STATUS OF THE NICA-MPD-PLATFORM

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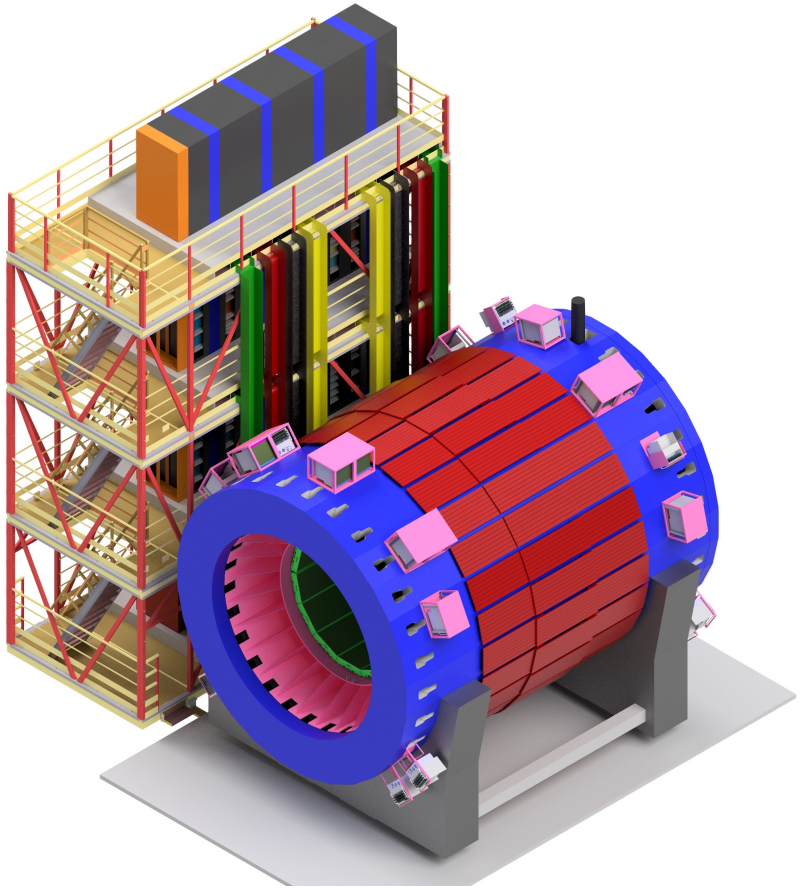
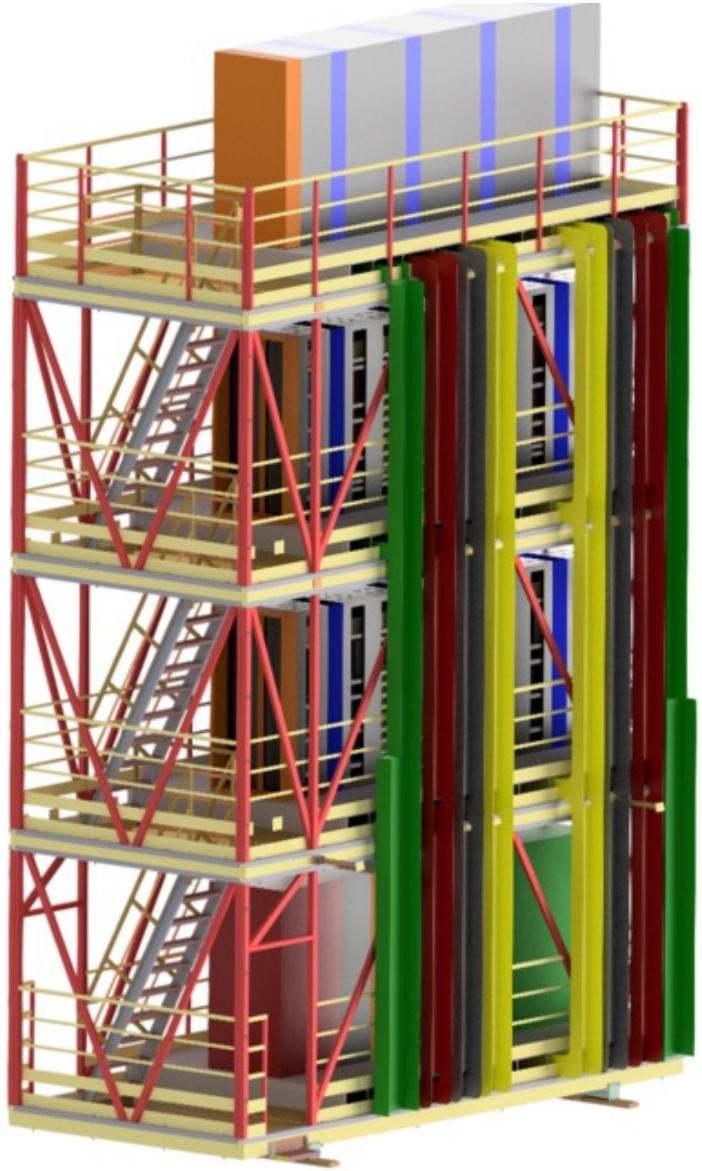
MPD

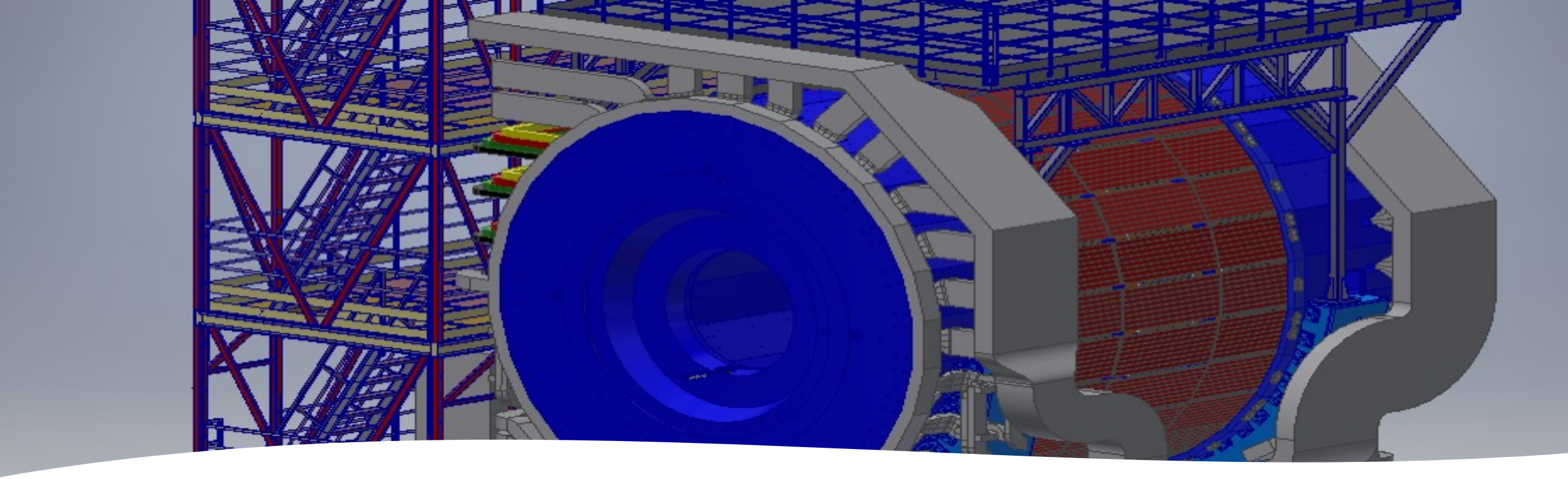
- 4π spectrometer
- Au+Au collisions
  at √sNN = 11 GeV
- Length: 8.2 m
- Diameter: 5.4 m
- ±2 units in pseudorapidity (η)



PARTS of the NMP

- Ducting system
- IT RACKS on the NMP
- Raised floor
- Power Supply
- Cooling System
- Structural Cabling
- Access control and management system
- Video based fire detection
- CCTV video surveillance system
- Emergency sound notification system
- Radiation monitoring system
- Magnetic field measurement system
- Autonomous fire extinguishing system
- Intelligent Power Distributor



