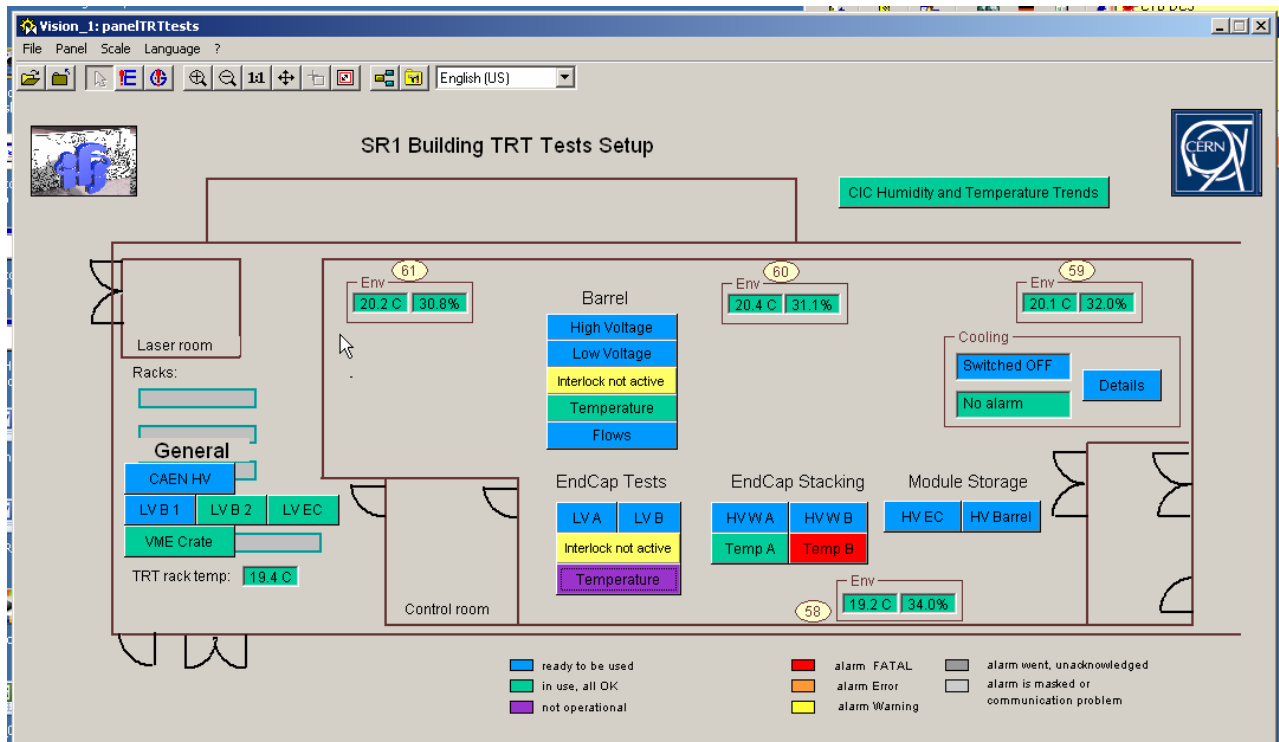


Modifications of DCS software in the SR1 building

2 main steps were done during last 3 weeks:

1. changes in the main test panel view, high voltage test panel and temperature panel accordingly to needs;
2. implementation of new hardware (2 bulk PL500 low voltage power supplies and temperature monitoring).

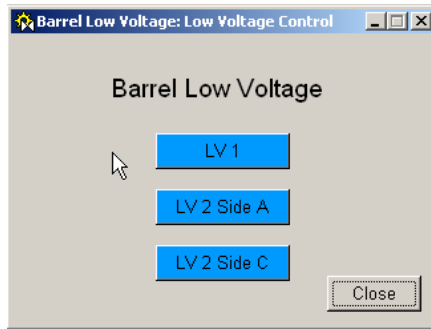
1. Main panel view:



Changes:

1. Test place 'System Tests' has been removed.
2. Test place 'EndCap Stacking':
 - a. button **Low Voltage** has been removed;
 - b. as the hardware for temperature monitoring (temperature motherboard and ELMB) has been moved close to the Wheel A, and the previous one is situated close to the Wheel B, the new temperature button **Temp A** has been added, and the previous **Temperature** has been renamed to: **Temp B**.
3. Test place 'EndCap Tests':
 - a. 2 new buttons: LV A and LV B allow controls of the EndCap PL500 low voltage power supply.

