Advanced Control For MedAustron Power Converters

Power Converter Work Package
WP_PO
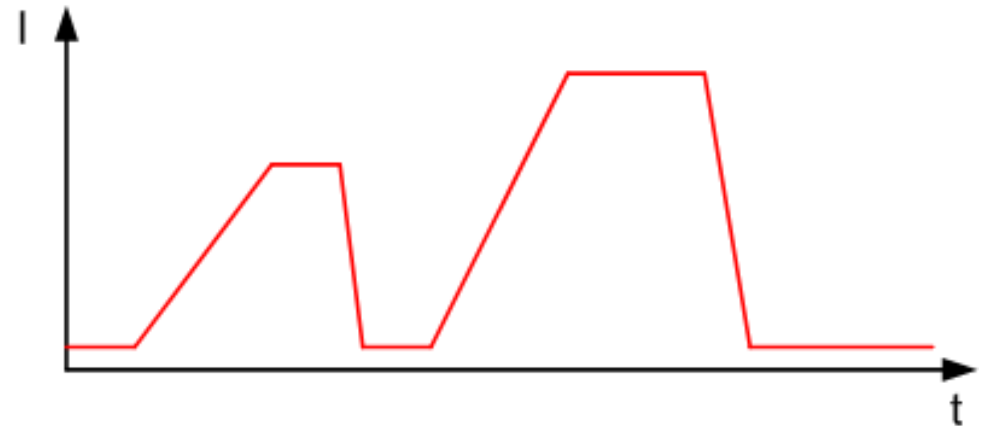
What do we want ?

We want to apply a given magnetic field
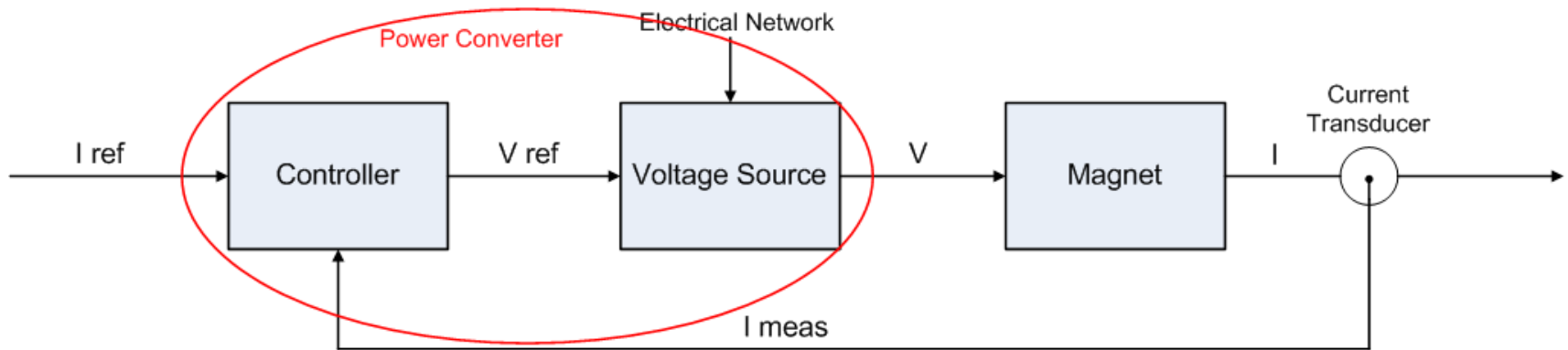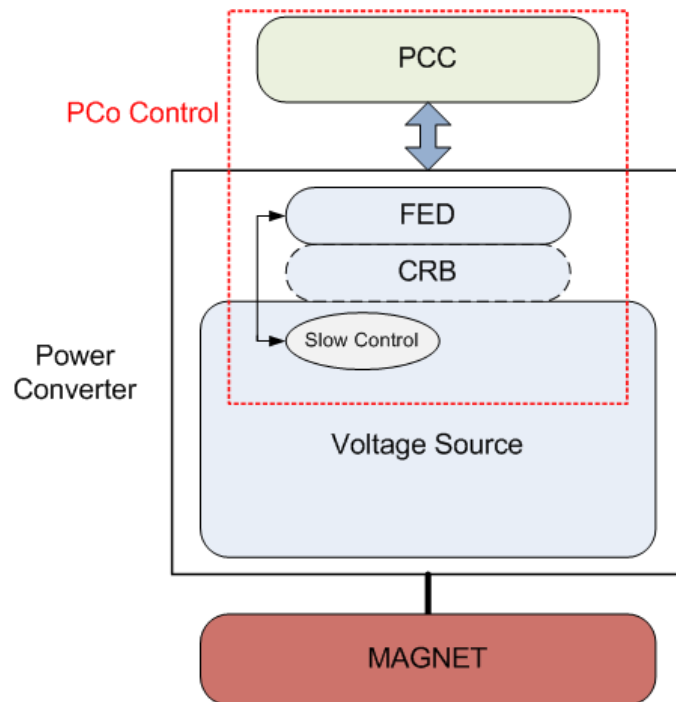to the beam of particles

