

Instructions for cooling the LTMAS cabinet and DNP probe (16MAY2016)

Filling the LTMAS LN2 dewar:

- on LTMAS cabinet controller panel, check 'Vacuum and LN2' --> vacuum level (10^{-3} mB) < 10
- on Liquid Level Controller, ensure that switch is in 'OFF' mode
- connect LN2 supply tank to liquid fill line from LTMAS cabinet
- open liquid valve on LN2 supply tank
- on Liquid Level Controller, turn switch to 'AUTO'
- open the vent valve (inside the cabinet door) on LTMAS LN2 dewar if filling from ambient temperature
- when LN2 level is > 3 close vent valve on LTMAS LN2 dewar
- wait for LTMAS LN2 dewar to fill; filling will automatically stop when the appropriate level is reached, at 37.5 cm
- on LTMAS cabinet controller panel, go to 'Fill' panel
- wait for all 'Chamber temperature (K)' to reach $\leq \sim 120$ K before proceeding to the next step

>>> total time expired: ~ 1.0 hours

Filling the VT, bearing and drive heat exchanger chambers within the LN2 dewar:

- make sure 'Exchange Valves' is on 'BY-PASS' mode
- on LTMAS cabinet controller panel, go to 'Fill' panel
- reset fill counter to zero for three chambers by pressing both arrow buttons simultaneously
- wait for 'Chamber temperature (K)' to reach $< \sim 120$ K
- on LTMAS cabinet controller panel, 'Fill' --> hit 'START' for 'Chamber filling' under the VT, bearing and drive columns
- wait for chambers to fill; filling will stop automatically and should require ~ 230 L of N2 gas for each chamber. 'Fill status' will change from 'IN PROGRESS' to 'DONE'
- on LTMAS cabinet controller panel, go to 'Fill' panel
- wait for all 'Chamber pressure (bar)' to reach ≤ 0.2 bar before proceeding to the next step

>>> total time expired: ~ 2.0 hours

Cooling the LTMAS probe:

- put probe into magnet & connect all cables and hoses including tapered waveguide.
- flush the LTMAS probe (this can be done while the cabinet is cooling down):
 - |- on LTMAS cabinet controller panel, make sure 'Run' --> 'Exchanger Valve' in on 'BY-PASS' mode
 - |- in 'edte', turn VT 'Heater' to 'ON' and set 'Gas flow' to 670 l/h
 - |- on LTMAS cabinet MAS II controller, set bearing and drive to ~ 300 mbar
 - |- wait 20 minutes
 - |- on LTMAS cabinet MAS II controller, set bearing and drive to 0 mbar and hit 'EJECT'

- | - remove sample holder from bottom of probe
- | - wait 20 minutes
- | - insert sample holder back onto bottom of probe
- | - on LTMAS cabinet MAS II controller, hit 'STOP' to stop ejecting

- cool the LTMAS probe:
 - on LTMAS cabinet controller panel, in 'Run'
 - | - ensure that the 'Pressure setpoint (bar)' for the VT, Bearing and Drive columns are set to 1.5, 2.5 and 2.0, respectively
 - | - set 'Chamber Heater' to 'ON' for all three gas streams
 - | - set 'Exchanger Valve' to 'COOLING' from 'BY-PASS'
 - on LTMAS cabinet MAS II controller, set bearing to 1500 mbar and drive to 1000 mbar
 - in Topspin 'edte', turn VT 'Heater' to 'ON' and set 'Gas flow' to 2000 l/h
 - wait 60 minutes, or until aux2 sensor reading in 'edte' reaches ~135 K

- >>> total time expired: ~3.0 hours