

GBAR Trap Meeting

D.H. Won

Seoul National University

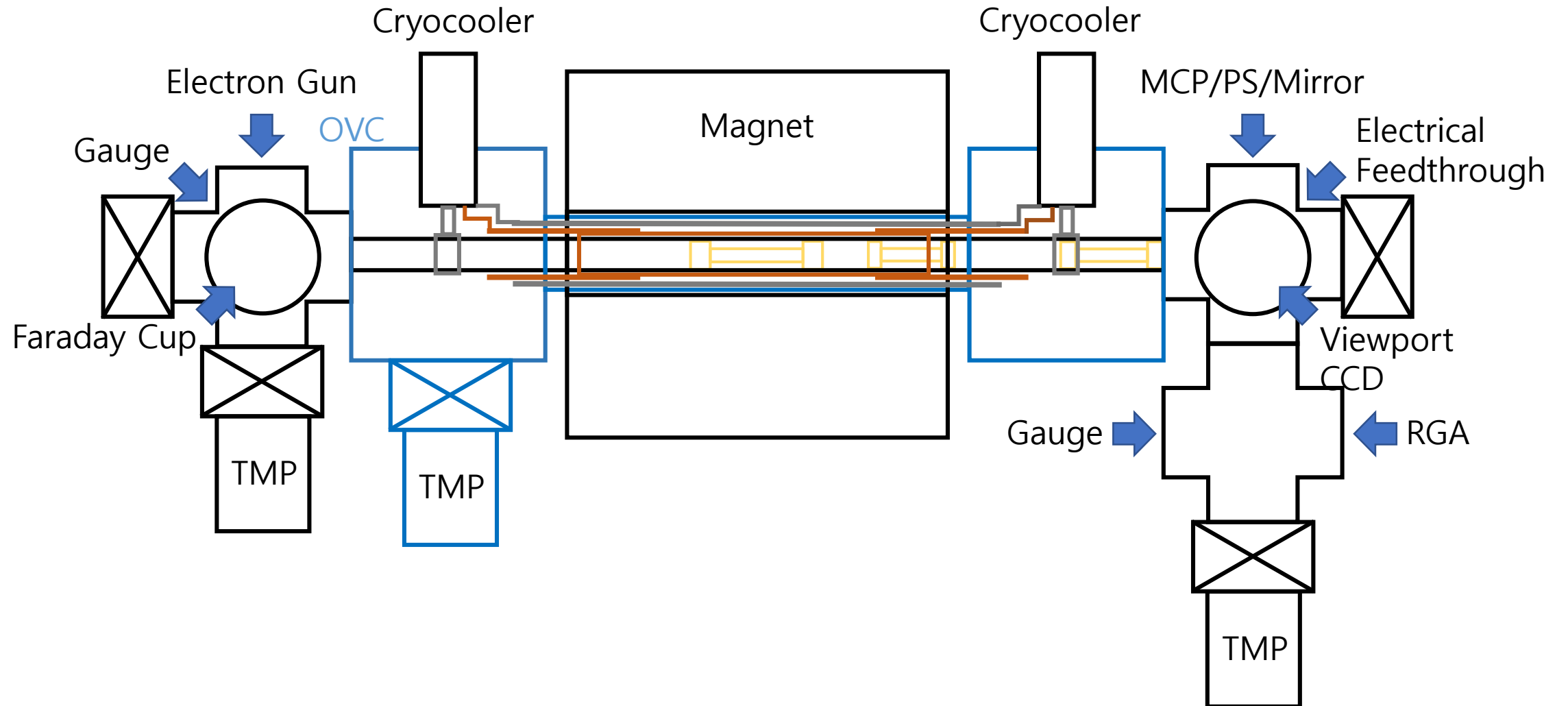
22.Jan.2020

- Pressure
- Temperature
- High Voltage Test
- Electron Trap Test Plan
- Schedule

