

Help For Run Page

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1 Terms and Definitions

IDLE	Python Integrated Development Environment
IO	Any of the following devices: AIN5A, AOUT8A, CIO5A, DIN8A, DDIN5A, DOUT8A, ROUT5A.
UI	User Interface.
Trend	A set of a channel's recorded values.
Log	A Trend's recorded value with its timestamp.
uC	Microcontroller. The main chip of the CON64A device
admin	An Administrator Level user

2 Pre-requirements

The currently supported browsers are:

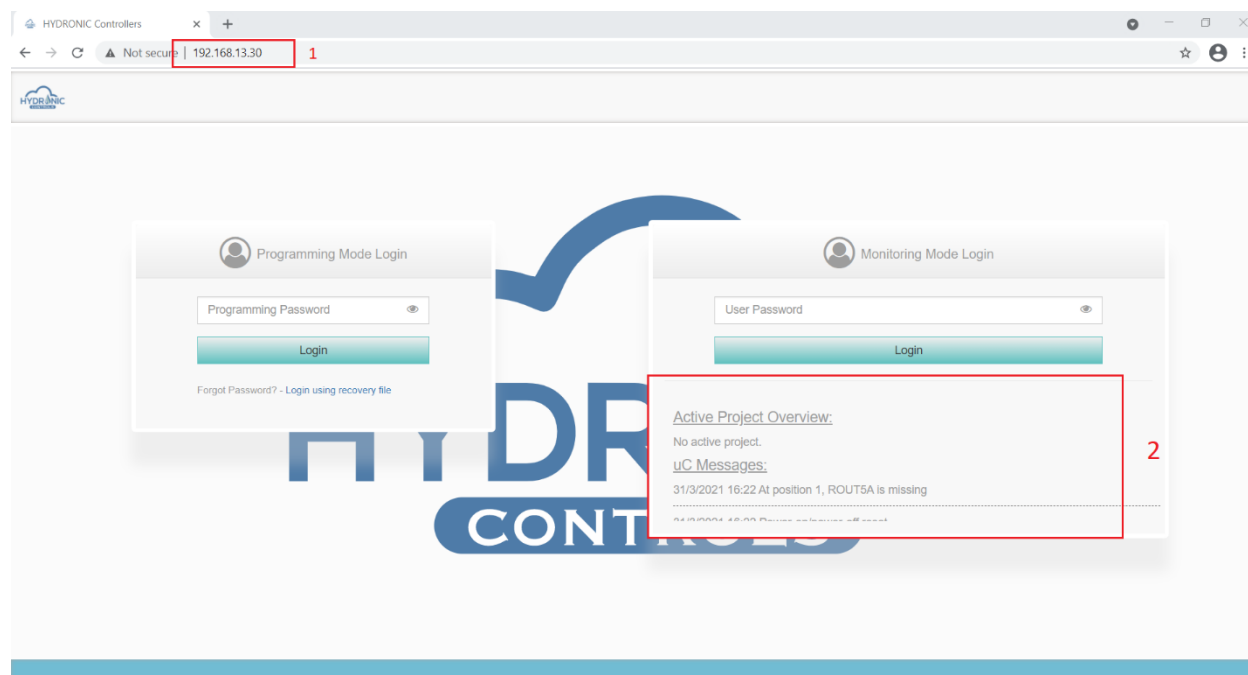
- Mozilla Firefox
- Chrome

Notes:

1. As of Google Chrome update to version 83.0.4103.97, the checkboxes are displayed blue while color combination. They can be restored to their original settings (in greyed color) by navigating to the following address <chrome://flags/#form-controls-refresh> and disabling the flag "Web Platform Controls updated UI".
2. By default, Google Chrome blocks pop-ups from automatically showing up on your screen. To only allow pop-ups from the IP of the CON64A you can do the following:
 - 1) Navigate to your browser's setting e.g. <chrome://settings/>
 - 2) Under "Privacy and security", click Site settings
 - 3) Click Pop-ups and redirects
 - 4) Click the Add button next to "Allow" label
 - 5) Enter the IP of the CON64A e.g. <http://192.168.10.10>

