



University centre , Engineering and physics training

Controls & Vacuum hands-on training

Student:

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Participation period:

July 09 – July 27

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Controls & Vacuum hands-on training

Practice structure:

1. Vacuum technology

- Assembling and Pumping-out of the model of the accelerator vacuum system.
- Pumping-out, Detecting and Eliminating of Vacuum Leaks.
- Leakage Time Estimation, Leakage Graphs.

2. Controls

- Acquaintance with control elements.
- Assembling basics (instruments, methods).
- PLC programming basics.
- ACS project: structure, schemes, tables etc.
- Development of the project of the ACS for the model of the accelerator vacuum system: requirements, explanatory note, structural and electrical circuits, equipment layout, cable journal, specification, operation manual.
- ACS assembling, vacuum equipment connection
- PLC programming and operational testing.

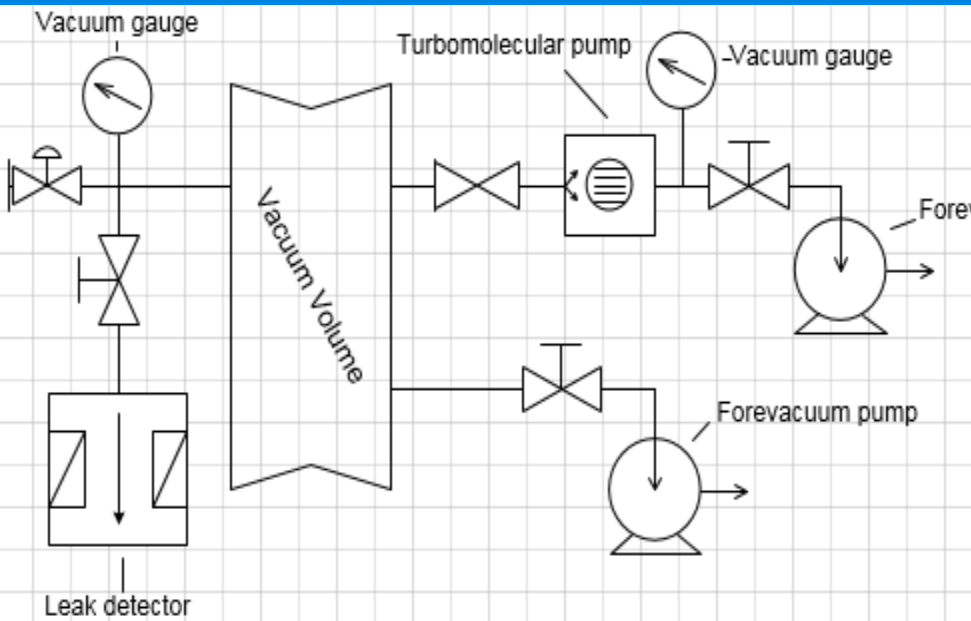
TEST PROJECT

FINAL PROJECT



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Vacuum technology



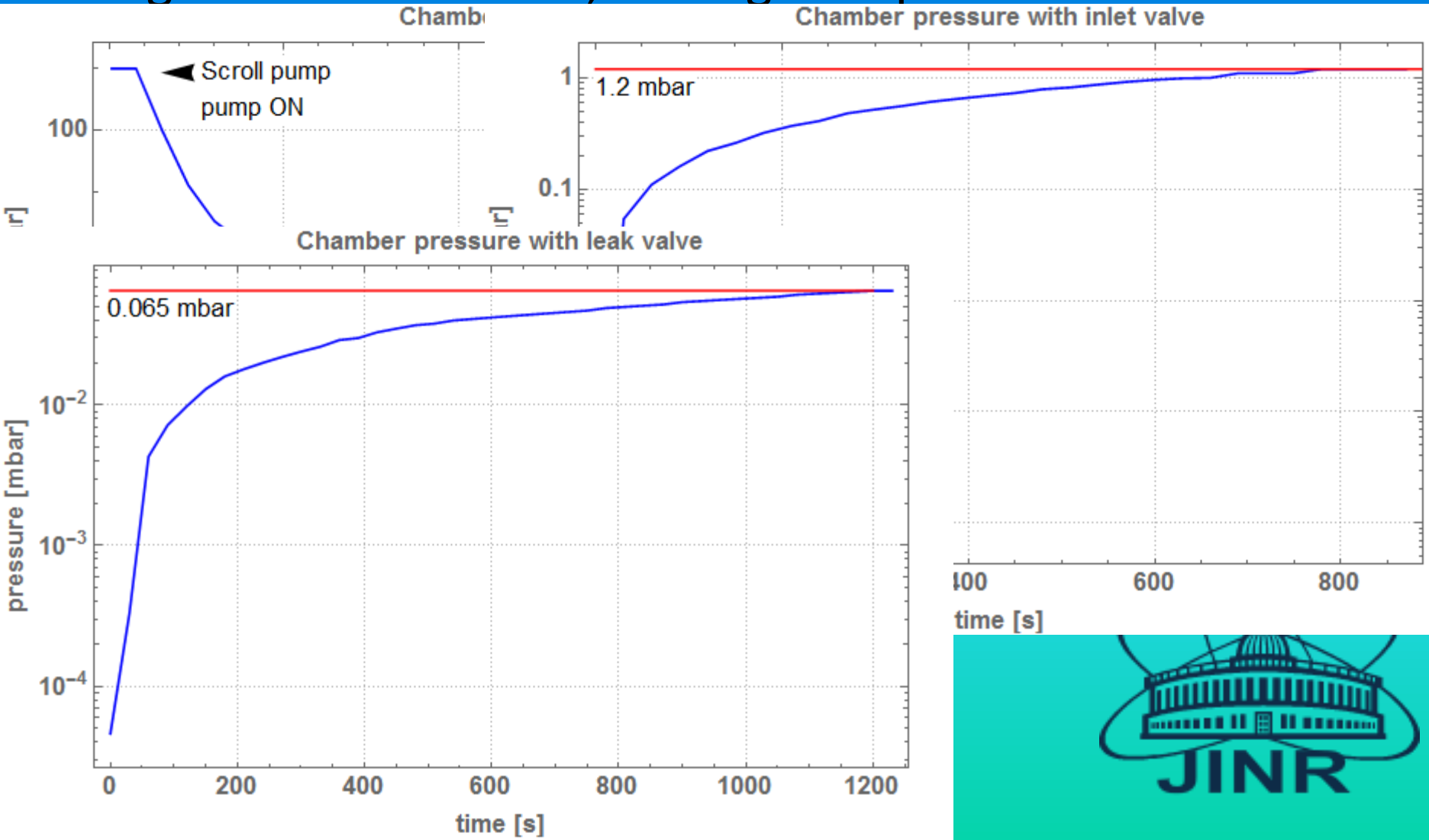
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Pumping-out, Detecting and Eliminating of Vacuum Leaks.



