

RICH DCS status



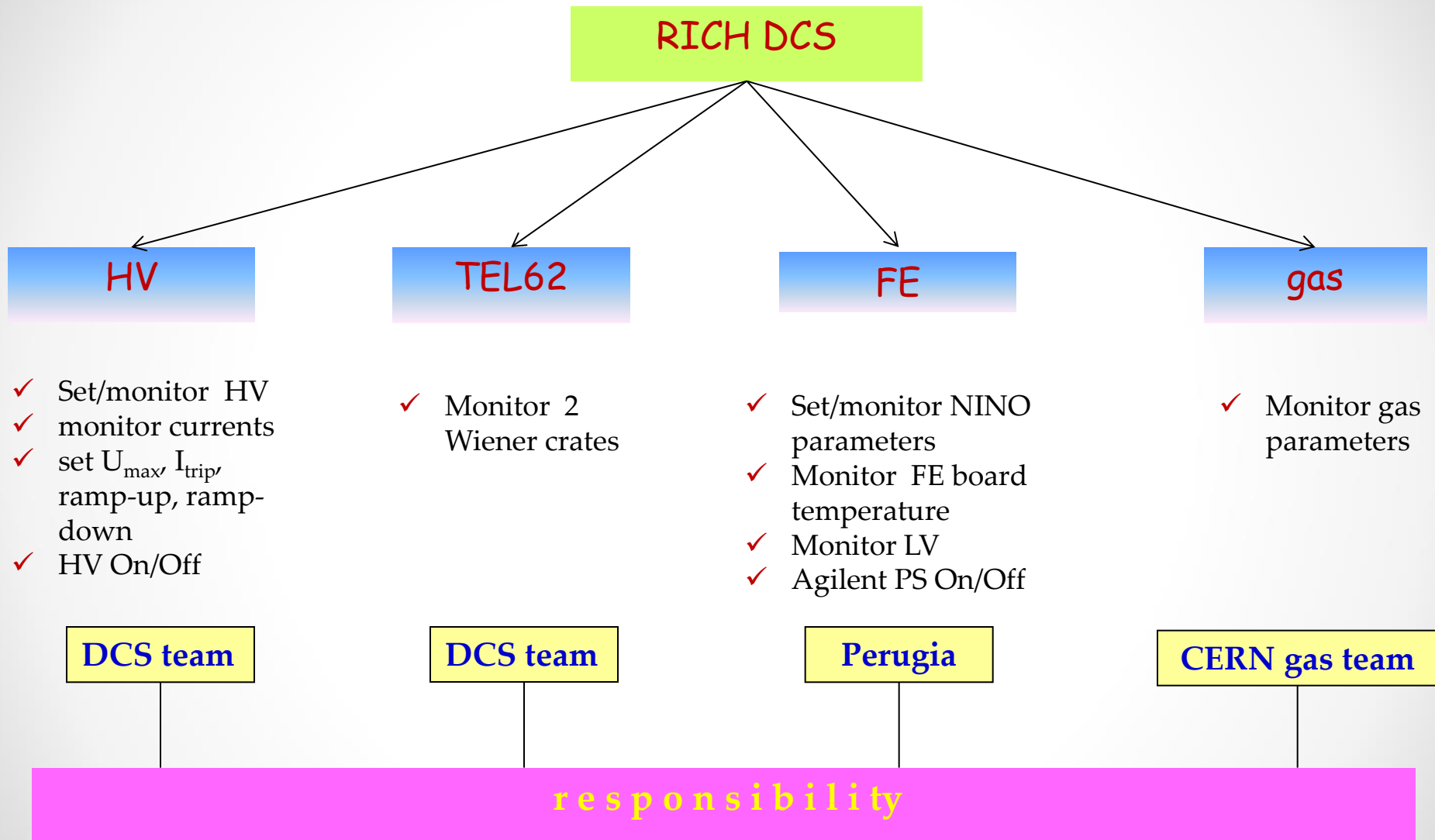
Viacheslav Duk, INFN Perugia
Ferrara, 02.09.2014



outline

1. DCS overview
2. HV control
3. TEL62 control
4. FE control
5. Tests in Perugia
6. Gas control
7. Conclusions

RICH DCS overview



HV control

Natural subdivision: 4 crates x 61 supercells/crate x 2 HV_channels/supercell

- ✓ crates: JURA_UP, JURA_DOWN, SALEVE_UP, SALEVE_DOWN
- ✓ Supercell: 8 adjacent PMs
- ✓ HV channel: 4 PMs powered from one channel in the HV splitter board

Integration to the DCS:

- ✓ CAENs connected to the LAN with ethernet cables
- ✓ CAEN OPC server is used to communicate with DCS

Status:

- ✓ Fully integrated into the central DCS

TEL62 control

2 standard **Wiener crates** to be monitored:

- ✓ Jura crate (4 TEL62 for data) installed
- ✓ Saleve crate (1 TEL62 for L0 from NINO OR's) to be installed soon
- ✓ Wiener OPC server is used to communicate with DCS
- ✓ Integration to the central DCS: in queue



*Thanks to Mauro
Piccini for the pictures*

FE boards in the DCS

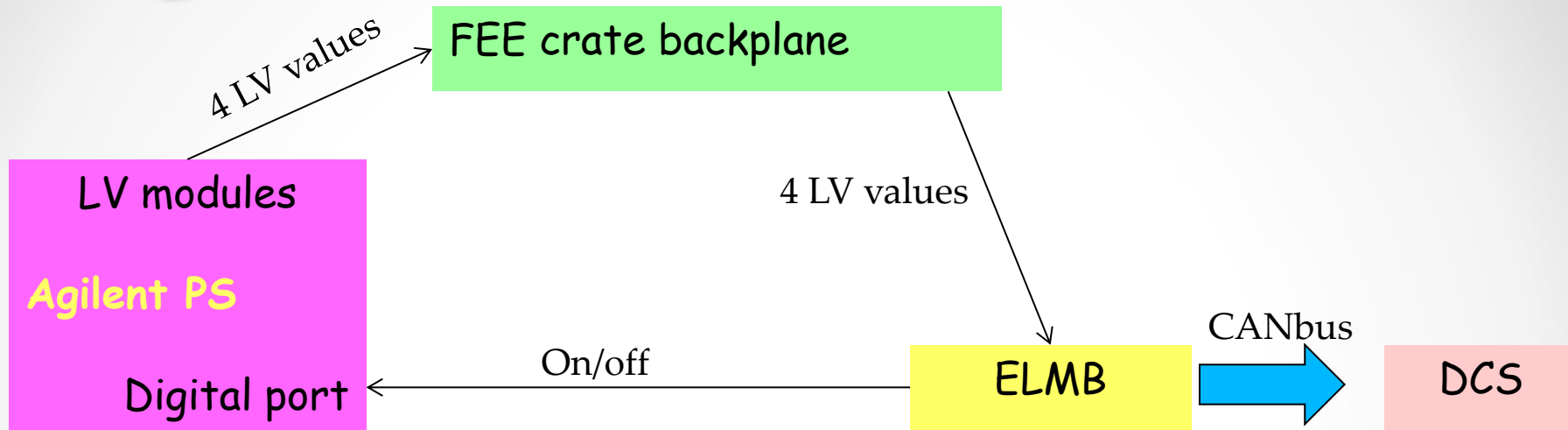
- ✓ 4 FE crates x 16 boards/crate x 32 channels/board
- ✓ Each FE board contains 4 amplifiers, 4 NINO discriminators (8 channels per NINO), 1 ELMB embedded (with minor changes wrt a standard ATLAS design)
- ✓ **ELMB communicates with DCS via CANBUS** (all boards are connected in a daisy chain)
- ✓ parameters to control/set by ELMB: thresholds (4), hysteresis (4), stretching (4), board temperature (1)

