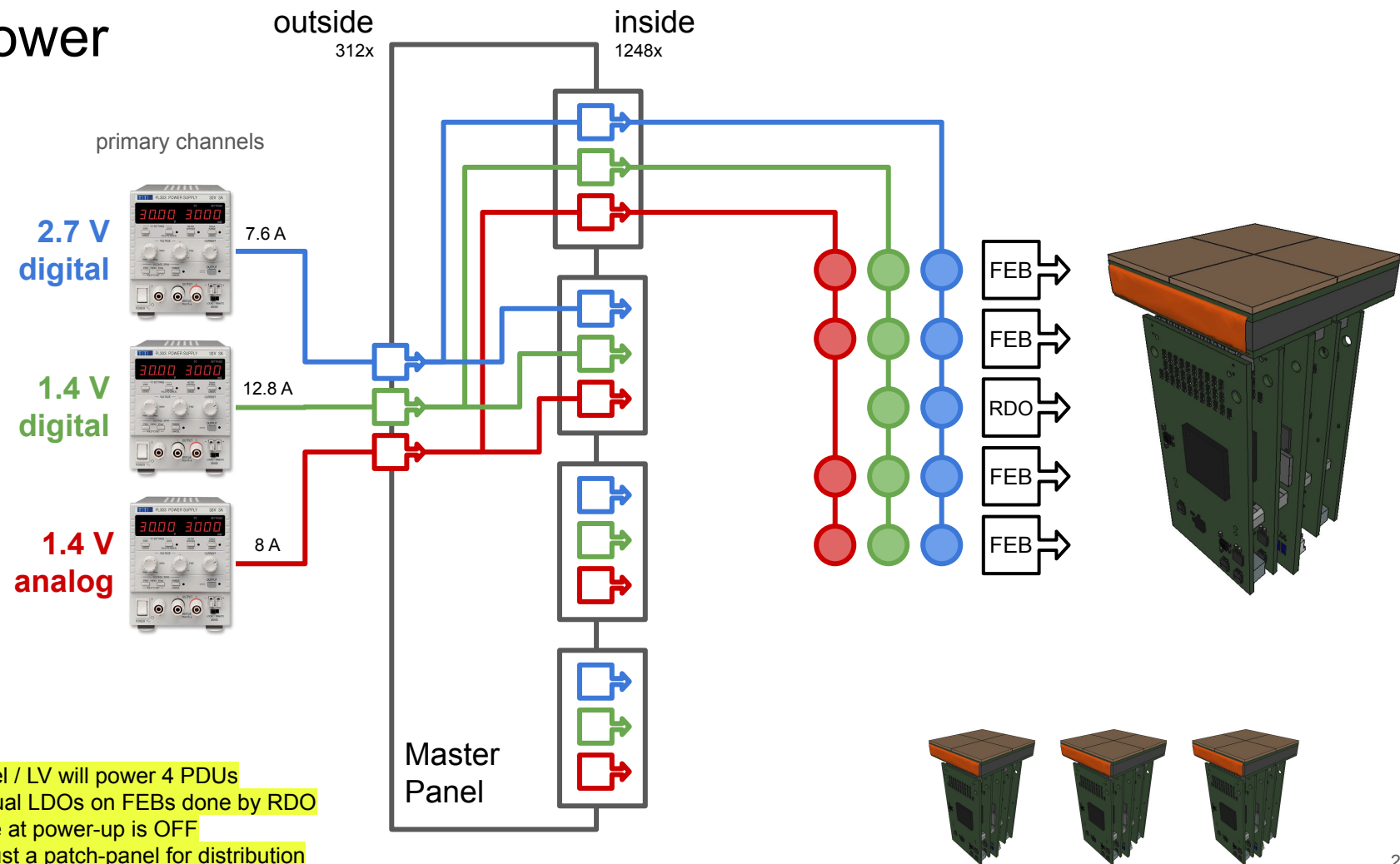


dRICH LV power distribution

Roberto Preghenella
Thursday 25 September 2025

FEE power



1 primary channel / LV will power 4 PDUs
control of individual LDOs on FEBs done by RDO
default FEB state at power-up is OFF
MasterPanel is just a patch-panel for distribution