=

Magnet

+

Proper current

How do we do that ?

Power Converter and Control

PCC = Power Coverter Control
FED = Front End Device
CRB = Converter Regulation Board

Power Converter (PCo) :
• Voltage Source (with slow control)
• Embedded control (FED and CRB when needed)

Voltage source :
Power device providing the specified voltage

Slow control :
Serial non real-time interface for PCo commands & status

Power Converters Overview

Family	Power	Qty	Comments
A	5 - 15 kW	31	COTS – Current Source
B	1.5 - 25 kW	202	-
C	32.5 - 400 kW	25	-
D	400 kW	10	High BW
E	1.4 & 4.5 MW	2	-
F	150 kW	1 or 2	RF
Total		About 270	

What does it look like ? (1)
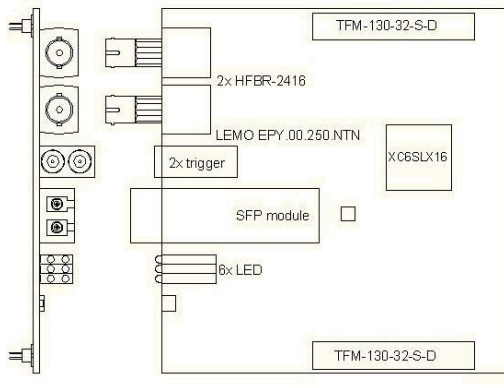# Power Sources
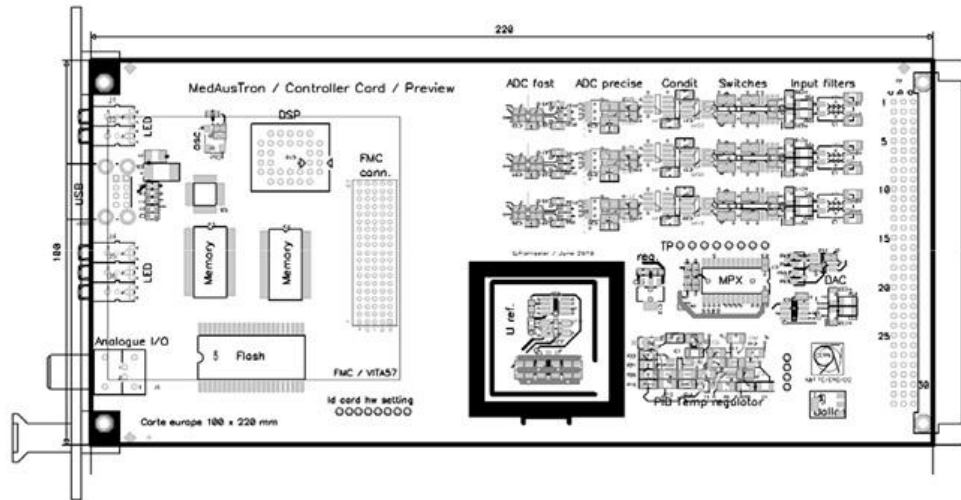
400 kW – Family C