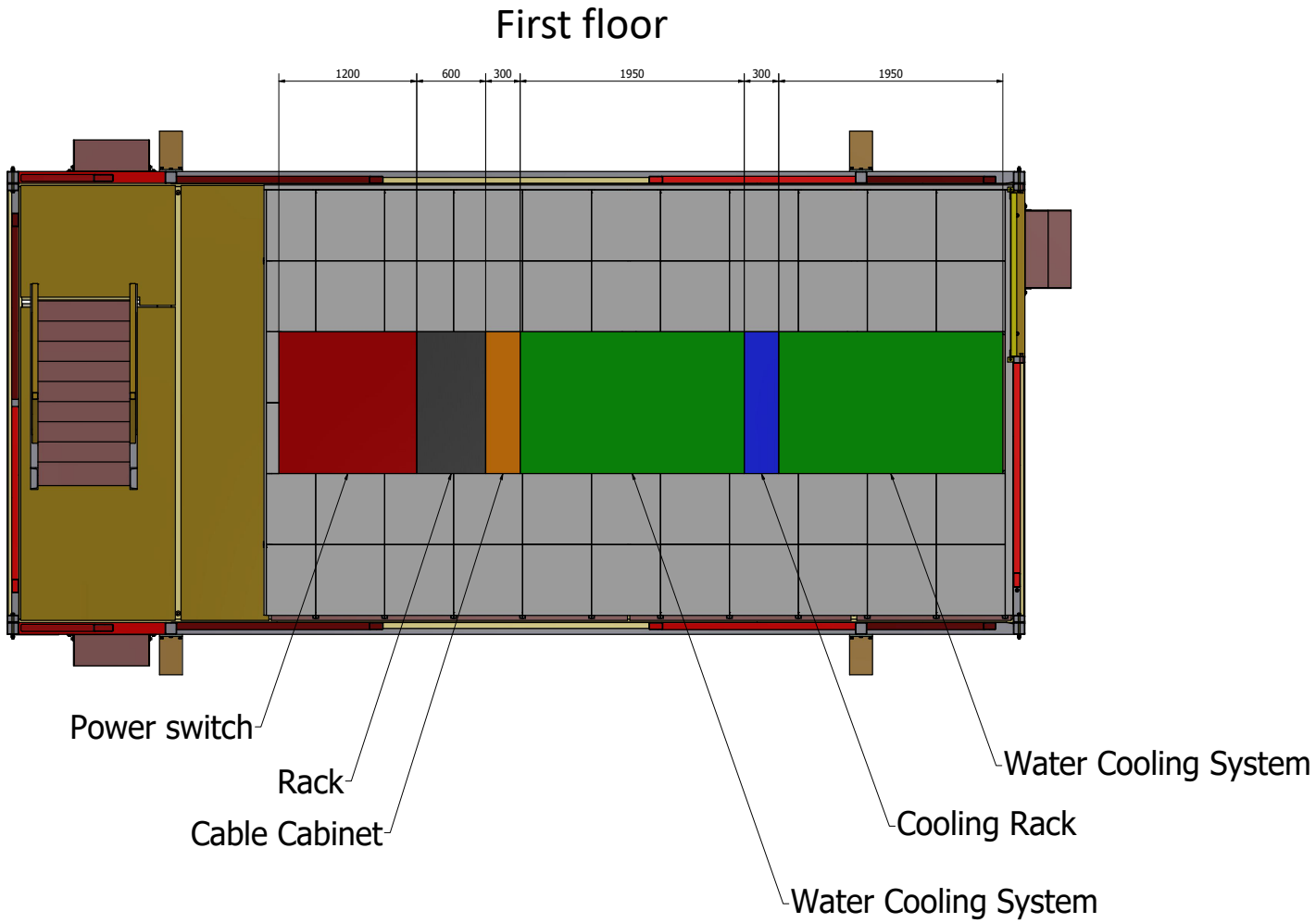


DUCTING SYSTEM

- **Why the NICA-MPD-Platform (NMP) is such important for the whole project?**

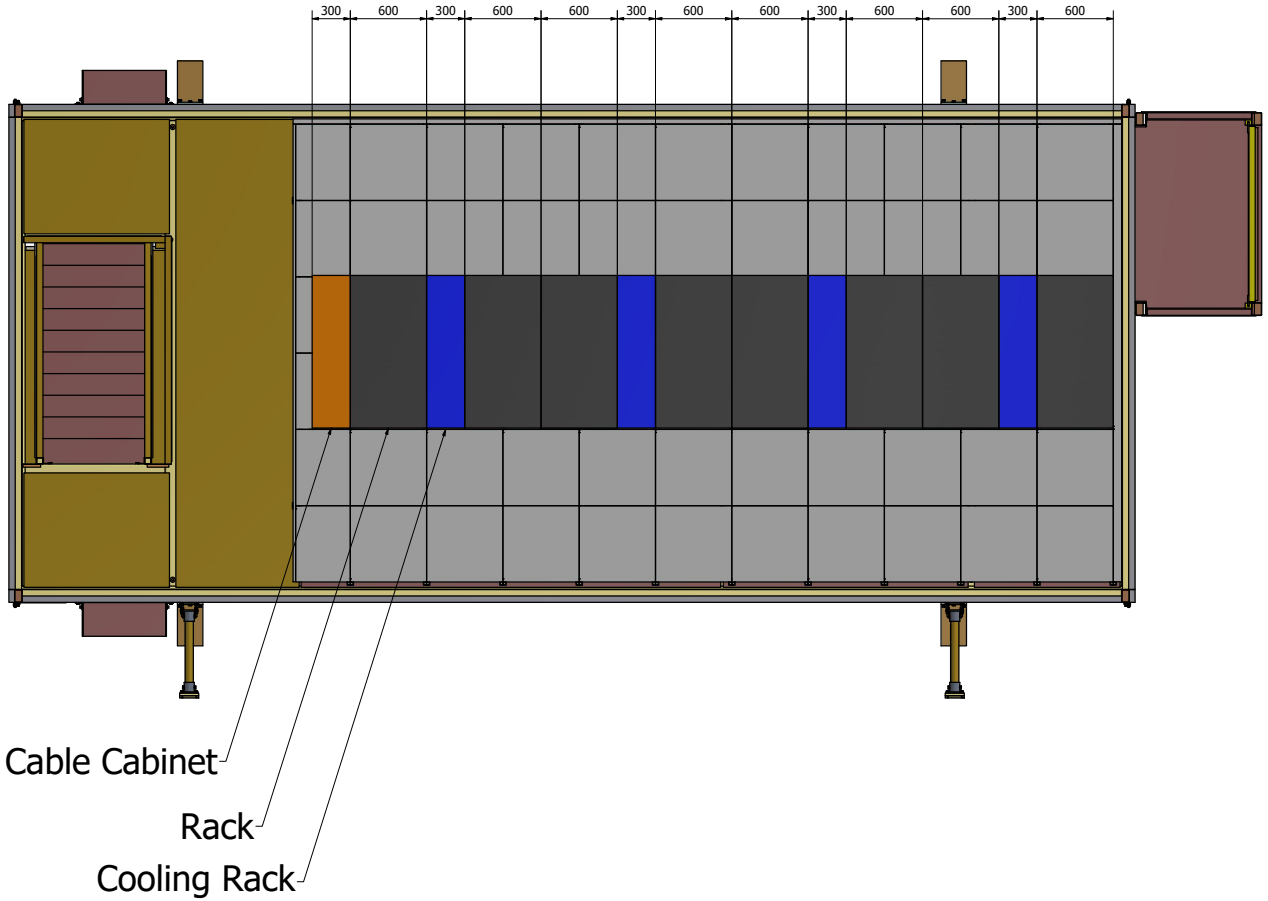
It is responsible for the collecting all information coming from the MPD detector. On the NMP, connected to the detector, RACKs cabinets will be located. All services (cables, pipes, FO) from the MPD will go inside the cable ducts to the NMP.

