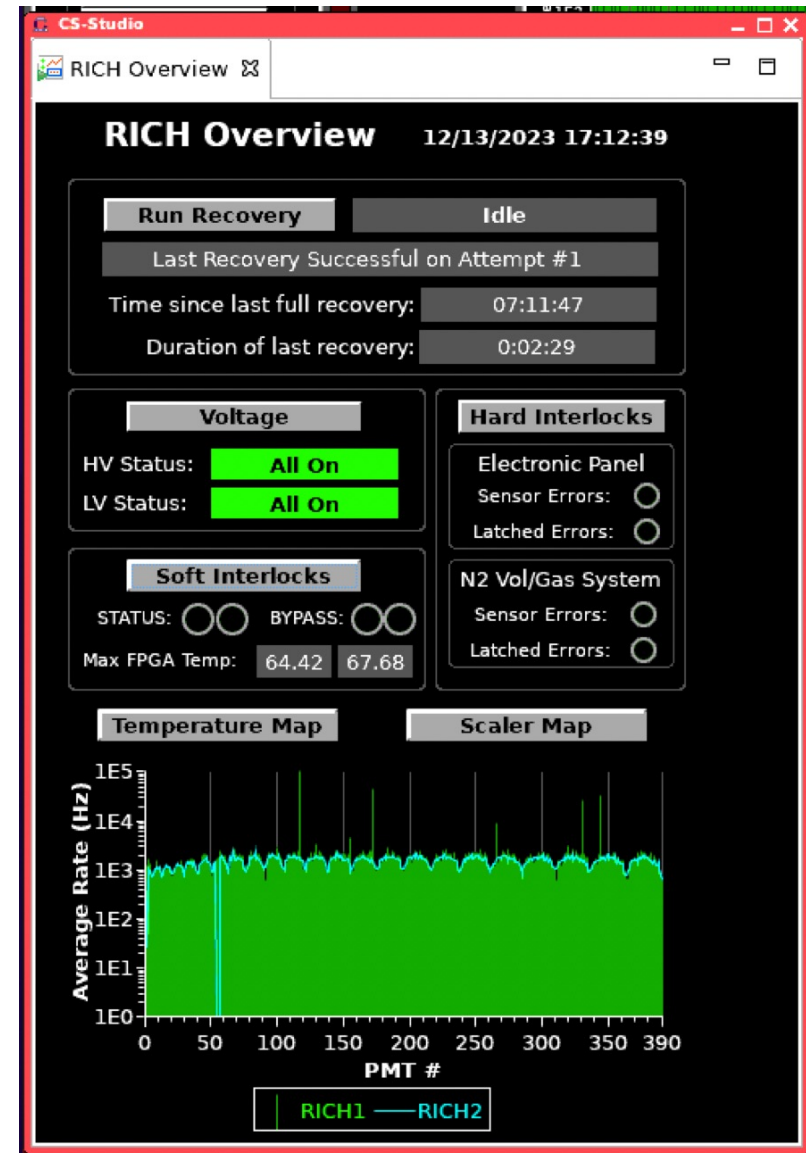


RICH Control Manual

September 20, 2021

**Do full RICH RECOVERY
every day shift between
runs and in case of missing
tiles in the temperature or
scaler plots**

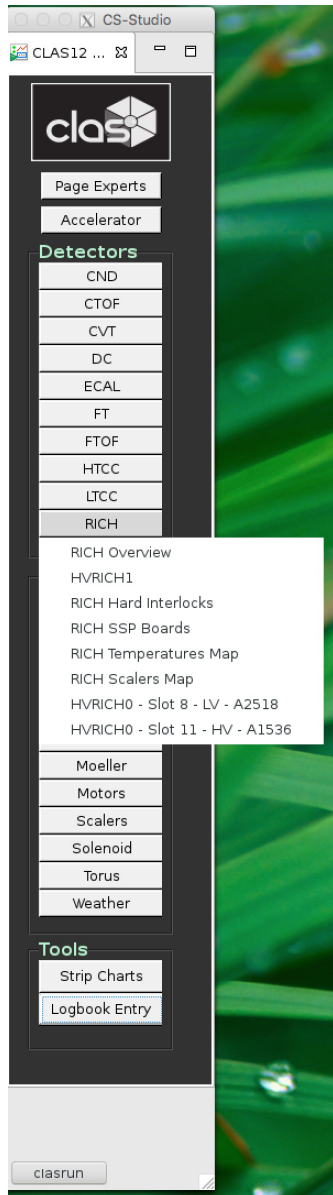
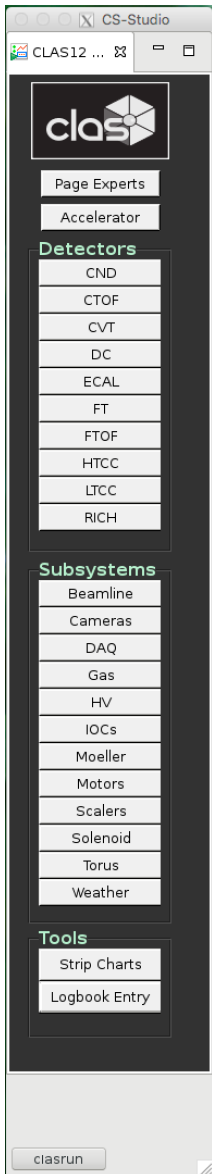
- RICH front-end is sitting in the beam of the secondary particles. The radiation damage causes the malfunction of FE . Dead tiles