ALICE SPD system installation

SPD team

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This report describes the way the ALICE system components have been installed and tested.

1.0 Rack installation

2.0 Low/high voltage distribution and electrical cable installation

Figure 1 shows the electrical connection scheme.

@ Describe in more detail.

2.1 C-side electrical cables

Patch panel 3 is sitting directly in the absorber close to the detector. Fig. @ shows the patch panels. The connection is done via printed circuit boards. Each of the LV channels contain a capacitor with the value x uF/ x uF for the 2.6V for the MCM and the 1.8V for the pixel chip power supply. The MCM and bus extenders are connected to patch panel 3. From there (connection 405/410) the LV/HV cables are routed in the absorber cable trays to patch panel 4. Patch panel 4 can be seen in fig. @. Cables 405/410 in Figure 1 have been pre-fabricated and tested before installation. The length of these cables is 4.5m

The cables (407/412a) from PP4 are routed to the LV power supply racks I18 and I19 on a path which is between 33 and 36m long. There the LV cables are connected to the CAEN power supply modules 3009 via PP13, (see Figure 1). The HV cables (412a) go to PP13S and from there on a cable path with a length of xx@ m to CR4 where they are connected directly to the CAEN HV modules xx@.

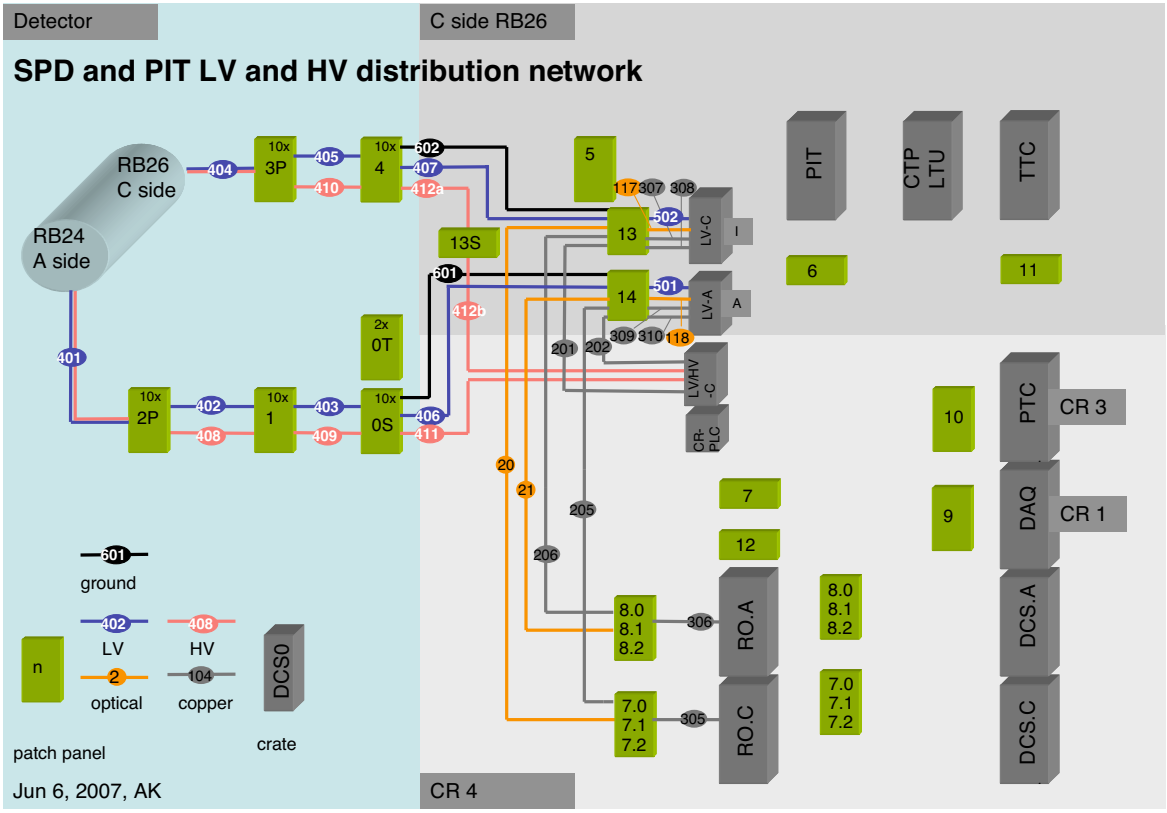


FIGURE 1. Electrical connections

2.1.1 Test of C-side electrical cables

All LV cables from the LV modules to PP3 have been tested in the follwing way before the half-staves were connected with the MCM and bus extenders. A CAEN 3009 module was connected to the cables corresponding to the full sector. For each channel a different voltage between 1.7V and 1.95V was adjusted so that mixing of cables could have been identified. On the PP3 side a passive load corresponding to the half-stave load was connected (5.5V for the pixel chips and 0.5 A for the MCMs. Furthermore the bias cables and the temperature cables were applied to voltages between 100 and 125V (depending on the channel) and measured on PP3. The voltages on PP3, the connector voltage on the CAEN modules and the current were registered for the MCM and the pixel chips. Table @ shows the measurement protocol of the values taken in PP3. Table @ shows the measaruements taken on the I-rack (power supplies).

Temperature sensor chain on the pixel bus (PT1000-chain).

The pixel bus PT1000 chain was verified and values were registered, see Table 1 (Pt1000 temp alice)

Pt1000 measured in ALICE (7/2007)

Half-stave	Sector 0	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7	Sector 8	Sector 9
0C	22.00	21.64	22.28	23.98	21.99	22.81	22.59	22.31	22.77	23.43
1C	22.49	21.53	22.09	25.63	22.11	21.83	22.49	23.04	23.28	23.49
2C	22.66	21.59	22.04	23.29	22.40	23.56	22.11	21.90	23.73	24.62
3C	22.25	24.12	22.42	22.09	21.89	24.17	27.60	22.13	22.73	24.20
4C	22.18	22.40	21.95	22.28	21.83	21.94	24.27	21.67	23.70	70.73
5C	22.71	21.71	22.39	23.02	21.76	21.95	22.28	21.74	23.85	23.77
Avg	22.3817	22.165	22.195	23.3817	21.9967	22.71	23.5567	22.1317	23.3433	31.7067
stdv	0.28308	1.00933	0.19542	1.29879	0.23269	0.98071	2.12849	0.50539	0.49846	19.1228

TABLE 1. C-side PT1000 chain temperature measurements taken with the ‘Cesar box’. (Petra, Simone, Pt1000 temp alice)

The PT1000 chain was again verified using the PLC system. The measurements have been performed after the protection diodes (TVS) have been inserted in PP4 and after the patch panel installation in the I-rack. All values correspond to the expected values with the exception of sector 6 channel 0 and sector 9 channel 4. Table 2 (pt1000sideC) contains the measurements.

Observations:

Sector 1, MCM5 and sector 4 MCM 5 had a too low voltage and current. This error was later eliminated. The sense wires on the CAEN 3009 were not connected properly.

Sector 6 MCM 0: Defective cable was found for MCM, CAEN module gave HVMAX error. A MCM spare cable is connected instaed.

Sector 9 Bus 0: Cable connector pin on PP4 needed to be inserted properly.

3.0 Optical and electrical signal distribution system

Table 2 shows the entire connection scheme.

3.1 C-side optical network

Clock and serial fibers come from CR4 PP7 on link7 directly to PP4. Data (G-link) fibers run from PP4 to a splitter box in C-area (PP5) and from there to the control room on link 11. The lengths of the different sections can be found in table @. It is important that all fibers for the same links have the same length with a tolerance of 60 cm or 3 ns. The fibers for link 6 and 8 must be as short as possible but still must have all the same length.

HALF STAVE	Resistance read by PLC	Resistance measured by multimeter	status
Sect 0,Res[0]	5409.722		
Sect 0,Res[1]	5418.402		
Sect 0,Res[2]	5423.611		
Sect 0,Res[3]	5414.931		
Sect 0,Res[4]	5413.194		
Sect 0,Res[5]	5423.611		
Sect 5,Res[0]	5432.292		
Sect 5,Res[1]	5413.194		
Sect 5,Res[2]	5446.181		
Sect 5,Res[3]	5458.333		
Sect 5,Res[4]	5414.931		
Sect 5,Res[5]	5414.931		
Sect 1,Res[0]	5414.931		
Sect 1,Res[1]	5411.458		
Sect 1,Res[2]	5413.194		
Sect 1,Res[3]	5461.806		
Sect 1,Res[4]	5428.819		
Sect 1,Res[5]	5414.931		
Sect 6,Res[0]	6000	overflow	check in DSF log book
Sect 6,Res[1]	5427.083		
Sect 6,Res[2]	5420.139		
Sect 6,Res[3]	5526.042		
Sect 6,Res[4]	5421.875		
Sect 6,Res[5]	5461.806		
Sect 2,Res[0]	5421.875		
Sect 2,Res[1]	5418.402		
Sect 2,Res[2]	5416.667		
Sect 2,Res[3]	5423.611		
Sect 2,Res[4]	5414.931		
Sect 2,Res[5]	5423.611		
Sect 7,Res[0]	5427.083		
Sect 7,Res[1]	5440.972		
Sect 7,Res[2]	5418.402		
Sect 7,Res[3]	5423.611		
Sect 7,Res[4]	5414.931		
Sect 7,Res[5]	5414.931		
Sect 3,Res[0]	5453.125		
Sect 3,Res[1]	5486.111		
Sect 3,Res[2]	5440.972		
Sect 3,Res[3]	5416.667		
Sect 3,Res[4]	5421.875		
Sect 3,Res[5]	5434.028		
Sect 8,Res[0]	5423.611		
Sect 8,Res[1]	5432.292		
Sect 8,Res[2]	5440.972		
Sect 8,Res[3]	5421.875		
Sect 8,Res[4]	5440.972		
Sect 8,Res[5]	5444.444		
Sect 4,Res[0]	5416.667		
Sect 4,Res[1]	5420.139		
Sect 4,Res[2]	5425.347		
Sect 4,Res[3]	5416.667		
Sect 4,Res[4]	5414.931		
Sect 4,Res[5]	5413.194		
Sect 9,Res[0]	5423.611		
Sect 9,Res[1]	5423.611		
Sect 9,Res[2]	5444.444		
Sect 9,Res[3]	5434.028		
Sect 9,Res[4]	6000	6200 Ohm	
Sect 9,Res[5]	5423.611		

TABLE 2. C-side PT1000 chain temperature measurements taken with the PLC system (M. Caselle, pt1000sideC-3).