ELMB =
embedded local
monitor board
(from ATLAS)

Status:

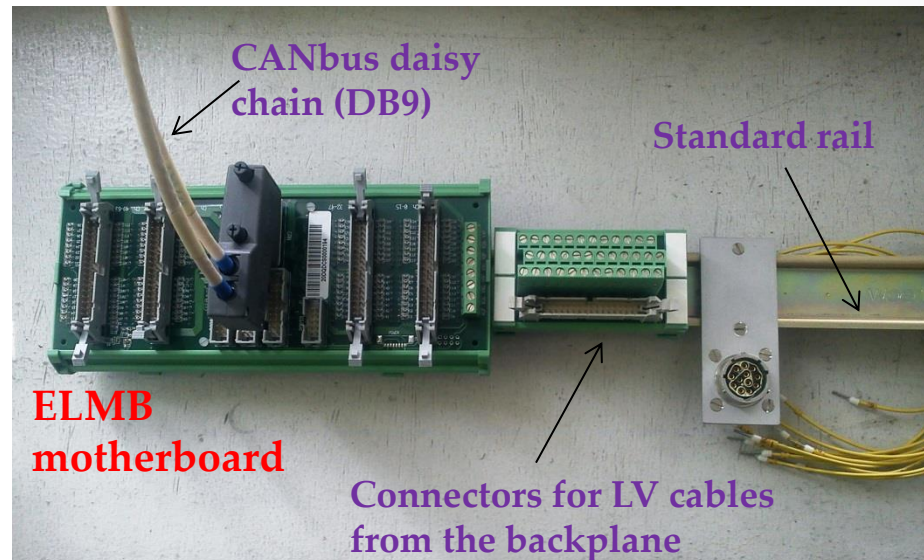
- ✓ Cables, connectors and patch panels for daisy chains ready (delivery at CERN: mid September)
- ✓ DCS infrastructure installation to be started after Ferrara meeting (waiting for FE boards)

Agilent LV PS in the DCS

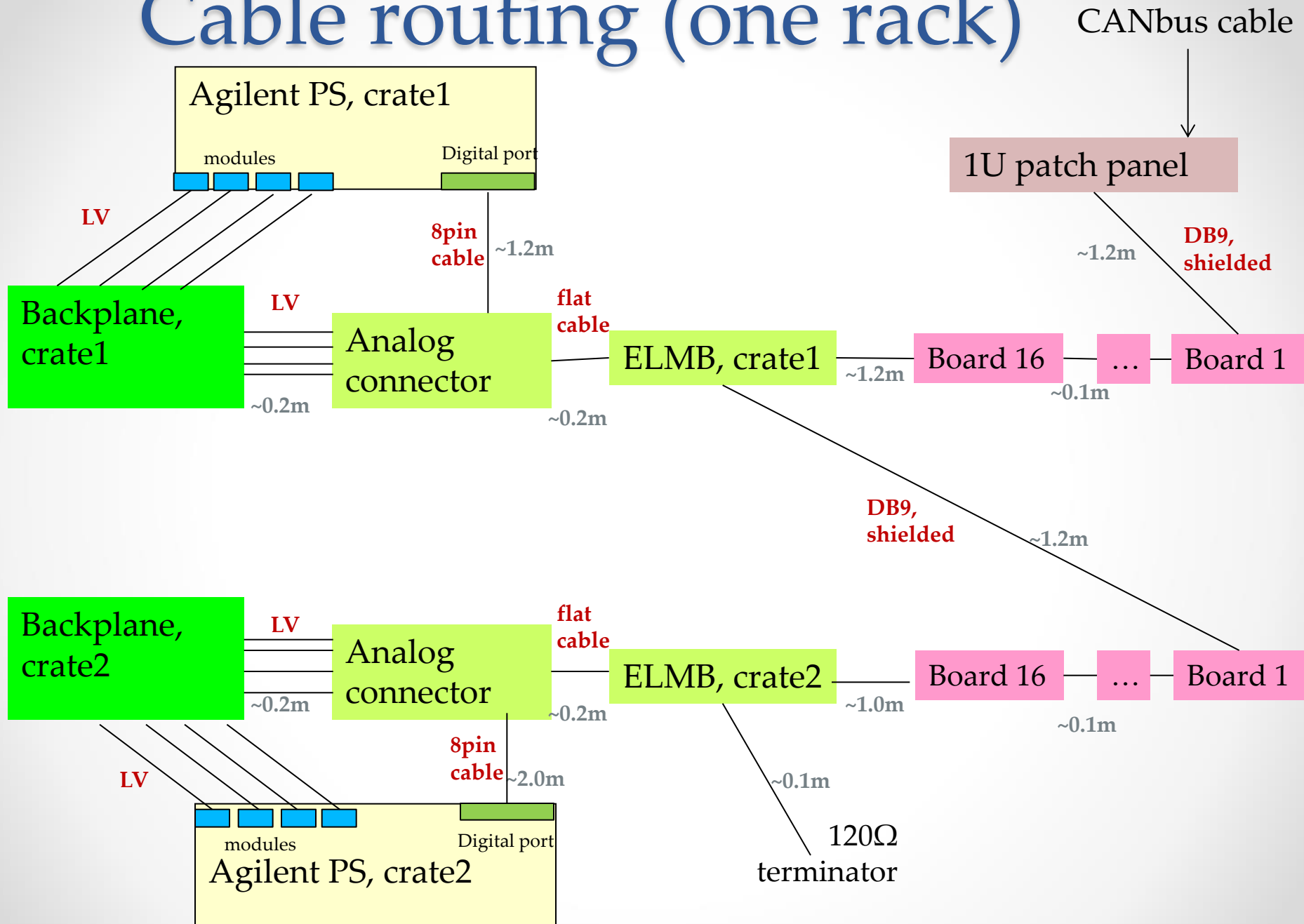


Simple solution:

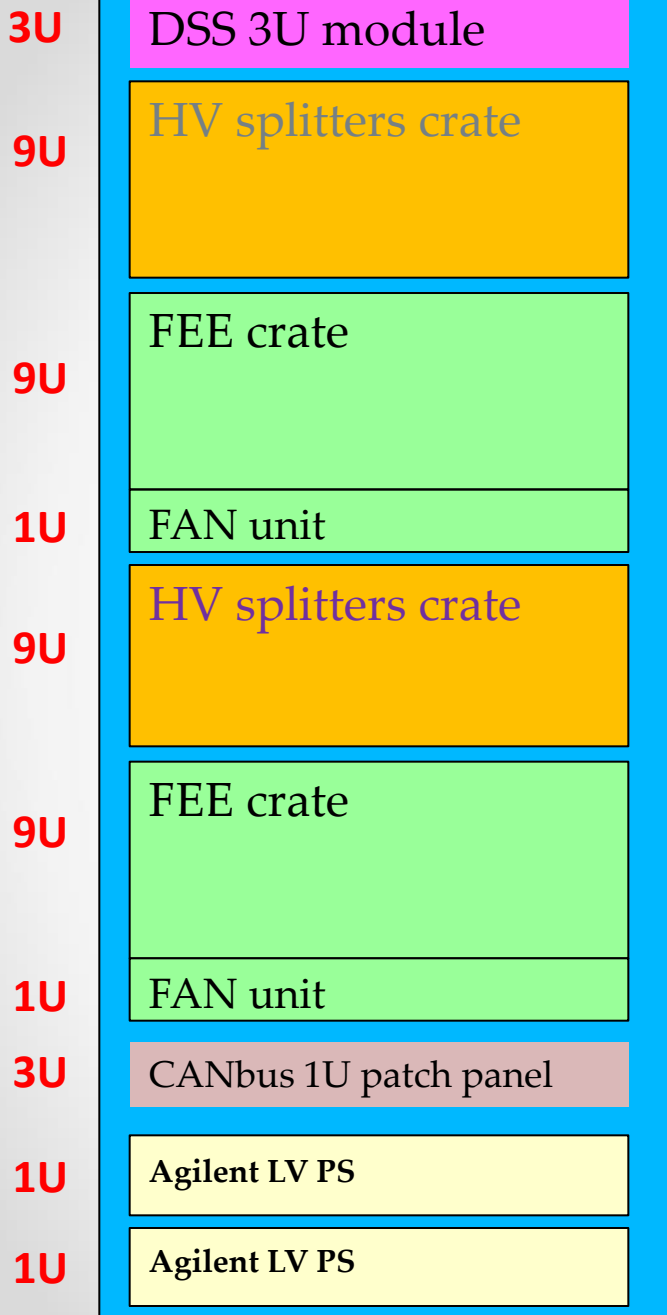
- ✓ Standard board (mother + ELMB) attached to the backplane on a standard DIN rail



