



MedAustron Power Converters Overview – 6th POPCA -

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Gender Disclaimer: Wegen der besseren Lesbarkeit wird im weiteren Text zum Teil auf die gleichzeitige Verwendung weiblicher und männlicher Personenbegriffe verzichtet. Gemeint und angesprochen sind – sofern zutreffend – immer beide Geschlechter.
For better readability, the remaining text refrains from using gender-specific role designations. Where applicable, both genders are implied.

All MedAustron power converters (303 items) are switching-mode, with Mosfet and IGBT. Some of them with Active Front End, including main dipoles, 90° dipole, all extraction dipoles and magnetic septa:

- $\cos\phi$ between 0.85 and 1 for the bigger power converters
- High efficiency (greater than 87%)
- No compensation system needed on electrical network side

All power converters are splitted in 5 families, according power and topology:

Replacing active spare PCO is very easy with fast-disconnection cables (Multicontact) up to 650A and motor controlled commutators for high current PCO (C5)



274 magnet circuits to be powered with:

5 Families of power converters Quantity + spare

A:	Heinzinger, Rosenheim	35 + 4
B:	Equipaggiamenti Elettronici Industriali, Vicenza	195 + 19
C:	Equipaggiamenti Elettronici Industriali, Vicenza	18 + 3
D:	Equipaggiamenti Elettronici Industriali, Vicenza	8 + 1
E:	General Electric, Belfort (ex-Converteam)	2
C3:	Based on CERN design (Davide Aguglia's section)	16 +



PCO	Magnet	Quadrants	Cycle	Topology	Voltage	Current
A	LEBT-MEBT quadrupoles, solenoide	1	DC mode	H-bridge switching	50V	up to 300A
B	LEBT, MEBT, HEBT correctors and quadrupoles, MR correctors, skew, betatrone	4	Cycling	H-bridge switching	up to ±90V	up to ±300°
C	MR-HEBT quads, sext, HEBT dipoles, septum	4	Cycling	H-bridge switching + AFE	up to ±200V	up to ±3000A
C3 (Maxi discap)	IH quads	2	Fast Pulse	H-bridge pulsed capacitor discharge	250V	±1250A
D	Scanning Dipoles	4	Raster Scan	H-bridge switching	±600V	±600A
E1	Main Bending Dipoles	2	Cycling	H-bridge switching + AFE	±1500V	3000A
E2	90° Dipoles	2	Cycling	H-bridge switching + AFE	±500V	2300A

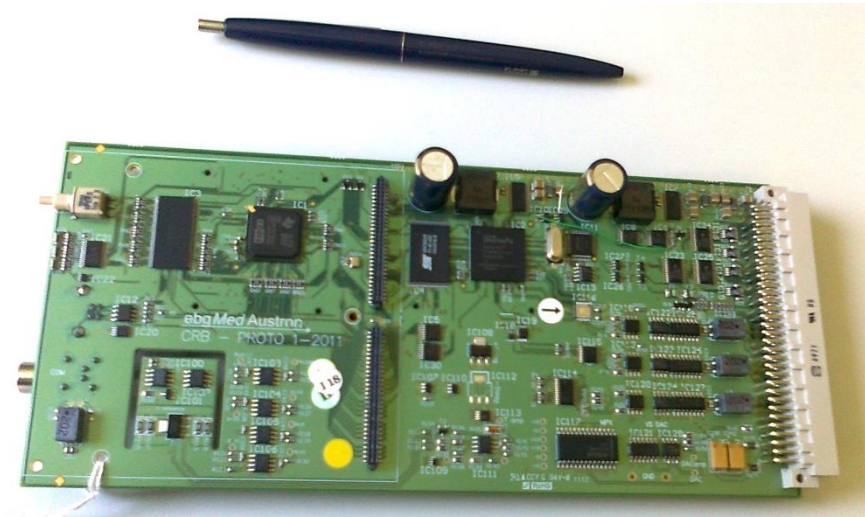
MedAustron Control electronic modules

Specific items

B train

Betatron control

Air quad converter



MedAustron CRB (Converter Regulation Board)

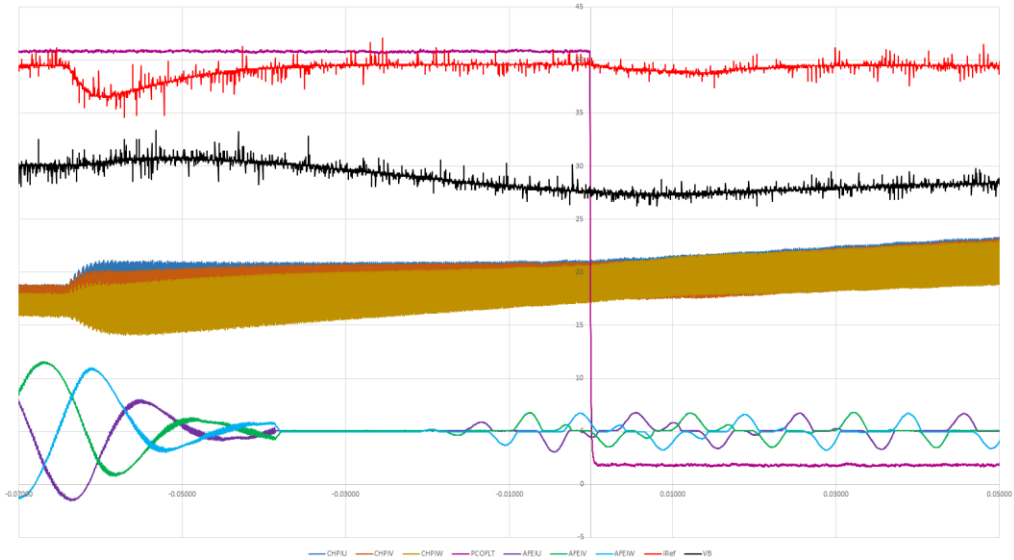
Developed with CERN and MedAustron team (Fraboulet, De Cesaris), was characterized for analogue performance (current measurement), and the results are very good: (10 ppm p2p noise / 8 ppm of non-linearity / 5° tempCoeff). Now MA is developing version 2.0.

Heinzinger 50V-300A



- Serial command timeout;
- Power supply failure.

EEI 650A-150V



- AFE unbalanced current (C1);
- IGBT driver fault (D1);

Maxidiscap 1250A-250V

➔ MCB wrong status fault;



GE 1500V-3000A



- Siemens 20kV switch.
- IGBT fault after VME crate restart;
- Small crystals formation in cooling circuit.

Thank you for your attention!

