



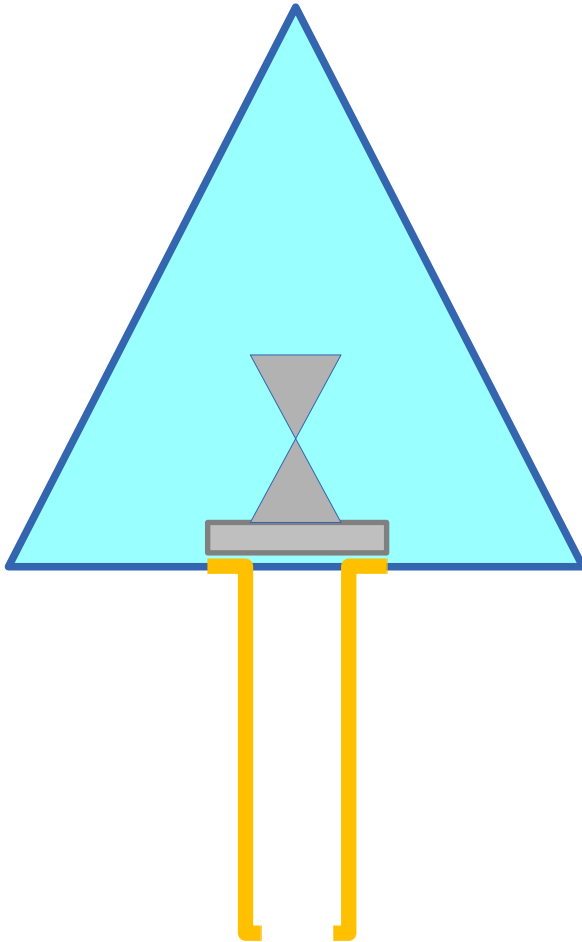
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# Update and Lessons from LSM

2019-05-21

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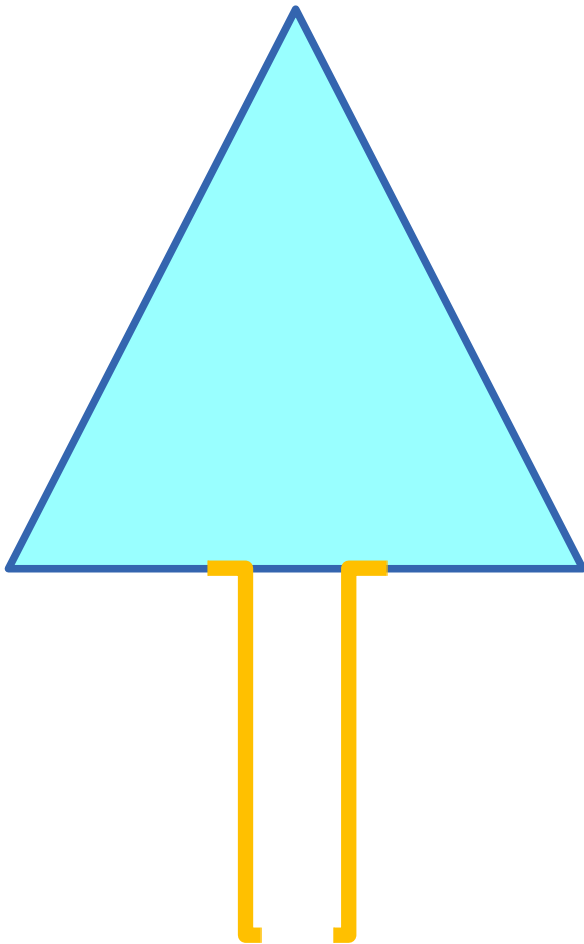
- equipped with pressure relief, gauges and valve
- Use of balloon plug
  - no problem
  - wires added to pull out balloon
- closed with “travel flange”
  - pressure relief
  - 2x 1/4” valves → balloon + sphere
- *headless screws/lubricant should be used*
- *CF63 copper gasket can get stuck: tool?*