Cable routing (one rack)

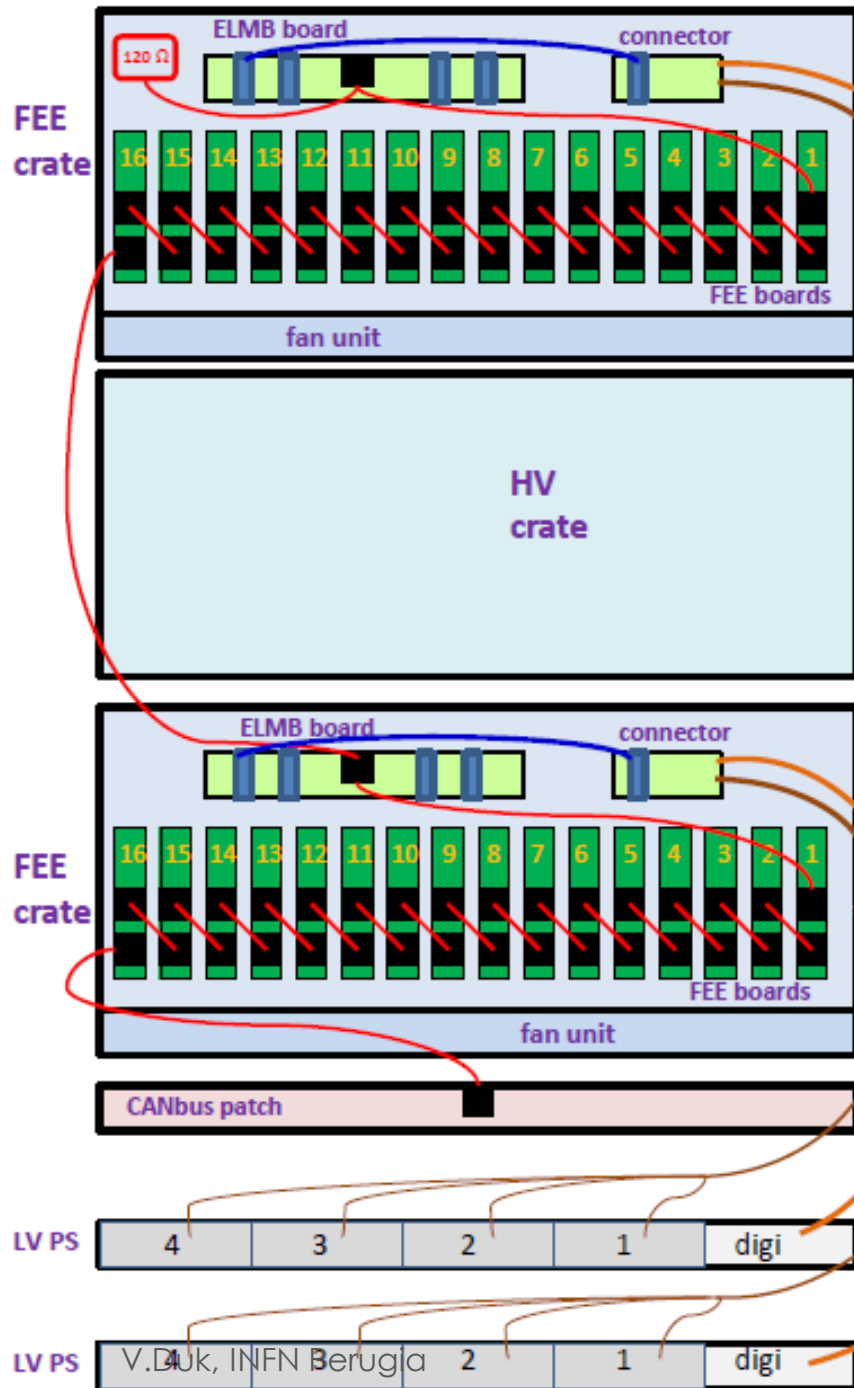


FE rack design



- ✓ DSS (detector safety system) needs air flow throughout the rack
- ✓ Agilent should not be too far from FEE
- ✓ RACK = 45U
- ✓ 44U occupied

