Detector Control System for 2008 run

DCS phones: 164872, 77076

1 PCs identification

The DCS uses one main Linux PC:

- **pccompass07**, located in the control room.

3 other Linux PCs are used for front-ends (CAEN control using SLiC/DIM):

- **pclip05** (DCS & Saclay barrack),
- **pclip010** (Trigger barrack),
- **pclip09** (RICH barrack).

3 other Windows PCs are used for front-ends (all controls from OPC servers):

- **pccompass03**,
- **pccompass06**,
- **pccompass08**,

all located in the DCS & Saclay barrack.

pccompass07 and the 3 Windows PCs are connected to **UPS units**. In case of **power cut**, these units start powering the PCs, while producing a "bip" sound. Automatic procedure of stopping PVSS and safe shutdown of the PCs occurs in the following minutes. DCS experts should be called when the power is back, to restart the PCs and the DCS project.

2 PCs Accounts

All the DCS PCs are in the **COMPASS domain**. To access them from outside, one must login first in the gateway (**pccogw01** and **pccogw02**), using the personal lxplus usernames/passwords. Each computer is then accessible via ssh, using the accounts given below.

The main PC pccompass07 has 3 local accounts:

- **dcs** (for use of all COMPASS members – for DCS visualization, detector experts access, etc). Password is the old "onl" password.
- **compassdcs** (for exclusive use of the DCS group – for project development only).
- **root** (for exclusive use of the DCS group – for system maintenance only).

A session on the **dcs** account is to be opened at all times in **pccompass07** for use of the shift crew during the Run.

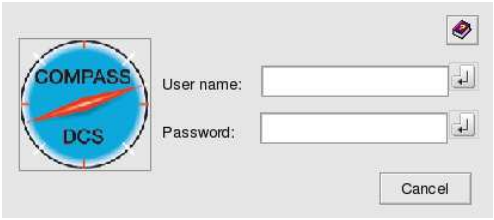
Front-ends Linux PCs for SLiC have only one local account **root**. These are for usage of the DCS group only.

Front-ends Windows PCs for OPC have 1 local account with administration rights: **compassdcs**. This is for usage of the DCS group only.

3 DCS project visualization

The DCS project is running in the main computer **pccompass07**. During Run, a **dcs login session** (with old onl password) must be always opened, and the PVSS **User Interface** (UI) must be running.

