

## EDACQ hardware configuration for BRIKEN neutron detector

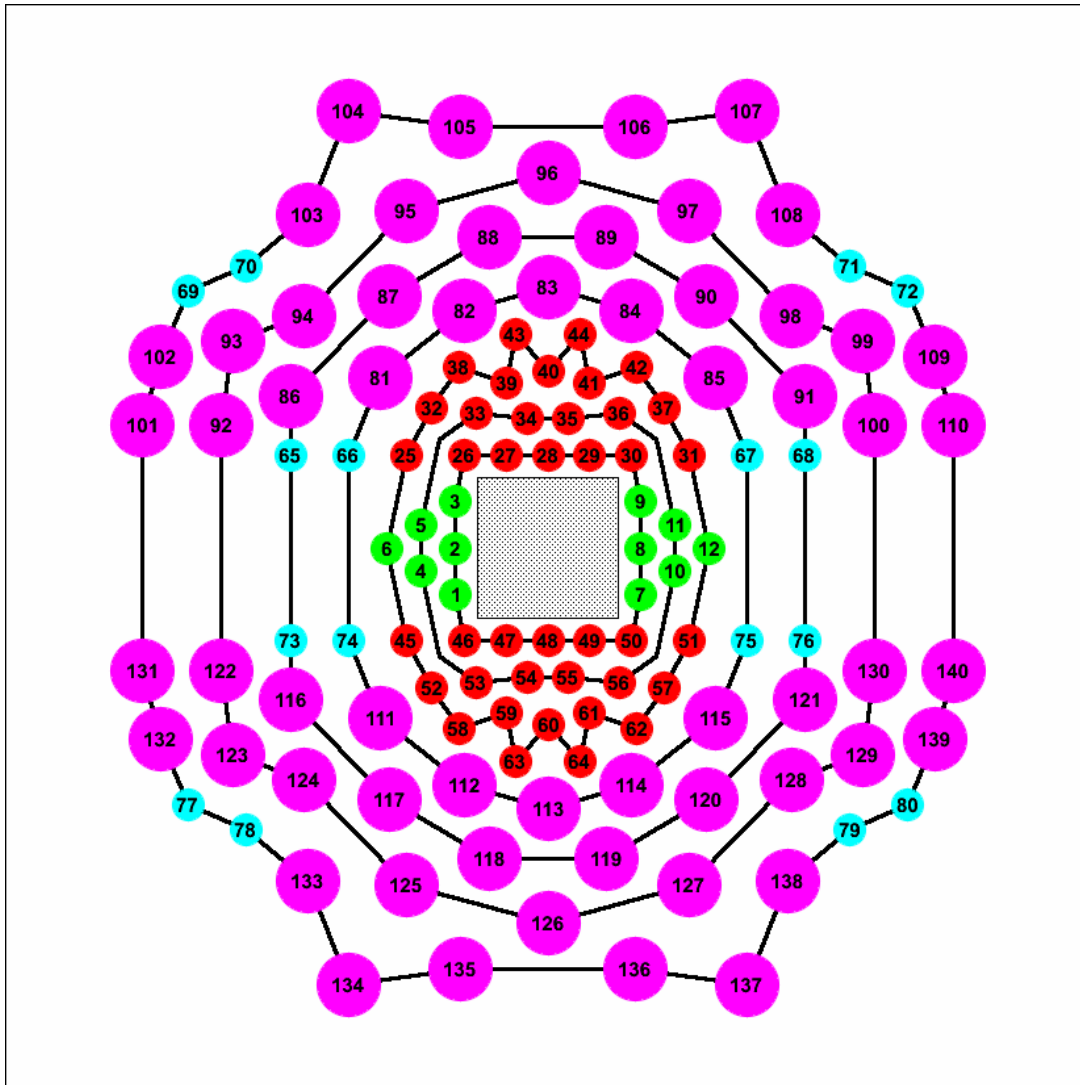
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For hybrid configuration with two CLOVER detectors excluding GSI tubes and JINR tubes:

### 1. Tube numbering and ring definition



Rings are connected with a line. Color code: tube type.