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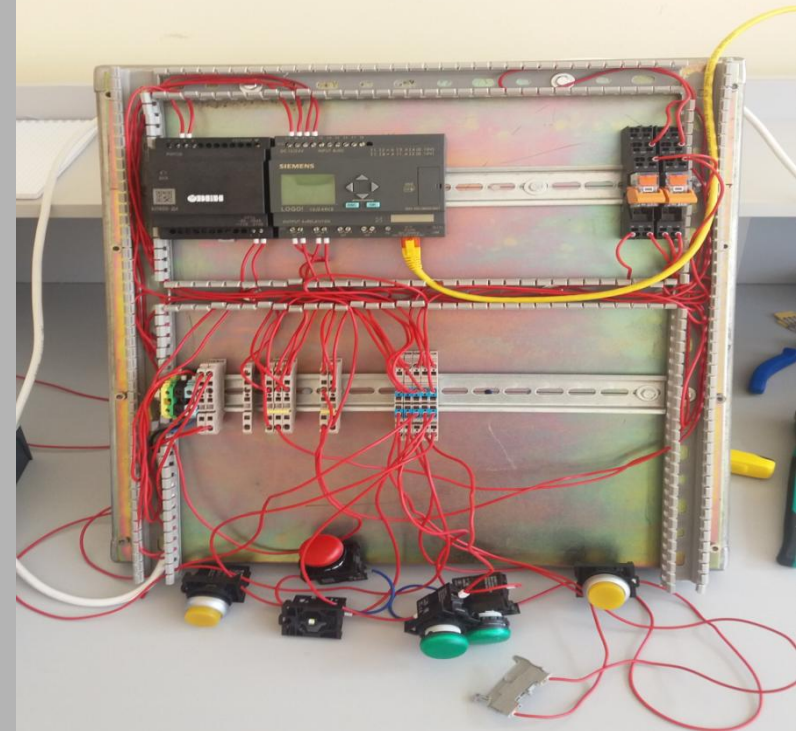
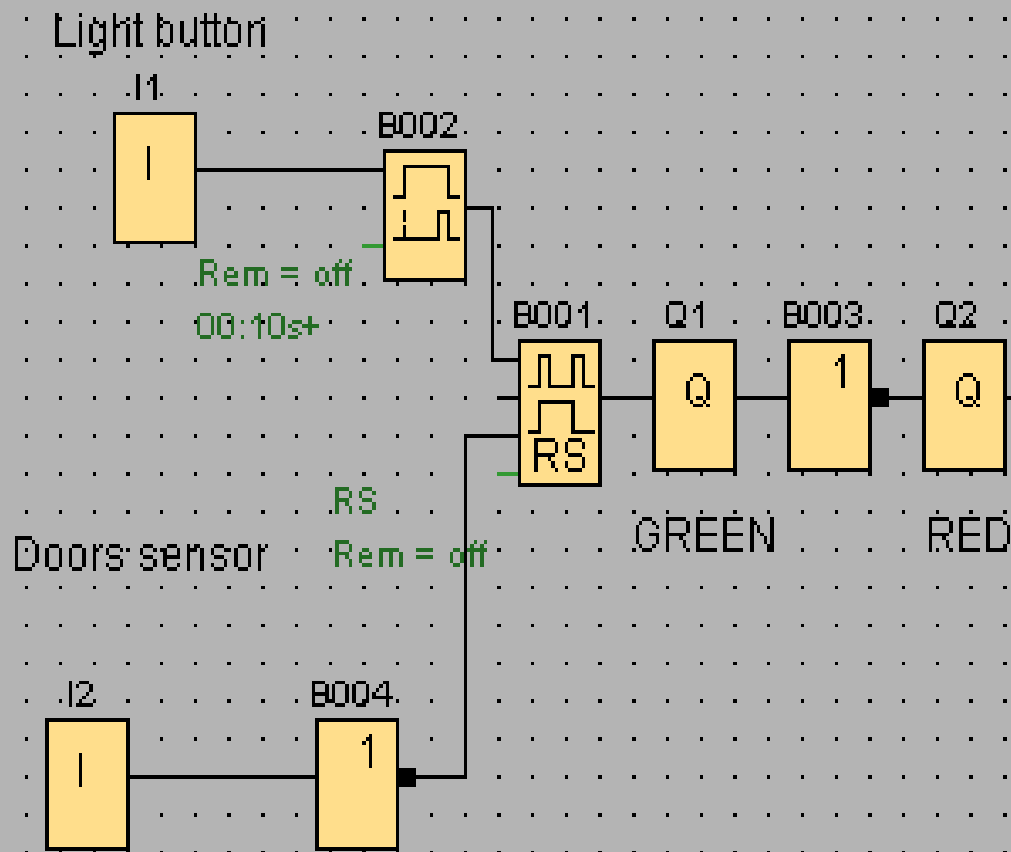
Leakage Time Estimation, Leakage Graphs.