- b. Interlock monitor button – here in yellow – has been added – after pressing it, state of possible interlocks is shown (more detailed description – further in the text).
4. Test place ‘Barrel’:
- a. **Low Voltage** button allows now control of 2 bulk PL500 power supplies: first (old one with 3 voltage channels) and second – with 8 voltage channels which are split into two independent sets:



- b. Interlock monitor button.

Low Voltage panels

3 bulk low voltage power supplies PL500 are now available:

1. Barrel 1 LV power supply (3 channels 8.5 V/ 64 A);
2. Barrel 2 LV power supply (8 channels 7.0 V/30 A) - split into to sets:
 - a. 4 channels for LV2 Side A
 - b. 4 channels for LV2 Side C
3. EndCap power supply (8 channels 7.0 V/30 A) - split into to sets:
 - a. 4 channels for LV A
 - b. 4 channels for LV B

Detailed layout of low voltage channels is placed in EDMS:

https://edms.cern.ch/file/455270/1/LV_layout.pdf

8 channels of bulk PL500 #2 and #3 power supplies has been split into 2 *almost* independent sets of four channels.

Voltages in each set can be put on/off independently of the other one. This is done in the following way:

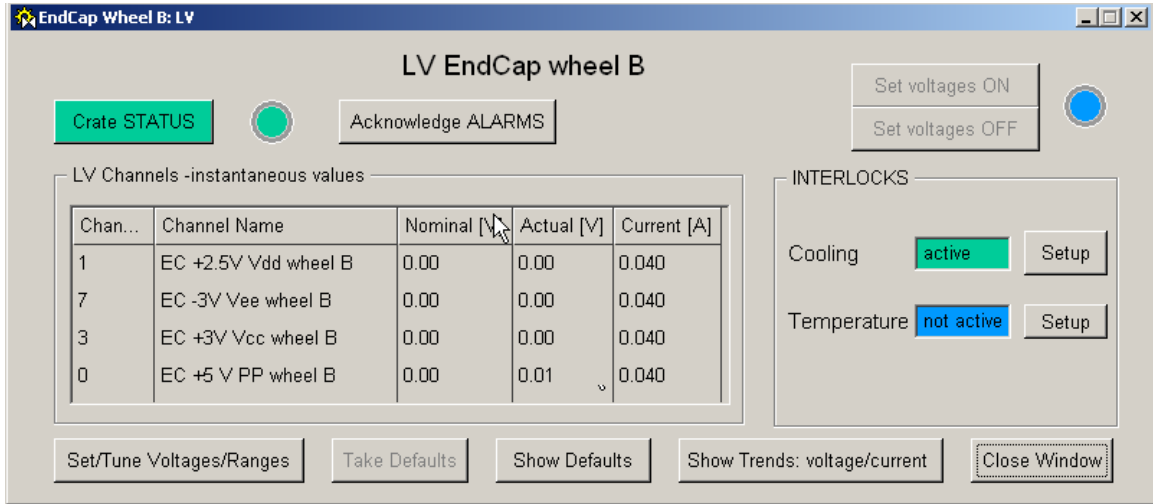
- putting voltages on means setting the level of the voltage set points to nominal levels;
- putting voltages off means setting the level of the voltage set points to 0.

The PL500 crate itself should always remain SWITCHED ON.

If somebody switches the crate off – voltages in both sets will be immediately off also.

The same situation occurs, when PL500 crate trips in case of error. This is why I said that these 2 sets are almost independent.

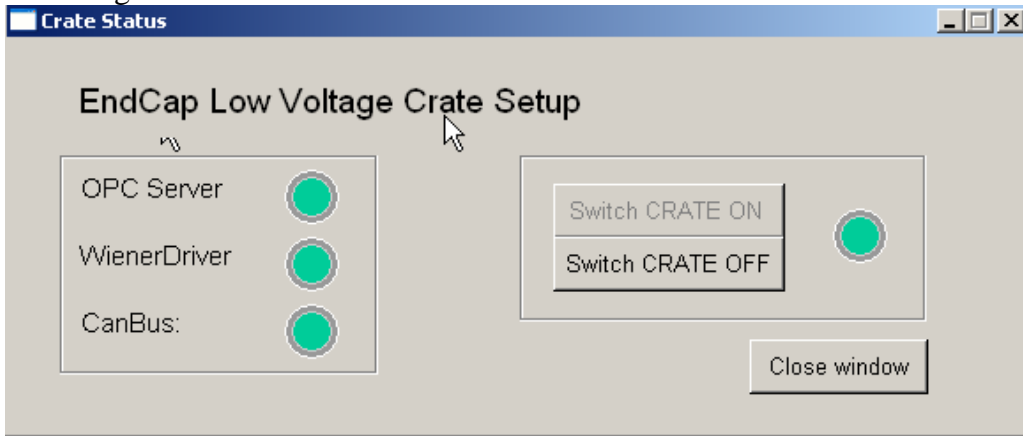
After pressing buttons LV A or LV B or LV2 Side A or LV 2 Side C the following window appears:



Crate Status button:

its background color represents state of the Low Voltage system (PL500 crate + control):
 green – crate is ON, without error;
 blue - crate is switched OFF, without error;
 yellow or orange or red – error occurred (color represents gradation of severity).
 grey – communication problems.

by pressing this button a window, when more information is displayed and buttons for switching the crate ON/OFF are available:



The components of PL500 control are shown in the left side of the window: OPC Server, Wiener Driver and state of CAN bus – if a circle to the right of each of them is green – it means no error.

On the right side of the window there are 2 buttons (Switch CRATE ON and Switch CRATE OFF) and a circle – its color represents status of the crate.

Set/Tune Voltages/Ranges button:

allows to set/change nominal voltages' levels, and also, only when a crate is switched off, change voltage and current limits (this is action should be done with care).

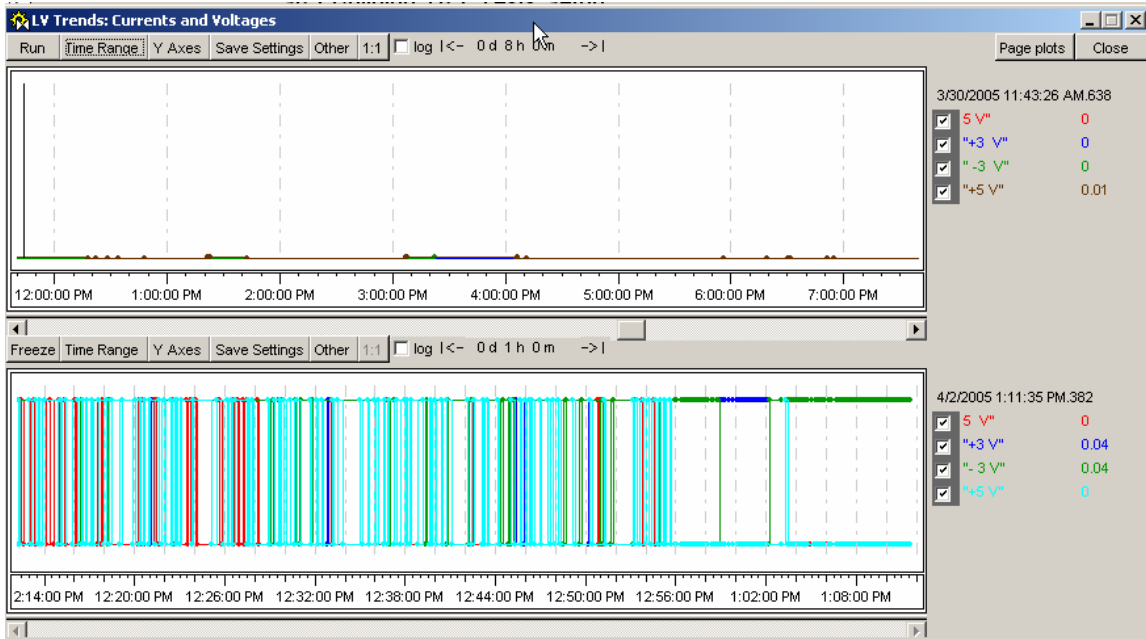
Channel	Value [V]	Fine Adjustment	Current Limit [A]	Overcurrent [A]	Undervoltage [V]	Overvolt PROT [V]	Overvolt CMP [V]
EC +2.5V Vdd wheel B	0.00	-128	18.000	18.000	0.00	7.00	7.35
EC -3V Vee wheel B	0.00	-128	18.000	18.000	0.00	7.00	7.35
EC +3V Vcc wheel B	0.00	-128	20.000	20.000	0.00	7.00	7.35
EC +5 V PP wheel B	0.00	-128	7.000	8.000	0.00	9.00	9.00

The **Store settings to defaults** button allows to store tuned values as nominal ones (defaults).

Take defaults button:

set nominal values of voltages, when voltages are ON (this action can be performed after somebody tuned voltages – so changed their levels – and want to go back to nominal without switching off).

