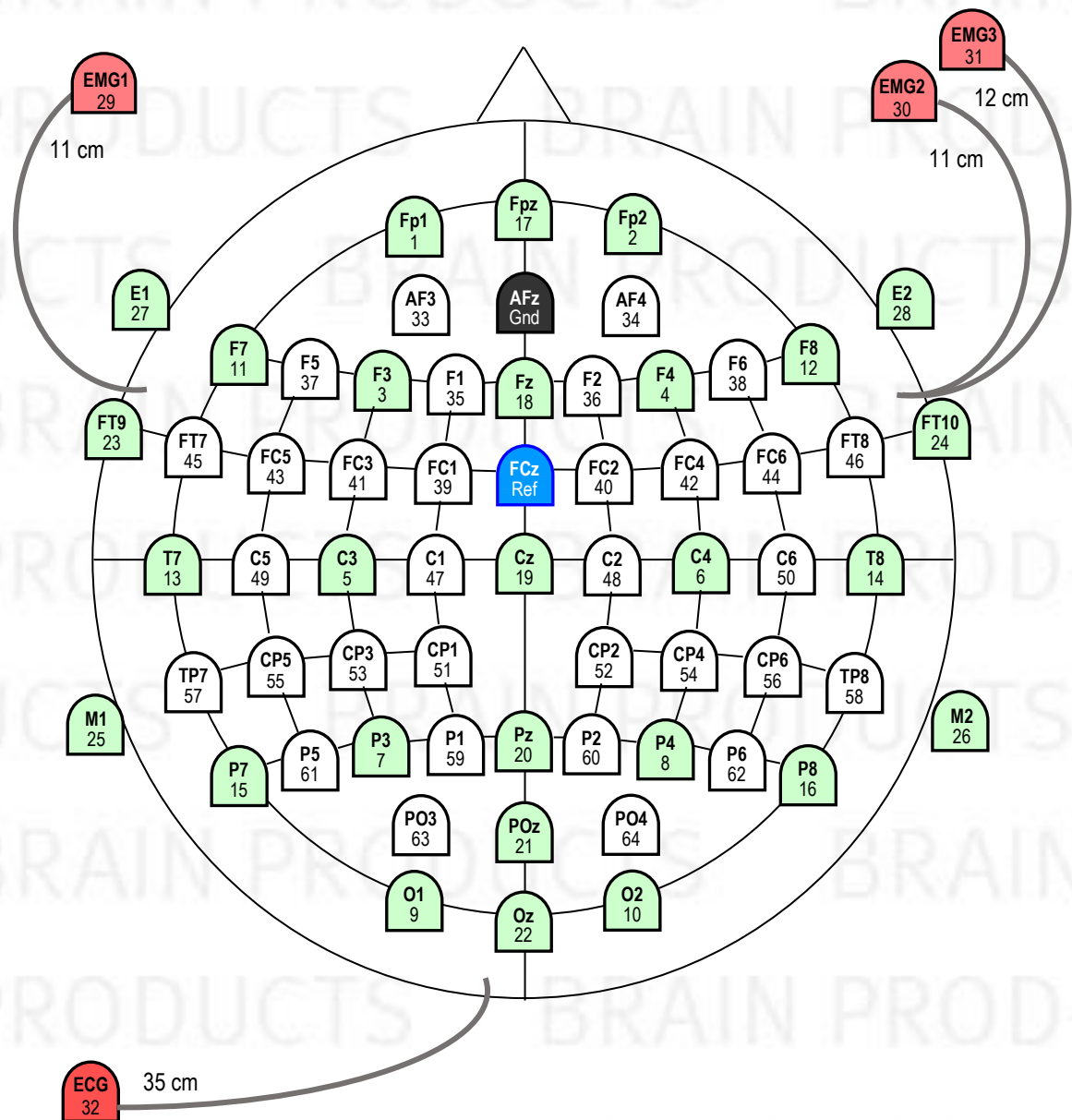




## 64Ch BrainCap MR for 3 Tesla for Sleep Recordings during fMRI

With EOG for reference to FPz

### Electrode Layout and Channel Assignment

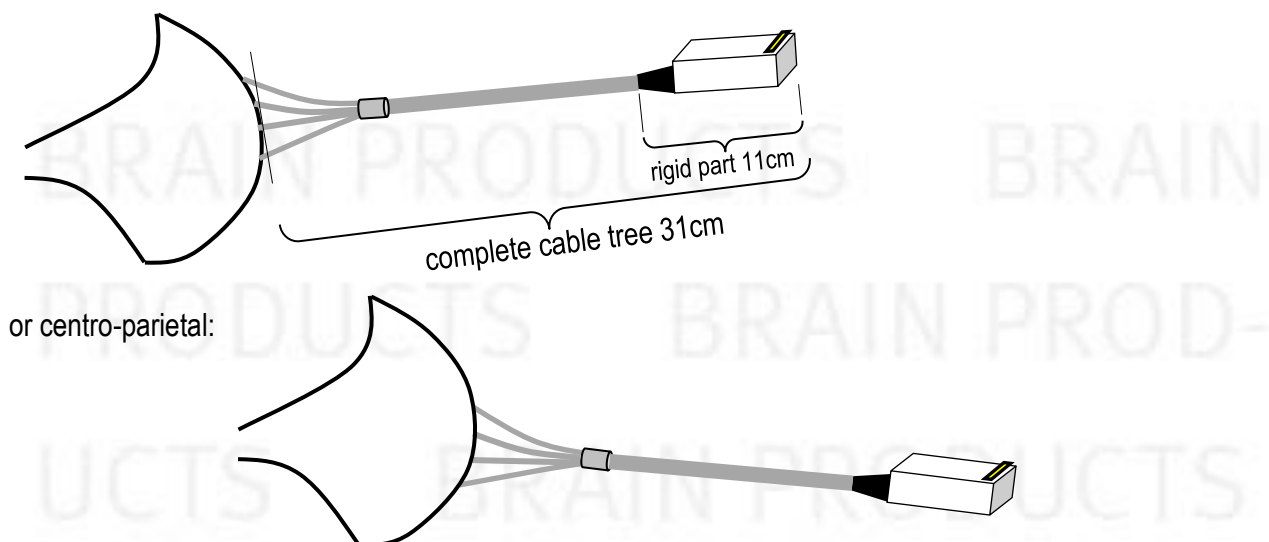


- M1 / M2 are approximately at mastoid positions (TP9' / TP10')
- FCz offers a reliable online recording reference; please reference offline to mastoid position e.g. M2
- E1/Fpz and E2/Fpz may be used for EOG, they are integrated in the cap for better signal quality

## Details for Users

### Exit Point of Cable Tree

In BrainCap-MRS the exit point of the cable tree can be either fronto-central:



The decision depends on the headcoil used. Upon ordering one of these options needs to be chosen.

### Ordering Information

For ordering please give **Article Number, Cap Cut, Exit Point, and Size**  
(e.g. BC-MRS3-64, C-Cut, Exit FFCz, 56):

- Article Number: **BC-MRS3-64**
- Cap Cut: **C-Cut** or **A-Cut**
- Exit Point: **Cable Tree Exit Frontal (at FFCz)** or **CentroParietal (at CPz)**
- 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: **42, 44** (7 month), **46, 48** (2 years)

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

### Cap

Standard Cap: Sublunion Cap with integrated chin belt, white

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

Options: C-Cut or A-Cut, Exit Point, Size. For further variations, please contact us.