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Controls

Test project – Clinic notification system



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Final project (Automation of the accelerator vacuum system)

Motivation:

- Reflection on the air particles
- Beam losses
- Absorption
- Dispersion



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Final project

Explanatory note & System behavior

Stages:

1. System behavior
2. Vacuum equipment, Scheme and layout.
3. Electrical scheme
4. PLC programming & interlocks
5. RC & Fully automatized user friendly system

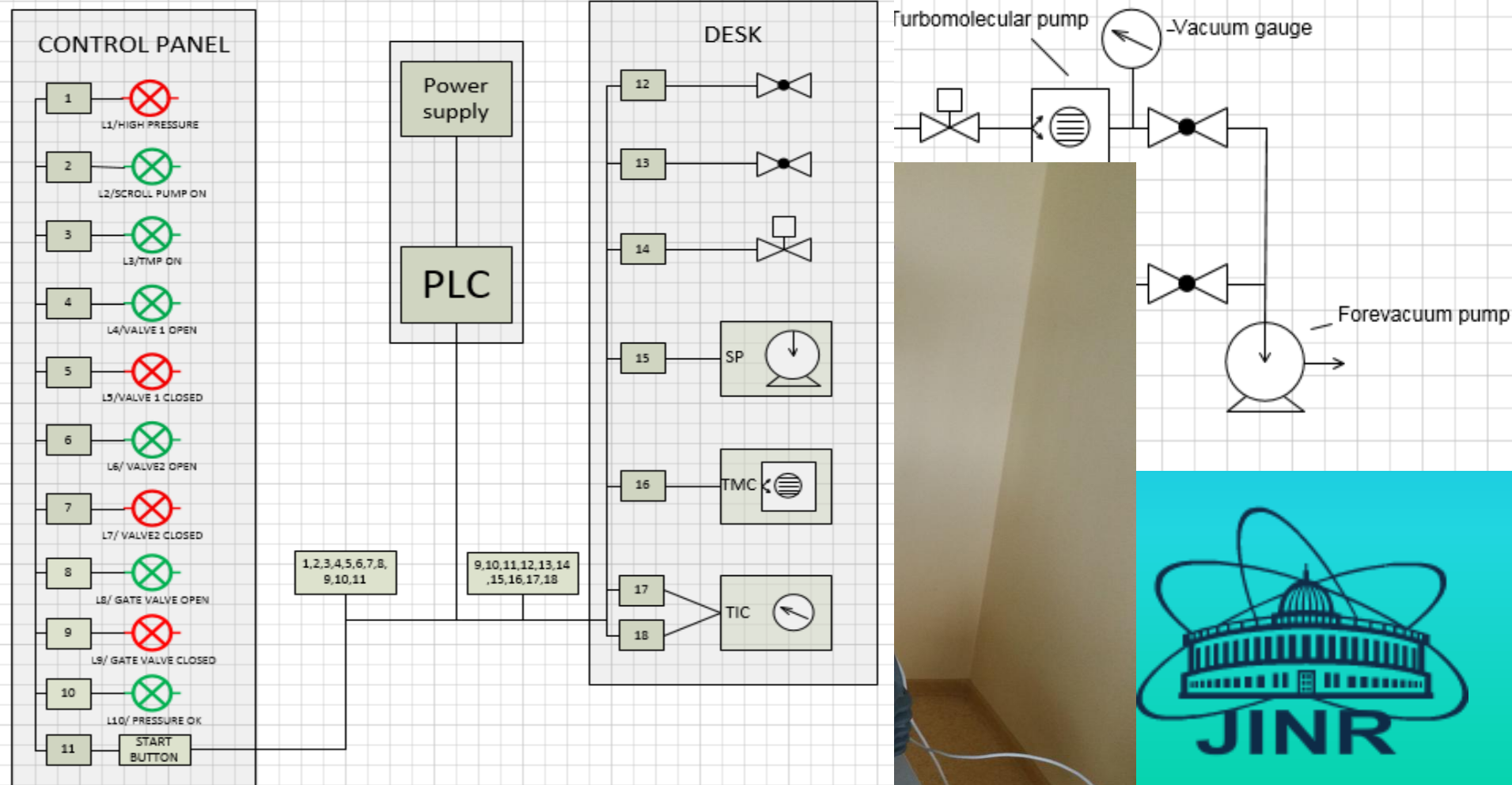
System behavior:

1. Initial state:
All valves (1,2) and the gate valve are closed.
Green lamps for valves are ON.
Pumps are turned OFF.
2. Second stage (forevacuum):
Turn the scroll pump on
Open the valve 2.
Measure the chamber pressure.
3. Third stage (High vacuum):
Close the valve 2.
Open the valve 1.
Measure the TMP pressure. Turn the TMP ON.
Open the gate valve.
4. Final stage (acceleration)
White lights ON (pressure)
START acceleration

