PHOS cables & p-panels

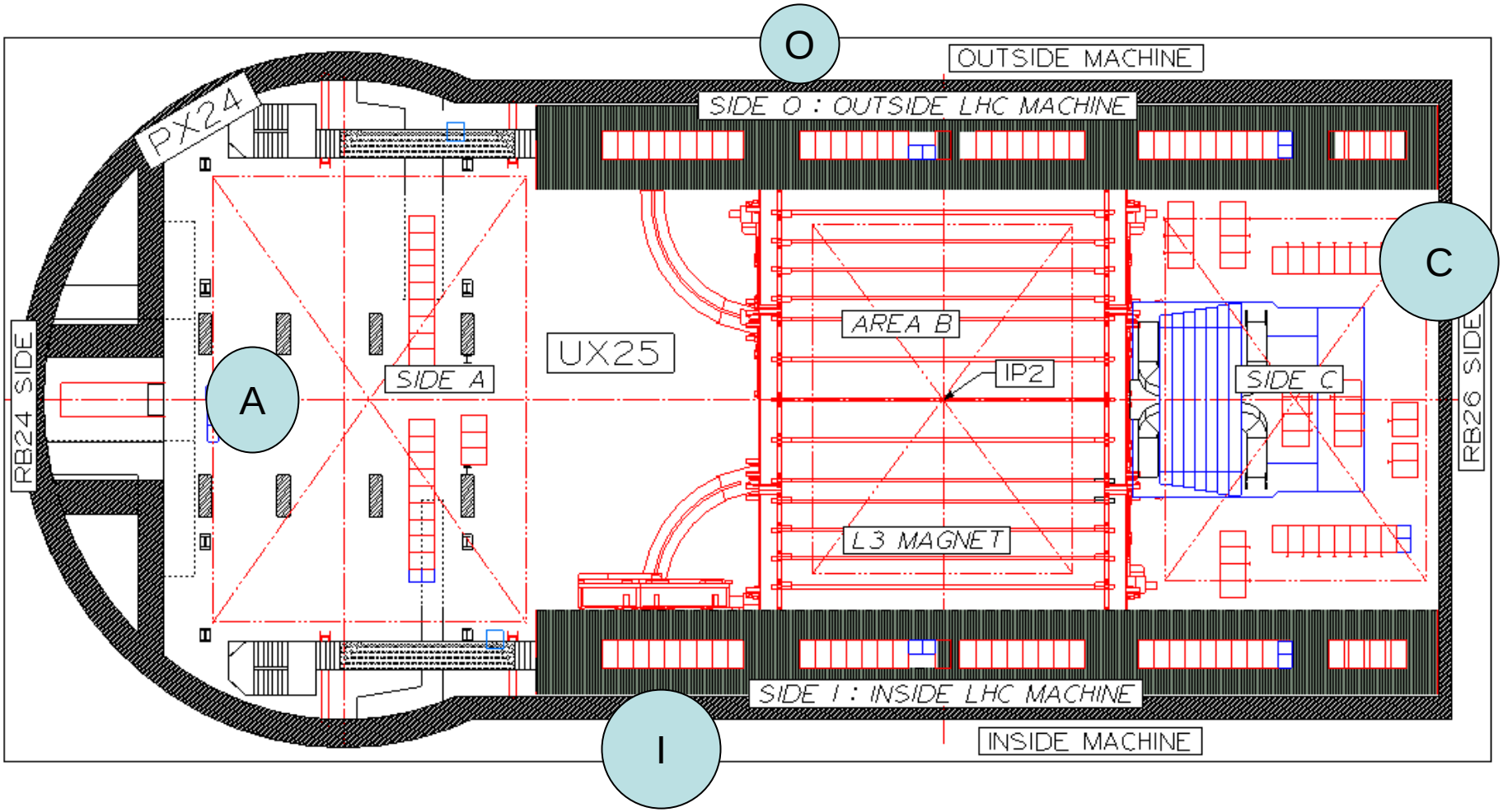
-illustrated draft-

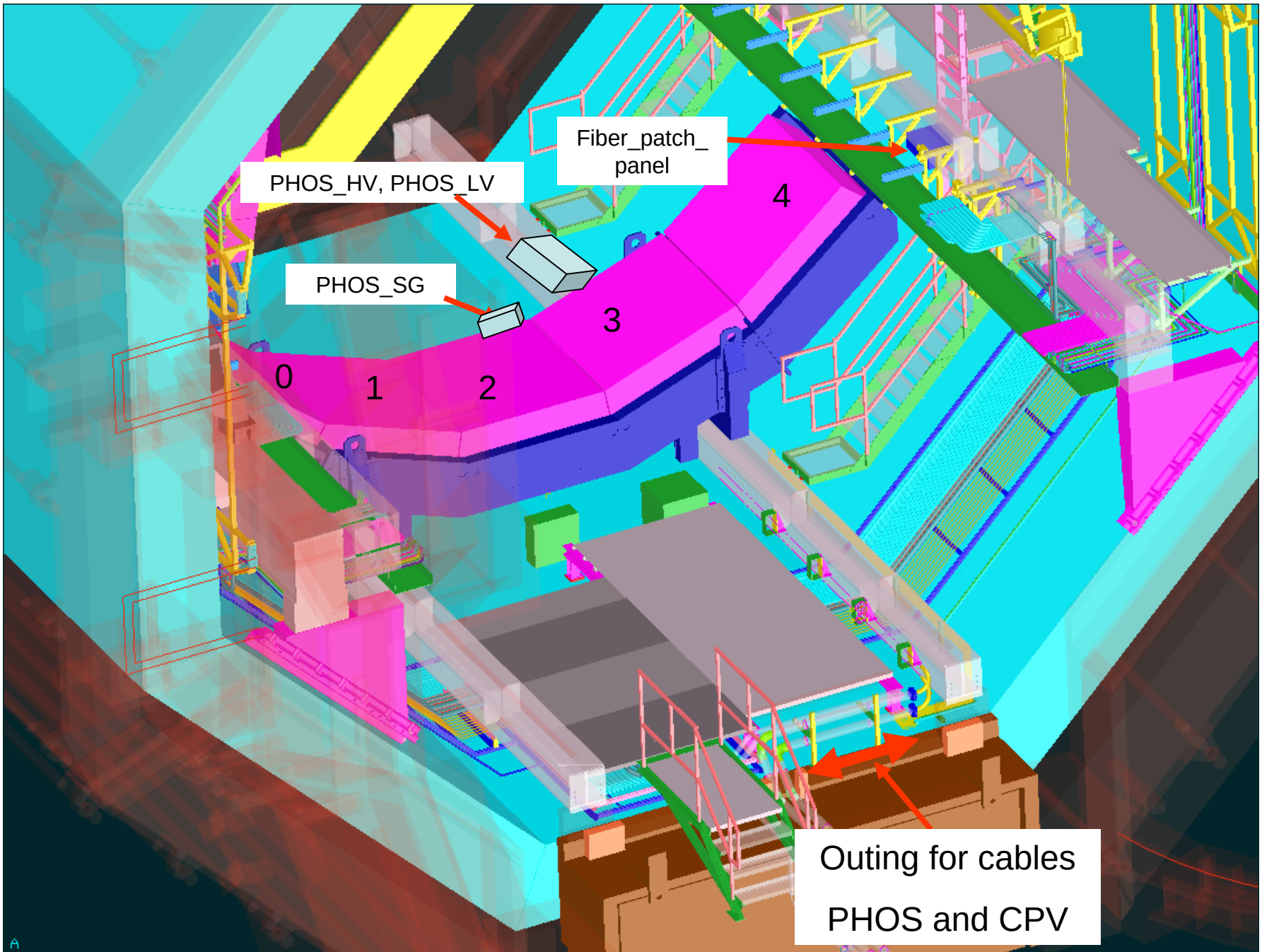
H.Muller

Revised Status 2 August 2007

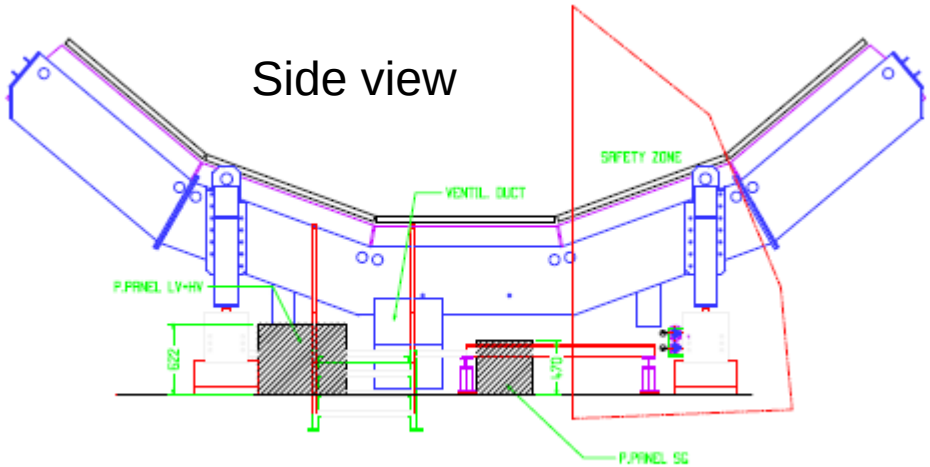
Open questions in red print

Underground area ux25




Fiber_patch_
panel
PHOS_HV, PHOS_LV
PHOS_SG
4
3
0
1
2
Outing for cables
PHOS and CPV

Positions of panels in point 2

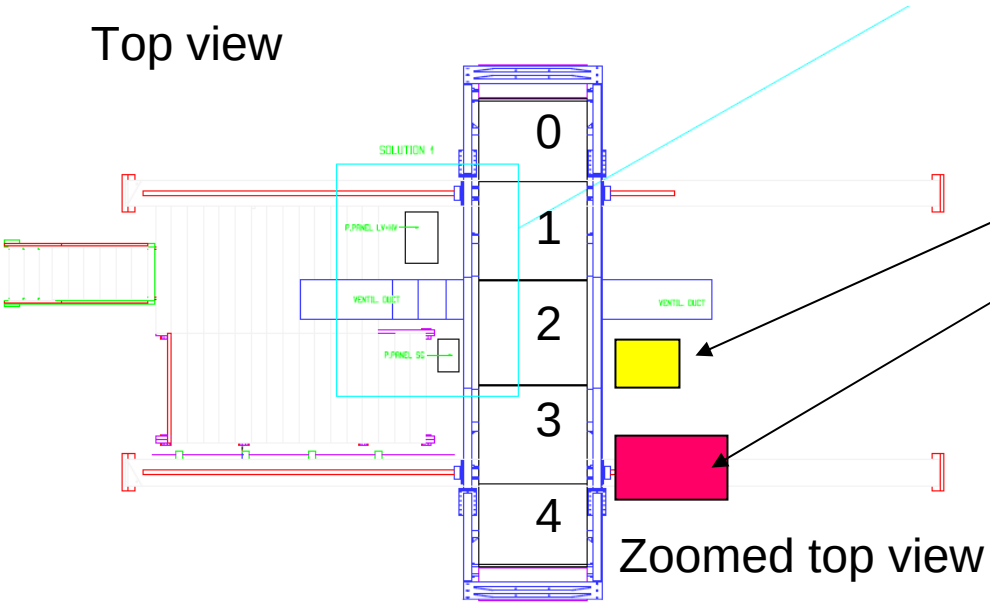


on spaceframe

Fiber patch box

3 slots HMPID: 14 DDL
4 slots PHOS: 20 DDL
2 slots CPV: 10 DDL
2 free slots

2 slots HMPID: 14 TTC
2 slots PHOS: 20 TTC
1 slot CPV: 10 TTC
7 free slots



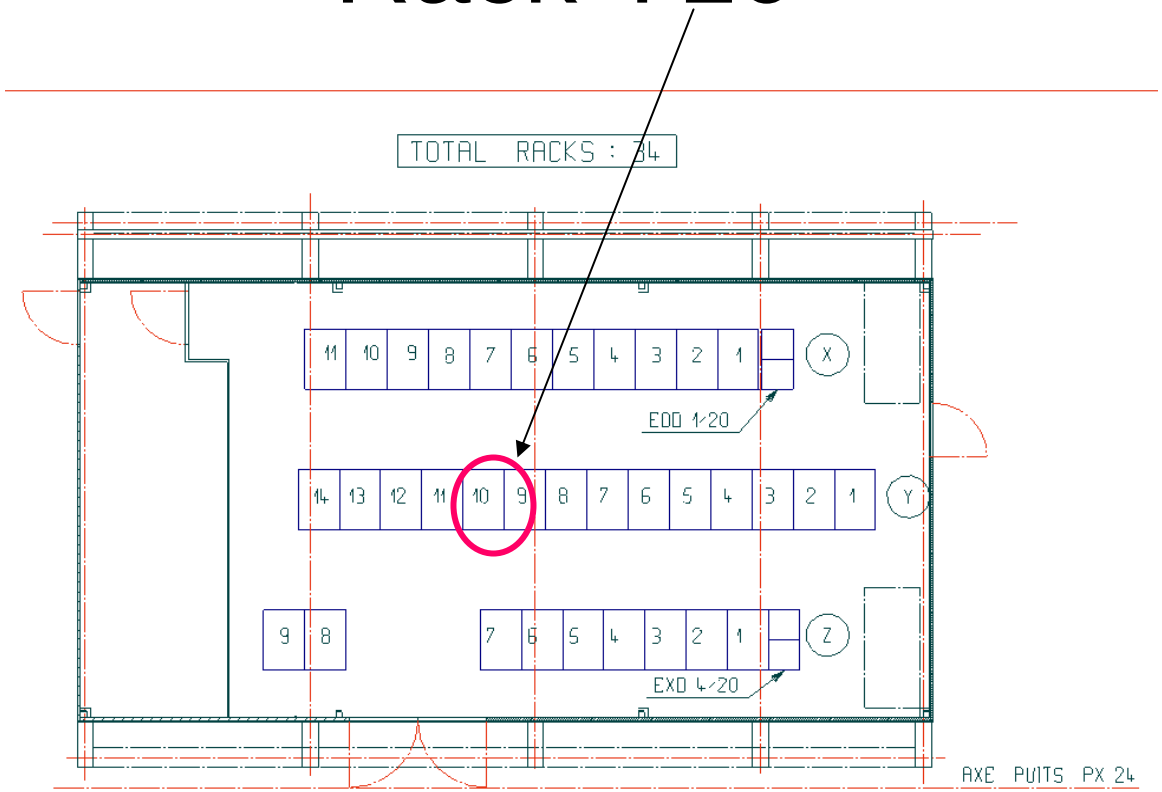
PHOS_SG

Ethernet 21 x
- Trigger-OR
  - 4 Draka trigger cables
  - 1 TTC fiber
  - 1 Ethernet
- LED 5 cables
- 5 x ELMB

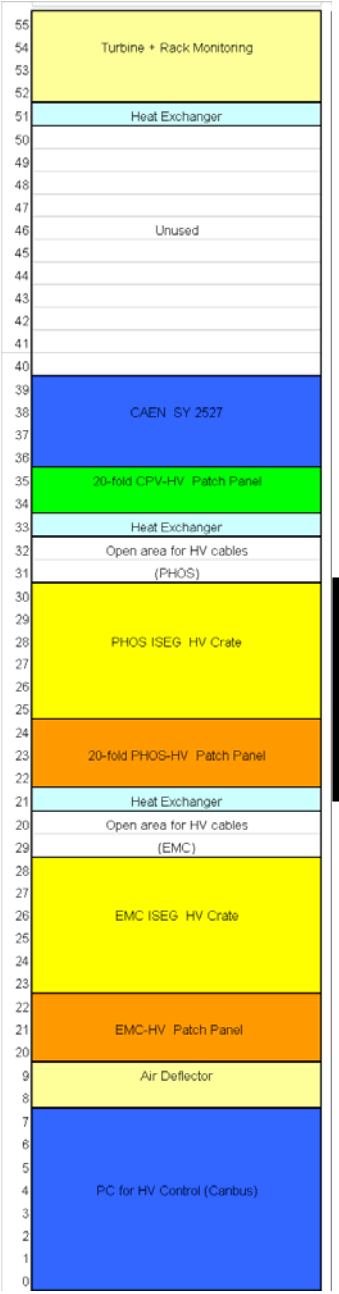
PHOS_LV

- LV 48 x
- HV 3 x
- Sense-Wires 5x

High Voltage in Counting Room 4
Rack Y10



HV: ISEG Crate CR4 Y10



PHOS

EHS 8605p_156-F
HV module
8 channels floating ground
0..-500V positive

HV Patch panel
Below ISEG crate

Redel Connector on ISEG Front panel

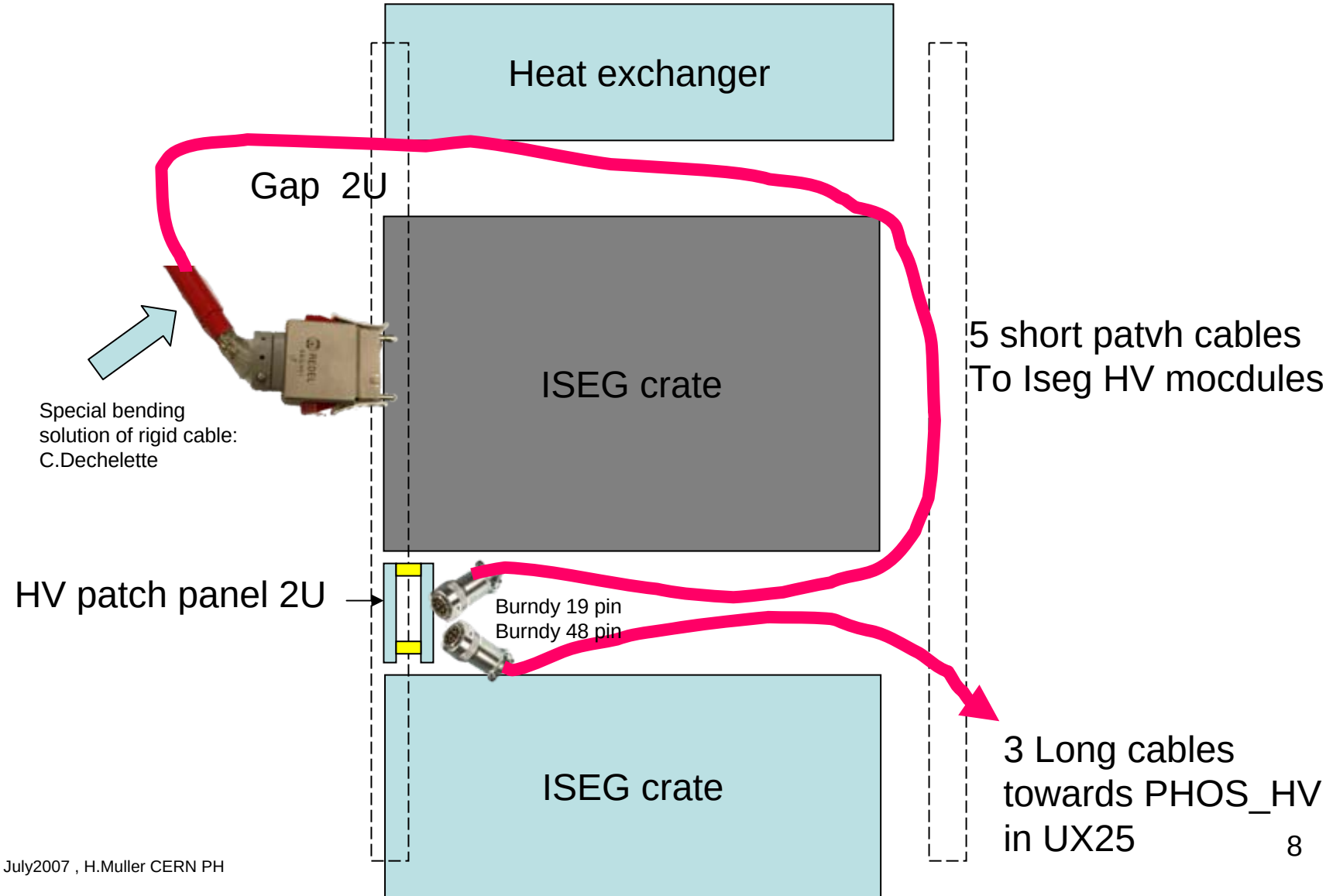
HV patch cable to patch panel
04.31.52.224.2
(04.31.52.256.2)