25 kW – Family B

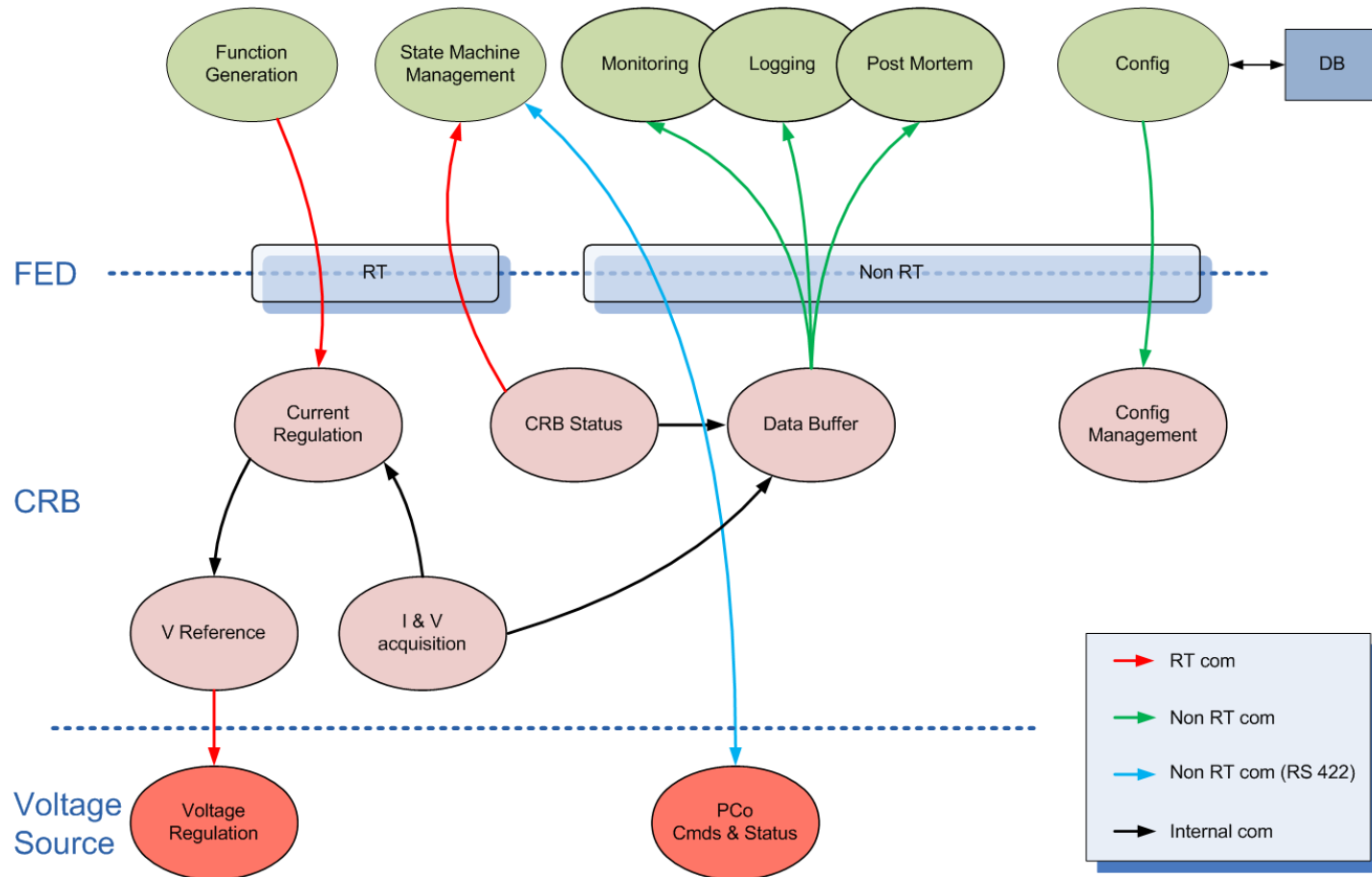15 kW – Family A

What does it look like ? (2)
Embedded Control

FED

CRB

Control Functions