3 UI initialization

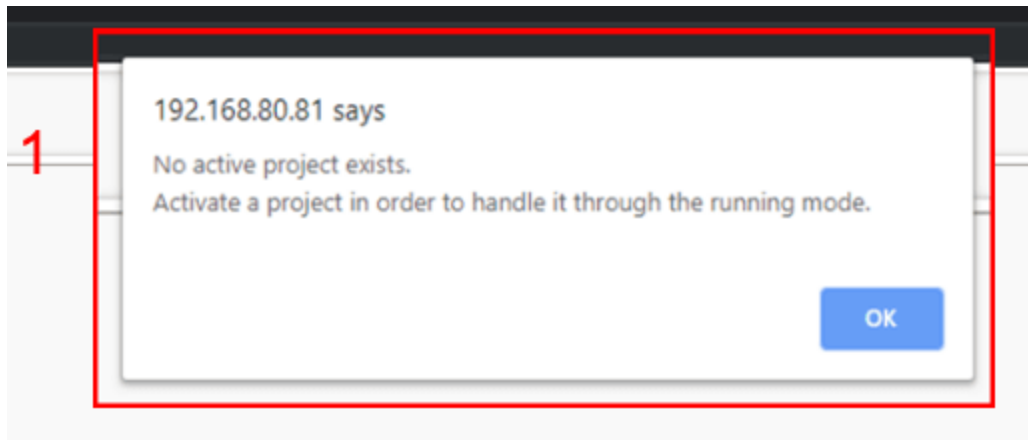
To initialize the UI, the user should type in the URL field of the browser the IP of the CON64A. e.g. 192.168.13.10 (see 1 in image below). Upon page load, the initial screen displayed contains two login areas. One for the Programming page and another one for the Run page. The user can see information related to an active project (if exists) and messages logged from the uC (see 2 in image below).



Index page of Hydronic Controller

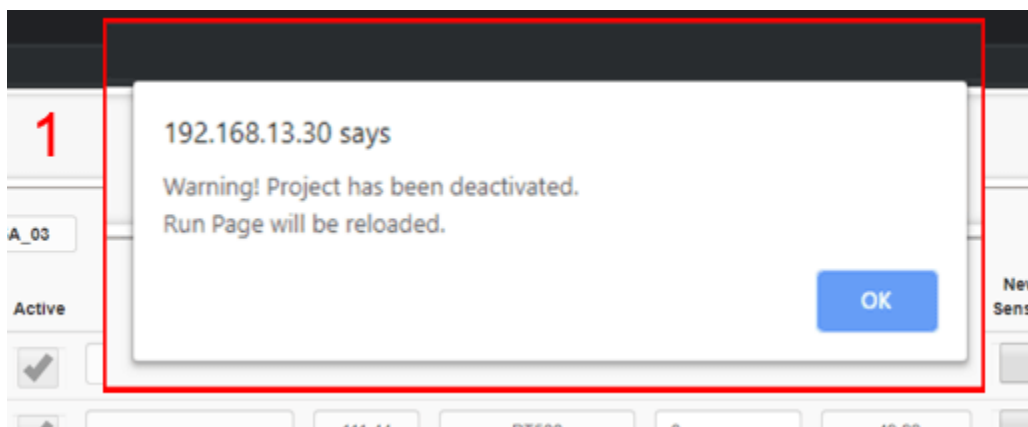
4 Run Page mode

In this section the main functionalities of the UI are described for the Run page which is functional only when an active project exists. Therefore, the user can interact with the active project through the offered functionalities, depending on his access level. If no active project exists, the user is informed upon log-in accordingly (See 1 of Image below).



Run page with no active project

If an active project gets deactivated while the run page is open, the user is informed about the deactivation with an alert window, the functionality of run page stops and the page is reloaded to refresh its settings. (See 1 of Image below).



Run page alert upon project's deactivation

In case an Active Project exists the first page to be displayed is the Main SCR routine of the project as defined from the system programmer.