appear. The damage is not permanent. It can be recovered by switching LV OFF/ON.
- One click RICH recovery procedure
 1. RICH LV OFF/ON
 2. Verify the number of live tiles
 3. Repeat 1) if RICH still has dead tiles
 4. Reboot rich4
- **Start new run with CANCEL-RESET!**



RICH mainframe remote reboot

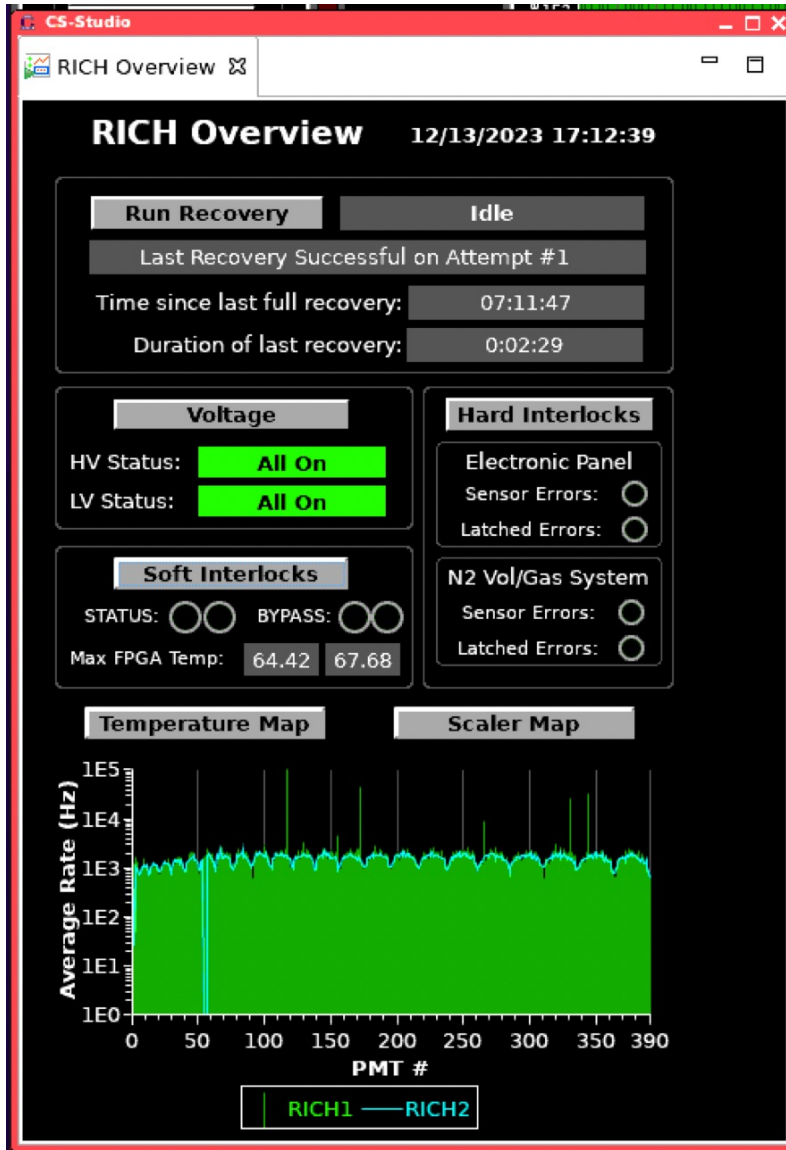
In case of communication lost with the RICH mainframe try to reboot it remotely