Show Trends: voltage/current button:
trends of all channels in one set are displayed:



Interlocks

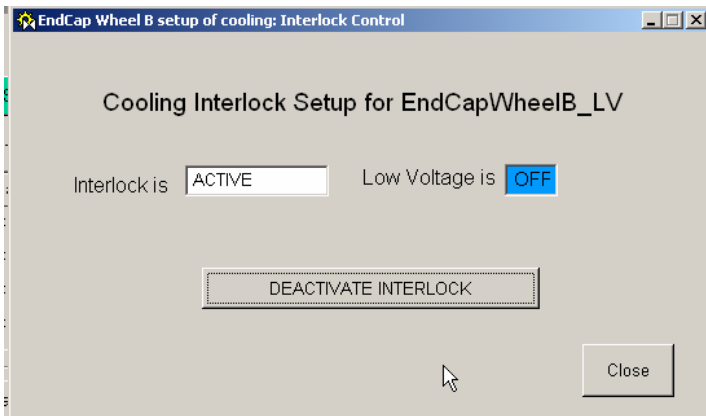
Interlocks for low voltage are activated/deactivated on the low voltage panel. On the right side of the panel there is a field 'INTERLOCKS', where interlock components are shown:

in EndCap these are Cooling and Temperature

in Barrel: Cooling, Temperature and Flows.

Each interlock can be activated/deactivated individually by pressing **Setup** button.

The following window appears (this is an example for EndCap Wheel B Cooling):



The information of interlock status (ACTIVE or NOT ACTIVE) is shown, together with information, whether low voltage is ON or OFF.

By pressing the button below (here: DEACTIVATE INTERLOCK) one can activate interlock.

If the interlock is active, the text on the button changes to: ACTIVATE INTRELOCK, and, by pressing it – one can activate interlock.

No action is allowed, when low voltage is ON.

If interlock is active, then the text on the right of 'Cooling' or 'Temperature' or 'Flows' in the INTERLOCKS field of the Low Voltage panel is set to: 'active' and its background color becomes green.

If interlock is not active -> the text is set to: 'not active' and its background color becomes yellow (state attention).

There is a possibility to view interlock states from the main panel:

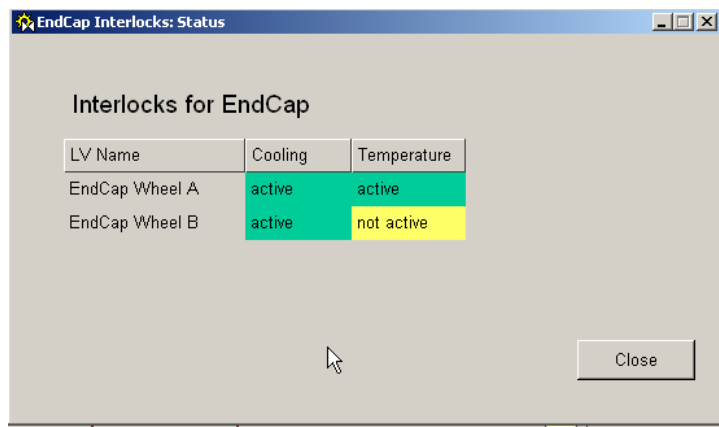
in test places "Barrel" and "EndCap Tests" there is a button, which represents state of low voltage interlocks:

if all interlocks are active – the background color becomes green and the text on the button is: 'Interlocks Active'.

if any of the interlocks is not active – the background color becomes yellow (state attention) and the text is: 'Interlock not active'.

By pressing this button, the following overview is given:

EndCap:

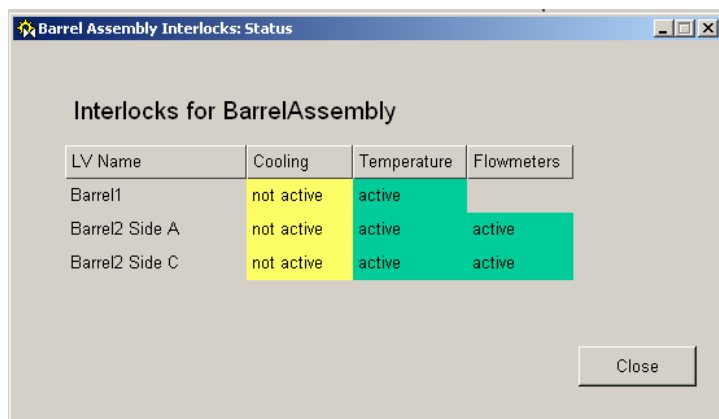


The screenshot shows a window titled "EndCap Interlocks: Status". It contains a table with the following data:

LV Name	Cooling	Temperature
EndCap Wheel A	active	active
EndCap Wheel B	active	not active

A "Close" button is located at the bottom right of the window.