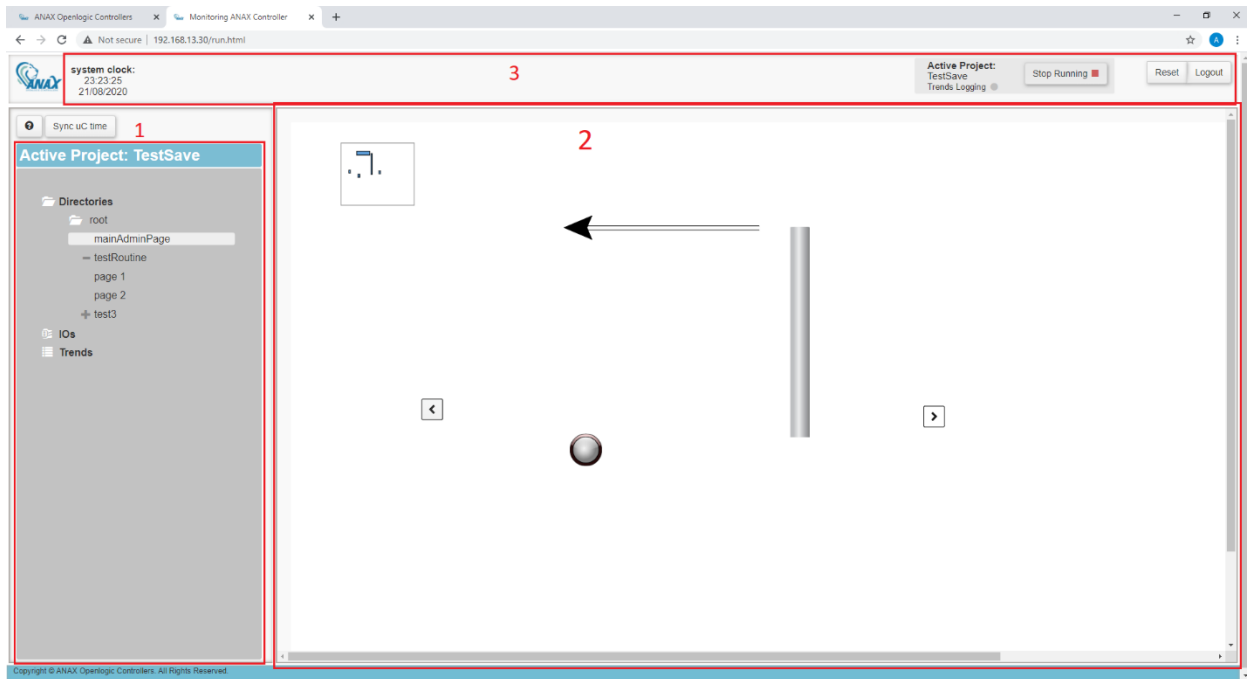
4.1 User levels

Three user levels allow access to the Run page. The Administrator level, the High user level and the Low user level. The system programmer has the ability to set passwords for three predefined users and assign the desired access levels to them.

The Administrator level is the highest Level for the users that allows interaction with all the functionalities of the Run page. The High user Level and Low user Level may be used as read only levels for supervising and limited interaction with the graphics of an Active project.

4.2 Run Page Overview

The run page is divided as follows: the project explorer area (See 1 of Image below) where all the directories, routines and graphic pages of the active project are listed, the main viewer area (See 2 of Image below) where the system's functionalities are displayed and some useful uController and project related buttons and information (See 3 of Image below).



Run Page Overview

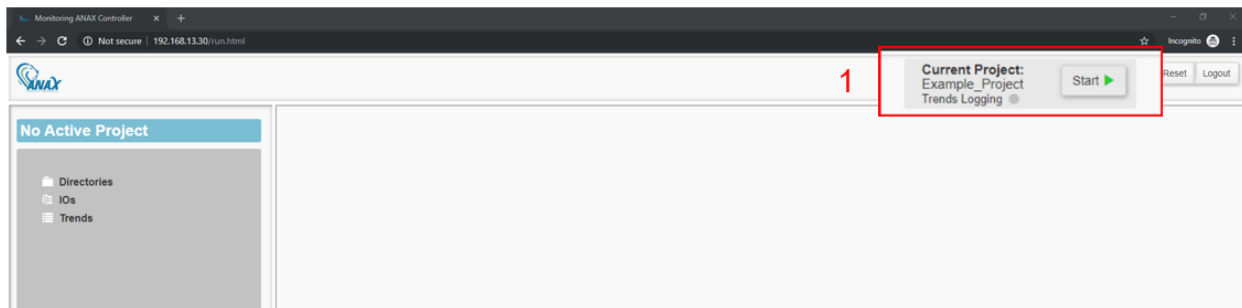
4.3 Active Project Information Section

The project info section displays details related to the active project and is visible to the Administrator User Level user who can interact with the project. (See 1 of Image below). It includes the name of the Active project, an icon indicating when trend logging is active and the Stop Running/Start button.