Lemo Redel Connector:
straight plug
SAG.H51.LLZBG
SCEM 09.41.34.250.7
16 pins ERA.05.403.ZLL1
SCEM 09.41.33.200.1
2 pins EGG.3B.665.ZZM
SCEM 09.41.33.400.5

1 plug/ patch cable per PHOS module

HV patch cable to HV panel in CR4

patch cord to be made
connectors/pins available



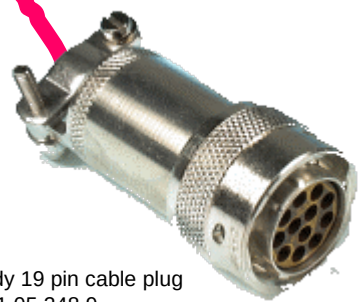
Patch cable ISEG to HV-p-p

Redel 51 pin prise

09.41.34.255.2

to ISEG Module
CR4 Y10

2x12 twistd pair HV cable, int. Twisted 0.14mm2
04.31.52.224.2



Bundy 19 pin cable plug
09.31.05.248.9

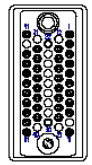
From HV patch panel
CR4 Y10

16 contacts female

09.21.05.410.4

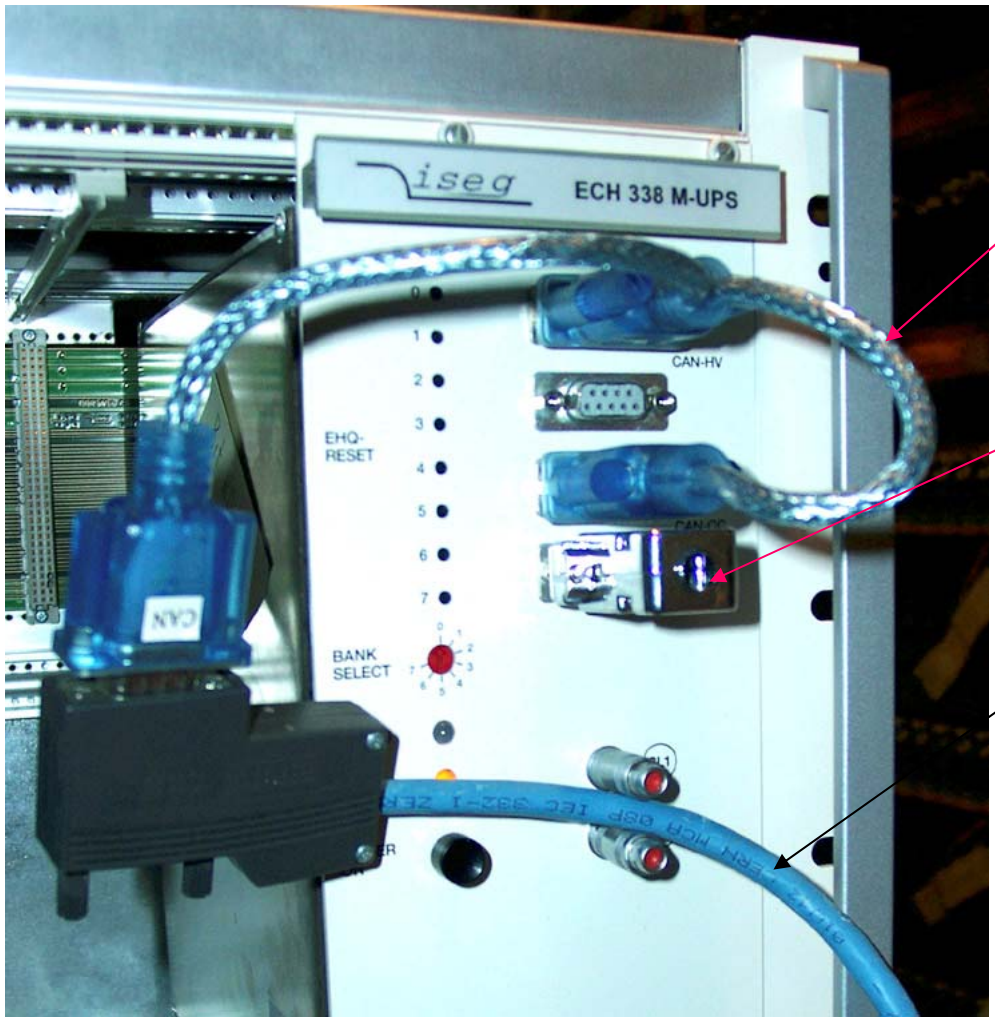
ISEG pinout
Redel

REDEL-Adapter Anschlußbelegung / pin assignment



	Anschlußstecker / HV cable connector			freies Kabelende / wire end
	Belegung / pin assignment			Bezeichnung/Kabelaufdruck marking of the cable
	EHQ floating GND	EHQ common GND	PIN	
	nc	C-RTN	1	
	CH0 HV	CH0 HV	2	
	CH1 HV	CH2 HV	3	
	CH2 HV	CH4 HV	4	
	CH3 HV	CH6 HV	5	
	CH4 HV	CH8 HV	6	
	CH5 HV	CH10 HV	7	
	CH6 HV	CH12 HV	8	
	CH7 HV	CH14 HV	9	
	nc	nc	10	
	nc	C-RTN	11	
	nc	nc	12	
	CH0 RTN	CH1 HV	13	
	CH1 RTN	CH3 HV	14	
	CH2 RTN	CH5 HV	15	
	CH3 RTN	CH7 HV	16	
	CH4 RTN	CH9 HV	17	
	CH5 RTN	CH13 HV	18	
	CH6 RTN	CH13 HV	19	
	CH7 RTN	CH15 HV	20	
	nc	nc	21	
EGG.3B.665.ZZM	SL 1	SL 1	22	
	nc	nc	23	
	nc	nc	24	
	nc	nc	25	
	nc	nc	26	
	nc	nc	27	
	nc	nc	28	
	nc	nc	29	
EGG.3B.665.ZZM	SL 2	SL 2	30	
	nc	nc	31	
	CH15 RTN	CH31 HV	32	
	CH14 RTN	CH29 HV	33	
	CH13 RTN	CH27 HV	34	
	CH12 RTN	CH25 HV	35	
	CH11 RTN	CH23 HV	36	
	CH10 RTN	CH21 HV	37	
	CH9 RTN	CH19 HV	38	
	CH8 RTN	CH17 HV	39	
	nc	nc	40	
	nc	C-RTN	41	
	nc	nc	42	
	CH15 HV	CH30 HV	43	
	CH14 HV	CH28 HV	44	
	CH13 HV	CH26 HV	45	
	CH12 HV	CH24 HV	46	
	CH11 HV	CH22 HV	47	
	CH10 HV	CH20 HV	48	
	CH9 HV	CH18 HV	49	
	CH8 HV	CH16 HV	50	
	nc	C-RTN	51	nc

Canbus cable (ISEG in CR4)



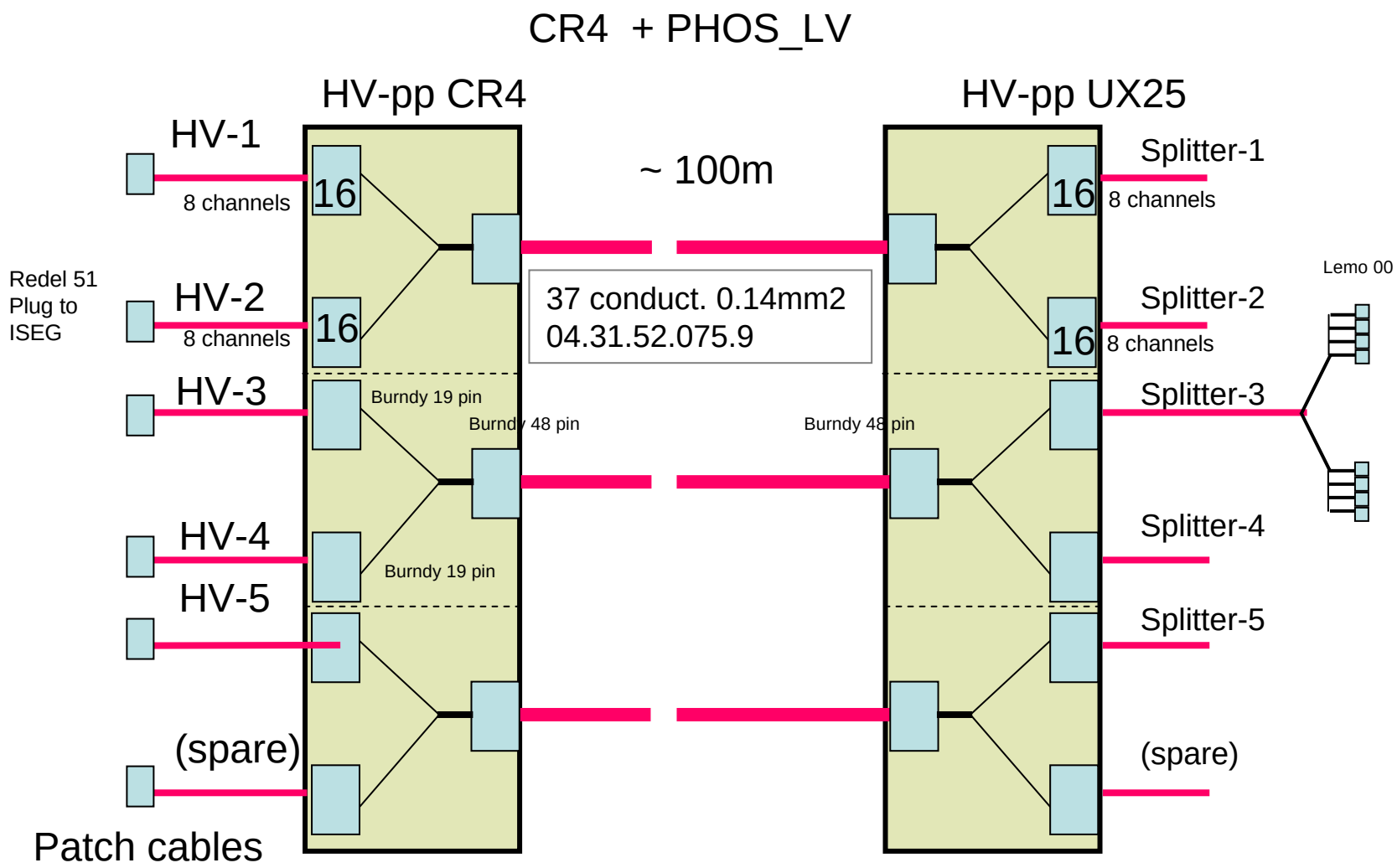
Canbus Y adapter/splitter
(ISEG accessory to be ordered)

Canbus terminator
(ISEG Accessory)

Canbus cable
04.21.60.491.2 to be verified

goes to CR3-Z04
(provided by DCS group)

HV Patch panel philosophy



HV patch panel design draft

2 equal panels, Burndy connector pins opposite polarity

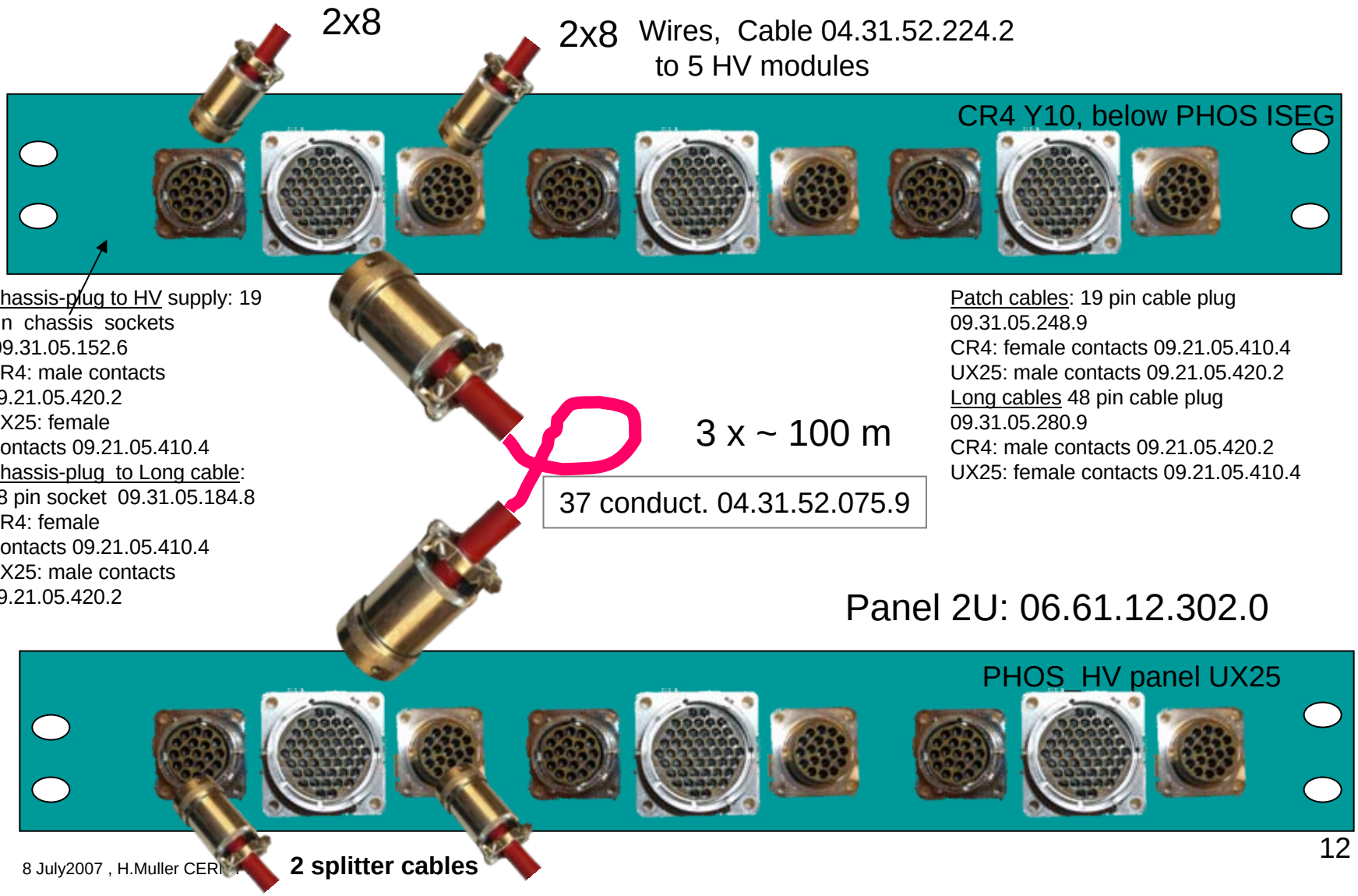
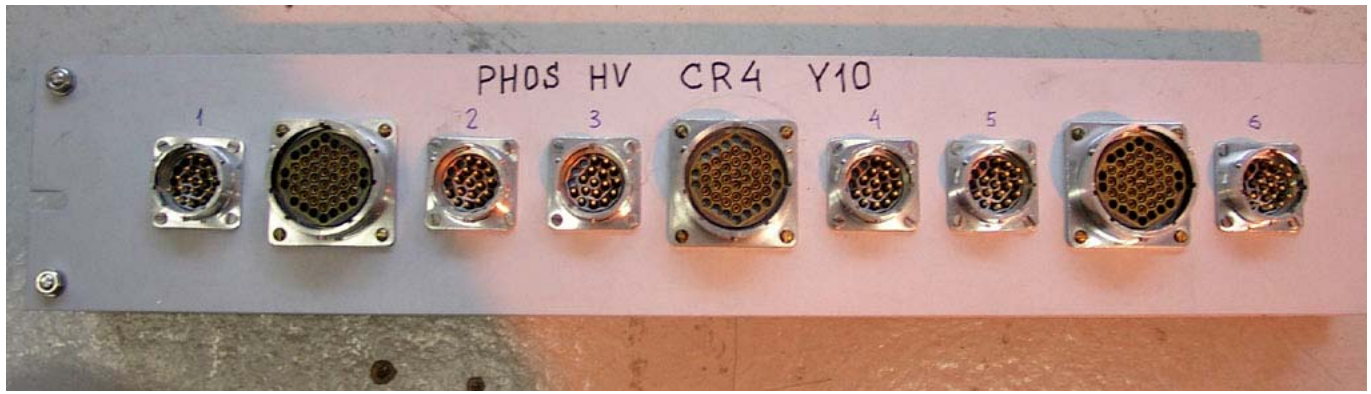


