Faculty of Physics
WARSAW UNIVERSITY OF TECHNOLOGY

JOINT INSTITUTE FOR NUCLEAR RESEARCH

Development of

# THE MIXER MODULE

software for the gas system of the TOF/MPD detector


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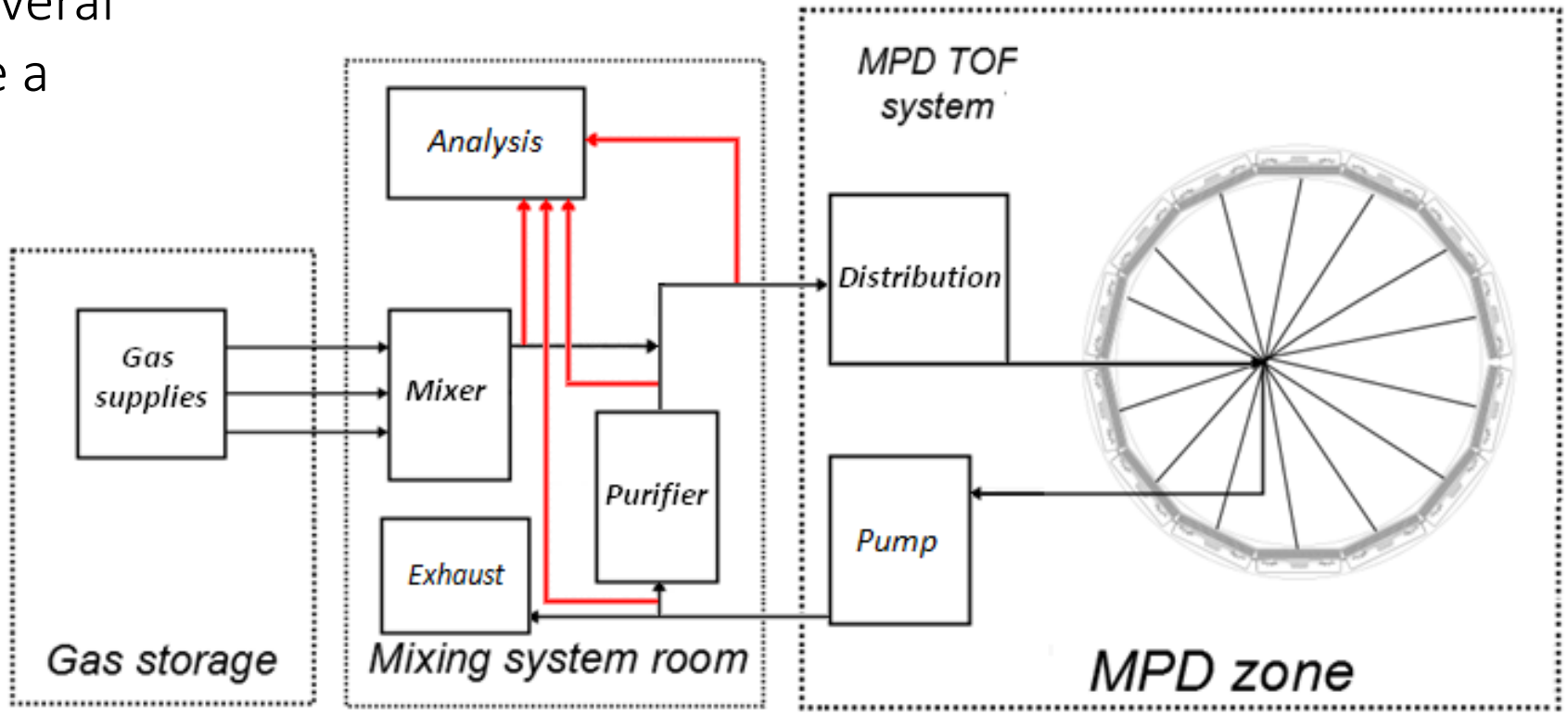
# Gas system

Gas system consists of several modules that will provide a closed circuit system




*Source: Dabrowski D., Gas control systems for MPD detector at JINR accelerator complex NICA – master's thesis*