IT RACKS on the NMP

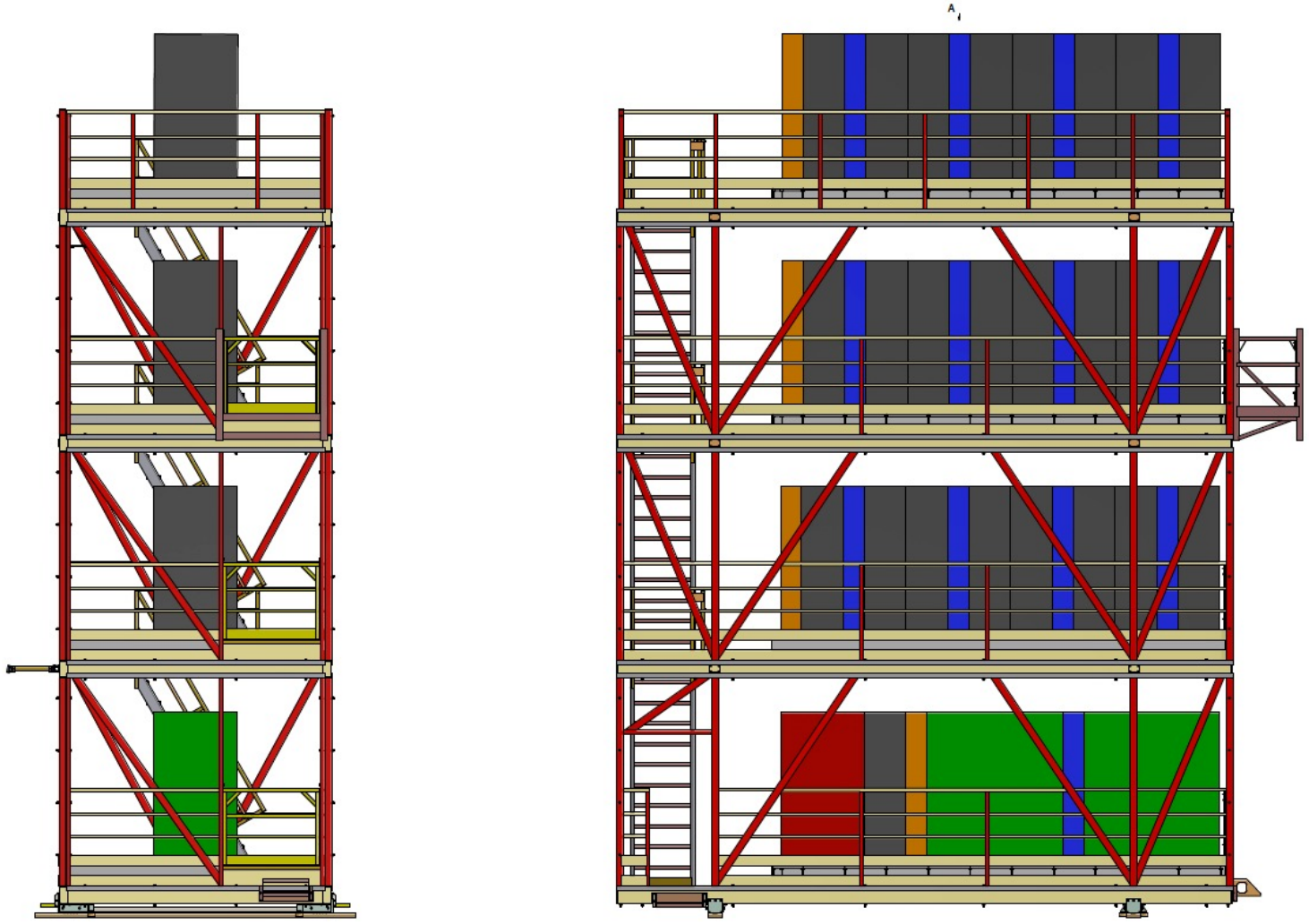


IT RACKS on the NMP

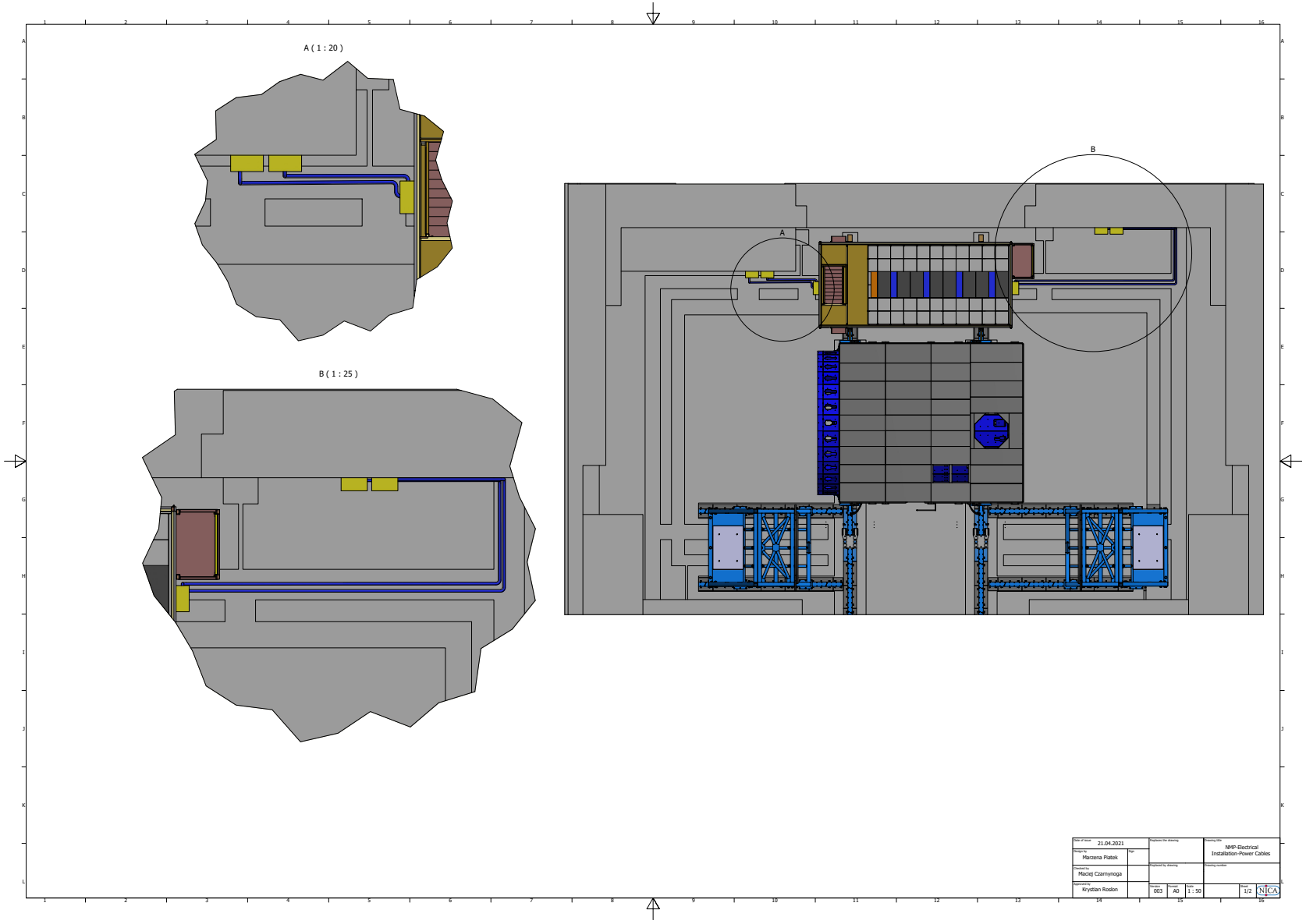
Second, third, fourth floors



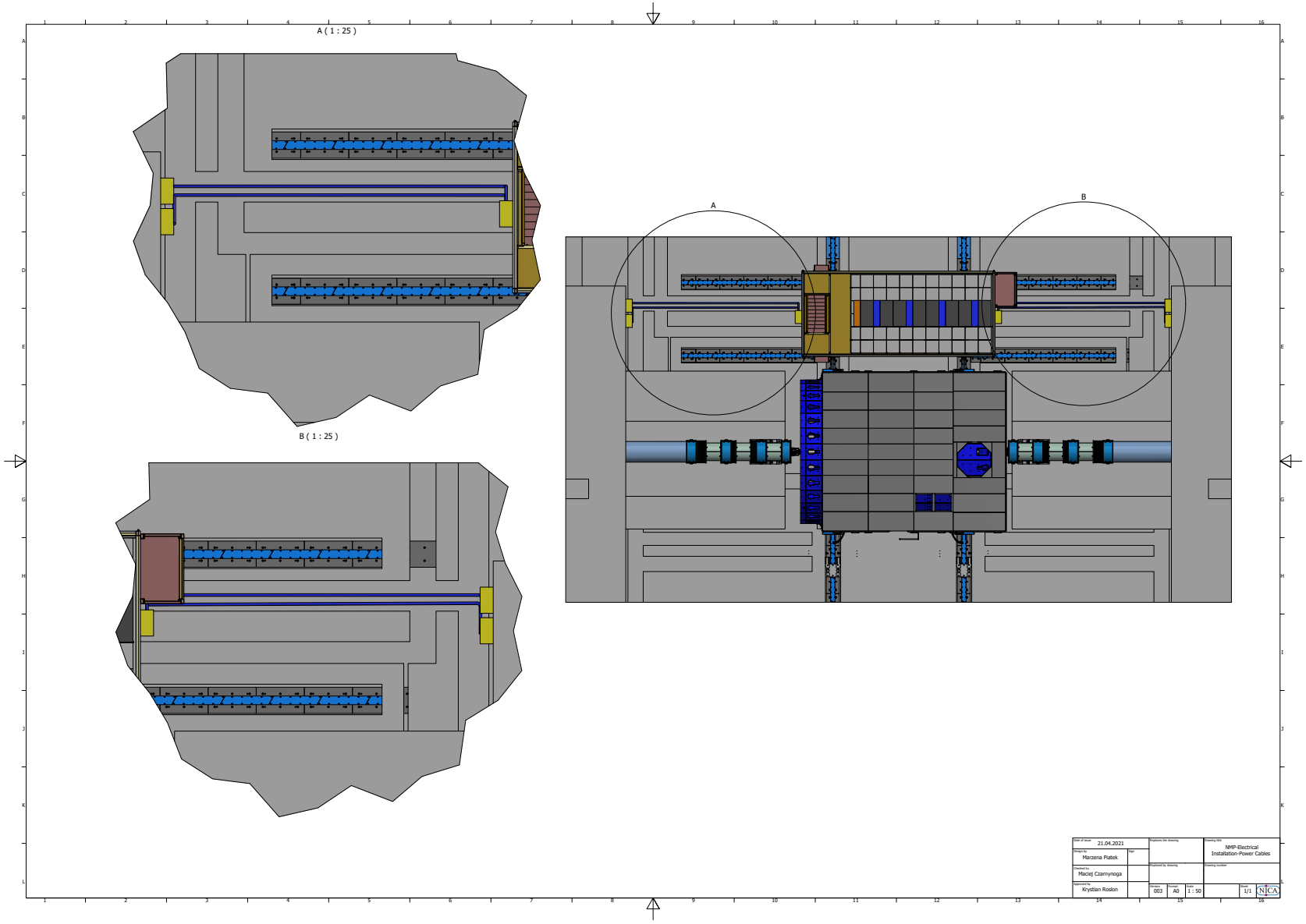
IT RACKS on the NMP



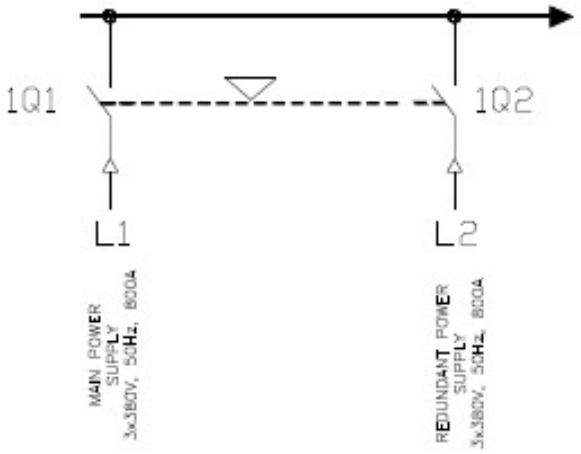
