



CMS-RPC Regulation Valve Test Summary

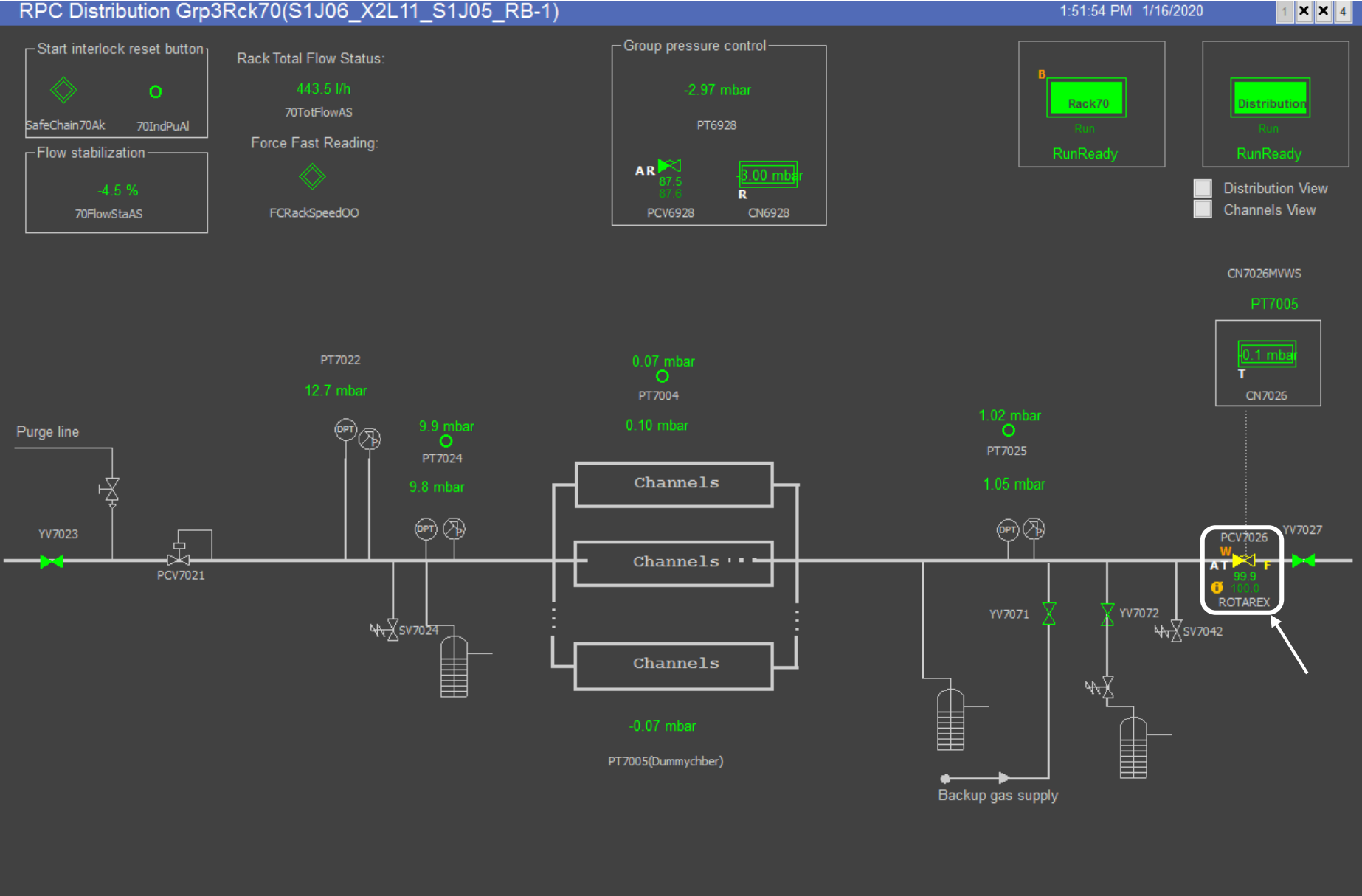
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EP-DT-FS