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Final project

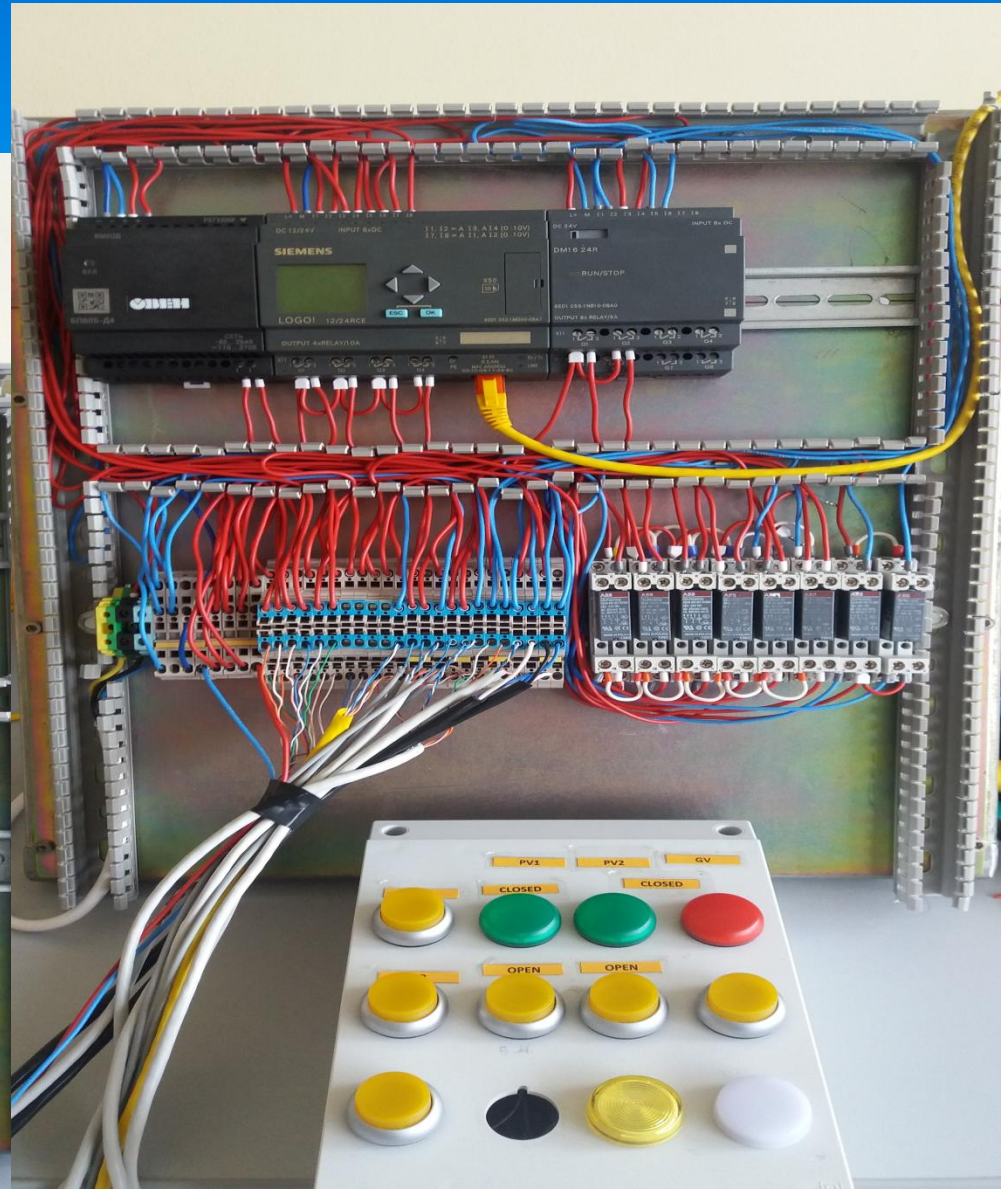