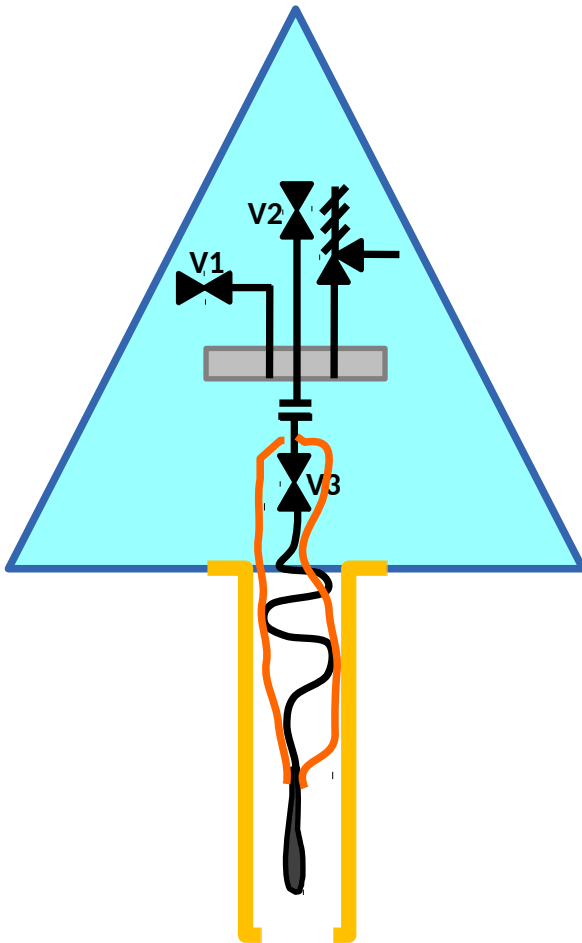
- Start
  - Vacuum valve
  - Glove Bag
  - N2 flow
- In GB
  - balloon + flange
  - Cu gasket
  - 13mm wrench (CF)
  - 9/16 wrench (Swagelok)
- Extension ready (valves installed)

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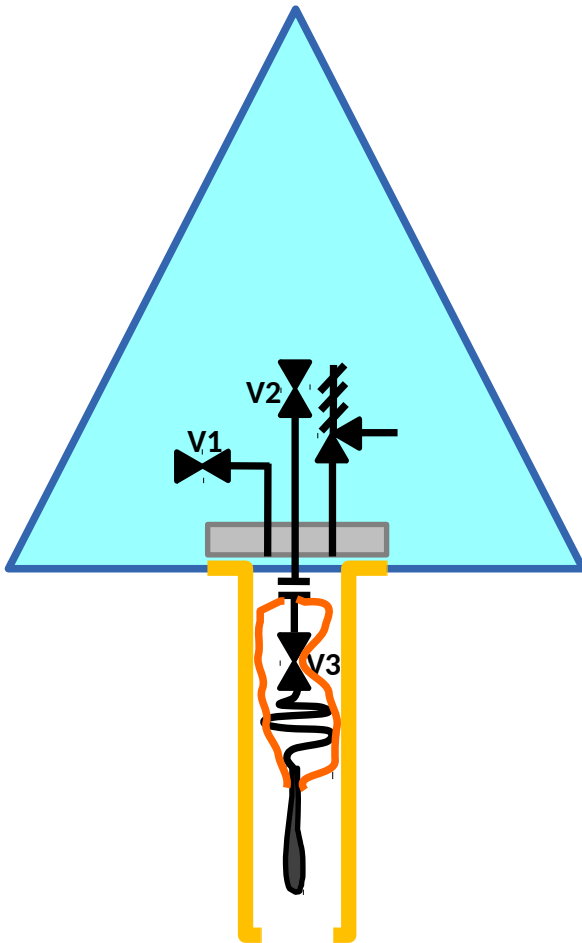
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- Removed valve