27/01/2020



New regulation valves



- Replacement of manual valves for better and automated regulation

→ LAB Characterization

→ Test in USC

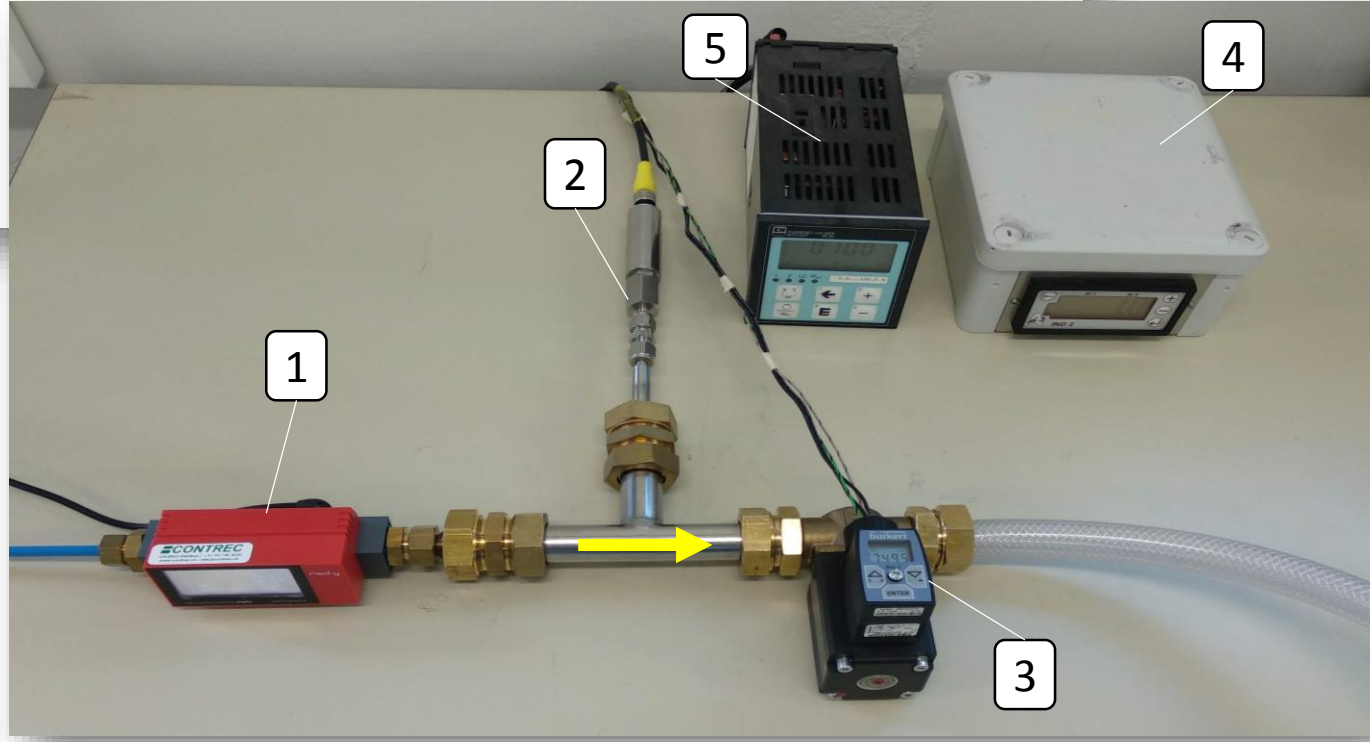
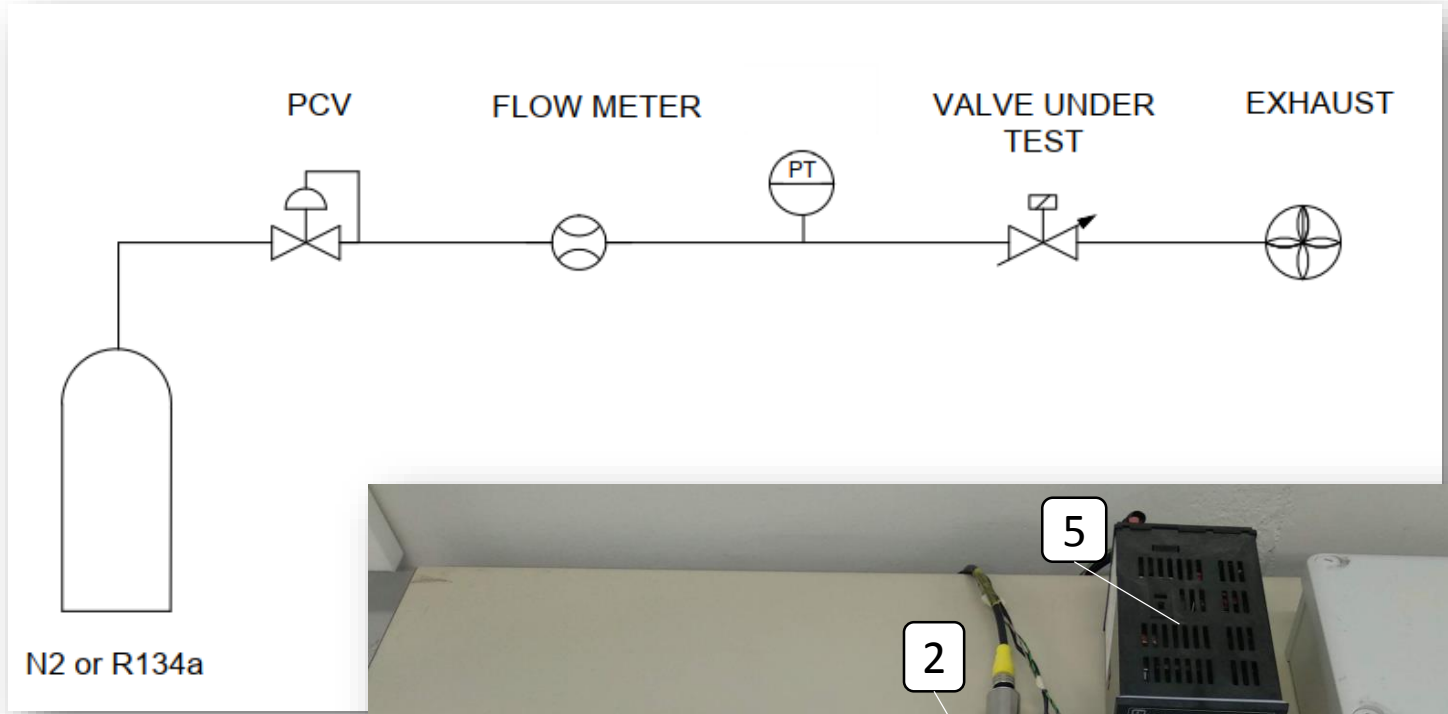
Valves List

- In the market do not exist valves with our requirements
- Mostly classic control signal: 4-20mA
- Many of them designed for higher pressure applications → difficult regulation in low pressure ranges
- Silicon free
- Aging test passed

	VALVE	TYPE/description	FEEDBACK	COST [CHF]
1	ROTAREX	MANUAL	NO	100
2	ROTAREX WITH GULEX MOTOR	ACTUATED MANUAL	YES	1400
3	ASCO DN4	SOLENOID	YES*	440
4	ASCO DN15	SOLENOID	YES*	320
5	ASCO DN20	SOLENOID	YES*	315
6	BURKERT 8mm	SOLENOID	NO	420
7	BURKERT 9.5mm	SOLENOID	NO	340
8	BURKERT 12	SOLENOID	NO	780
10	BURKERT 12S	SOLENOID	NO	500
11	RESOLUTIONAIR	PINCH VALVE *(control: PWM+DIGITAL BINARY)	NO	1300
12	BRONKHORST F004	SOLENOID *(control 70-190 mA)	YES	1460
13	FESTO	ELECTROPNEUMATIC Pinch valve	NO	710
14	FESTO	ELECTROPNEUMATIC Boisseau sphérique asservie par un contrôleur	NO	620
15	ECONEX	ELECTRO ACTUATED	NO	500
16	VON ROHR	ELECTROPNEUMATIC	YES	3300

LAB Test Setup

- 1. Flowmeter
- 2. Pressure sensor
- 3. Tested Valve
- 4. Pressure reading
- 5. Controller