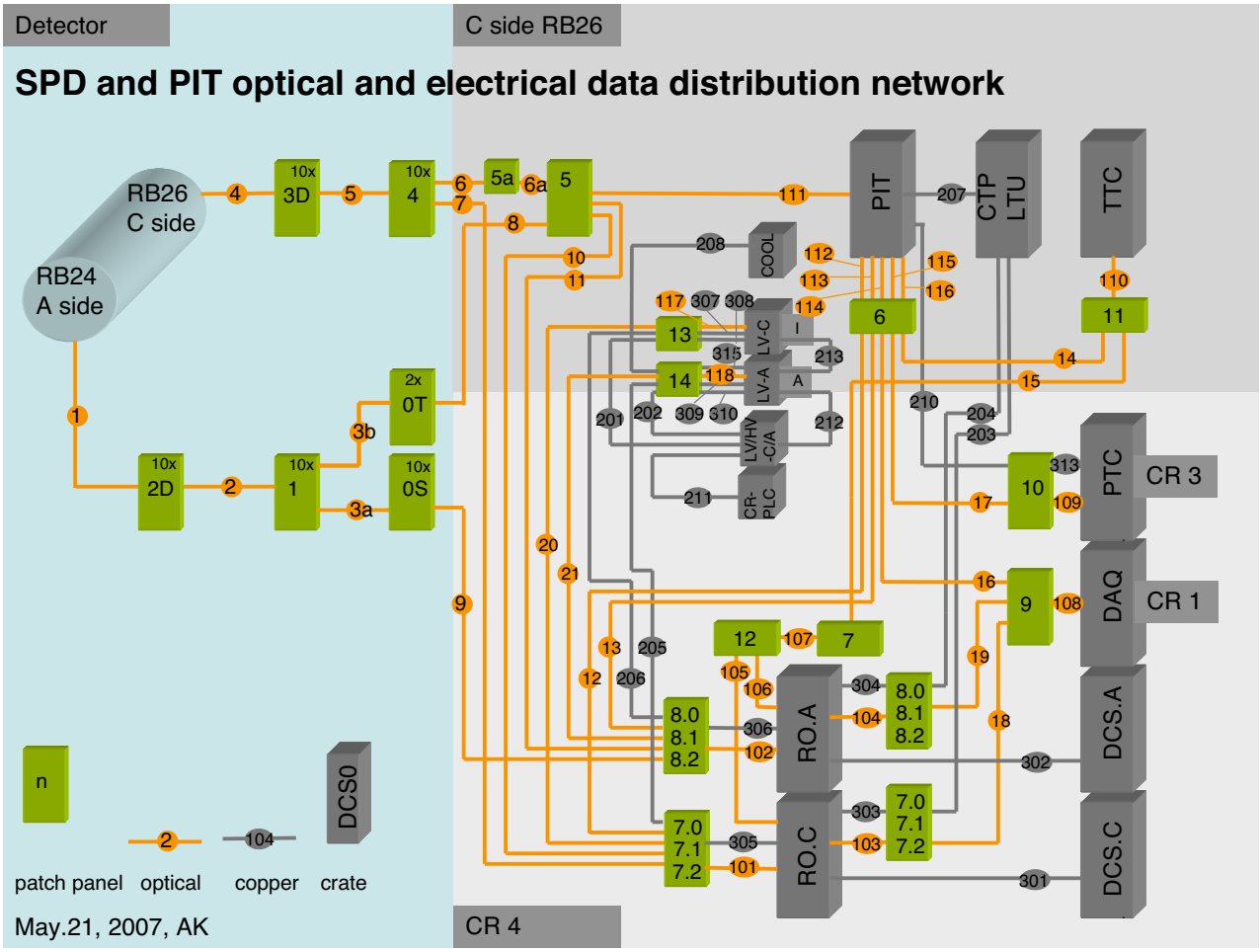


FIGURE 2. Data connections on optical and electrical cables.

From PP4 all optical signals are on patch cords in the cable trays on connected via the optical patch panel PP3D to the half-stave pig tails. A mixing-up of fibers in the installation in CR4, was equalized by renaming the patch cords on PP3 accordingly. As a result patch cord connections in PP4 are not in the correct place for the fibers concerned. Table @ shows the fibers and the change in the labelling.

In addition during the connection to the half-stave pig tails some fibers were found defective and spare fibers have been used instead and are outlined as follows:

Observations:

Sector 3 Serial 0 replaced for Z0 (broken connector on PP3)

Sector 4 Data 4 replaced for Z2

Sector 7 Data 2 replaced for Z2

The initial installation of the data fibers from PP4 to PP5 did not take into account that all fibers must have the same length and must be as short as possible. For that reason the fibers were cut in the C-area, the routing path was shortened and the fibers were re-spliced in a so called splicing box (PP5a, Figure 2). Table @ shows the length of each indivial cable coming from PP4 and going to PP5.

The initial installation of the clock&serial fibers on the C-side did not take into account that all fibers must have the same length. Table @ (mail Florian Oct 15) shows the length of the 10 cables from CR4 PP7 to the ten PP4 boxes. Additional cables are spliced in the Rack Y01 in CR4 to equalize this length.

3.1.1 Test of C-side optical connections

All MCMs on the C-side have been powered one by one. Clock, serial and data fibers have been connected with optical attenuators (clock 6dB, serial 5dB, data 8dB) to a universal SPD test board (MPT) and communication to the MCM has been established and verified by reading the id-registers of the MCM chips. Table @ shows the measurement protocol.

The MCM power supply currents as well as the sensor reverse current at 2 and 5V were recorded and can be seen in table @.

After a cooling leak in the silicon drift detector sensor leakage tests were repeated for a subset of half-staves. The results are shown in Table 3 (Smes09Aug07-1.xls)

Observations.

Sector 3 MCM1: serial signal was changed to spare signal Z0

Sector 4 MCM4: data was changed to spare signal Z2.

Sector 5 MCM2: data was changed to spare signal Z2.

Sector 7 MCM2: data was changed to spare signal Z2.

Sector 7 MCM3: serial was changed to Z1

Sector 8 MCM0: data was changed to spare signal Z2.

During the test the connector sector 6 Data 0 was found defective on PP4: data was changed to spare signal Z2.

Fig. @ shows the entire connection scheme.

-Sect 5:			
	ch 0 or 5	FW	ok
		2V	4 nA
		5V	7 nA
	ch 5 or 0	FW	ok
		2V	6 nA
		5V	54 nA
-Sect 6:			
	ch 0 or 5	FW	ok
		2V	7 nA
		5V	11 nA
		10V	10 nA
		20V	40 nA
	ch 5 or 0	FW	ok
		2V	75 nA
		5V	52 nA
		10V	50 nA
		20V	120 nA
-Sect 8:			
	ch 0 or 5	FW	ok
		2V	40 nA
		5V	45 nA
	ch 5 or 0	FW	ok
		2V	51 nA
		5V	60 nA
-Sect 9:			
	ch 0 or 5	FW	ok
		2V	56 nA
		5V	57 nA
	ch 5 or 0	FW	ok
		2V	199 nA
		5V	165 nA

Simone Ceresa

TABLE 3. Sensor leakage and forward tests (Petra, Simone, Smes09Aug07-1.xls)

3.2 A-side optical network

Clock and serial fibers come from CR4 PP8 on link 8 to PP0S. From there pre-fabricated optical cables connect via the mini-frame to PP1. Data (G-link) fibers run from PP8 in CR4 to a splitter box in C-area (PP5) and from to PP0T under the space frame. From there prefabricated cables connect to PP1. The lengths of the different sections can be found in table @. It is important that all fibers for the same links have the same length with a tolerance of 60 cm or 3 ns. The fibers for link 6 and 8 must be as short as possible but still must have all the same length.

From PP1 all optical signals are on patch cords in the cable trays on the service chariot connected via the optical patch panel PP2D to the half-stave pig tails.

3.2.1 Test of A-side optical connections

All MCM were switched on one by one using the cables coming out of the service chariotm and which will be connected to PP1. Clock, serial and data ware connected to the SPD MCM tester (MPT) with a 6 dB attenuator each. The MCM id registers were read and compared automatically to the expected value. Furthermore it was verified that the bias forward for all ladders was between @ and @. The reverse current for @ V was measured. Table 4 (MCMtestAside Oct 4) reports the test results.

Test on MCMs Side A

Side A	MCM	MCM JTAG	ChainPT 1000	Ladder 1		Ladder 2		Comments	Pixel Bus Impedance (Ω)
Sector	Half-Stave			HV_forward	Bias value (uA)	HV_forward	Bias value (uA)		
0	0	OK	5375	OK	0.13	OK	0.02		271
	1	OK	5387	OK	0.24	OK	0.09		268
	2	OK	5381	OK	0.06	OK	0.07		272
	3	OK	5382	OK	0.04	OK	0.05		275
	4	OK	5377	OK	0.04	OK	0.05	Check the R pixel bus in DSF	92
	5	OK	5380	OK	0.02	OK	0.05		271
1	0	OK	5404	OK	0.05	OK	0.03	swapped with A2.channel0 All optical fibers	269
	1	OK	5411	OK	0.22	OK	0.24		272
	2	OK	5400	OK	0.21	OK	0.09		263
	3	OK	5398	OK	0.04	OK	0.15		272
	4	OK	5395	OK	0.46	OK	0.3		257
	5	OK	5399	OK	0.16	OK	0.22	G-Link connected on cable spare Z2	269
2	0	OK	5389	OK	0.06	OK	0.07	swapped with A1.channel0 all optical fibers	270
	1	OK	5402	OK	0.24	OK	0.06		273
	2	OK	5394	OK	0.16	OK	0.03		264
	3	OK	5399	OK	0.08	OK	0.21		272
	4	OK	5525	OK	0.22	OK	0.03		203
	5	OK	5382	OK	0.38	OK	0.03		260
3	0	OK	5508	OK	0.19	OK	0.08		261
	1	OK	5441	OK	0.13	OK	0.14		256
	2	OK	5447	OK	0.18	OK	0.07		253
	3	OK	5386	OK	0.18	OK	0.17		271
	4	OK	5401	OK	0.13	OK	0.16		257
	5	OK	5384	OK	0.18	OK	0.15		255
4	0	OK	5436	OK	0.11	OK	0.2		274
	1	OK	5419	OK	0.07	OK	0.04		275
	2	OK	5402	OK	0.07	OK	0.06		268
	3	OK	5414	OK	0.12	OK	0.09		267
	4	OK	5410	OK	0.6	OK	0.05		272
	5	OK	5411	OK	0.06	OK	0.14		260
5	0	OK	5399	OK	0.05	OK	0.05		271
	1	OK	5421	OK	0.01	OK	0.02		232
	2	OK	5408	OK	0.02	OK	0.01		276
	3	OK	5397	OK	0.04	OK	0.06	Check the R pixel bus in DSF	110
	4	OK	5417	OK	0.01	OK	0.01		276
	5	OK	5412	OK	0.01	OK	0.01		276
6	0	OK	5435	OK	0.36	OK	0.07	Check the R pixel bus in DSF	83
	1	OK	5434	OK	0.01	OK	0.01		273
	2	OK	5408	OK	0.01	OK	0.01		273
	3	OK	5418	OK	0.01	OK	0.01		267
	4	OK	5420	OK	0.26	OK	0.03		275
	5	OK	5408	OK	0.32	OK	0.01		272
7	0	OK	5400	OK	0.15	OK	0.15		228
	1	OK	5384	OK	0.11	OK	0.1		262
	2	OK	5400	OK	0.02	OK	0.02		272
	3	OK	5390	OK	0.02	OK	0.02		272
	4	OK	5396	OK	0.02	OK	0.02		249
	5	OK	5386	OK	0.24	OK	0.1		253
8	0	OK	5385	OK	0.31	OK	0.05		274
	1	OK	5400	OK	0.1	OK	0.22	but with g link plugged without click	274
	2	OK	5419	OK	0.24	OK	0.03		217
	3	OK	5407	OK	0.19	OK	0.07		270
	4	OK	5411	OK	0.21	OK	0.02		266
	5	OK	5400	OK	0.06	OK	1.9	Leakage current high	224
9	0	OK	5402	OK	0.09	OK	0.05		274
	1	OK	5377	OK	0.72	OK	0.04		267
	2	OK	5391	OK	0.07	OK	0.18		274
	3	OK	5369	OK	0.18	OK	0.1		267
	4	OK	5370	OK	0.07	OK	0.22		222
	5	OK	not connected	OK	0.17	OK	0.07	PT1000 not connected	199

TABLE 4. MCM test, PT1000 chain measurement, sensor current and pixel chip power supply resistance for A-side on cables coming out of service chariot. (MCMtestAside Oct 4, MC)

Observations:

Sector1 MCM0 - Sectpr2 MCM0: All optical fibers (clock, serial, data) of Sector 1 MCM 0 and Sector 2 MCM 0 are connected to the respective other MCM. The inversion has been done on the level of the pig tails on PP2.