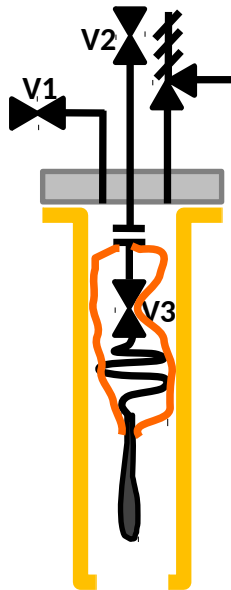


- Change Cu gasket
- Insert balloon
  - deflated
  - clean Cu wires attached to balloon, loosely tied to flange
  - v3 open, v1, v2 closed



- Flange closed
  - headless screws
  - lubricant

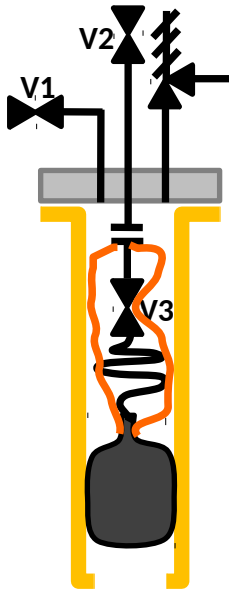
- Remove GB



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- Connect nitrogen gas to V2 and inflate balloon
- Close V2

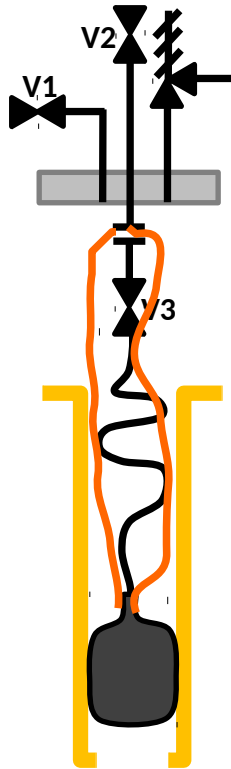


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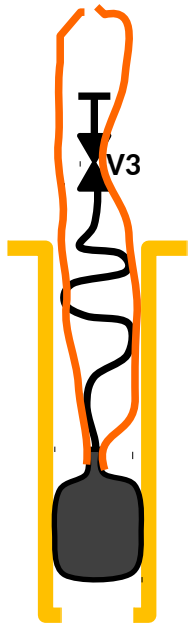
- Disconnect flange from sphere
- Close V3