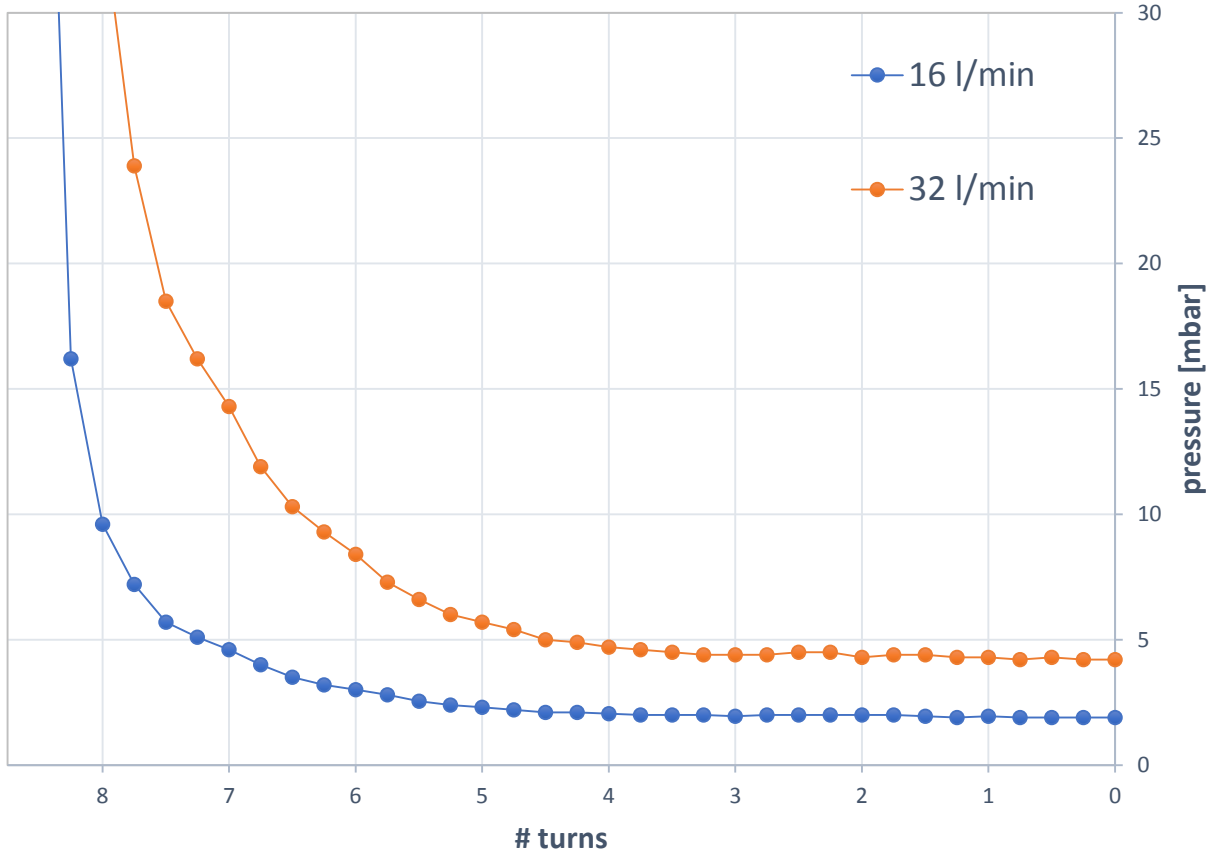


Manual Valve

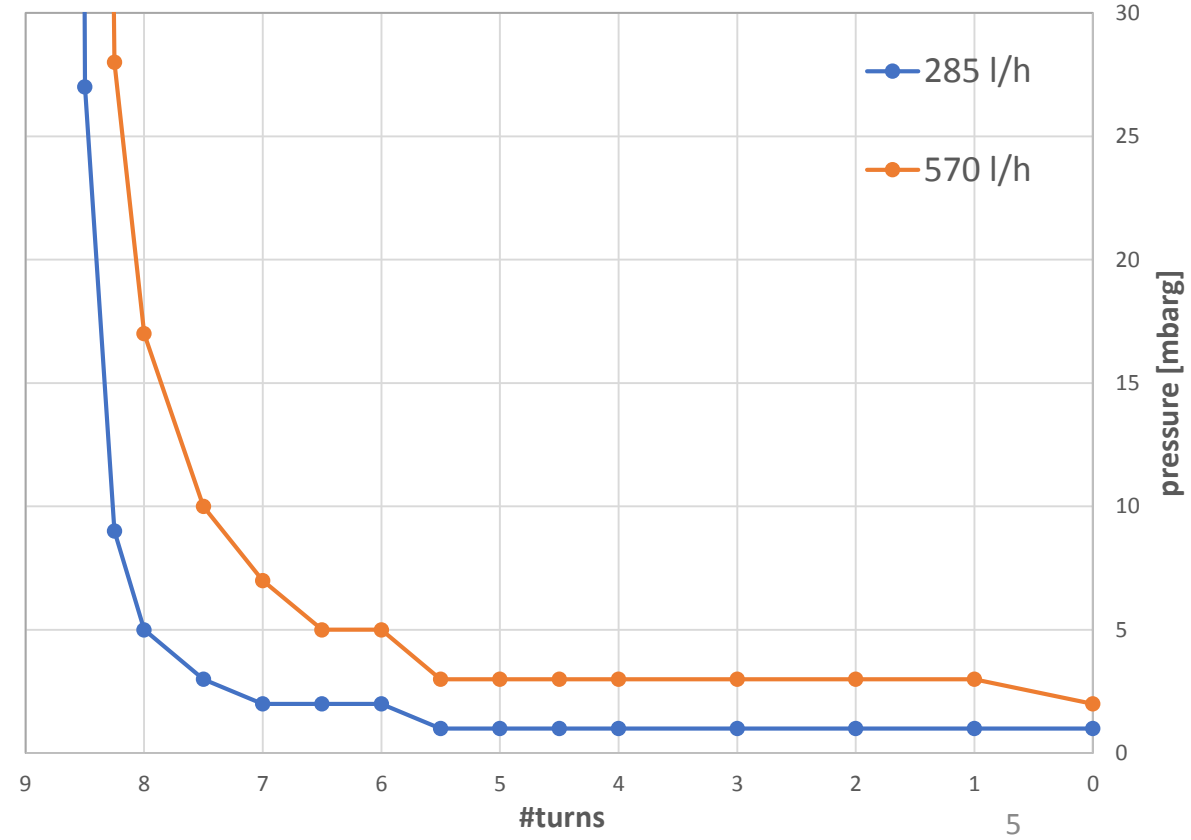


Currently installed
Used as reference

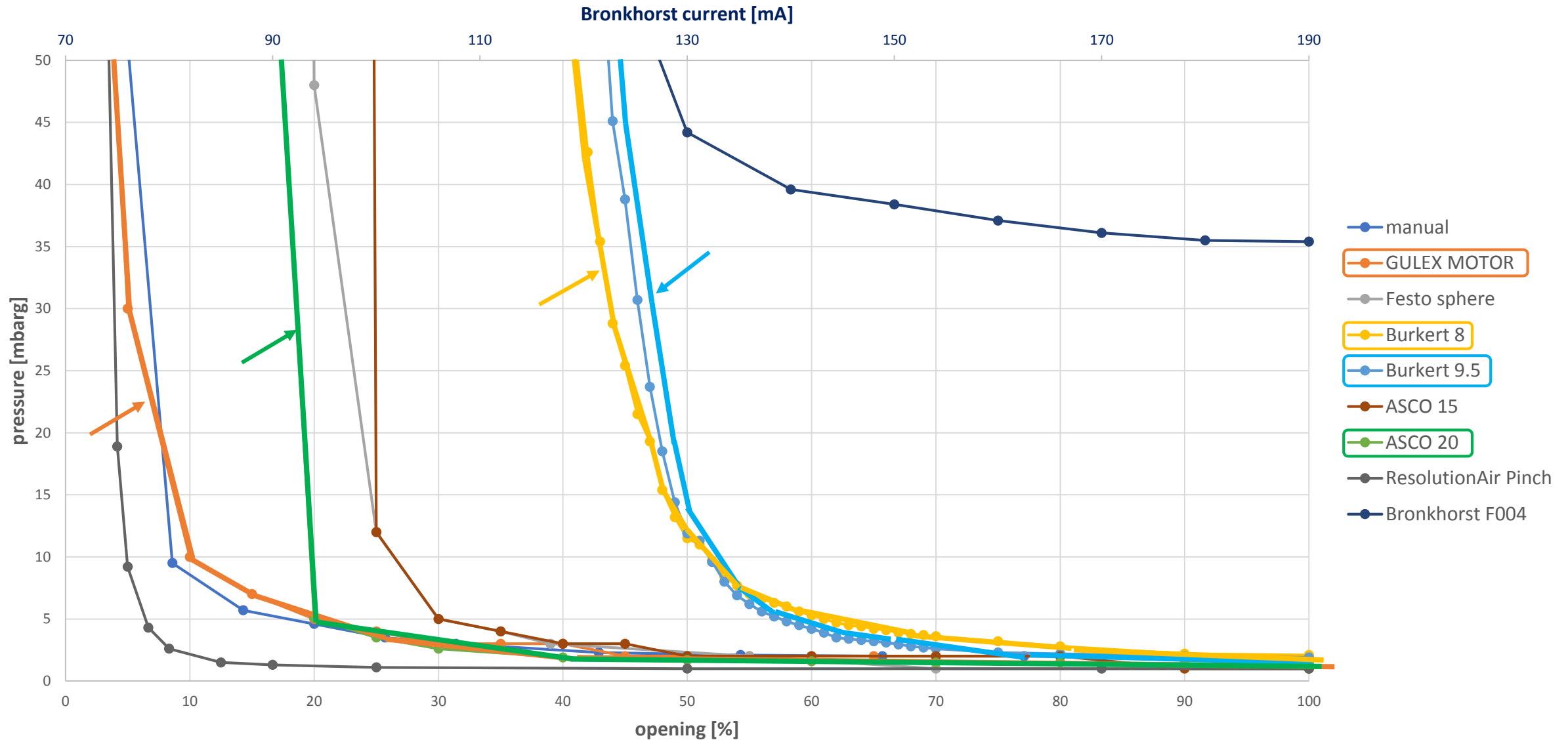
Manual valve - N₂



Manual valve - R134a

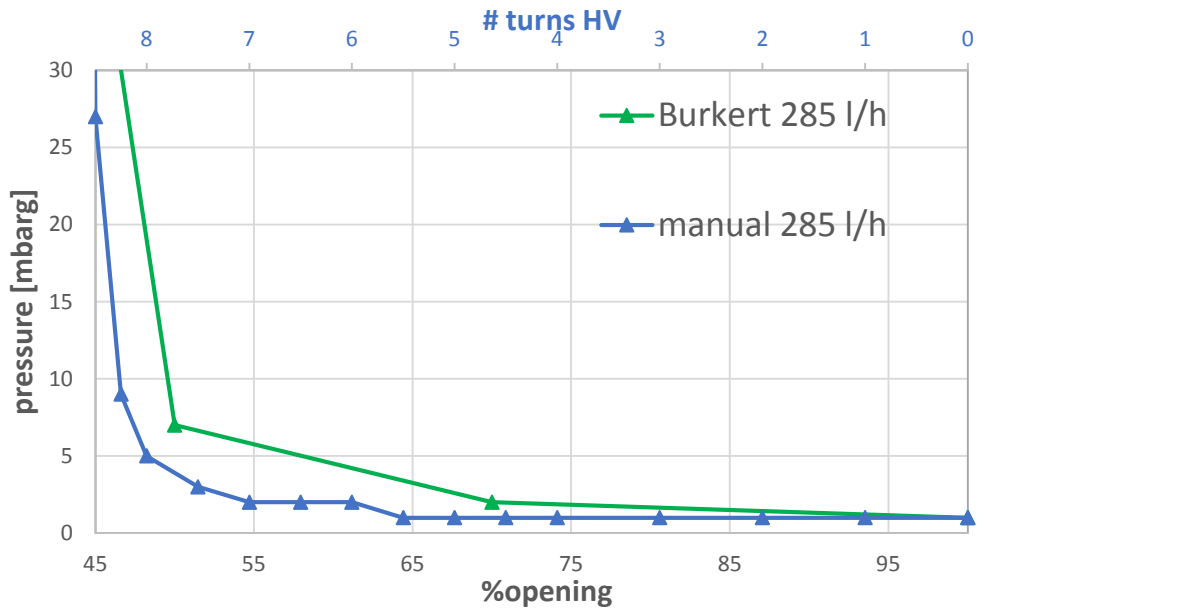