Photo of HV patch panels in CR4-Y10 and Ux25

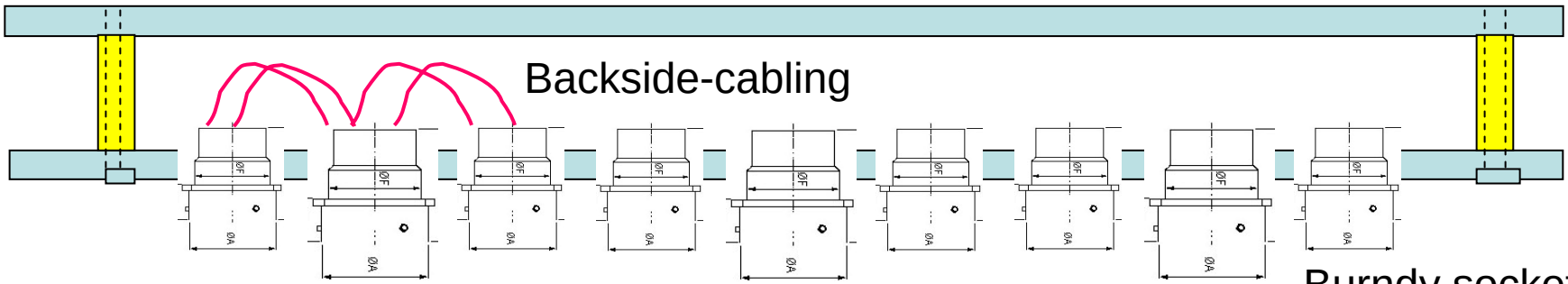


Need the pinout list

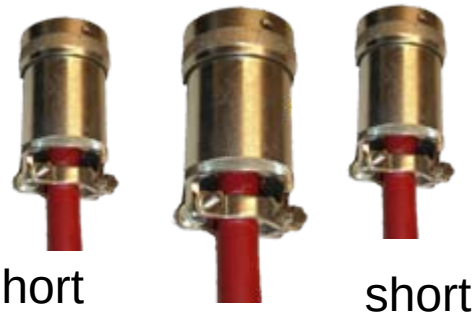
HV patch panel side view

46.2 (19”)

Front panel side (closed)



Burndy sockets

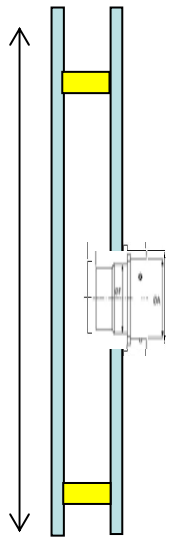


short

long

short

8.81cm



2U panel: 06.61.12.302.0

HV splitter cable

to be made

1 per PHOS module

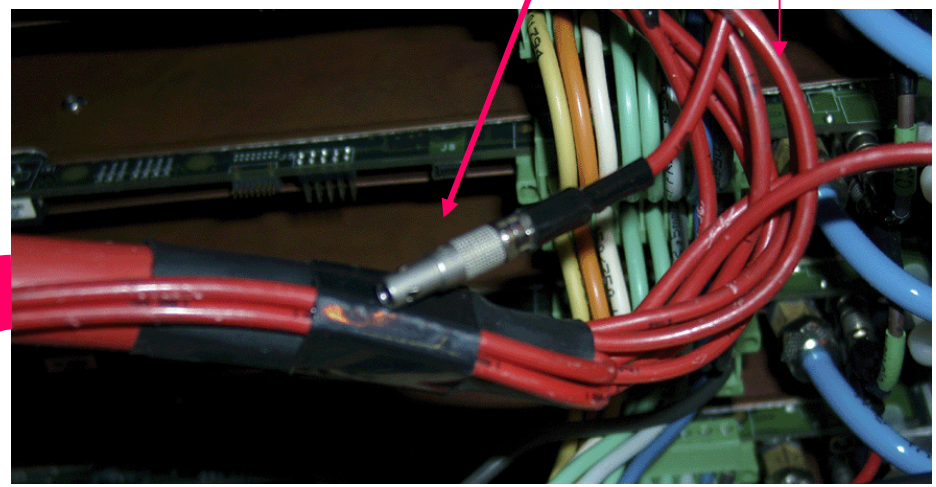
HV cable with 8 (10)
Internal coaxial HV cables
(cable type unknown so far)

to PHOS_HV

19 pin cable plug
09.31.05.248.9

LEMO 50 OHM size 00 crimp plug
crimped to individual ends
09.46.11.100.2

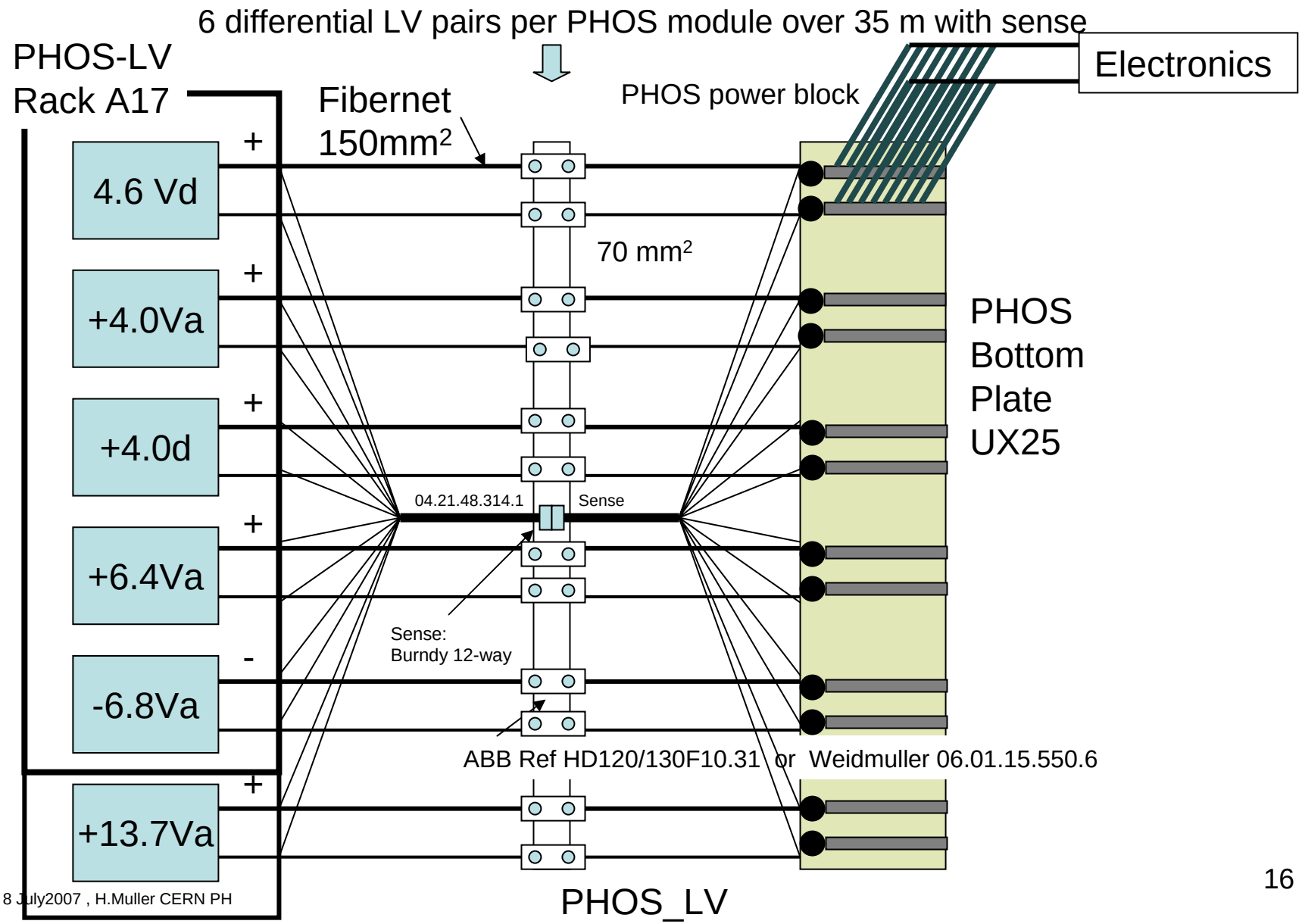
HV coax Cables:
04.31.51.750.1 3.3mm



1 Cable = 4 RCU partitions

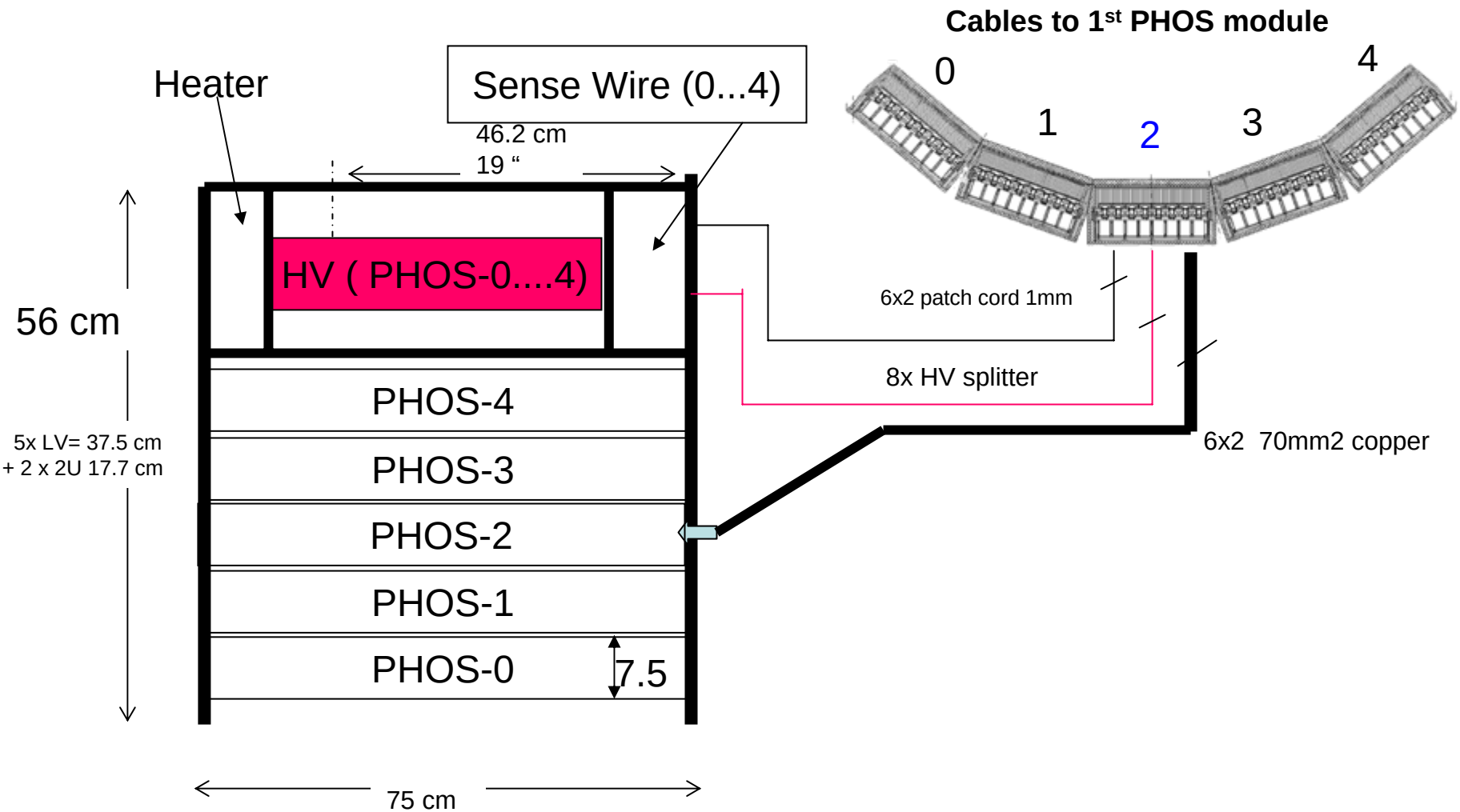
PHOS: 1 Lemo=14 FEE cards
EMCal: 1Lemo= 9 FEE cards

LV & Sense

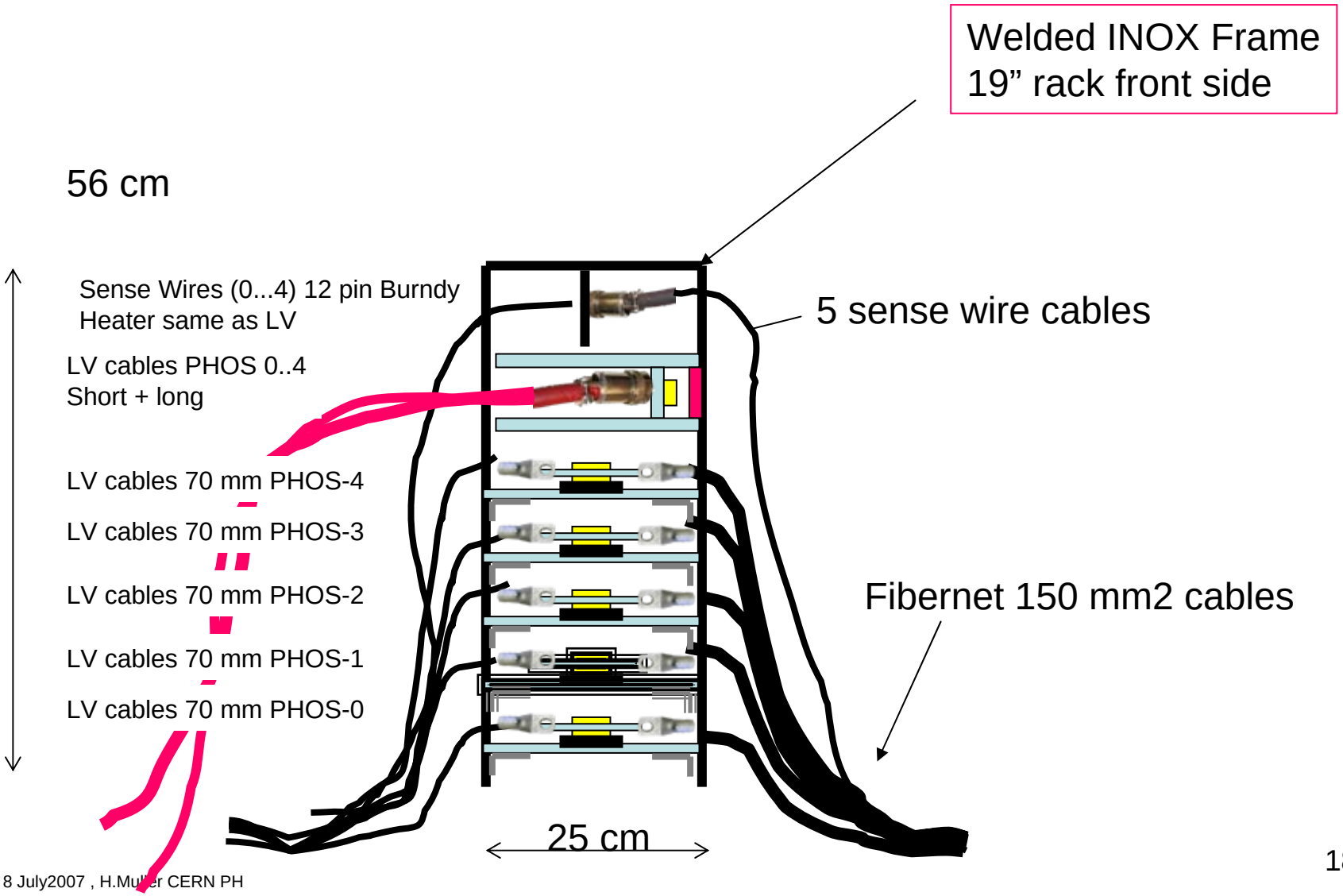

6 differential LV pairs per PHOS module over 35 m with sense
PHOS-LV
Rack A17
Fibernet
150mm2
PHOS power block
Electronics
4.6 Vd
+4.0Va
+4.0d
+6.4Va
-6.8Va
+13.7Va
+
-
70 mm2
PHOS
Bottom
Plate
UX25
04.21.48.314.1
Sense
Sense:
Burndy 12-way
ABB Ref HD120/130F10.31 or Weidmuller 06.01.15.550.6
PHOS_LV

Patch panel PHOS_LV+HV

sense wire/ heater panel to be made



PHOS_LV side view



LV patch panel

Nodename PHOS_LV

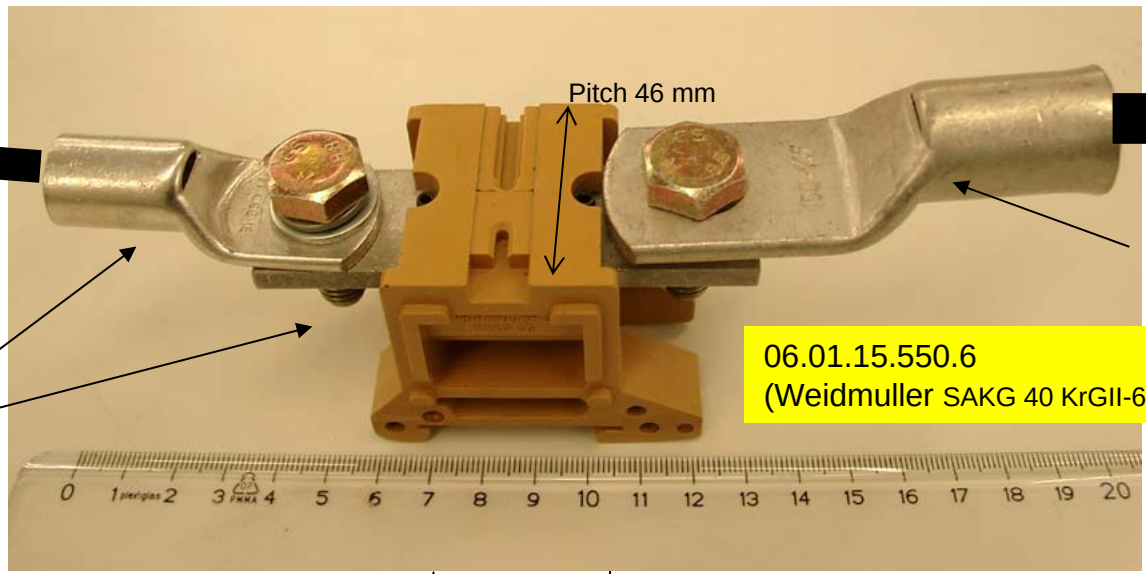
Detector side

PS side

1 element: height 7.5 cm incl rails + screws

Cable CERN
04.8.61.970.5

70 mm^2



Fibernet HFFR

150mm^2

Available ?

