Development of ISOL Off-line Test Facility Control & Safety System at RISP

Yonghak, Kim

RI Experimental Systems Team, RISP, IBS, Korea

Outline

1. ISOL Off-line Test Facility Control System Manufacturing and Installation
2. ISOL Off-line Test Facility Safety System Manufacturing and Installation
3. ISOL Off-line Test Facility Software Manufacturing
4. Summary

1. ISOL Off-line Test Facility Control System Manufacturing and Installation

- Control system of ISOL Off-line test facility consist of RI beam production/separation/transport control and Safety control(including vacuum and utilities)

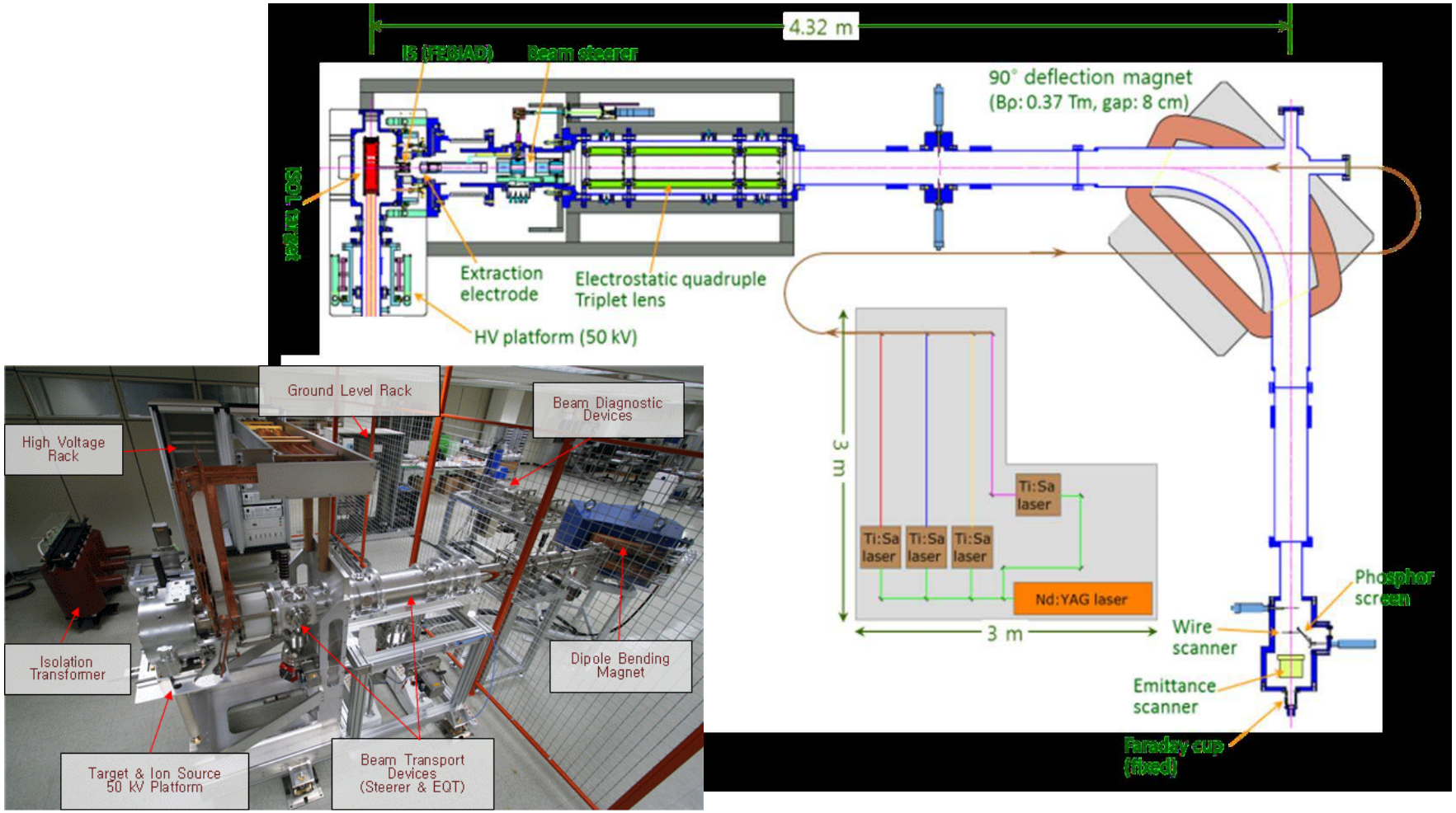

Fig. 1. ISOL off-line test facility at RISP

1. ISOL Off-line Test Facility Control System Manufacturing and Installation

- Performing control of all devices in the Industrial PC of the Ground Rack.
- Rack consist of High-Voltage and Ground level.