Cables and boards for FEB and RDO power

To be updated in the document "**ePIC Interface Control Document for Services**"

- **FEE analog 1.4V**

- power for ALCOR analog
- 1.4V 8A for each channel → AWG 11
- 1 primary channels / 4 PDUs → 312 + 312 cavi (output + return)
- 39x CAEN A2551 boards (possible choice)

A2551 ★ New

8 Channel 8 V/12 A Full Floating Channel Board

- **FEE digital 1.4V**

- power for ALCOR and RDO digital core
- 1.4V 12.8A for each channel → AWG 9
- same as above, but **A2551 boards have not enough Amps**

A2551 ★ New

8 Channel 8 V/12 A Full Floating Channel Board

- **FEE digital 2.7V**

- power for ALCOR and RDO digital I/O
- 2.7V 7.6A for each channel → AWG 11
- same as above

A2551 ★ New

8 Channel 8 V/12 A Full Floating Channel Board



this scheme would almost work using a commercial CAEN board (60W/channel)
similar reasoning holds for the Wiener MPOD system (50W/channel)
although the MPOD has lower power and lower Amps / channel than CAEN commercial boards (max 10A/channel)

Development with CAEN for a new LV board

to fit the current budget we would need to

- either change the power aggregation scheme
 - from 4 PDU / primary channel to 3 PDU / primary channel
 - number of boards increases from 117 to 156 (~2.5 kEUR/board = 100 kEUR more + crates, space, cables)
- or double the channels for the FEE digital 1.4V
 - instead of 39 boards, use 78 (~2.5 kEUR/board = 100 kEUR more + crates, space, cables)

• FEE digital 1.4V

- power for ALCOR and RDO digital core
- 1.4V 12.8A for each channel → AWG 9
- same as above, but A2551 boards not enough Amps

A2551 ★ New

8 Channel 8 V/12 A Full Floating Channel Board

initiated a **discussions with CAEN for a development** of a similar LV board with same power output / channel (60W) with customisation

- reduce max voltage, 0-5V
- increase max current, 0-16A

dRICH FEE does not need up to 8V voltages, but benefits for more current development costs with CAEN (can this be a PED?) are low compared to potential cost saving (~ 100 kEUR)



Cables and boards for SiPM e MasterLogic power

Current status of the document **"ePIC Interface Control Document for Services"**

- **Ancillary Power**

- power for MasterLogic boards
- 7V 5.2 A for each channel → AWG 13
- 1 primary channel / 208 PDUs (readout box) → 6 + 6 cables (output + return)
- 1x CAEN A2551 board (possible choice)

A2551 ★ New

8 Channel 8 V/12 A Full Floating Channel Board

- **SiPM bias voltage**

- power for SiPM sensors
- 64V 1.3 A for each channel → AWG 19
- 2 primary channels / 208 PDUs (readout box) → 12 + 12 cables (output + return)
- 2x CAEN A2554 boards (possible choice)

A2554 ★ Coming Soon

8 Channel 64 V/1.5 A Full Floating Channel Board

- **SiPM annealing voltage**

- power for SiPM sensors
- 12V 3.2 A for each channel → AWG 15
- 8 primary channels / PDU (each primary is shared among 8 PDUs) → 1248 + 1248
- 156 CAEN A2552 boards (possible choice)

A2552 ★ New

8 Channel 16 V/6 A Full Floating Channel Board

this scheme works using a commercial CAEN board (60W/channel)
similar reasoning holds for the Wiener MPOD system (50W/channel)



Crates and racks for power

- 39x CAEN A2551 boards for FEE analog 1.4V (ALCOR analog)
- 39x CAEN A2551 modified boards for FEE digital 1.4V (ALCOR and RDO digital core)
- 39x CAEN A2551 boards for FEE digital 2.7V (ALCOR and RDO digital I/O)
- 1x CAEN A2551 board for Ancillary Power (MasterLogic)
- 2x CAEN A2554 boards for SiPM bias voltage
- 156x CAEN A2552 boards for SiPM annealing voltage

total 276 boards compatible with the
CAEN Universal Multichannel Power Supply System

commercial crate CAEN SY4527 (19", 8 U)
one crate → 16 slots, 5500 W

we need 18 crates, 4x 42U racks

8x crates for the FEE, 2x 42U racks

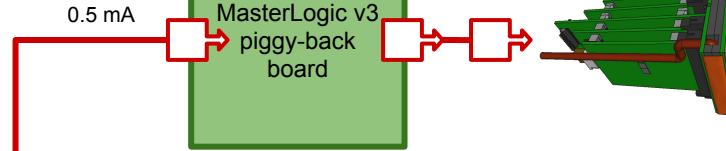
10x crates for the annealing, 2x 42U racks



