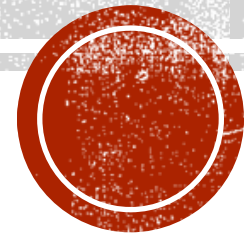




JINR

CONTROLS & VACUUM HANDS-ON TRAINING

Joint Institute for Nuclear Research



- By: Esraa Khaled Ali
- Teacher assistant at the British University in Egypt

- University Center, JINR
- Supervisors:
 - R. Pivin
 - D. Zlydenny
 - V. Kosachev



AIM OF PROJECT

Design and assemble the Automatic Control System (ACS) for the model of the accelerator vacuum system

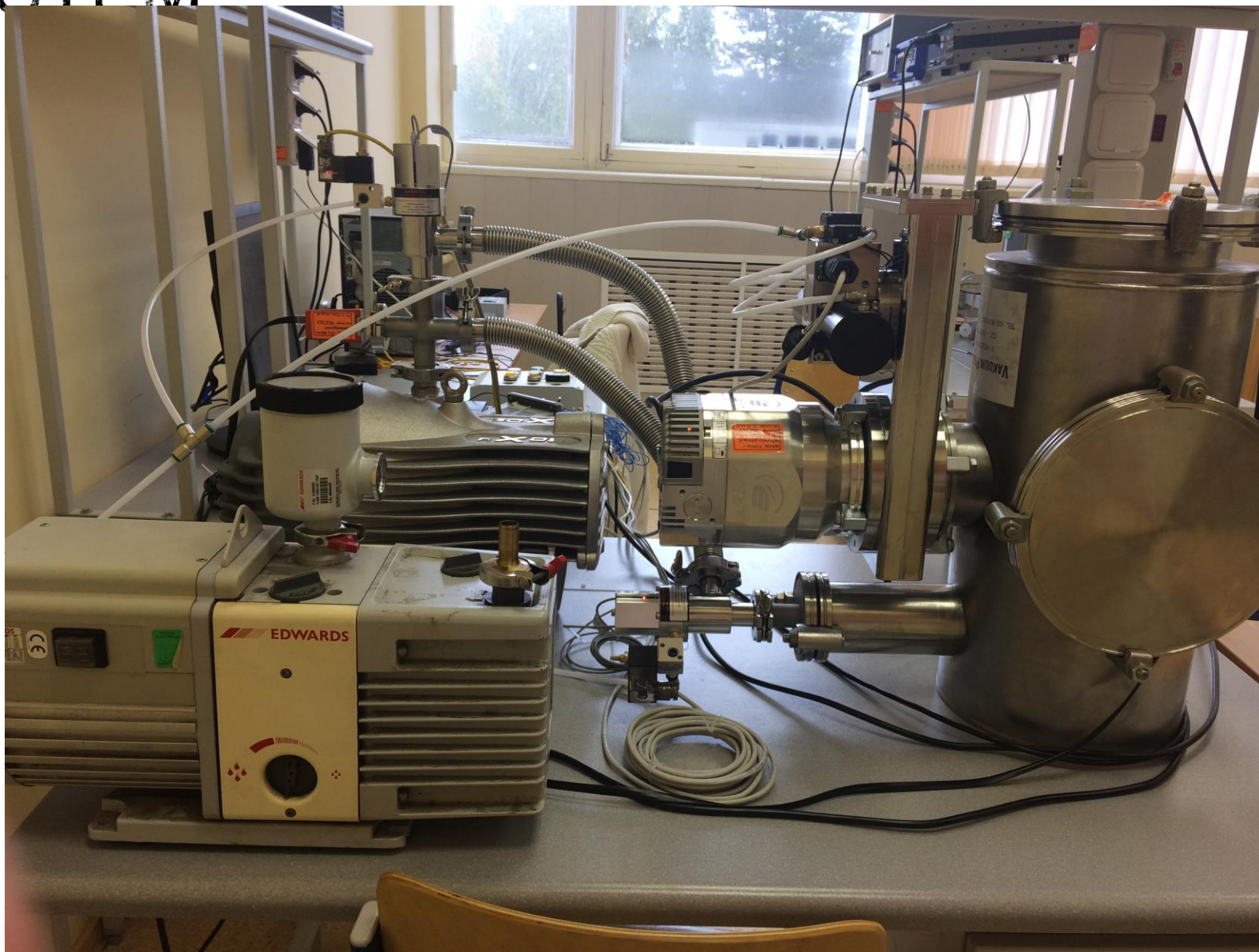


1. VACUUM LAB

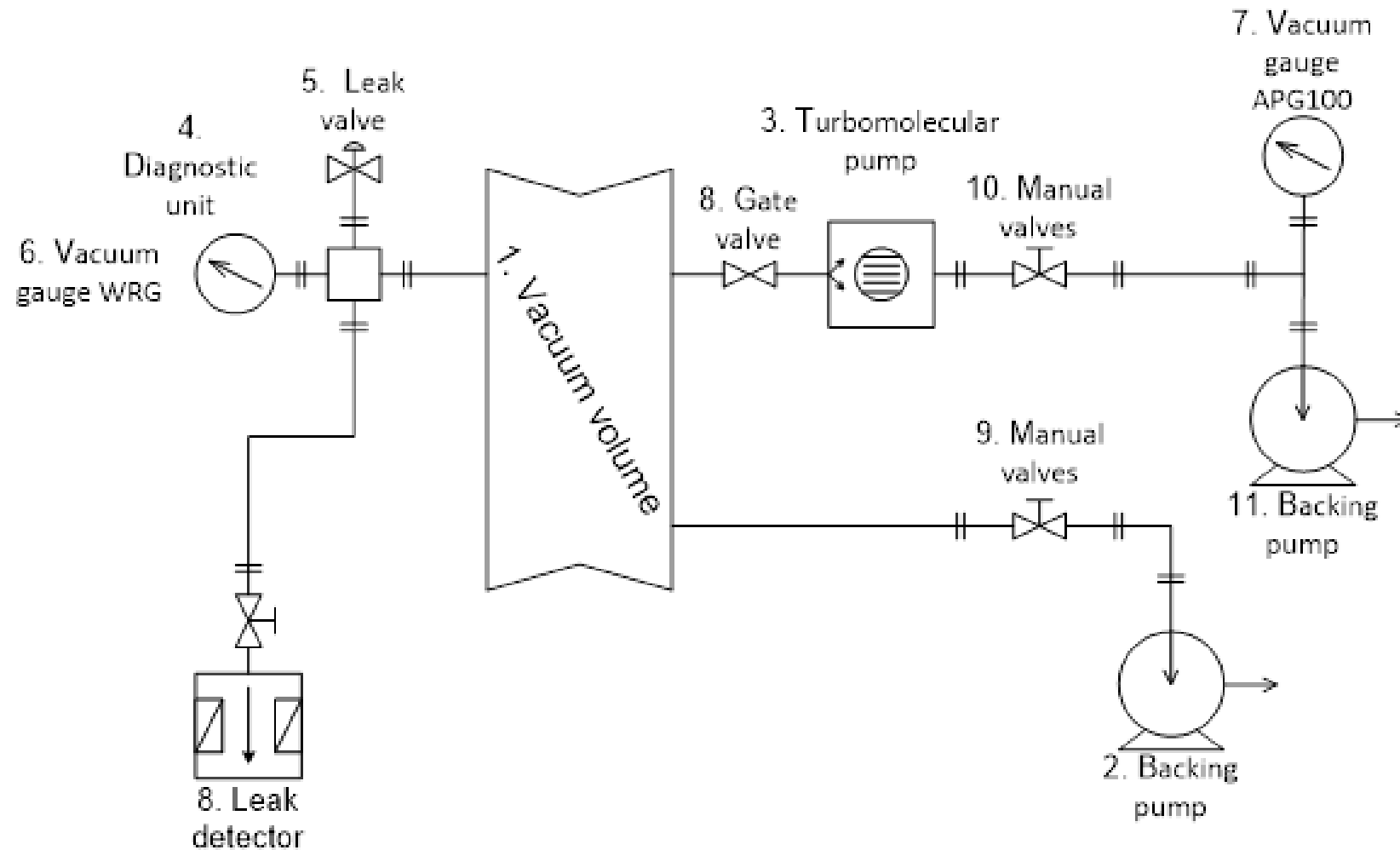
- a. Assembling and pumping of vacuum system.
- b. Vacuum system pumping-out, leak detection and elimination.
- c. Plotting of pumping graphs.