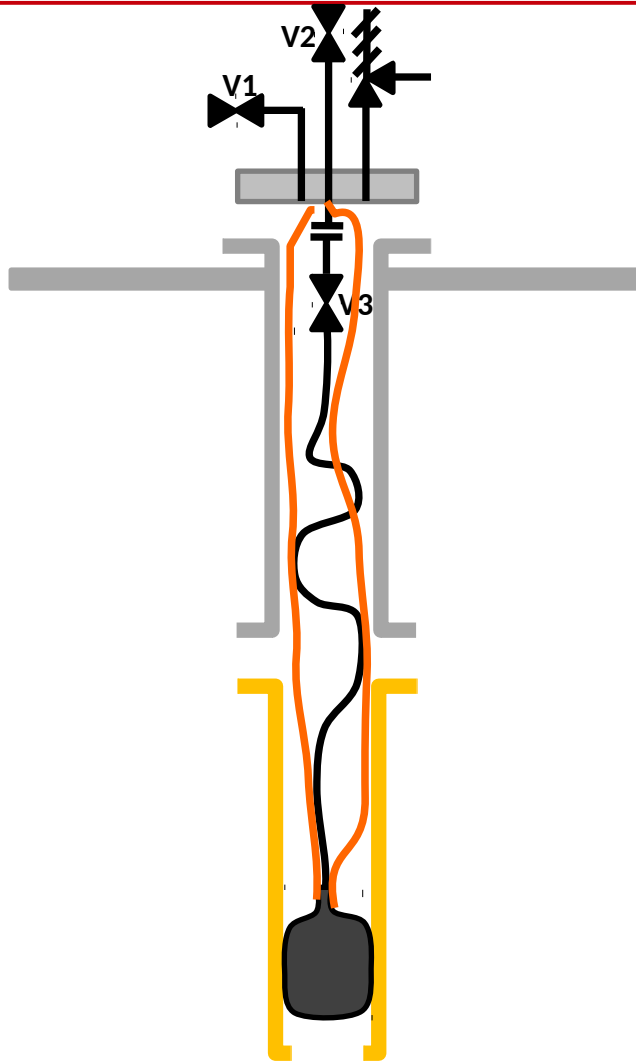


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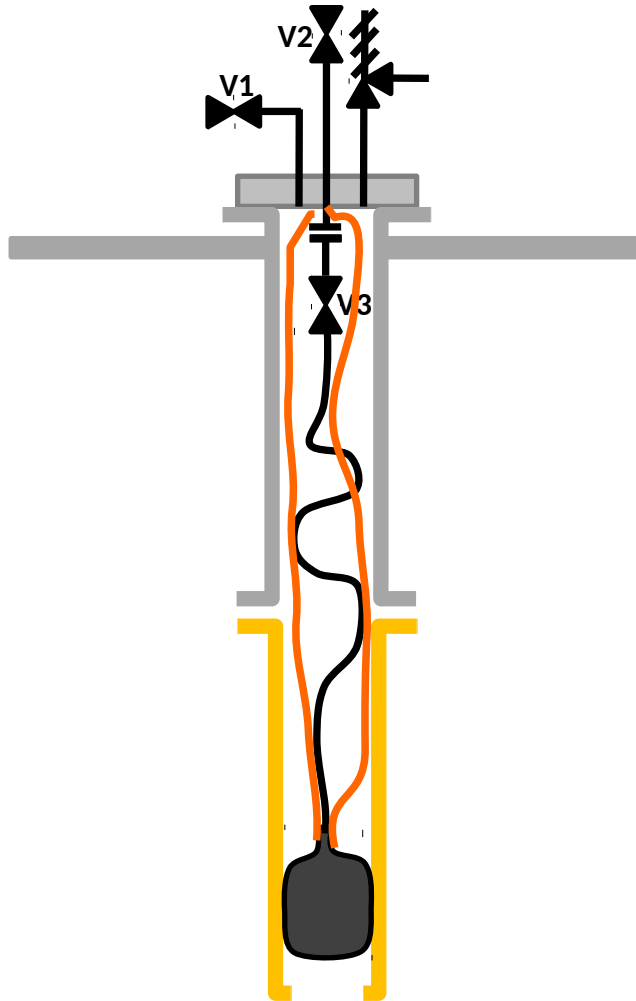
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- Disconnect flange from balloon tubing