Cable
Shoes M10

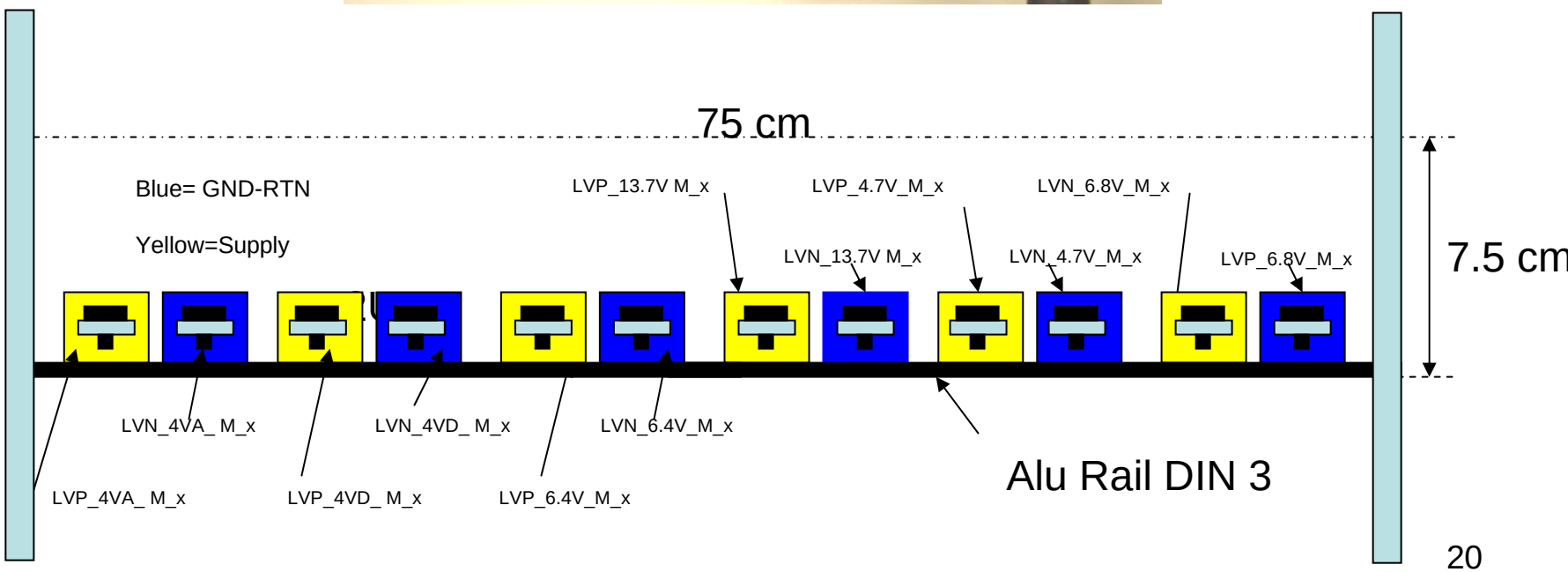
straight

magnetic
Screws (M10) and washers
Replaced by brass type

ALU rails DIN3 from Weidmuller

Power-Rails

space in
PHOS-LV

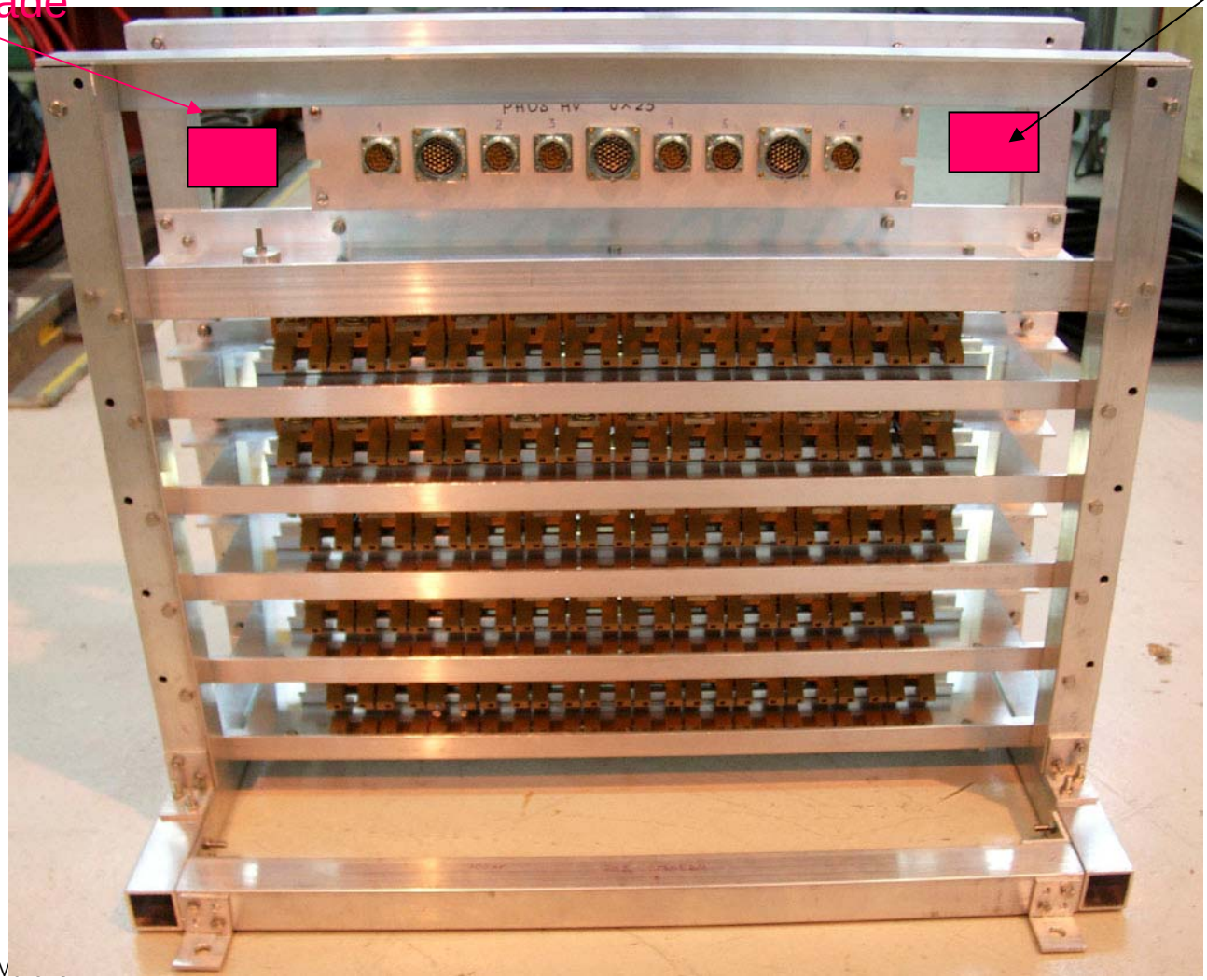


LV + HV panel

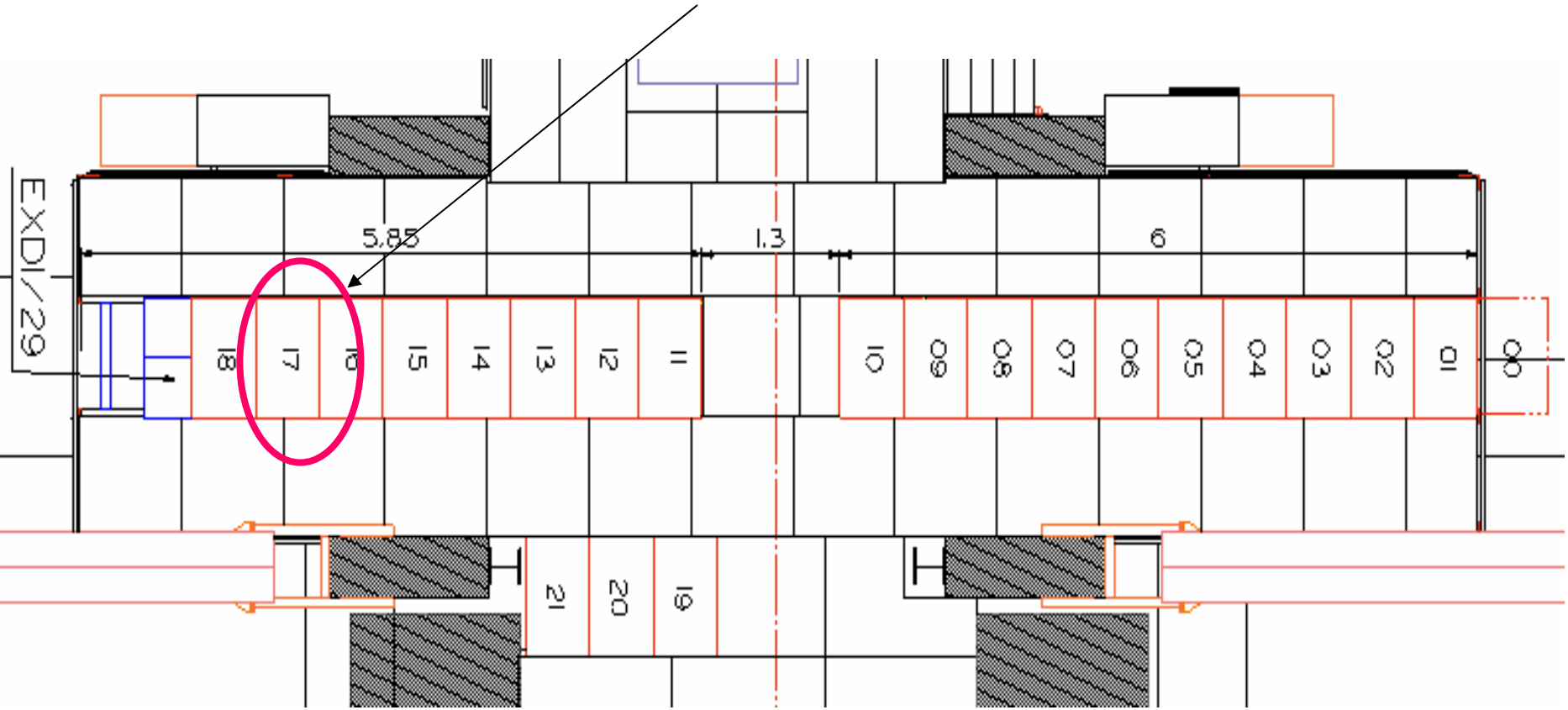
(made by D.Budnikov)

Sense wire panel
to be made

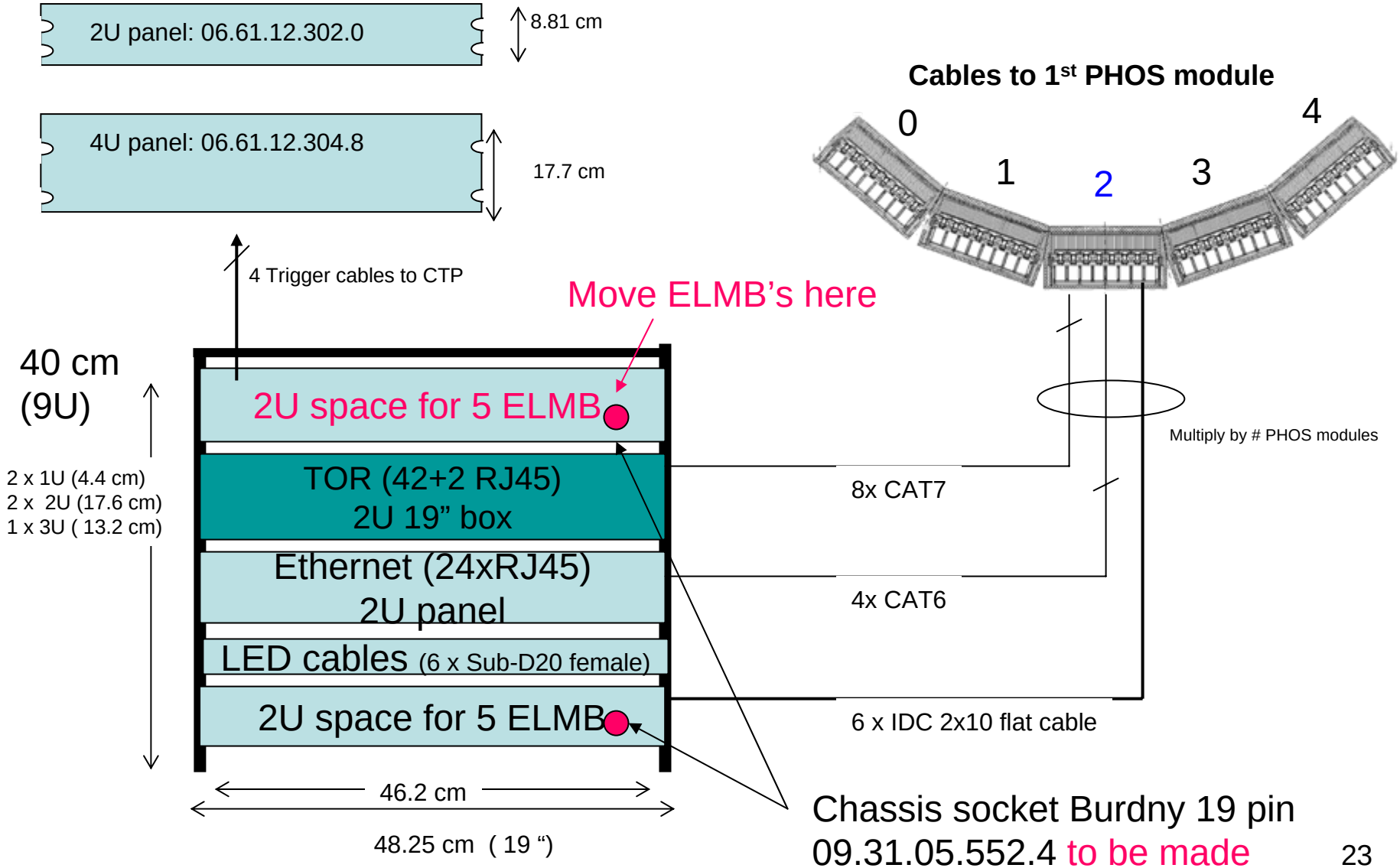
Heater cable connectors
2 x LV to be made



Wiener PS and Ethernet switch A17



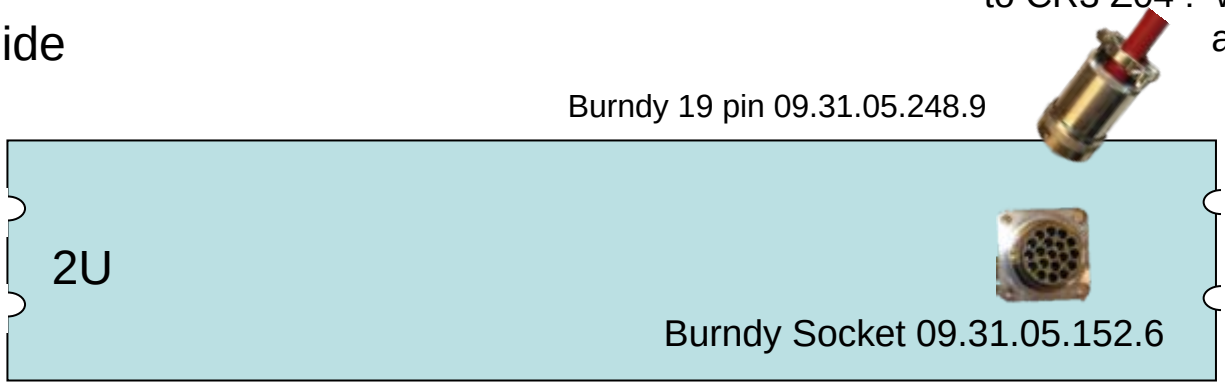
Patch panel PHOS_SG



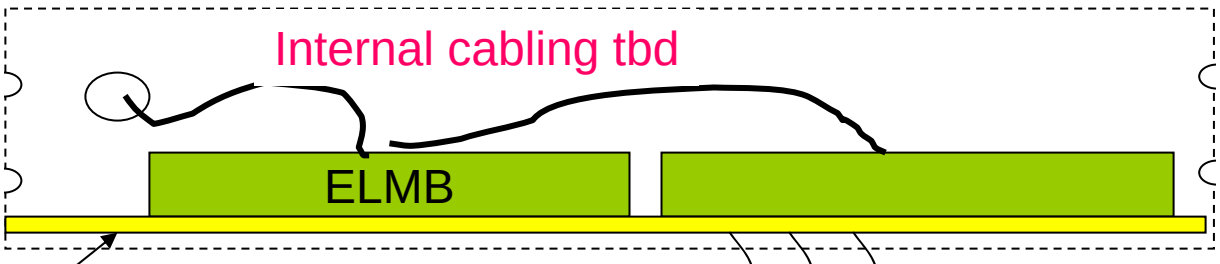
ELMB panel
(in PHOS-SG)

Check if correct ..
Canbus cable 04.21.60.491.2
to CR3 Z04 : which length ??
assume 150 m