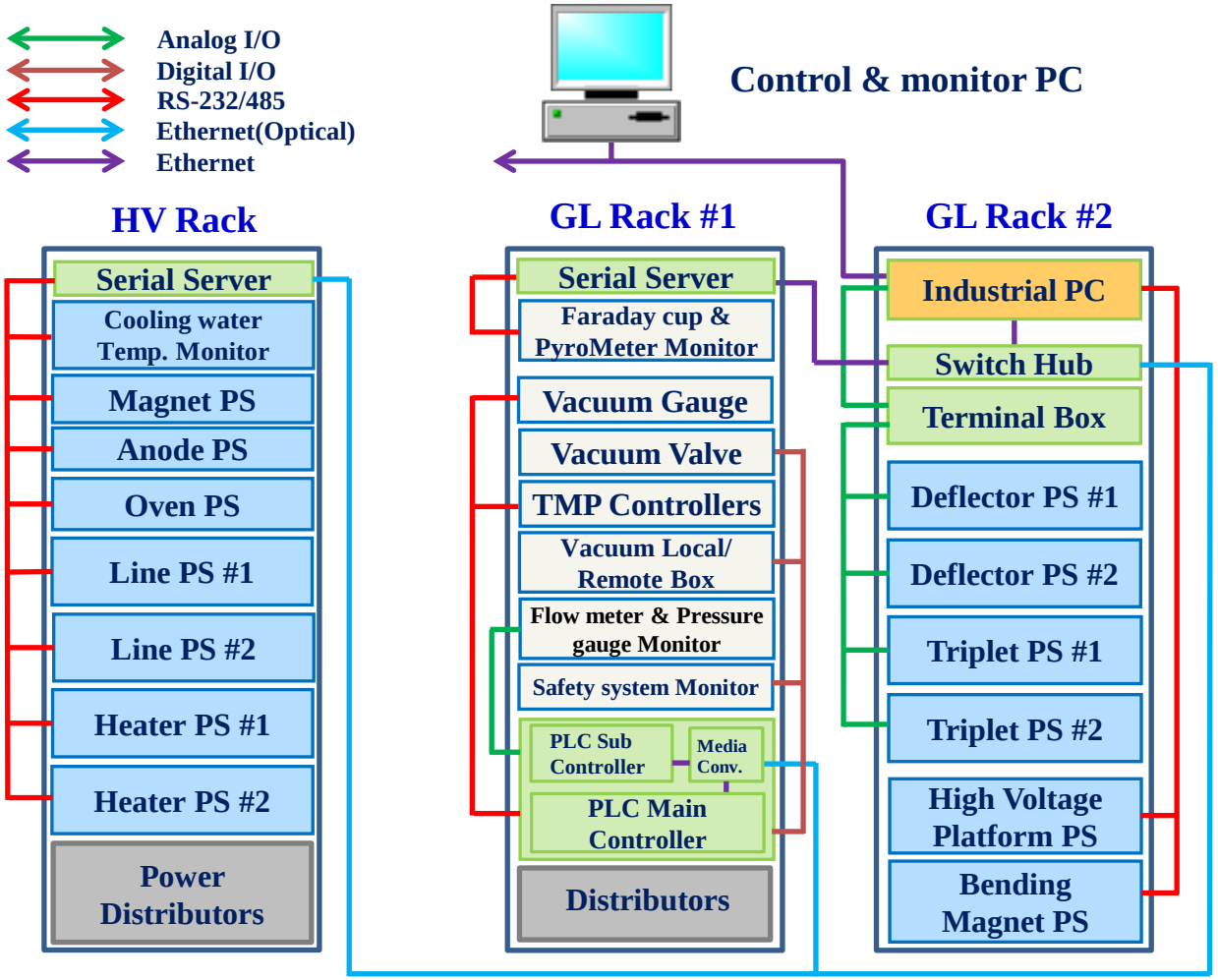

Fig. 2. Block diagram of control system Rack

1. ISOL Off-line Test Facility Control System Manufacturing and Installation

- Configuration of High Voltage Rack for controlling the Target/Ion-source is shown in Figure 3.