A. ASSEMBLING AND PUMPING OF VACUUM SYSTEM



VACUUM SYSTEM LAYOUT



LAPORATORY WORK PUMPS

Pre-vacuum



Edwards RV8: oil plate-rotary
Productivity 2,7 l/s
Max. pressure 2×10^{-3} mbar



Edwards nXDS6i: scroll
Productivity 1,9 l/s
Max. pressure 5×10^{-2} mbar

High Vacuum



Edwards nEXT300: turbo pump
Productivity 300 l/s
Max. pressure 5×10^{-10} mbar



VACUUM SENSORS

Pirani sensor

Edwards AGP 100



Wide-band sensor

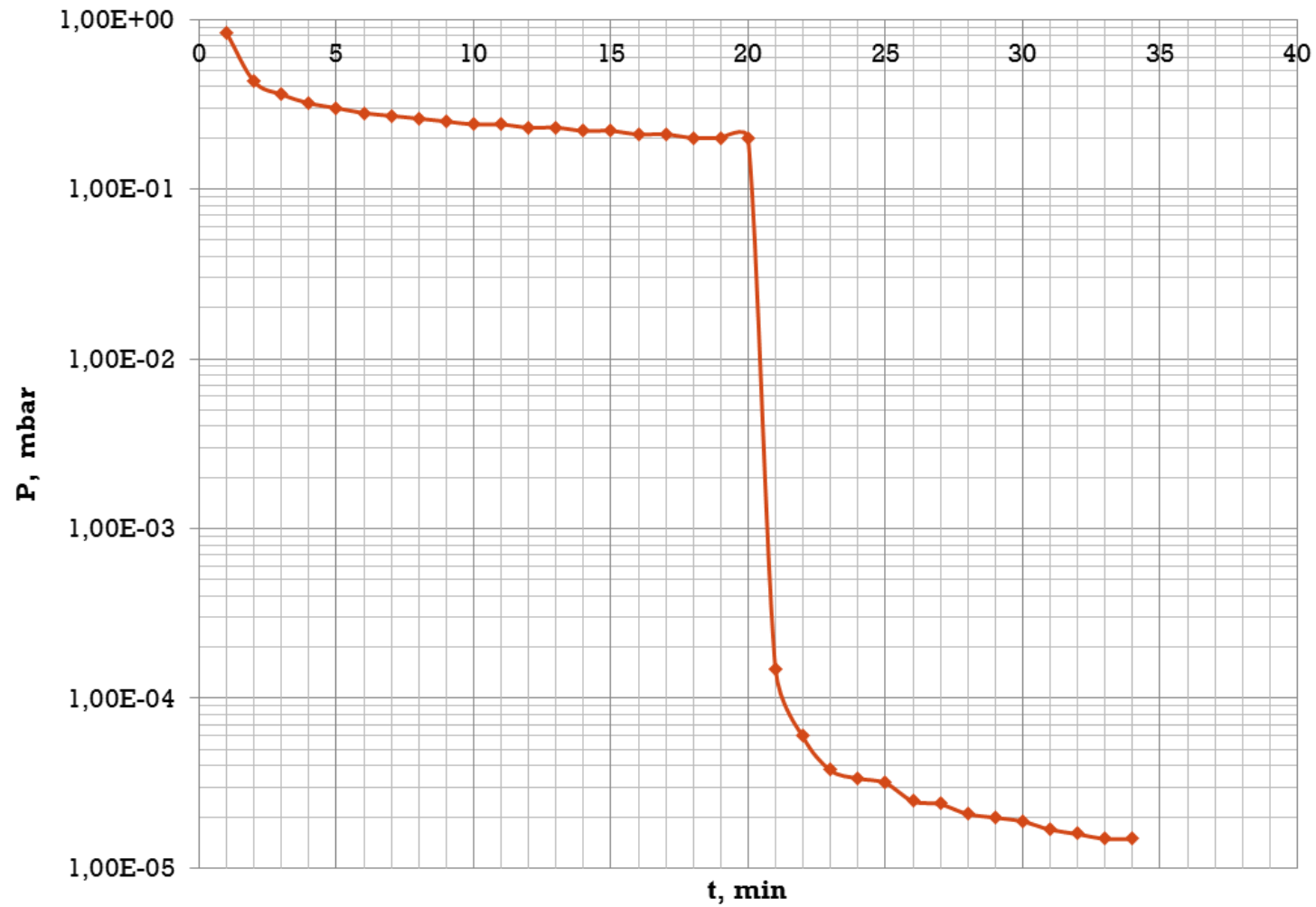
Edwards WRG



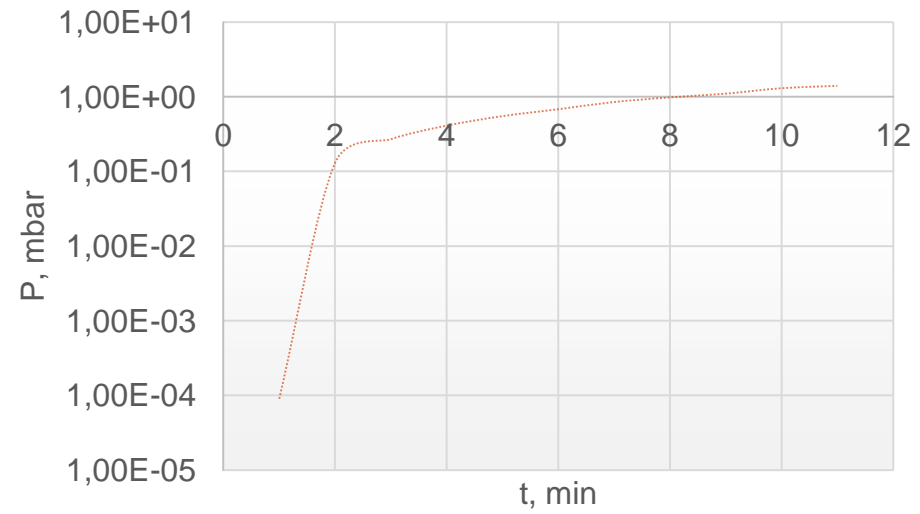
B. VACUUM PUMPING-OUT, LEAK DETECTION AND ELIMINATION.