General Comparison – 16 l/min N₂

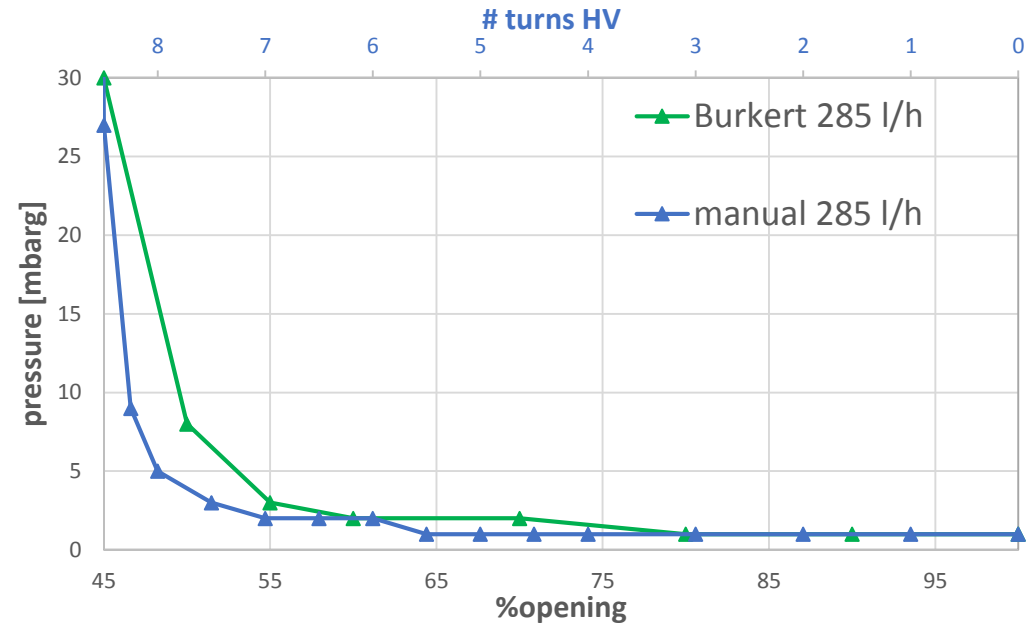


Installed valves

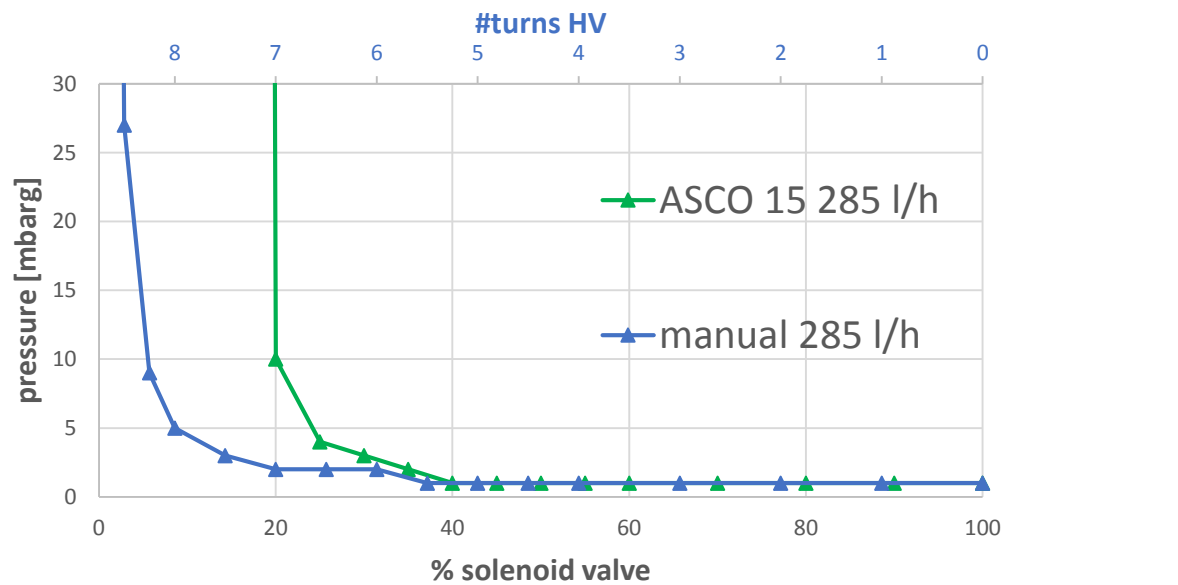
Burkert 8 - R134a



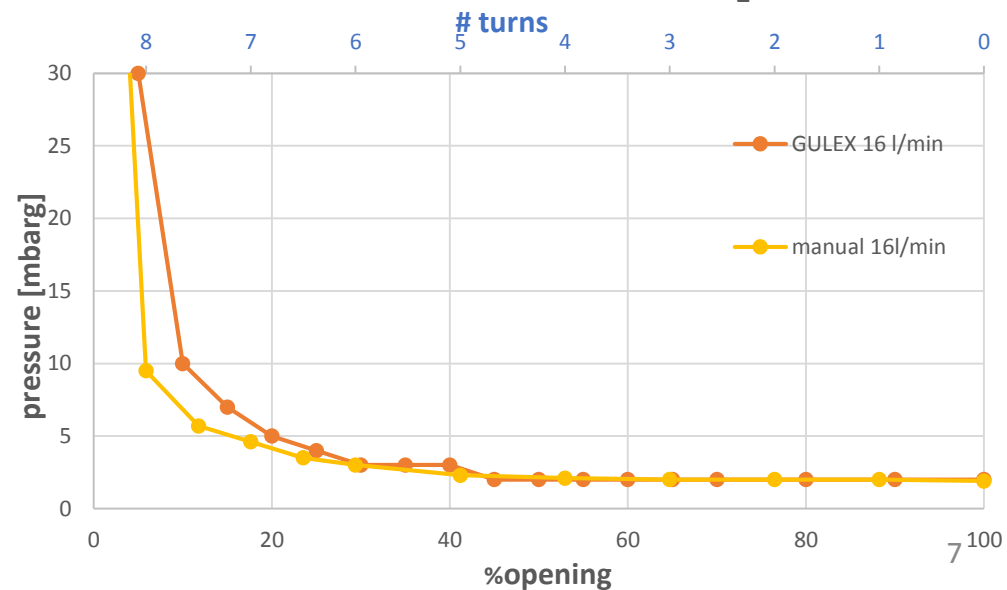
Burkert 9.5 - R134a