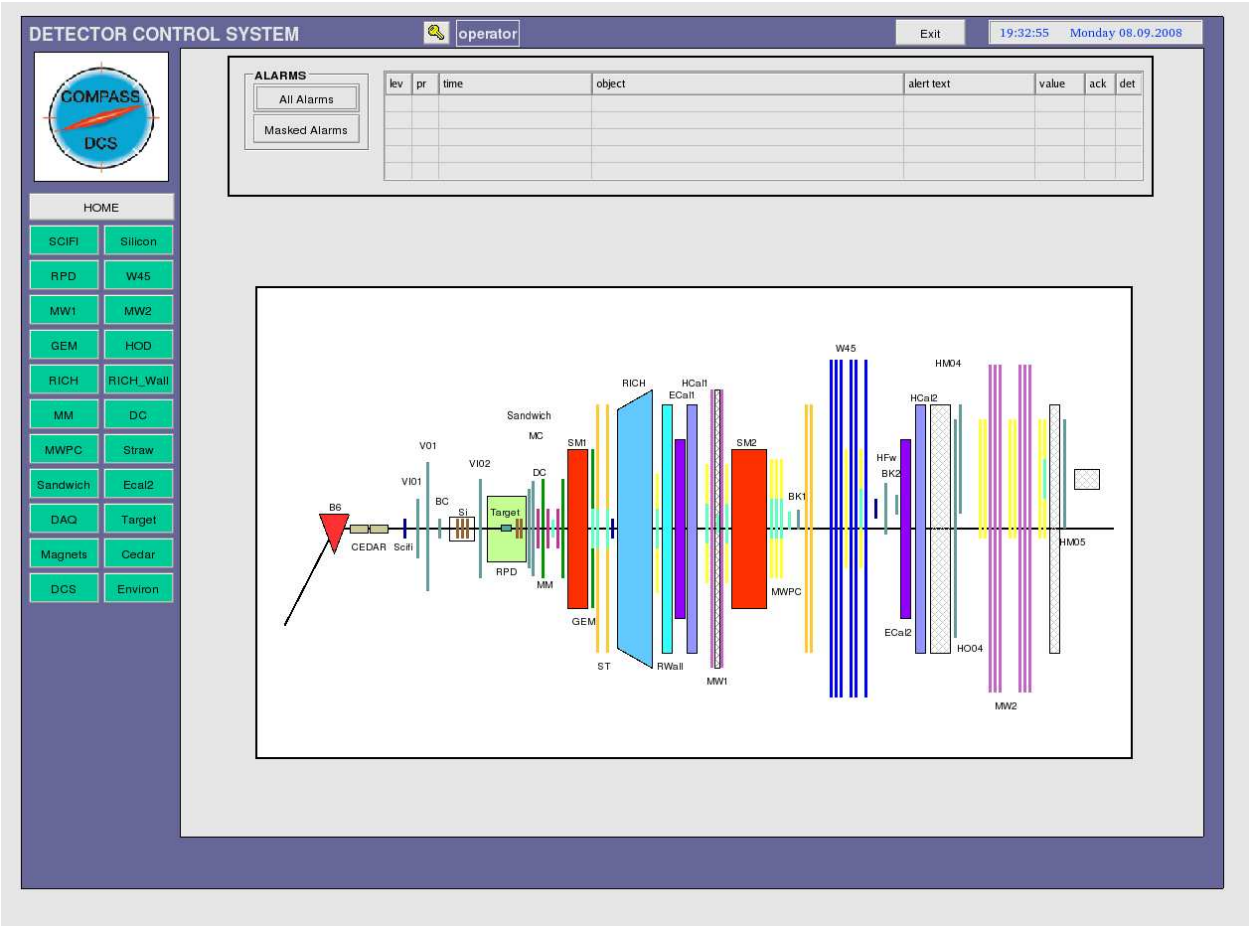
If you don't see any UI window opened (and it is not minimized – check in the horizontal menu bar, on the bottom of the screen), start it from a terminal window, by typing in the prompt:
>**dcsUI**.
A PVSS login window should open. Choose
Username: **operator** [press return key] Password: [**EMPTY**] [press return key]
The entrance panel of the DCS project opens.



If the login panel does not open when typing "dcsUI":

- Check first if PVSS is running, by typing in the prompt of a terminal window:
  >**ps -ef | grep PVSS**
  There should be as answer a long list of PVSS processes running, like: PVSS00data, PVSS00event, PVSS00ctrl, PVSS00valarch, etc.
- If at least the above mentioned processes are not shown, it means that the DCS project was stopped, and no equipments are being controlled anymore.
- Call a DCS expert: **#164872**. Project restart must be done by a DCS expert only.

4 DCS Entrance Panel



The UI opens with the main COMPASS control panel.

On the top center, the UI ownership is shown – usually it is "**operator**". Click the yellow key to change UI ownership (for example if you are a detector expert and want to change settings). If this area is showing "NO USER" in red, click the key and login to regain "operator" ownership.

On the top right there is an "**EXIT**" button. Use it to close the UI – then, restart the UI with the command "dcsUI" from the prompt of a terminal window. The DCS UI panel should be opened at all times in pccompass07.

On the left there are buttons to access the detectors information. The color of these buttons is inherited from the equipments belonging to these detectors

that are controlled/monitored by the DCS. The color code is as follows:

- GREEN: all OK
- ORANGE: some alert is present
- RED: Some fatal alert is present
- DARK GREY: an alert has come, but state went back to normal again. The Grey color is displayed until a user **"acknowledges"** the alert.
- LIGHT GREY: no alert is defined, or exists but was masked.

On the center top there is the **alerts panel**. It shows the most recent 6 alerts in the system. If more than 6 alerts are active at the moment (which is probable), they can be viewed in detail from the **All alarms** button: "All alarms": choose "Time range: Current" and check that "filter" has "alert state: All" and "Dpe filter: *" selected. The **Masked Alarms** button opens a list of all the alarms that are presently masked in the system (thus, if one of these will be in alert state, it will not show up as in the detector buttons color, or as a line in the alerts panel).