Schematic Drawing of Antiproton Trap

Upstream

Downstream

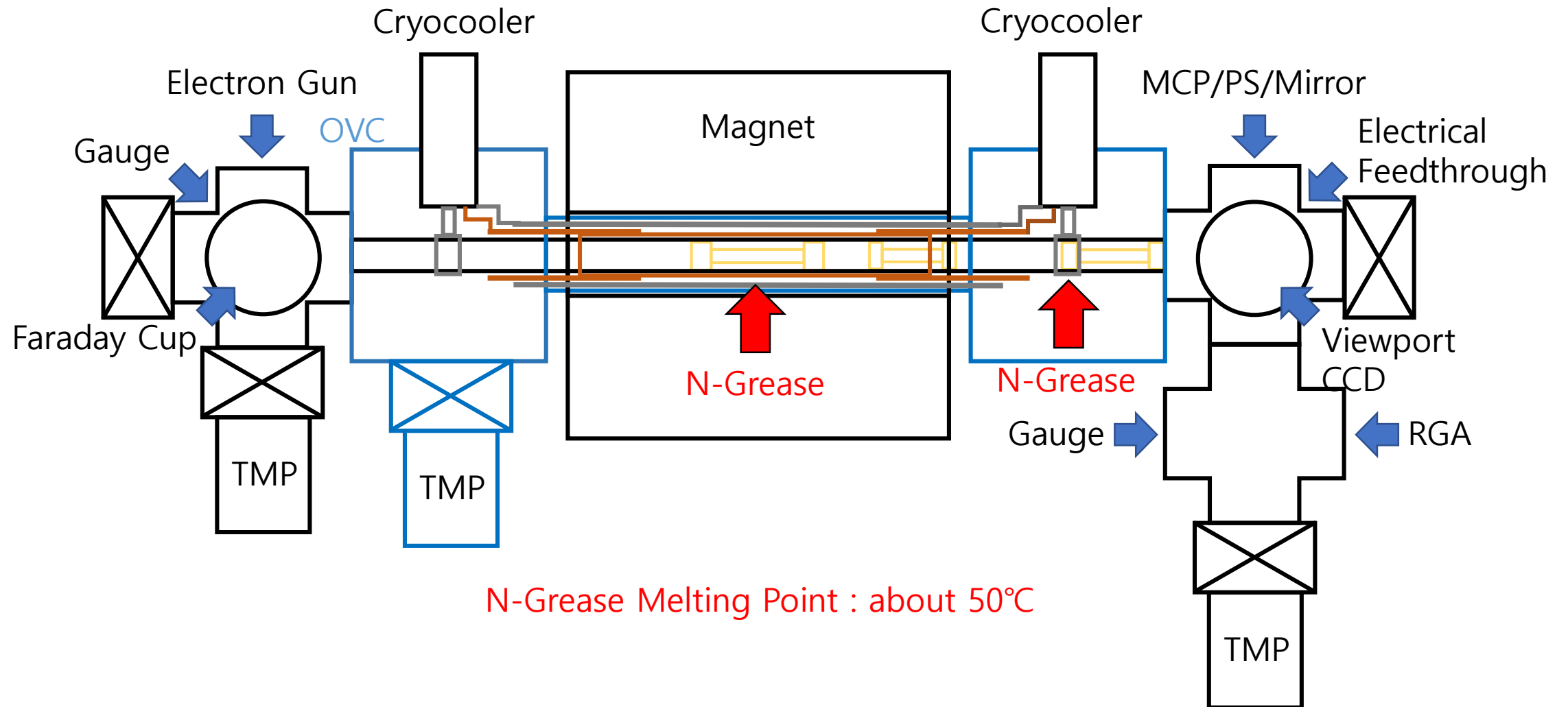


Pressure with full set up
MRE + EL1 + EL2 with all cables connected

Baking

Upstream

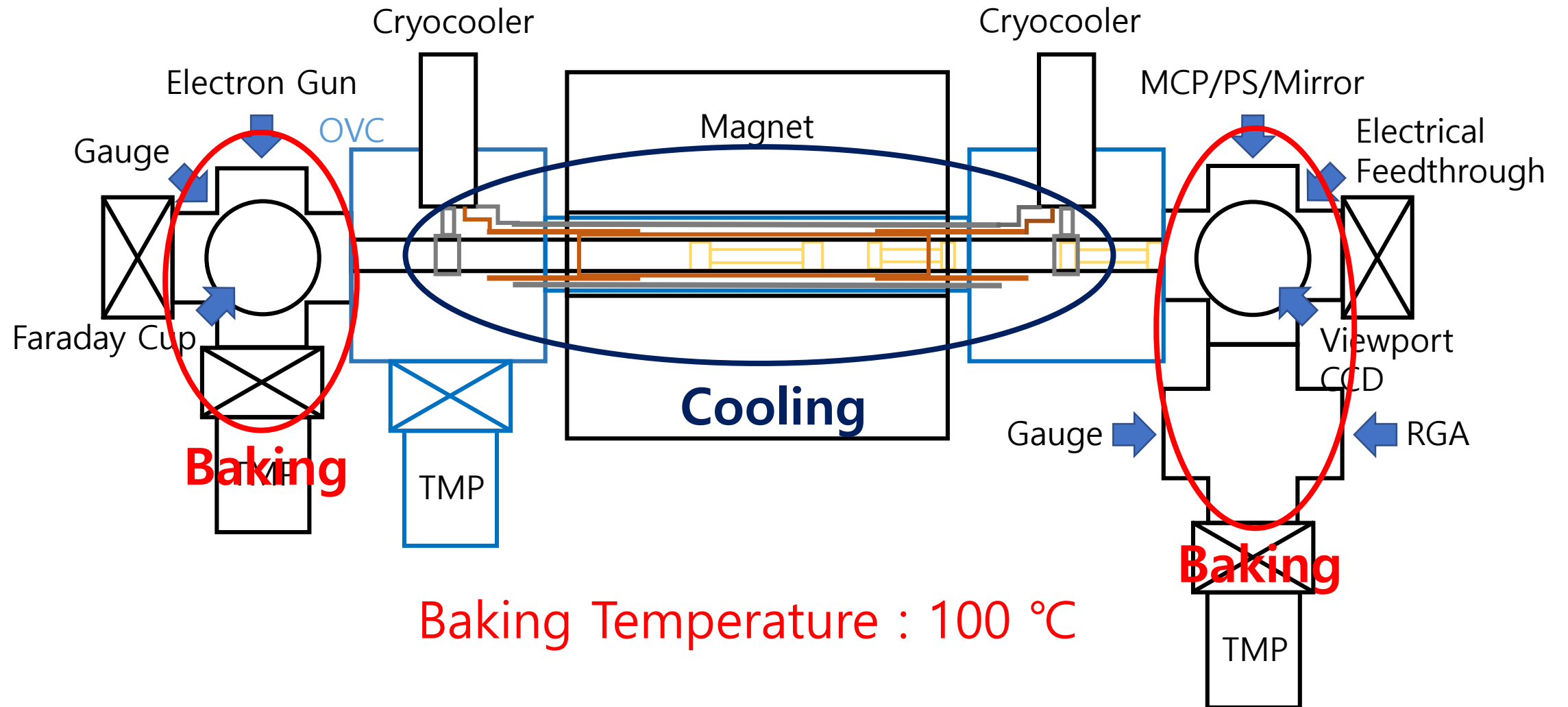
Downstream



Baking

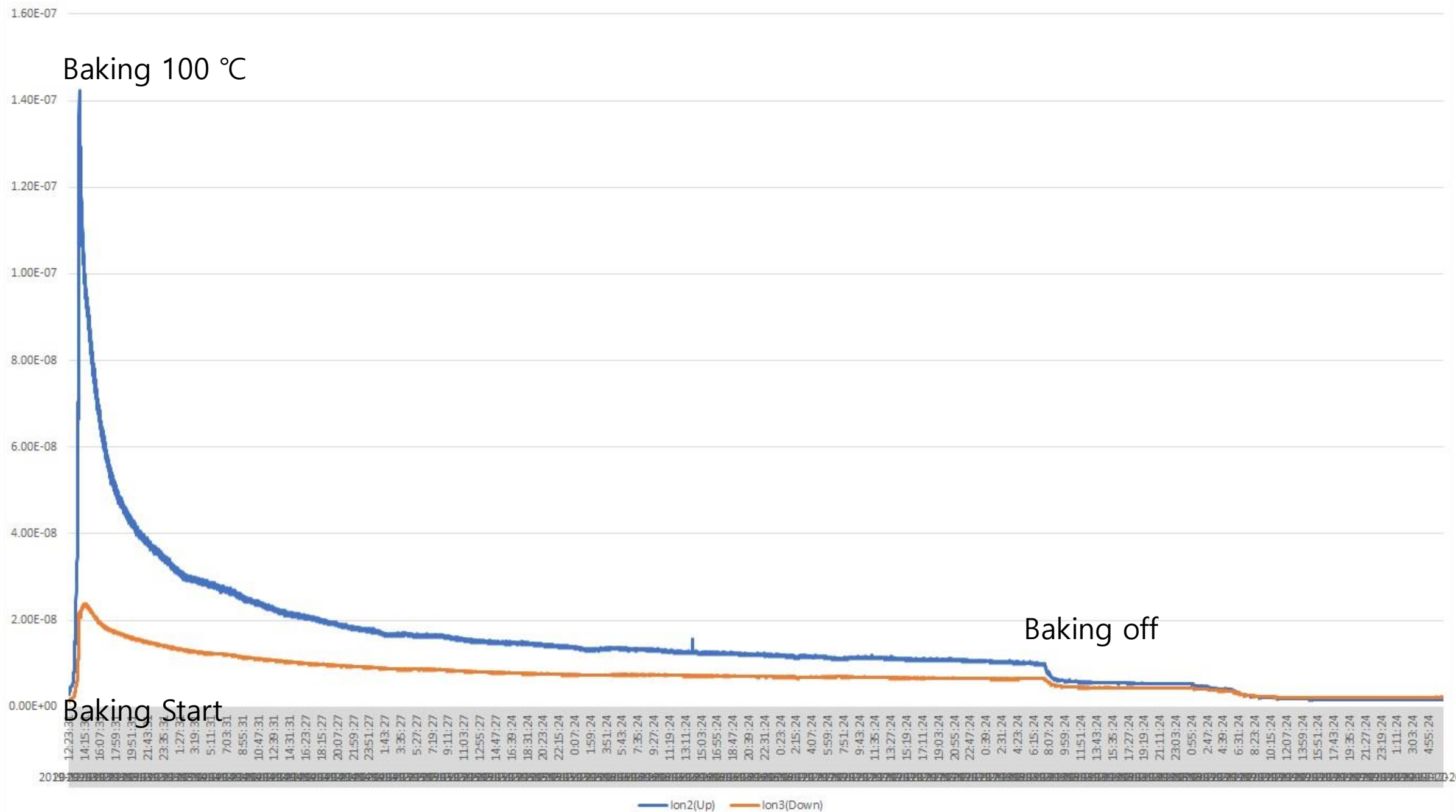
Upstream

Downstream

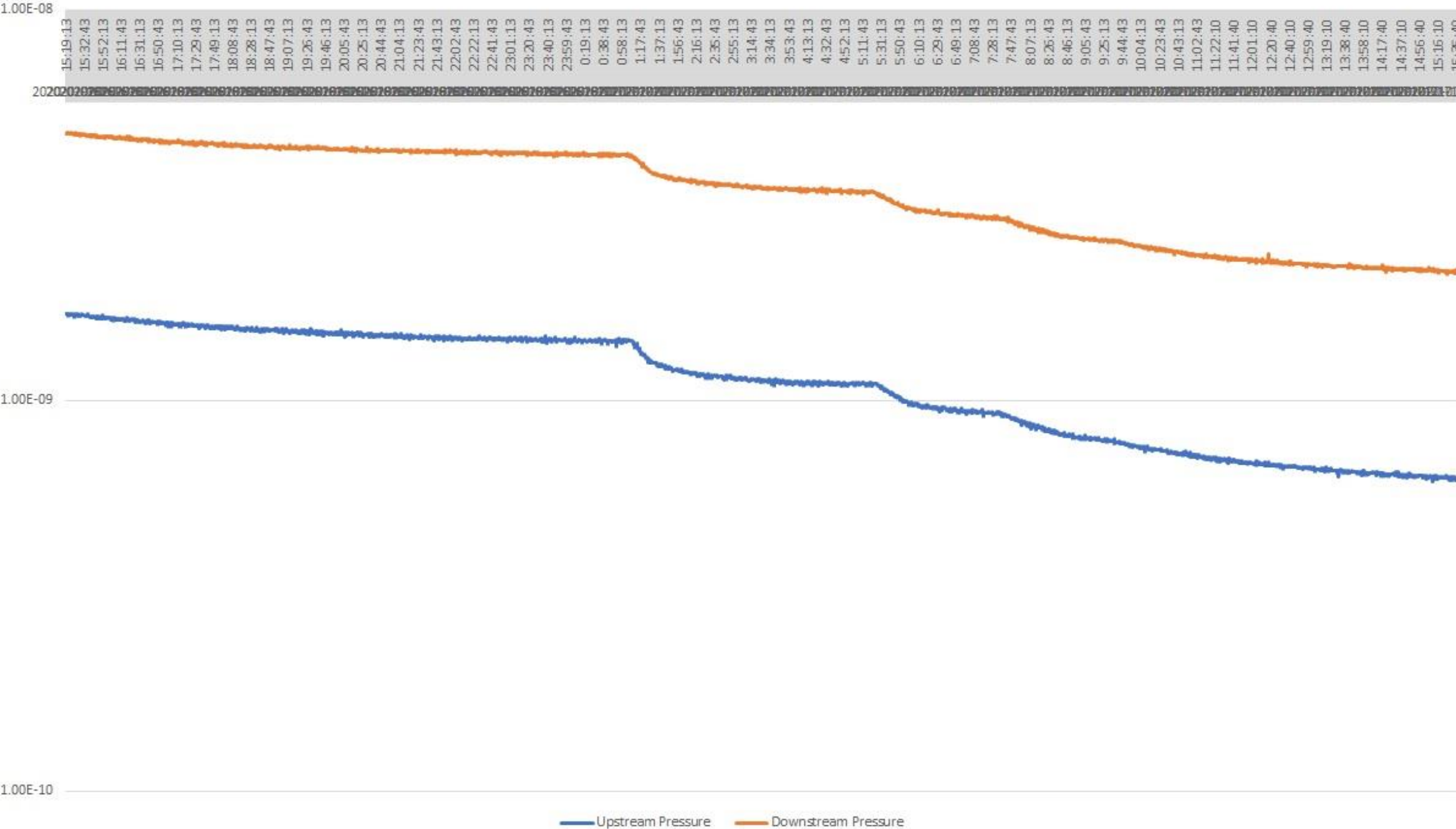


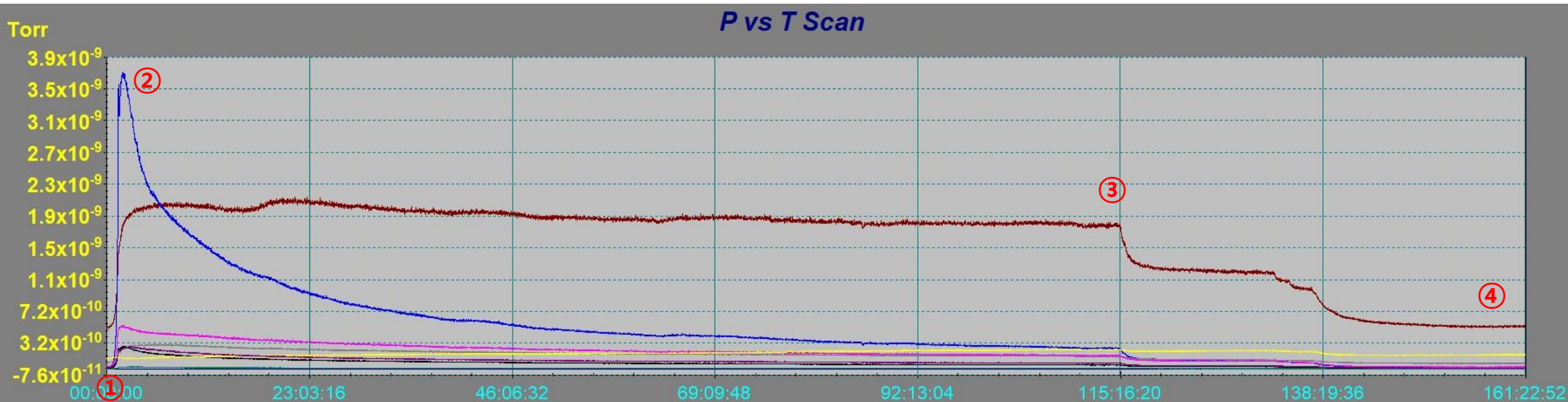