POWER SUPPLY (SERVICE)



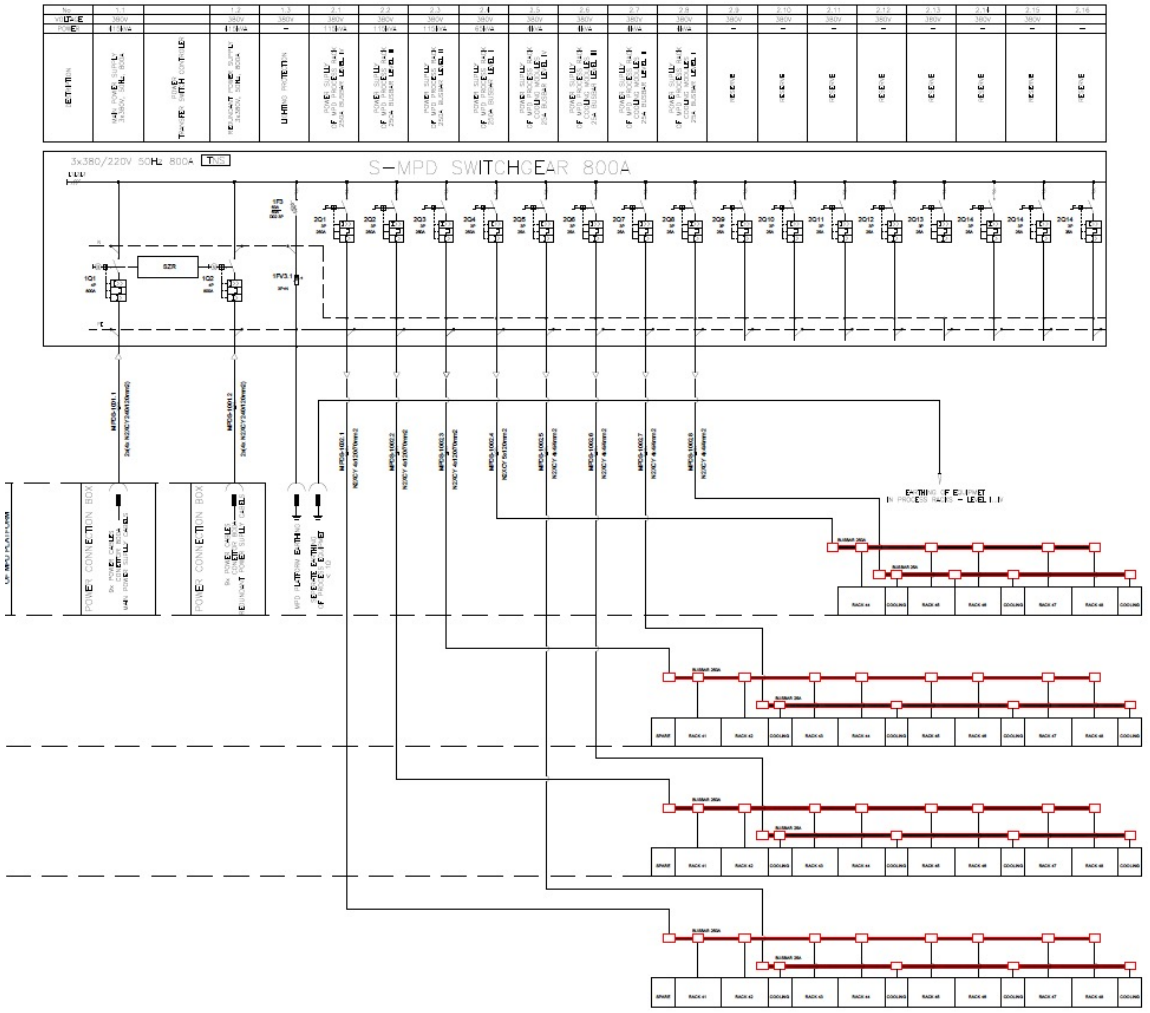
POWER SUPPLY (RUN)



POWER SUPPLY

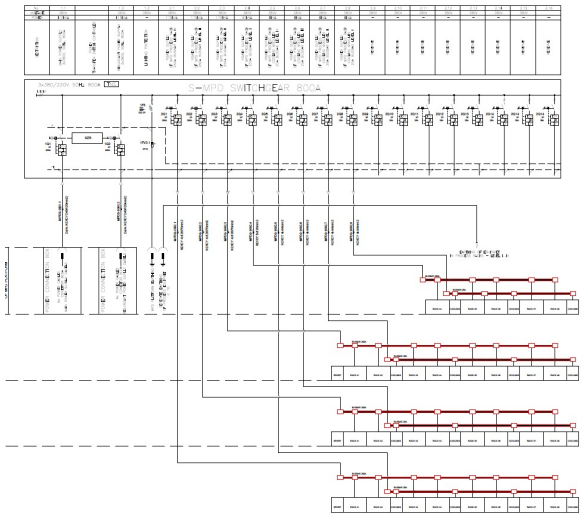


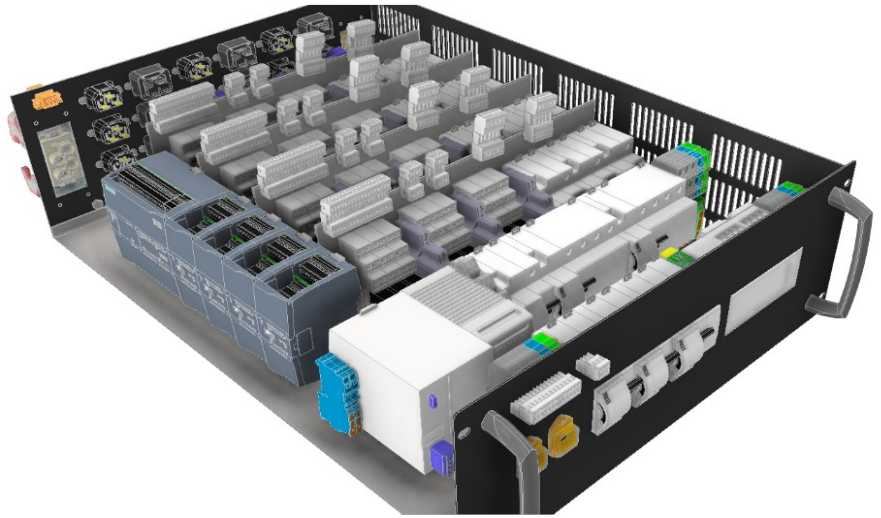
Power Transfer Switch			
L1	L2	1Q1	1Q2
1	1	0	1
1	0	1	0
0	1	0	1