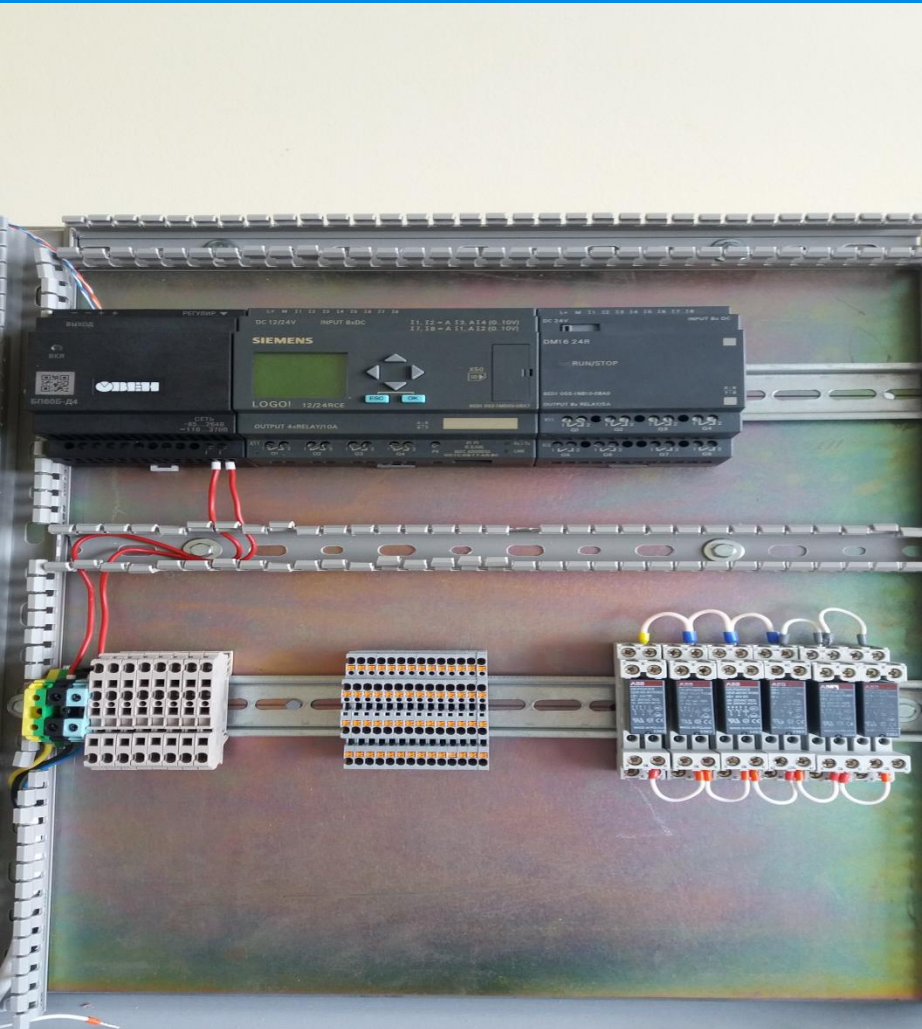
Vacuum equipment, scheme & layout