압력

Baking 100 °C



Pressure





① Baking Start

Time:00:03:18

- 5.28e-010 Hydrogen
- 5.32e-013 Helium
- 3.00e-012 Methane14
- 1.45e-012 Methane15
- 1.12e-011 Methane
- 2.16e-011 Water
- 7.66e-011 Nitrogen
- 3.00e-011 Oxygen
- 1.23e-010 Argon
- 1.86e-011 Carbon dioxide

② Baking 100 °C

Time:01:50:01

- 1.78e-009 Hydrogen
- 1.47e-012 Helium
- 1.98e-011 Methane14
- 2.23e-011 Methane15
- 2.71e-010 Methane
- 3.69e-009 Water
- 2.47e-010 Nitrogen
- 5.25e-010 Oxygen
- 1.36e-010 Argon
- 2.53e-010 Carbon dioxide

③ Before Baking off (100 °C)

Time:115:05:39

- 1.79e-009 Hydrogen
- 5.52e-013 Helium
- 6.97e-012 Methane14
- 6.90e-012 Methane15
- 4.87e-011 Methane
- 2.55e-010 Water
- 1.55e-010 Nitrogen
- 1.61e-010 Oxygen
- 2.34e-010 Argon
- 7.03e-011 Carbon dioxide

④ After Baking end (25 °C)