POWER SUPPLY

	Name	Power (kW)
	Inside the MPD detector	
1	TOF	2
2	ECal	16
3	FFD	0,1
4	ITS	10
5	FHCal	1
	In total:	30
	Outside the MPD detector (NICA-MPD-Platform)	
6	TPC	40
7	TOF	30
8	ECal	30
9	FFD	10
10	FHCal	5
11	MCORD	5,2
12	DAQ	30
13	NICA-MPD-Platform	90
14	Reserve	65
	In total:	305 (335)
	Upper Platform	
15	Cryogenics Platform	65
	In total:	65 (400)





COOLING SYSTEM

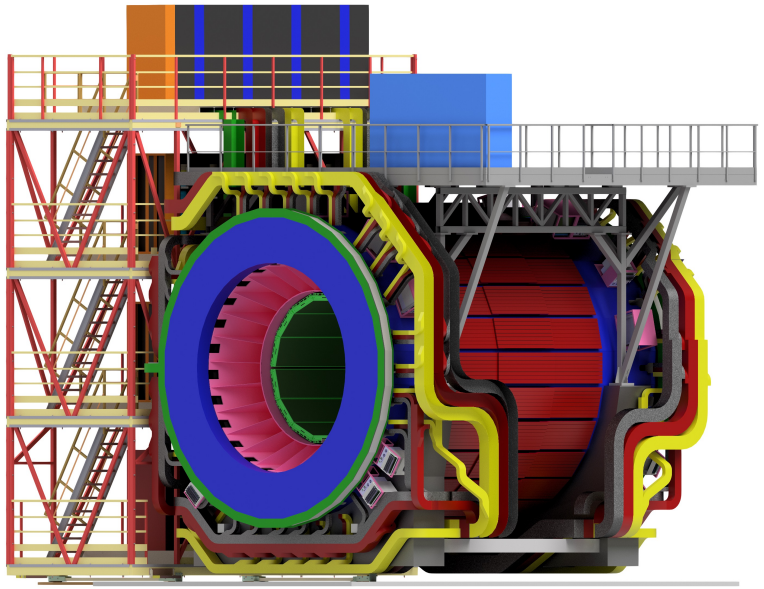
- Air return temperature from racks: 37°C
- Return air RH: 35%
- Operating temperature inside racks, air supply temperature 37°C
- Relative humidity – not controlled
- Cooling medium – chilled water 18/23°C

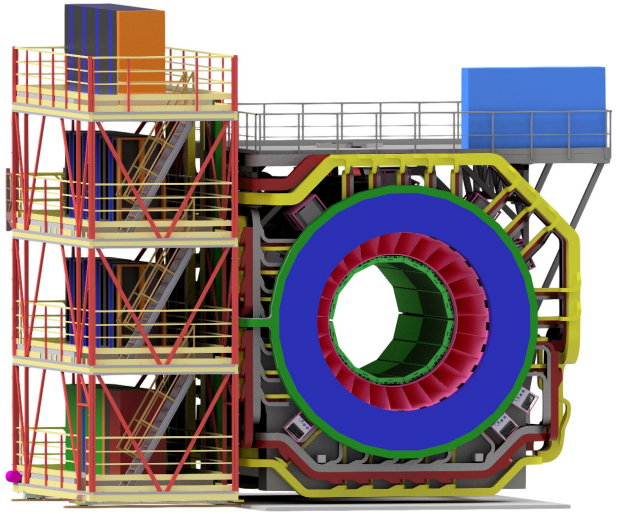
Level	No. Of unit	Unit	Cooling power @ 37C35%_water 18/23C	Flow	Chilled water parameter	Electrical supply	Electrical Power
			kW	m3/h			kW
1	K0-3	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
2	K1-1	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
2	K1-2	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
2	K1-3	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
2	K1-4	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
3	K2-1	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
3	K2-2	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
3	K2-3	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
3	K2-4	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
4	K3-1	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
4	K3-2	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
4	K3-3	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
4	K3-4	10RHC0250	25,8	4,45	18/23 water	230/1/50-60	0,81
			335,4	57,85	minimum dP in water flow 145kPa		10,53
			kW	m3/h			kW

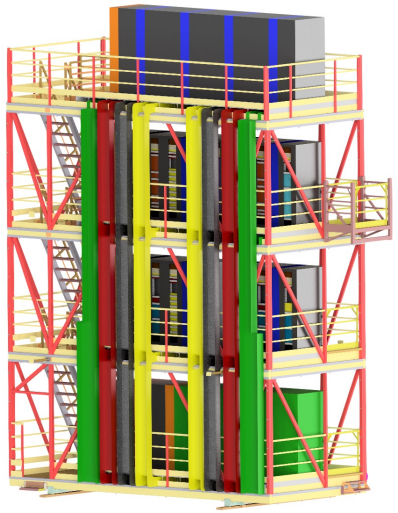
Figure 3.5.5-3 – Cooling installation on the NMP

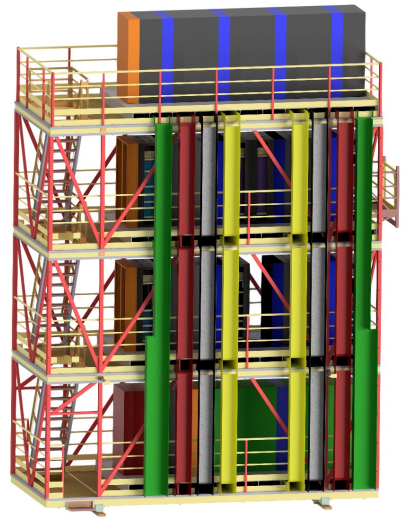
STRUCTURAL CABLING

STRUCTURAL CABLING









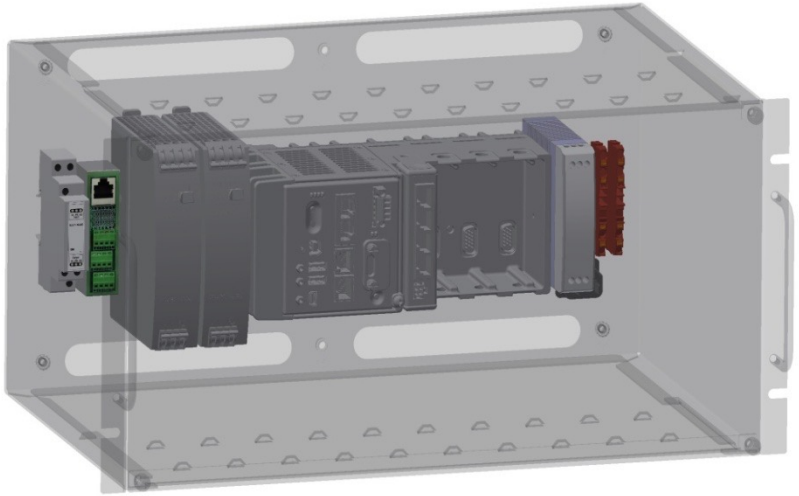
RADIATION MONITORING

Type	EKO-C	EGM-104
Measuring range	10 nSv/h – 1 mSv/h	10 nSv/h – 10 Sv/h
Number of GM tubes	1	3
Gamma energy range	50 keV – 1500 keV	40 keV – 3000 keV
Interfaces	RS-485	RS-485, RS-232, USB
Manufacturer	POLON-EKOLAB	NuviaTech Instruments
Country	Poland	Czech Republic