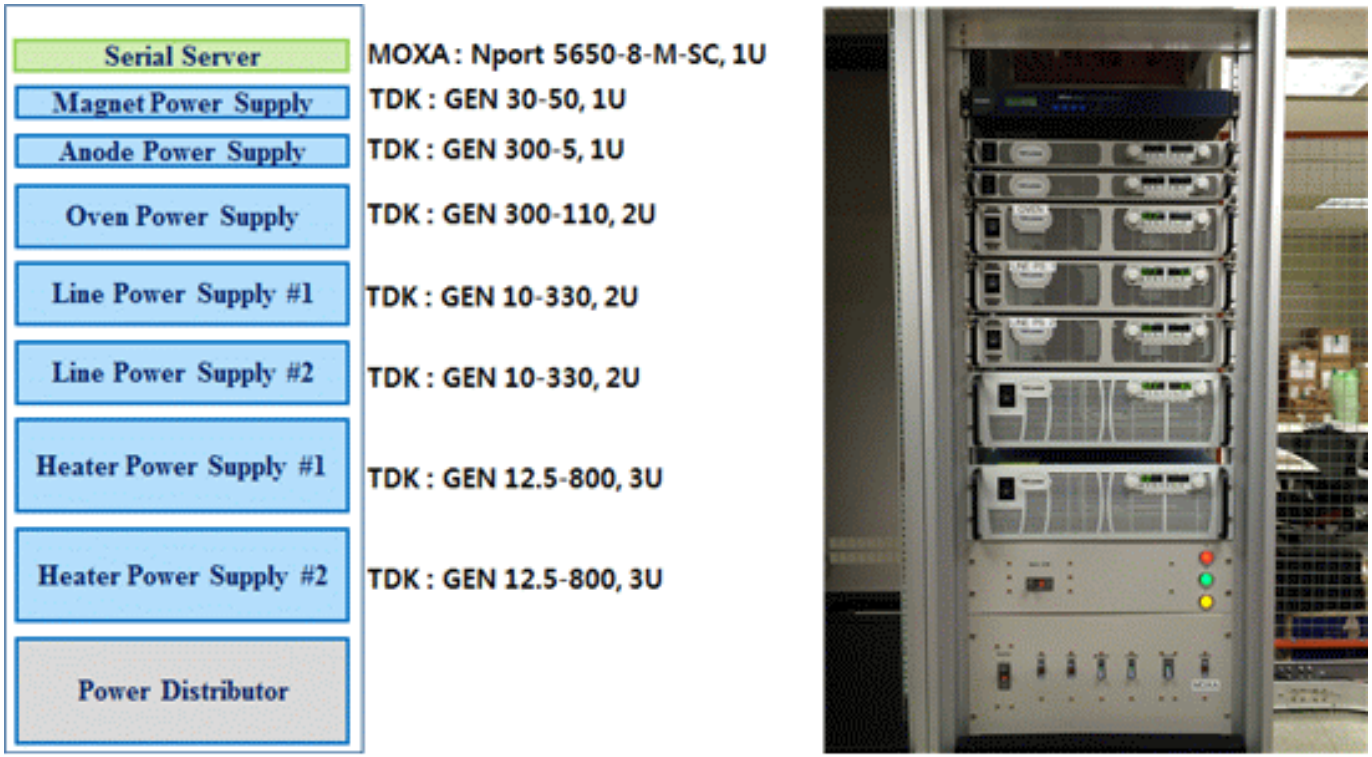

Fig. 3. High voltage Rack device configuration and installation photo

1. ISOL Off-line Test Facility Control System Manufacturing and Installation

- Ground Rack for controlling the configuration of other devices(EQT, Steerers, High-Voltage & Magnet) is shown in Figure 4.

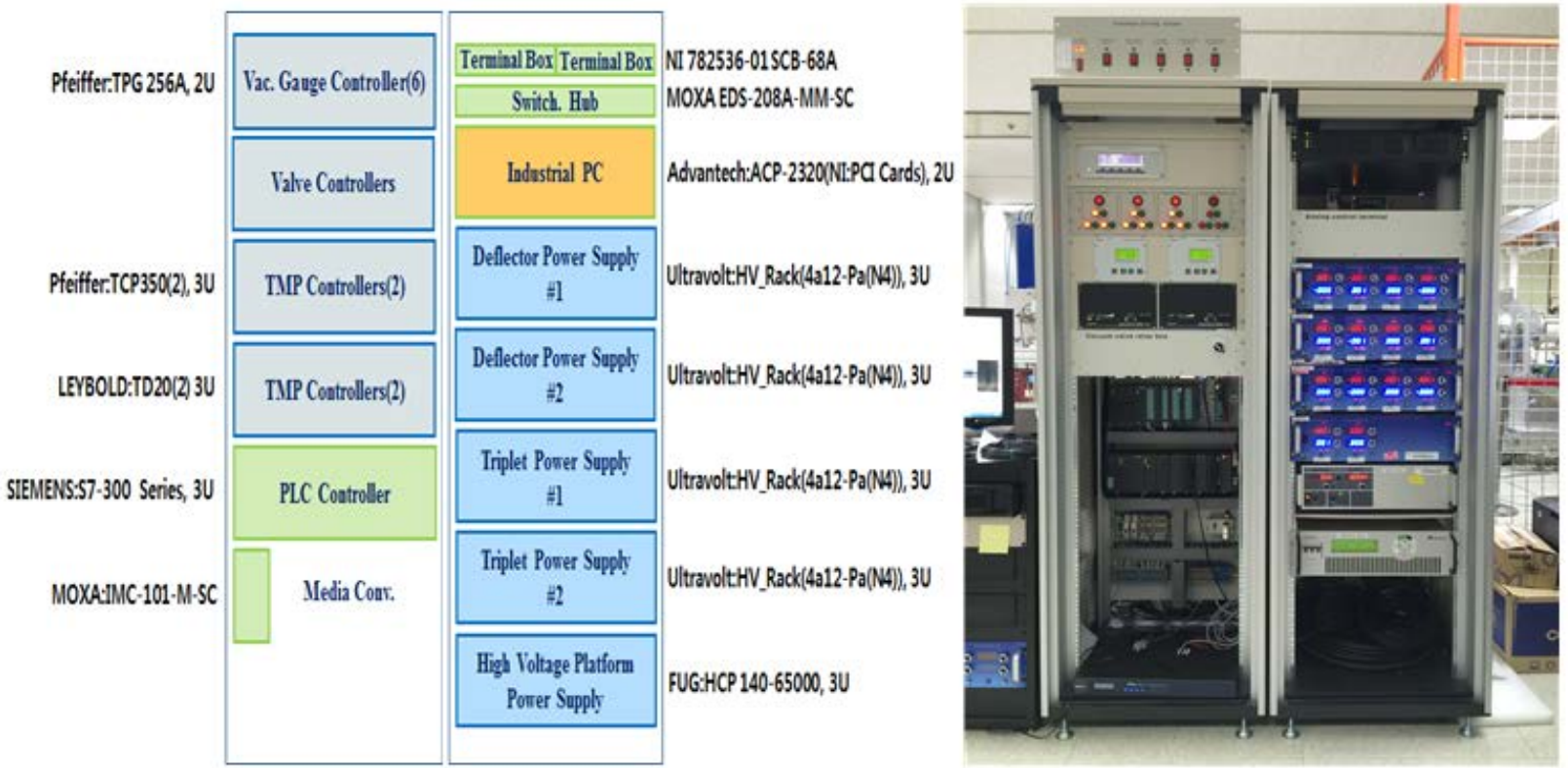

Fig. 4. Ground Rack device configuration and installation photo

1. ISOL Off-line Test Facility Control System Manufacturing and Installation

- PLC system is composed of a dispersion IO consisting of a CPU, CP, IM and SM(Single module).
- A vacuum system(pump, valve, controller, etc.) and the equipment units(cooling water, compressed air, etc.) to perform, such as drive, control and monitoring.