Active project handling section

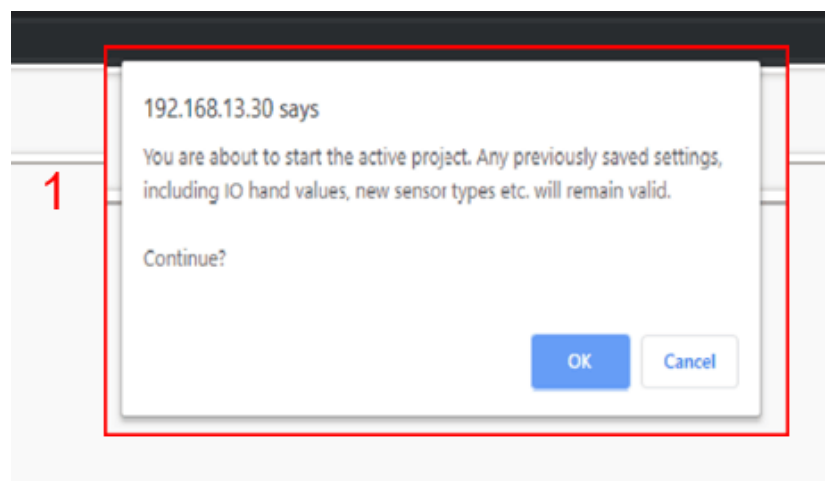
The Administrator user level can stop the execution of the active project by clicking the 'Stop Running' button. The section is updated accordingly and the button changes to 'Start'. (See 1 of Image below).



Active project handling section

As long as the administrator user remains on the same session of the run page, he has the ability to restart the project with its current settings by clicking the 'Start' button. Any possible configurations made in the run page either in IOs or in graphics are maintained. (See 1 of Image below)

In case the session of the run page is closed before the project is reactivated, the administrator user has no longer the ability to Start the project, and the programmer shall activate it from the programming page.



Alert window upon restarting the project

4.4 System Time Synchronization

On the top left corner of the run page and next to the Logo the system's time (MCU time) is shown (See 2 of image below).

The time is read every 10 minutes from the Board and can be synchronized to the local computer's clock by clicking the "Sync uC time" (See 1 of image below). . This button will read the local computer's clock and send it to the Board. When the CON64A is not powered the time is not updated and has to be synced again when accessing the UI.

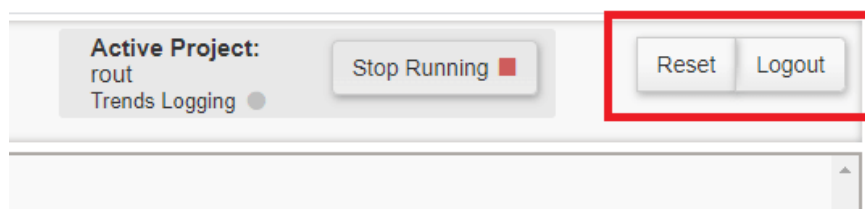
4.5 Action Buttons

A "Reset" and a "Logout" button are available at the top right corner of the run page (See Image below).

The "Reset" button, available only to the Administrator user level, performs a reset of the CON64A and the IOs..

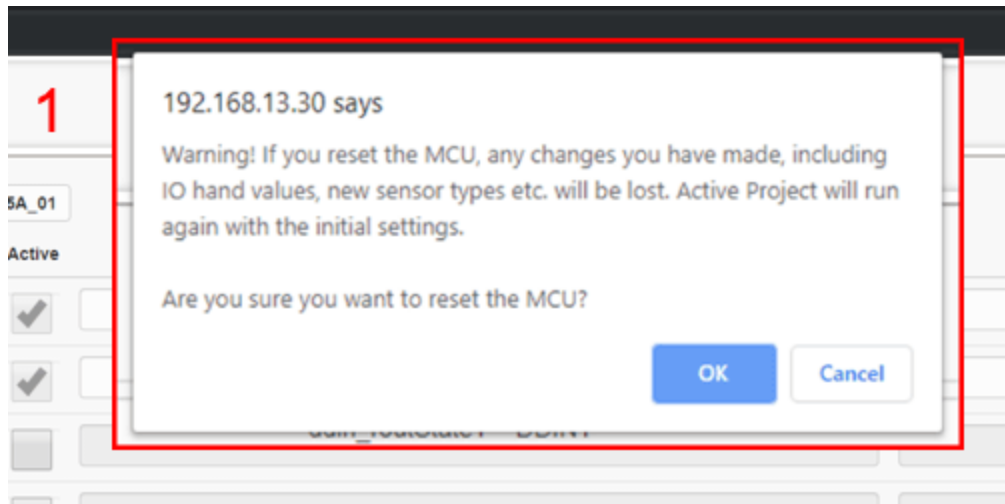
By clicking the "Logout" button the user will be redirected to the initial screen and the active session of the run page is terminated.