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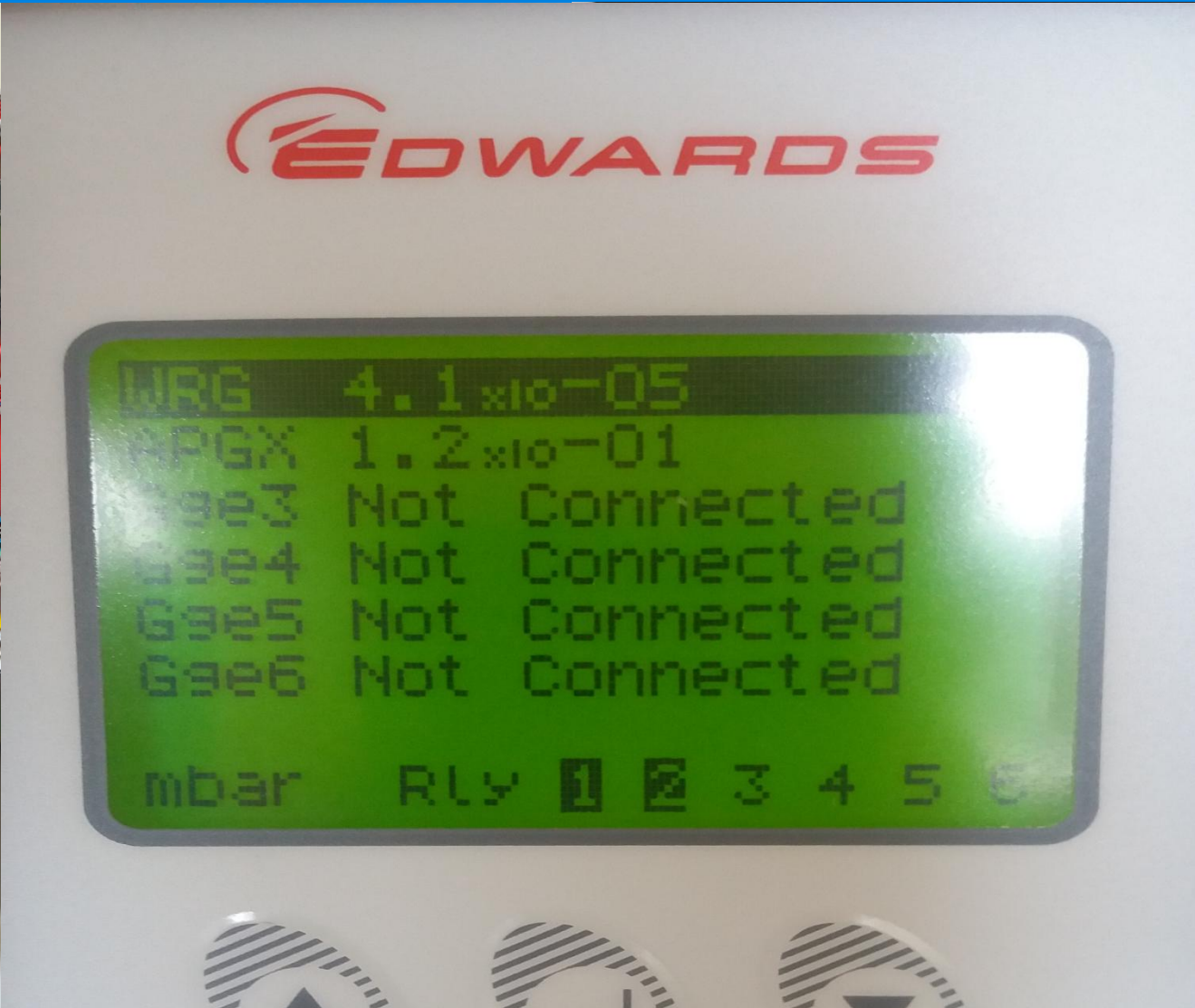
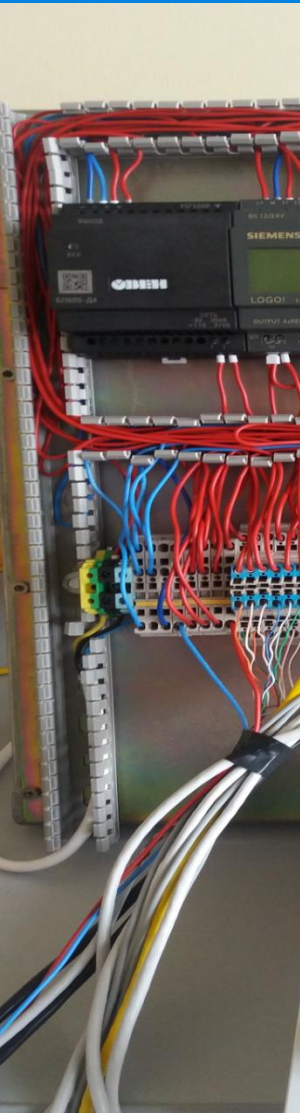
Final project