Sector A1 MCM5: Data has been conected to spare Z2.

Sector A8 channel5: leakage current 1.9 uA.

Sector A9 channel5: Pt1000 chain is not connected.

4.0 Temperature interlock (PLC)

4.1 PLC in I-rack for C-side

Figure @ shows a photograph of the installation. Figure @ shows the setup in the I-rack @.(PLC rack layout 23.oct)

All channels had been tested. The CAEN modules were powered but no channel was switched on. By changing the threshold in the PLC each of the 60 outpus was forced to send an interlock to the CAEN 3009 module. The arrival of the signal was verified by looking at the LED on the 3009 module.

Observation:

In the PLC code (Cesar code) the option was implemented to remove a channel from the interlock as there are at least two channels on the C-side and one on the A-side which have a non-working Pt1000 chain. These channels are:

Sector C6 channel0

Sector C9 channel4

Sector A9 channel5

5.0 Patch panels

5.1 Optical patch panel PP7 for the C-side in CR4

The layout of the signal connection of the optical patch panel 7 for the C-side in CR4 can be found in Figure 3 (CR4 opt P7/8legend). Note, that due to the mixing up during the cabling the fiber connections are not consequently in order.

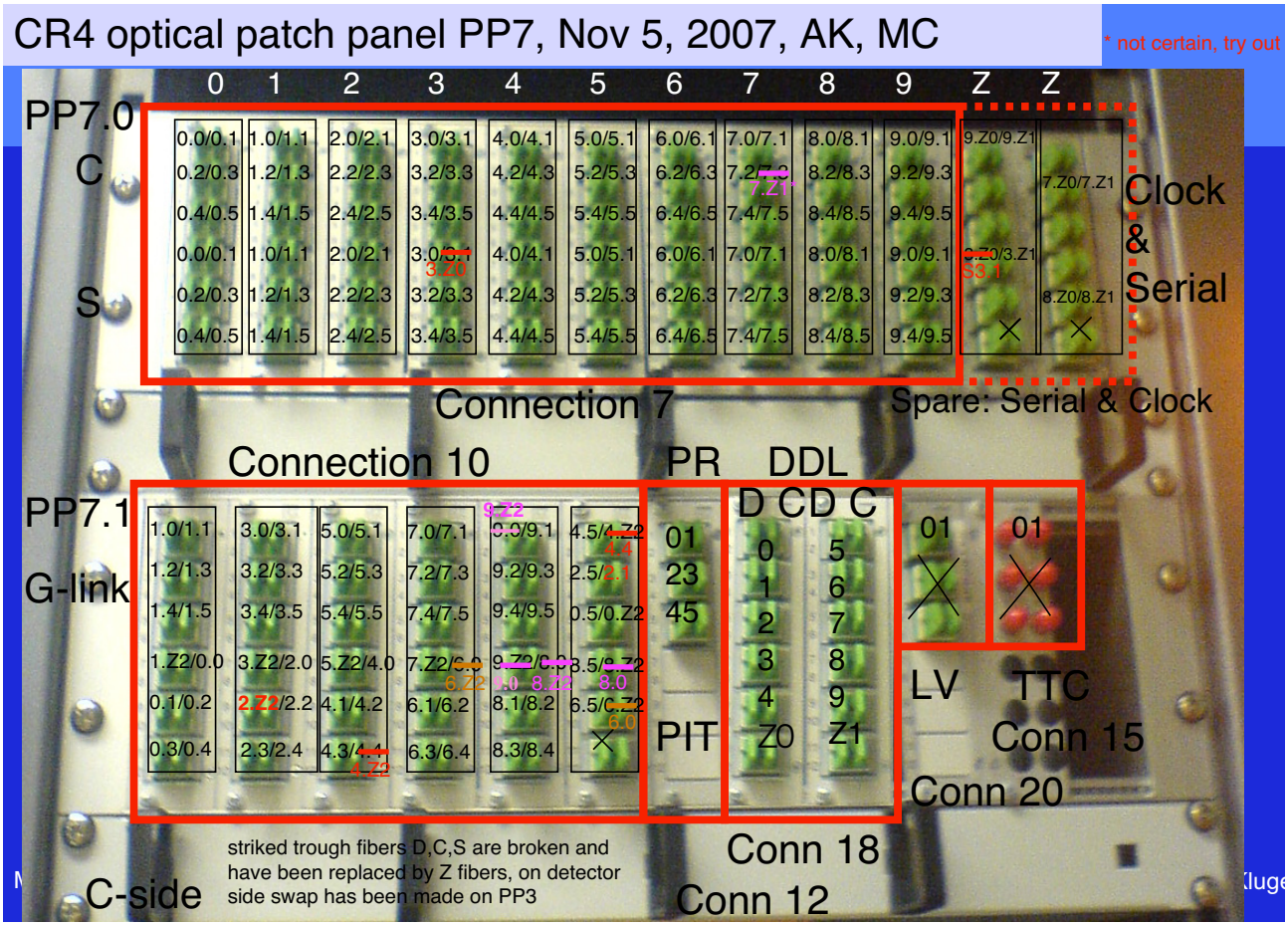


FIGURE 3. PP7 connection in CR4 - C-side (CR4 opt P7/8legend).

5.2 Optical patch panel PP8 for the A-side in CR4

The layout of the signal connection of the optical patch panel 7 for the A-side in CR4 can be found in figure @.

5.3 Optical patch panel PP5 (splitter box) in C-area

The layout of the signal connection of the optical patch panel 5 (splitter box) for can be found in figure @ (5 Nov). Note, that due to the mixing up during the cabling the fiber connections are not consequently in order.

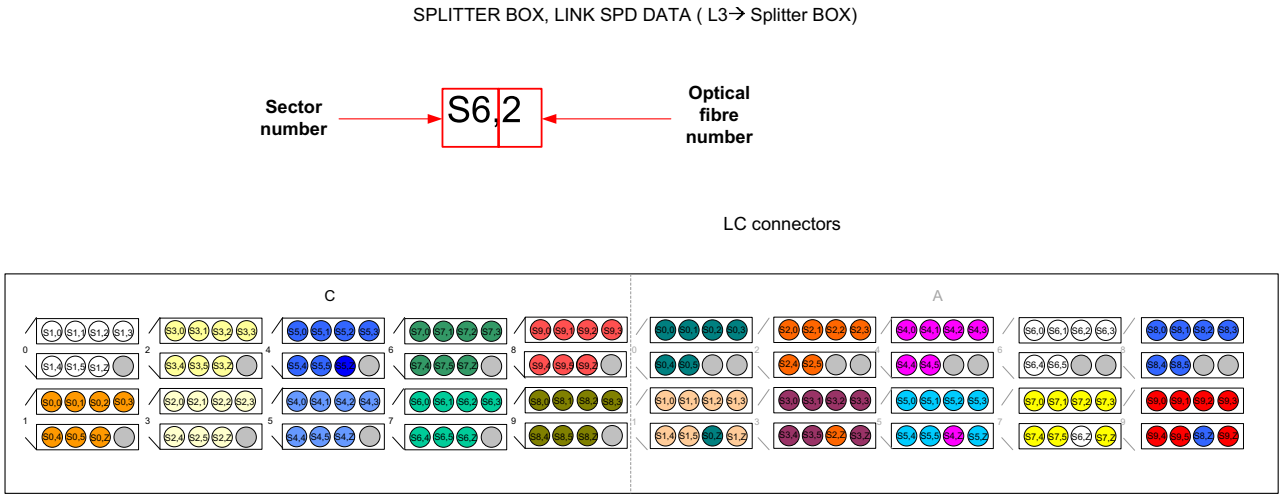


FIGURE 4. PP5 splitter box optical connections (Florian, PP5optLegend).

Absorber Cable Testing & connecting

Side C

Sector 0

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
0	1,895	1.95		2,84	2.85		✓/✓	125		125	125	
1	1,88	1.9		2,78	2.8		119.5/0	120		119.5	120	
2	1,85	1.85		2,75	2.75		116.8/0	115		114.8	115	
3	1,844	1.8		2,7	2.7		109.9/0	110		109.9	110	
4	1,758	1.75		2,66	2.65		105.1/0	105		105.2	105	
5	1,682	1.7		2,598	2.6		99.2/0	100		99.2	100	

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 5. Absorber measurements sector 0.

Absorber Cable Testing & connecting

Side C

Sector 1

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
			conn									
0	1,898	1.95		2,847	2.85		✓ / 0	125		125	125	
1	1,884	1.9		2,789	2.8		119,5 / 0	120		119,5	120	
2	1,840	1.85		2,739	2.75		114,8 / 0	115		114,8	115	
3	1,8	1.8	4,270	2,682	2.7		109,8 / 0	110		109,9	110	
4	1,756	1.75	4,50	2,655	2.65		105,1 / 0	105		105,1	105	
5	1,0	1.7	2,465	2,606	2.6		99,4 / 0	100		99,2	100	

3,01A

↳ verified on PP4: same error ⇒ [illegible] PP3 on PP3 [illegible] & ✓
[illegible]

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one **HV** sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

bus extender were labelled sector 3

TABLE 7. Absorber measurements sector 1.

Absorber Cable Testing & connecting

Side C

Sector 2

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
0	1,897	1.95		2,84	2.85		✓ / ✓	125		99,7	125	
1	1,892	1.9		2,78	2.8		119,9/119,5	120		118,1	120	
2	1,848	1.85		2,75	2.75		114,9/114,8	115		109,9	115	
3	1,8	1.8		2,7	2.7	4,6	109,9/109,9	110		114,9	110	
4	1,751	1.75		2,657	2.65	4,58	108,2/108,2	105		119,5	105	
5	1,69	1.7		[illegible] 2,6	2.6	4,3	99,7/99,7	100		125	100	

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

labels on bus extender rood sector 4.

TABLE 9. Absorber measurements sector 2.

Absorber **Cable Testing & connecting**

Side C 4.7.07

Sector 3

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
0	1,835	1.95		2,84	2.85		✓ / ✓	125		✓	125	
1	1,899	1.9		2,783	2.8		119,5 / 0	120		118,4	120	
2	1,848	1.85		2,746	2.75		114,7 / 0	115		114,7	115	
3	1,9	1.8		2,7	2.7		109,9 / 0	110		109,8	110	
4	1,752	1.75		2,656	2.65		104,2 / 0	105		[illegible]	105	
5	1,686	1.7		2.585	2.6		99,0 / 0	100		99,0	100	

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 11. Absorber measurements sector 3.

2.7.07

423 678

Absorber Cable Testing & connecting

Side C

Sector 4

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
0	1.94	1.95		2.85	2.85		✓ / ✓	125		✓	125	
1	~~2.90~~ 1.89	1.9		~~2.80~~ 2.8	2.8		125 / 125	120			120	
2	1.85	1.85		2.75	2.75		114.7 / 114.8	115			115	
3	✓	1.8		✓	2.7		109.9 / 109.9	110			110	
4	1.73	1.75		✓	2.65		105.1 / 105.1	105			105	
5	1.683	1.7		2.265	2.6		99.14 / 99.14	100		✓	100	

relax

5k6

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 13. Absorber measurements sector 4.