Front Side

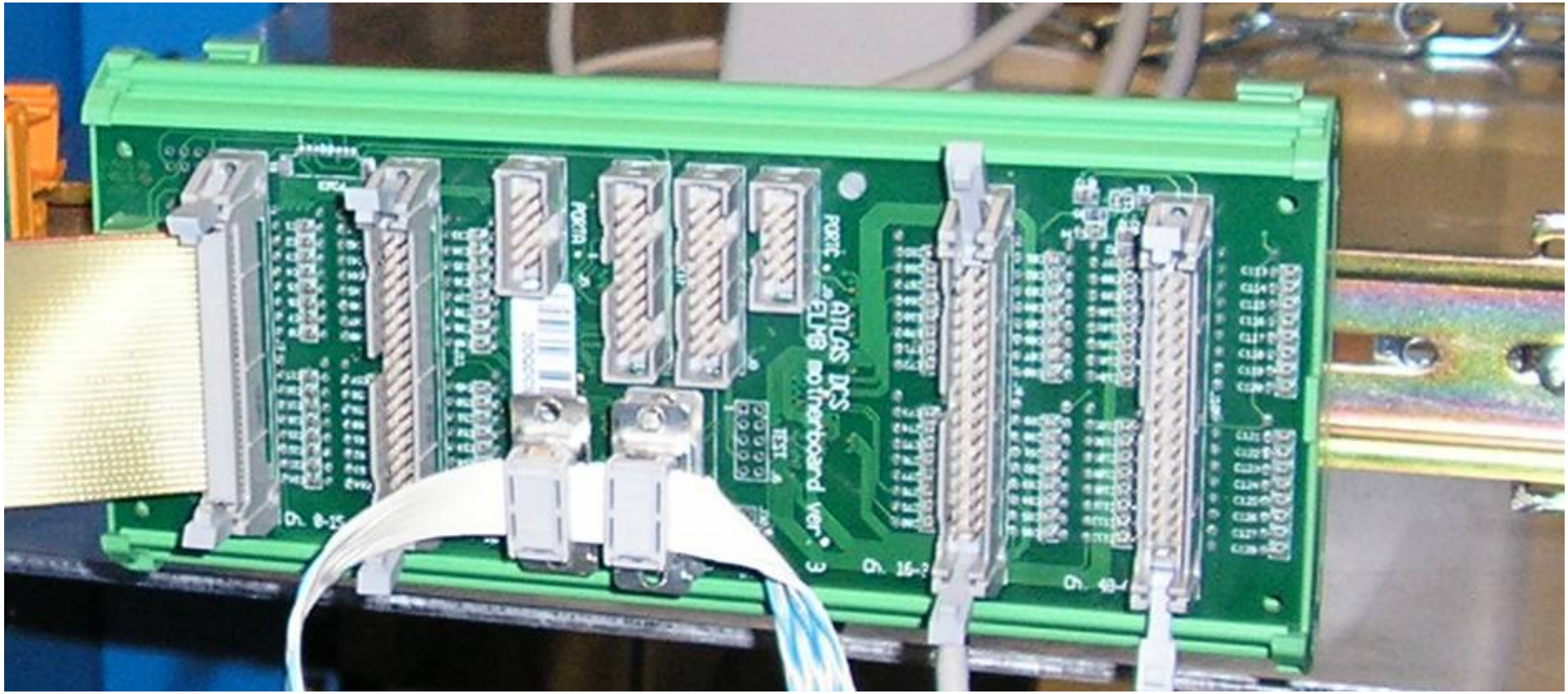


Back Side



35 mm DIN rail, non magnetic, from DCS group

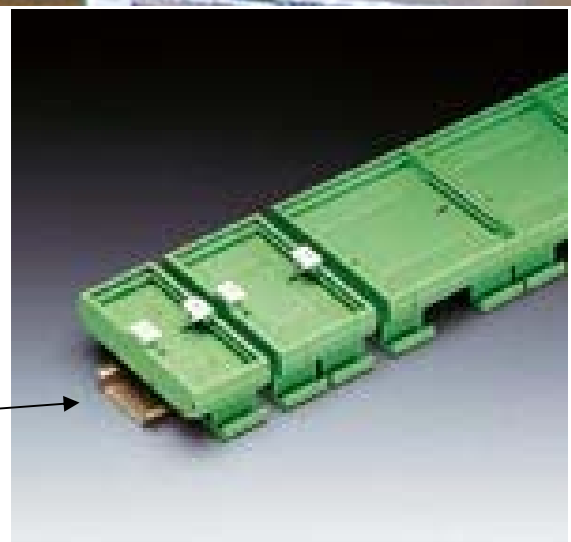
External cabling: tbd



ELMB (how many How are they connected)

Canbus cable 04.21.60.491.2 to CR3 Z04
In CR3: Burndy 19 pin in CR3 male contacts
09.31.05.548.0

In UX25: connector D25, female contacts
09.21.21.090.6
Rails : 35mm DIN rail, ALU !
(from DCS group)



PHOS_SG side view

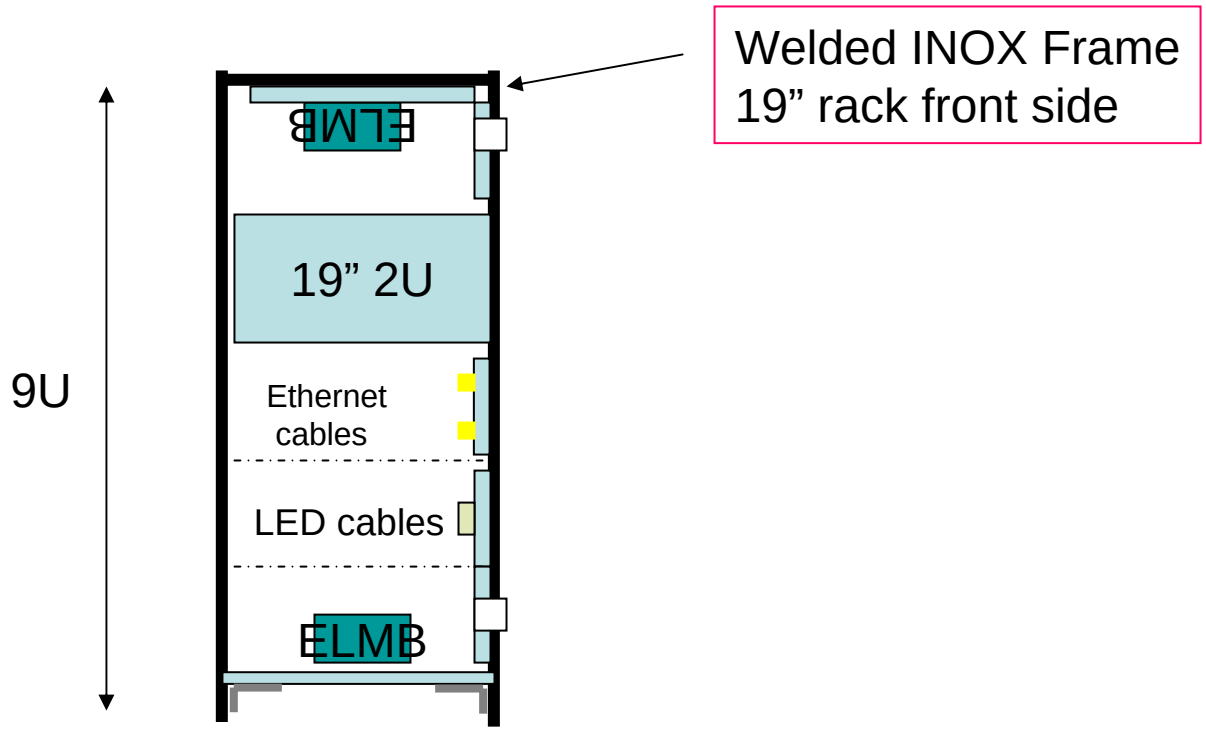
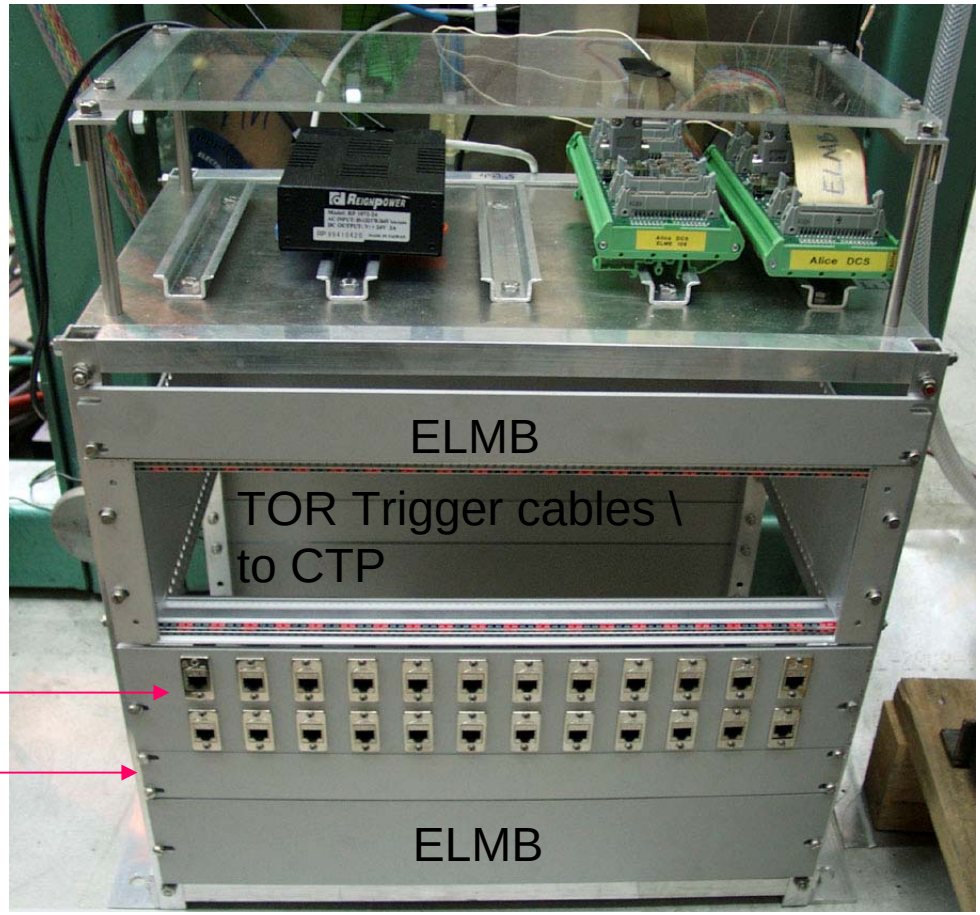


Photo of PHOS-SG panel

Move auxiliary ELMB's inside



Ethernets (24)

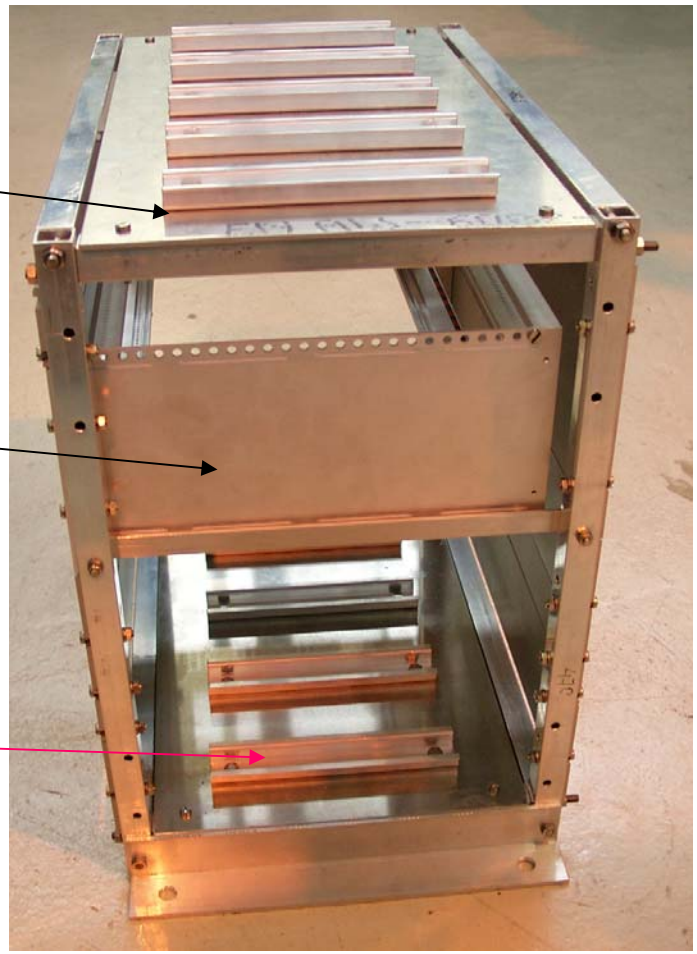
LED cables

PHOS_SG panel: side view

Auxiliary ELMB rails

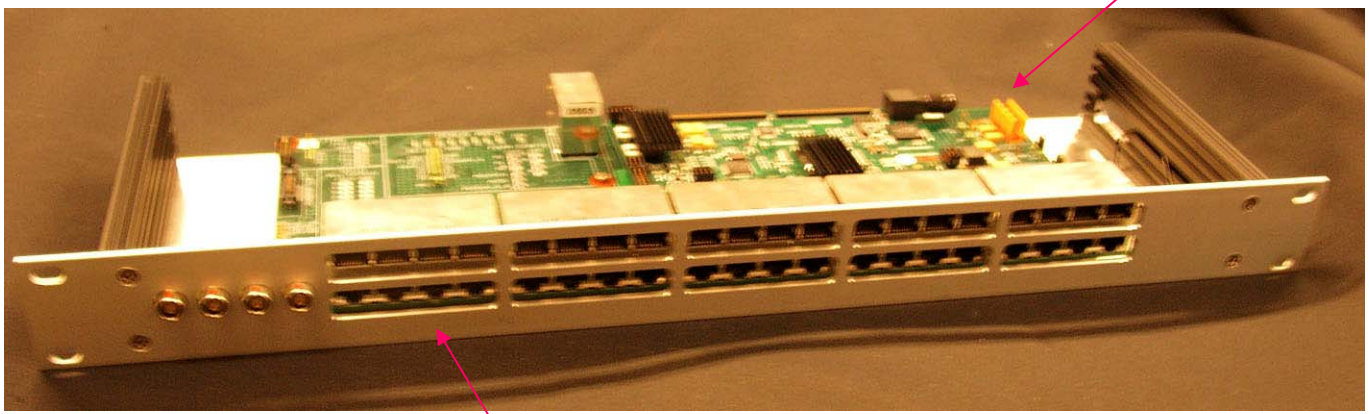
2 U chassis
for TOR

Magnetic-free
rails for ELMBs



TOR in 19” chassis

Power cable

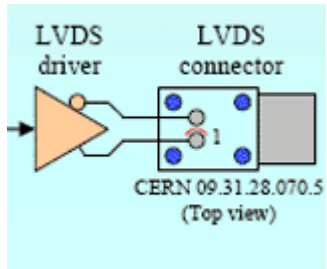


40 x RJ45 cables from 40 x TRU

Trigger cables

4 x dual-pin LEMO on TOR in PHOS_SG

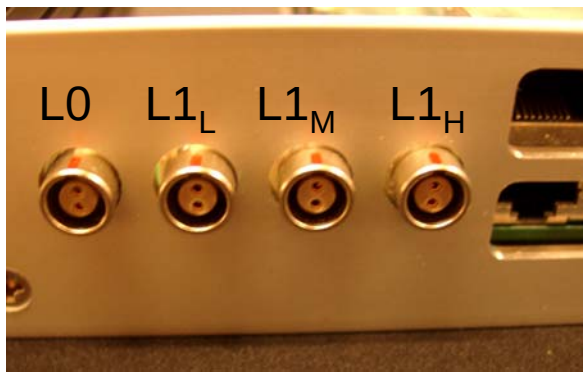
special Draka Li-2Y(St)H (1* twisted pair) alias
“Formenti cable” for: L0 , L1, Busy
4.4 ns/m



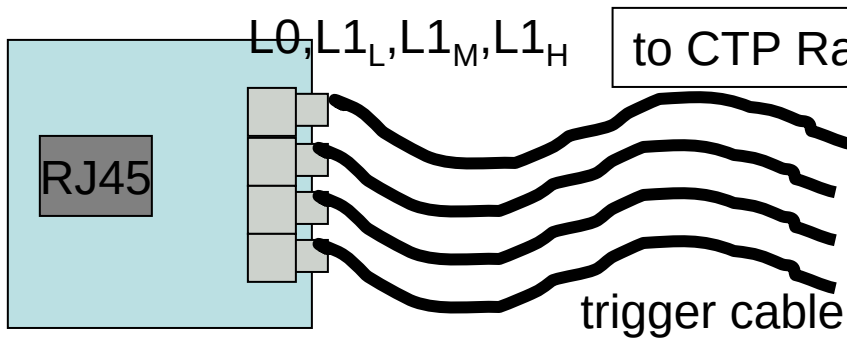
Lemo size 00 B type
Cable plug
09.31.28.001.8

watch polarity !!