ASCO 15 - R134a

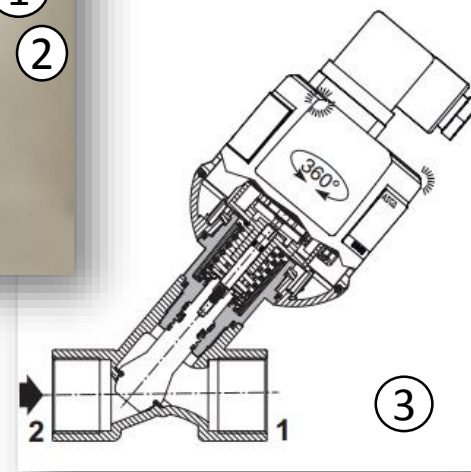


GULEX MOTOR - N₂



What's installed in USC

1. Burkert 8mm
2. Burkert 9.5mm
3. ASCO DN20
4. ROTAREX MANUAL VALVE WITH GULEX ELECTRIC MOTOR

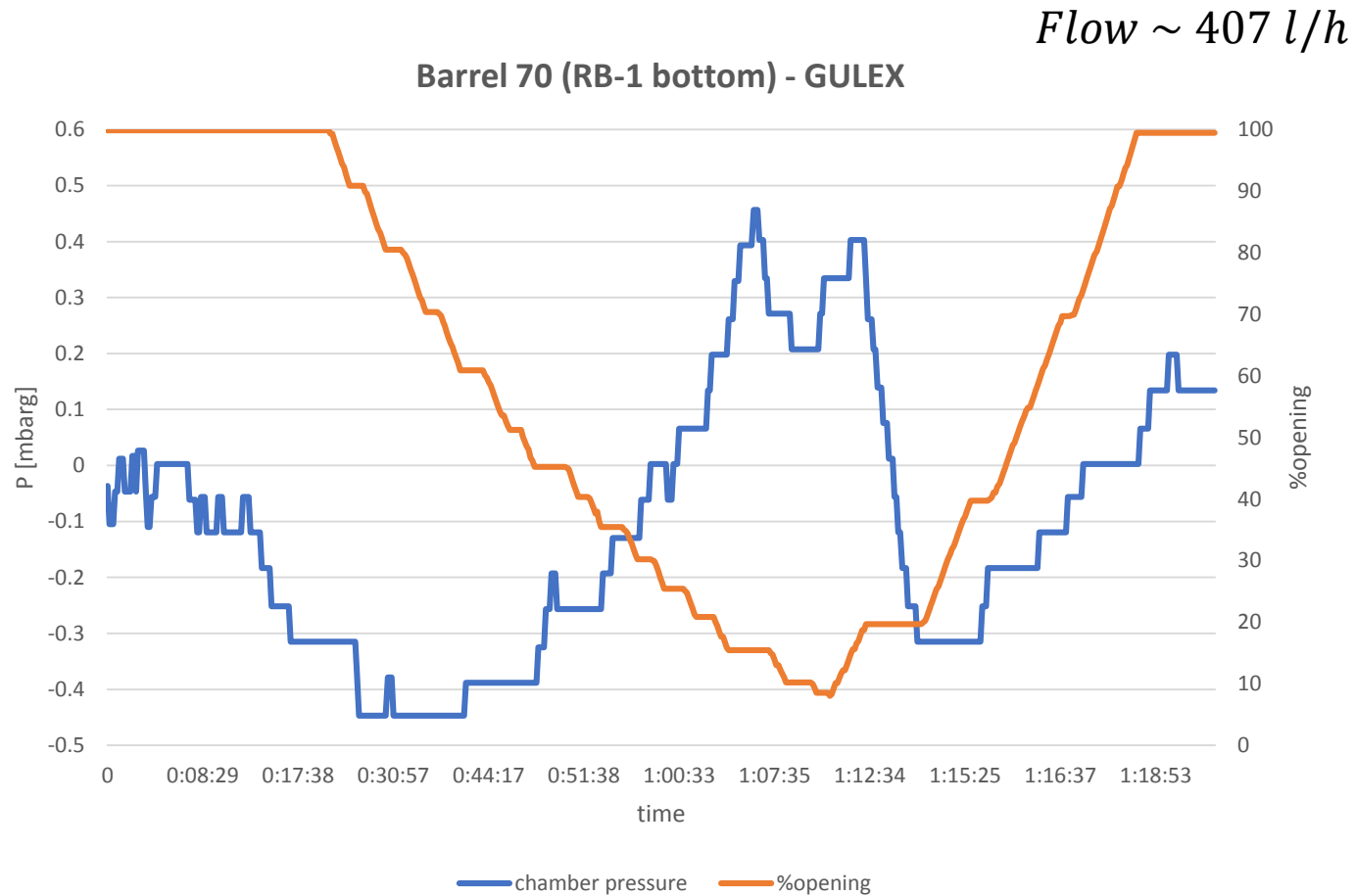


VALVE	WHERE	TYPE	FEEDBACK	COST [CHF]
BURKERT 8mm	BARREL 74 (RB-2 top)	SOLENOID	no	420
BURKERT 9.5mm	BARREL 69 (RB-2 bottom)			340
ROTAREX WITH GULEX MOTOR	BARREL 70 (RB-1 bottom)	ACTUATED	yes	1400
ASCO DN20	ENDCAP 83 (no dummy chamber)	SOLENOID	yes	315