The **!!!** in some lines of the alerts panel indicates that this alert is waiting for **acknowledgement**. The shift crew can do it by clicking on it. This should be done after evaluation of the cause of alert and report to the expert of the corresponding detector (if judged necessary).

The center area of the Entrance Panel shows the current detector selection. Use the **home** button on the left to go back to the spectrometer view in the central area of the panel.

5 Alert handling

Alerts are displayed as a **color**, and also as a "**cuckoo**" **sound** (sound only in the control room).

In general, fatal alerts are displayed in red color, and require human intervention. This is the case for HV channels trips, RICH vessel alerts, and DCS computers and/or managers stopped.

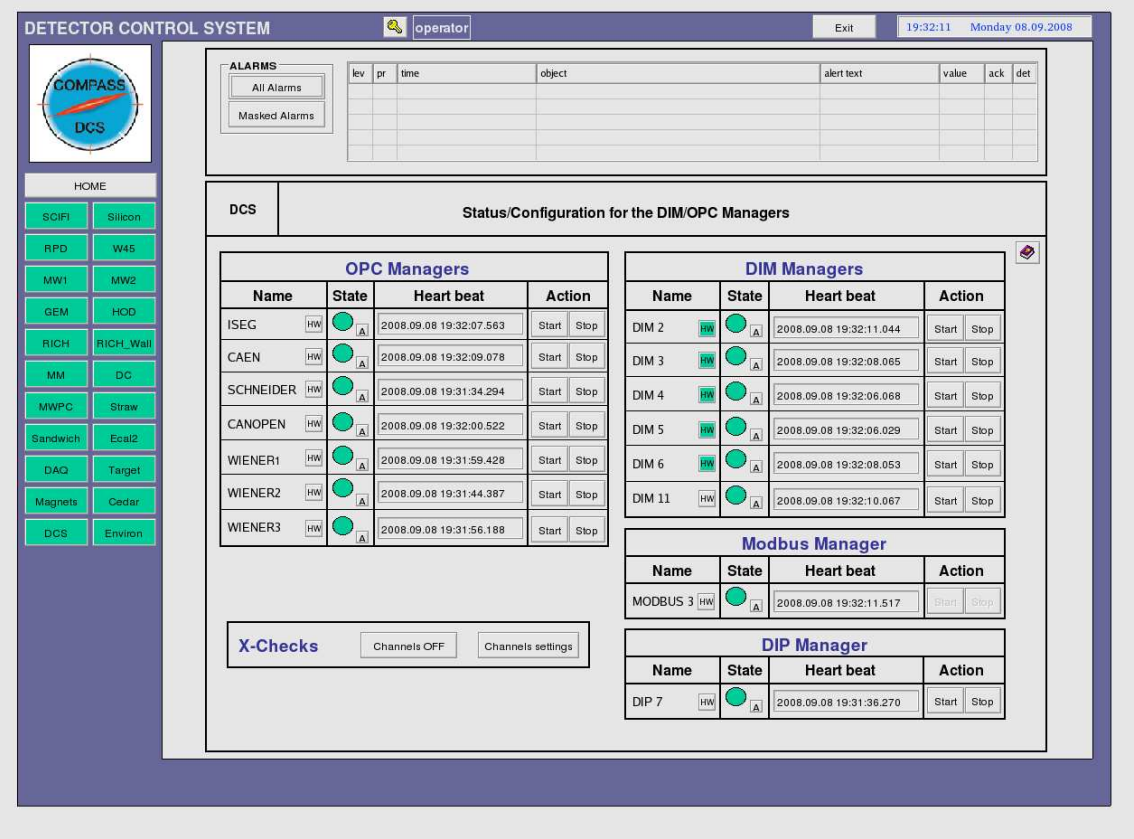
Gas system alerts and RICH vessel alerts also send **sms messages** to detector experts.

Some alerts require "**acknowledgement**", meaning that even if the alert state condition is no longer present, the alert will remain as grey color, until acknowledged. This is the case for Gas system alerts. Acknowledgement can be done either from the alerts panel, by clicking in the !!! marks; or from the specific detector subsystem panel, by clicking the "**A**" button (sometimes also called "**Action**" button), and selecting "Acknowledge".