Absorber Cable Testing & connecting

Side C

Sector 5

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
0	1,835	1.95		2,84	2.85		✓/ ✓	125		✓	125	
1	1,880	1.9		2,78	2.8		119,5/0	120		119,5	120	
2	1,845	1.85		2,736	2.75		114,7/0	115		114,7	115	
3	1,802	1.8		2,695	2.7		109,8/0	110		109,8	110	
4	1,757	1.75		2,657	2.65		105,4/0	105		105,1	105	
5	1,7	1.7		2,6	2.6		99,1/0	100		99,1	100	

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 15. Absorber measurements sector 5.

Absorber Cable Testing & connecting

Side C

Sector 6

verified on PP4: same error
⇒ orange spare cable [illegible]

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
				HV max ✓	✓	conn						
0	1,925	1.95			2.85		✓ / ✓	125		✓	125	
1	1,885	1.9		2,792	2.8		119,5 / Ø	120		119,5	120	
2	1,850	1.85		2,750	2.75		114,8 / 0	115		114,8	115	
3	1,805	1.8		2,7	2.7		109,8 / 0	110		109,8	110	
4	1,757	1.75		2,660	2.65		105,1 / 0	105		105,1	105	
5	1,692	1.7		2,6	2.6		99,2 / 0	100		99,2	100	

0 = same as '0' Bias Ø

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 17. Absorber measurements sector 6.

Absorber Cable Testing & connecting

Side C

Sector 7

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
0	1.938	1.95		2840	2.85		V / V	125		125	125	
1	1.881	1.9		2786	2.8		119.5/ 0	120		119.5	120	
2	1845	1.85		2740	2.75		116.8/ 0	115		116.8	115	
3	1.8	1.8		2699	2.7		109.9/ 0	110		109.8	110	
4	1.759	1.75		2660	2.65		105 / V	105		105.1	105	
5	1.7	1.7		2606	2.6		99.2/	100		99.2	100	

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 19. Absorber measurements sector 7.

Absorber Cable Testing & connecting

Side C

Sector 8

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations (Conn)	Bias measured (0 / 1)	bias expected	Observation	Temp measured	temp expected	Observation
0	1,972	1.95		2,84	2.85	4,975	✓ / ✓	125		125	125	
1	1,89	1.9		2,788	2.8	4,975	1195 / 0	120		119.5	120	
2	1,95	1.85		2,746	2.75	4,950	1148 / 0	115		114.8	115	
3	1,804	1.8		2,7	2.7		1099 0	110		109.9	110	
4	1,75	1.75		2,658	2.65		1051 0	105		105.1	105	
5	1,69	1.7		2,597	2.6		991 / 0	100		99.2	100	

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 21. Absorber measurements sector 8.

Absorber Cable Testing & connecting

Side C

Sector 9 [illegible]

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
		3,380	open									
0	1,24	1.95	2,805	2,858	2.85		125/ ✓	125		✓	125	
1	1,882	1.9	4,820	2,787	2.8		119,5/0	120		119,5	120	
2	1,847	1.85	4,660	2,743	2.75		114,7/0	115		114,8	115	
3	1,8	1.8		2,688	2.7		108,9/0	110		1088	110	
4	1,757	1.75		2,660	2.65		105,1/0	105		105,1	105	
5	1,688	1.7		2,604	2.6		98,1/0	100		99,2	100	

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 23. Absorber measurements sector 9.

Rack I Cable Testing & connecting

Side C

Sector Ø (Horst + Petra) 10:30 / 4.7.2007

HS	Bus Nominal Voltage V	Bus Connector Voltage V	Bus current A	Observations	MCM Nominal Voltage V	MCM Connector Voltage V	MCM current A	Observations	Bias current	bias voltage	temp current	Temp Voltage
0	1.95	4.740	5.77	/	2.85	4.960	0.60	/	4.76	125	0.03	125
1	1.9	4.650	5.68	/	2.8	4.875	0.59	/	4.63	120	0.08	120
2	1.85	4.555	5.56	/	2.75	4.810	0.59	/	4.25	115	0.05	115
3	1.8	4.435	5.38	/	2.7	4.715	0.56	/	4.26	110	0.05	110
4	1.75	4.310	4.24	→ 5.25*	2.65	4.660	0.55	/	3.93	105	0.06	105
5	1.7	4.180	5.09	/	2.6	4.535	0.54	/	3.74	100	0.06	100

* changed to nominal value after few minutes, connector voltage increased by 15mV to 4.325

1) Switch on MCM & Bus to nominal voltages, wait for confirmation from abosrber
2) Switch off all; disconnect Anderson and sense from CAEN
3) Connect Anderson-short circuiter to cables of this sector
4) Connect Det Bias to CAEN HV channels set to nominal values and wait for confirmation & connect HV short circuiter
5) Connect temperature sensor CAEN HV and set nominal voltages and wait for confirmation

TABLE 25. Rack I measurements sector 0.

Rack I Cable Testing & connecting

Side C

Sector 1 (Romualdo, Horst)

HS	Bus Nominal Voltage V	Bus Connector Voltage V	Bus current A	Observations	MCM Nominal Voltage V	MCM Connector Voltage V	MCM current A	Observations	Bias current	bias voltage	temp current	Temp Voltage
0	1.95	4.660	5.77	/	2.85	4.800	0.59	/	4.76	125	0.03	125
1	1.9	4.513	5.85	/	2.8	4.800	0.58	/	4.64	120	0.07	120
2	1.85	4.465	5.54	/	2.75	4.735	0.58	/	4.25	115	0.05	115
3	1.8	4.385	5.36	/	2.7	4.770	0.55	/	4.27	110	0.06	110
4	1.75	4.250	5.23	/	2.65	4.675	0.54	/	3.92	105	0.07	105
5	1.7	2.460	3.01*	lowcurrent	2.6	4.485	0.55	/	3.74	100	0.06	100
		2.455				4.800						

*low current, changing channel didn't improve

1) Switch on MCM & Bus to nominal voltages, wait for confirmation from abosrber
2) Switch off all; disconnect Anderson and sense from CAEN
3) Connect Anderson-short circuiter to cables of this sector
4) Connect Det Bias to CAEN HV channels set to nominal values and wait for confirmation & connect HV short circuiter
5) Connect temperature sensor CAEN HV and set nominal voltages and wait for confirmation

4.7.2007 (Petra): check BUS 5 (too low current) on PP rack I with charge:

$V_B = 1.7V$, I_B = [illegible] 5.26 A $V_{connector} = 1.8V$

TABLE 27. Rack I measurements sector 1.

TABLE 29. Rack I measurements sector 2.

Rack I **Cable Testing & connecting**

Side C

Sector 2 (Horst + Petra) 11:35/2-7-2007

HS	Bus Nominal Voltage V	Bus Connector Voltage V	Bus current A	Observations	MCM Nominal Voltage V	MCM Connector Voltage V	MCM current A	Observations	Bias current	bias voltage	temp current	Temp Voltage
0	1.95	4.67	5.78	–	2.85	4.855	0.59	–	4.71µA	125	10µA	125
1	1.9	4.60	5.69	–	2.8	4.78	0.58	–	4.63µA	120	10nA	120
2	1.85	4.51	5.56	–	2.75	4.70	0.58	–	4.25µA	115	50nA	115
3	1.8	4.385	5.37	–	2.7	4.60	0.56	–	4.26µA	110	50nA	110
4	1.75	4.24	5.23	–	2.65	4.55	0.55	–	3.93µA	105	50nA	105
5	1.7	4.10	5.10	–	2.6	4.43	054	–	3.72µA	100	20µA	100

1) Switch on MCM & Bus to nominal voltages, wait for confirmation from abosrber
2) Switch off all; disconnect Anderson and sense from CAEN
3) Connect Anderson-short circuiter to cables of this sector
4) Connect Det Bias to CAEN HV channels set to nominal values and wait for confirmation & connect HV short circuiter
5) Connect temperature sensor CAEN HV and set nominal voltages and wait for confirmation

	MCM	BUS	
CH 0	4.86	4.67	connector voltages after check of Tichel box
1	4.78	4.56	
2	4.71	4.47	
3	4.6	4.35	
4	4.55	4.23	
5	4.54	4.10	

Rack I Cable Testing & connecting

Side C

Sector 3 (Horst + Petro) 9:45 / 4.7.07

HS	Bus Nominal Voltage V	Bus Connector Voltage V	Bus current A	Observations	MCM Nominal Voltage V	MCM Connector Voltage V	MCM current A	Observations	Bias current	bias voltage	temp current	Temp Voltage
0	1.95	4.645	5.76	✓	2.85	4.830	0.59	✓	4.76	125	0.03	125
1	1.9	4.560	5.67	✓	2.8	4.755	0.58	✓	4.63	120	0.09	120
2	1.85	4.475	5.55	✓	2.75	4.685	0.58	✓	4.24	115	0.06	115
3	1.8	4.360	5.37	✓	2.7	4.595	0.56	✓	4.26	110	0.06	110
4	1.75	4.225	5.23	✓	2.65	4.535	0.54	✓	3.93	105	0.07	105
5	1.7	4.090	5.08	✓	2.6	4.415	0.54	✓	3.74	100	0.04	100

1) Switch on MCM & Bus to nominal voltages, wait for confirmation from abosrber ✓
2) Switch off all; disconnect Anderson and sense from CAEN ✓
3) Connect Anderson-short circuiter to cables of this sector ✓
4) Connect Det Bias to CAEN HV channels set to nominal values and wait for confirmation & connect HV short circuiter ✓
5) Connect temperature sensor CAEN HV and set nominal voltages and wait for confirmation ✓

TABLE 31. Rack I measurements sector 3.

Rack I Cable Testing & connecting

Side C

10:44 / 2.7.2007

Sector 4 (Horst + Petra)

HS	Bus Nominal Voltage V	Bus Connector Voltage V	Bus current A	Observations	MCM Nominal Voltage V	MCM Connector Voltage V	MCM current A	Observations	Bias current	bias voltage	temp current	Temp Voltage
0	1.95	4.775	5.77 A	/	2.85	4.92	TRIP* →	0.58A	4.74μA	125		125
1	1.9	4.690	5.69A	/	2.8	4.830	0.58A	/	4.62μA	120		120
2	1.85	4.61	5.57A	/	2.75	4.77	0.58A	/	4.24μA	115		115
3	1.8	4.48	5.39A	/	2.7	4.67	0.55A	/	4.27μA	110		110
4	1.75	4.33	5.24A	/	2.65	4.61	0.54 A	/	3.91μA	105		105
5	1.7	4.23	5.11A	/	2.6	4.50	0.54A	/	3.73μA	100		100

* increased I-limit (1turn, HW)

cable problem:
- order inverted
- Ø missing

1) Switch on MCM & Bus to nominal voltages, wait for confirmation from abosrber
2) Switch off all; disconnect Anderson and sense from CAEN
3) Connect Anderson-short circuiter to cables of this sector
4) Connect Det Bias to CAEN HV channels set to nominal values and wait for confirmation & connect HV short circuiter
5) Connect temperature sensor CAEN HV and set nominal voltages and wait for confirmation

Pt1000 : connected Resistor-termination (5.6k on each channel)

TABLE 33. Rack I measurements sector 4.