- To reboot only the CPU:
`caenhvReset.py --soft hvrich1`
- To power cycle the whole thing, causing all voltages to go to zero:
`caenhvReset.py --hard hvrich1`



- Press RICH on clascss menu
- Chose RICH Overview

RICH Overview



- **Voltage** control
RICH HV and LV

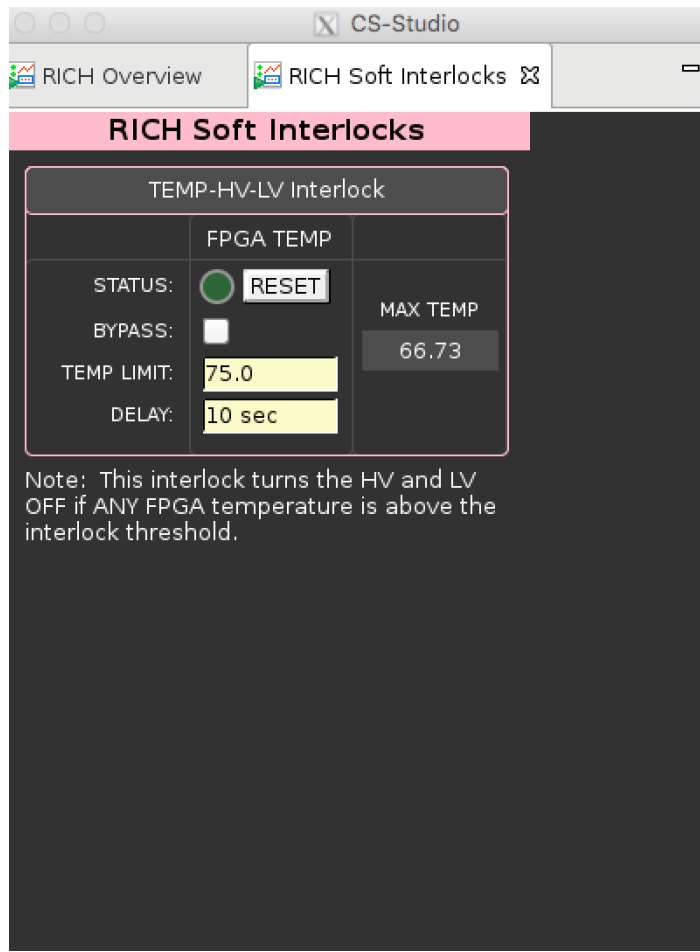
- **Temperature Map**
Shows the temperature of the RICH electronic boards