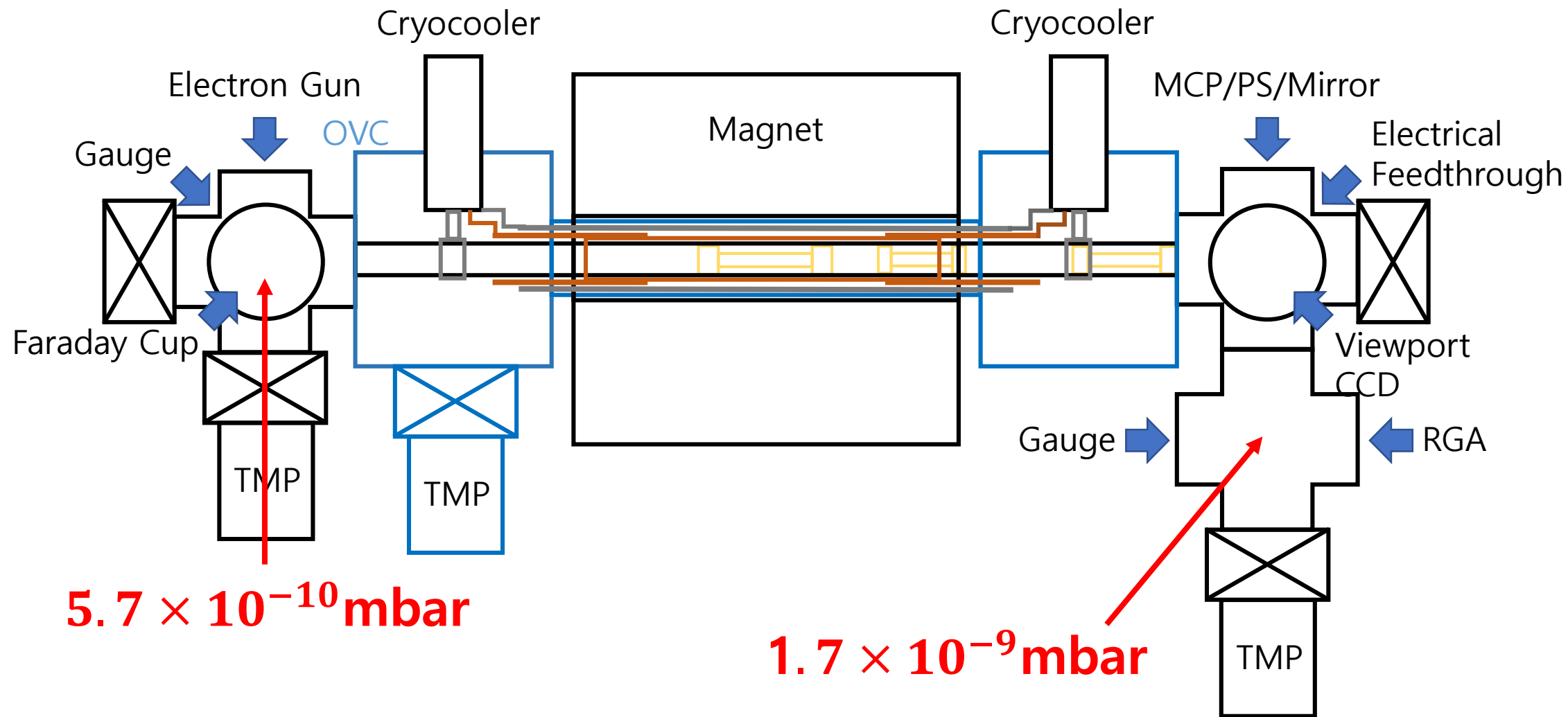
Time:161:22:52

- 5.38e-010 Hydrogen
- 2.63e-013 Helium
- 2.84e-012 Methane14
- 1.31e-012 Methane15
- 8.73e-012 Methane
- 2.02e-011 Water
- 6.65e-011 Nitrogen
- 2.54e-011 Oxygen
- 1.77e-010 Argon
- 1.22e-011 Carbon dioxide