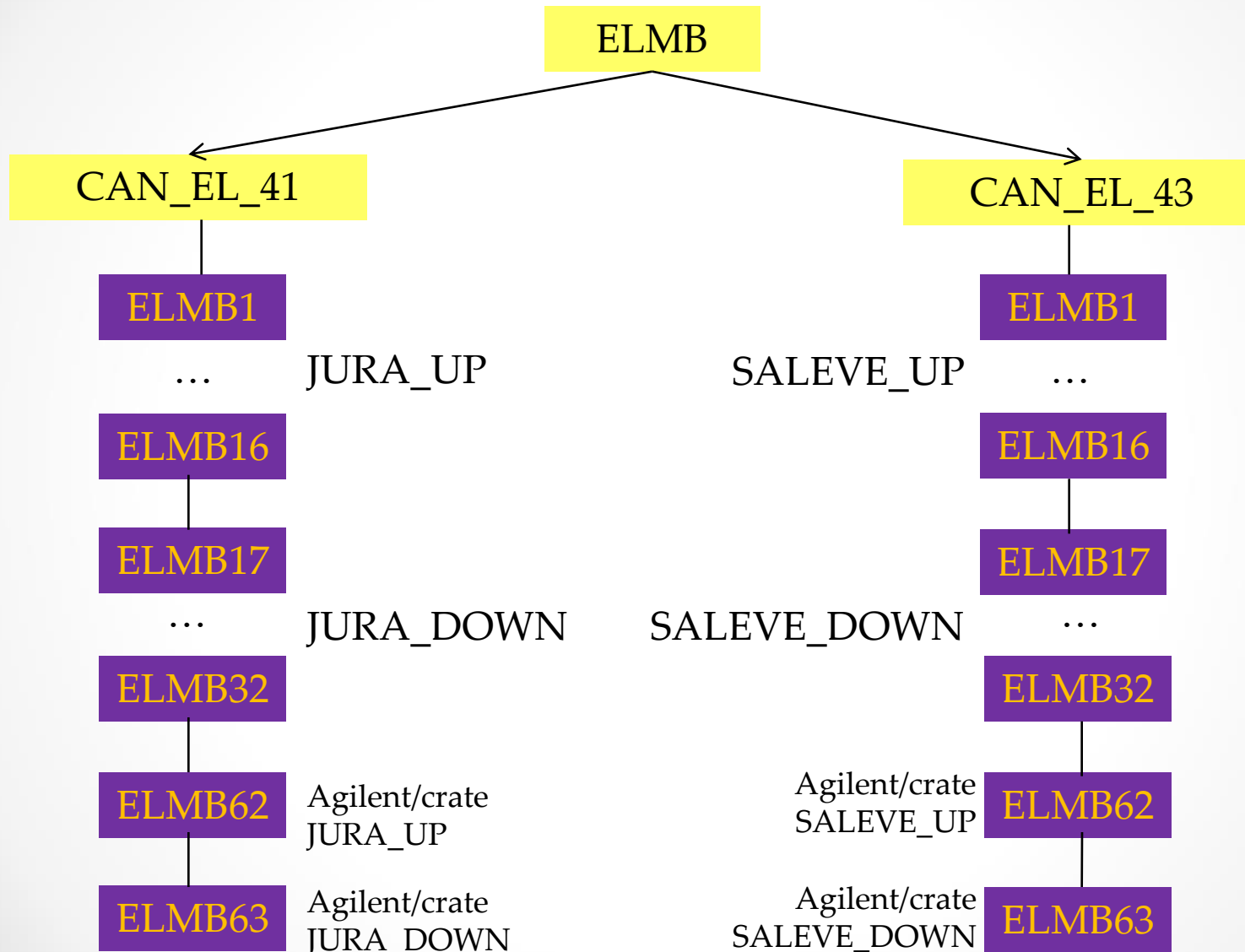
RICH DCS Cable routing



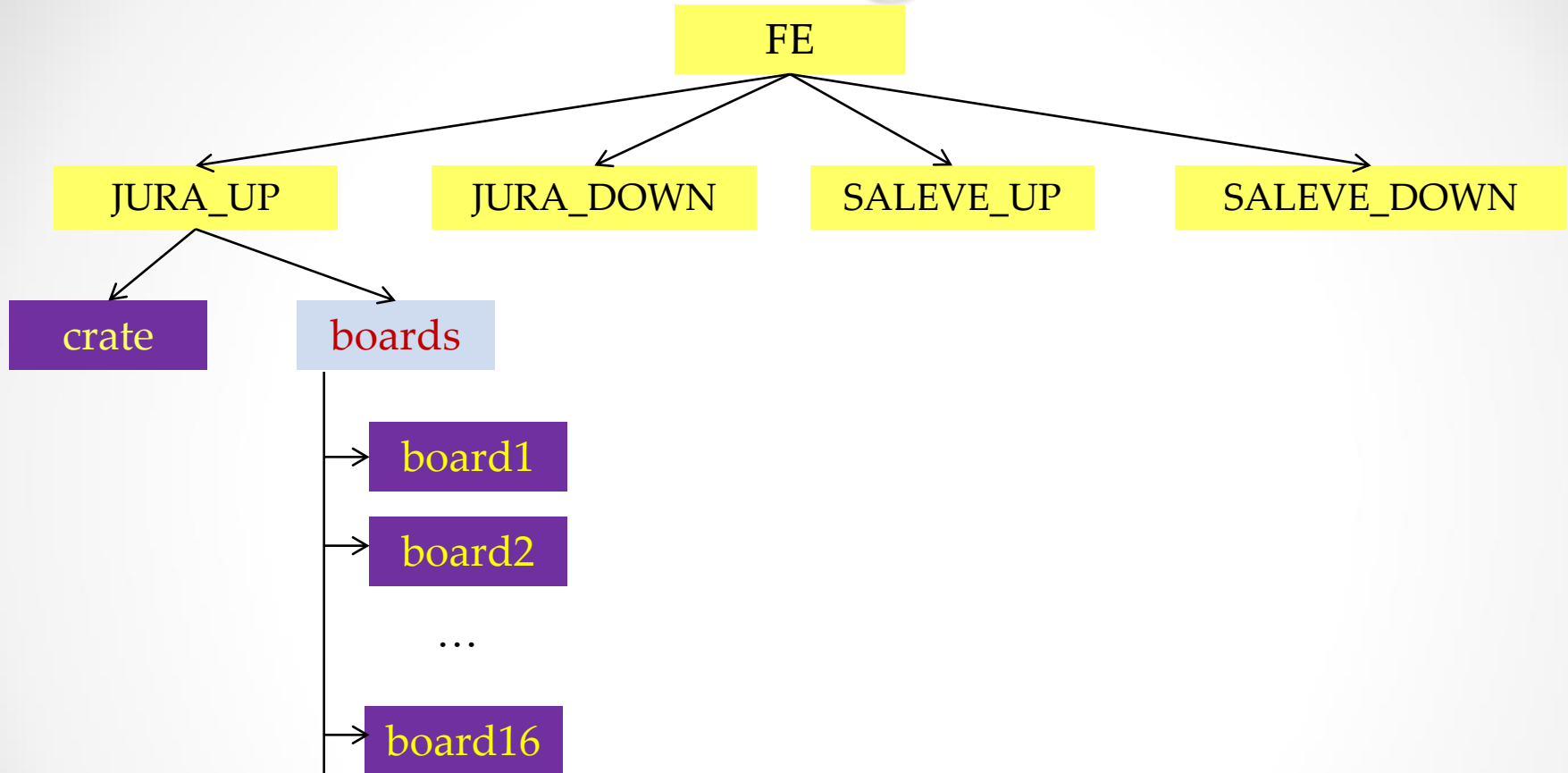
RICH FEE rack
(rear view)

- 34-pin flat cable
- Daisy chain,
SCEM 04.21.60.430.5
- from the LV PS digi port
to the analog connector,
8 single wires (?)
- LV cable from the
backplane to the analog
connector, 5 single
wires (?)
- DB9 connector
- 34-pin connector for
the flat cable

FE DCS: hardware tree

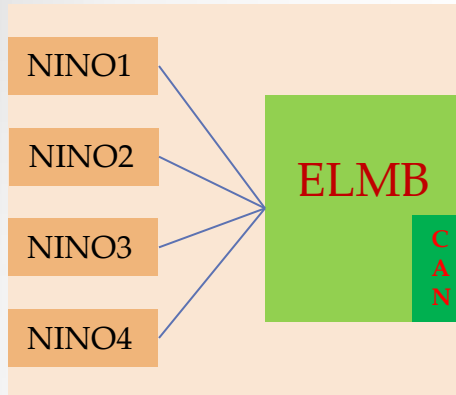


FE DCS: logical tree



FE board control

FE board



ai_00 : analog input ELMB channel

ao_00 : analog output ELMB channel

Thr : NINO discrimination threshold

Hyst : hysteresis (threshold_trailing – threshold_leading)

Str : stretch (additional TOT)

Temp : FE board temperature

Monitor

channel	parameter
ai_00	Thr_1
ai_01	Hyst_1
ai_02	Str_1
ai_03	Thr_2
ai_04	Hyst_2
ai_05	Str_2
ai_06	Thr_3
ai_07	Hyst_3
ai_08	Str_3
ai_09	Thr_4
ai_10	Hyst_4
ai_11	Str_4
ai_12	Temp