Tubes		
Type	Used	Spare
RIKEN	24	2
UPC	40	1
ORNL1	16	1
ORNL2	60	4
<b>Total</b>	<b>140</b>	<b>8</b>

## 2. Tube distribution into Preamps

Takes into account HV value, digitizer distribution and spatial location.

	RIKEN		UPC
	ORNL1		ORNL2

Differential			
1	13	10	42
2	14	11	43
3	15	16	44
7	19	17	37
8	20	22	31
9	21	23	45
26	33	6	52
27	34	12	58
28	35	18	59
29	36	24	60
30	53	25	61
46	54	32	62
47	55	38	63
48	56	39	64
49	4	40	57
50	5	41	51

Unipolar				
65	83	81	111	113
66	84	82	112	114
67	85	86	116	115
68	89	87	117	119
69	90	88	118	120
70	91	92	122	121
71	97	93	123	127
72	98	94	124	128
73	99	95	125	129
74	100	96	126	130
75	106	101	131	136
76	107	102	132	137
77	108	103	133	138
78	109	104	134	139
79	110	105	135	140
80				

### 3. Tube distribution into digitizers

Facilitates de definition of rings. Color code: ring number.

	Ring 1		Ring 2		Ring 3
	Ring 4		Ring 5		Ring 6
	Ring 7				

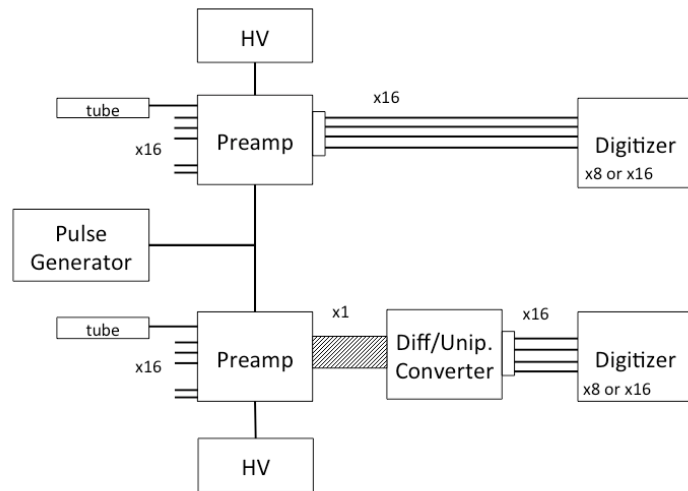
SIS3316					
1	13	10	42	66	65
2	14	11	43	67	68
3	15	16	44	74	73
7	19	17	37	75	76
8	20	22	31	81	86
9	21	23	45	82	87
26	33	6	52	83	88
27	34	12	58	84	89
28	35	18	59	85	90
29	36	24	60	111	91
30	53	25	61	122	116
46	54	32	62	113	117
47	55	38	63	114	118
48	56	39	64	115	119
49	4	40	57		120
50	5	41	51		121

SIIS3302					
92	100	129	107	135	69
93	122	130	108	136	70
94	123	101	109	137	71
95	124	102	110	138	72
96	125	103	131	139	77
97	126	104	132	140	78
98	127	105	133		79
99	128	106	134		80