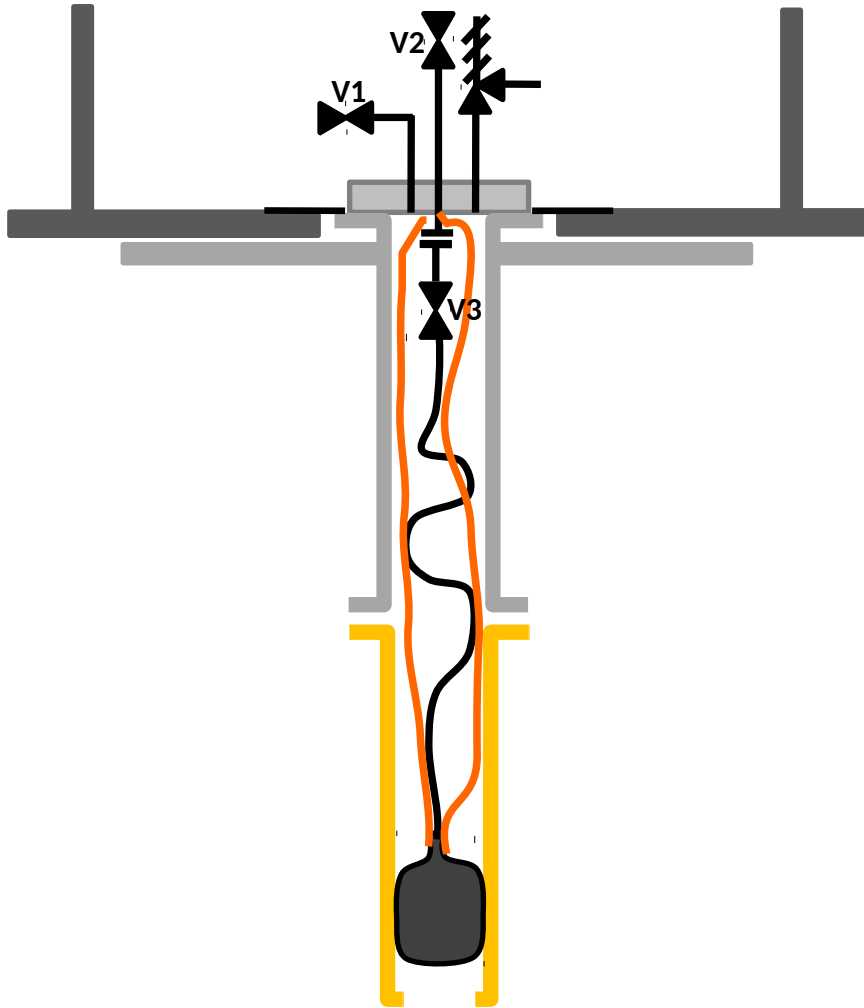




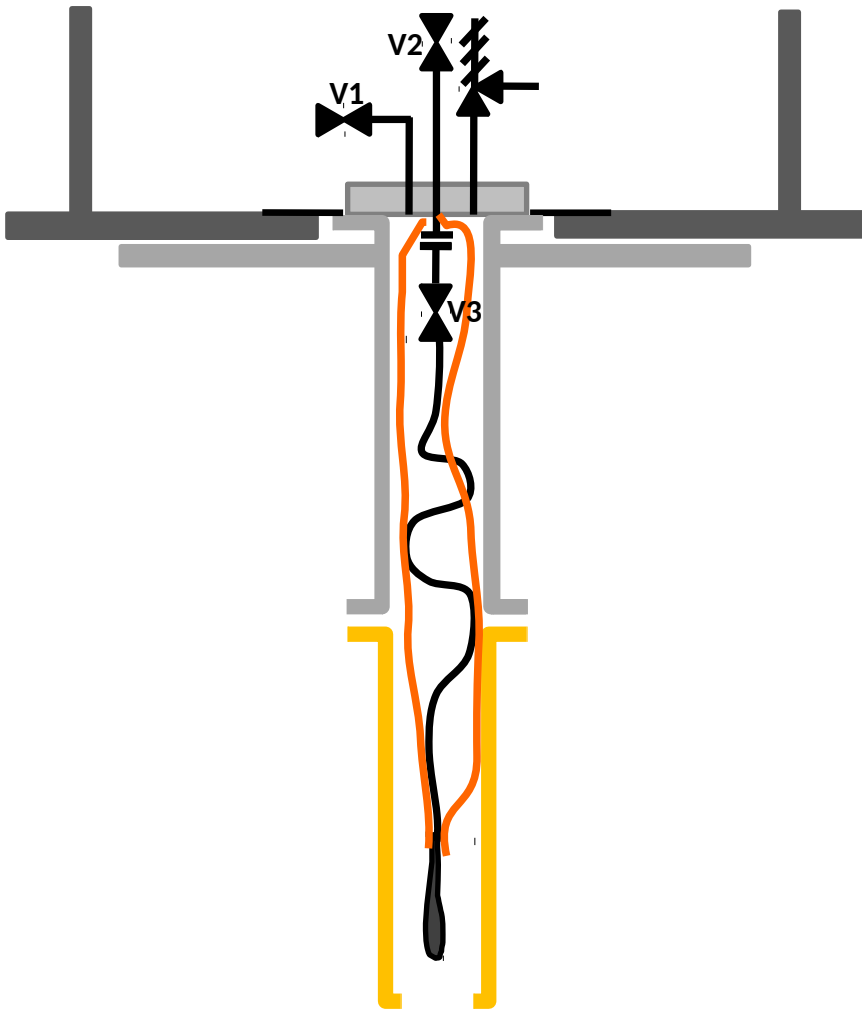
- Slide nozzle extension over balloon tubing
- Pull tube using wire
- Push wires up
- Connect balloon tubing to flange
- Check that V2 is closed
- Open V3