- **Scaler Map**
Presents the rate of the MAPMT pixels

- **Hard Interlock**
Control the RICH interlock

- **Soft Interlock**
Control the max temperature of the FPGA chips

Soft Interlock



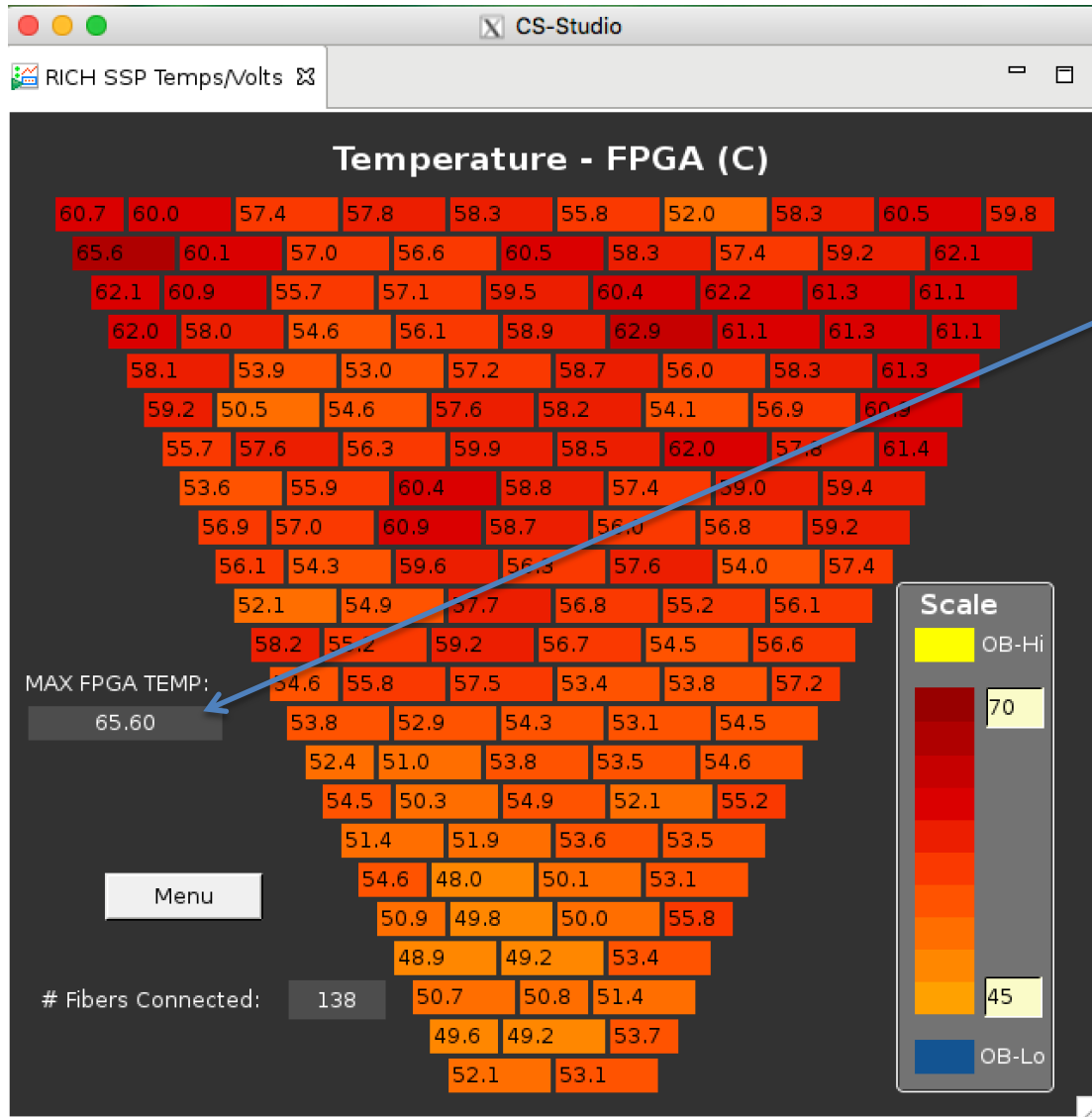
The screenshot shows the CS-Studio interface with the 'RICH Soft Interlocks' window open. The window has a pink header bar with the title 'RICH Soft Interlocks'. Below the header, there is a section titled 'TEMP-HV-LV Interlock'. This section contains a table with the following data:

	FPGA TEMP	
STATUS:	<input checked="" type="radio"/> <input type="radio"/> RESET	
BYPASS:	<input type="checkbox"/>	MAX TEMP
TEMP LIMIT:	75.0	66.73
DELAY:	10 sec	

Below the table, there is a note: 'Note: This interlock turns the HV and LV OFF if ANY FPGA temperature is above the interlock threshold.'