Rack I Cable Testing & connecting

Side C

Sector 5 (Horst + Petra) 10:00 / 4.7.2007

HS	Bus Nominal Voltage V	Bus Connector Voltage V	Bus current A	Observations	MCM Nominal Voltage V	MCM Connector Voltage V	MCM current A	Observations	Bias current	bias voltage	temp current	Temp Voltage
0	1.95	4.930	5.75	✓	2.85	5.220	0.59	✓	4.76	125	0.03	125
1	1.9	4.825	5.64	✓	2.8	5.130	0.58	✓	4.63	120	0.08	120
2	1.85	4.755	5.54	✓	2.75	5.055	0.59	✓	4.24	115	0.05	115
3	1.8	4.635	5.37	✓	2.7	4.960	0.56	✓	4.27	110	0.06	110
4	1.75	4.510	5.24	✓	2.65	4.910	0.55	✓	3.93	105	0.06	105
5	1.7	4.370	5.11	✓	2.6	4.790	0.55	✓	3.74	100	0.05	100

1) Switch on MCM & Bus to nominal voltages, wait for confirmation from abosrber
2) Switch off all; disconnect Anderson and sense from CAEN
3) Connect Anderson-short circuiter to cables of this sector
4) Connect Det Bias to CAEN HV channels set to nominal values and wait for confirmation & connect HV short circuiter
5) Connect temperature sensor CAEN HV and set nominal voltages and wait for confirmation

TABLE 35. Rack I measurements sector 5.

Rack I Cable Testing & connecting

Side C

Sector 6 (Petra, Romualdo, Horst)

HS	Bus Nominal Voltage V	Bus Connector Voltage V	Bus current A	Observations	MCM Nominal Voltage V	MCM Connector Voltage V	MCM current A	Observations	Bias current	bias voltage	temp current	Temp Voltage
0	1.95	5.030	2.30		2.85	/	/	HVMAX	4.76	125	0.04	125
1	1.9	4.945	5.70		2.8	0.57	5.2		4.62	120	0.47	120
2	1.85	4.855	5.58		2.75	0.58	5.135		4.25	115	0.65	115
3	1.8	4.725	5.41		2.7	0.56	5.030		4.27	110	0.06	110
4	1.75	4.890	5.25		2.65	0.54	4.970		3.82	105	0.06	105
5	1.7	4.495	5.11		2.6	0.54	4.848		3.74	100	0.06	100

MCM current and connector voltage inverted

1) Switch on MCM & Bus to nominal voltages, wait for confirmation from abosrber
2) Switch off all; disconnect Anderson and sense from CAEN
3) Connect Anderson-short circuiter to cables of this sector
4) Connect Det Bias to CAEN HV channels set to nominal values and wait for confirmation & connect HV short circuiter
5) Connect temperature sensor CAEN HV and set nominal voltages and wait for confirmation

4.7. Investigate HV max problem on MCM Ø : connect local charge to PP on rack I
→ MCM-current: 0.55A / 2.85V, connector voltage : 2.91V

TABLE 37. Rack I measurements sector 6.

Rack I Cable Testing & connecting

Side C

Sector 7 (Horst + Petra)

15:30/ 3.7.2007

HS	Bus Nominal Voltage V	Bus Connector Voltage V	Bus current A	Observations	MCM Nominal Voltage V	MCM Connector Voltage V	MCM current A	Observations	Bias current	bias voltage	temp current	Temp Voltage
0	1.95	5.035	5.76	✓	2.85	5.330	0.58	✓	4.76μA	125	0.03	125
1	1.9	4.935	5.65	✓	2.8	5.240	0.58	✓	4.64μA	120	0.07	120
2	1.85	4.855	5.55	HVmax *	2.75	5.165	0.58	HVmax *	4.27μA	115	0.05	115
3	1.8	4.735	5.38	HVmax *	2.7	5.065	0.56	HVmax *	4.28μA	110	0.06	110
4	1.75	4.610	5.25	✓	2.65	5.015	0.54	✓	3.92μA	105	0.06	105
5	1.7	4.475	5.12	✓	2.6	4.890	0.54	✓	3.74μA	100	0.06	100

* senses mixed → corrected

1) Switch on MCM & Bus to nominal voltages, wait for confirmation from abosrber ✓
2) Switch off all; disconnect Anderson and sense from CAEN ✓
3) Connect Anderson-short circuiter to cables of this sector ✓
4) Connect Det Bias to CAEN HV channels set to nominal values and wait for confirmation & connect HV short circuiter ✓
5) Connect temperature sensor CAEN HV and set nominal voltages and wait for confirmation ✓

TABLE 39. Rack I measurements sector 7.

Absorber Cable Testing & connecting

Side C

Sector 8

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
				2,94		Conn						
0	1,972	1.95		[illegible]	2.85	4,95	✓ / ✓	125		125	125	
1	1,89	1.9		2,788	2.8	4,95	125 / 0	120		119.5	120	
2	1,95	1.85		2,746	2.75	4,950	118 / 0	115		116.8	115	
3	1,804	1.8		2,7	2.7		109 / 0	110		109.9	110	
4	1,75	1.75		2,658	2.65		105 / 0	105		105.1	105	
5	1,69	1.7		2,597	2.6		99 / 0	100		99.2	100	

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 41. Rack I measurements sector 8.

Absorber Cable Testing & connecting

Side C

Sector 9

not verified on PP4 : [illegible]

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
		3,380	open									
0	[illegible]	1.95	2,805	2,838	2.85		125/ ✓	125		✓	125	
1	1,882	1.9	4,820	2,787	2.8		119,5/0	120		119,5	120	
2	1,847	1.85	4,660	2,743	2.75		114,7/0	115		114,8	115	
3	1,8	1.8		2,688	2.7		109,9/0	110		1088	110	
4	1,757	1.75		2,660	2.65		105,1/0	105		105,1	105	
5	1,698	1.7		2,604	2.6		98,1/0	100		88,2	100	

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 43. Rack I measurements sector 9.

Sheet [illegible]/10

Equipment needed: PC, MPT, optical fiber patch cords, scope, optical head, power meter

1) connect clk, serial and g-link of corresponding channel to MPT card with attenuator
2) Run JTAG tester

HS	Observations
0	0
1	0
2	0
3	0
4	0
5	0 to low current

Sheet /10

TABLE 45. MCM test protocol CR4 C-side sector 0.

Sheet 1/10

CR4 MCM tests

Equipment needed: PC, MPT, optical fiber patch cords, scope, optical head, power meter

1) connect clk, serial and g-link of corresponding channel to MPT card with attenuator
2) Run JTAG tester

HS Observations

0 0
1 0
2 0
3 0
4 0
5 0 clk cannot be sent

Sheet /10

TABLE 47. MCM test protocol CR4 C-side sector 1.

Sheet 2 /10

CR4 MCM testing

Equipment needed: PC, MPT, optical fiber patch cords, scope, optical head, power meter

1) connect clk, serial and g-link of corresponding channel to MPT card with attenuator
2) Run JTAG tester

HS	Observations
0	O
1	O
2	O
3	O
4	O
5	O [illegible] current

Sheet /10

TABLE 49. MCM test protocol CR4 C-side sector 2.

Sheet 3/10
CR4 MCM testing

G-link 8dB (Attenuator) + 2 patchcords (=2 connectors)
clk 6 dB 1 line Attenuator
serial 5 dB

Equipment needed: PC, MPT, optical fiber patch cords, scope, optical head, power meter

1) connect clk, serial and g-link of corresponding channel to MPT card with attenuator
2) Run JTAG tester

HS	Observations
0	O
1	→ locks but all scope signals low ! Attenuator ?
2	O
3	O
4	O
5	O ✓ too low current

Sheet /10

checked with scope = 0

TABLE 51. MCM test protocol CR4 C-side sector 3.

Sheet 4/10

CR4 MCM testing

Equipment needed: PC, MPT, optical fiber patch cords, scope, optical head, power meter

1) connect clk, serial and g-link of corresponding channel to MPT card with attenuator
2) Run JTAG tester

HS	Observations
0	O
1	O
2	O
3	O
4	O D → 13 moved to Z2
5	O too low current

Sheet /10

TABLE 53. MCM test protocol CR4 C-side sector 4.

Sheet 5/10

CR4 MCM testing

Equipment needed: PC, MPT, optical fiber patch cords, scope, optical head, power meter

1) connect clk, serial and g-link of corresponding channel to MPT card with attenuator
2) Run JTAG tester

HS	Observations
0	O
1	O
2	O → [illegible]
3	O
4	O
5	O

Sheet /10

TABLE 55. MCM test protocol CR4 C-side sector 5.

Sheet 6/10

CR4 MCM testing

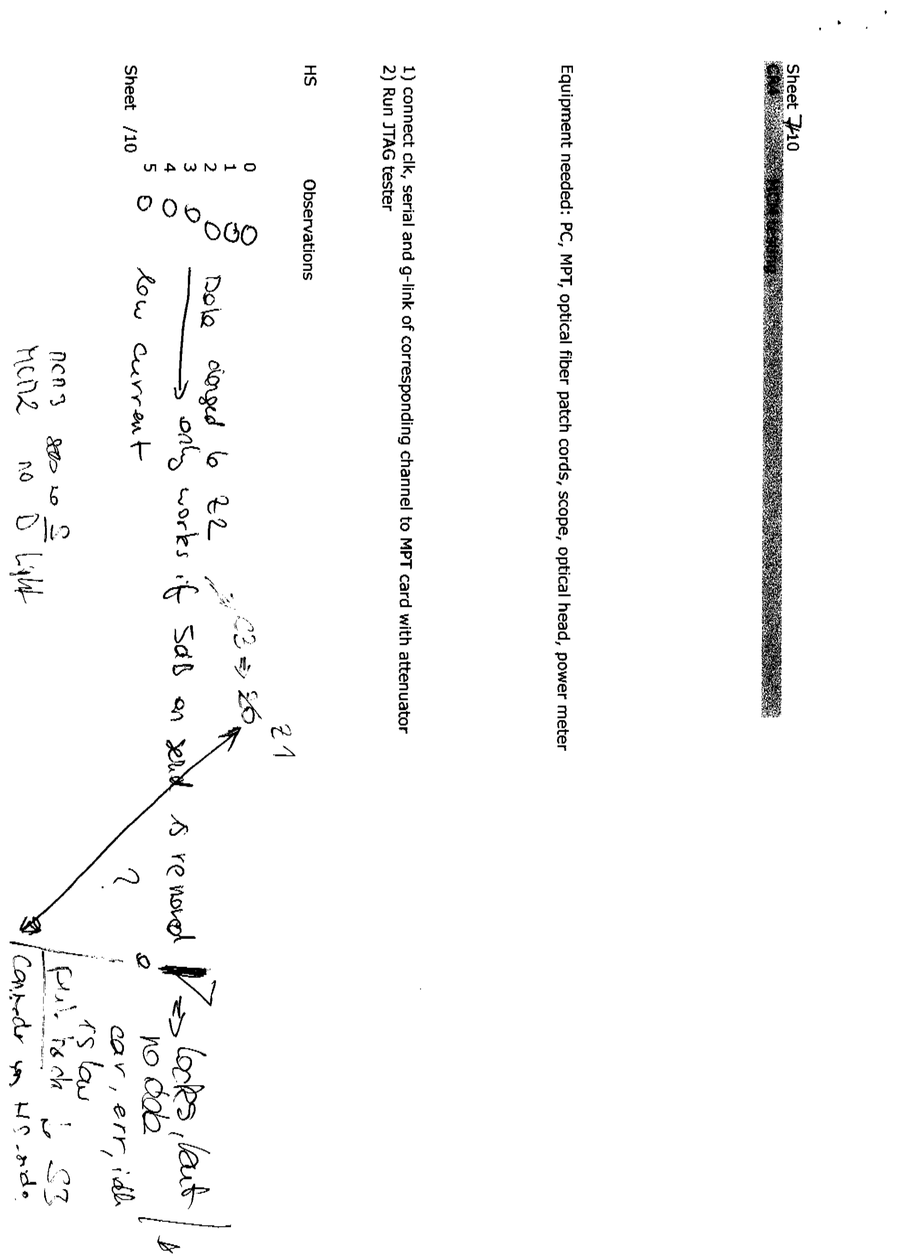
Equipment needed: PC, MPT, optical fiber patch cords, scope, optical head, power meter

1) connect clk, serial and g-link of corresponding channel to MPT card with attenuator
2) Run JTAG tester

HS	Observations
0	not yet tested ✓
1	0
2	0
3	0
4	~~clock cond~~ clo cond correct clock ✓
5	〃 + 7,5 appears twice in list ✓

Sheet /10

TABLE 57. MCM test protocol CR4 C-side sector 6.