Masking is used to avoid too many alerts being displayed at the same time, a situation that can distract the shift crew from new important alerts. Alerts can be masked, by clicking the "**A**" button (also called "**Action**" button), and selecting "**mask**". Unmasking can the done with the same process. Only the shift crew or detector expert should mask alerts, if the alert reason is already known and is being taken care. A button "Masked alarms" in the Entrance Panel can be used to view and print the list of currently masked items – this list should be printed twice per shift.

In case a new alert has come but no "**cuckoo**" sound was produced, this can be due to another alert of the same type for the same detector subsystem being already present (this situation is then a normal behaviour). If this is not the case, check that the **loud speakers** are ON. If they are ON, go to the "main menu" (left bottom corner of the screen), select "Sound and Video", then "Volume Control", and check that "vol" and "speaker" are not at the minimum.

6 DCS panel



The DCS panel, accessible by clicking the "DCS" button on the left, shows the state of the servers used for monitoring/control of equipments (GREEN: running; RED: stopped). "**Start/Stop**" buttons can be used by the shift crew to restart managers that stopped for some reason. One should wait a few minutes until the manager is restarted and the bullet turns GREEN. If it does not work, call a DCS expert (**#164872**).

The correspondence between managers and equipments they control is:

- OPC Managers
  - ISEG: Straws HV and Silicons HV (@pccompass03)
  - CAEN: RICH PMTs HV (@pccompass03)
  - SCHNEIDER: All detectors Gas Systems and RICH vessel pressure (@pccompass06, from PLCs 1, 2 and 3)

  - CANOPEN: detectors and environment temperatures and humidities, magnets fields(B6 and SM1), LV of MW1, MW2, W45 and MWPC (@pccompass08, from ELMbs)
  - WIENER1: DAQ VME Crates (@pccompass08)
  - WIENER2: RICH LV (@pccompass06)
  - WIENER3: Straws (@pccompass03)
- DIM Servers
  - DIM2: Trigger, Veto (HOD) and RPD HV (@pclip07)
  - DIM3: SciFis 5, 8 (Germany) HV; MW2 HV; MWPC 7 to 11 HV (@pclip010)
  - DIM4: GEMs 5 to 11 HV, LV and Centre voltages; PixelGems HV; W45 HV; MWPC 1 to 6 HV; MW1 HV (@pclip05)
  - DIM5: GEMs 1 to 4 HV, LV and Centre voltages; Silicon LV; SciFi 1 HV; RICH Wall HV (@pclip09)
  - DIM6: RICH PDs HV (@pclip09)
  - DIM11: DAQ racks temperatures
- MODBUS/TCP server: Silicon cryogenics
- DIP 7 server: CEDARs data

At the bottom of the DCS Panel, there is an area for "**Cross-checks**". A button **OFF Channels** is available, to provide the list of all the CAEN and ISEG HV and LV channels that are presently OFF, as well as the Wiener crates that are OFF.

There is also a button **Channels Settings**, to compare the settings from reference files and the readback values of settings from hardware. Only items with differences greater than some percentage (limits are shown in the panel) are displayed.

7 HV Systems

The DCS for HV systems of each detector provides tables with the set voltage (**v0**), monitored voltage (**vMon**), monitored current (**iMon**), ON/OFF state (**isOn**) and hardware alarms (**HwAlarms**) for channels in the group. The 2 last columns have alerts defined. **isOn** displays GREEN color if the requested state equals the readback state from the channel; it displays ORANGE color otherwise. The **HwAlarms** is a summary of the possible hardware alarms for HV channels: OverVoltage, OverCurrent, UnderVoltage and Trip (all displayed in ORANGE, except for trip, displayed in RED).

Note: For Straws HV and Silicons HV (ISEG equipments), the "isOn" column shows always the ORANGE color when the channels are switched OFF. 2 additional columns are displayed in the table: the maximum allowed voltage of the channel (**vMax**) and the current trip limit (**i0**).

If a channel trips, one will see the alarm in the "isOn" column (requested state $\neq$ readback state); and usually also the "Trip" information in the "HwAlarms" column. In this case, the channel must be ramped up by a shift crew action.

The **PURPLE color** in the "v0", "vMon" and "iMon" columns of the table means the reading of the item from the hardware was not succesfull (in this case, the value displayed is the last value the system could read). If all cells in these columns are PURPLE simultaneously for all channels, it means the SLiC server for this control stopped. If this happens, call a DCS expert (**#164872**).