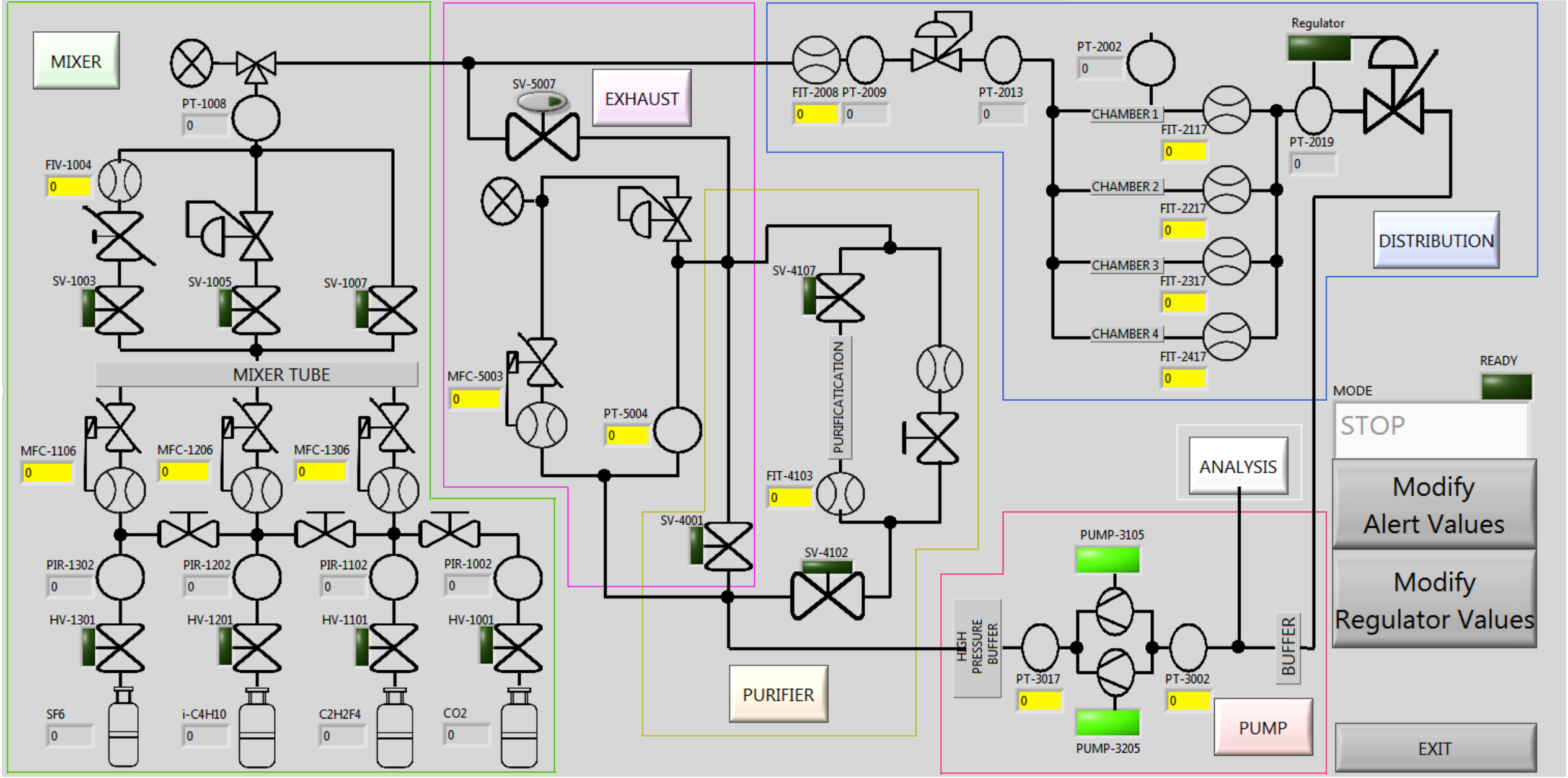
# Goals



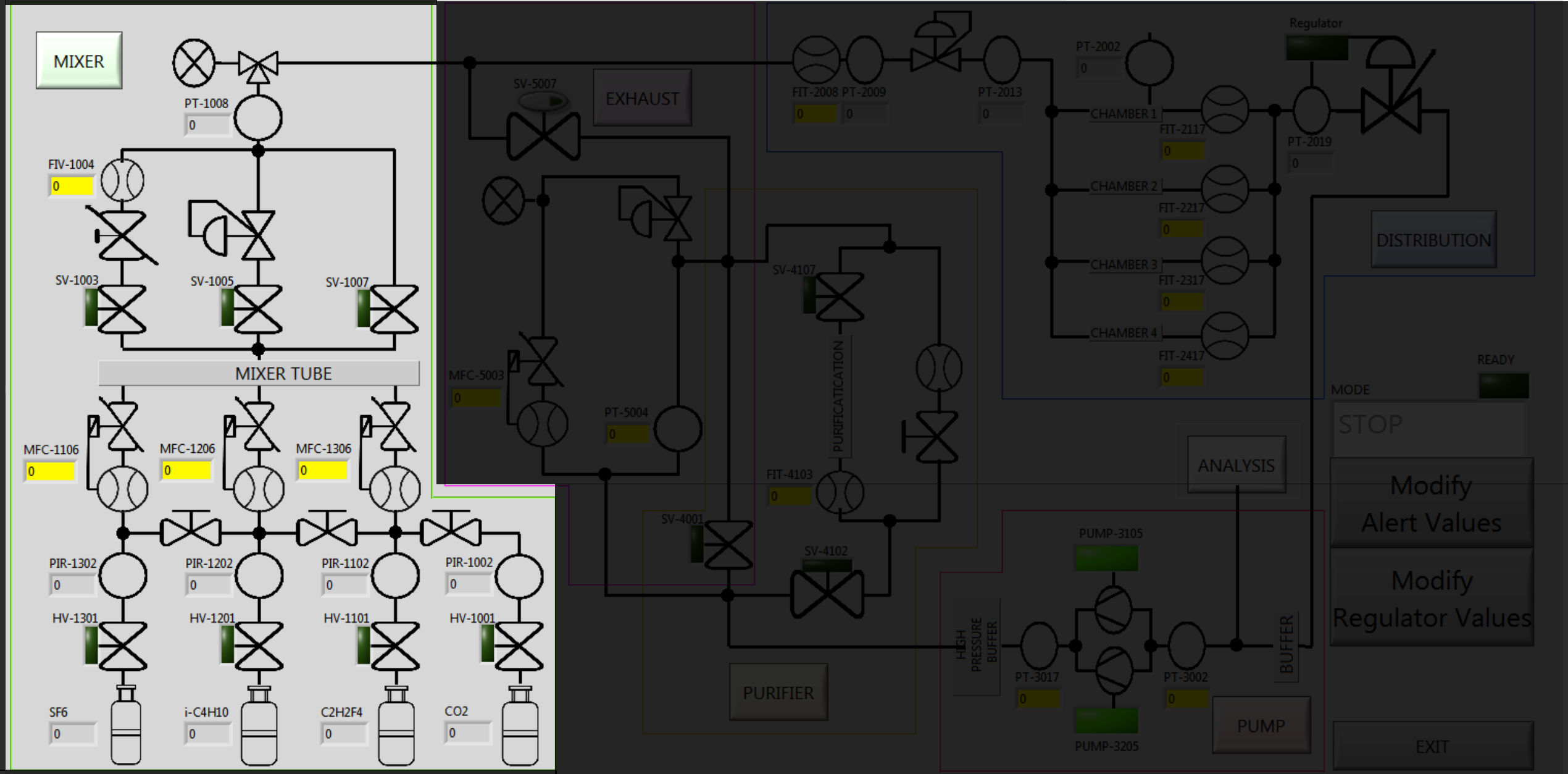
making **software** that allows user to:

- make **a gas mixture** with the given proportions
- monitor **the pressure** in the system, **the weight of gas cylinders** and **gas flows**
- set operating **mode**
- control the system through **the user interface**