Barrel:



The screenshot shows a window titled "Barrel Assembly Interlocks: Status". It contains a table with the following data:

LV Name	Cooling	Temperature	Flowmeters
Barrel1	not active	active	
Barrel2 Side A	not active	active	active
Barrel2 Side C	not active	active	active

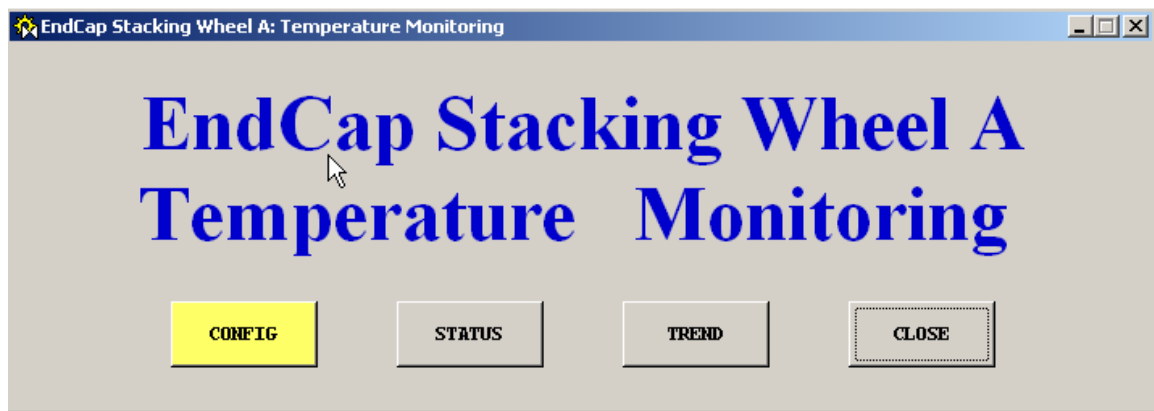
A "Close" button is located at the bottom right of the window.

Temperature part

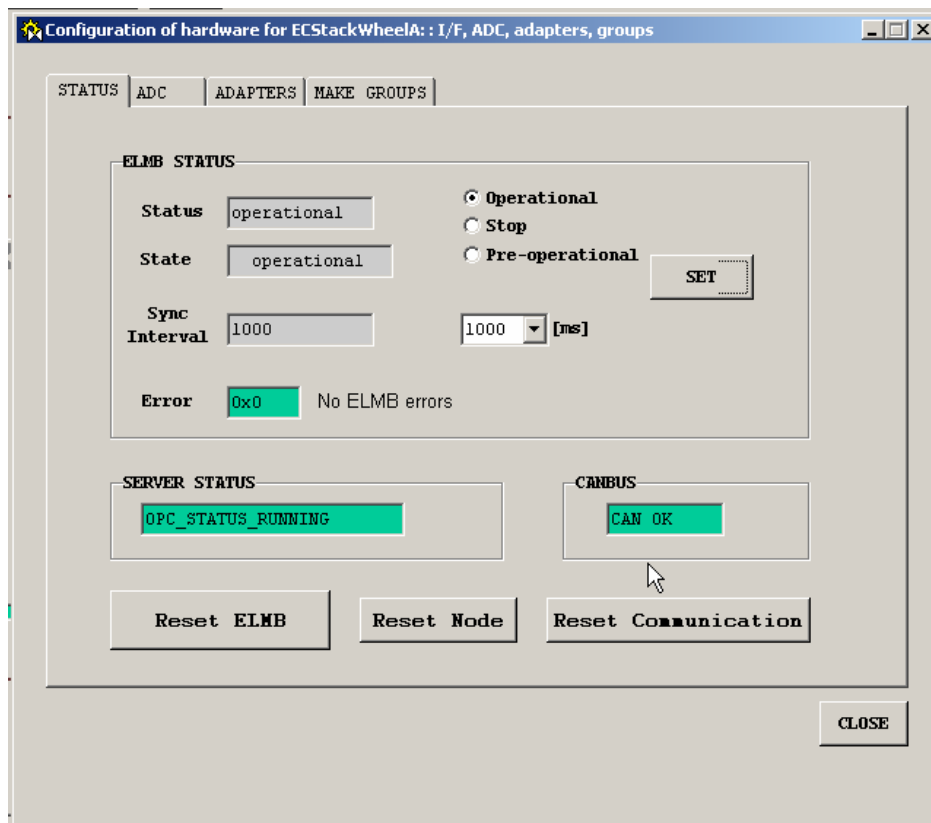
A small modification has been implemented on the temperature panels. This modification shows the status of ELMB (error or good conditions) and allows for resetting it.