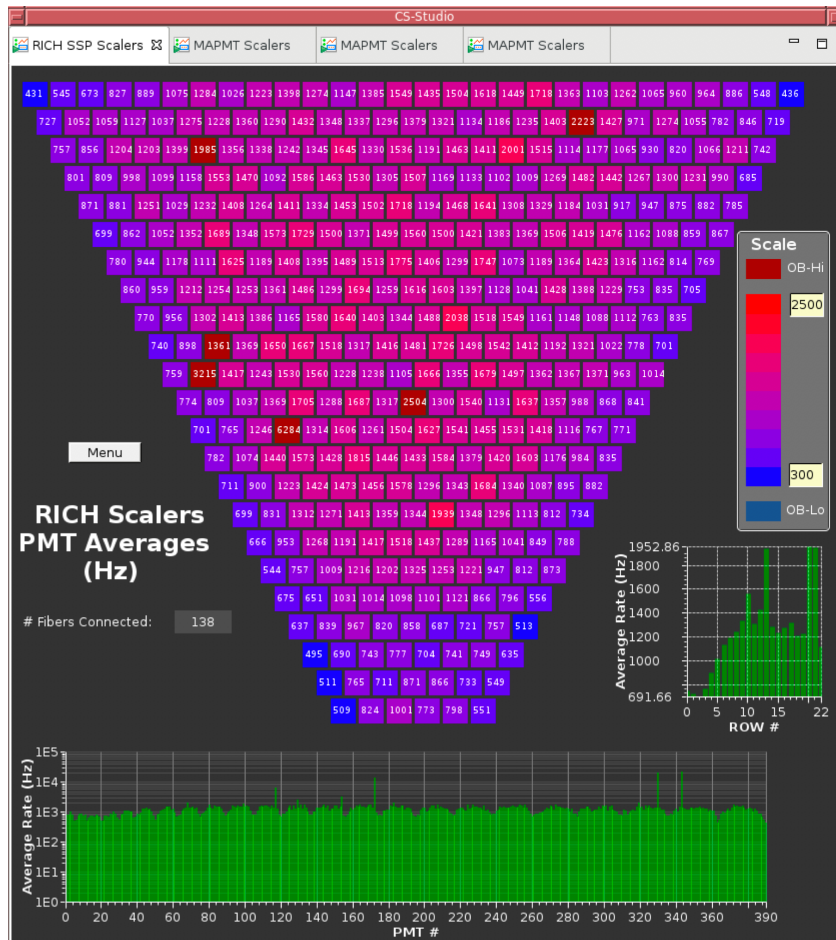
- Max temperature has to be less than 75 C
- Reset the interlock if necessary