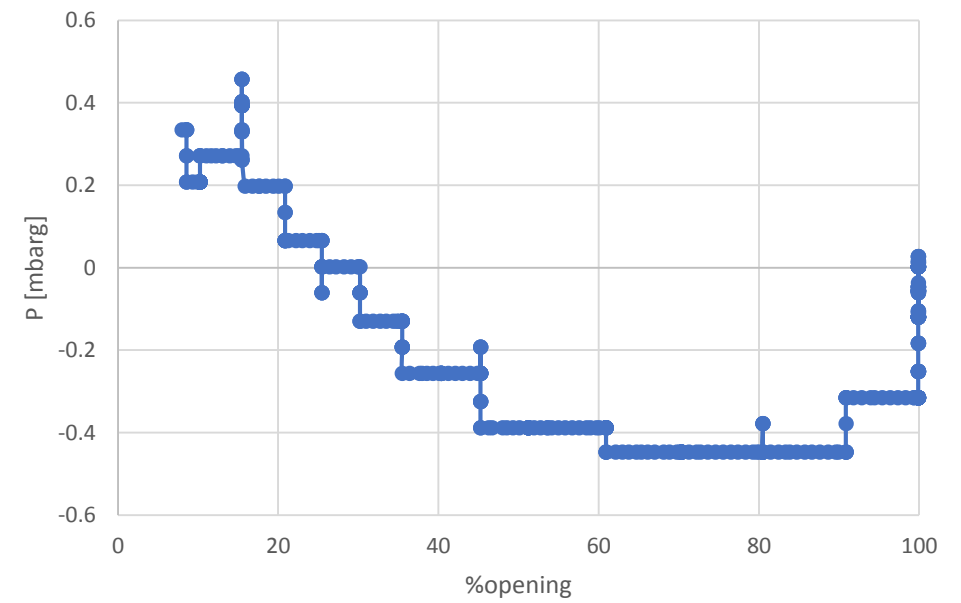
Installation in USC



First tests on the real systems

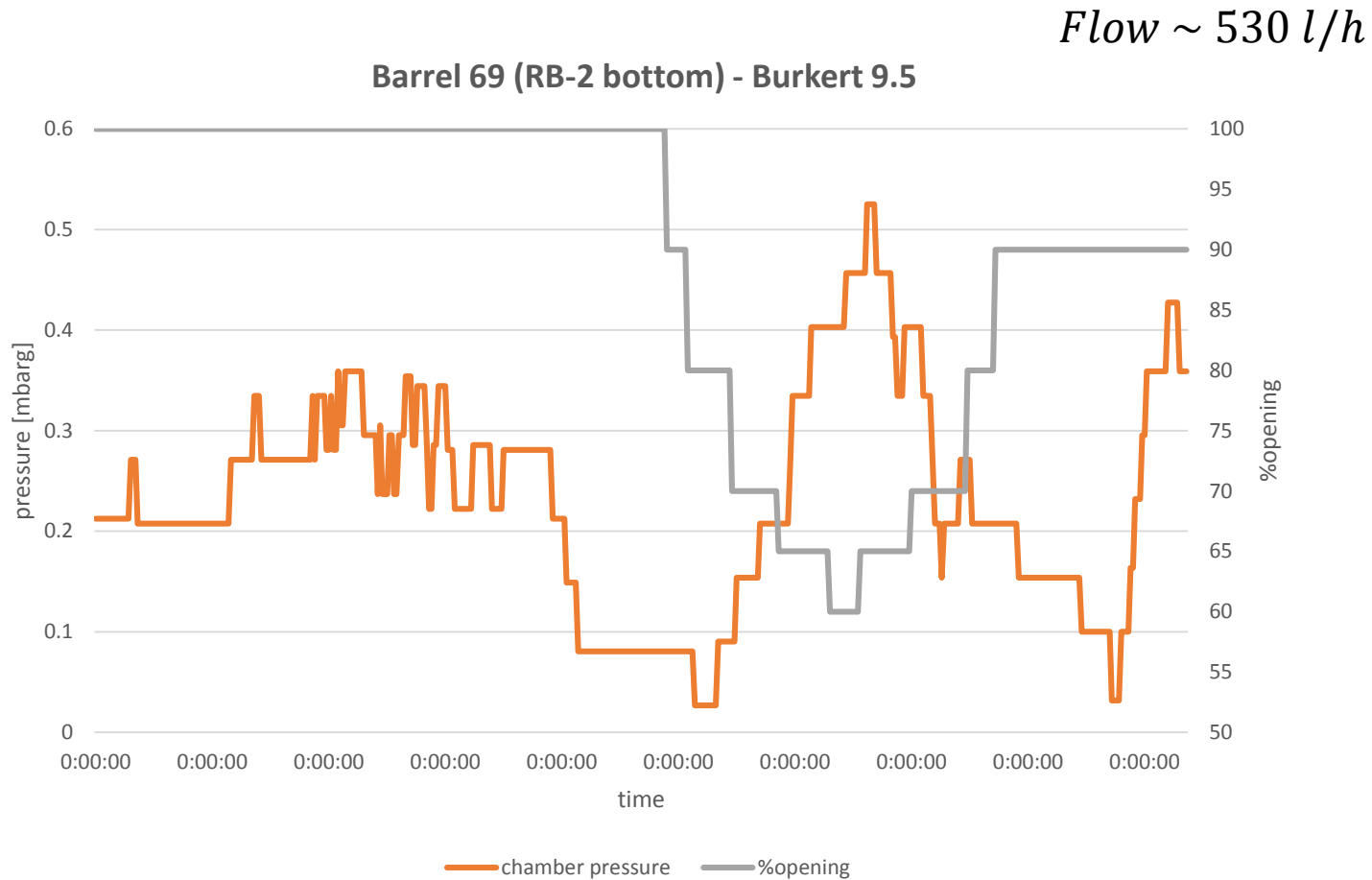


$\Delta p \sim 1 \text{ mbar}$ with opening in range 10 – 100%
 $\Delta p \sim 0.7 \text{ mbar}$ with opening in range 10 – 60%

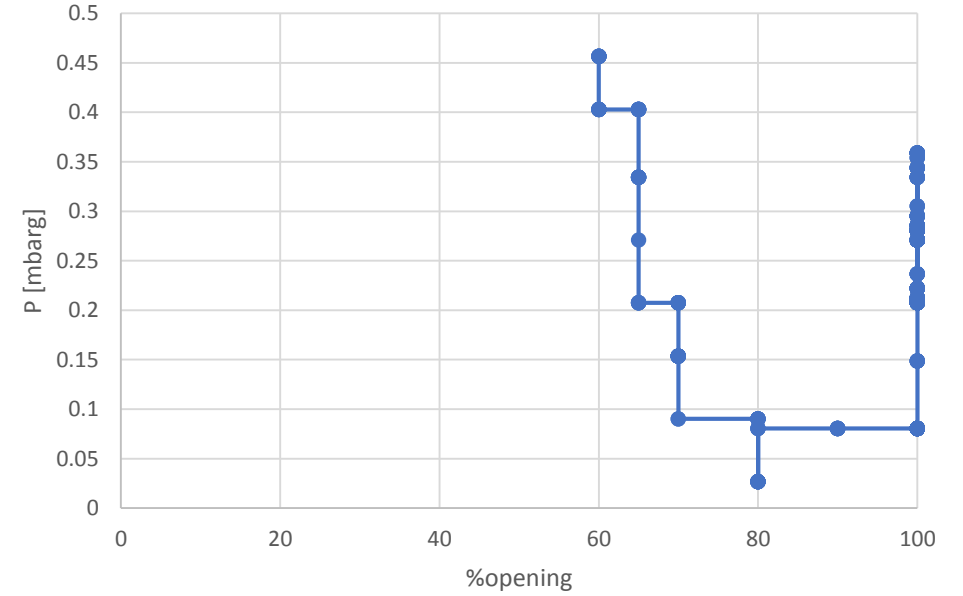


$\Delta\%$	Δp [mbar]
100-70	0
70-60	0.05
60-50	0.05
50-45	0.05
45-40	0.05
40-35	0.05
35-30	0.06
30-25	0.06
25-20	0.06
20-15	0.15