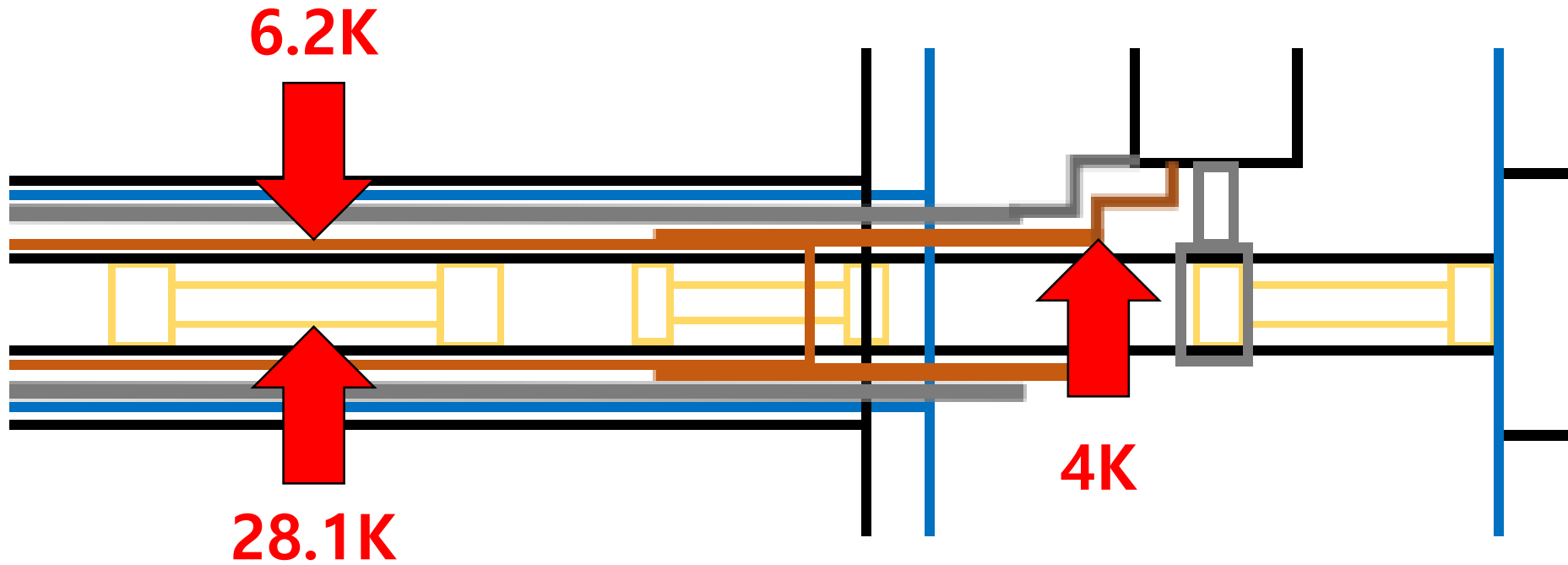
Pressure

Upstream

Downstream



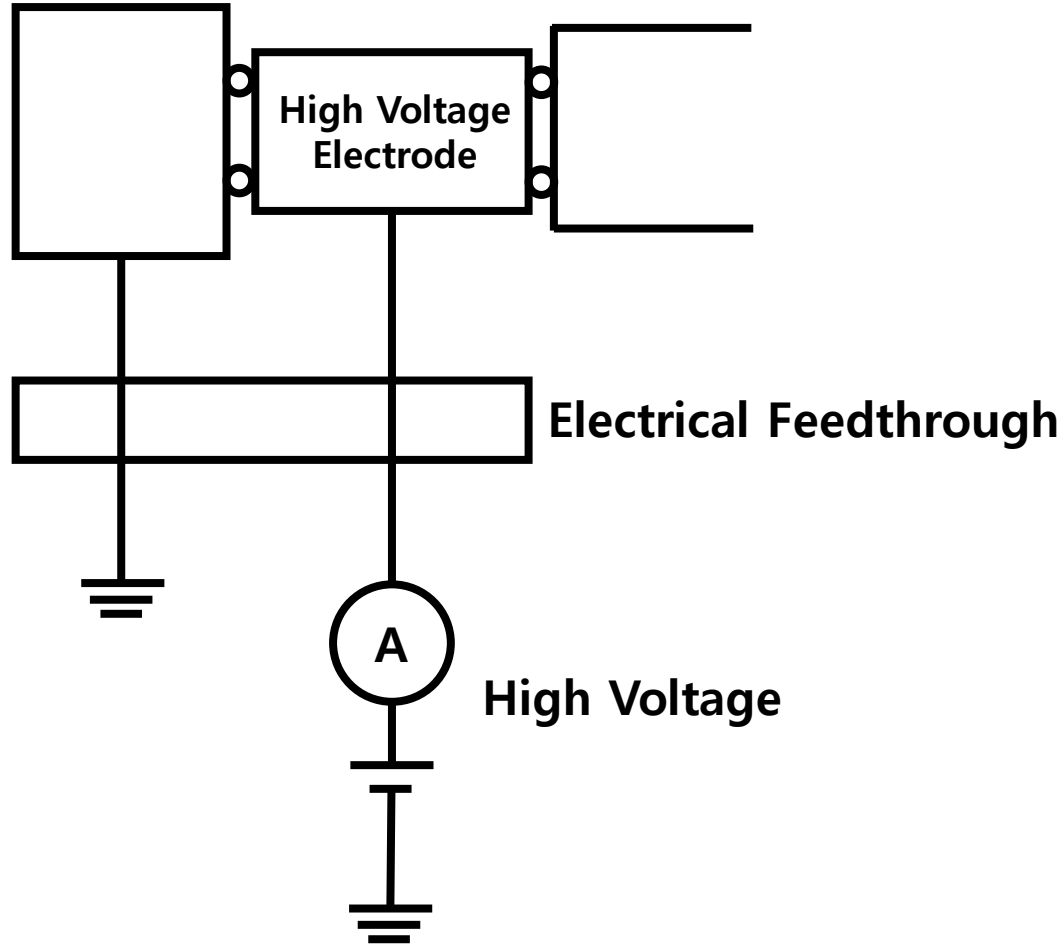
Temperature



Last cooling test MRE temperature : 19K

1. MRE wire is connected
2. EL1, EL2, is installed

High Voltage Test



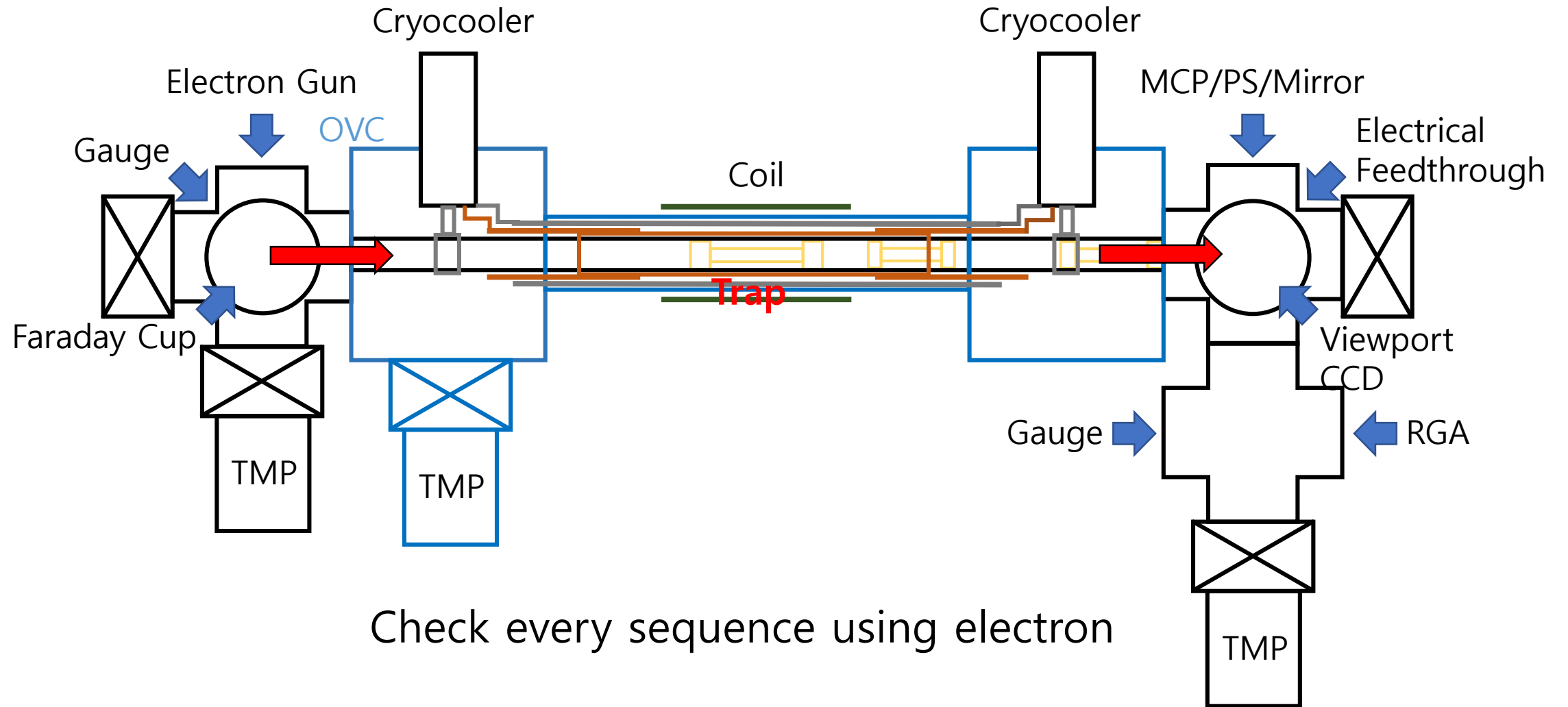
**High Voltage raised up to 8kV
No electrical breakdown observed**

Electron Trap Test Plan

Electron Trap Test