LVDS driver mezzanine
on TOR



Trigger cable plugs to CTP



to CTP Rack C25

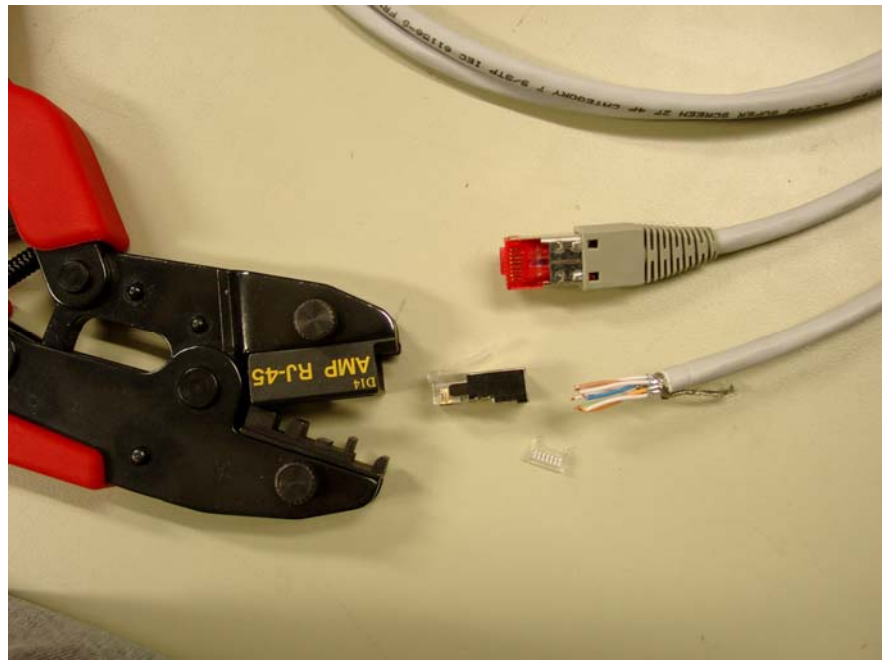
As short
As possible !
< 40 m

Adapter Card
on TOR

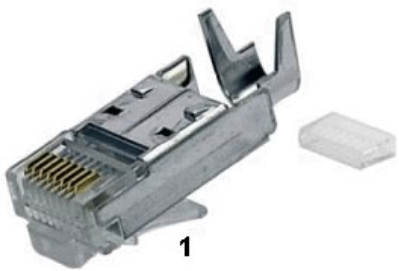
RJ45 trigger cables TRU-TOR

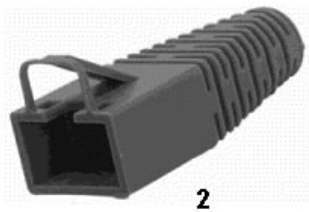
CAT7 cables 04.21.70.105.9 4x twisted pairs

8 cables to be made



Cable plug 09.65.10.106.8 and plastic cover 09.65.10.121.0



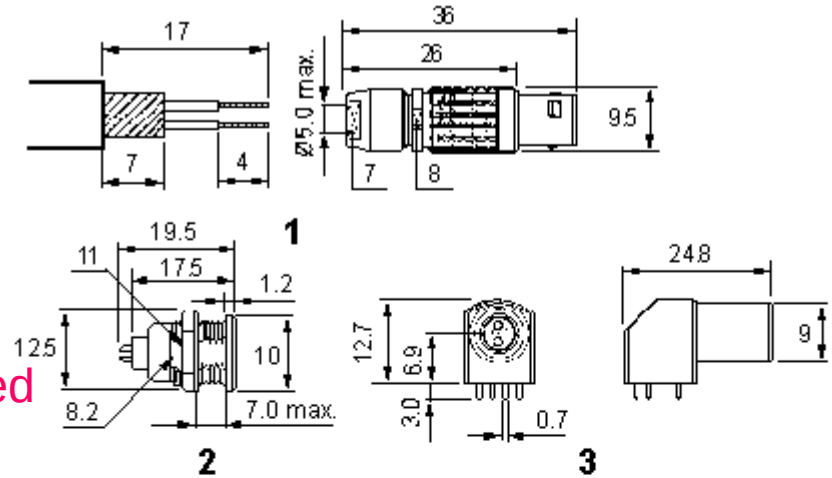


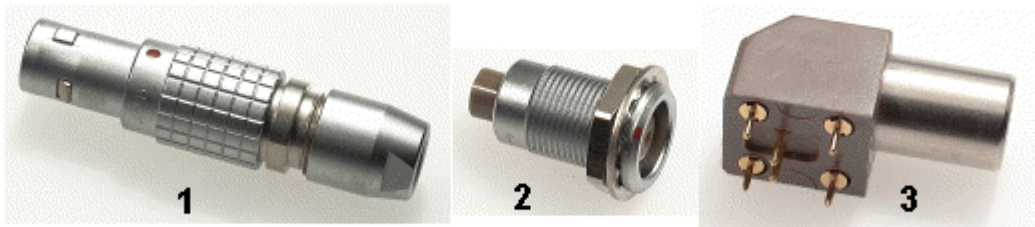
Trigger cable plugs dual Lemo

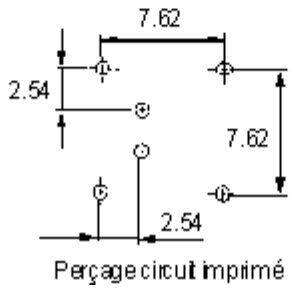
Crimp tool
Available

Mounting on
Trigger cable to be tested

4 trigger cables to CTP
to be made





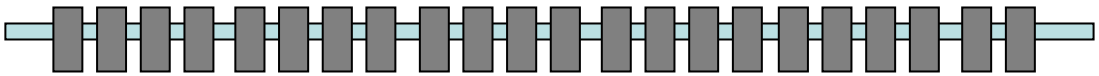


Cable plug 09.31.28.050.9
Chassis socket 09.31.28.060.7
Male crim contacts 09.31.28.800.5

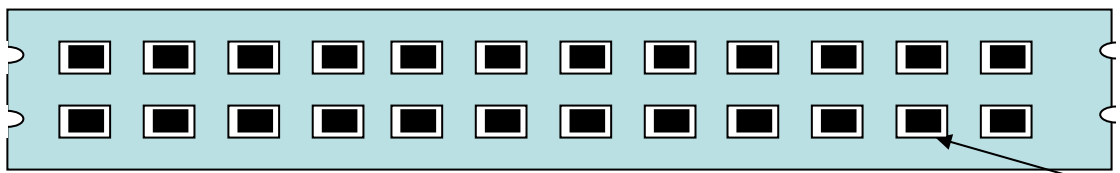
Ethernet panel
on PHOS-SG

24x RJ45 coupler in 2 row (20x DCS + 1x TOR + 3 Spare)

Designed by D.Gabriele (common for TPC and PHOS/EMCal)



1U panel: 06.61.12.302.0



L-com TDG1026KS-C6

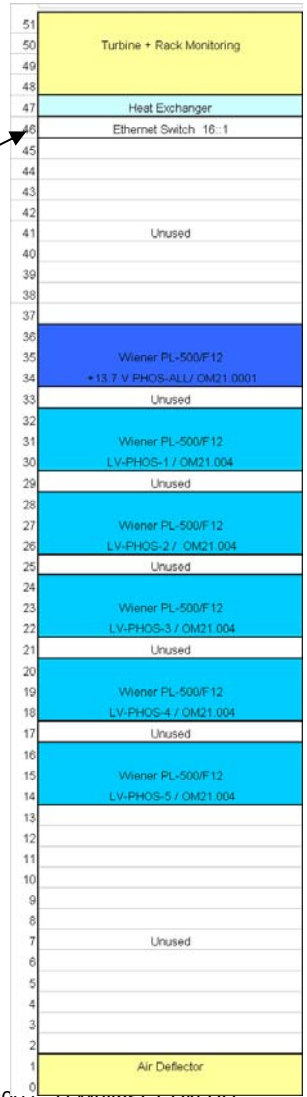
Radiospares 2508613979

1 Panel finished
2nd panel + plus available for spare ethernet connections

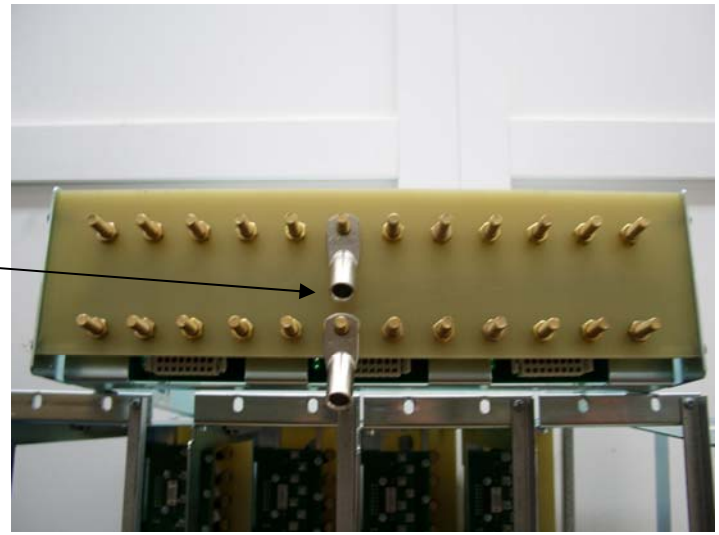
Plug-ins (non magnetic)

LV Power supplies in Rack A17

Ethernet switch



Wiener back-side



45 deg M12 for
Lugs 150 mm2

PHOS Wiener LV supplies:
ethernet control, water cooled,
never-exceed over-voltage.

1 X QM21.0001L, 12ch, 5 - 15V, 20A, protection 13.8V
=> modified to 6 channel 40A !

5 x QM21.0004L 6ch, 2 - 8V, 100A (2x50A), protection 6.8V

Power lugs

<u>Wiener side</u>
M12 150 mm2

<u>Panel side:</u> M12 150mm2

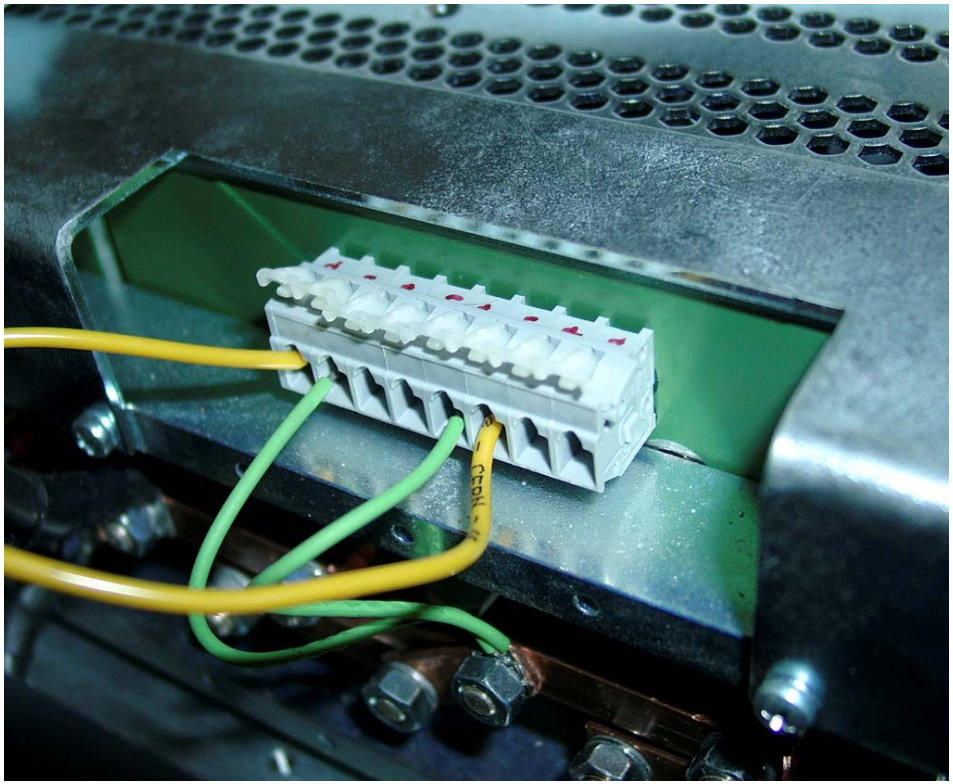
Check availability

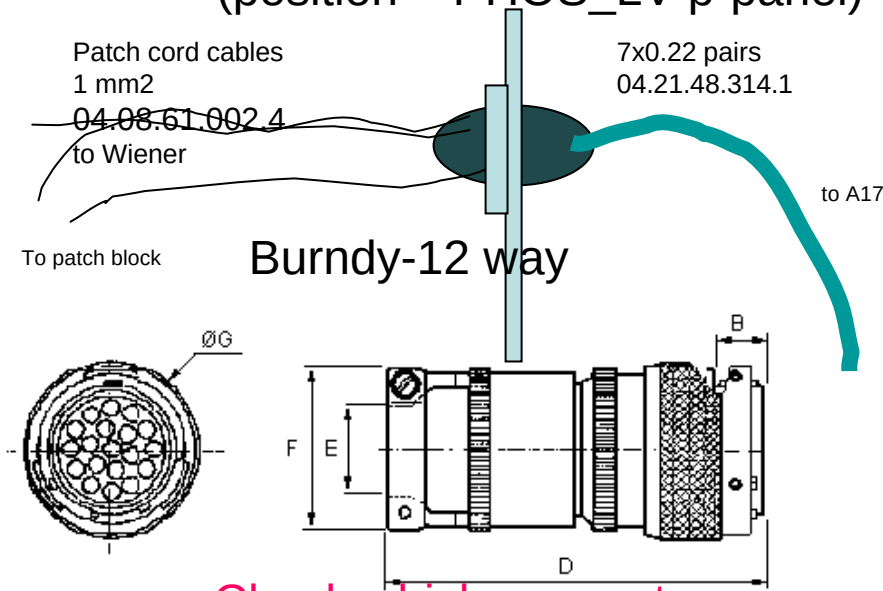
Final Wiener back-panel

Backpanels:
Already
Mounted

Sense Wire attachenemt back of Wiener

(position = PHOS_LV p-panel)





Check which connector

Wiener-PS patch block:

Pairs of 1mm2 patch cords (orange/white) from LV panel

12 pin Burndy plug

09.31.05.232.7 on PHOS and Wiener side

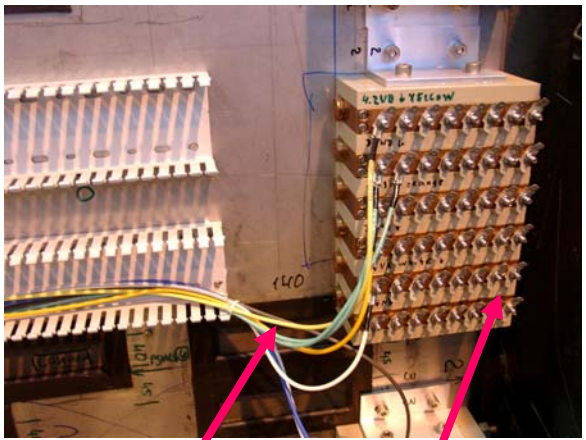
09.31.05.236.3 Both sides 40 m cable

PHOS LV Power block

(fixed on each phos bottom plate)

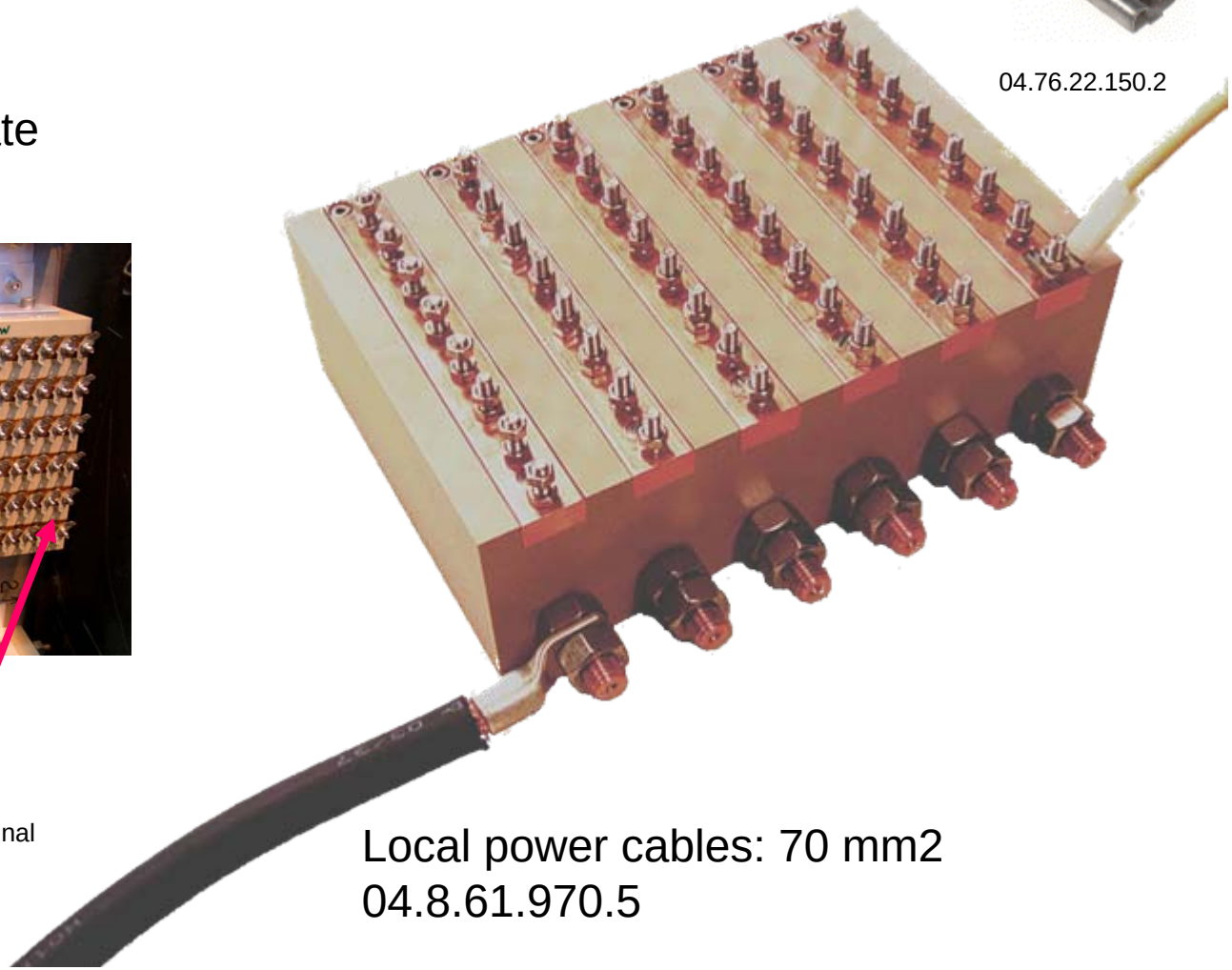
04.76.22.150.2

PHOS bottom plate
(below PHOS)



