New baseline for the magnet cooling system

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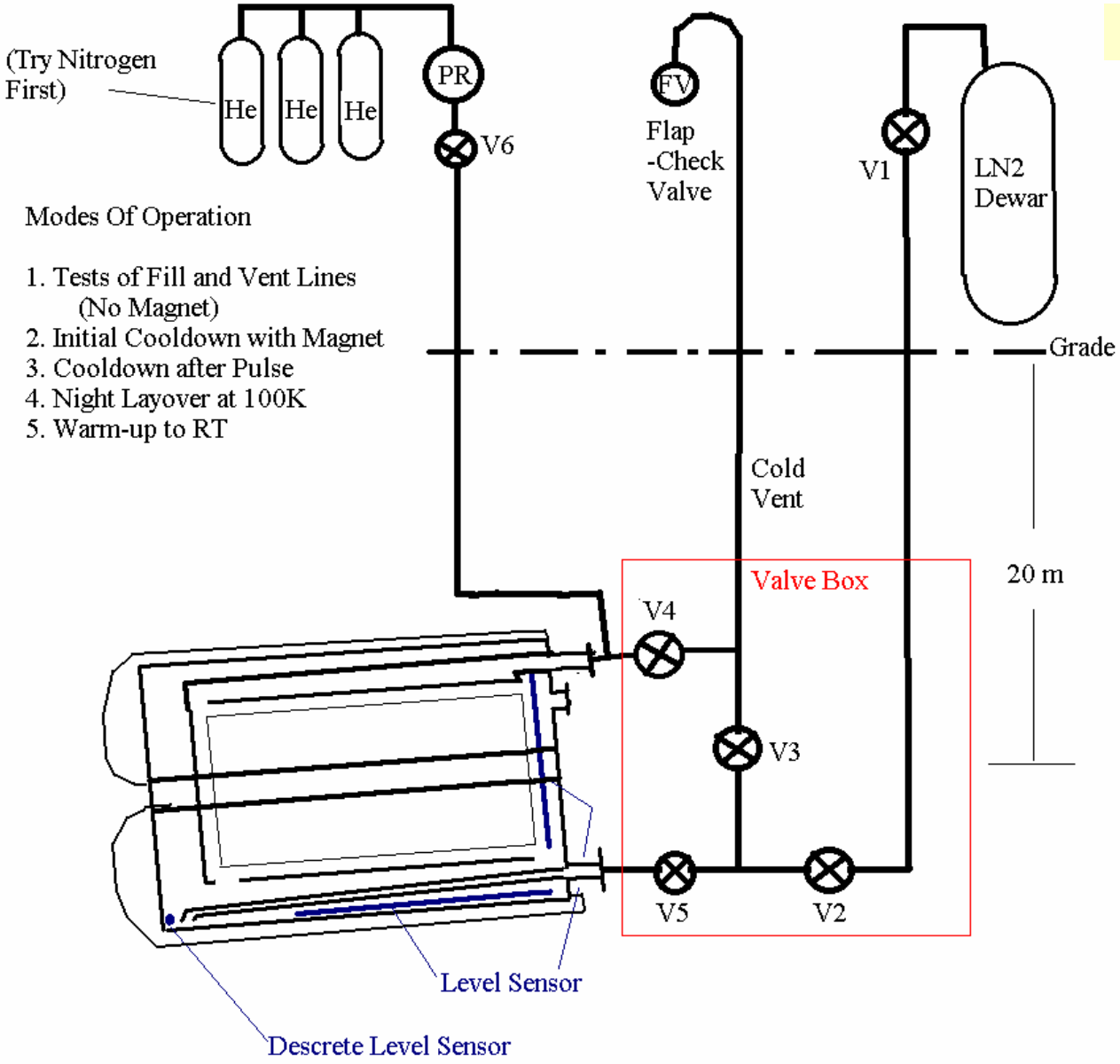
Liquid nitrogen cooling system: Conceptual points

- Magnet sub-cooling is eliminated -> no pumping on LN2
- LN2 is pushed (by pressurizing the magnet) back onto the surface and disposed
  -> more robust solution compared to the previous concept of pushing LN2 back into the dewar
- Cold vent line -> heater is eliminated
- Valves are located in a valve box -> this ensures that valves are cold
- Filling and vent lines as well as a valve box can be tested independently from the magnet as a stand alone system.

Liquid nitrogen cooling system: Diagram



Drawn by Peter Titus

Liquid nitrogen cooling system: Instrumentation and Control

Instrumentation:

Inside the magnet:
- Continuous liquid level sensors (vertical and horizontal)
- Discrete level sensors (up to 10)
- Set of temperature sensors

Outside the magnet:
- Temperature sensor on a cold line ?

Control system:

- UNICOS (UNified Industrial Control System) vs. LabView

-> LabView looks more affordable, accepted and portable
BUT more careful consideration is required

Liquid nitrogen cooling system: Next steps

To do list:

- Check whether the proposed base line fulfils all the requirements for the magnet cooling (are we missing anything?)
- Propose operation sequence (as well as a logical diagram for control)
- Specify components

(make calculation for the pressure drop in the lines etc.)

- Make a flow diagram and a layout for the system
- Specify instrumentation and a control system and select a platform (LabView ?)
- Specify safety system
- Check what equipment is available
- Get quotation for missing bits
- Make cost estimate for the system
- Make safety assessment
- Prepare a technical note on the cooling system including responsibilities and a schedule