Sheet 7/10

CR4 MCM testing

Equipment needed: PC, MPT, optical fiber patch cords, scope, optical head, power meter

1) connect clk, serial and g-link of corresponding channel to MPT card with attenuator
2) Run JTAG tester

HS	Observations
0	
1	
2	Data ...
3	→ only works if 5dB on ... is removed → locks, but no data
4	
5	low current

Sheet /10

TABLE 59. AMCM test protocol CR4 C-side sector 7.

Absorber Cable Testing & connecting

Side C

Sector 8

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations Conn	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
0	1,972	1.95		[illegible] 2,94	2.85	4,995	✓ / ✓	125		125	125	
1	1,89	1.9		2,788	2.8	4,995	1195 / 0	120		119.5	120	
2	1,95	1.85		2,746	2.75	4,990	1148 / 0	115		114.8	115	
3	1,804	1.8		2,7	2.7		109.9 / 0	110		109.9	110	
4	1,75	1.75		2,658	2.65		105.1 / 0	105		105.1	105	
5	1,68	1.7		2,597	2.6		99.1 / 0	100		99.2	100	

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 61. MCM test protocol CR4 C-side sector 8.

Absorber Cable Testing & connecting

Side C

Sector 9

[illegible]

HS	Bus measured Voltage V	Bus expected voltage	Observations	MCM measured Voltage	MCM expected voltage V	Observations	Bias measured 0 / 1	bias expected	Observation	Temp measured	temp expected	Observation
0	1,14	1.95	2,805	2,858	2.85		125/ ✓	125		✓	125	
1	1,882	1.9	4,820	2,787	2.8		119,5/0	120		119,5	120	
2	1,847	1.85	4,660	2,743	2.75		114,7/0	115		114,8	115	
3	1,8	1.8		2,688	2.7		108,9/0	110		108,8	110	
4	1,757	1.75		2,660	2.65		105,1/0	105		105,1	105	
5	1,698	1.7		2,604	2.6		98,1/0	100		98,2	100	

3,380 open

0) open PP3
1) Measure all MCM & Bus voltages

2) Measure on one by one HV sensor and confirm
3) Measure on one by one temperature sensor and confirm after each channel
4) Connect Bus and MCM to detector
5) use laser for proper routing & clean optics & connect optics
6) close PP3

TABLE 63. MCM test protocol CR4 C-side sector 9.

Sheet /10
Rack I MCM testing

Side C
Sector 0

17:30 5.7.2007

CAEN power supply Hardware limits must be set back to ALICE nominal
LV and current and limits must be set to ALICE nominal for MCM 2.6V/0.5A
LV and limits must be set to 0V for bus

MCM nominal voltage is 2.6
Bus is on 0V!

0) Connect 6 multimeters/Cesar box to PT5000 chain and verify visually that none leave the nominal value of x Ohm.
1) Connect Sense wire short circuiter on bus sense wires
2) Connect MCM-Anderson cable of sector to Anderson cable adapter and connect adapter to CAEN
3) Switch on/off the MCM of the sector one by one (0->5) and wait for confirmation.

4) Disconnect Anderson cable from CAEN and connect Anderson short circuiter
5) Connect HV bias and measure I
6) Disconnect HV bias and connect together

HS	Observations Imcm	Imcm + CLK [A]		I(uA) at 2V		I(uA) at 5V [uA]	@ 10V
0	0.27	0.39	0	0.1	6	0.07	0.06
1	0.27	0.40	1	0.18	7	0.22	
2	0.29	0.41	2	0.15	8	0.19	
3	0.27	0.38	3	0.13	9	0.14	
4	0.27	0.38	4	1.20	10	1.31	
* 5	0.17	0.23	5	0.44	11	0.42	

Sheet /10

TABLE 65. Rack I measurements for MCM on C-side sector 0.

Sheet /10
Rack I MCM testing

Side C
Sector 1

CAEN power supply Hardware limits must be set back to ALICE nominal
LV and current and limits must be set to ALICE nominal for MCM 2.6V/0.5A
LV and limits must be set to 0V for bus

MCM nominal voltage is 2.6
Bus is on 0V!

0) Connect 6 multimeters/Cesar box to PT5000 chain and verify visually that none leave the nominal value of x Ohm.
1) Connect Sense wire short circuiter on bus sense wires
2) Connect MCM-Anderson cable of sector to Anderson cable adapter and connect adapter to CAEN
3) Switch on/off the MCM of the sector one by one (0->5) and wait for confirmation.

4) Disconnect Anderson cable from CAEN and connect Anderson short circuiter
5) Connect HV bias and measure I
6) Disconnect HV bias and connect together

HS	Observations: Inom	Inom +CLK [A]		I(uA) @2V		I(uA) @5V [nA]	@10V
0	0.28	0.40	0	0.98	6	0.15	
1	0.27	0.39	1	0.28	7	0.39	
2	0.29	0.40	2	0.40	8	0.39	
3	0.26	0.39	3	0.23	9	0.17	
* 4	0.27	0.48®	4	0.11	10	0.11	0.10
5	0.17	0.23	5	0.51	11	0.55	

Sheet /10

® after retesting channel o.k.
* cannot find CLK-fibre in CR4

TABLE 67. Rack I measurements for MCM on C-side sector 1.

Sheet /10
Rack I MCM testing

Side C
Sector 2

Pietro + Alex 16:40 / 5.7.07

CAEN power supply Hardware limits must be set back to ALICE nominal
LV and current and limits must be set to ALICE nominal for MCM 2.6V/0.5A
LV and limits must be set to 0V for bus

MCM nominal voltage is 2.6
Bus is on 0V!

0) Connect 6 multimeters/Cesar box to PT5000 chain and verify visually that none leave the nominal value of x Ohm.
1) Connect Sense wire short circuiter on bus sense wires
2) Connect MCM-Anderson cable of sector to Anderson cable adapter and connect adapter to CAEN
3) Switch on/off the MCM of the sector one by one (0->5) and wait for confirmation.

4) Disconnect Anderson cable from CAEN and connect Anderson short circuiter
5) Connect HV bias and measure I
6) Disconnect HV bias and connect together

HS Observations

$V_{set} = 2.6V$

HS	I_{MCM}	I_{MCM}^{+CLK} [A]		I(uA)@2V [uA]		I(uA)@5V [uA]
0	0.27A	0.40	0	0.09	6	0.11
1	0.27A	0.39	1	0.15	8	0.17
2	0.29A	0.40	2	0.62	9	0.63
3	0.27A	0.39	3	0.12	10	0.13
4	0.28A	0.40	4	0.13	11	0.14
5	0.17A	0.22	5	0.15		0.17

Low!* Sheet /10

TABLE 69. Rack I measurements for MCM on C-side sector 2.

Sheet /10
Rack I MCM testing

Simone, Alex, Petra 15:10 5/7/200[illegible]

Side C
Sector 3

CAEN power supply Hardware limits must be set back to ALICE nominal
LV and current and limits must be set to ALICE nominal for MCM 2.6V/0.5A
LV and limits must be set to 0V for bus

MCM nominal voltage is 2.6
Bus is on 0V!

0) Connect 6 multimeters/Cesar box to PT5000 chain and verify visually that none leave the nominal value of x Ohm.
1) Connect Sense wire short circuiter on bus sense wires
2) Connect MCM-Anderson cable of sector to Anderson cable adapter and connect adapter to CAEN
3) Switch on/off the MCM of the sector one by one (0->5) and wait for confirmation.

4) Disconnect Anderson cable from CAEN and connect Anderson short circuiter
5) Connect HV bias and measure I
6) Disconnect HV bias and connect together

HS	Observations Vset=2.6V Imcm	Vcau	Imcm +clk		I(uA) @2V		@5V	@10V	@20V
0	0.28A	3.48	[illegible] 0.40A	0	0.36uA	6	0.33uA	0.31uA	
too low * 1	0.26A	3.46	0.36A ->0.33*	1	0.62uA	7	0.67uA	0.63uA	1.4uA increase
2	0.29A	3.86	0.40A	2	0.39	8	0.28		
3	0.27		0.40A	3	0.52	9	0.48		
4	0.27		0.40A	4	0.38	10	0.26		
* 5	0.17		0.23A	5	0.80	11	0.90	0.87	

Sheet /10

*retesting ch.

TABLE 71. Rack I measurements for MCM on C-side sector 3.

Sheet /10
Rack I MCM testing

Side C
Sector 4

CAEN power supply Hardware limits must be set back to ALICE nominal
LV and current and limits must be set to ALICE nominal for MCM 2.6V/0.5A
LV and limits must be set to 0V for bus

MCM nominal voltage is 2.6
Bus is on 0V!

0) Connect 6 multimeters/Cesar box to PT5000 chain and verify visually that none leave the nominal value of x Ohm.
1) Connect Sense wire short circuiter on bus sense wires
2) Connect MCM-Anderson cable of sector to Anderson cable adapter and connect adapter to CAEN
3) Switch on/off the MCM of the sector one by one (0->5) and wait for confirmation.

4) Disconnect Anderson cable from CAEN and connect Anderson short circuiter
5) Connect HV bias and measure I
6) Disconnect HV bias and connect together

HS	I mcm	I mcm +CLK [A]	Observations		I(uA) @2V		I(uA) @5V [uA]	@10V
0	0.28	0.40		0	0.06	6	0.13	
1	0.27	0.39		1	0.17	7	0.20	
2	0.29	0.40		2	1.16	8	1.36	
3	0.28	0.40		3	0.21	9	0.20	
[illegible] 4	0.27	0.39		4	0.12	10	0.12	Spare fibre !
5	0.17	0.22		5	0.13	11	0.14	

Sheet /10

→ connect MCM5 to LVPS-MCM1 → 0.40A ✓ MCM ok

TABLE 73. Rack I measurements for MCM on C-side sector 4.

19:45 5.7.07

Sheet /10
Rack I MCM testing

Side C
Sector 5

CAEN power supply Hardware limits must be set back to ALICE nominal
LV and current and limits must be set to ALICE nominal for MCM 2.6V/0.5A
LV and limits must be set to 0V for bus

MCM nominal voltage is 2.6
Bus is on 0V!

0) Connect 6 multimeters/Cesar box to PT5000 chain and verify visually that none leave the nominal value of x Ohm.
1) Connect Sense wire short circuiter on bus sense wires
2) Connect MCM-Anderson cable of sector to Anderson cable adapter and connect adapter to CAEN
3) Switch on/off the MCM of the sector one by one (0->5) and wait for confirmation.

4) Disconnect Anderson cable from CAEN and connect Anderson short circuiter
5) Connect HV bias and measure I
6) Disconnect HV bias and connect together

	HS	Observations: Imcm	Imcm +clk [A]		I(uA) @2V		I(uA) @5V [uA]	@10V
	0	0.27	0.38	0	0.11	6	0.09	0.09
	1	0.28	0.39	1	0.10	7	0.11	
~~no data!~~	2	0.29	0.41	2	0.10	8	0.11	spare data fibr
	3	0.27	0.39	3	0.30	9	0.26	
	4	0.28	0.38	4	0.24	10	0.21	
	5	0.16	0.22	5	0.10	11	0.11	

Sheet /10

TABLE 75. Rack I measurements for MCM on C-side sector 5.