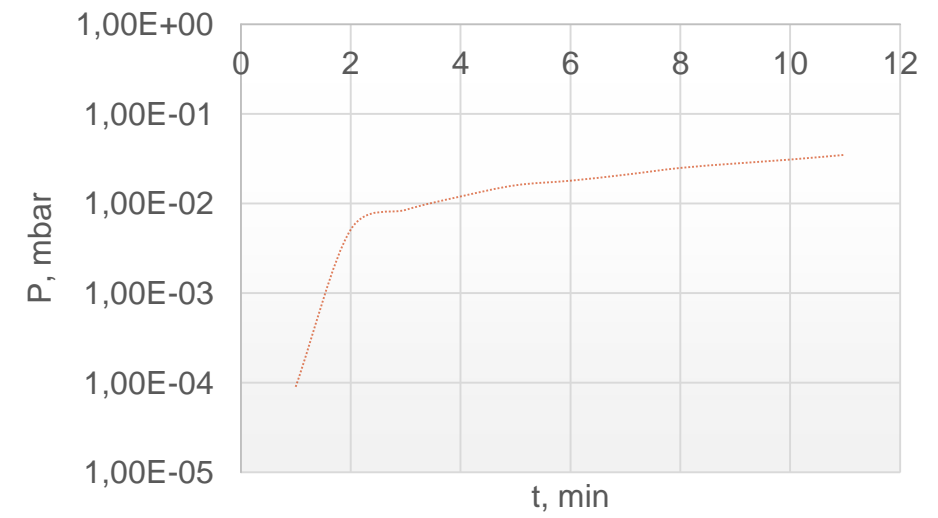
C. PLOTTING OF PUMPING GRAPHS.