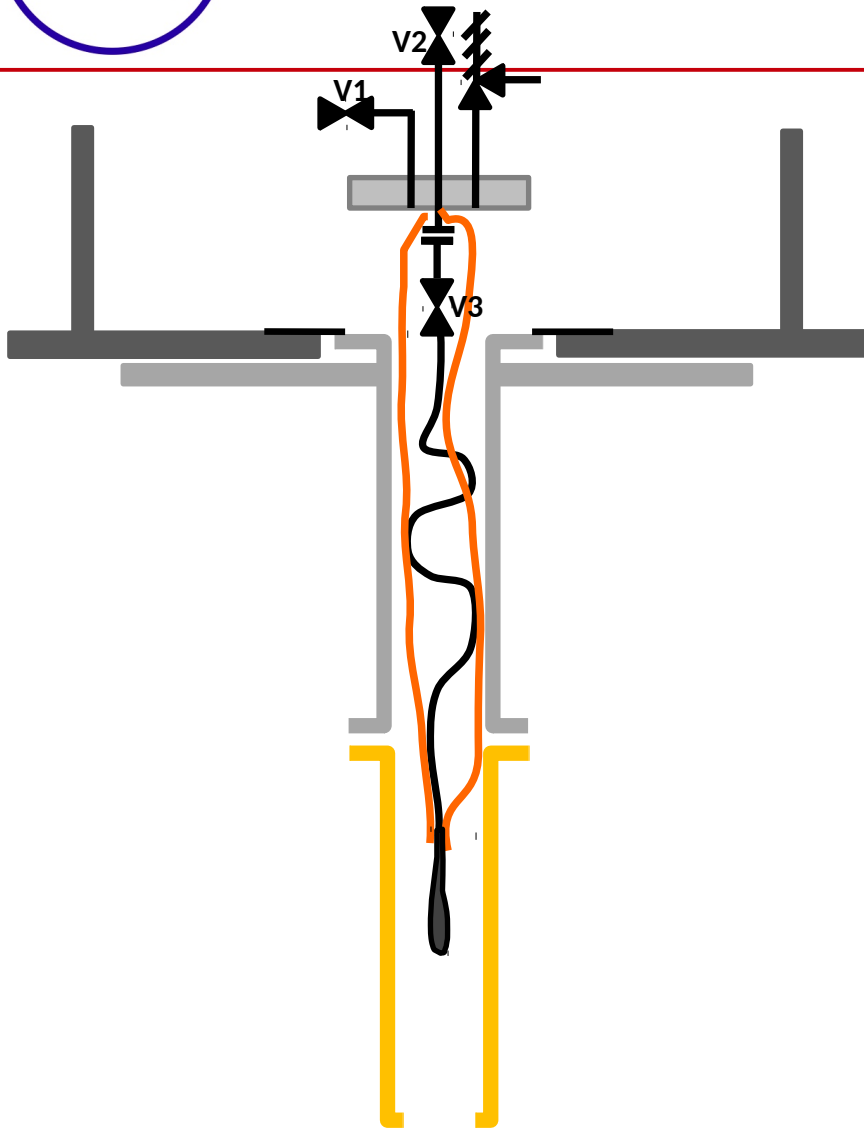
- Connect nozzle extension to sphere nozzle
- Connect flange to nozzle extension