Set

channel	parameter
ao_00	Thr_1
ao_01	Hyst_1
ao_02	Str_1
ao_03	Thr_2
ao_04	Hyst_2
ao_05	Str_2
ao_06	Thr_3
ao_07	Hyst_3
ao_08	Str_3
ao_09	Thr_4
ao_10	Hyst_4
ao_11	Str_4

FE board control panel

ELMB channel (4 NINO's)

info.channelName

actual.TempMon

NINO 1

Settings

Nino1.settings.Thr

Nino1.settings.Hyst

Nino1.settings.Str

Actual

Nino1.actual.ThrMon

Nino1.actual.HystMon

Nino1.actual.StrMon

NINO 2

Settings

Nino2.settings.Thr

Nino2.settings.Hyst

Nino2.settings.Str

Actual

Nino2.actual.ThrMon

Nino2.actual.HystMon

Nino2.actual.StrMon

NINO 3

Settings

Nino3.settings.Thr

Nino3.settings.Hyst

Nino3.settings.Str

Actual

Nino3.actual.ThrMon

Nino3.actual.HystMon

Nino3.actual.StrMon

NINO 4

Settings

Nino4.settings.Thr

Nino4.settings.Hyst

Nino4.settings.Str

Actual

Nino4.actual.ThrMon

Nino4.actual.HystMon

Nino4.actual.StrMon

Agilent/crate control

Monitor

channel	parameter
ai_00	LV1
ai_01	LV2
ai_02	LV3
ai_03	LV4

Set

channel	parameter
do_C_03	onOff

LV1 : +5 V, digital part

LV2: +5 V, NINO, amplifiers

LV3 : -5 V, amplifiers

LV4: +3.3 V, spare

ELMB voltage limit: 5 V

Improvement: HV dividers
(factor 0.5, 100K+100K)

Status: PCB ready, mounting
in process

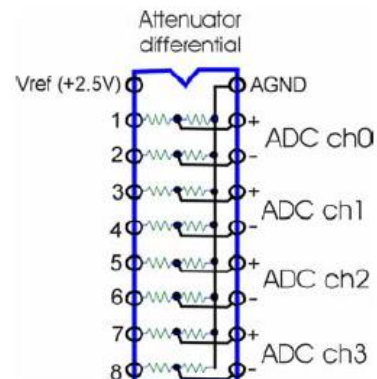


Figure 20: Plug-in adapter with differential attenuators

Agilent/crate control panel

Agilent LV PS

Agilent JURA_UP

switch on
Agilent PS

switch off
Agilent PS

Agilent status

On Off

LV Monitor

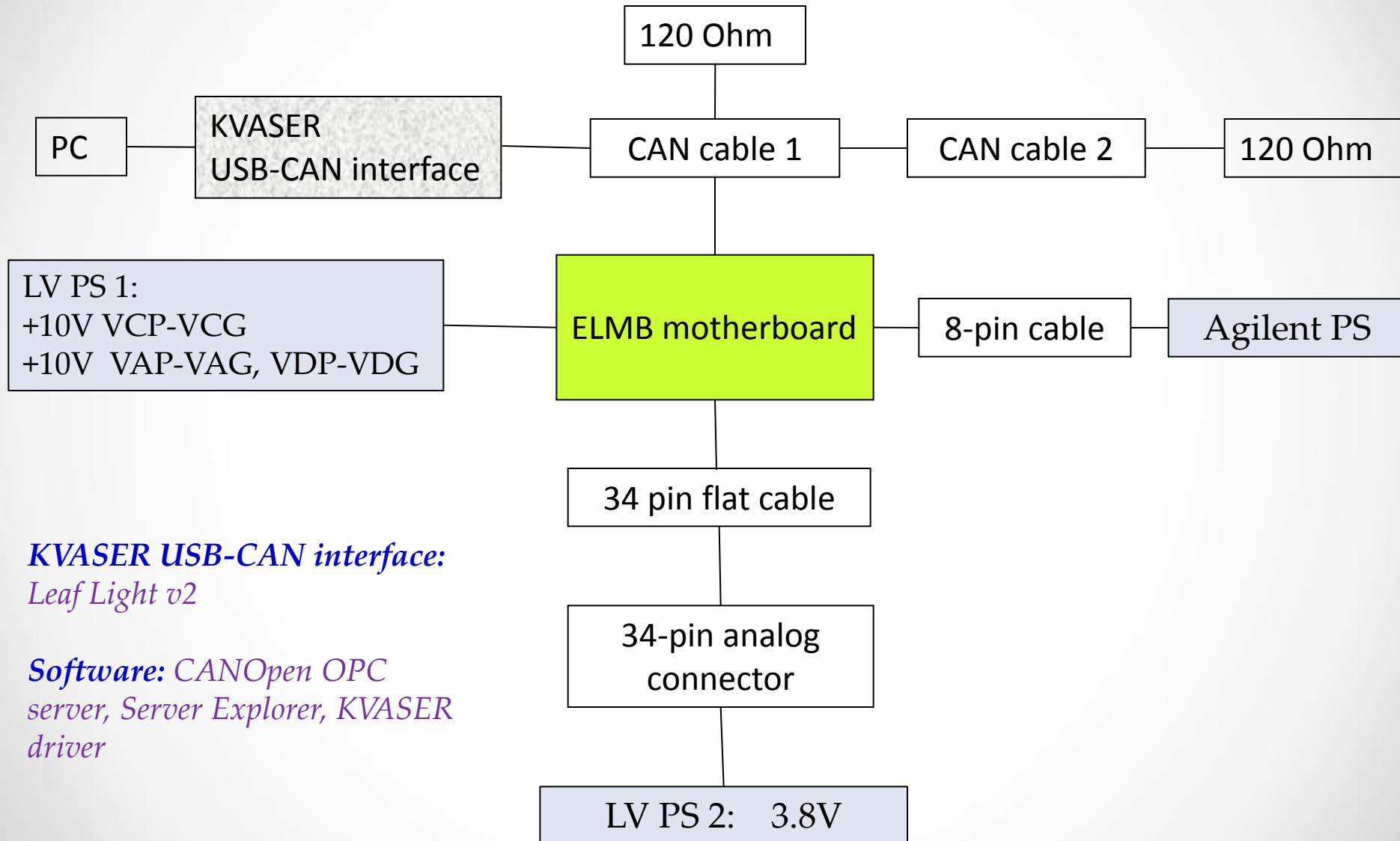
actual.v1Mon
5.1 LV1: digital part (+5V)

actual.v2Mon
4.9 LV2: NINO, amplifiers (+5V)

actual.v3Mon
-5.1 LV3: amplifiers (-5V)