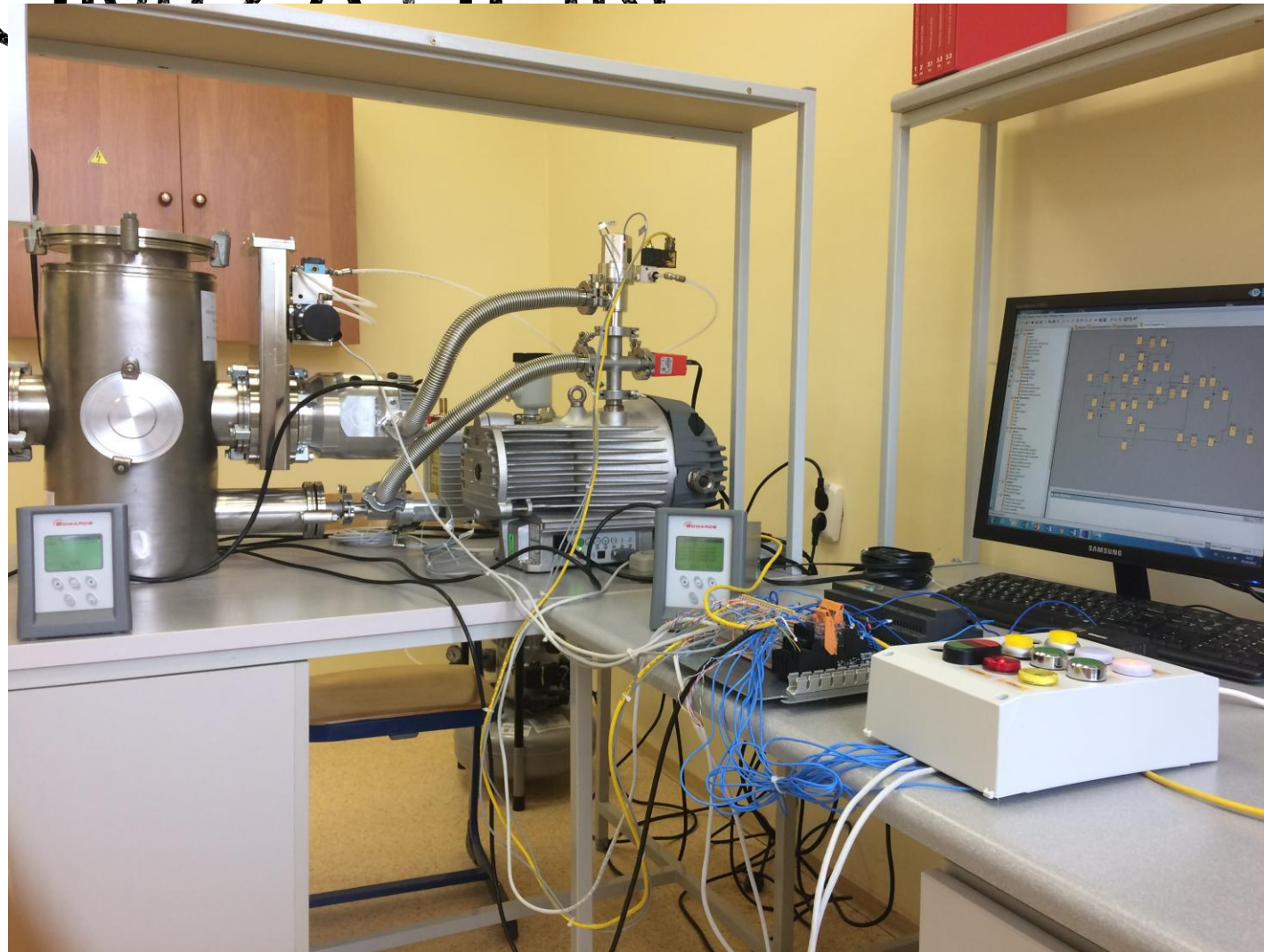
With leakage



After leakage elimination



2. CONTROLS & AUTOMIZATION

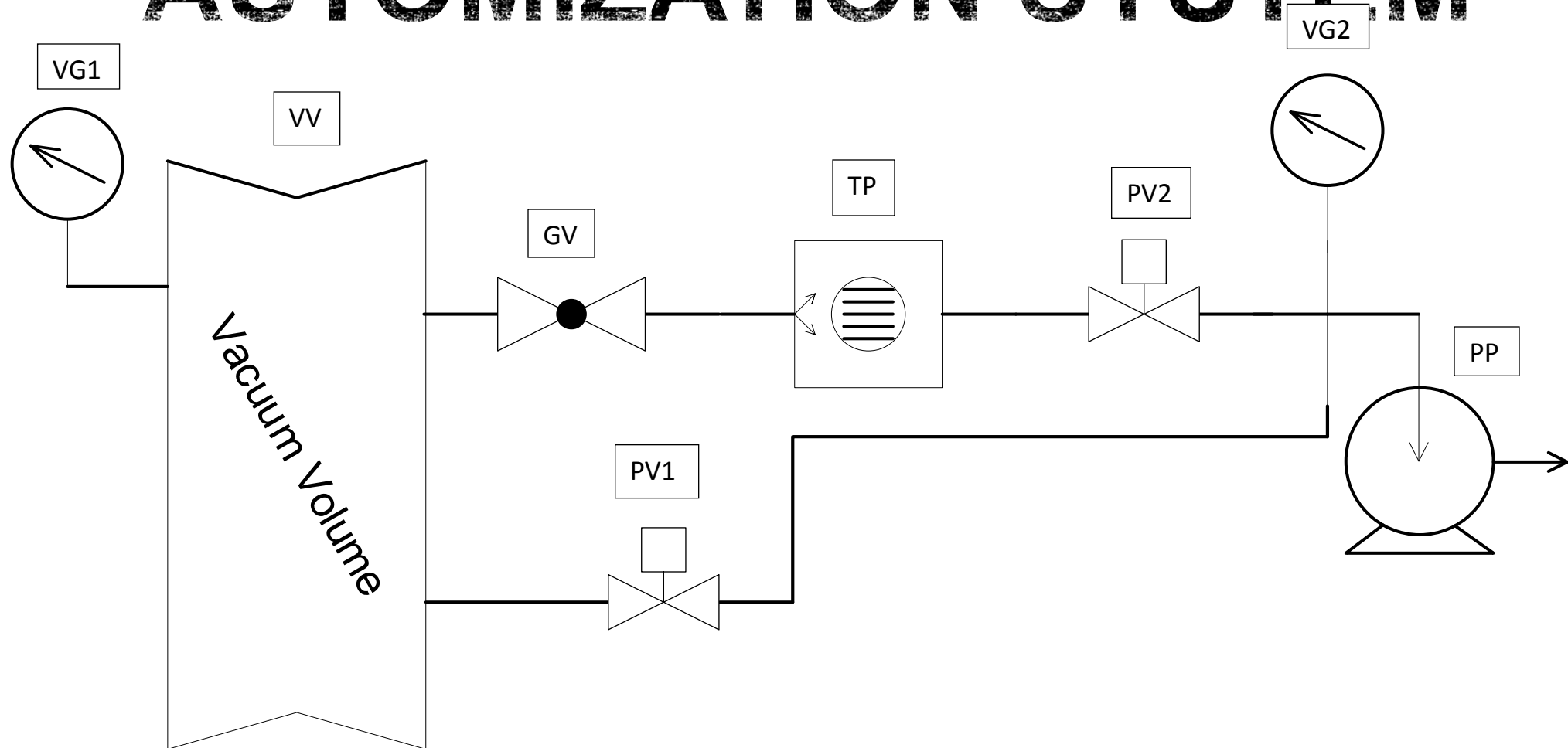


WHAT IS A CONTROL SYSTEM?

- **Control system**, means a variable or set of variables are made to be controlled. It either holds the values of the controlled quantities constant or causes them to vary in a specific way.