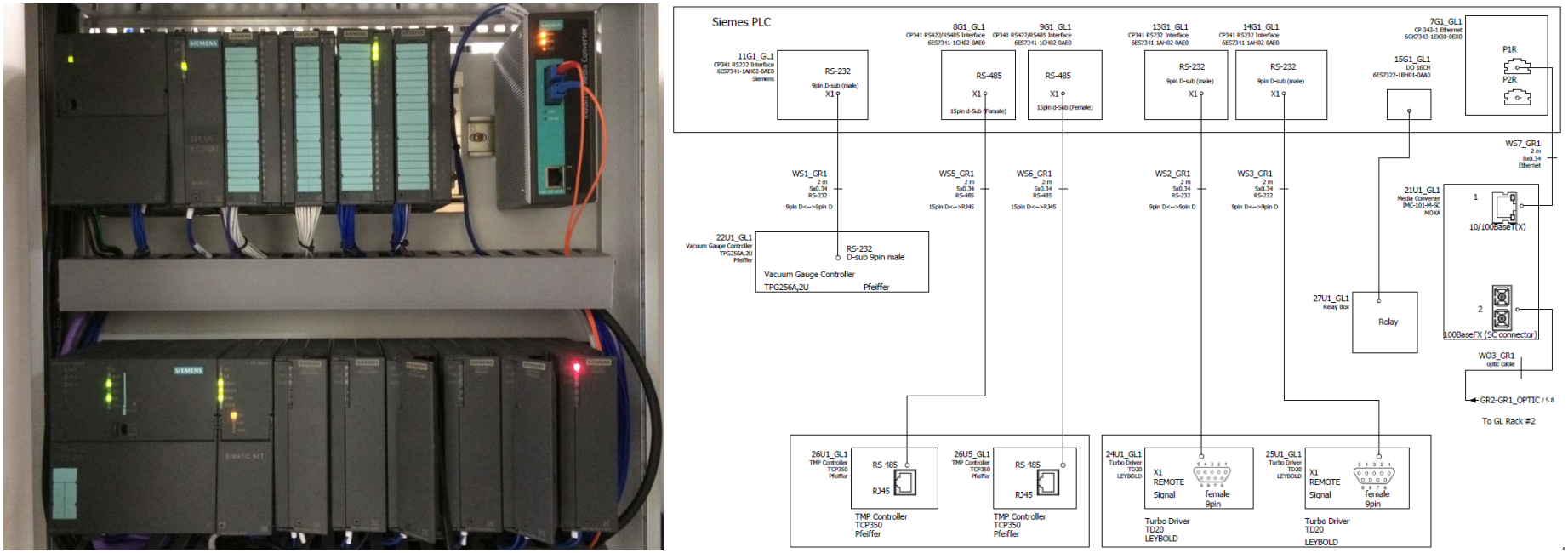

Fig. 5. Siemens S7 300 series PLC system and Cable configuration

1. ISOL Off-line Test Facility Control System Manufacturing and Installation

- installed Flow/pressure gauge and Temperature Monitoring equipment.

Pressure Gauge 1	Pressure Gauge 2
2016.00	2000.00
70 kPa	69 kPa
Flowmeter 1	Flowmeter 2
6816.00	3488.00
243 l/min	125 l/min

Fig. 6. Flow/pressure gauge installation and CSS screen

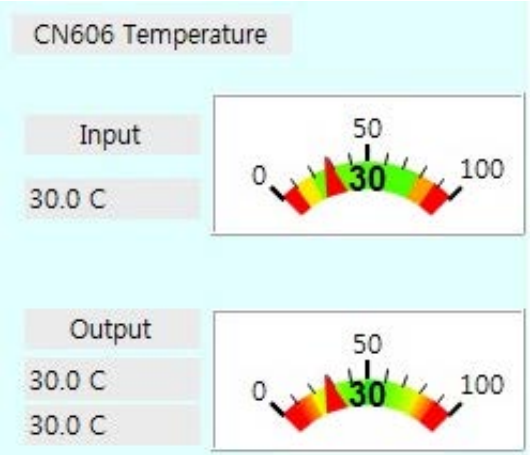

Fig. 7. Temperature Monitoring installation and CSS screen

2. ISOL Off-line Test Facility Safety System Manufacturing and Installation

- The Target & Ion source platform of ISOL Offline Test Facility is applied to high voltage and current of 50kV, because it requires a safety system to protect operators and equipment.