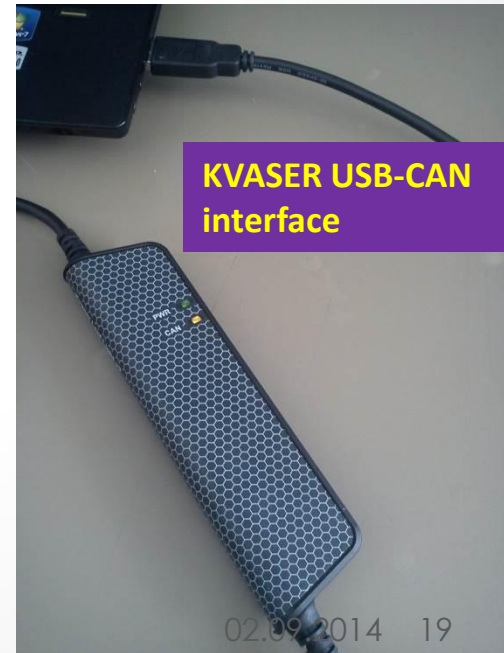
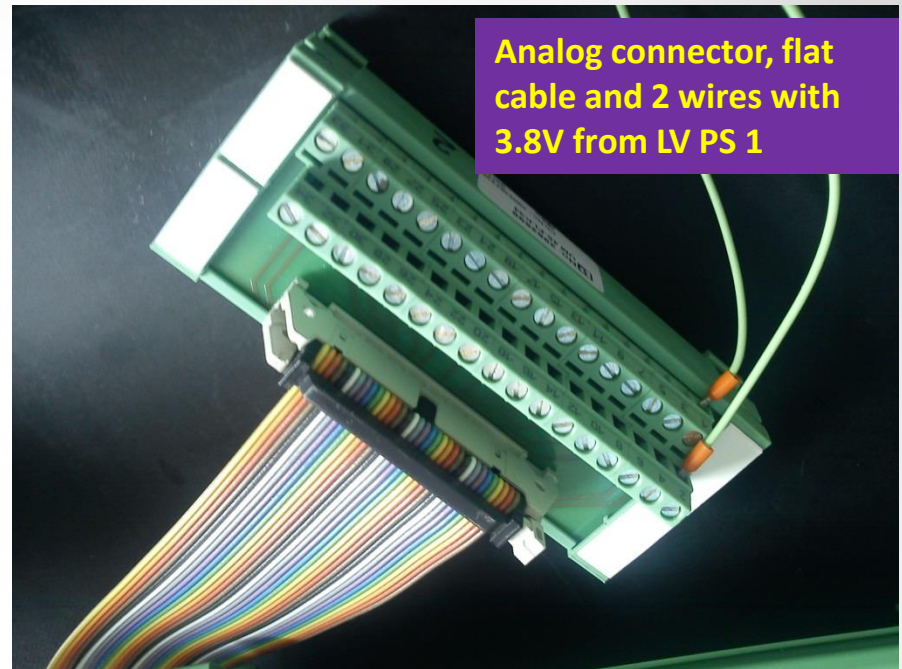
actual.v4Mon
3.3 LV4: spare (+3.3V)

ELMB test setup in Perugia



KVASER USB-CAN interface:
Leaf Light v2

Software: *CANOpen OPC server, Server Explorer, KVASER driver*



Screenshot with 3.8V on (highlighted channel)

New Project - Server Explorer 2.4.1

File Servers Edit View Options Help

LookoutOPCServer

OPC20CanOpen+

MyGroup

Name (Device\Item)	Item ID	Value	Timestamp	Quality
CAN_BUS_1...	CAN_BUS_1.ELM...	51728	11:35:02:336	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	41123	11:35:02:427	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	XXX	11:34:13:514	Value bad
CAN_BUS_1...	CAN_BUS_1.ELM...	32883	11:35:02:609	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	39139	11:35:02:700	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	33722	11:35:02:791	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	50888	11:35:02:882	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	39063	11:35:02:973	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	19607	11:35:03:064	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	37308	11:35:03:155	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	63324	11:35:03:246	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	22049	11:35:03:337	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	XXX	11:33:25:412	Value bad
CAN_BUS_1...	CAN_BUS_1.ELM...	XXX	11:33:46:511	Value bad
CAN_BUS_1...	CAN_BUS_1.ELM...	3794460	11:35:03:689	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	306858	11:35:03:780	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	1515449	11:35:03:871	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	1463645	11:35:03:962	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	38452	11:35:04:053	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	98420	11:35:04:144	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	35019	11:35:04:236	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	22278	11:35:04:326	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	81559	11:35:04:417	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	125276	11:35:04:508	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	51041	11:35:04:599	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	42648	11:35:04:690	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	69123	11:35:04:781	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	125734	11:35:04:872	Value good

Ready

C:\Program Files (x86)\National Instruments\nati.ccd

Screenshot with 3.8V off (highlighted channel)

New Project - Server Explorer 2.4.1

File Servers Edit View Options Help

LookoutOPCServer
OPC20CanOpen+
MyGroup
CAN_BUS_1.ELMB_3F.Error
CAN_BUS_1.ELMB_3F.NMT
CAN_BUS_1.ELMB_3F.State
CAN_BUS_1.ELMB_3F.aiEventTimer
CAN_BUS_1.ELMB_3F.aiTransmissio
CAN_BUS_1.ELMB_3F.ai_0
CAN_BUS_1.ELMB_3F.ai_1
CAN_BUS_1.ELMB_3F.ai_2
CAN_BUS_1.ELMB_3F.ai_3
CAN_BUS_1.ELMB_3F.ai_4
CAN_BUS_1.ELMB_3F.ai_5
CAN_BUS_1.ELMB_3F.ai_6
CAN_BUS_1.ELMB_3F.ai_7
CAN_BUS_1.ELMB_3F.ai_8
CAN_BUS_1.ELMB_3F.ai_9
CAN_BUS_1.ELMB_3F.ai_10
CAN_BUS_1.ELMB_3F.ai_11
CAN_BUS_1.ELMB_3F.ai_12
CAN_BUS_1.ELMB_3F.ai_13
CAN_BUS_1.ELMB_3F.ai_14
CAN_BUS_1.ELMB_3F.ai_15
CAN_BUS_1.ELMB_3F.ai_16
CAN_BUS_1.ELMB_3F.ai_17

Name (Device\It...	Item ID	Value	Timestamp	Quality
CAN_BUS_1...	CAN_BUS_1.ELM...	63401	11:35:23:336	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	54703	11:35:23:427	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	XXX	11:34:13:514	Value bad
CAN_BUS_1...	CAN_BUS_1.ELM...	37155	11:35:23:609	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	43488	11:35:23:700	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	38223	11:35:23:791	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	56992	11:35:23:882	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	43640	11:35:23:973	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	24032	11:35:24:064	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	41504	11:35:24:155	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	66224	11:35:24:246	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	26855	11:35:24:337	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	XXX	11:33:25:412	Value bad
CAN_BUS_1...	CAN_BUS_1.ELM...	XXX	11:33:46:511	Value bad
CAN_BUS_1...	CAN_BUS_1.ELM...	XXX	11:35:17:690	Value bad
CAN_BUS_1...	CAN_BUS_1.ELM...	330281	11:35:24:780	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	1507362	11:35:24:871	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	1465705	11:35:24:962	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	42496	11:35:25:053	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	103227	11:35:25:144	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	38757	11:35:25:235	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	26321	11:35:25:326	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	86289	11:35:25:417	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	129549	11:35:25:508	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	55390	11:35:25:599	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	46768	11:35:25:690	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	76676	11:35:25:781	Value good
CAN_BUS_1...	CAN_BUS_1.ELM...	129854	11:35:25:872	Value good

Ready C:\Program Files (x86)\National Instruments\nati.ccd

Скриншот сохранен
В ваш Dropbox был добавлен скриншот.