RADIATION MONITORING

FHT 762 neutron probe

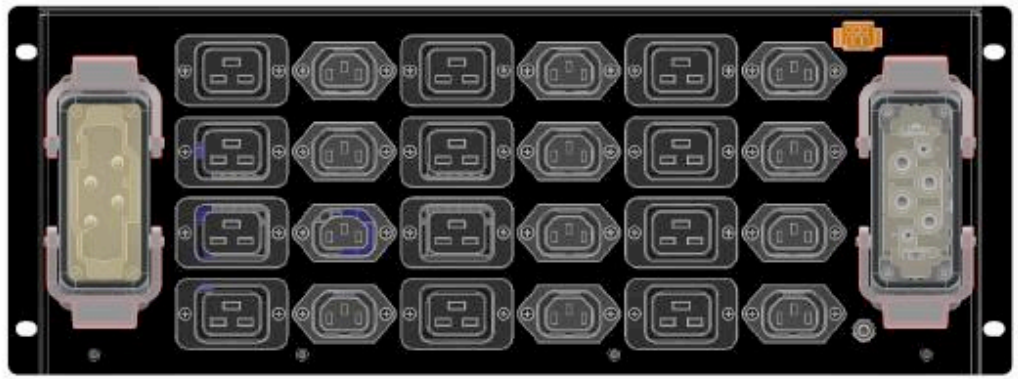
FHT 6020 controller



Full system controll box with cRIO and power supplies

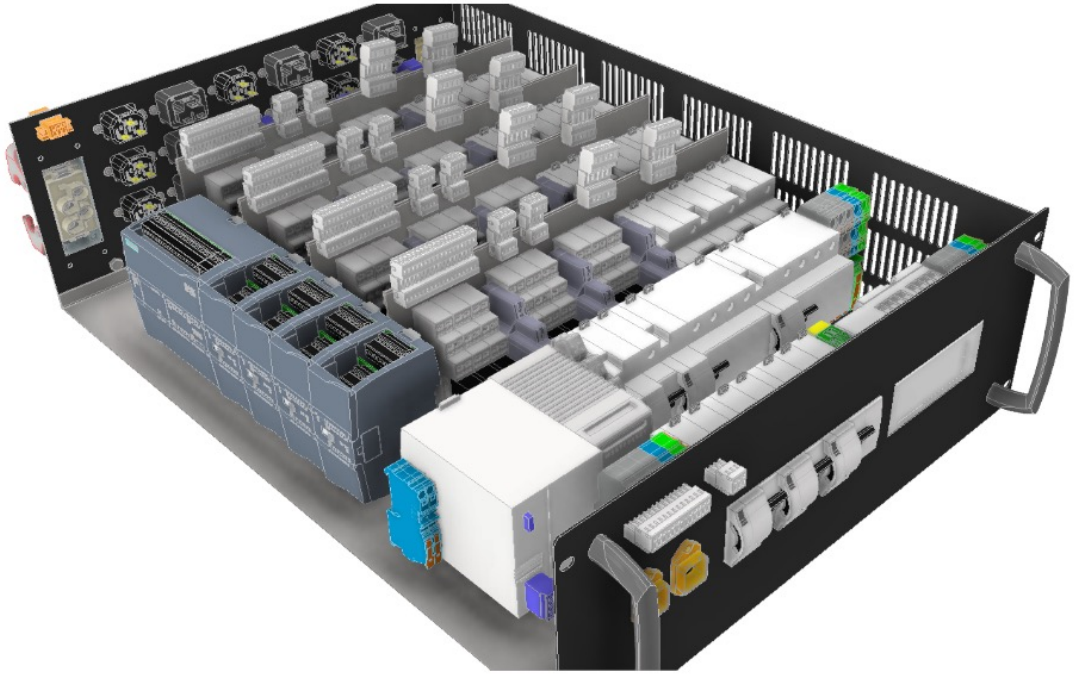
Intelligent Power Distributor

- Allows to connect up to 24 electric devices to a three-phase network
- Allows to switch connected phase on each outlet
- Balances the load on each phase
- Monitors the electrical network
- True RMS measurement, up to 63’th harmonic
- Detects and separates noisy electric devices
- Has short circuit protection
- Remotely monitors the states of the circuit breakers and remotely resets them

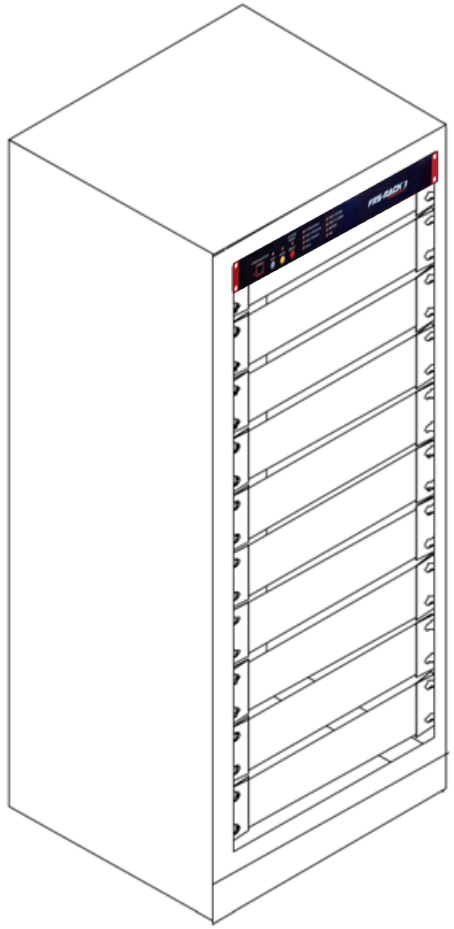


Intelligent Power Distributor

- Has prepared SCADA in TIA Portal v16
- Soft start for all connected devices
- Configurable, sequential startup and shutdown for all connected devices
- Can be integrated with Fire Alarm System
- Will be installed in each RACK
- Is modular and scalable
- Default module occupies 4U



Fire extinguishing system description:



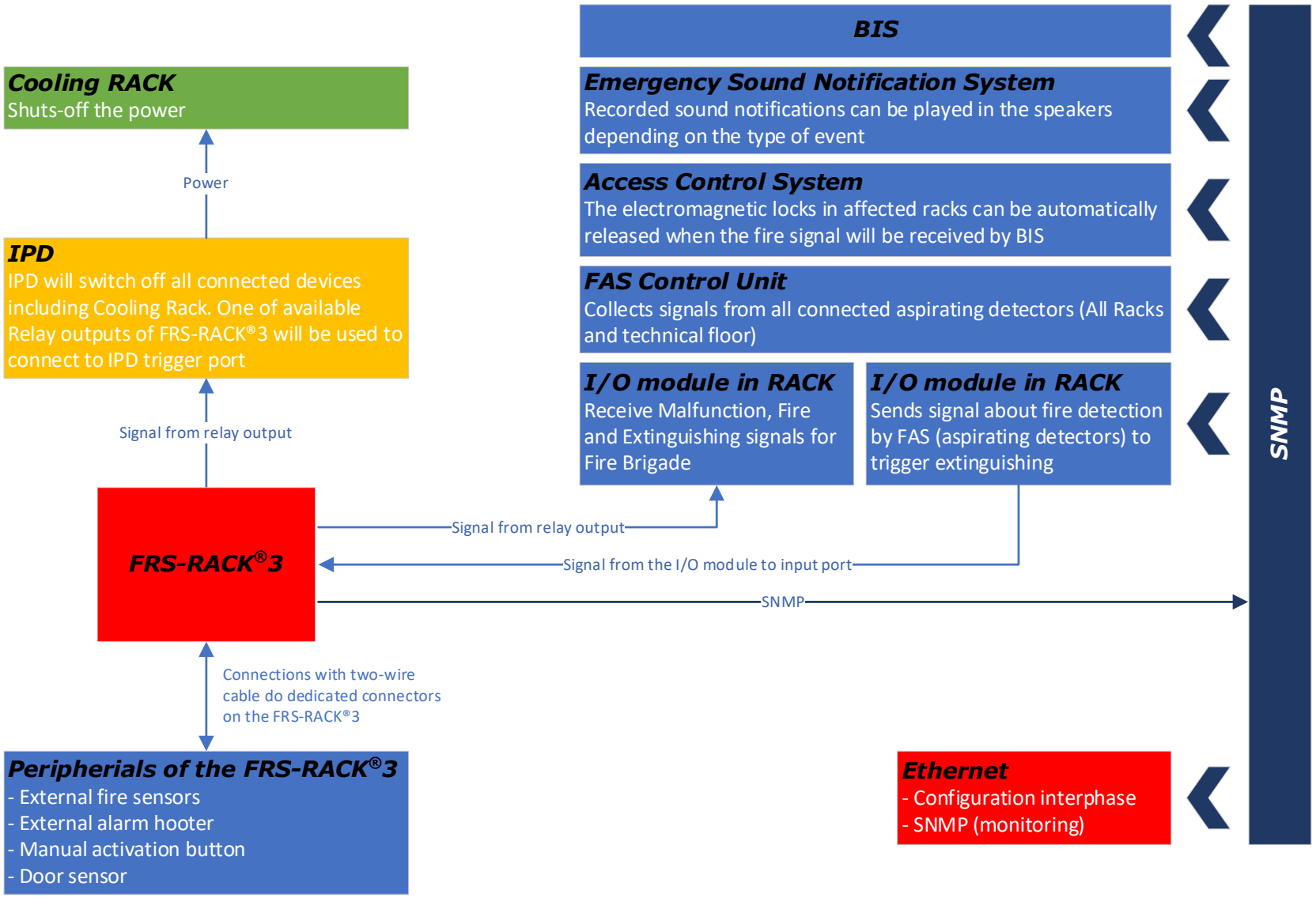
FRS-RACK®3 is an autonomous, fully automatic fire detection and extinguishing system. The device is designed for a fire protection of 19" rack enclosures.