VACUUM SCHEME FOR AUTOMIZATION SYSTEM



SPECIFICATIONS TABLE

	Name	Power	Control
PP	Pre-vacuum Pump	220 V	Relay
TP	Turbomolecular Pump	24-48 V	TIC Turbo Controller
GV	Pneumatic Gate Valve	24 V DC	Relay
PV 1	Pneumatic Valve	DC 24V	Reed Sensor
PV 2	Pneumatic Valve	DC 24V	Reed Sensor
VV	Vacuum Volume		
VG1	Vacuum Gauge	24V	Relay
VG2	Vacuum Gauge	24V	Relay

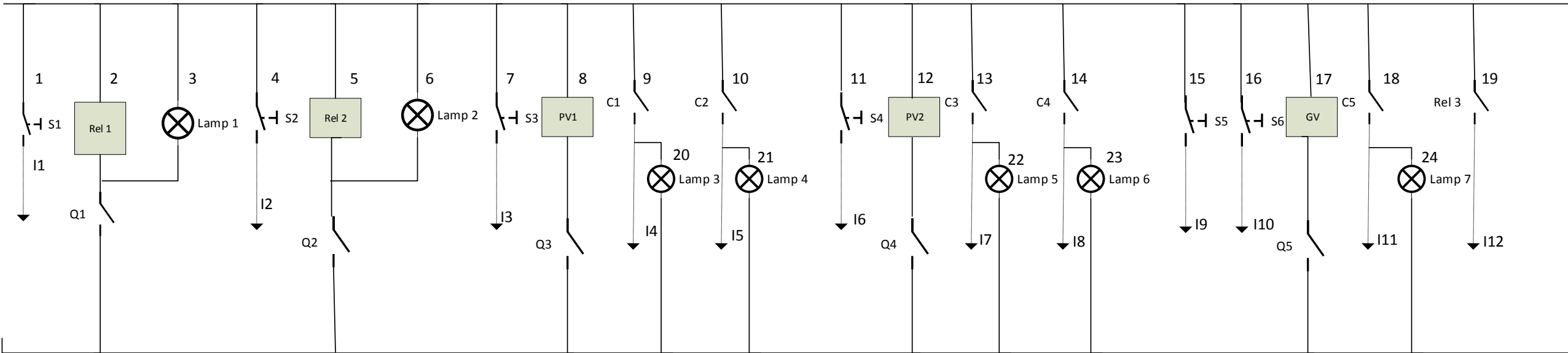


INTERLOCK LOGIC

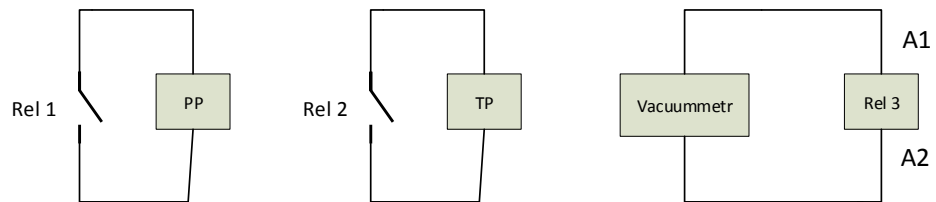
- PV2 must be closed when PP is offline.
- PV1 must be closed when PP is offline and GV is opened.
- TP can't be turned on if PV2 is closed.
- GV must be closed when TP is offline and when the pressure in VG1 reaches the high or low limit.