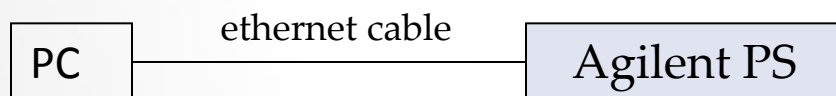
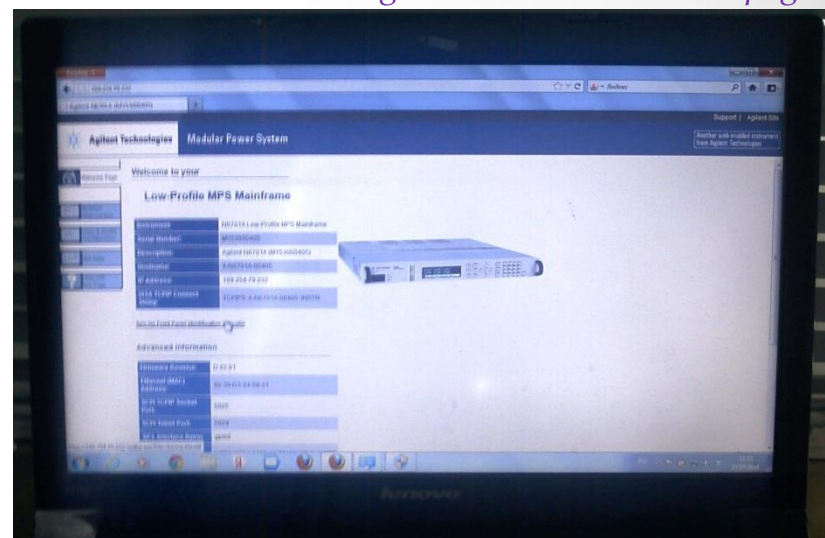
RU 11:35 26.06.2014

Hardware tests in Perugia

Agilent Web Server main page

Main tests:

- 4 ELMBs for Agilent control
- All analog input channels (ai)
- All digital output channels (do, port A, port C)
- All cables
- Agilent digital port



Agilent Web Server:

- Use IP to enter Web Server from CR
- Front panel operated by the mouse

Additional tests:

- PVSS/JCOP instead of Server Explorer (ai, do)
- Agilent Web Server
- Patch panels and thick ELMB cables (CERN, 07.2014)

Tests to be done at CERN:

- Tests with FE boards (full hardware tests)

gas

- ✓ Gas control will be done by CERN people
- ✓ Parameters to control: pressure
- ✓ gas chemical composition: intervention
done 1-2 times a year (or on request)

Additional parameters

- ✓ Temperature(s) on the vessel?
- ✓ Easy to use ELMB with Pt-100 plug-in adapter

Conclusions

- ✓ RICH HV integrated in the central DCS
- ✓ Wiener crates for TEL62 are in queue
- ✓ FE boards and Agilent PS's will be controlled by ELMB
- ✓ FE DCS hardware: ready, installation in September
- ✓ FE DCS software: development in progress, run as a standalone project in 2014 run



The run starts on the 6th
of October. Is the RICH
DCS ready?

we
try
our best...

SPARES

Agilent PS



4 pin output

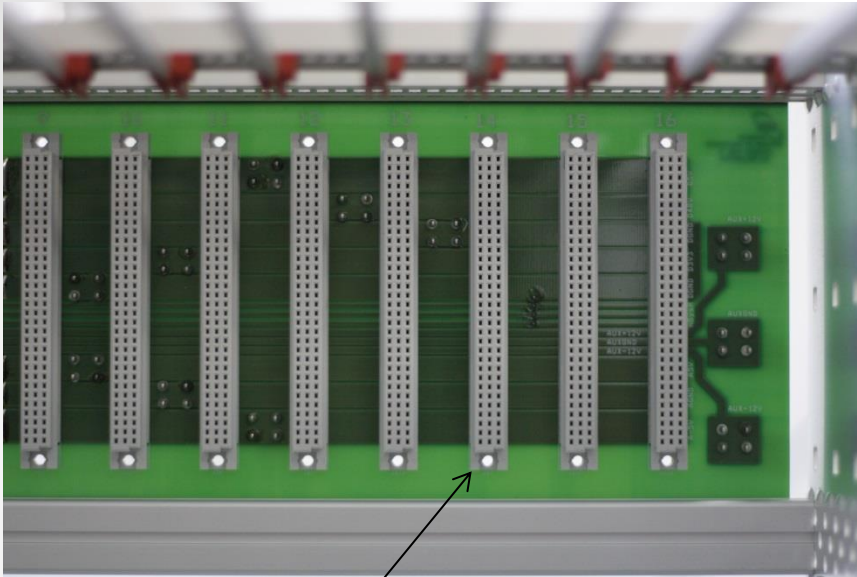


Digital port

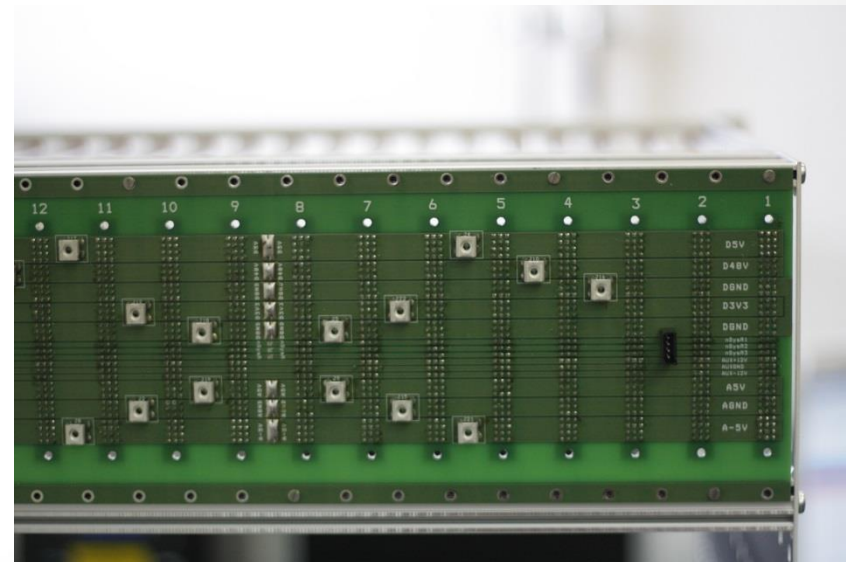
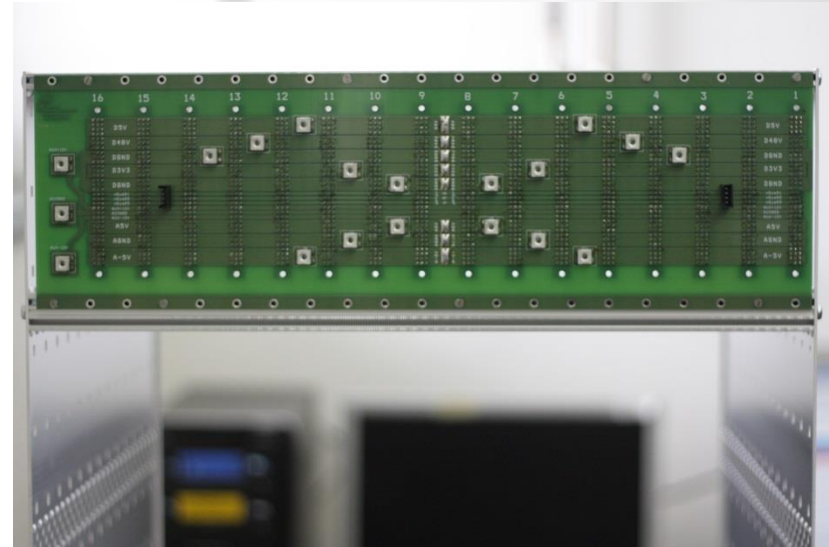
Agilent system