Sheet /10
Rack I MCM testing

Side C
Sector 6

10:00 5.7.07

CAEN power supply Hardware limits must be set back to ALICE nominal
LV and current and limits must be set to ALICE nominal for MCM 2.6V/0.5A
LV and limits must be set to 0V for bus

MCM nominal voltage is 2.6
Bus is on 0V!

0) Connect 6 multimeters/Cesar box to PT5000 chain and verify visually that none leave the nominal value of x Ohm.
1) Connect Sense wire short circuiter on bus sense wires
2) Connect MCM-Anderson cable of sector to Anderson cable adapter and connect adapter to CAEN
3) Switch on/off the MCM of the sector one by one (0->5) and wait for confirmation.

4) Disconnect Anderson cable from CAEN and connect Anderson short circuiter
5) Connect HV bias and measure I
6) Disconnect HV bias and connect together

HS	I_{MCM}	I_{MCM} +CLK	V_{COM}		I(uA)		I(uA)@5V	@ 10V
* 0	0.26	0.38	3.550V	0		6	MCM-LVsense prob. inv. → investigate ①	
1	0.28	0.40		1	0.08	7	0.08	0.10
2	0.29	0.41		2	0.10	8	0.11	
3	0.26	0.39		3	0.49	9	0.43	
* 4	0.28	0.39* → 0.40		4	0.25	10	0.23	no CLK!
* 5	0.16 → 0.28 ②	0,40* → 0.41		5	0.06	11	0.07	no CLK! + no light back

Sheet /10

① changed the complete cable of the MCM from rack I down to absorber with a spare cable → powering without any problem

* sens was connected to bus

② After repairing the connection of the sense cable

TABLE 77. Rack I measurements for MCM on C-side sector 6.

Sheet /10
Rack I MCM testing

Side C
Sector 7

Petra + Alex 17:10 5.7.07

CAEN power supply Hardware limits must be set back to ALICE nominal
LV and current and limits must be set to ALICE nominal for MCM 2.6V/0.5A
LV and limits must be set to 0V for bus

MCM nominal voltage is 2.6
Bus is on 0V!

0) Connect 6 multimeters/Cesar box to PT5000 chain and verify visually that none leave the nominal value of x Ohm.
1) Connect Sense wire short circuiter on bus sense wires
2) Connect MCM-Anderson cable of sector to Anderson cable adapter and connect adapter to CAEN
3) Switch on/off the MCM of the sector one by one (0->5) and wait for confirmation.

4) Disconnect Anderson cable from CAEN and connect Anderson short circuiter
5) Connect HV bias and measure I
6) Disconnect HV bias and connect together

HS	Observations I_{MCM}	I_{MCM}^{+CLK} [A]		I(uA) @ 2V		I(uA) @ 5V [uA]	@ 10V
0	0.28	0.39	0	0.44	6	0.36	0.25
1	0.27	0.39	1	0.53	7	0.50	
2	0.28	0.40	2	0.28	8	0.25	0.22
3	0.27	0.39 ①	3	0.63	9	0.58	
4	0.27	0.39	4	0.44	10	0.36	0.33
5	0.15	0.21	5	0.42	11	0.34	

Sheet /10

① 06.07.07 15:45: still no G-Link signal on router side; currents are o.k.

TABLE 79. Rack I measurements for MCM on C-side sector 7.

7:30 pm 5/7/07

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Rack I MCM testing

Side C
Sector 8

CAEN power supply Hardware limits must be set back to ALICE nominal
LV and current and limits must be set to ALICE nominal for MCM 2.6V/0.5A
LV and limits must be set to 0V for bus

MCM nominal voltage is 2.6
Bus is on 0V!

0) Connect 6 multimeters/Cesar box to PT5000 chain and verify visually that none leave the nominal value of x Ohm.
1) Connect Sense wire short circuiter on bus sense wires
2) Connect MCM-Anderson cable of sector to Anderson cable adapter and connect adapter to CAEN
3) Switch on/off the MCM of the sector one by one (0->5) and wait for confirmation.

4) Disconnect Anderson cable from CAEN and connect Anderson short circuiter
5) Connect HV bias and measure I
6) Disconnect HV bias and connect together

no data!

HS	Observations Imcm	Imcm +clk [A]		I(uA) @ 2V		I(uA) @ 5V [mA?]	@ 10V
0	0.27	0.39	0	0.10	6	0.10	
1	0.26	0.39	1	0.60	7	0.56	
2	0.30	0.42	2	0.41	8	0.36	
3	0.27	0.39	3	0.09	9	0.09	
4	0.27	0.39	4	0.32	10	0.31	
5	0.16	0.22	5	0.43	11	0.48	

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TABLE 81. Rack I measurements for MCM on C-side sector 8.

Sheet /10
Rack I MCM testing

Side C
Sector 9

CAEN power supply Hardware limits must be set back to ALICE nominal
LV and current and limits must be set to ALICE nominal for MCM 2.6V/0.5A
LV and limits must be set to 0V for bus

MCM nominal voltage is 2.6
Bus is on 0V!

0) Connect 6 multimeters/Cesar box to PT5000 chain and verify visually that none leave the nominal value of x Ohm.
1) Connect Sense wire short circuiter on bus sense wires
2) Connect MCM-Anderson cable of sector to Anderson cable adapter and connect adapter to CAEN
3) Switch on/off the MCM of the sector one by one (0->5) and wait for confirmation.

4) Disconnect Anderson cable from CAEN and connect Anderson short circuiter
5) Connect HV bias and measure I
6) Disconnect HV bias and connect together

HS	Observations	Imcm	Imcm +CLK [A]		I(uA) @2V		I(uA) @5V [uA]	@10V
	0	0.28	0.39 -> 0.40	0	0.12	6	0.11	
	1	0.26	0.39	1	0.30	7	0.31	
	2	0.28	0.40	2	0.47	8	0.44	
	3	0.27	0.38	3	0.62	9	0.47	
*	4	0.27	0.40	4	0.32	10	0.28	Pt1000-measures 69 °C
	5	0.16	0.22	5	0.32	11	0.28	

Sheet /10

TABLE 83. Rack I measurements for MCM on C-side sector 9.

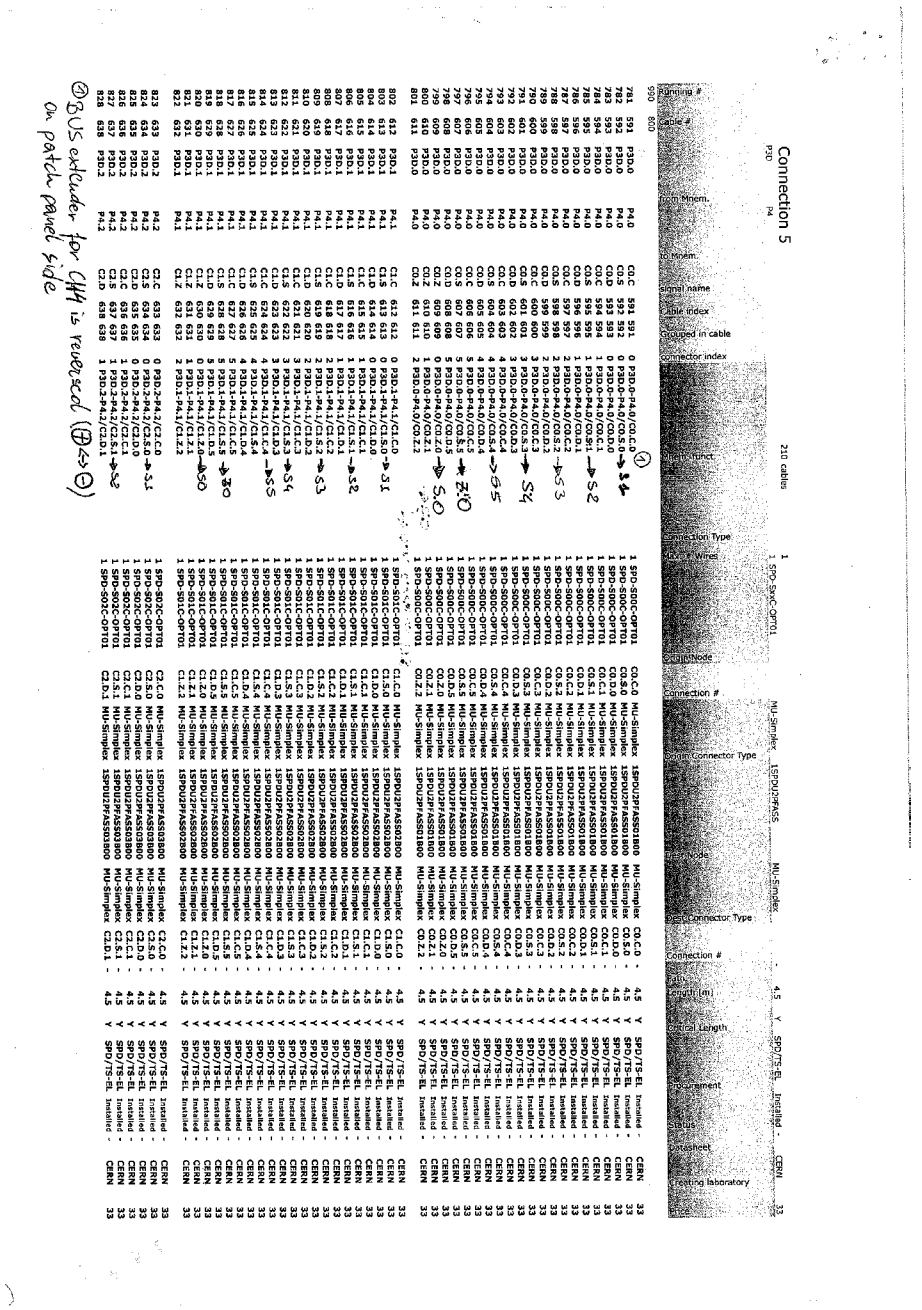

TABLE 85. Optical patch panel connection PP3 (Page1).