Height:	1U
Sensors:	2x internal + 4x external (configurable algorithms)
Inputs:	3x external input sources (aspirating smoke detectors), 2x temperature sensors, manual activation button, door sensor
Outputs:	4x output relays, alarm hooter
Extinguishing agent:	NOVEC™ 1230
Communication:	SNMP and Ethernet protocols

The extinguishing agent is non-corrosive, non-conductive and can be used to extinguish working, sensitive electric equipment with a nominal voltage up to 1,000 V.

Located in the topmost slot of the RACK cabinet, the system monitors the hazard zone. Upon detection of a fire or manual activation, the device will release the extinguishant into the hazard zone through the nozzle. 12V DC backup battery provides energy required in case of no power during extinguishing.

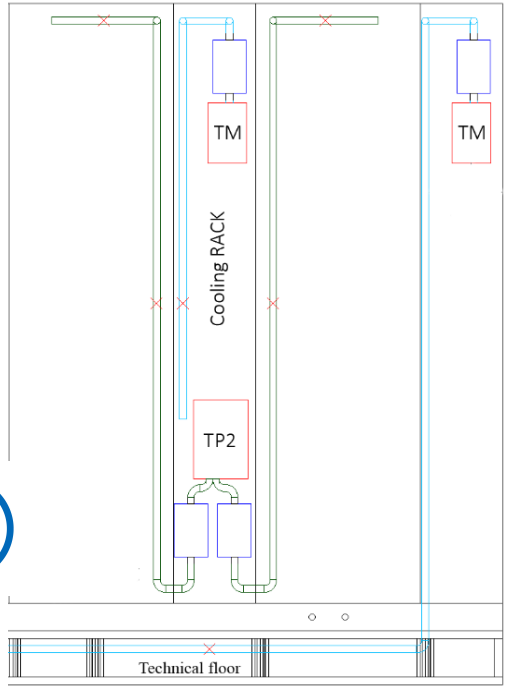
Integration the FRS-RACK®3:



Fire Alarm System:

Aspirating system operates in class A according to EN-54-20.

- Detects fire in the very beginning (in the “pyrolysis” phase), before the visible smoke is released
- Uses intelligent signal processing that minimizes the chance of false alarms
- The detector itself allows for flexible installation outside of inconvenient places (technical floor, cable canals)



Aspirating system will be used to protect all necessary areas:

- Cooling Racks,
- 19” Racks with forced air circulation
- Space under technical floor
- Inner side of MPD
- Cable canals

Automation for the MFS

MFS (Magnet Flushing Station)

Initially designed for cleaning and drying ALICE magnets at CERN

Some modifications in the station were made

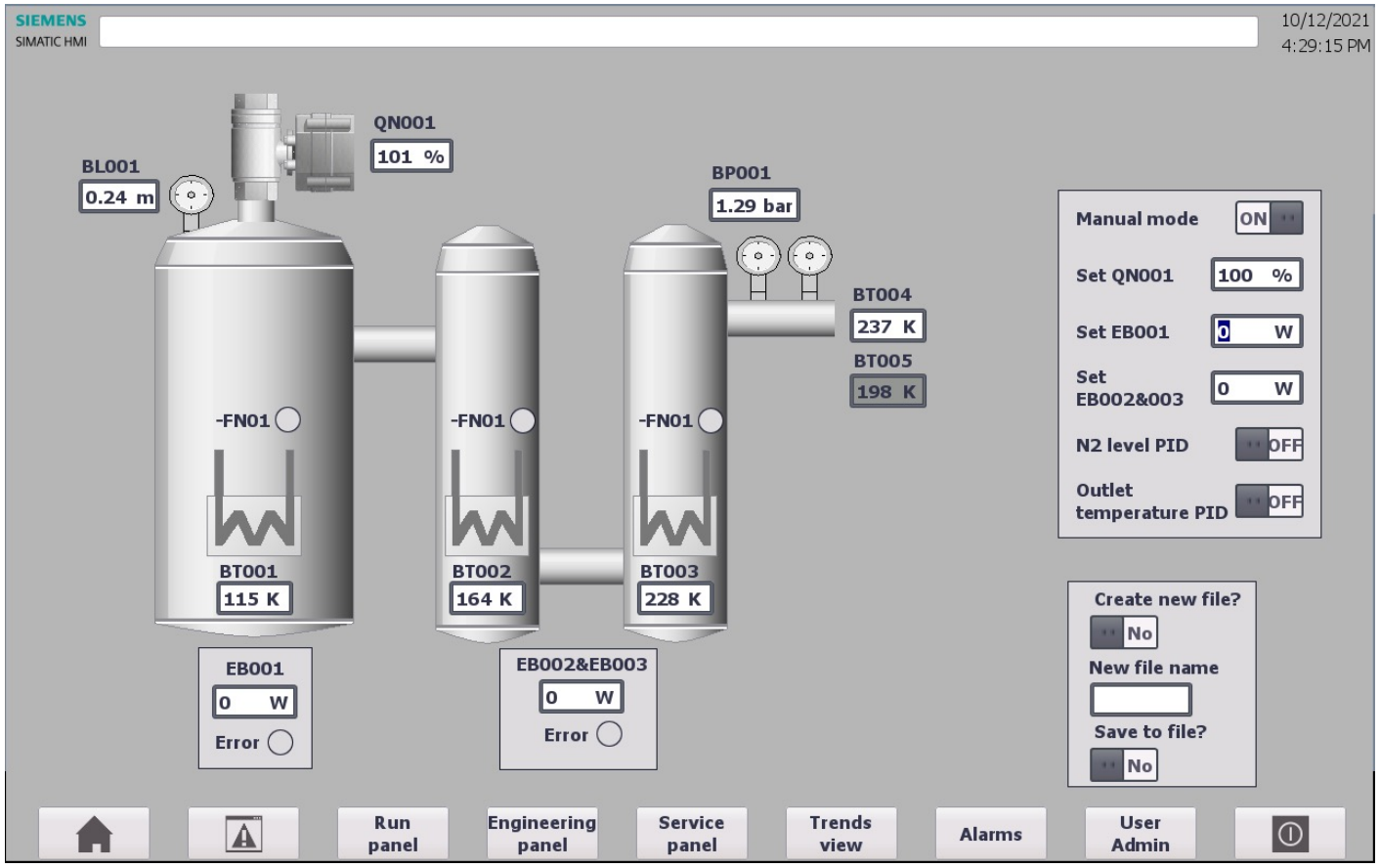
Soon it will be used to cool the entire NICA-MPD magnet to 80 K

In the future, only the thermal shield will be cooled down by the MFS

Automation for the MFS

Tasks of the automation system of the MFS:

- Maintaining a constant level of LN_2 inside the MFS
- Regulation of GN_2 temperature at the outlet from the system
- Monitoring the parameters inside the MFS