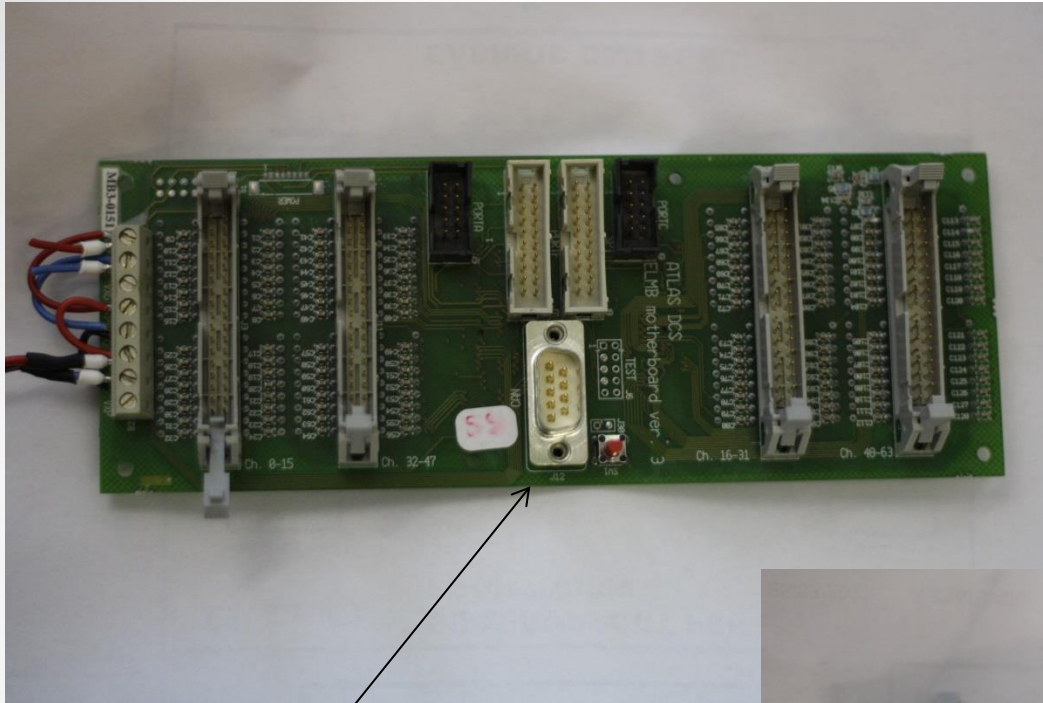
FEE crate: backplane



Standard VME
connectors (96 pins)

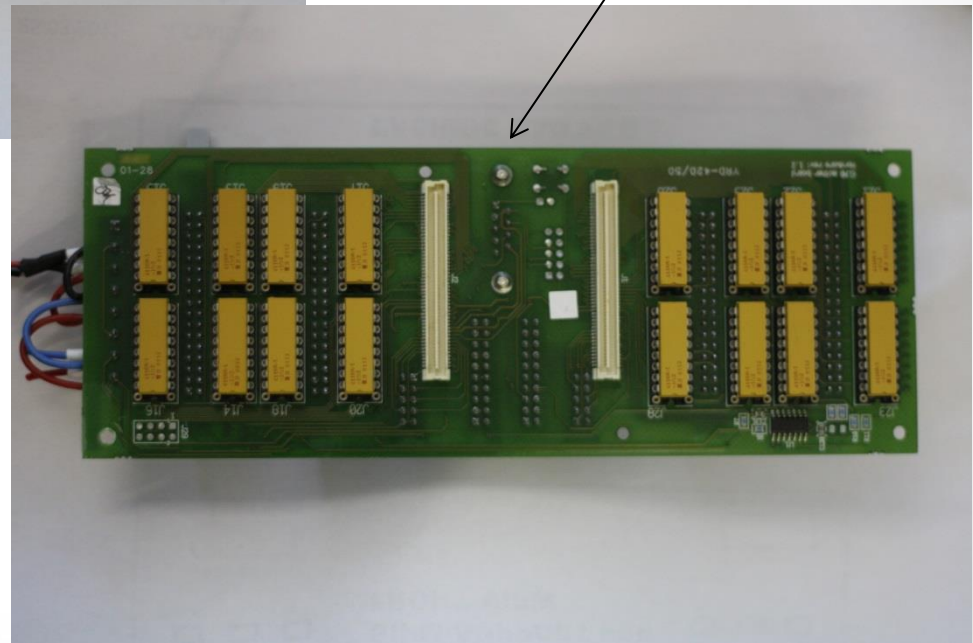


ELMB motherboard

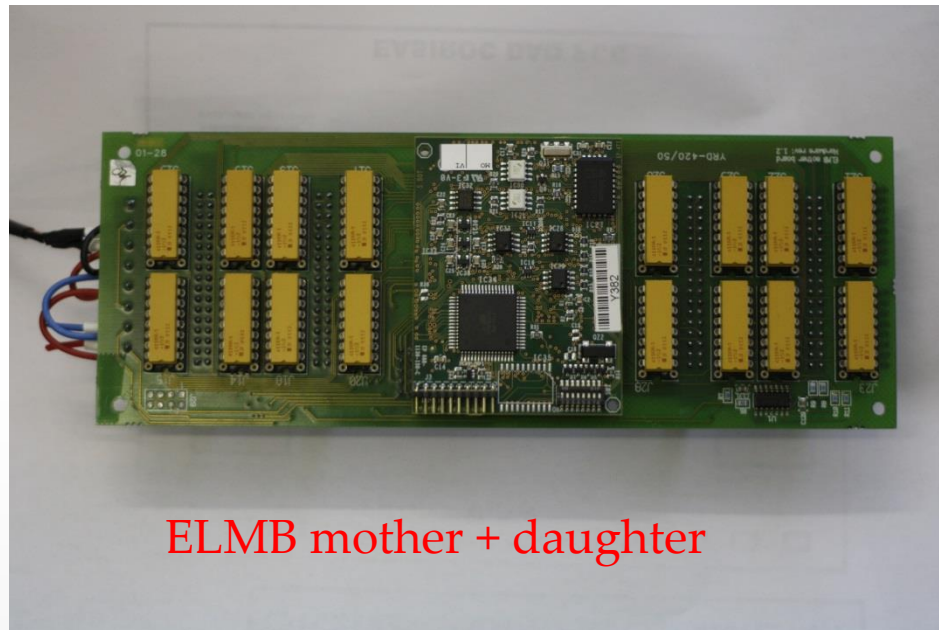


DB9 connector for
CANBUS

Place for ELMB



ELMB



ELMB mother + daughter

FE DCS cables

Cable table

location	Cable type	length	Start connector	End connector	quantity
Agilent digi port 1 → analog connector	8 single wires ???	120cm	8pin phoenix	8 wires screwed	2
Agilent digi port 2 → analog connector	8 single wires ???	200cm	8pin phoenix	8 wires screwed	2
FEE backplane → analog connector	5 single wires ???	20cm	5 lugs (capocorde)	5 wires screwed	4
Analog connector → ELMB	flat	20cm	34pin	34pin	4
Burndy → DB9	ELMB thin cable*	40cm	Burndy male**	DB9 female	2
Patch panel → FEE board	ELMB thin cable*	120cm	DB9 male	DB9 male	2
FEE board → ELMB → FEE board	ELMB thin cable*	120cm+120cm	DB9 female (2 cables going out)	2xDB9 female	2
FEE board → FEE board	ELMB thin cable*	10cm	DB9 male	DB9 female	60
FEE board → ELMB → terminator	ELMB thin cable*	100cm+10cm	DB9 female (2 cables going out)	2xDB9 male	2

* ELMB thin cable: [SCEM 04.21.60.430.5](#)

** Burndy male: 19 pins Burndy connector (CERN store SCEM code 09.31.05.548.0)