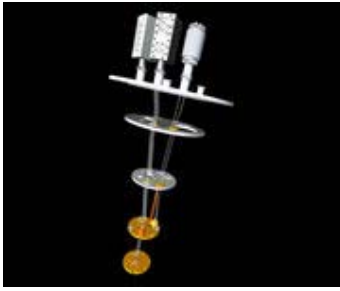


Measurement Circuitry



Overview

The cryostat is design for high frequency measurements at base temperatures as low as 50mK. There are 2 coaxial high frequency input lines and 2 outputs including low noise amplifiers. There are also around 20 DC measurement lines.

Passive Components

Circulators

- 2x PamTech 700-900 MHz

DC line low-pass filters

- Type A filter consists of 1 m of thermocoax, 650 ohm RC filters with a cutoff of approx. 1 kHz.
- Type B filter consists of 1 m of thermocoax, 65 ohm RC filters with a cutoff of approx. 1 kHz.
- Type C filter consists of 1 m of thermocoax only. Usable for RF excitation up to 500 MHz.

Active Components

- CBT & CBT preamplifier & software from Aivon (currently not mounted).

Low Noise Amplifiers (LNA)

- Remember to bias with the cryogenic voltage values before cooling down (otherwise it may "freeze") and keep it biased while cold.
- 2x Homemade HEMT amplifier from 600 MHz to 1 GHz.

Approx. Gate: -0.2V Source-Drain : +0.6V

Manuals

[BlueFors BF-SD250 User manual \(pdf\)](#)

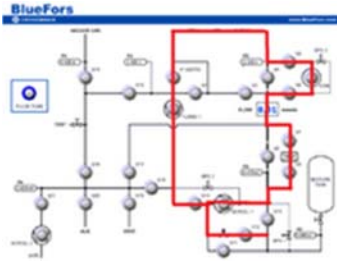
Cooldown

Pumping and pulse tube cooldown

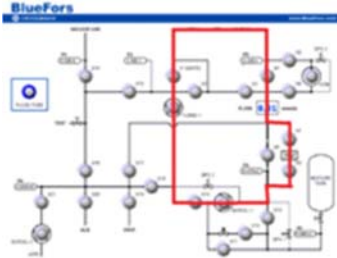
1. Pump with SCROLL 2, through V21, V16, V14, keep everything else closed.
2. When the pressure is close to 1 mbar, open V15 and V18, close V16 and use TURBO.
3. Remember to switch on the LNAs with their cryogenic voltages and the heat switch before switching on the pulse tube.
4. When the pressure in VC is $<2e-3$ mbar (after couple of hours) switch on the pulse tube.

- When closing the V14 no longer makes P1 rise very much, you can stop pumping and close all valves.

Condensing



Circulation path when condensing



Circulation path when operating normally

- Fill the trap and regenerate if necessary.
- When $R5 = 40$ ohms, switch off the heat switch.
- Switch on SCROLL 1, open V9, V7, V6, V5, V1, V10, V12.
- When P4 is near 1 bar (almost immediately), switch on the compressor and observe P3 go up to 2.8 bars.
- When the pressure in the tank has decreased to around 100 mbar you can stop the compressor, open V4 and close V5 and V6 and V12.
- Switch on TURBO. The temperature should go down to ~ 40 mK ($R7 \sim 17$ kohm) now (typically takes over night).

Warming up

- Switch off TURBO.
- Close V9 and open V13.
- Collect all of the mixture back to the tank.
- After all of the mixture is in the tank, close V13 and switch off PULSE TUBE.
- Use mixing chamber and still resistors (parallel) to warm up the fridge. Use 4VDC.

Leak Testing

Connecting

- Close V1,2,9 and attach leak detector to vacuum can line
- Start up leak detector
- Pump line with leak detector until He pressure is $10e-9$
- Open V1 to vacuum can

Measuring

Guideline: After 1.6 hours background should be around $5 \cdot 10e-9$

Disconnecting

1. Close V1
2. Turn off leak detector and disconnect hose
3. Open V9 to coarse pump line
4. When pressure is low enough (value?) open V2
5. When P2 has reached can pressure (P1) V1 can be opened again