Upstream

Downstream



Electron Trap Test Field Calculation

- 원심력=자기력

- $\frac{mv^2}{r} = qvB$

- $\frac{mv}{qr} = B$

- Energy: 100eV

- Velocity: $\sqrt{\frac{2E}{m}} = \sqrt{\frac{200 \text{ eV}}{m}}$

- Radius: 5mm=0.005 m

- Electron mass: $9.10938356 \times 10^{-31} \text{ kg}$

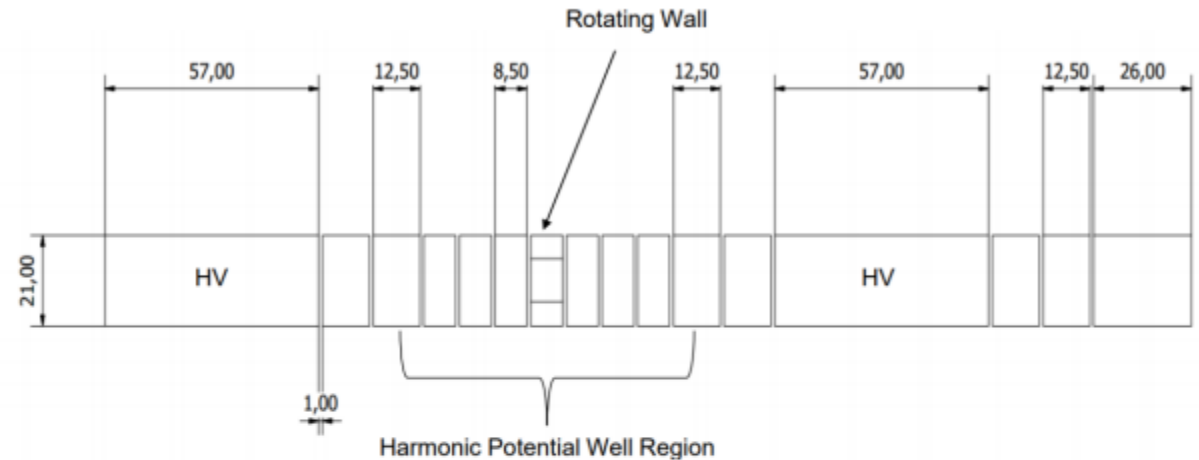
- Electron charge: $1.60217662 \times 10^{-19} \text{ coulombs}$

