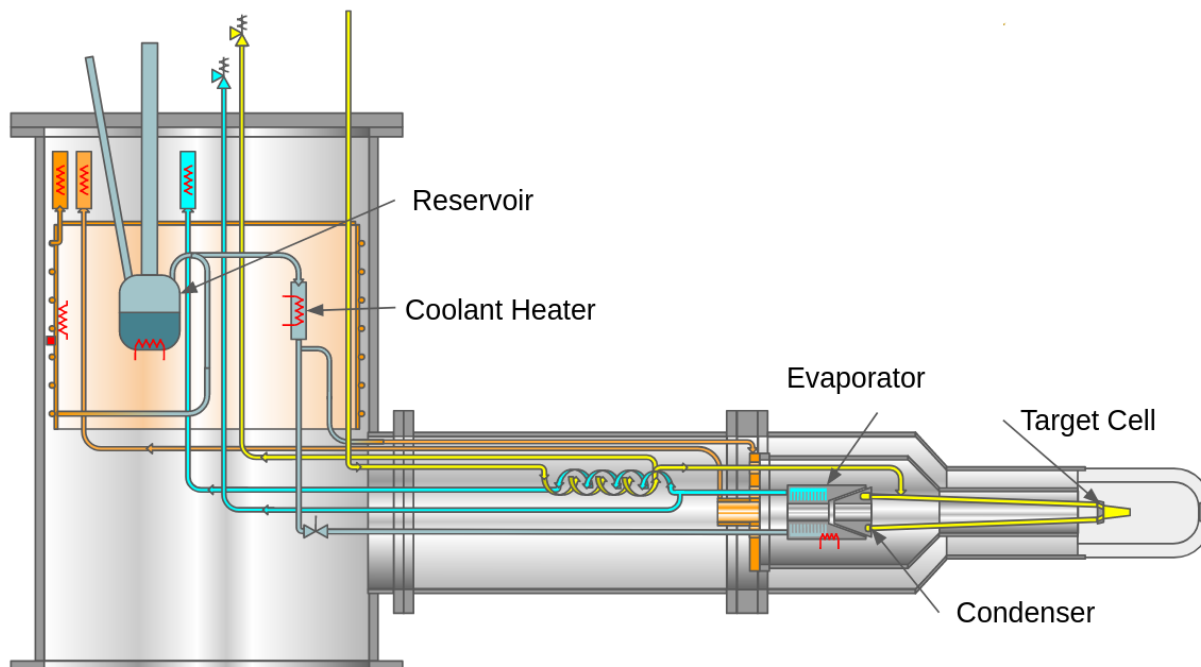


Hall B Cryotarget Controls Manual

System Overview

The Hall B Cryotarget uses liquid helium from the end station refrigerator as a coolant to liquify gases (H_2 , D_2 , 4He or 3He), filling a kapton target cell within the CLAS12 interaction region. The system consists of two primary, completely separated gas loops. The coolant loop (in blue in the figure) delivers 4 K gas boil-off from the liquid Helium reservoir through a heater to the evaporator, which is held at the desired temperature to liquify the target gas. The coolant loop also cools heat shields around the reservoir and target, and it vents back to the end station refrigerator through three exhaust paths. The target gas loop (in yellow in the figure) carries gas from the gas panel to liquify in the target condenser, which is thermally coupled to the evaporator of the coolant loop. From the condenser, target liquid leads to the target cell.

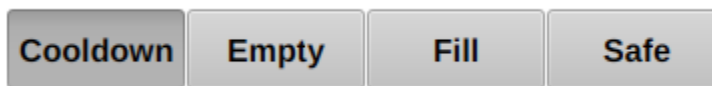


Operator Controls

The target control GUI is a frontend written in CSS Phoebus to control and monitor the target's EPICS PVs. The GUI is available to open from the Hall B EPICS menu.

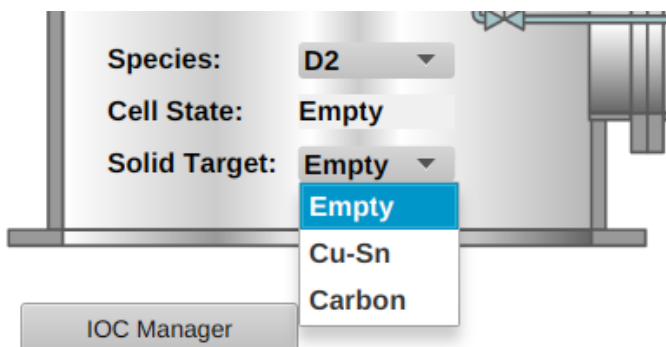
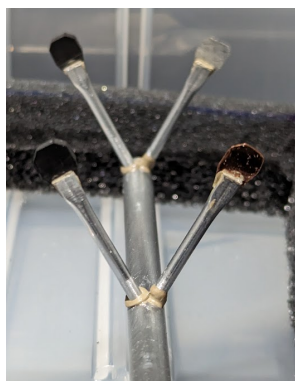
A shift worker will operate only two controls on the main panel during normal operation, the target status and the solid target flags. The large target status multiple choice buttons at top left allow the changing of state of the liquid target. Selecting one of these choices changes the exhaust flows, heaters and alarm values to set the target for the desired state. To fill the target with liquid, select the "Fill" state, and to empty it, select "Empty." The "Cooldown" state is used to

bring the target down to operating temperatures from room temperature. The “Safe” state is used to warm the target to a safe state in case of malfunction.

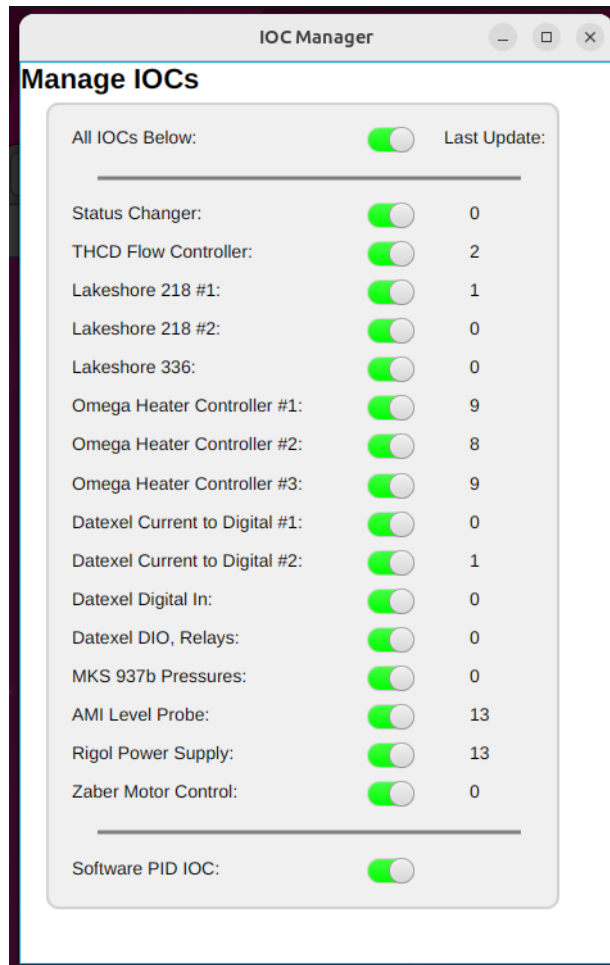


Once the state is selected, it will take some time for the target to empty or fill. The “Cell State” indicator will show the current state of the cell, and will show “Not Ready” as the state changes.

The target flags control the solid targets which are mounted on a rotating shaft downstream of the liquid target cell. By rotating the flags toward beam left, the Copper and Tin targets are brought into the beam, and by rotating right, two Carbon foils are brought into the beam. When centered, no solid target is in the beam; it is “empty.” To select one of these three options, a drop-down menu at the bottom left of the panel is used.



When first starting the IOCs, or in the event of an IOC failure, it may be necessary to operate the IOC manager panel. This is accessed using a button at the bottom left. The IOC manager panel allows the starting and stopping of any of the individual IOCs that run the target. The manager shows the status of each IOC, with an update counter showing the last time that the IOC updated a value.



Soft-IOC Backend

Every instrument in the cryotarget system is controlled over ethernet by software EPICS IOCs written in Python. To start and stop each IOC, a separate Soft-IOC is dedicated to manage them. This IOC manager creates control PVs for each instrument IOC, and runs each IOC process on the host machine in a Unix screen interface.

To start the IOC Manager, it's necessary to ssh to the host machine, poltar-ioc2 using the group account poltar. Change to the controls directory `cd btarg_controls` and run `./start.sh`. This will start a new screen, so that the IOC continues to run if you close the terminal, and run the IOC manager script. To start all the instrument IOCs, toggle on the "All IOCs Below" switch, then toggle on the "Software PID IOC."