First tests on the real systems

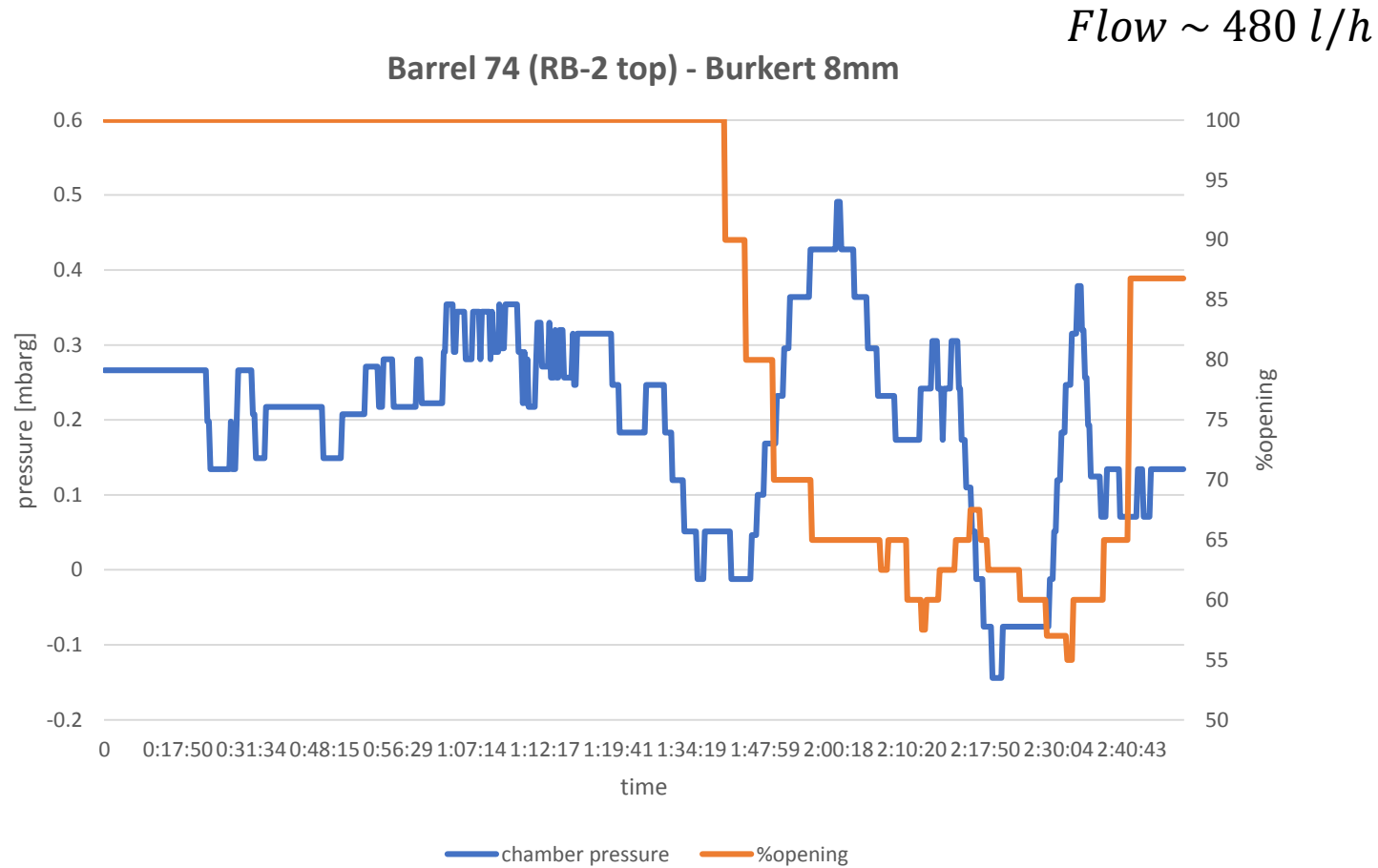


$\Delta p \sim 0,5$ mbar with opening in range 60 – 100%

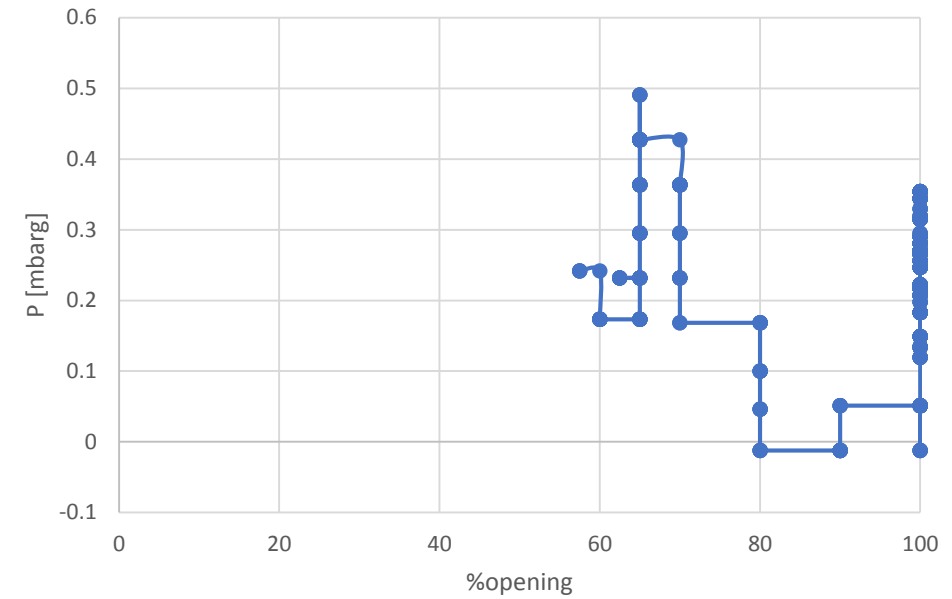


$\Delta\%$	Δp [mbar]
100-90	0
90-80	0.02
80-70	0.11
70-65	0.3
65-60	0.15

First tests on the real systems



$\Delta p \sim 0.5$ mbar with opening in range 70 – 100%



$\Delta\%$	Δp [mbar]
100-90	0
90-80	0.15
80-70	0.25
70-65	-

Next steps

- **Other tests in USC**

Auto regulation on dummy chambers

Different pressure and flow conditions

Regulation with manual valves completely open

- **Other valves still under discussion/test**

1. Resolution air pinch valve
2. Von Rohr
3. Econex
4. New ASCO