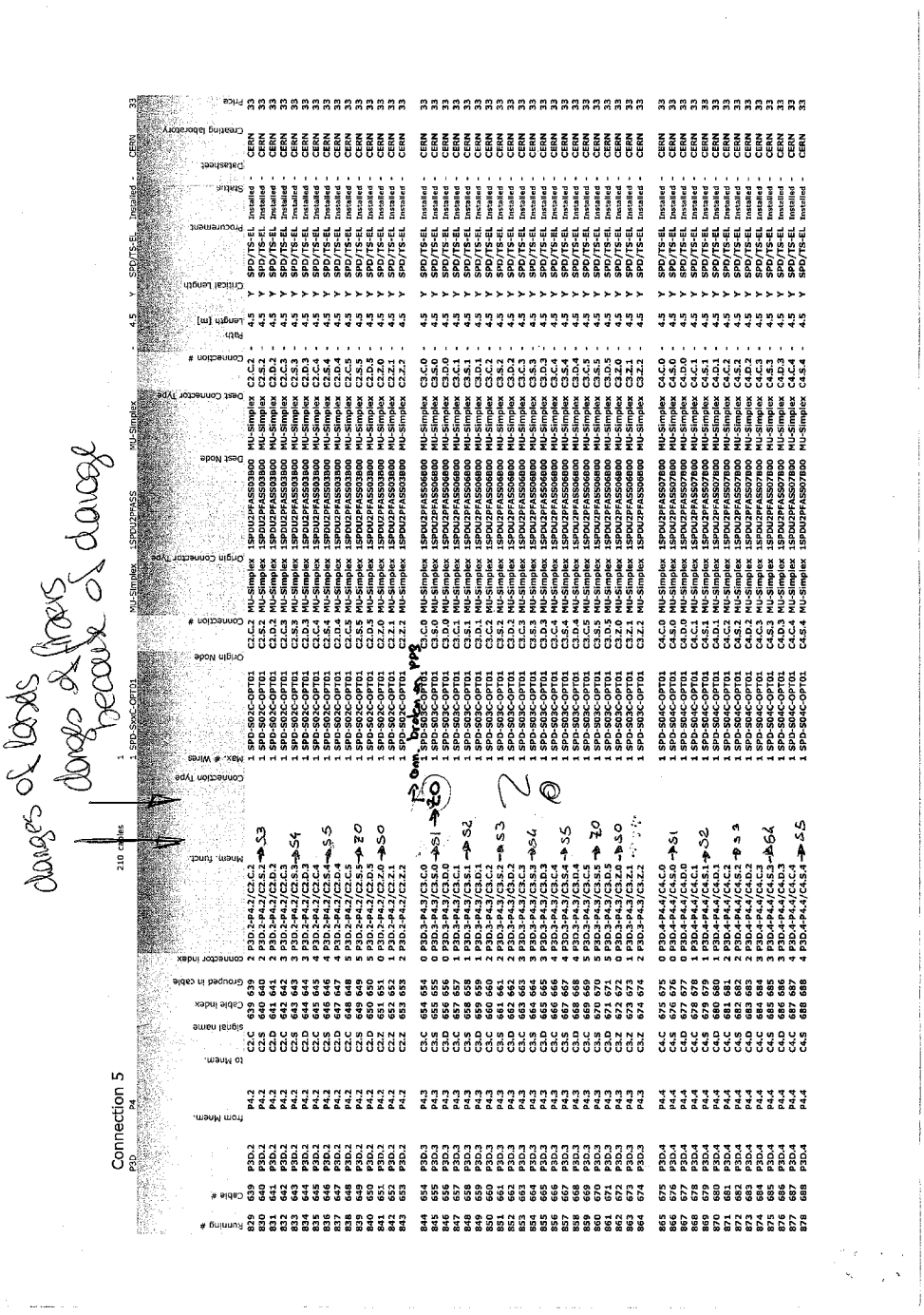

TABLE 87. Optical patch panel connection PP3 (Page2).

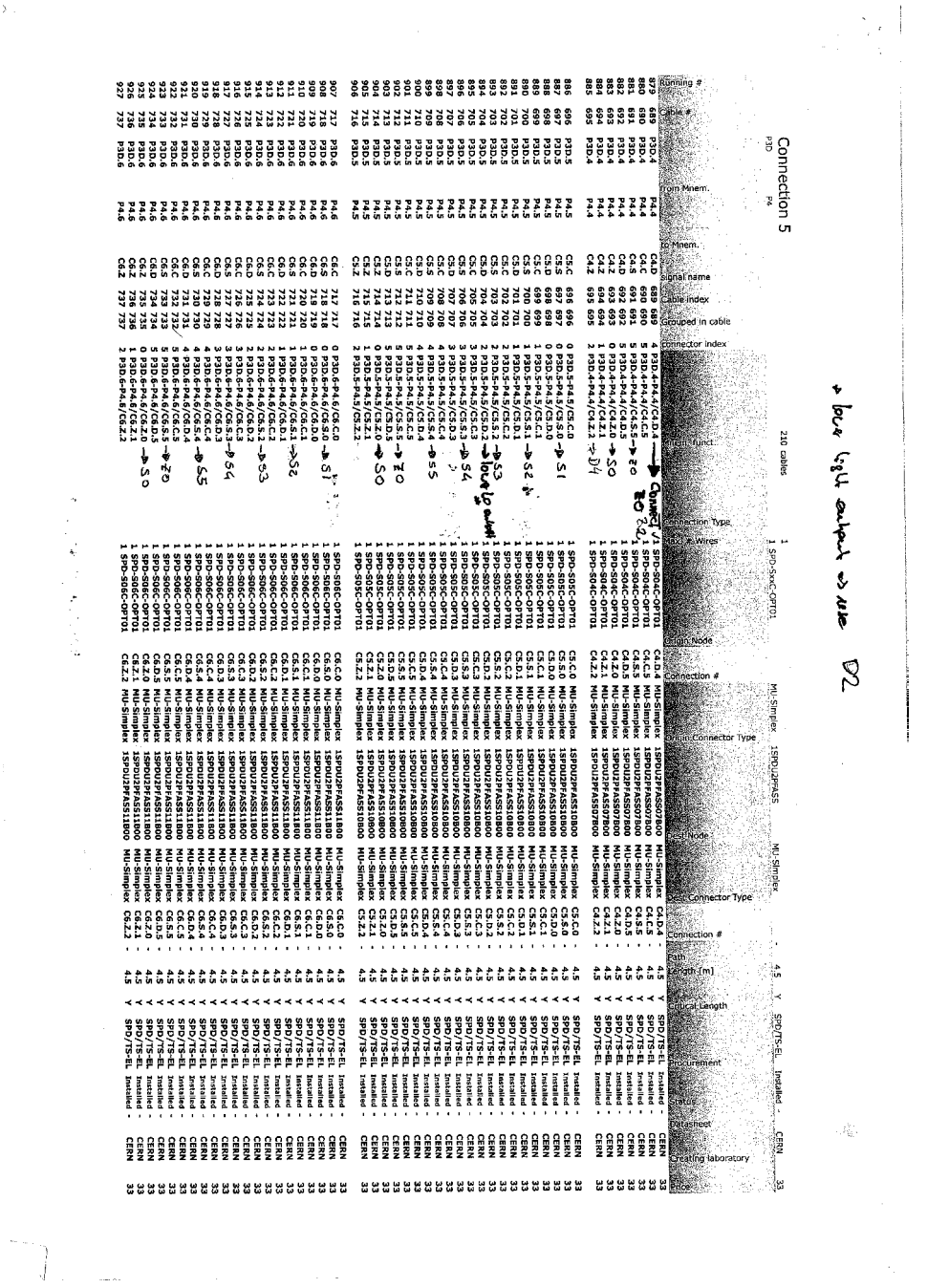

TABLE 89. Optical patch panel connection PP3 (Page 3).

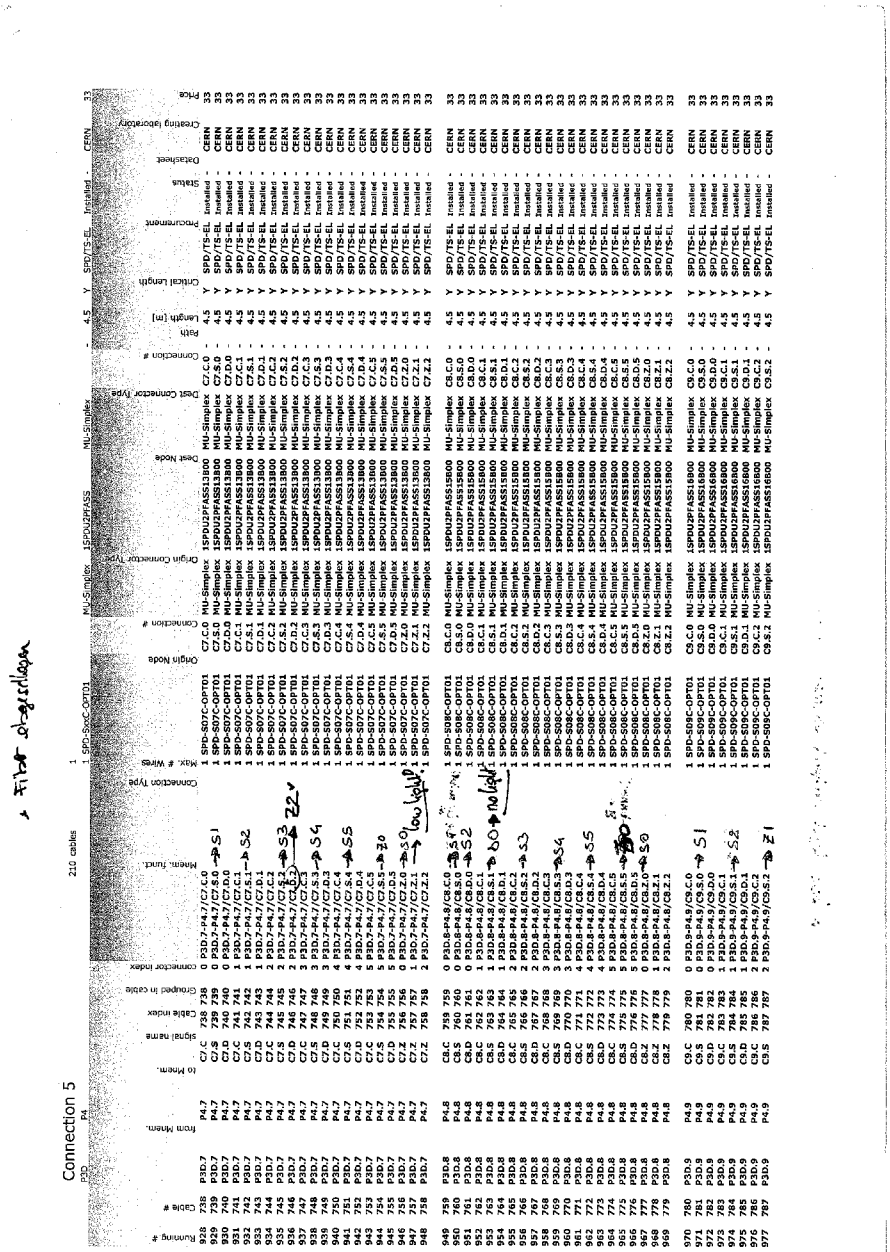

TABLE 91. Optical patch panel connection PP3 (Page 4).

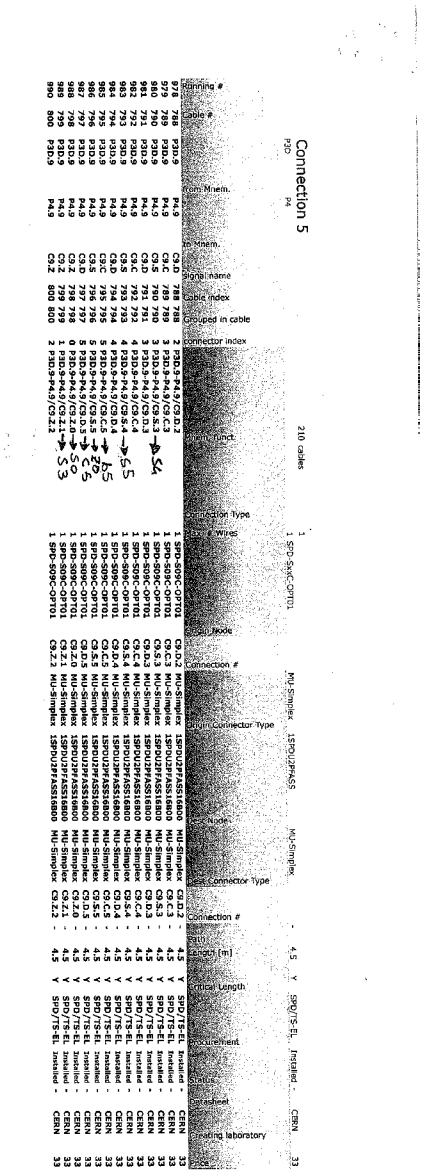

TABLE 93. Optical patch panel connection PP3 (Page 5).