*Mixer module*




*Source: Gas system user interface made by Przemysław Kaim and Marek Wiejak.*




*Source: Gas system user interface made by Przemysław Kaim and Marek Wiejak.*

# Used equipment

Mass Flow Controllers


Pressure transmitters

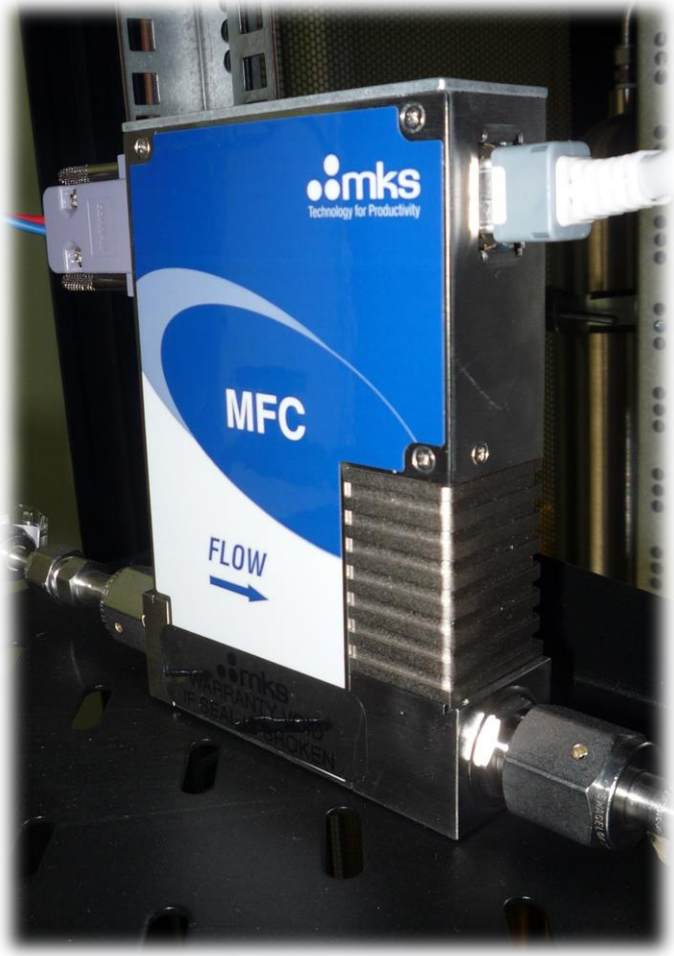

CompactRIO

*http://www.ni.com/pl-pl/shop/select/compactrio-controller*

LabVIEW +

Programming environment

# MFC – Mass Flow Controller




The MFC compares the flow reading with the setpoint and sets the valve to maintain or reach desired point