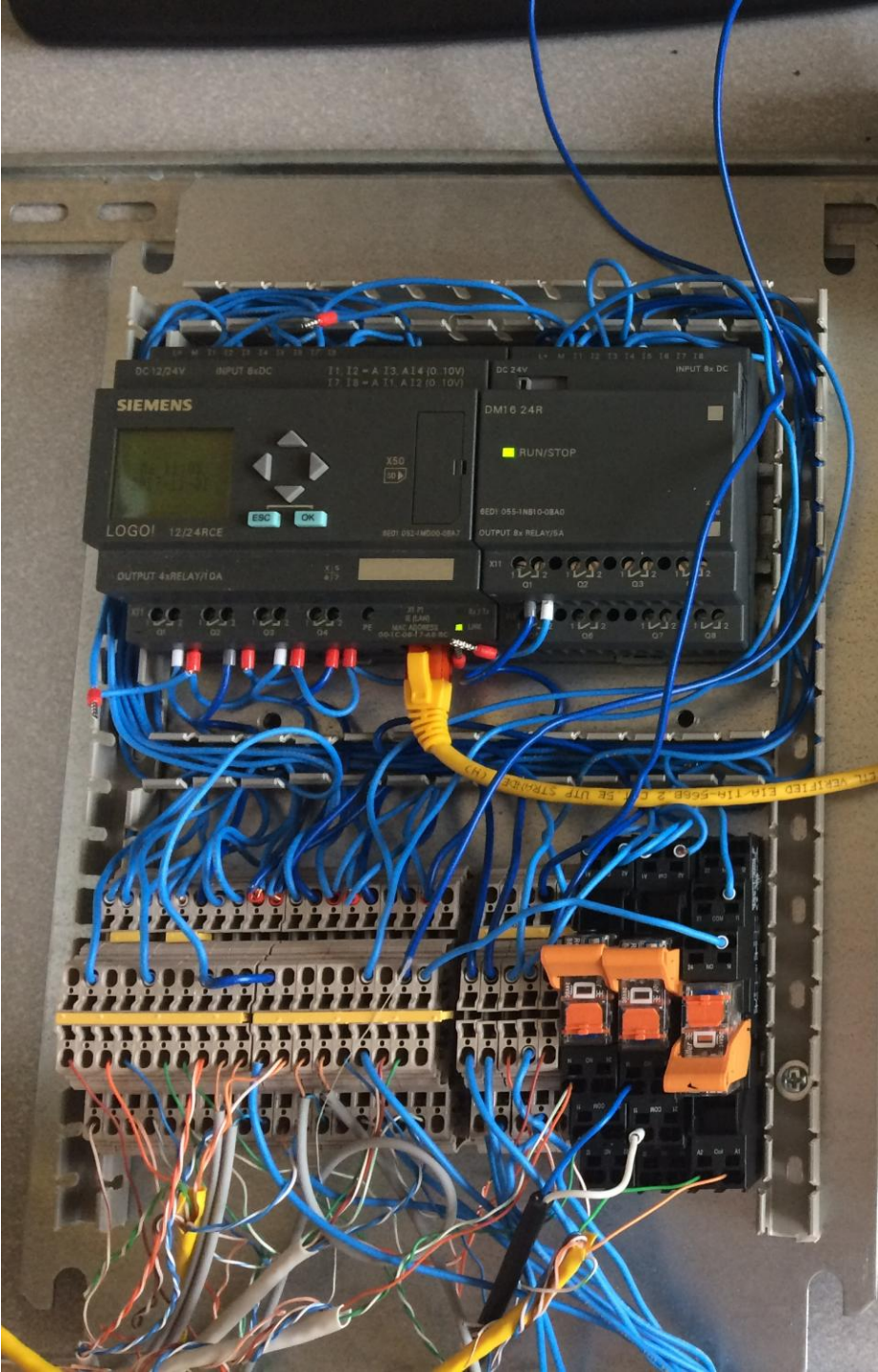


ELECTRONIC SCHEME

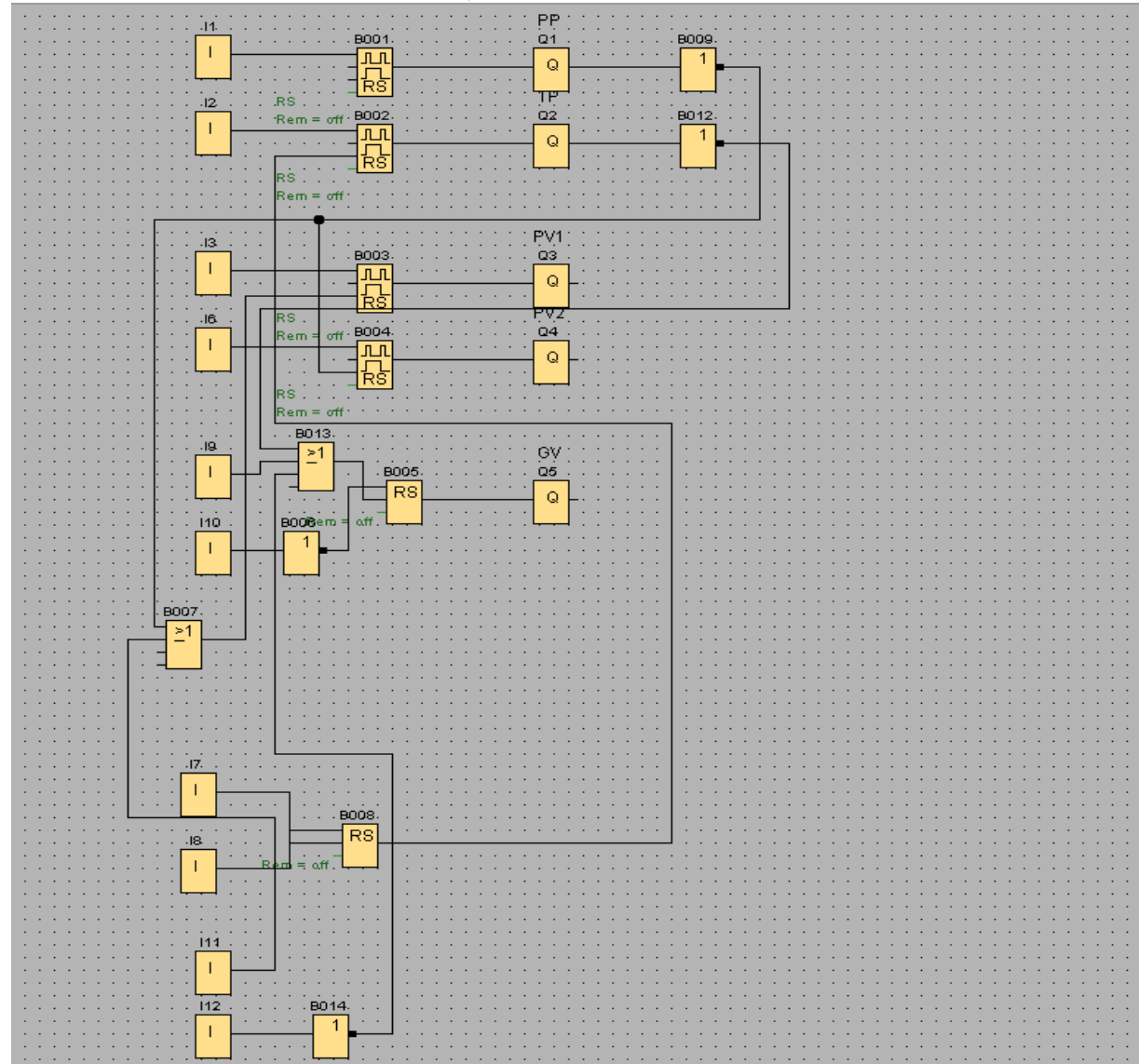


GND

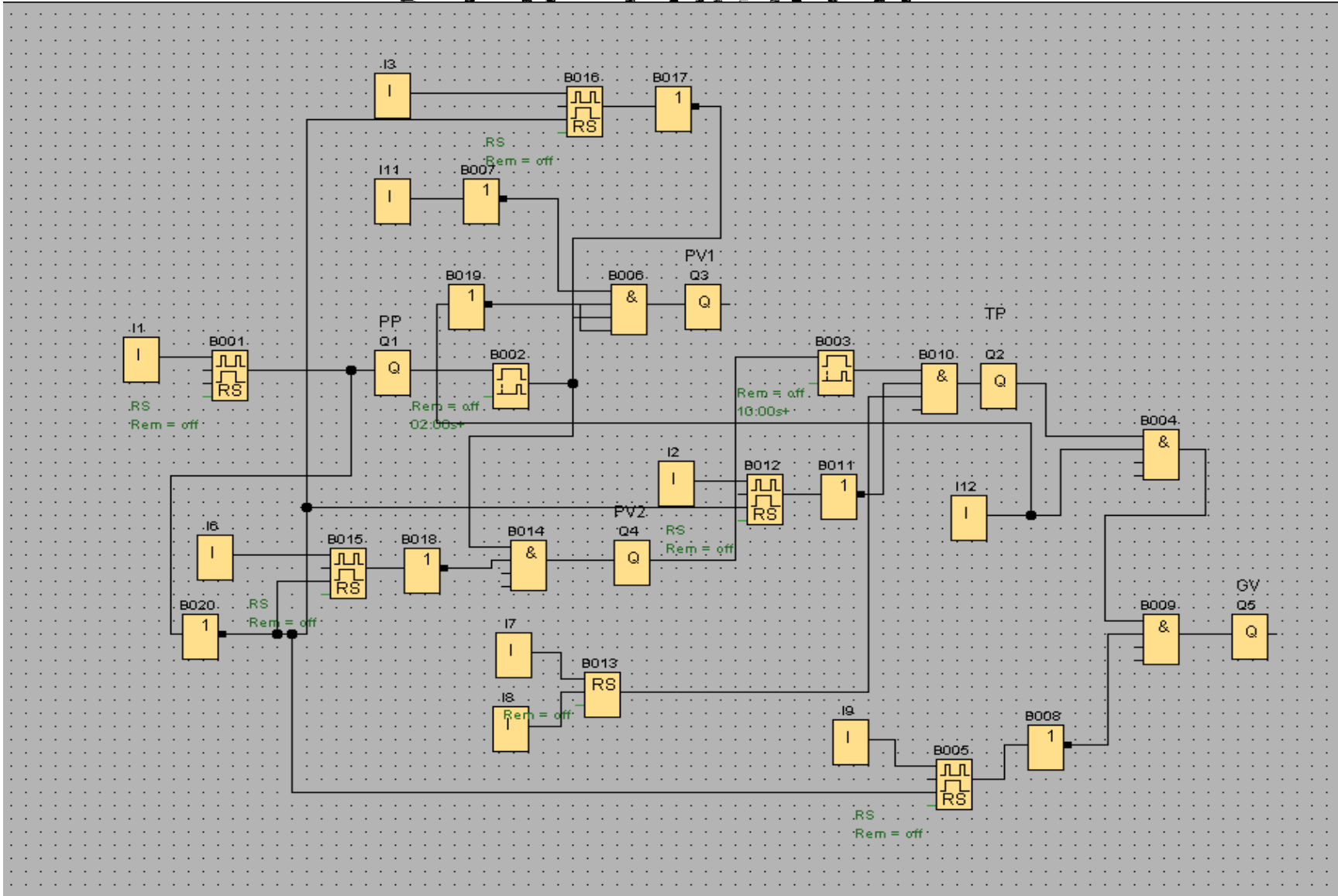




MANUAL CONTROL USING LOGO!SOFT COMFORT SOFTWARE



AUTOMATIC CONTROL USING LOGO!SOFT COMFORT SOFTWARE



Thank You