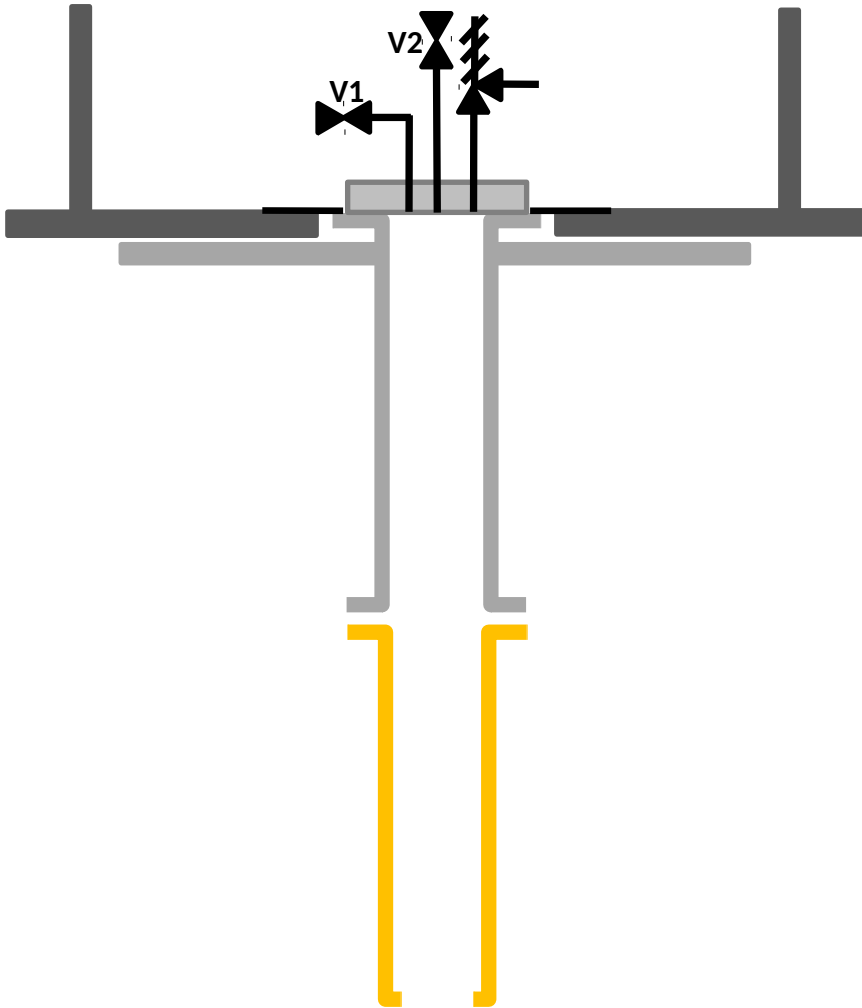
- Install glove box and seal to nozzle extension
- Fill glove box with nitrogen gas and equalize pressure with sphere and lab



- Open V2 and deflate balloon



- Disconnect flange from nozzle extension
- Pull out balloon
  - using wires



- Reinstall flange on nozzle extension without balloon
  - headless screws
  - lubricant



- Easy installation
- very leak-tight
- Pressure limitations
  - gloves pop out at a few mbar overpressure
  - outflow too small → long flushing
- Upgrades
  - *low pressure/high flow relief*
  - *caps for gloves could help*
  - *oxygen detector added → identify sufficient flushing*

- 3 people operation
- One sensor broken (glass umbrella)
  - *should be handled only by experts (PK, IS, IG)*
- Lead plug issues
  - *very tight → risk of jamming*
  - *needed for rod alignment*
  - *fixed*
- Top lead plug not necessary any longer
  - replaced by rod bend
  - space might be needed for fibre connector

- Configuration constraints
  - *Getter vertical, downwards flow*
  - *Radon trap cooling*
  - *Gas fill through rod: needs hole*
- $^{37}\text{Ar}$  location issue
  - *needs to be close to sphere (diffusion)*
  - *system to force flow?*

- Opportunity to build SOPs
  - Sphere installation
  - Glove Box operation (v0)
  - Rod installation (to do)
  - Vacuum management (v0)
  - Gas management (v0)
  - ...
- Start tracking operation
  - gas exposure...

- First installation successful, but with some hiccups
- Upgrades added or planned for easier operations
- This will make life at SNOLAB easier!