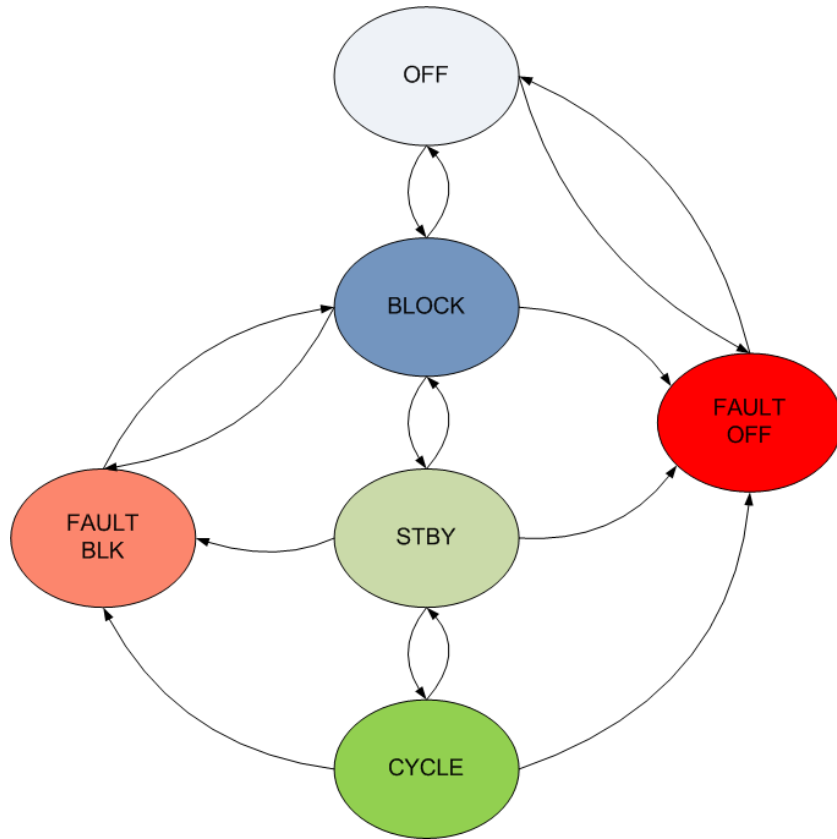
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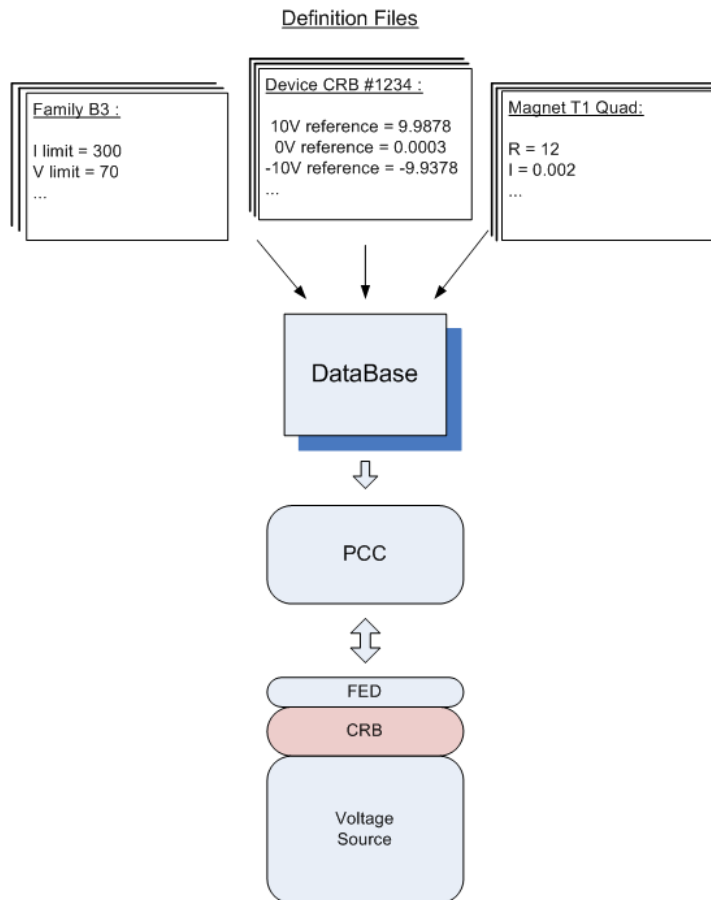
PCo State Machine
-- Draft --