- $mv = \sqrt{m * 200 \text{ eV}} = \sqrt{9.10938356 \times 10^{-31} \text{ (kg)} * 3.2044 \times 10^{-17} \text{ (Joule)}} = \sqrt{28.8 \times 10^{-48}}$

- $qr = 8 \times 10^{-22}$

- $\therefore \frac{mv}{qr} = B = \frac{\sqrt{28.8 \times 10^{-48}}}{8 \times 10^{-22}} = 0.67 \times 10^{-2} \text{ T} = 67 \text{ G}$

Multi-Ring Electrodes



Electron Trap Test Setting

Coil for electron trap test

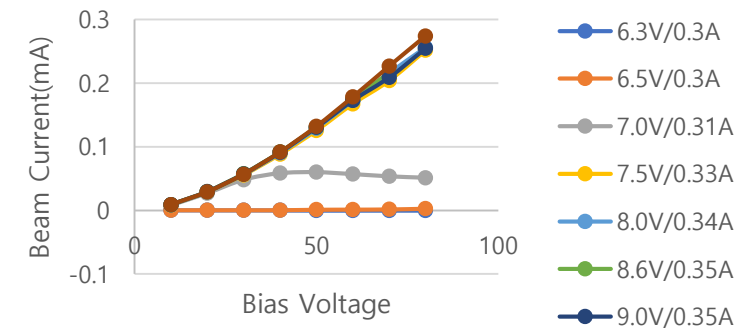


B-field 70G @ 3A
need ~67G

Electron gun

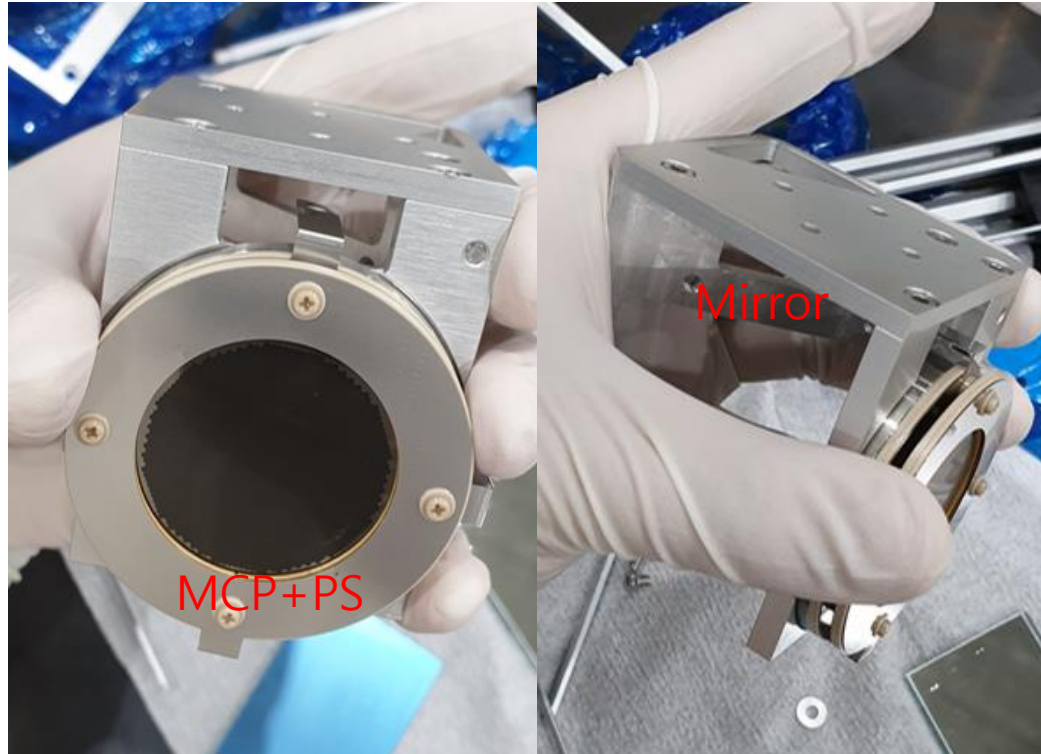


Electron Gun Test

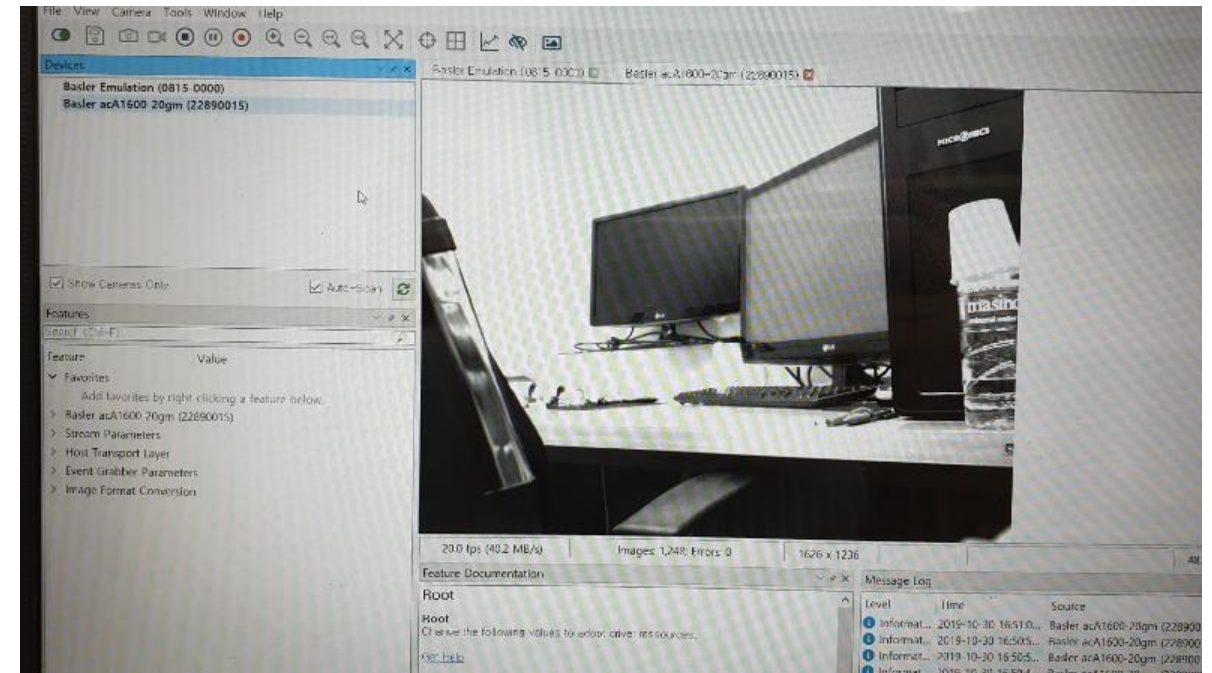


Electron gun test

MCP + PS

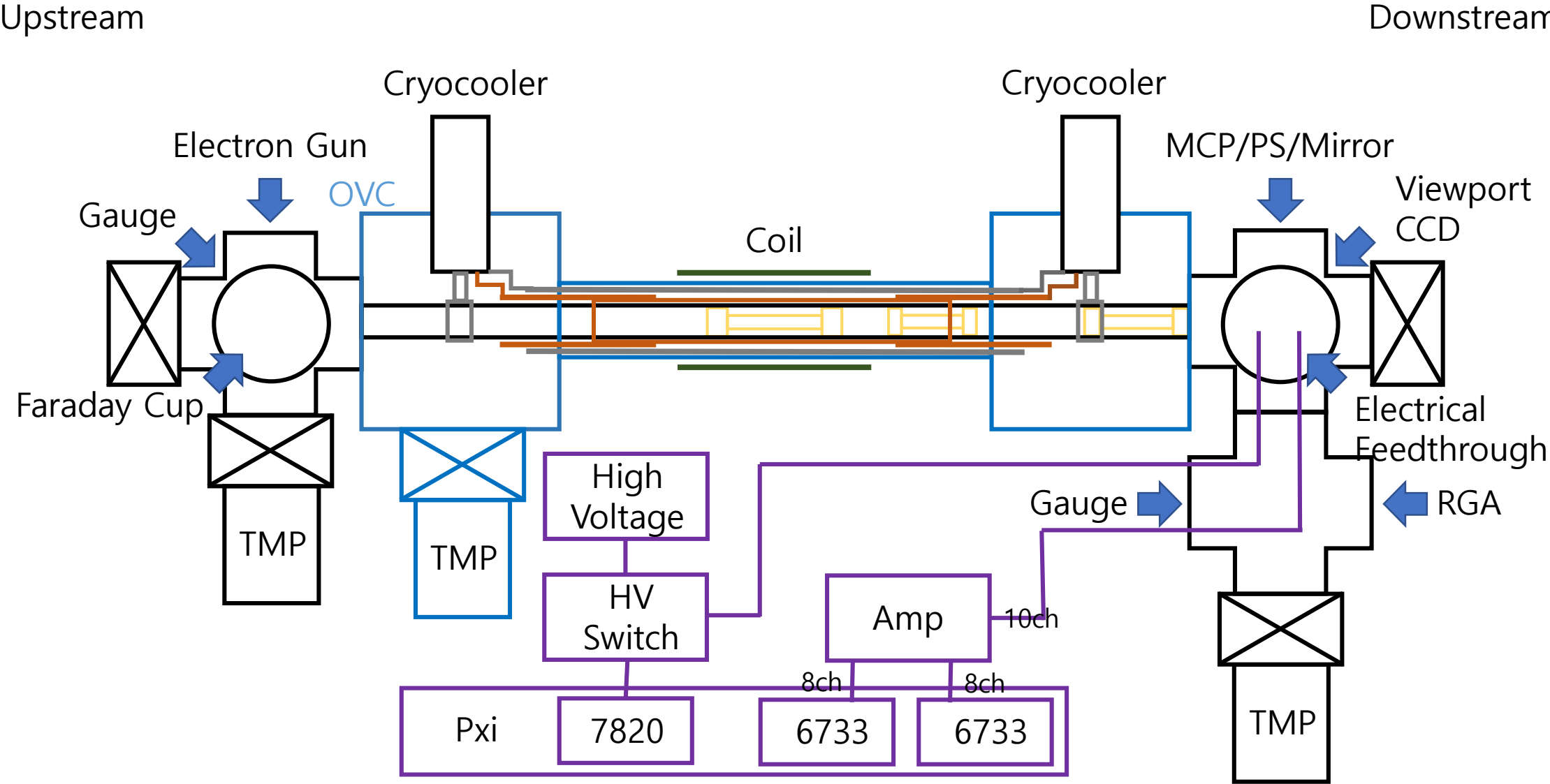


MCP Mount manufacture



CCD Camera setting(for MCPPS)

Electron Trap Test Control



Schedule

2020 **1** JAN

일 SUN	월 MON	화 TUE	수 WED	목 THU	금 FRI	토 SAT
			1 신정	2	3	4
5	6	7	8	9 음 12.15	10	11
12	13	14	15	16	17 준분	18
19	20 대한	21	22 Meeting	23	24	25 설날
26	27 대체 휴일	28	29 E-Gun, MCP, CCD Install	30 Time for high vacuum	31	

2020 **2** FEB

일 SUN	월 MON	화 TUE	수 WED	목 THU	금 FRI	토 SAT
						1
2	3	4 입춘	5	6	7	8 정월대보름 음 1,15
Co-work with CVE about cooling system Install coil for electron test Simple electron test in high vacuum						
9	10	11	12	13	14 삼짇날	15
Time for ultra high vacuum						
16	17	18	19 추분	20	21	22
Electron test in ultra high vacuum						
23	24 음 2,1	25	26	27	28	29

Thank You!