Vbias distribution



64 V
0.2 A



MasterLogic v3
piggy-back board

una scheda MasterLogic-v3 per PDU
in un settore ci sono 208 PDU

sulla MasterLogic v2 i regolatori
consumano ognuno
3.3 mA quando l'uscita è a 50 V

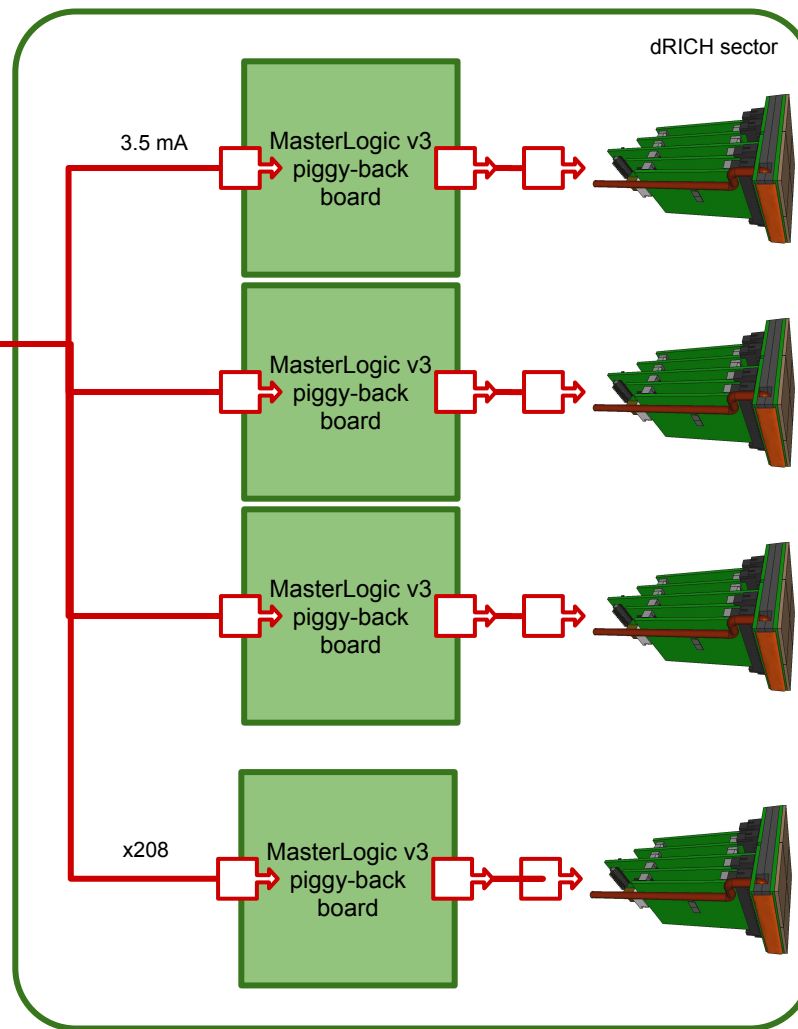
assunzione che consumo sia lo stesso
nella nuova MasterLogic-v3