#### 4. Hardware required and connections:

- **2 VME crates.** Each crate contain a **SIS3100 controller** connected via optical fiber to one of the two **SIS1100 cPCI cards** on the acquisition PC
- **VME1 contains 6x SIS3316** (16 ch) digitizers. **VME2 contains 7x SIS3302** (8 ch) digitizers.
- 1 clock distributor **SIS3820 on VME1** connected with Lemo cables to the 13 digitizers
- All tubes except JINR, will be grouped in 10 preamplifiers
- **RIKEN (24) and UPC (40) tubes** (all at a common voltage of +1450V) grouped into **4 MPR16-HV differential** preamps
- **ORNL1 (16) tubes** (at +1350V) into **1 MPR16-HV unipolar** preamps
- **ORNL2 (60) tubes** (at +1750V) grouped by quadrants into **4 MPR16-HV unipolar** preamps
- **Total of 9 preamps** (4 differential + 5 unipolar)
- 1 crate to hold the preamps
- The **9 MPR16-HV** preamps will be **powered with MPOD low voltage.**
- **ORNL1-ORNL2** tubes connected to the preamps with **76 HV cables 1.8m** long with **HN-SHV** connectors. **RIKEN-UPC** tubes connected to the preamps with **64 HV cables 1.8m** long with **SHV-SHV** connectors.
- RIKEN tubes on AIDA side connected to HV cable with **12 SHV right-angle adapter**
- Preamps connected to **9 HV ISEG/MPOD** channels with **9 HV cables SHV-SHV.**
- **4 differential preamps** (GSI-UPC-ORNL1 tubes) connected via **34w twisted flat cable** to 4 differential-unipolar converter cards
- **4 differential-unipolar converter cards** inserted (not connected) in **VME1** crate
- **Regulated +/-6V power supply for converter cards** (stand alone)
- **Converter cards** connected to **4 SIS3316** digitizers with **64 short Lemo cables**
- 5 unipolar preamps (ORNL1 and ORNL2 tubes) connected with **5 cable bundles** (34pin flat connector to 16 BNC cables) and **76 adapters (BNC to Lemo) + short Lemo cables** into 2 SIS3316 digitizers of VME1 and 6 SIS3302 digitizers of VME2
- HV supply for 8 (2x4 crystals) CLOVER Preamps from **8 HV ISEG/MPOD** channels with **8 HV cables SHV-SHV.**
- 8 energy signals from preamps of **two CLOVER** detectors into **1 SIS3302** digitizer using **8 adapters (BNC to Lemo)**
- **1 NIM crate for pulse generator (GSI-clock, TC410A, BH-1 and N625) and clock reset distributor (LF4000)**

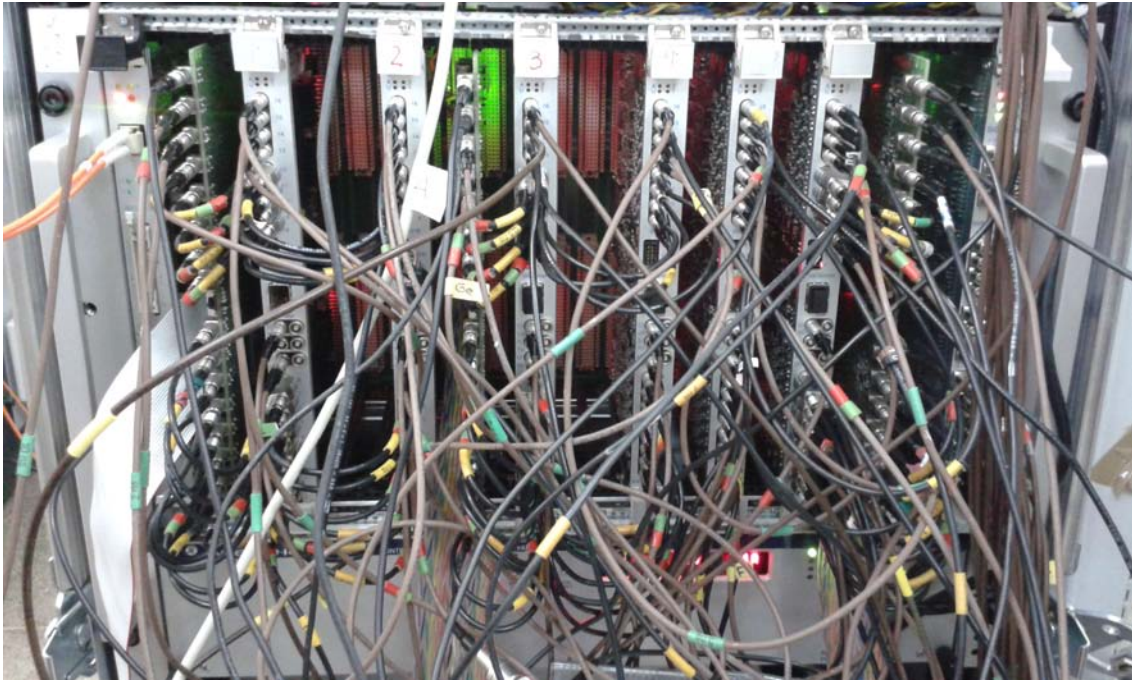
Connection sketch of Tube-HV-Pulser-Preamp-(D/U converter)-Digitizer:



Connection sketch of Pulse Generator:



VME1: With SIS3100 controller, six SIS3316 digitizers, a SIS3820 clock and three converter cards

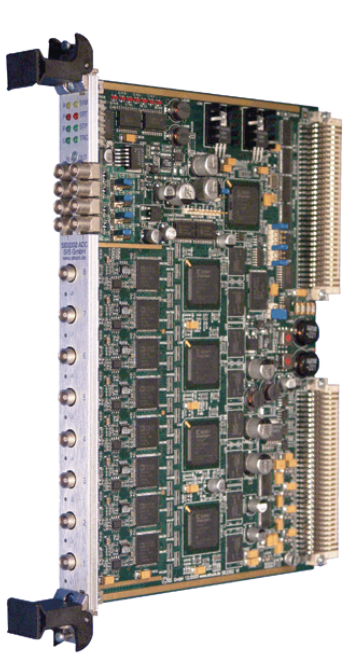


VME2: with SIS3100 controller and eight SIS3302 digitizers



**EDACQ modules:**

VME modules:



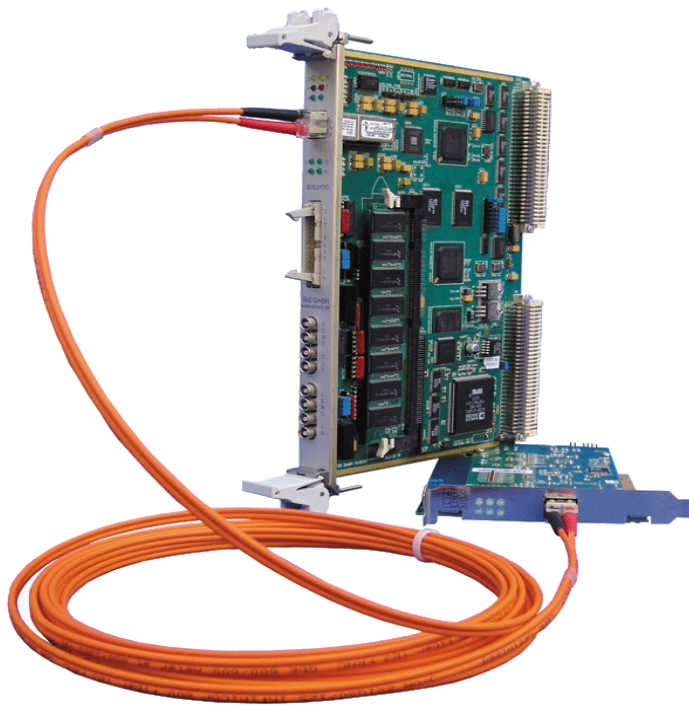
SIS3302 digitizer



SIS3316 digitizer



SIS3820 Clock



SIS1100/3100 PCI/VME interface

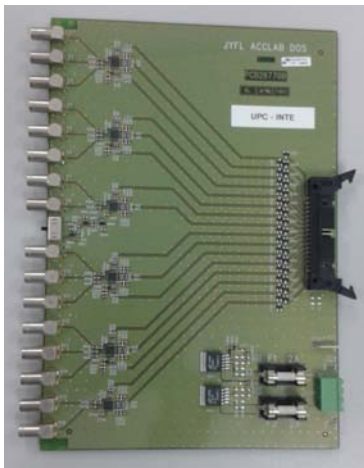
Electronic modules:



MPR16-HV preamplifier



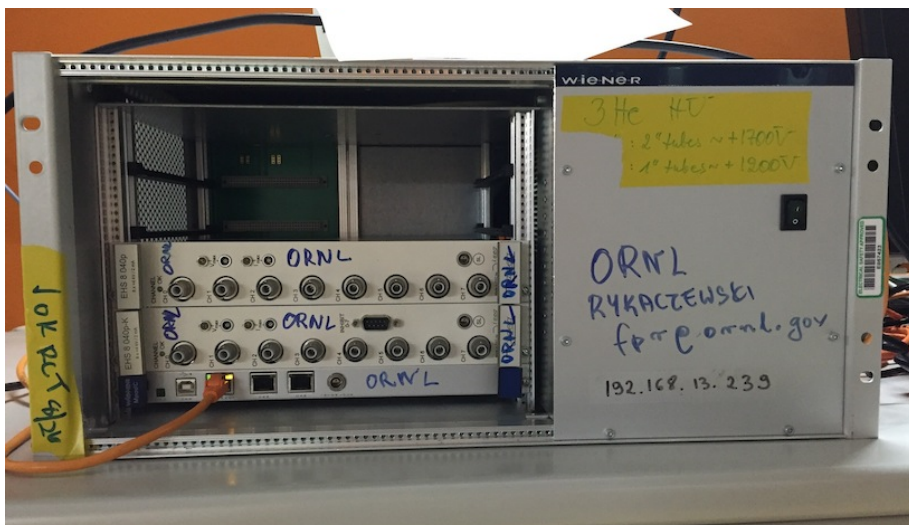
Crate for preamps (rear and front view)



ESPOTEL Diff/Uni converter



Power supply for converter



MPOD HV supply



MNV4



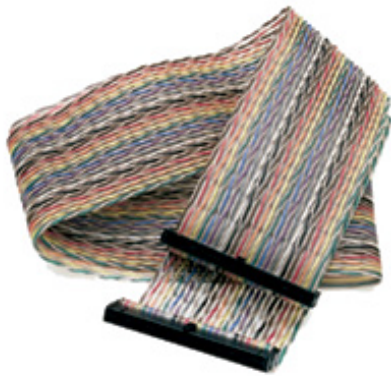
**Cables and connectors:**



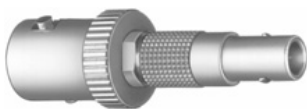
RG223/U HV cable w NH-SHV 1.8m



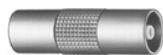
RG174 signal cable 34pin-BNC 2.8m



34w flat signal cable w conn.



F/M BNC/Lemo adapter



F/F Lemo coupler



SHV Plug to SHV Jack Right Angle Adapter

In addition:

a. Pulser system for 10 preamps consisting on **Quad Clock 10/100Hz**, **Delay and Gate Generator**, **BNC BH-1 Tail Pulse generator** and **CAEN N625 Linear Fan-In/Fan-Out** in a **NIM crate**. Connected by **10 Lemo cables** to the preamplifiers.



Quad clock    D & G Gen. TC410    Tail Pulser BH-1    Linear FI/FO N625

b. Distribution of clock reset signals from SIS3300 controller to all digitizers for synchronization via Logic FanIn/FanOut **Ortec LF4000**



Position of HV connectors for the tubes with respect to the moderator:

AIDA