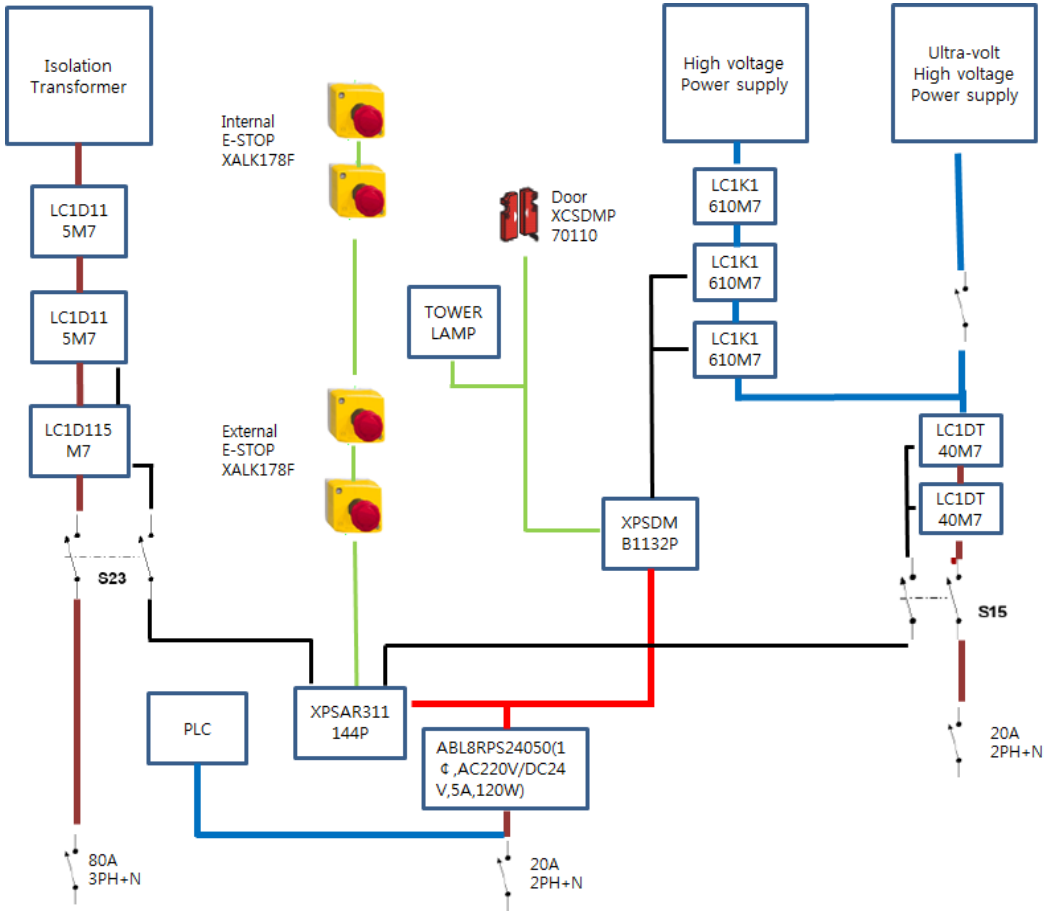

Fig. 8. Block diagram of safety system

Fig. 9. Control panel manufacturing and installation

3. ISOL Off-line Test Facility Software Manufacturing

- In the control and monitoring PC implemented GUI using a BOY CSS(Control System Studio).
- EPICS network via the CA(Channel Access) transfers data(PV) to a control and monitoring PC.

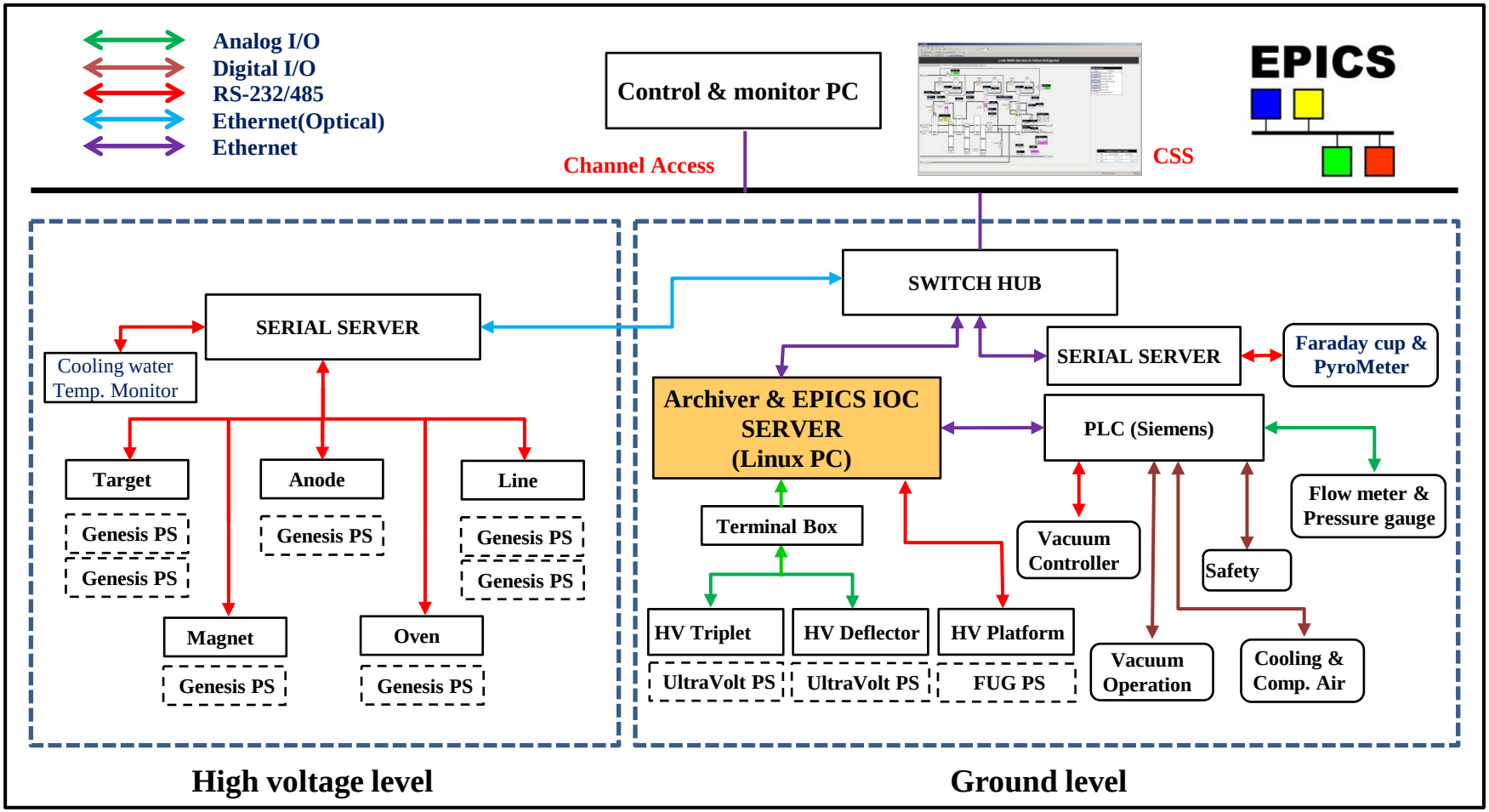

Fig. 10. Block diagram of Software using a EPICS

3. ISOL Off-line Test Facility Software Manufacturing

- The device driver of EPICS IOC controls a power supply for target/ion-source using serial device server, another power supply for EQT/steerer using analog I/O card and vacuum, utility & safety using PLC.

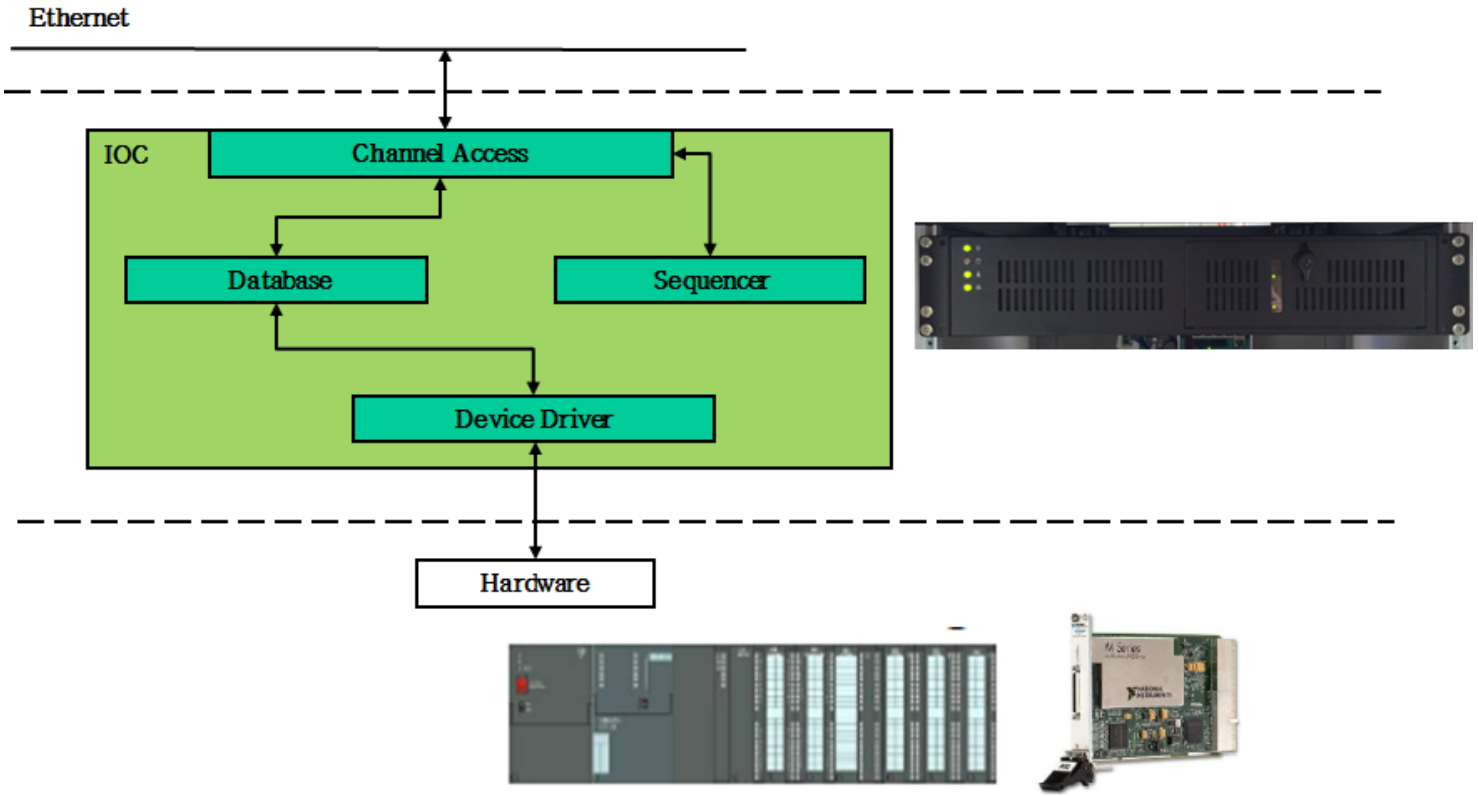

Fig. 11. Internal block diagram of EPICS IOC

3. ISOL Off-line Test Facility Software Manufacturing

- CSS Overview Screen can check the status of the whole ISOL system and a button to switch to the individual control screen.

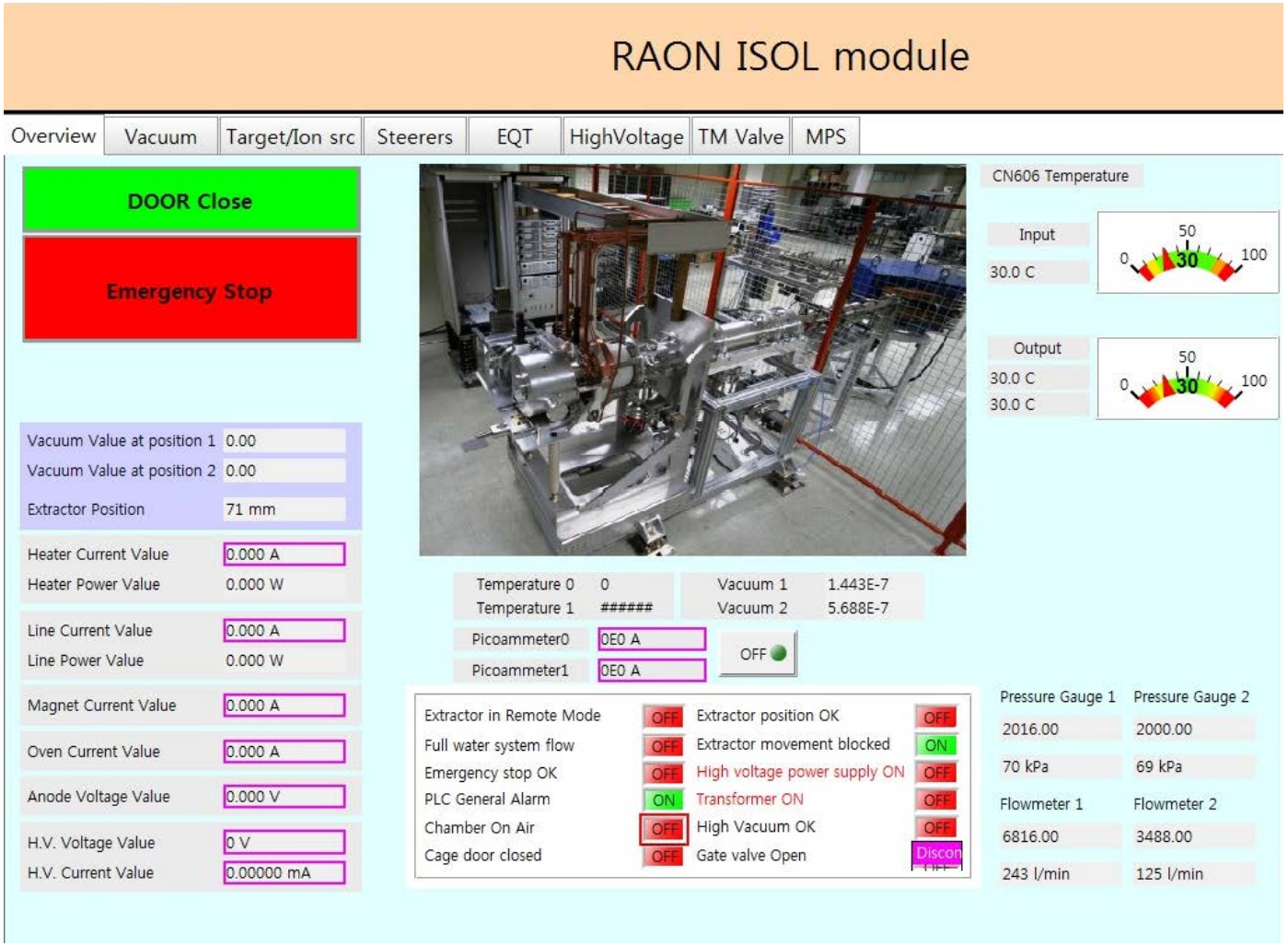

Fig. 12. CSS Overview Screen

3. ISOL Off-line Test Facility Software Manufacturing

- The individual control screen is configured as Target/Ion-source, EQT, Steeres, vacuum, High-voltage and Magnet.

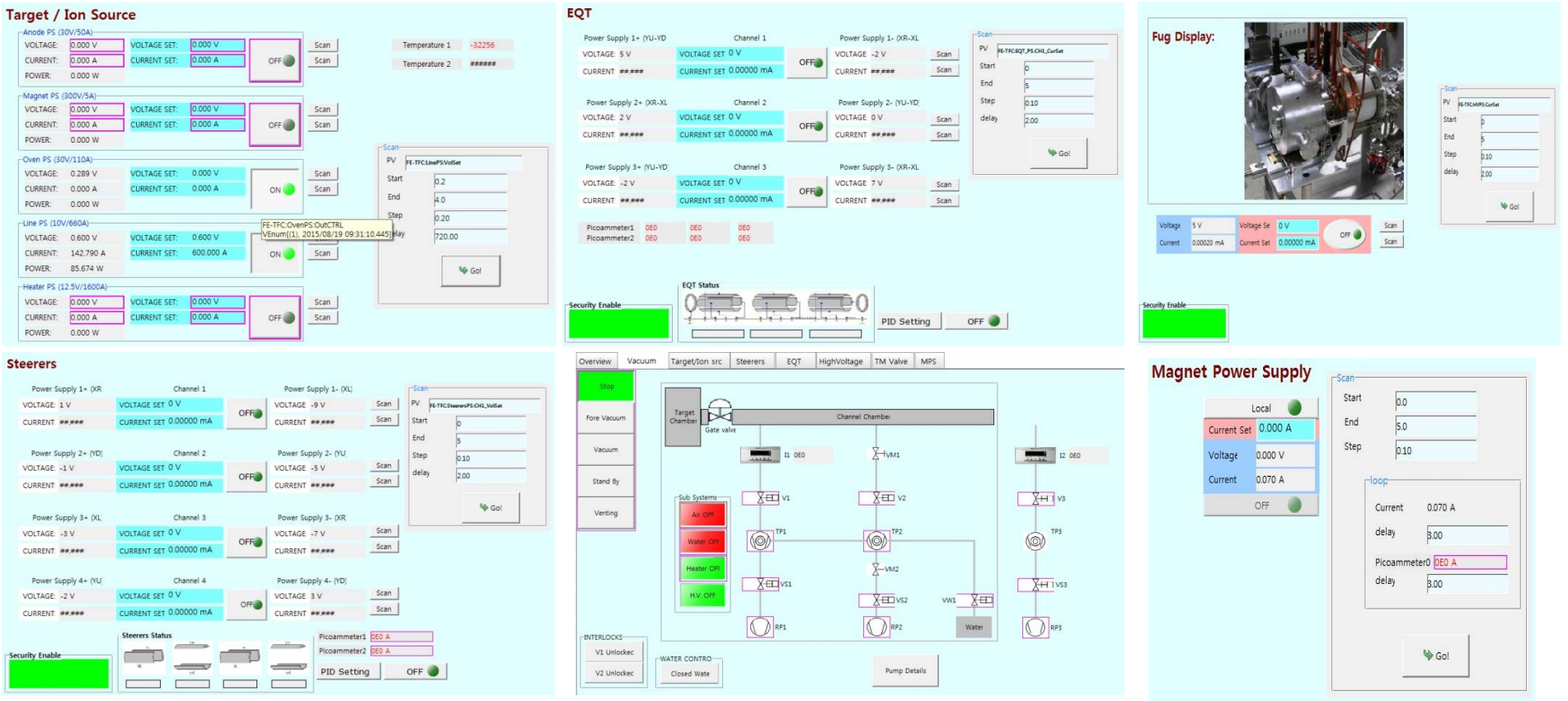

Fig. 13. individual control screen

3. ISOL Off-line Test Facility Software Manufacturing

- By increasing the current of the Magnet Power Supply may measure the current using the Faraday Cup magnet in the rear end.
- Measuring of the ion beam current can be measured by the current meter (picoammeter) connected to the Faraday-Cup.
- Figure 15 Results, the mass analysis is possible by the specification of the magnet.

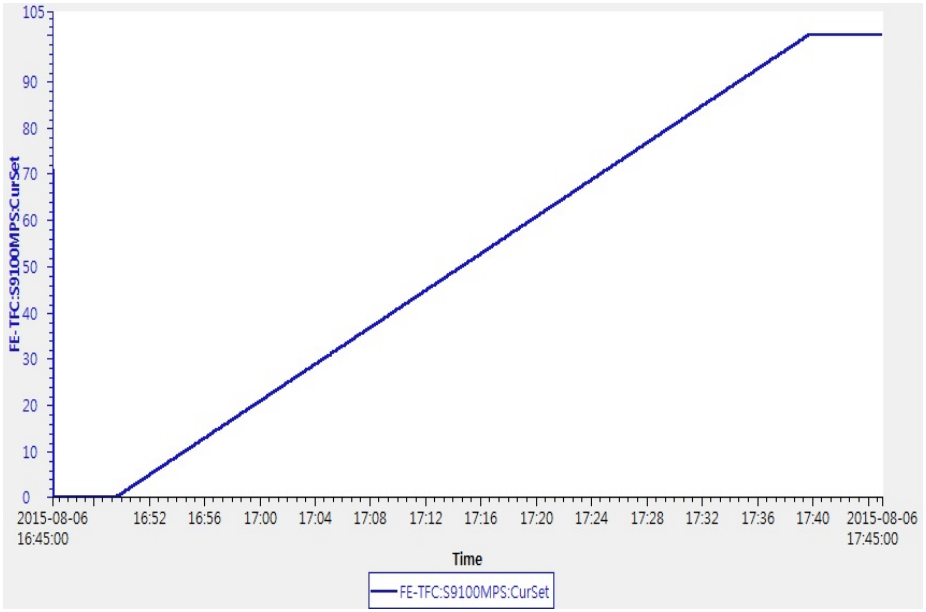

Fig. 14. Magnet Power Supply current change

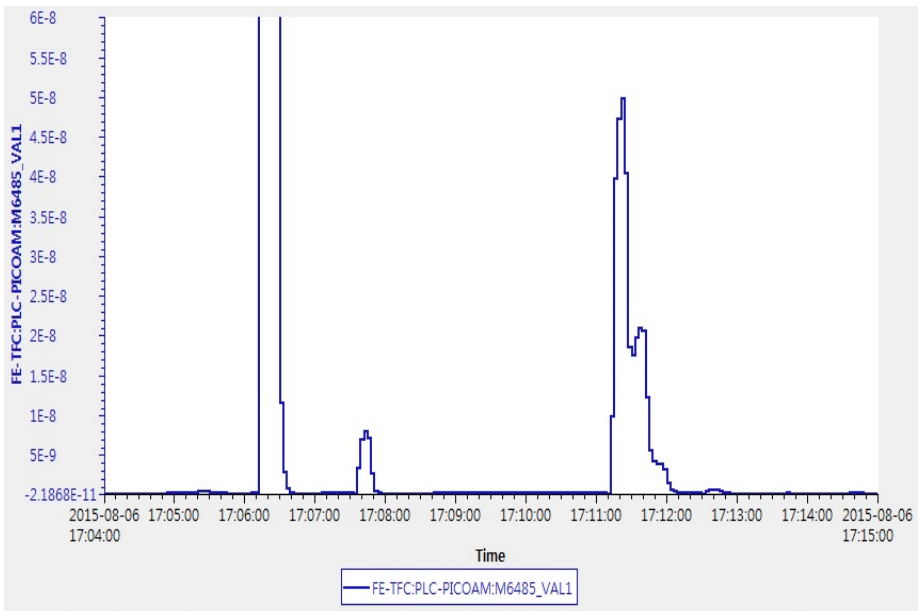

Fig. 15. Faraday-Cup current change

4. Summary

- The control & Safety system of the ISOL off-line test facility is based on EPICS.
- The control system of ISOL Off-line test facility at RISP is composed of two major parts of the control for RI beam production/separation/transportation and the safety for high voltage power supply and utility.
- It controls the devices and monitors the current status of each device remotely through GUI using CSS.
- The safety system has been designed and run to protect the facility and people.
- The first stable ion beam of sodium has been successfully extracted.

Thank you for your attention !