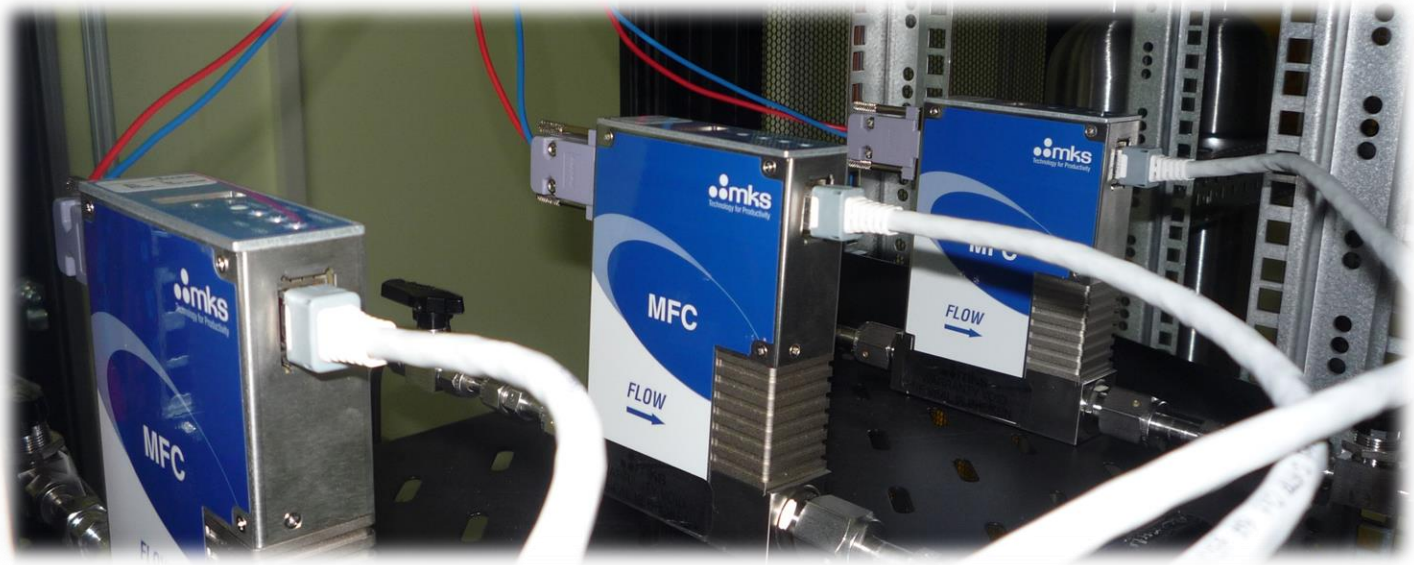
too SMALL flow rate

The MFC opens the valve to increase the flow

too HIGH flow rate

The MFC closes the valve to reduce the flow

# MFC – Mass Flow Controller




In order to obtain a gas mixture consisting of

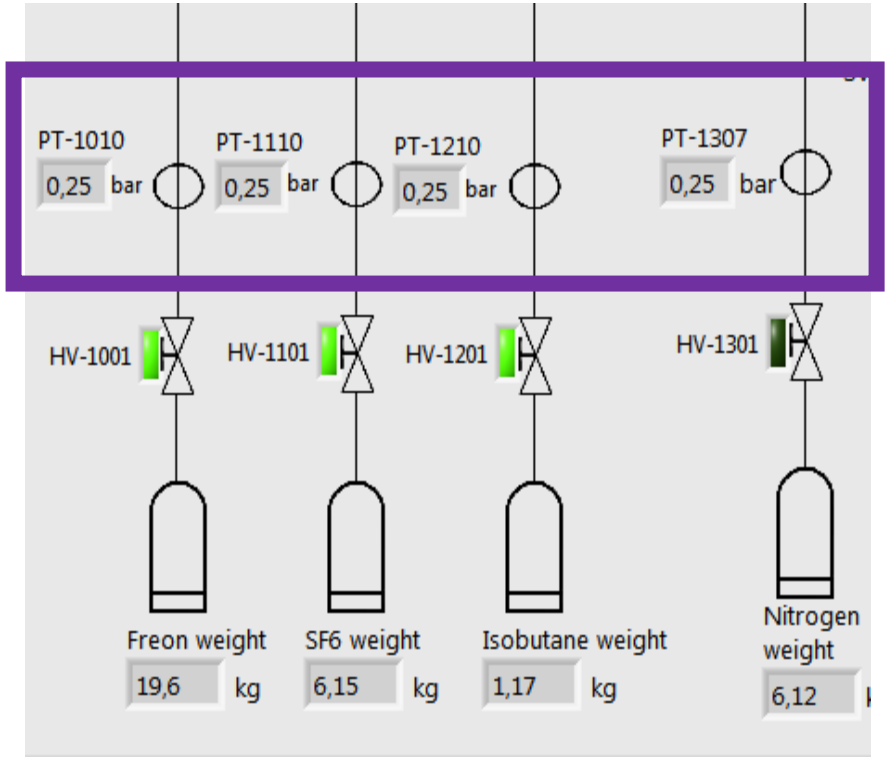
- 90% of Freon
- 5% of SF6
- 5% of Isobutane