Temperature Map

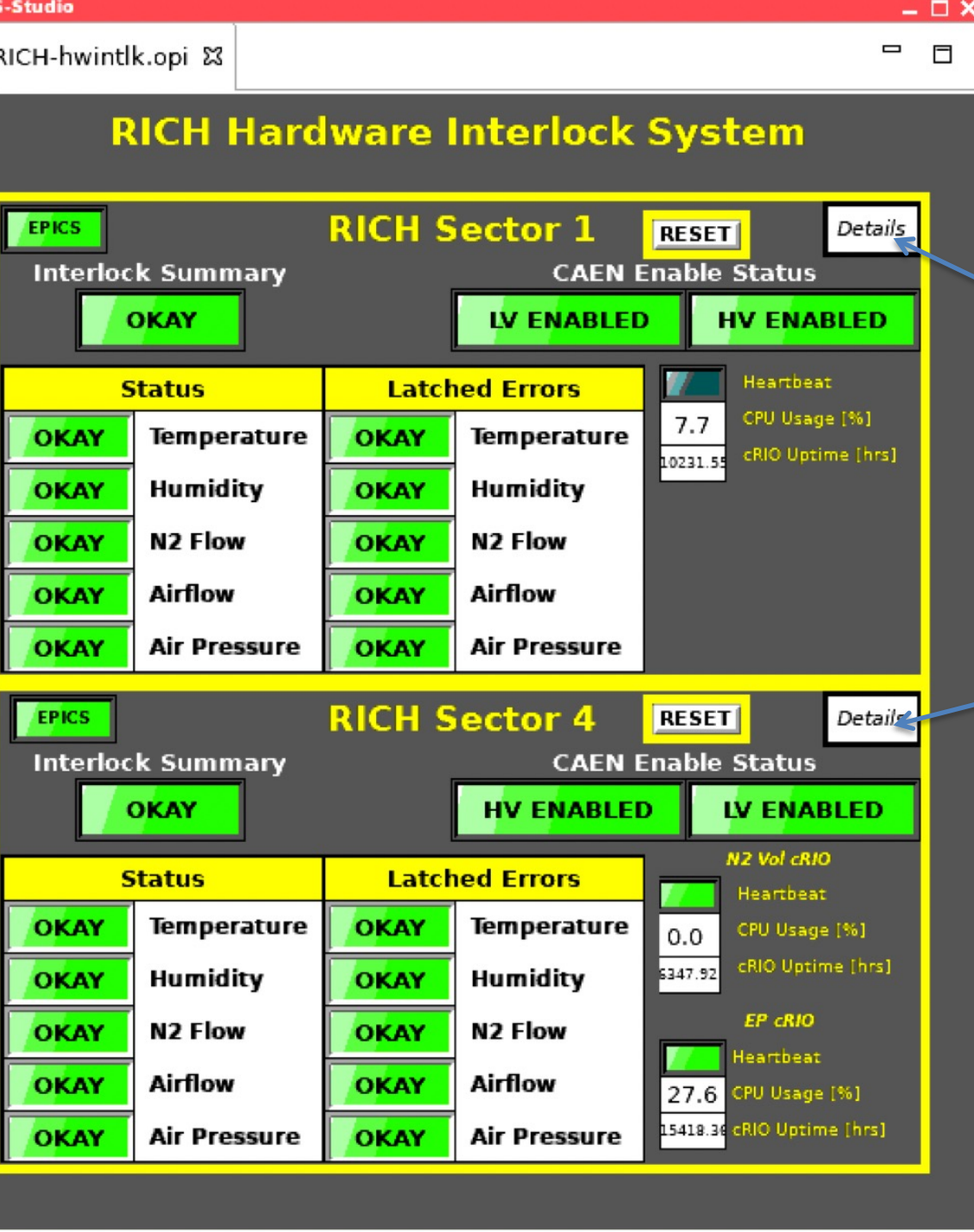


- Max temperature has to be less than 75 C
- Soft interlock switches off The RICH HV and LV if $t > 75^{\circ}\text{C}$
- All tiles have to be present except Tile 21 in sector 1

RICH scalers



- The plot presents the average rate of the MAPMT pixels
- ALL MAPMTs have to be present except Tile 21 in sector 1



- Hard Interlock controls the temperature and humidity inside the RICH detector
- Press this button to view the sector 1 panel
- Press this button to view the sector 4 panel

Electronic Volume Interlock

CS-Studio

RICH_S1_EP.opi

RICH Sector 1 Electronic Panel Interlocks

Detector Interlock Status

Any Interlock Over Limit? **OK**

RICH CAEN HV Enable Status **HV ENABLED**

RICH CAEN LV Enable Status **LV ENABLED**

Air Compressor Status **ON**

Heartbeat **ENABLED**

EPICS Control **ENABLED**

Signal Monitoring and Limit Control | Sensor Locations in RICH

Sector 1 Electronic Panel Temperature Interlocks

	Value	Status	Limit Control		Unit	Interlock Status		Latched Errors	
			High	Low		High	Low	High	Low
Temperature 1	32.94	ENABLED	45	10	°C	OK	OK	OK	OK
Temperature 2	33.03	ENABLED	45	10	°C	OK	OK	OK	OK
Temperature 3	31.90	ENABLED	45	10	°C	OK	OK	OK	OK
Temperature 4	34.17	ENABLED	45	10	°C	OK	OK	OK	OK
Temperature 5	40.04	ENABLED	46	10	°C	OK	OK	OK	OK
Temperature 6	39.94	ENABLED	46	10	°C	OK	OK	OK	OK
Temperature 7	35.58	ENABLED	45	10	°C	OK	OK	OK	OK
Temperature 8	35.52	ENABLED	45	10	°C	OK	OK	OK	OK
Temperature 9	39.02	ENABLED	45	10	°C	OK	OK	OK	OK
Temperature 10	38.93	ENABLED	45	10	°C	OK	OK	OK	OK
Temperature 11	40.27	ENABLED	47	10	°C	OK	OK	OK	OK
Temperature 12	40.16	ENABLED	47	10	°C	OK	OK	OK	OK
Temperature 13	38.15	ENABLED	45	10	°C	OK	OK	OK	OK
Temperature 14	38.24	ENABLED	45	10	°C	OK	OK	OK	OK
Temperature 15	25.34	ENABLED	45	10	°C	OK	OK	OK	OK
Temperature 16	25.54	ENABLED	45	10	°C	OK	OK	OK	OK

