Quick reference for the NBI Temperature- and Pressure- controller

The NBI temperature and pressure controller is limited to handle four temperature- and one pressure-channels for dedicated operation of a cryogenic cooled array detector. Usually one channel is used to monitor and control the detector temperature and one to monitor the temperature of the cold surface leaving two channels optional.

The control is facilitated by a display and three pushbuttons on the frontplate, one for programming (P) and two arrow buttons, - for up and down.

Menus

You have a choice of 6 menus in total, - the bottom line indicates the one on display. On all menues except for the startup menue (5), the upper three lines are the same, - one line showing the current CCD- temperature, one showing the current LN2-temperature and one showing the current pressure.

Menues 0 to 2 are for normal operation:

0: CCD Temp: Graph shows the last 2 minutes of the CCD-temperature.

1: LN2 Temp: Graph shows the last 2 minutes of the LN2-temperature.

2: Pressure: Graph shows the last 2 minutes of the pressure.
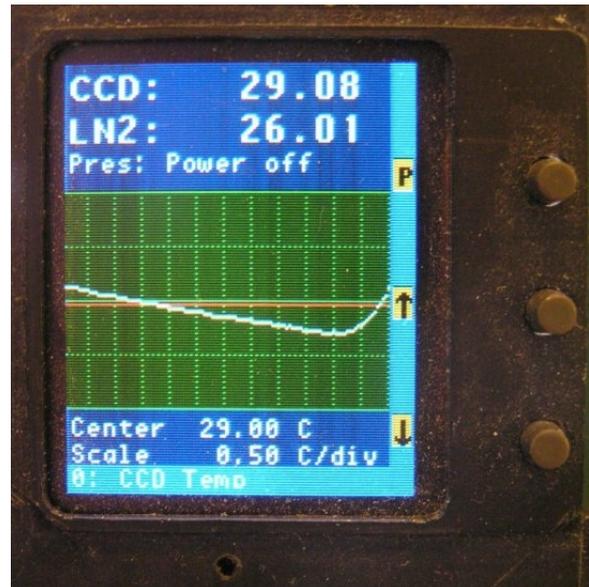
Menus 3 to 5 are for setup and programming:

The general scheme for programming is the same in menu 3 and 4. Pressing the P button will force the controller in programming mode.

First level is selecting the line to program, - the selected line will flash in Yellow, as well as a SEL will flash on the bottom line. Use arrow-buttons to move up/down.

Next level, - the actual programming, - is performed by pressing P once again, making the selected parameter flashing red as well as a PROG will flash in RED on the bottom line. Use the up/down buttons to alter the parameter.

Pres P a third time to leave the programming mode.

Note that the new values are only altered as the 'running' values, not in the system flash that will keep the values during power-down. See Flash Programming.

3: Setup Temp: Used to alter the setpoints of the temperature controller.

CCD Ref: will alter the current setpoint for the temperature control loop

LN2 Tsh.: will alter the current value for the audible alarm for 'insufficient cooling'. Currently not implemented!

MAX dT/dt: will alter the current value for the maximum allowed detector temperature gradient. Usually only relevant during cooldown of IR-detectors. Currently not implemented!

4: Setup Reg.: Used to alter the PID-regulator constants. These parameters are usually fitted to the current dewar before shipment.

In addition some operational conditions can be altered:

RS232 interface can be switched between 'On request' where you must ask for a parameter, 'Auto' where a limited number of parameters are output automatically, and 'Auto eng.' Where an extended number of parameters are automatically transmitted.

Display: Can be switched between 'always on', 'On for 10 seconds', and 'On for 30 seconds' after the last depressed button.
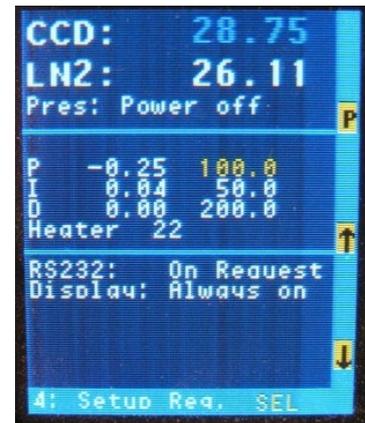
5: Start: Has two functions:
Acts as a simple startup delay, allowing for the analog circuitry to stabilise to some reasonable values.
Pressing the P-button in this menu, e.g. during startup will transfer factory settings of all parameters to current operational values. Note, - no flash programming takes place! See Flash Programming

Operational issues

Temperature measurement uses a PT100 RTD sensor and a 4-wire resistance circuit to cover a full -200C to +230C span.

Pressure measurement uses the Pfeiffer PKR251/PTR26000 dual range pressure gauge to cover the full ambient to 10^{-8}mB range. The switch-over between Pirani- and Penning modes is at 10^{-2}mB.
To protect the Penning gate from being contaminated when operated at pressures slightly below 10^{-2}mB during extended periods of time, e.g. during an uncontrolled dewar warm-up, the controller is duty cycling the power to the gauge taking periodical mesurements until the pressure is above 10^{-2} mB (Pirani mode) or below 10^{-4}mB (Penning mode) where the gauge is turned on continuously.

Flash Programming

All relevant operational parameters can be transferred to Flash-memory, thus keeping the setup (e.g. temperature setpoint and PID constants) also during a power down condition.
Putting the controller in menu 3 or 4 and keeping the P-button depressed for more than 5 seconds will do the job.