we need to use three controllers

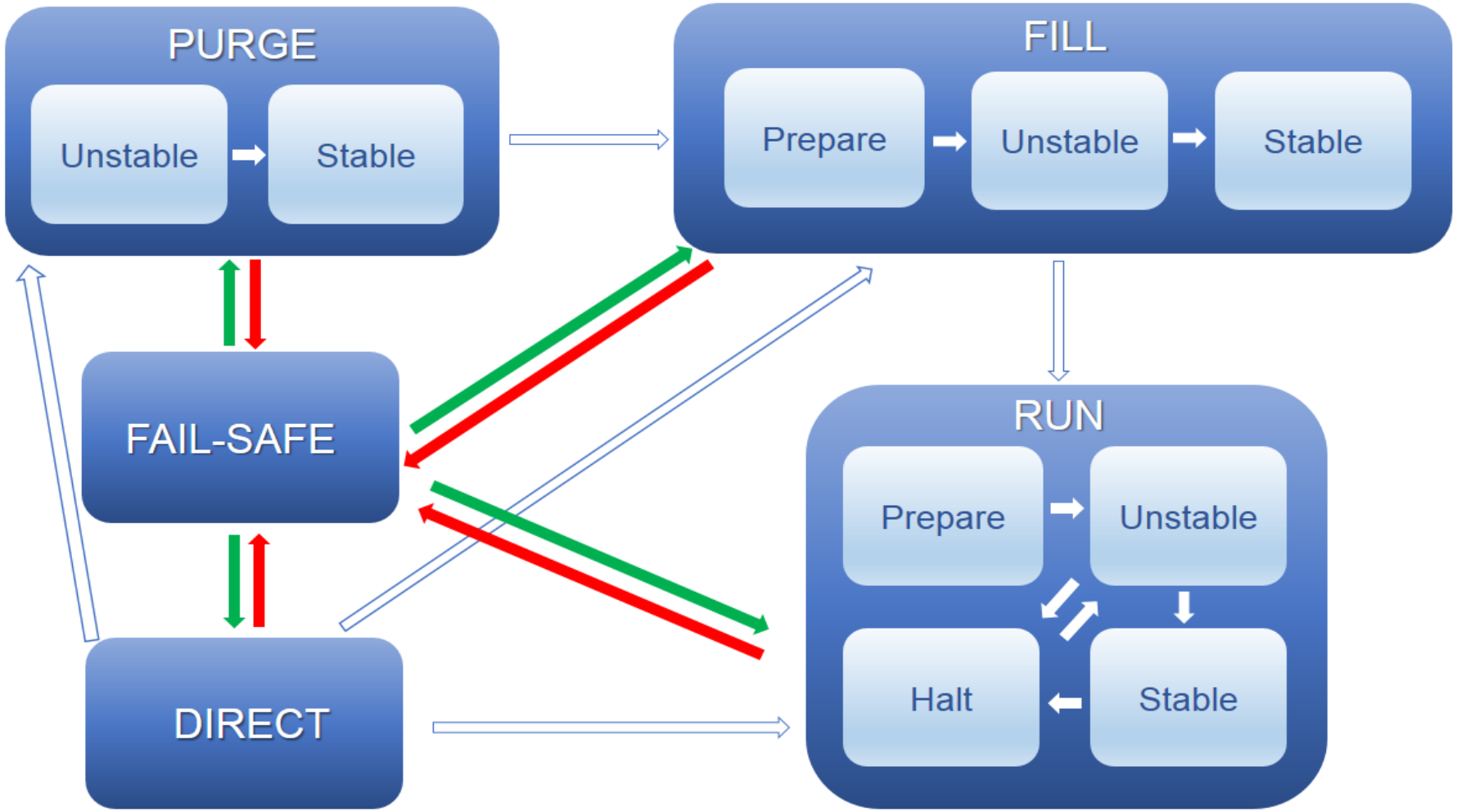
# Pressure transmitter

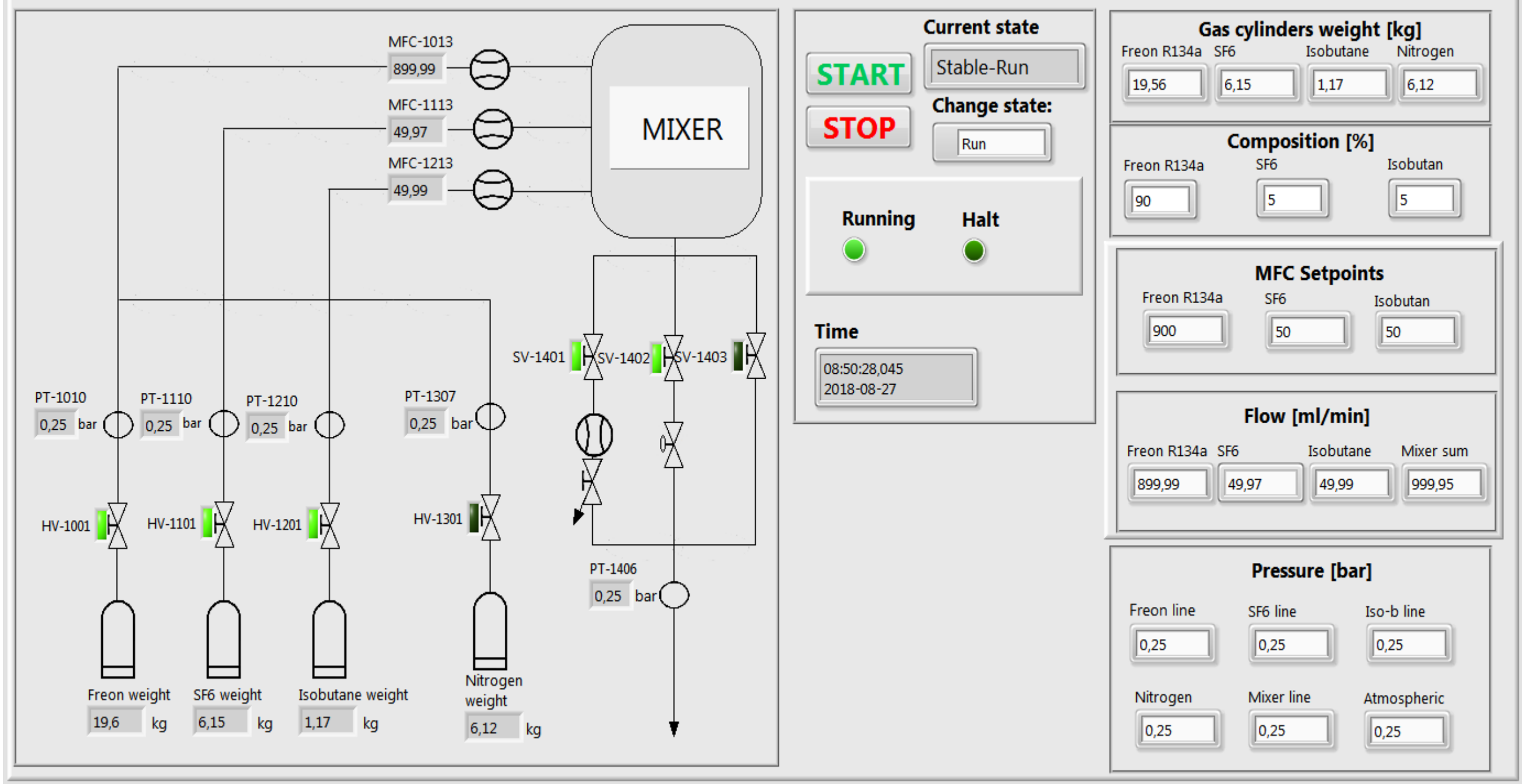

The MKS Baratron 750 pressure sensor gives a 4-20 mA output.

It is connected to the analog outputs of the CompactRIO controller.



# Operating modes




MFC-1013
899,99
MFC-1113
49,97
MFC-1213
49,99
MIXER
SV-1401
SV-1402
SV-1403
PT-1010
0,25 bar
PT-1110
0,25 bar
PT-1210
0,25 bar
PT-1307
0,25 bar
HV-1001
HV-1101
HV-1201
HV-1301
PT-1406
0,25 bar
Freon weight
19,6 kg
SF6 weight
6,15 kg
Isobutane weight
1,17 kg
Nitrogen weight
6,12 kg
Current state
START
Stable-Run
STOP
Change state:
Run
Running
Halt
Time
08:50:28,045
2018-08-27
Gas cylinders weight [kg]
Freon R134a
19,56
SF6
6,15
Isobutane
1,17
Nitrogen
6,12
Composition [%]
Freon R134a
90
SF6
5
Isobutan
5
MFC Setpoints
Freon R134a
900
SF6
50
Isobutan
50
Flow [ml/min]
Freon R134a
899,99
SF6
49,97
Isobutane
49,99
Mixer sum
999,95
Pressure [bar]
Freon line
0,25
SF6 line
0,25
Iso-b line
0,25
Nitrogen
0,25
Mixer line
0,25
Atmospheric
0,25

# Thank you for your attention!