To operate the state machine, the PCC must :

• send commands to the PCo Slow Control
• read status from the PCo Slow Control
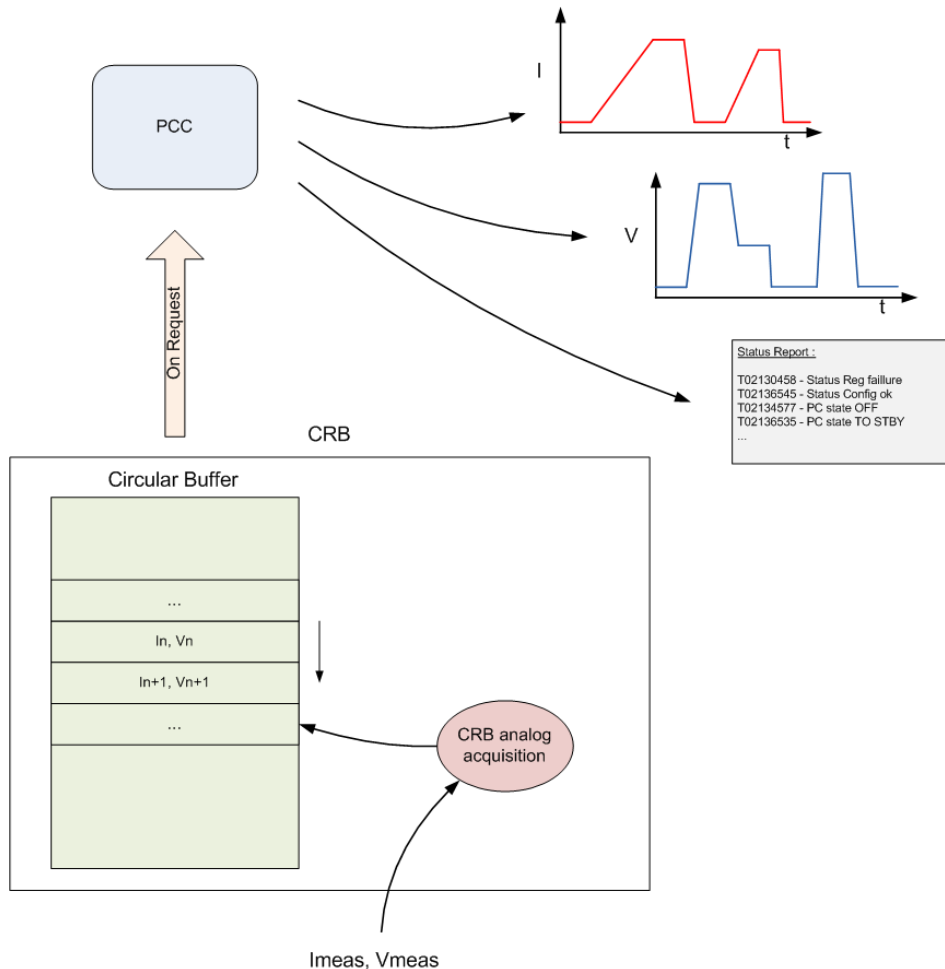• get status from the CRB (RT and non RT data)

Configuration Management

Definition Files

Family B3 :

I limit = 300
V limit = 70
...

Device CRB #1234 :

10V reference = 9.9878
0V reference = 0.0003
-10V reference = -9.9378
...

Magnet T1 Quad:

R = 12
I = 0.002
...

DataBase

PCC

FED

CRB

Voltage Source

The PCC must :

- send configuration data to the CRB
- check that the CRB configuration status is OK

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Post Mortem, Monitoring, Logging

The CRB buffers
- measurement data
- status
- …

Data is frozen
- on request
- on PCo faillure (Post Mortem)

Data is uploaded for PM, monitoring, logging purpose

Next steps

- Specify the system performances (current precision, bandwidth, …)

- CRB Schematics and PCB rooting

- Start defining what is needed for the PCo control :
  - PCo state machine
  - Configuration management
  - Definition properties
  - Expert and operator interfaces
  - …