More details on a channel can be obtained by double-clicking in the corresponding table line. A new panel opens, with more information on settings, etc for that channel. The channel can be put **ON/OFF** from the corresponding buttons in the panel. Channel settings can be changed (by detector experts only) by clicking the corresponding "**settings**" cell. Alarms can be masked/unmasked from the "**action**" button on top. A button to "**load settings from hardware**" (to import the readback setting values in the crate into the DCS system) is also available for detector experts use.

Together with the channels summary table in one HV group, there are some **Group operation** buttons: "ON/OFF", "settings" (only for detector experts), "Trends" (not implemented yet) and "Pop window". The Group operation will act in the selected channels of the table. To select channels, click in a line to mark it, then press "Ctrl" key and click with mouse in other lines to select them also. If no line selection was done in the table, the Group operation will act in ALL the channels of the table. The "Pop window" button is used to open the table in a separate window, from where printing is possible.

If a crate, or some modules in the crate, lost its settings, this will show in the channels summary table as $v0 = 0$ in the first column. By double-clicking one of the lines with $v0 = 0$, one can see, in the right-handside table, the column for PVSS settings (1st column) with the last value set, and the column for readback settings from hardware with $v0 = 0$. In this case, you should contact the detector expert for this detector. On his advise, you can recover the standard settings for this detector by importing the corresponding Reference file. To do this, from the detector panel on top, in the area with buttons for stations voltages, click the "tools" button, and a panel for export/import will open. As you have login "operator", only limited actions are available. You can view the contents of the saved files for the detector (including the Reference file), but you cannot modify its contents. You can also import the Reference file. By doing this, you will send the settings from the file into the hardware. After this, you should go back to the channels summary table and check that the readback settings are $v0 \neq 0$.

8 WIENER Control: DAQ VME crates and LV units

By clicking the **DAQ** button, a summary table with all the VME crates used for the data acquisition is shown. The columns show the current for each voltage channel. There is also a column "Power On"; and a column "Alarms", grouping all the hardware alarms for the voltage channels. Only the "alarms" column has alert handling defined. It will show the ORANGE color in case of alarm from a channel, from the power supply or from the fantray. It will also show the ORANGE color in case the crate is switched OFF (and voltage settings $\neq 0$ – in that case, the voltages monitored and set will differ, thus triggering alarm). The column will show GREEN color if no alarm is present. By double-clicking one line (i.e. one crate), a detailed panel for the specific crate will be displayed. For some crate types, the monitoring of fantray parameters is not possible, and in that case the fantrays fields will display the PURPLE color.

The PURPLE color indicates that either the reading of the parameters failed (loss of communication), or a bad quality flag was assigned to the item by the server, for some reason. Cells in the summary table that show occasionaly the PURPLE color, alternating with white, is normal. If you observe persistent PURPLE color for an entire line (crate) in the summary table, inform a DCS expert.

The implementation of WIENER fantrays and LV units in the DCS does not allow to change settings, but only switch ON/OFF the crate, reset a VME crate, and monitor its parameters. The change of settings can be done by a DCS expert, on request, by using a different OPC client.

9 ELMBs

The **ELMBs** monitor temperatures, humidities, pressures, magnetic fields, gas flows (if not connected to PLCs), some LVs, etc. Access these measurements from the detector buttons in the Entrance Panel.

Value fields with WHITE background color indicate that no alert limits were defined for this measurement. GREEN color indicates the value is within the defined alert limits. ORANGE and RED indicate it exceeded the limits and is in alert state. LIGHT GREY indicates an alarm is defined but was masked – it can be unmasked from the "A" button next to the value field. The PURPLE color indicates the last reading was not successful (loss of communication), or that a bad quality was assigned to this item by the server.

If all the value fields show the PURPLE color, check in the DCS Panel if the OPC manager "CANOPEN" is running. If it is not running, restart it from the "Start" button. In case this doesn't work, call a DCS expert (**#164872**).