Electrical scheme



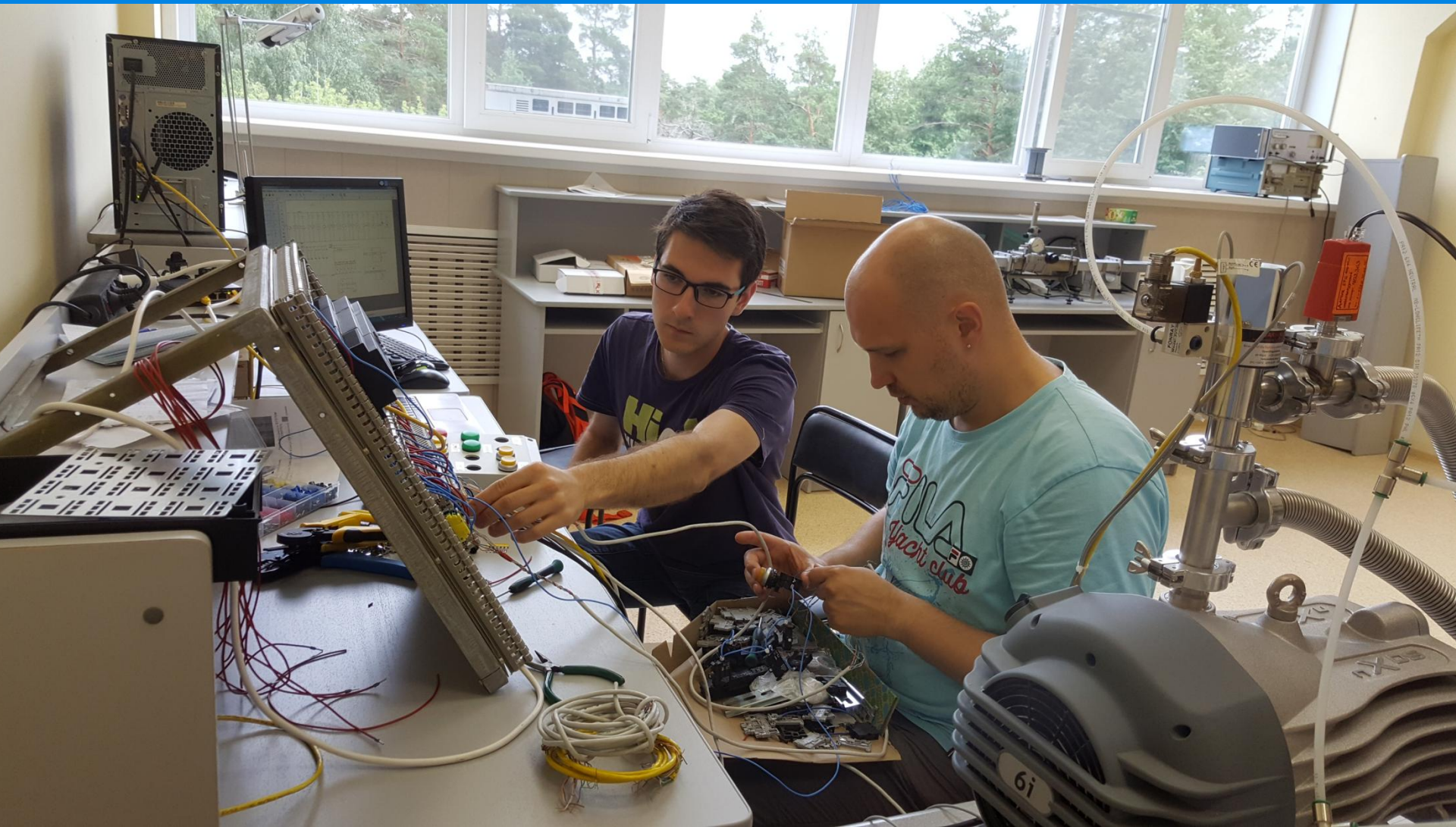
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Final project - RC & Fully automatized, user friendly system



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Final project - Assembling



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Thanks for your attention

Literature

- [1] Nagamitsu Yoshimura. Vacuum Technology: Practice for Scientific Instruments. Springer, 2008
- [2] Siemens S1200 PLC manual.