Distribution wires to Electronics

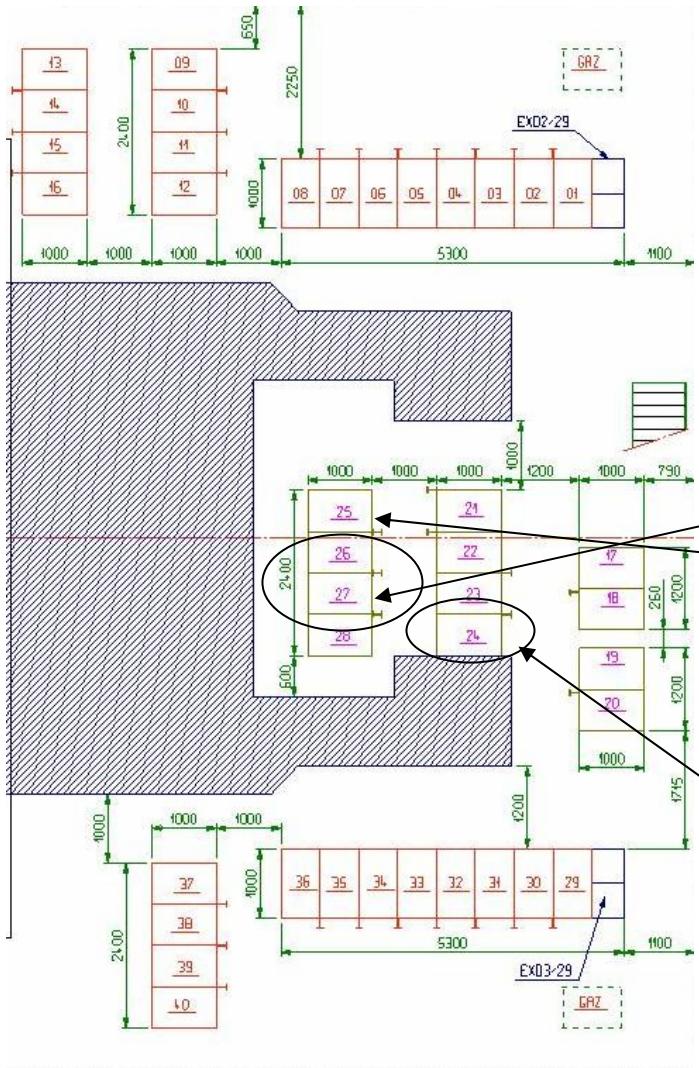
Sense wire terminal



Local power cables: 70 mm2
04.8.61.970.5

From PHOS LV patch panel

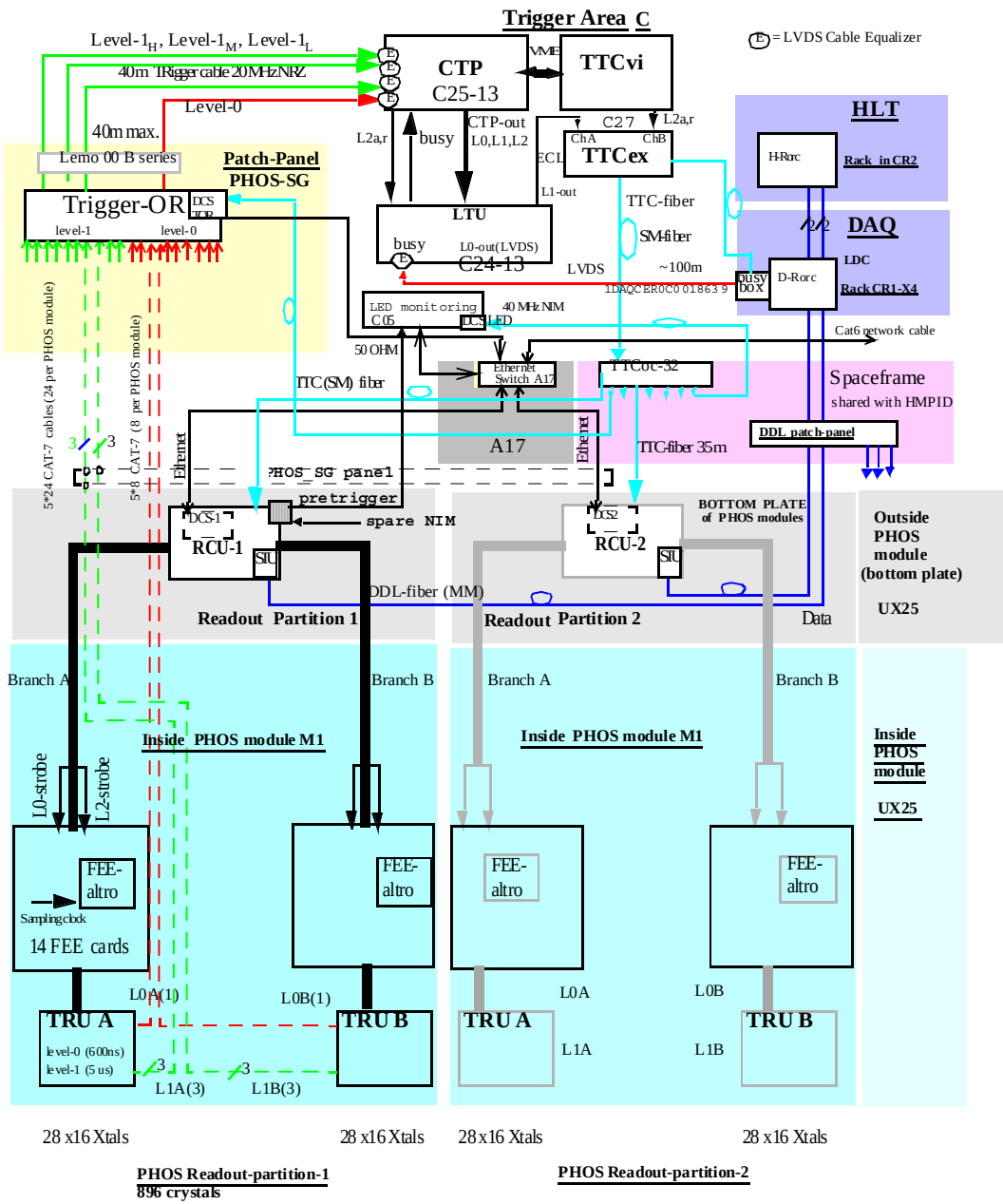
Trigger Rack positions



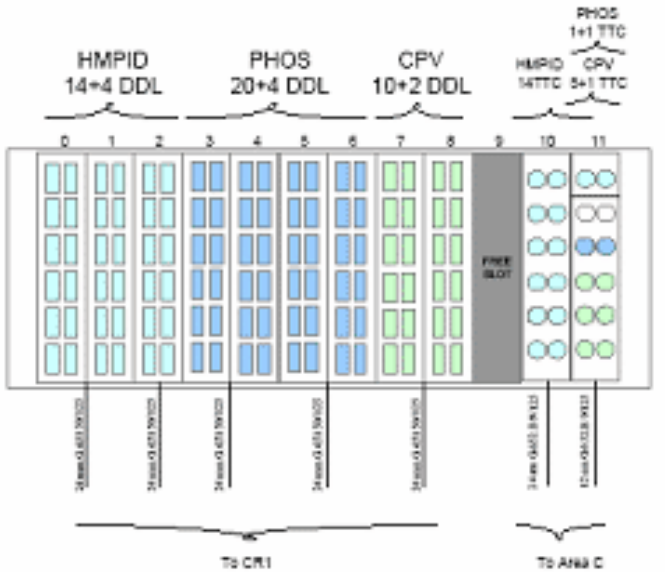
TTC partition crate C27B
- rack C27
CTP: C25-13

LTU C24-13

Trigger cabling Overview

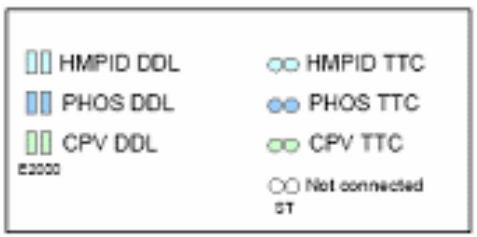


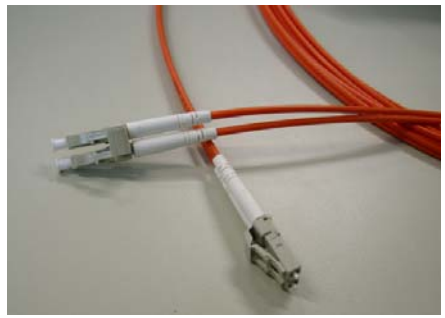
Common fiber patch boxes



Chassis 4U

Comcore 32 channels





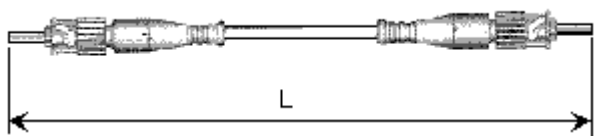
DDL: LC connector and MM fiber
04.67.10.x00.0

Length tbd. Max 50m

Position of TTC_{oc} optical splitter
single mode fiber

TTC fibers: ST/PC single mode

04.67.00.00x.9 max 50 m



Ethernet cables

CAT-6 : SCEM 04.21.70.104.6

1.) DCS cards on RCU

From PHOS-SG patch panel to A17_ ca. 40 m

20 x DCS card
1 x TOR

2.) LED monitoring crate

1x C5 -> ethernet -> A17

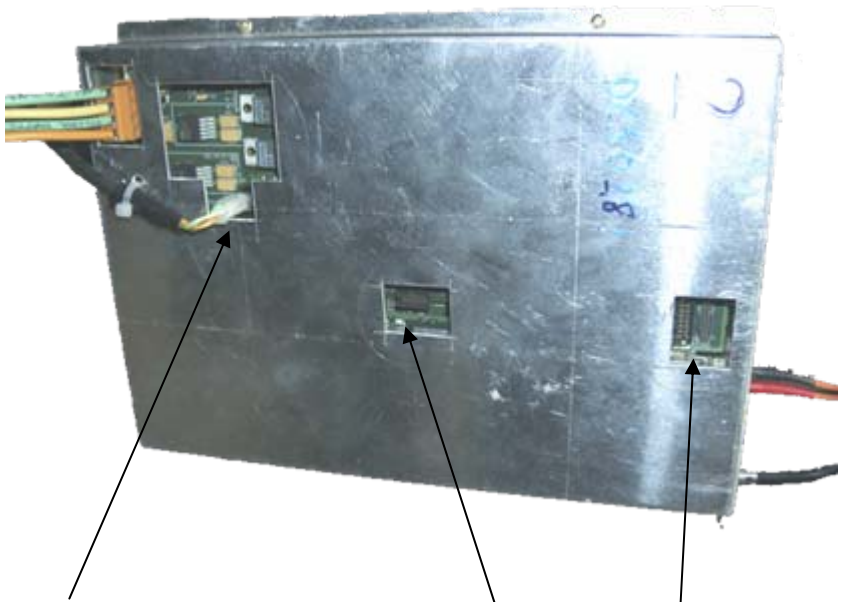
3.) Busy Box

Which ethernet in Counting Room CR2 ?

RCU box

use non-magnetic screws

Non-magnetic box



Use non-magnetic
Power Connector, ask TPC

TTC fiber

DDL
fiber

NIM trigger

Special ethernet connector
see next slide

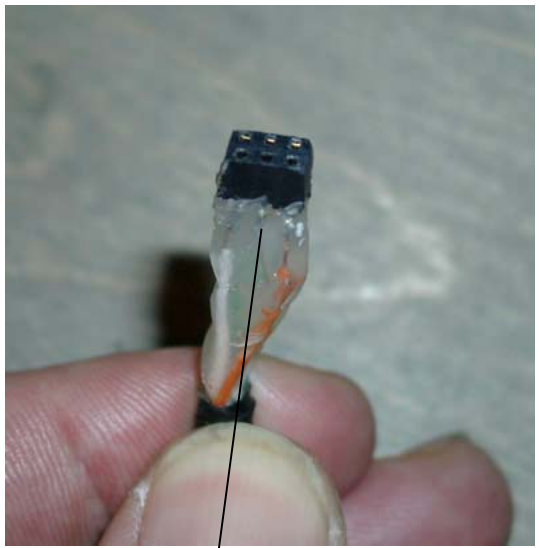
JTAG RCU FPGA (Virtex)

JTAG DCS card FPGA (Altera)

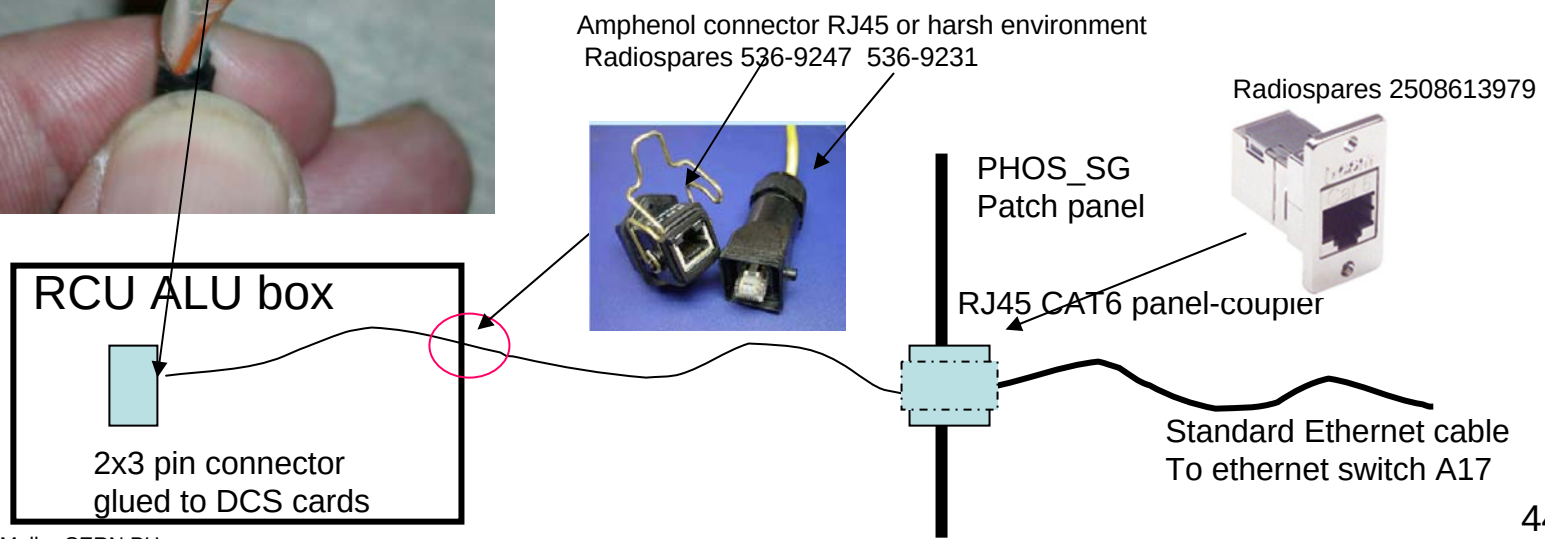
DCS ethernet connection

PHOS_SG panel to DCS card on RCU)

Inside DCS card:

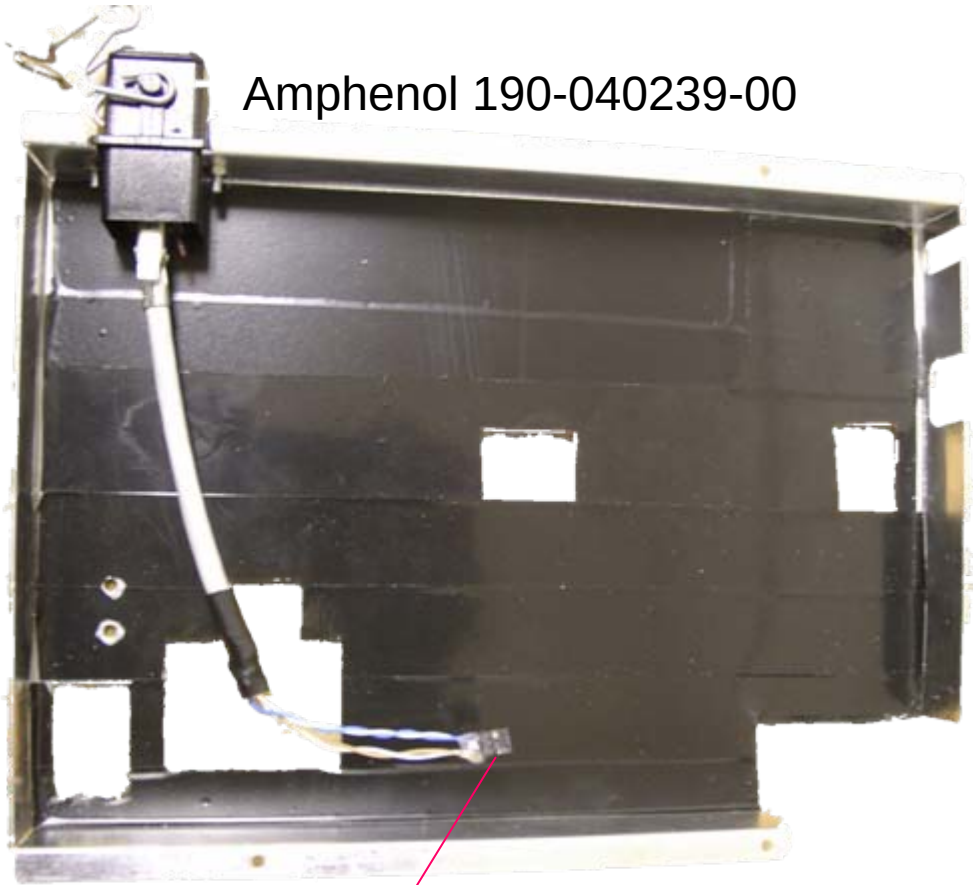


2x3 pin connector 2.54 mm
Molex 511100650 plastic housing
Molex 503948100 crimp contacts
-requires glueing