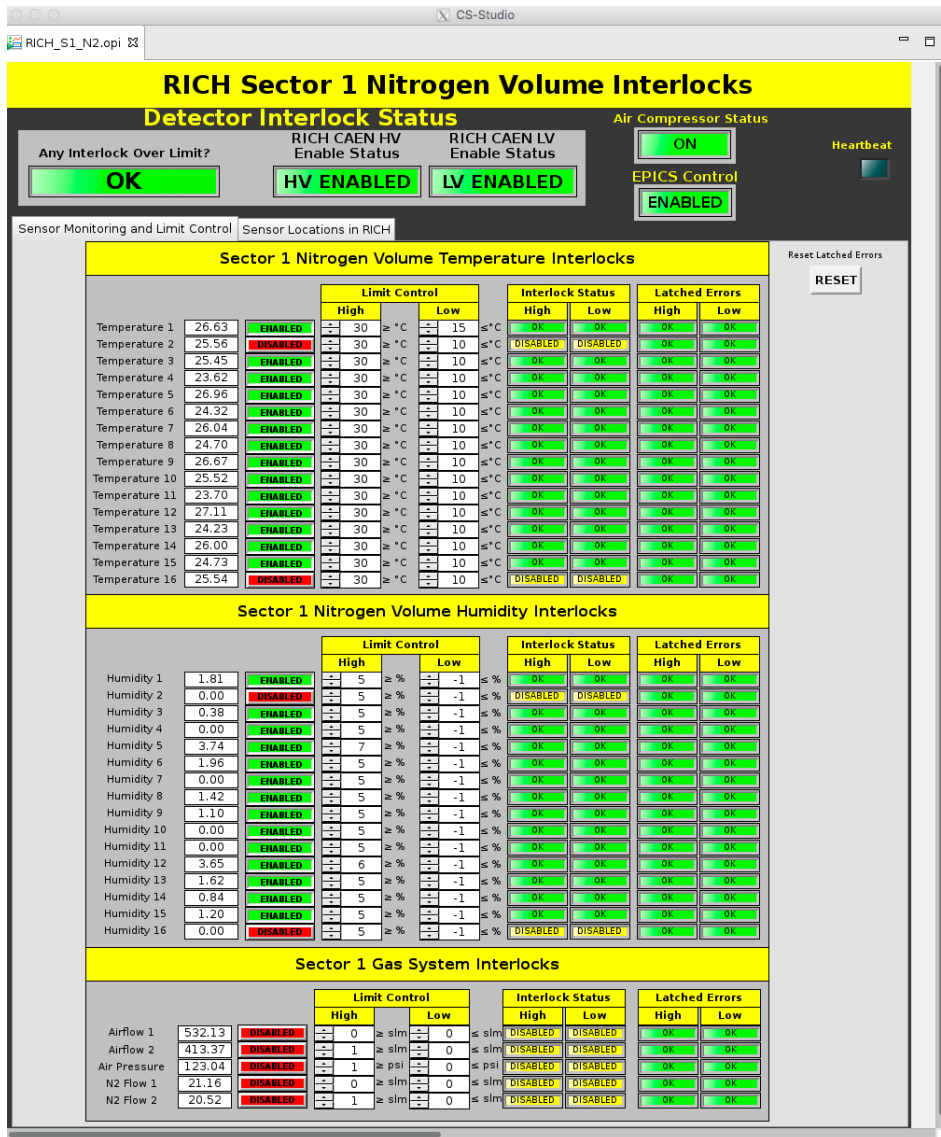
Sector 1 Electronic Panel Humidity Interlocks

	Value	Status	Limit Control		Unit	Interlock Status		Latched Errors	
			High	Low		High	Low	High	Low
Humidity 1	20.92	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 2	21.00	DISABLED	50	0	%	DISABLED	DISABLED	OK	OK
Humidity 3	19.54	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 4	0.00	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 5	0.03	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 6	0.10	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 7	0.44	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 8	0.41	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 9	0.30	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 10	0.22	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 11	0.31	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 12	0.36	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 13	0.11	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 14	0.09	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 15	0.00	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK
Humidity 16	32.69	DISABLED	0	0	%	DISABLED	DISABLED	OK	OK

Reset Latched Errors **RESET**

Check the temperature and humidity

Nitrogen Volume Interlock



Check the temperature and humidity