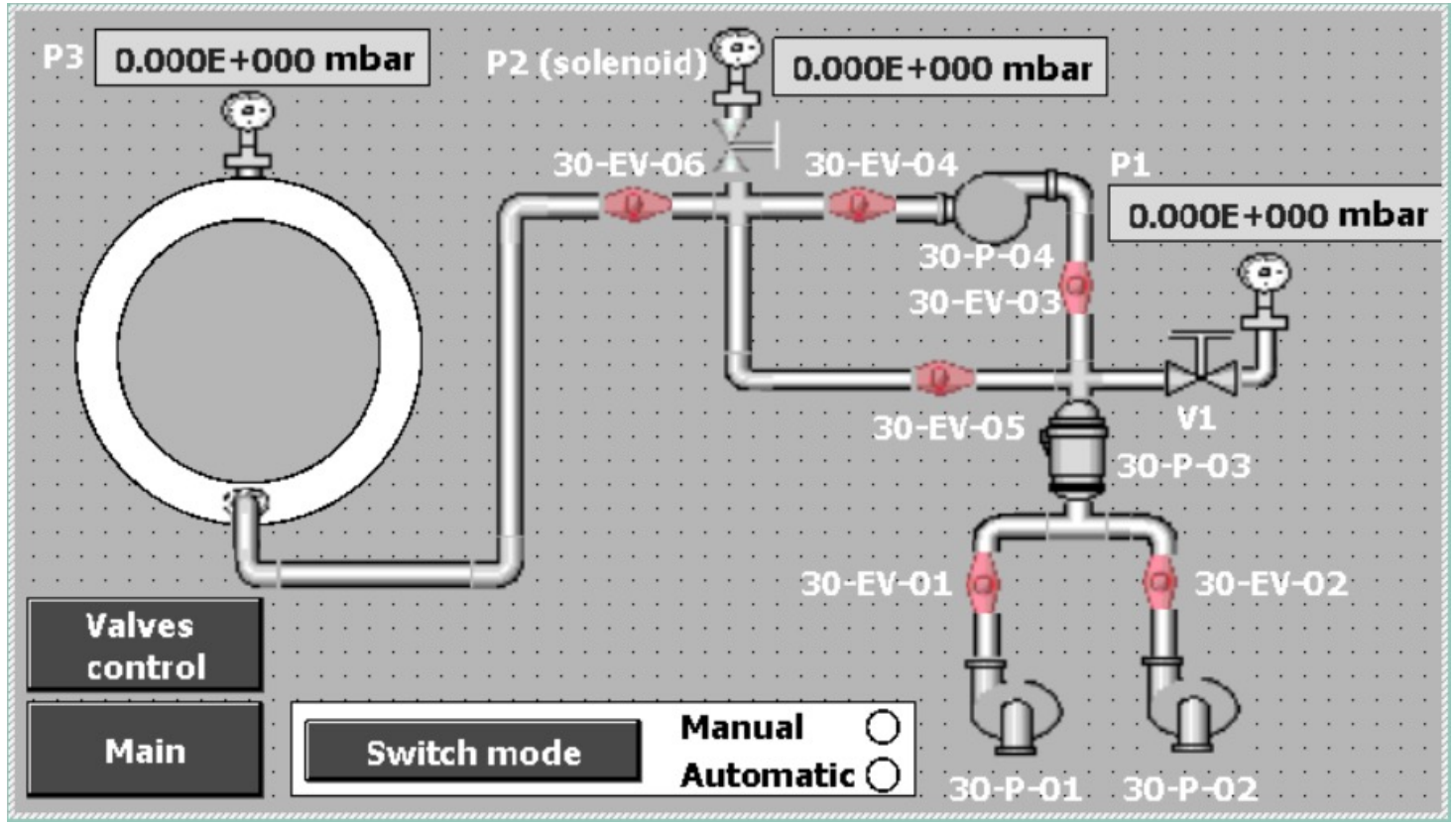


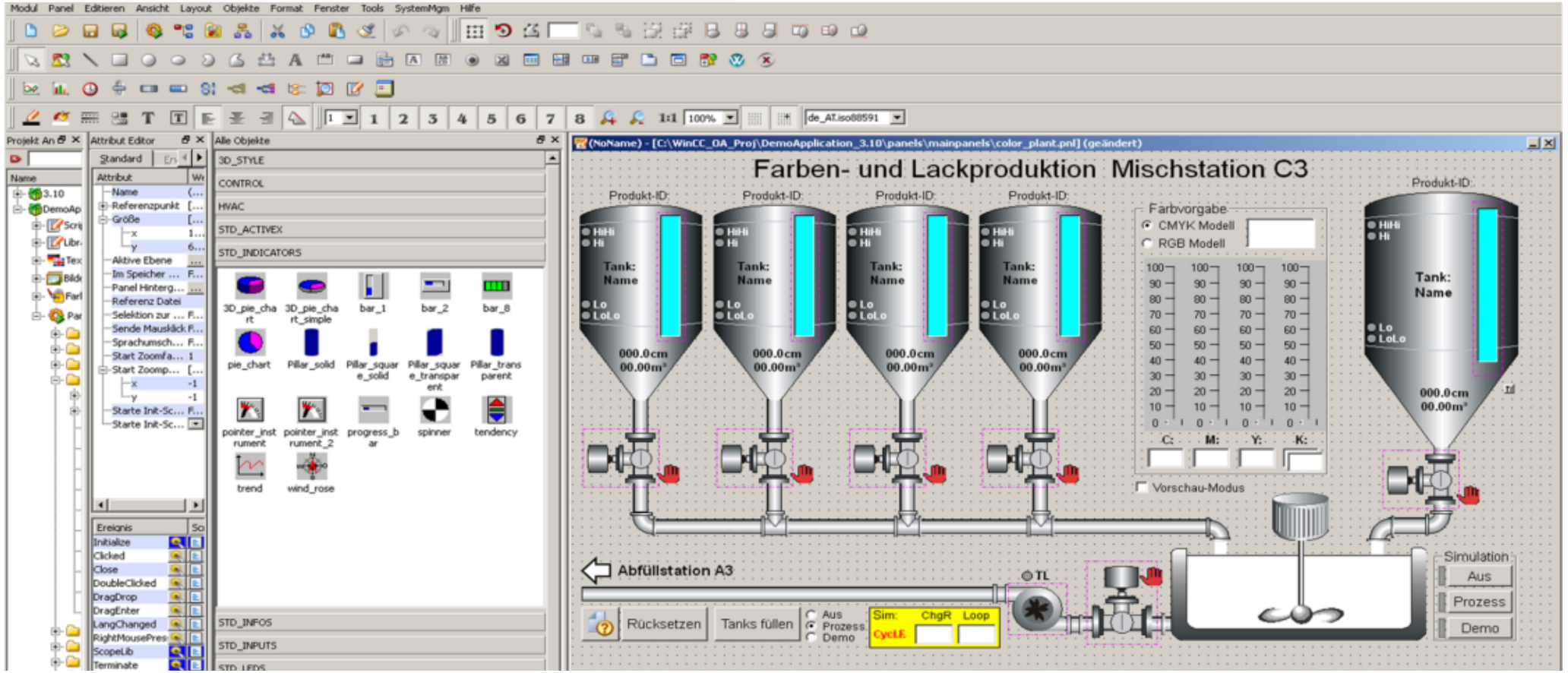
Automation for the vacuum test

A temporary automation system has been prepared that allows to carry out a vacuum test for the NICA-MPD magnet.

Tasks of the automation system of the vacuum test:

- Valve control
- Vacuum level monitoring at various points in the system
- Magnet protection against pump malfunction





Source: https://new.siemens.com/global/en/products/automation/industry-software/automation-software/scada/simatic-wincc-oa/wincc-oa-basic-software.html

WinCC OA

On October 11, 2021, the Engineering Support sector received a confirmation that soon will be the owner of a license for WinCC OA - software used e.g. by CERN to create SCADA systems. It is planned to use this software in the MPD experiment.

The previously prepared software will have to be rewritten to the new environment.

TeFeNICA 2021 internship programme

NAME	STATUS	COMMENTS
Ducting system,		Should be defined till the end of Year
IT RACKS on the NMP,		Designed
Raised floor,		Designed
Power Supply,		Designed
Cooling System,		Designed
Structural Cabling,		Designed
Access control and management system,		Designed
Video based fire detection,		Designed
CCTV video surveillance system,		Designed
Emergency sound notification system,		Designed
Radiation monitoring system,		In Dubna
Magnetic field measurement system,		In Dubna
Autonomous fire extinguishing system,		In Dubna
Intelligent Power Distributor,		In Dubna

The technical documentation is ready

↓

The application for the contract is uploaded to the SED

↓

The transport to JINR will take 20 weeks from signing the contract

↓

Commissioning will take 16 weeks from delivery the items

NICA

Thank You for Your Attention

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