### 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 these overall resistor values for each electrode:

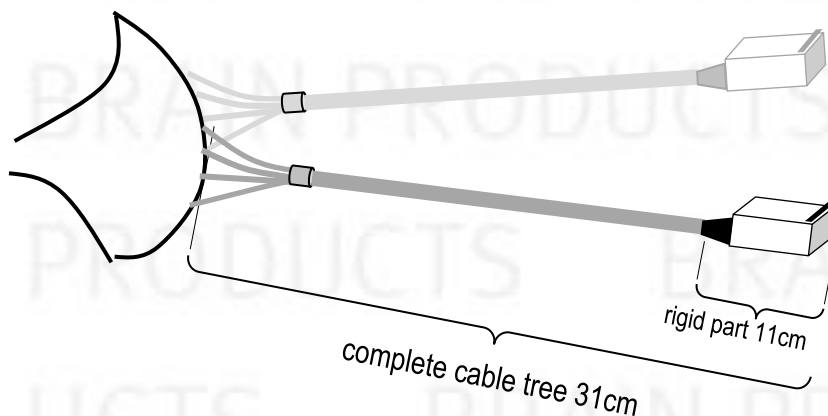
- Ch1-28, 33-64      10kOhm
- Ch 29-32 (drop-down) 20 kOhm
- REF                  15kOhm
- GND                  15kOhm

Electrode housing colours are according to the above figure. All cables are white, except Ch 29-32 red sensor and carbon leadwire, REF = blue cable, GND = black cable. All electrodes are name-labelled (Fp1, Fp2, ...) near sensor.

The drop-down electrode cable parts outside the cap are covered in spiral tube - to avoid direct contact to skin.

All cables go 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 FFCz or CPz and straight/tight to a uniting point after approx. 5 cm. After the uniting point, one cable tree continues to each BrainCap-connector-box.

The length of the cable trees until the end of the connector box is approx. 31 cm.



## Termination

Each cable tree leads into a Connector box. From here the caps are connected to BrainAmp-MR with 10 cm round ribbon-cables. These round ribbon cables are delivered with the BrainAmp MR system (from April 2020 onwards; prior to April 2020 30 cm flat ribbon cables were delivered). 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).

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

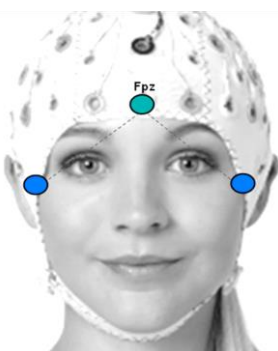
- 10k $\Omega$  in cap electrodes
- 20k $\Omega$  at drop-down
- 15k $\Omega$  at REF, GND
- Amp1, Amp2

## Theta / Phi Coordinates for BC-MRS3-64

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	Fpz	90	90
18	Fz	45	90
19	Cz	0	0
20	Pz	45	-90
21	POz	67	-90
22	Oz	90	-90
23	FT9	-113	-18
24	FT10	113	18
25	M1	-121	18
26	M2	121	-18
27	E1	-121	-30
28	E2	121	30
29	EMG1	-	-
30	EMG2	-	-
31	EMG3	-	-
32	ECG	-	-
REF	(FCz)	23	90

EEG data can be referenced offline to mastoid position, e.g. M2, as recommended in AASM manual.

For EOG, please reference the "E1" and "E2" channel offline to Fpz, for EOG left/right:



Channel-Number	Name	Theta	Phi
33	AF3	-74	-68
34	AF4	74	68
35	F1	-49	-68
36	F2	49	68
37	F5	-74	-41
38	F6	74	41
39	FC1	-31	-46
40	FC2	31	46
41	FC3	-49	-29
42	FC4	49	29
43	FC5	-69	-21
44	FC6	69	21
45	FT7	-90	-18
46	FT8	90	18
47	C1	-23	0
48	C2	23	0
49	C5	-68	0
50	C6	68	0
51	CP1	-31	46
52	CP2	31	-46
53	CP3	-49	29
54	CP4	49	-29
55	CP5	-69	21
56	CP6	69	-21
57	TP7	-90	18
58	TP8	90	-18
59	P1	-49	68
60	P2	49	-68
61	P5	-74	41
62	P6	74	-41
63	PO3	-74	68
64	PO4	74	-68
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:

