

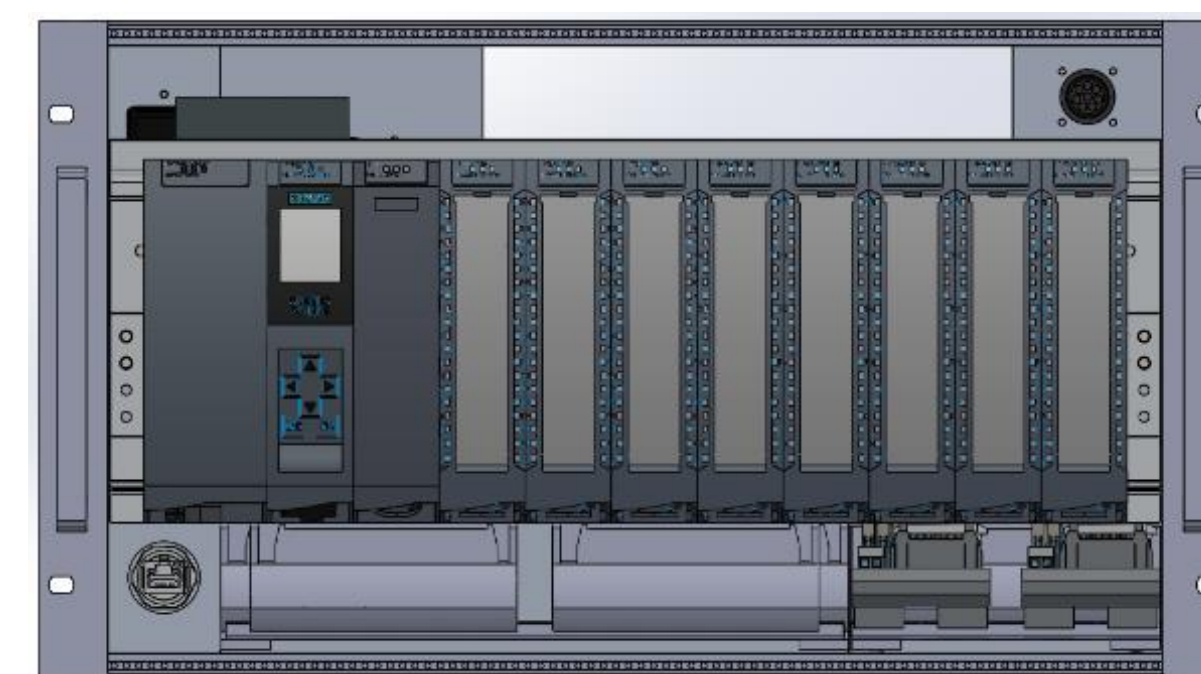
GeCo: The Elettra 2.0 Beamline Control System

The Elettra 2.0 light source

After nearly 30 years of operation, the Elettra synchrotron radiation source will be replaced by the new **Elettra 2.0 4th generation light source**. The new storage ring will employ a symmetric six-bend enhanced achromat lattice and will operate predominantly at 2.4 GeV. Elettra 2.0 will have up to **32 beamlines**: 20 of the present ones should be upgraded, and 12 new are scheduled to be built. For all of them a **new control system** infrastructure will be designed and installed using state of the art technologies. The project involves the Interlock System, the Personnel Safety System and the Instrumentation Control System.

GeCo* Interlock System

- Monitors and operates the beamline components and the vacuum elements in safe conditions
- Common modular solution for all the beamlines
- Based on Siemens PLC products
- Tango ready: single auto configuring device



Crate front view

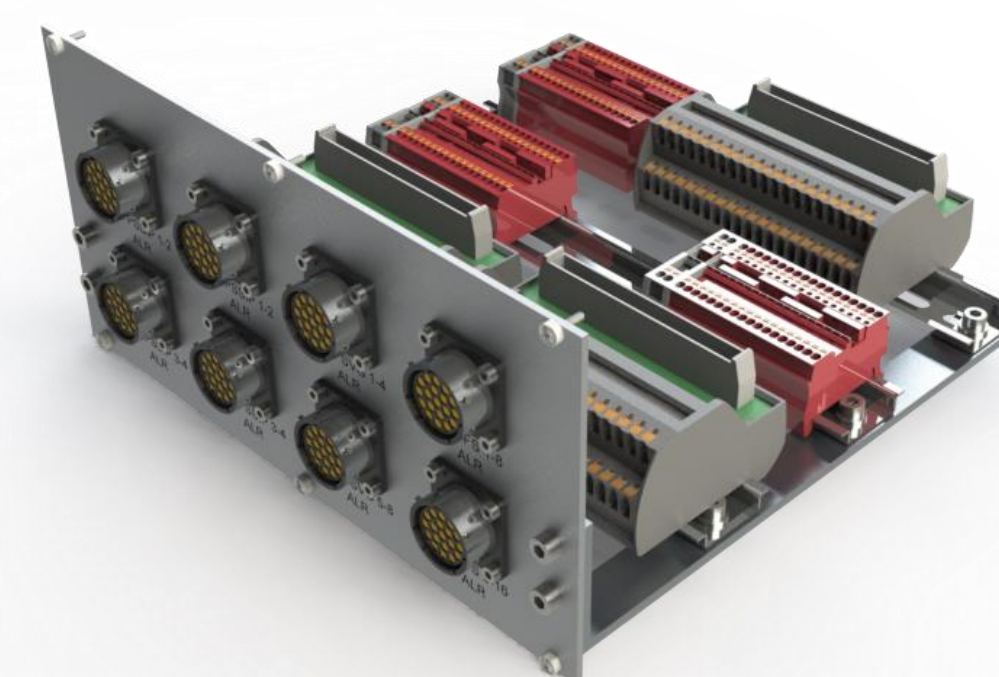
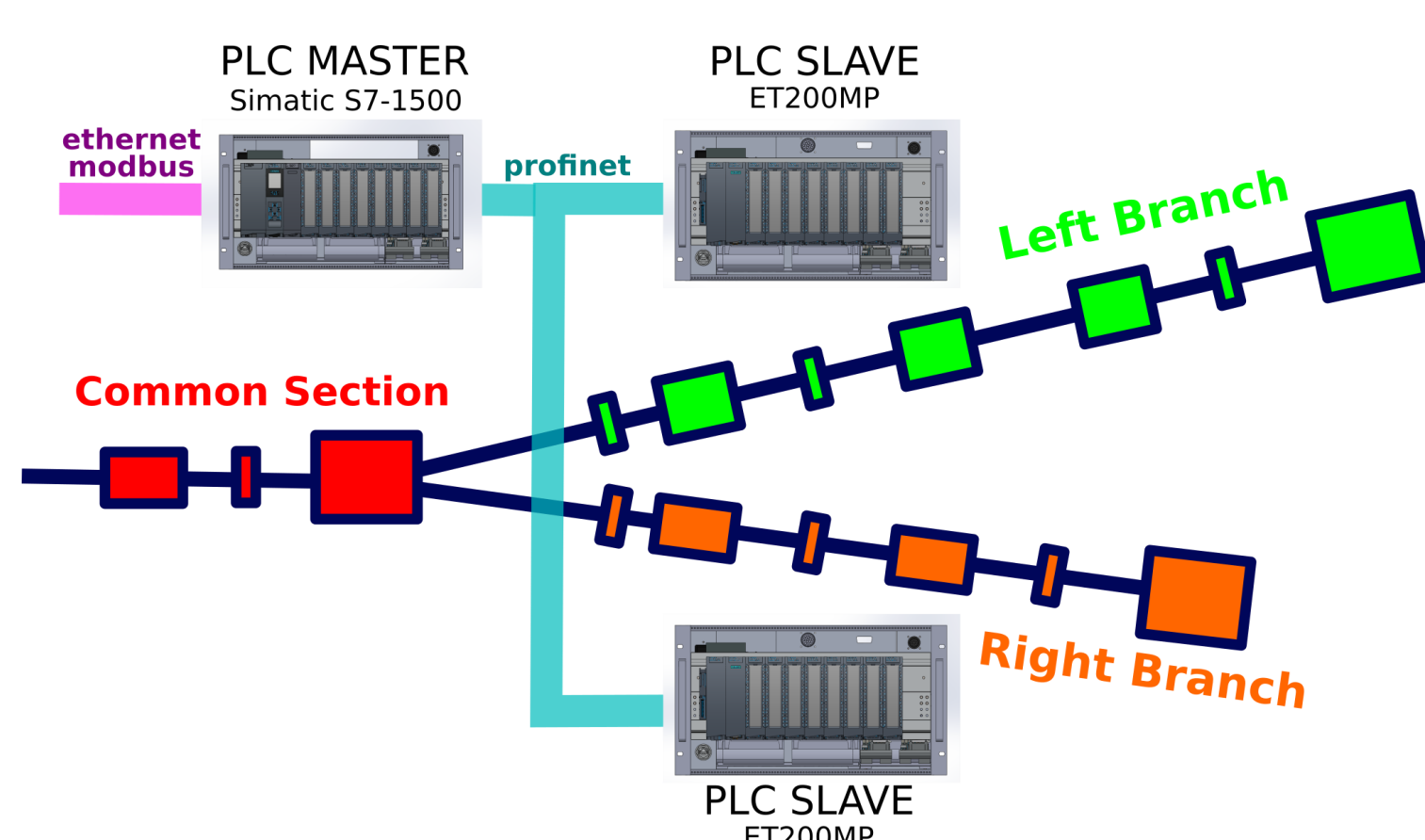


Crate back view

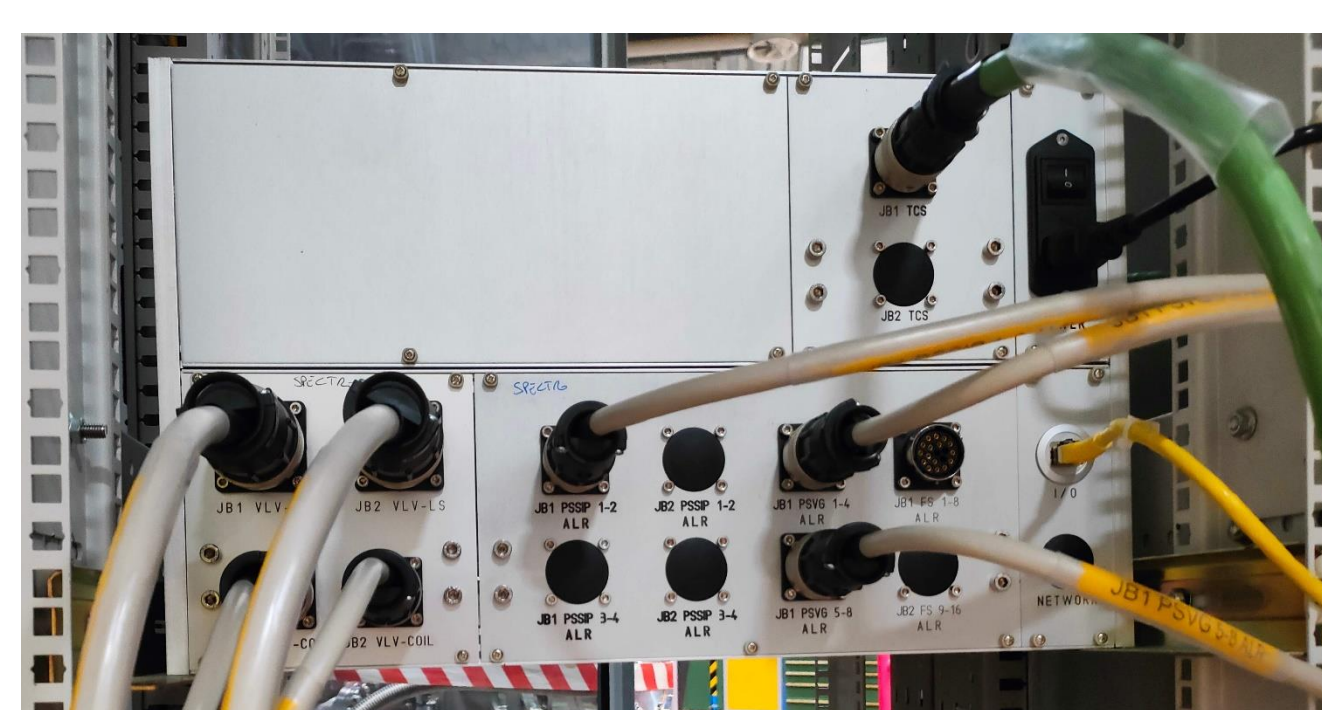
* Gestione e Controllo (Management and Control)

Hardware Architecture

- PLC Master Simatic S7-1500 CPU 1513: controls the components of the beamline common section
- PLC Slave ET200MP: controls the branchline components
- PROFINET fieldbus
- 6U crates: in-house modular design
- Standard junction boxes and cabling (flow switches, thermocouples and vacuum valves)



Internal modular cabling



Clean standard cabling

Software Architecture

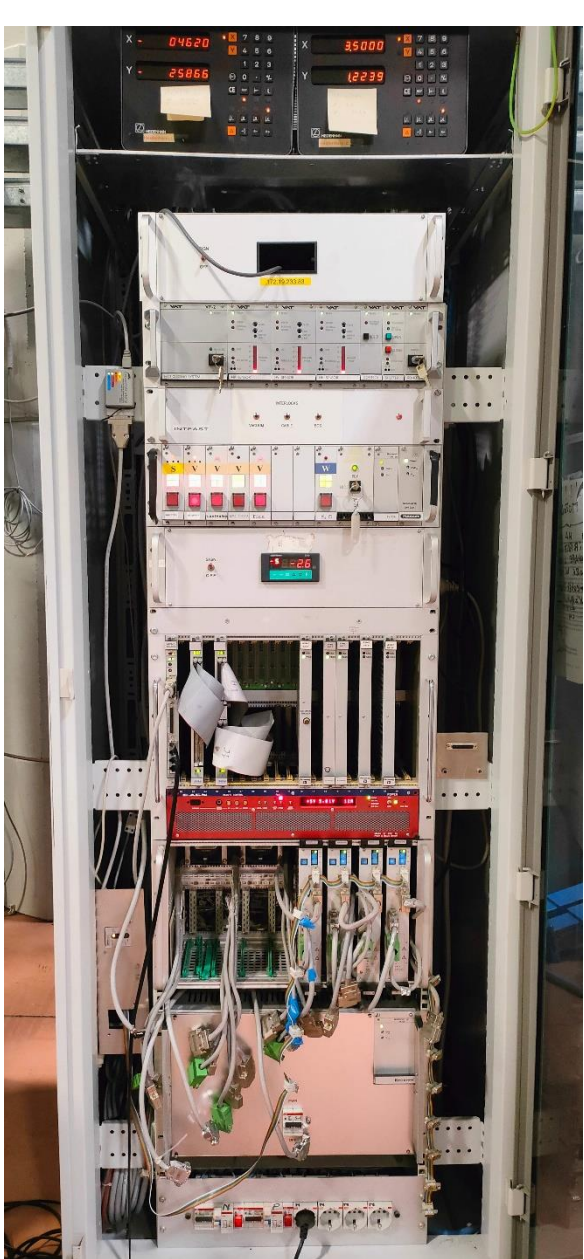
- Common template, SCL based programming
- Python scripts for generating PLC datablocks and I/O tag tables
- Ethernet Modbus communication protocol
- Internal FIFO buffer log
- Self describing Modbus exchange datablock

CLIENT COMMAND	String
COMMAND RESULT	String
CFG REF DATE	Date
LOG MESSAGE LENGTH	Int
LOG BUFFER LENGTH	Int
LOG BUFFER	Array [String]
DATA BLOCK START	-1
COMPONENT1	Data Struct
COMPONENT2	Data Struct
COMPONENT3	Data Struct
...	...
DATA BLOCK END	-2

The Smart modbus exchange datablock

Upgrade in progress

- **4 beamlines** upgraded during 2023
- The original VME control system has been substituted with GeCo
- New **YAMS** standard motion system
- Removal of obsolete instrumentation
- Rack redundant EATON power supply
- MOXA serial to Ethernet devices



Original control rack

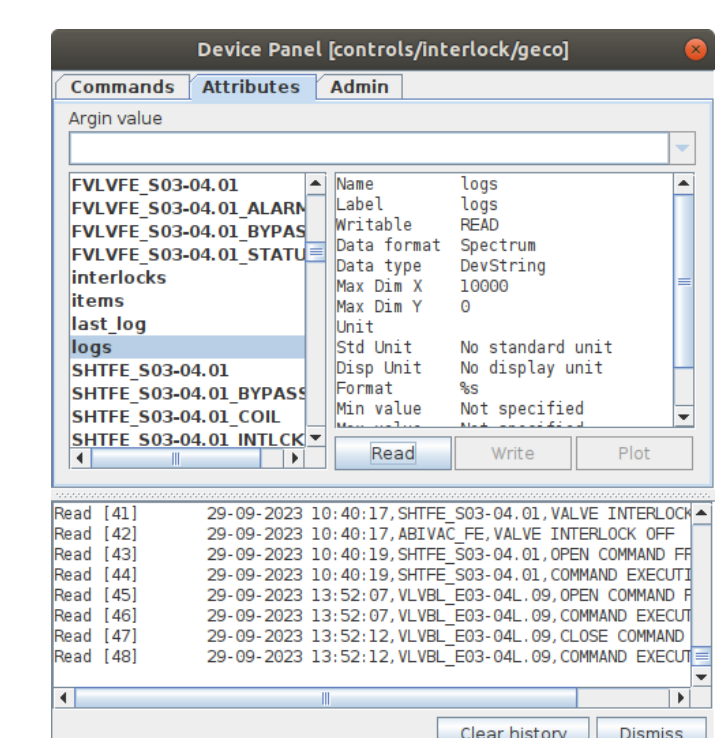


New GeCo rack

MORE SPACE, LESS ENERGY CONSUMPTION!

TANGO ready

- A unique GeCo device for all the installations
- **Dynamic attributes** created after parsing the modbus datablock
- Log messages file archiving



DonkiWeb tool

- Fully Python based
- Tango REST bridge
- Web-socket data streaming
- Javascript "easy scripting" GUI