If there is any problem with the ELMB, the color of “CONFIG” button in the temperature window becomes:

- yellow – ELMB error or CAN bus error
- orange – OPC server does not work.



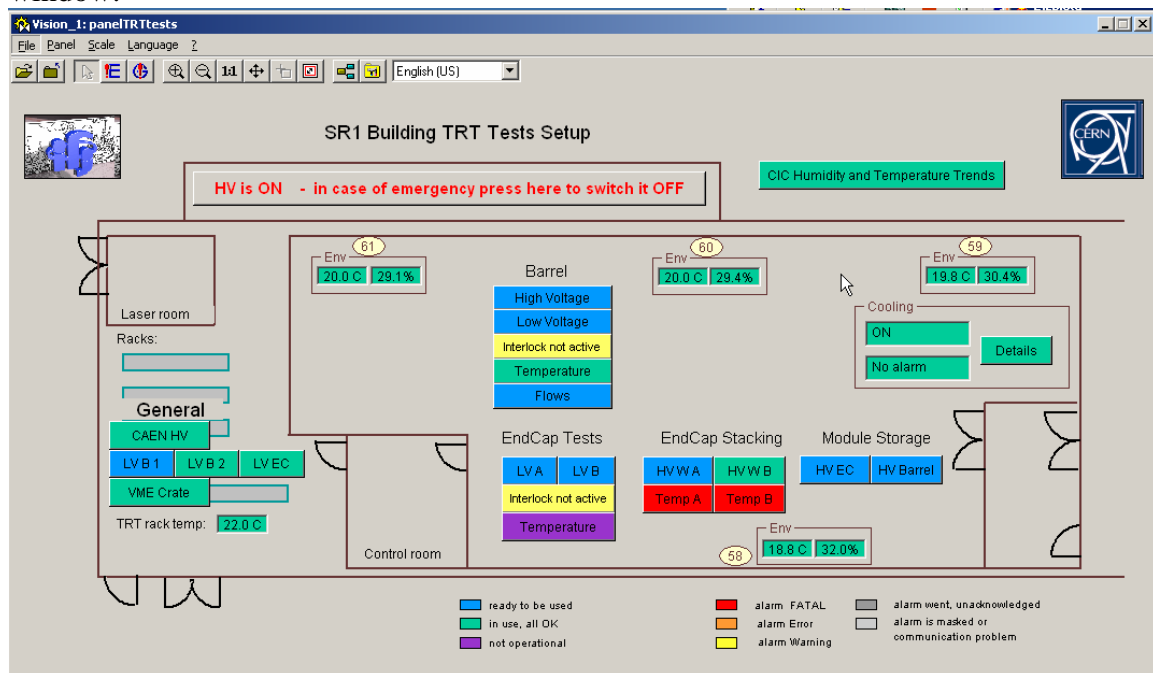
By pressing the CONFIG button, the following window is opened:



High Voltage modifications

1. A possibility of fast emergency switching off of the high voltage

If the high voltage is on in any channel, the following information is shown on the main window:



There is a possibility of emergency switching off of the high voltage in all SR1:



Also on the High Voltage test panel itself, when the high voltage is on – the button appears – by pressing it one can switch off all high voltage in a board.

2. Retrieving of the high voltage test in case of interruption.

The high voltage test can be started for any amount of time – a user can choose a limited or unlimited period. While test is running, data can be stored (if such option was chosen). After test is finished (on a user request or after test time is elapsed), high voltage is set off and all data is stored.

A retrieving procedure has been implemented, in case of any interruption in the system (both in the master PC, which is pcatlastrt02 in the SR1 control room or in any of PCs in the Clean Room).

After PVSS program is restarted on a PC, a check is done, whether HV program was running before crash on that PC. If yes, the HV Test panel is automatically opened. If test time is already elapsed, a test is stopped, and a user is given information about it. If test time is not elapsed yet or an unlimited period was chosen, a user receives an information window, that test was successfully retrieved. A user can stop test or continue it.