10 DIP server restart (for CEDARs monitoring)

The monitoring of CEDARs in the DCS is done connecting to a CERN DIP server. If in the DCS panels you see a red alarm in the "DCS" button, coming from "DIP 7" manager, and an indication of "timeserver alarm" in the alerts panel of DCS (on top), do:

- Wait approx 10 minutes. If the alarm disappears, no more action is needed. Just check that there are new points appearing in the trend plots (value vs time) of CEDAR readings in DCS.
- If the alarm does not disappear after 10 minutes, call the CRN control room and ask the operator to **"wreboot the dipGwExp server on cs-ccr-cmw2"**. After a while, the alarm should then disappear, and new updates should be visible in the CEDAR trends.

"wreboot" stands for warm reboot and is a command to restart operational servers by name. "cs-ccr-cmw2" is the name of the PC where the DIP server (dipGwExp) is running.

11 Trends

Trends (graph of values as a function of time) can be accessed from the buttons displaying a graph. On the top of the trend panel there is a line with tabs for commands. In the big central area, the graph is displayed. And in the bottom, a legend of the displayed trend appears, with the name of the channel, the present value, and the timestamp of the reading.

By positioning the mouse pointer on top of some data point in the graph, and clicking with the middle wheel button, one obtains the timestamp of the measurement, as well as the exact value.

The tab for commands on top starts with a button "**Time Range**", which allows to modify the timescale. By default this is set to 8 hours. An option for "user specified" timescale is also available. The time range of the plot can also be changed by placing the mouse pointer on the x-axis and moving the mouse wheel to compress/expand the scale.

The tab "**Y Axis**" offers the possibility to display or not the y scale in the graph. By default, only the scale for the first curve is displayed. If there is more than one curve superimposed in the graph, the following ones will be normalized with respect to the first. Use the tab to display also other curves scales.

The tab "**Other**" allows to select the "**Plot configuration**" option, from where an absolute scale for the graph can be set (by inserting values in the **Y axis: Min** and **Y axis: Max** fields). This tab offers also a "**Print plot**" option.

All the modifications done to the display of a trend will be lost when the trend panel is closed. Some permanent modifications can be done by DCS experts, on request.

12 For detector experts

Some actions, like changing parameter settings, importing and exporting settings from file, or loading settings from the hardware, can only be done from a detector expert login. Use the yellow key in the top of the Entrance Panel to login as expert.

If you are a detector expert, but were not given a password yet, contact a DCS expert to obtain one, or check with your colleagues if this password was given to one of them. It is recommended that the detector expert password remains secret, and it is the responsability of the expert to decide to whom he gives it. In case you forget your password, the DCS experts can reset it for you.

After you finished expert actions in the DCS system, do not forget to **logout**, by clicking the yellow key, and giving ownership of the UI back to "operator".

COMPASS members can open remote sessions of the DCS project, both for viewing the status of the DCS (login with username: "Guest" and password: [EMPTY]) or for changing settings (login as detector expert, with detector password). Opening remote sessions with login "operator" outside the control room is also possible, but not recommended. To open a remote session, login first in the COMPASS gateway, with your lxplus username. Afterwards, do:
>**ssh -l dcs pccompass07**
>**dcsUI**
and login to the DCS with detector expert username and password (or guest, without password). Remote sessions expire after 1 hour, after which the DCS UI asks you to insert again your password, for security reasons. If no password is inserted, the UI remains opened, but without any privileges ("NO USER").

Detector experts can change settings for their detector only, from the "**settings**" button in the Group operation, or by clicking in the specific setting cell of a table when viewing a single channel. When using Group operation always check that only the channels you want to modify are included in the ta-

ble for changes. Insert the new set value and press the "set" button. Check in the table that all the values you wanted are readback – if they are not, wait until you see them in the table, or press the "set" button again.

After you change settings, save the new values into file, for security. To save settings, click the "tools" button for **export/import of settings**, located in the detector buttons bar on top.

To export the settings to a Reference file, which can later be imported by the shift crew in case the hardware looses its settings, simply click the "Start" button. If you want to save some special settings, change the name of the file in the filename field (keep the file extension=[detector name] as proposed), then click the "Start" button.

You can edit or view the contents of any of the saved files for your detector from the "Edit" area. Click the yellow "folder" button to choose the file, then click the white "editor" button to view/modify it.

If the equipment (for example, a crate) lost its settings, these can be imported from the Reference file, and sent as commands to the devices using the "**import settings**" functionality. Special settings can also be loaded from file and sent as commands to the equipment (by detector experts only), from this "import" area.