Rugged ethernet connection on RCU box

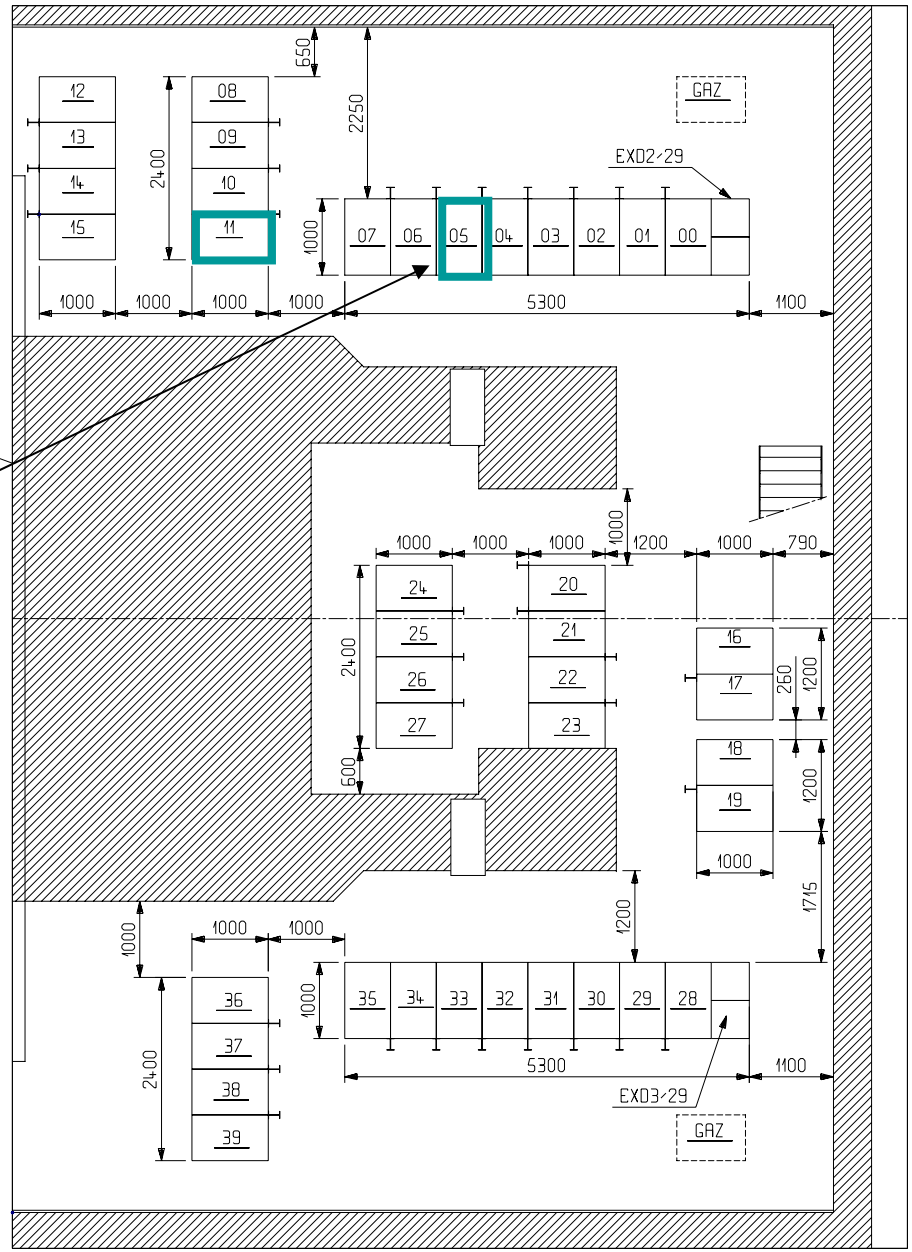
Amphenol 190-040238-00RS



Amphenol 190-040239-00

2x3 pin Molex Plug to DCS card

LED monitoring crate



- PHOS VME crate in Rack C05

flat cable max 22 m (CHECK!!)
SCEM 04.21.22.420.4

(2x10) between C05 and PHOS_SG

50 OHM coax for pretrigger from RCU (PHOS_SG)

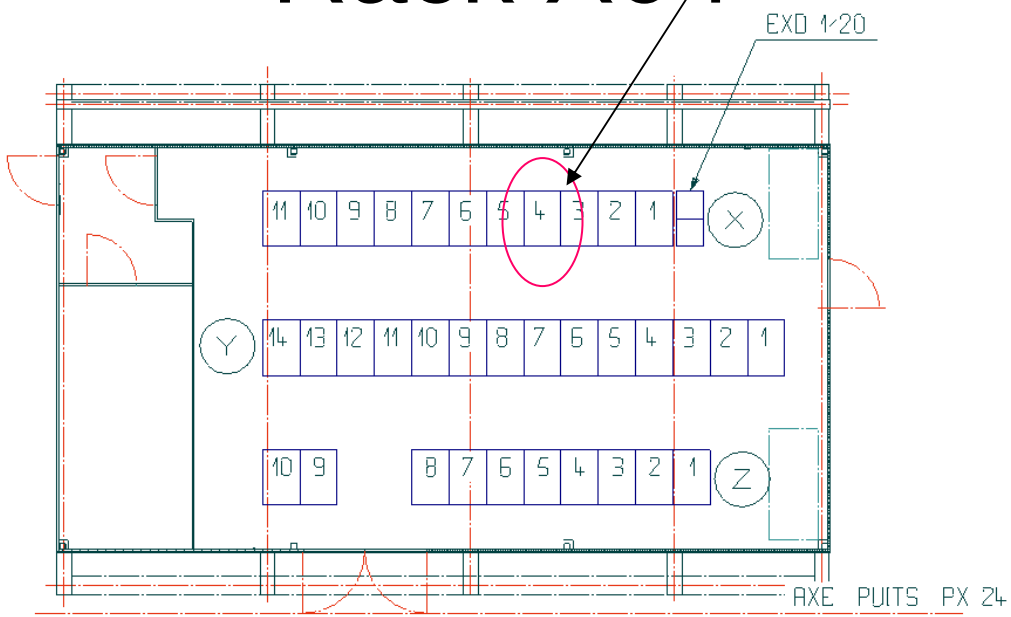
VME crate and patch panel-side:

IDC-20 Cable connectors:

IDC-20 pin female on both sides to be provided by Protvino Group,

(not on CERN store)

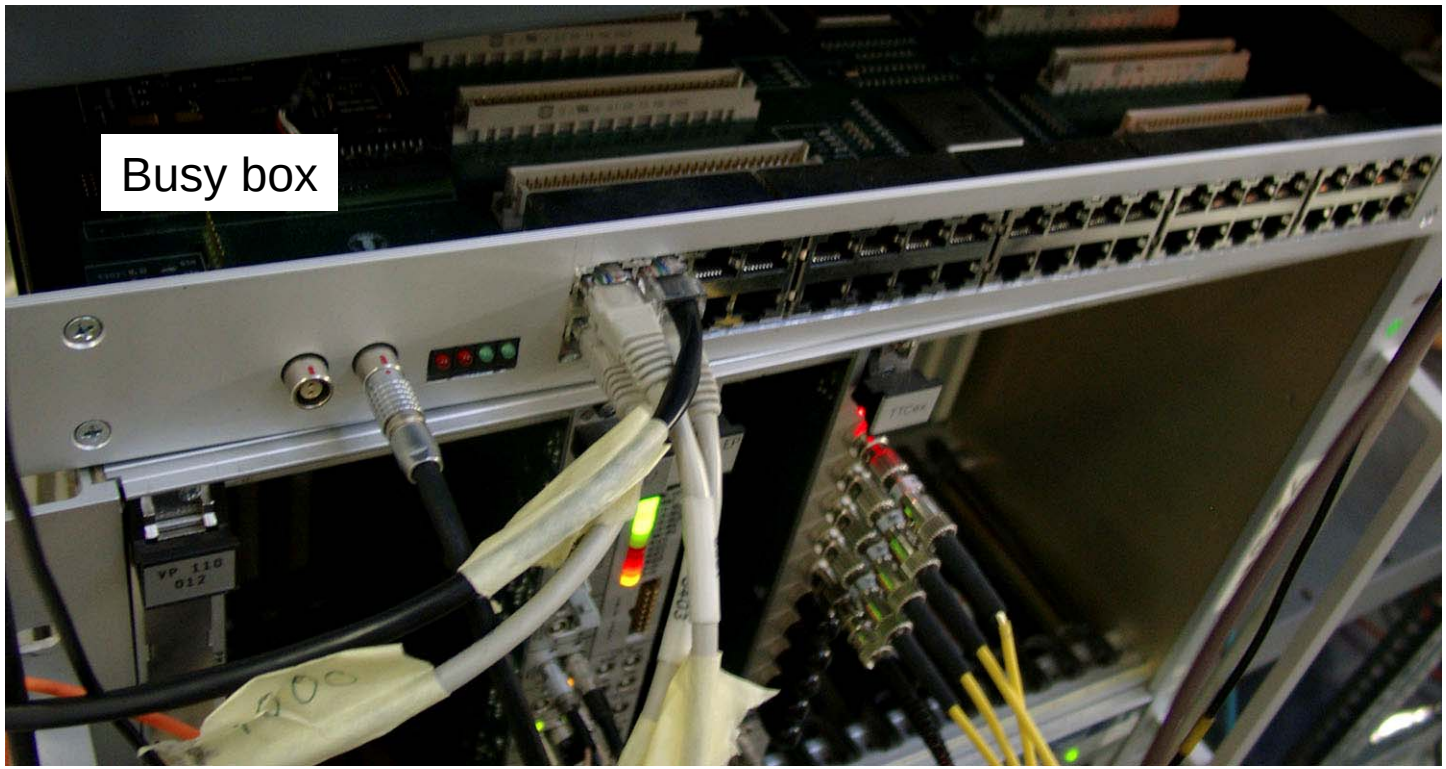
DAQ Counting Room1 Rack X04



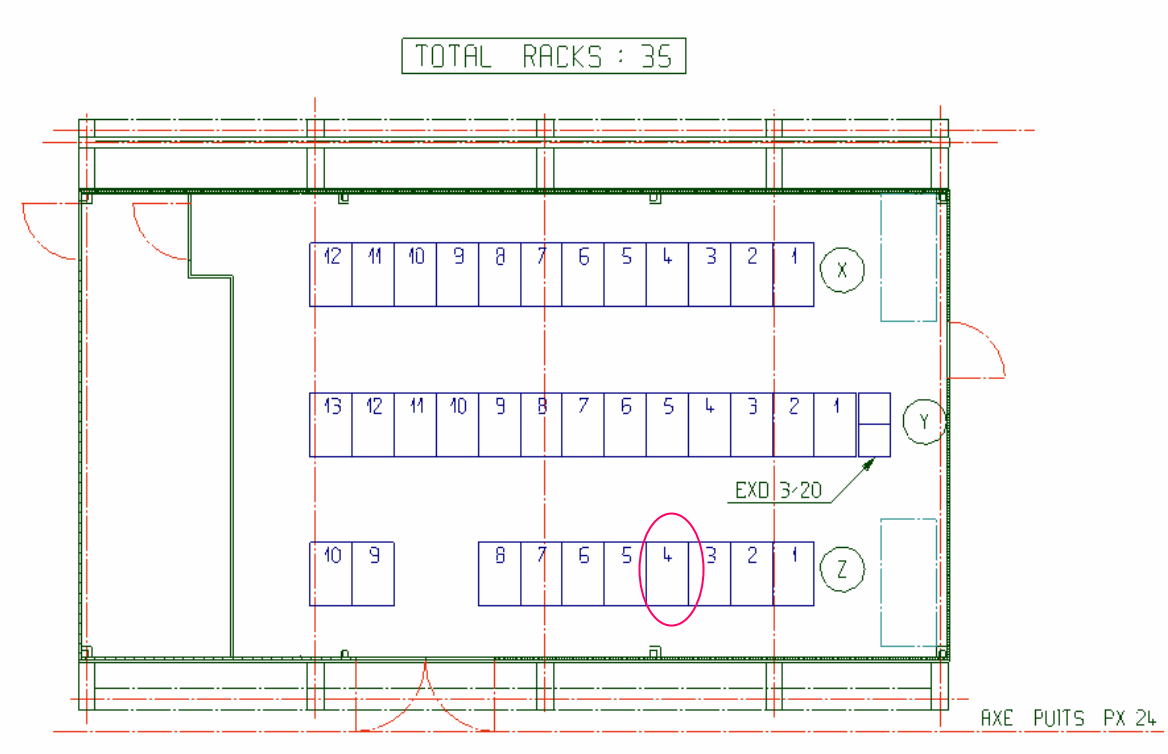
- Busy cable (trigger cable) to busy box
- Busy box needs TTC fiber
- Busy box needs ethernet
- 8 DDL cables to HRORC CR1 Rack X04

Busy box in CR2
19 “ 2 U

How many RJ45 connections are needed ?



DCS
CR3-Z04



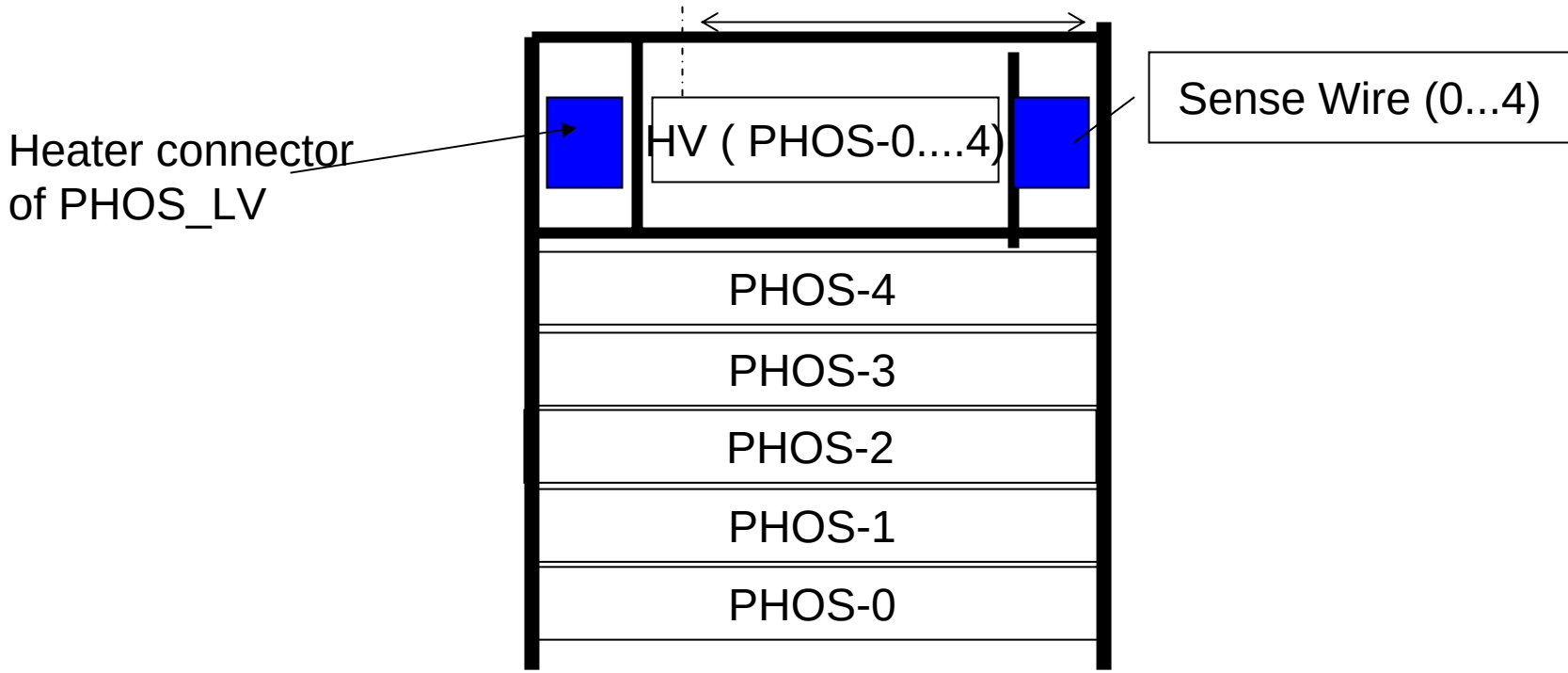
Which connections apart from Ethernet ?

Z04 CANbus to ELMB in PHOS_SG

CANbus to Iseg HV Rack Y10 in CR4

Heater/Cooler

- PHOS Heat P / PHOS Heat N and
- PHOS-LV pp
- Fibernet LV cable 150mm^2

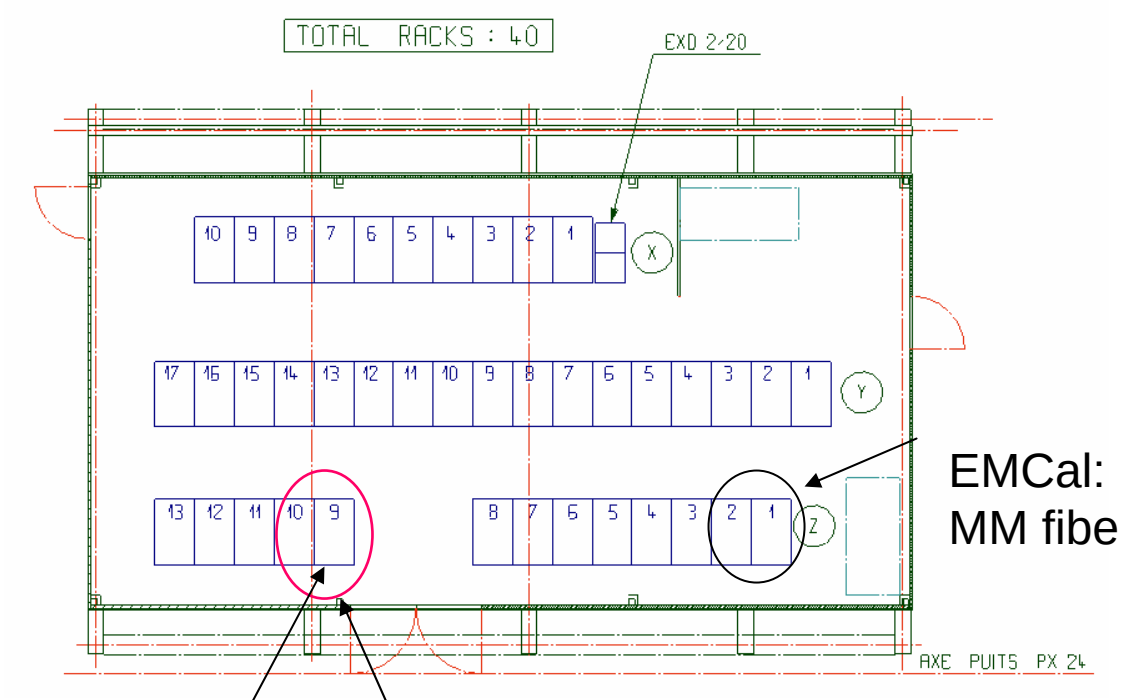


Fibers

- 20 TTC from TTCoc to RCU's @ PHOS
- 1 TTC from TTCoc to TOR trigger box
- 1 TTC from TTCoc to PHOS VME crate Rack C17
-
- 1 TTC from TTCoc to CR1 (Busy box)
- <u>Total 23 TTC</u>
-
- 20 DDL from PHOS/HMPID p-panel to RCU's @ PHOS
- 1 DDL from PHOS/HMPID p-panel to CR2 (TOR debug line)
- 1 DDL from V0 detector to one TRU (special test line)
- <u>Total 21 DDL</u>

Individual length to be defined D.Gabriele
Ordering to be defined by P.van de Vyvre

HLT in CR2



EMCal: Rack Z1/2
MM fiber to Z1

MM fiber
from TOR
to Z2

PHOS: Rack Z9/10

PHOS Cables

(check status of cables)

- HV cable 04.31.52.075.9 : 450 m ordered
- CAT-6 Ethernet cable (DCS) 04.21.70.104.6 : 900 m ordered
- CAT-7 cable (TOR) 04.21.70.105.9 : 50 m ordered
- Sense Wire 04.21.48.314.1: 200m ordered
- IDC cable (LED): 04.21.22.420.4 : 150 m ordered
- Local LV cables from LVpatch-PHOS, 70 mm2, 04.8.61.970.5 (assume 100 m)
- ordered ??

- Canbus Cable 04.21.60.491.2 (assume 150 m) ... By DCS group (A.Augustinus)
- Fibernet 150 mm2 Length ~ 62 @ 35 m .....already delivered point-2
- Draka Trigger cables .....available by Formenti
- Sense wire patch cables to Wiener .....already available
- HV coaxial cables for splitter .....already delivered