è meno, verosimilmente 0.5 mA

Vbias distribution



64 V
1.3 A



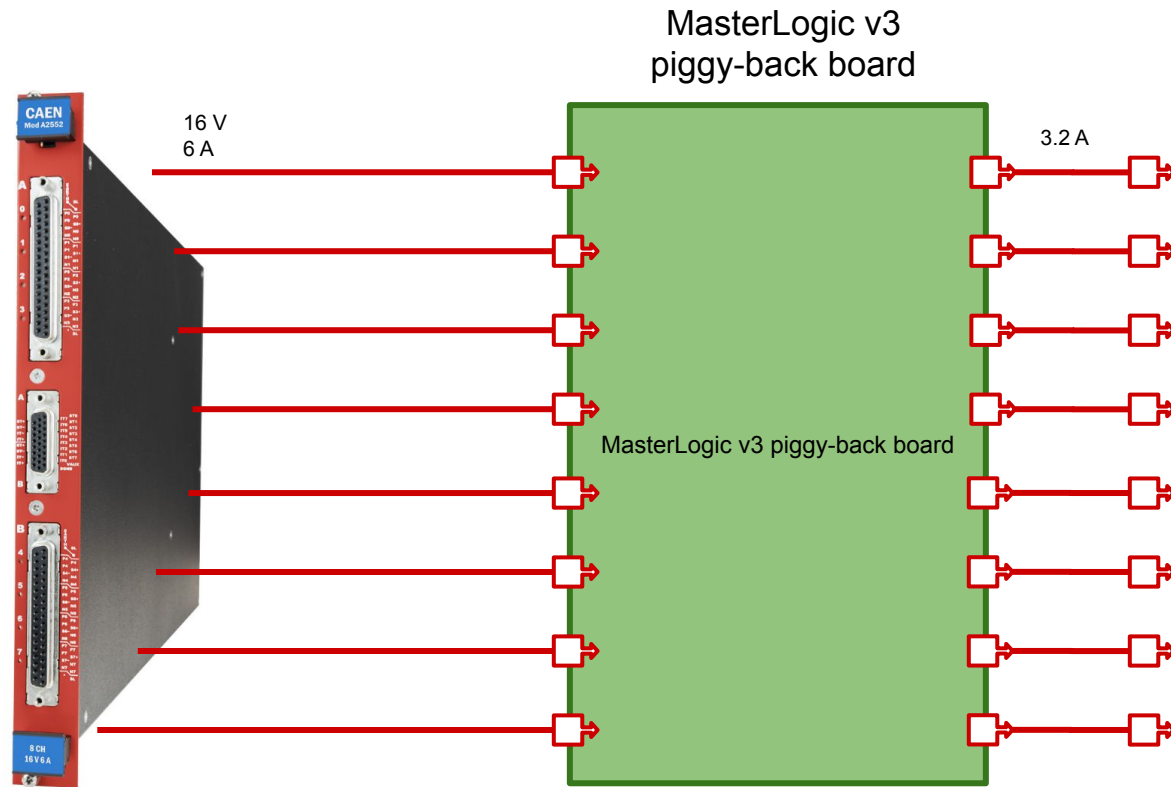
dRICH sector

una scheda MasterLogic-v3 per PDU
in un settore ci sono 208 PDU

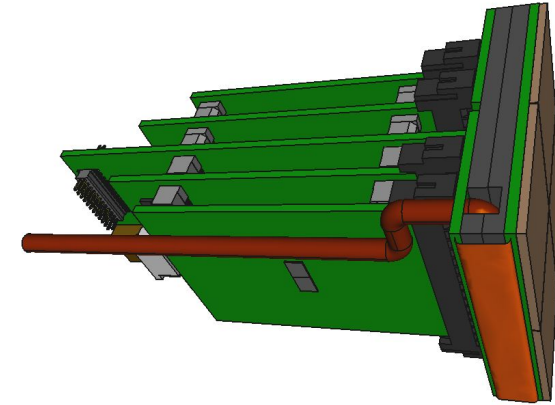
sulla MasterLogic v2 i regolatori
consumano ognuno
3.3 mA quando l'uscita è a 50 V

assunzione che consumo sia lo stesso
nella nuova MasterLogic-v3

Vannealing distribution



2 Vbias input lines for each FEB
32 SiPM / Vbias input line
= 3.2 A for each line during annealing (max)



but, 1248 8-channel CAEN boards are a bit too much and are not needed given that we do not do annealing all at the same time (that would be 150-300 kW)

fan-out to 8 PDUs

Vannealing distribution

the same LV channel will be shared by 8 PDUs
the MasterLogic decides if the PDU is doing
annealing