The reset and logout functionalities are the only ones that can be performed from the run page regardless of the existence of an active project.



Run page "Reset" and "Logout" buttons

In case of an existing active project, the reset functionality erases any changes made by the administrator user level to the IOs. The graphic changes are maintained and the active project runs again with its initial setting. An alert window informs the user accordingly. (See 1 of Image below)



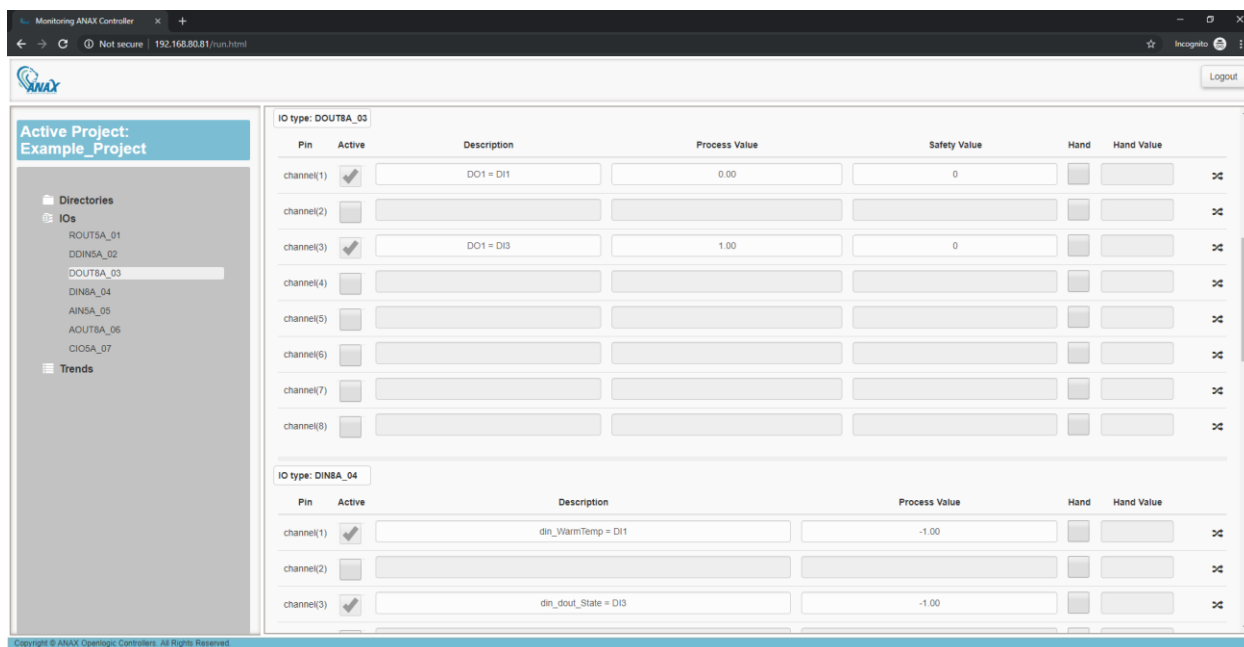
Run page "Reset" button

4.6 IOs section

In this section the main functionalities of the IOs are described. This section is available when an active project exists.

The IOs displayed are the ones declared to the IO Configuration regardless of their activation state and are displayed in the same order as declared in IO Configuration. In case of any valid reorder of the IOs while a project is active, the IOs are displayed in the new order after refreshing the page.

The Administrator User Level can interact with the IOs, activate any non-active channels and make changes related to the sensor types, the hand and offset values, where exist. All users can supervise during run-time the processing values of the active channels and navigate to any IO by clicking on it from the list on the Project explorer area and the IOs section (See Image below).

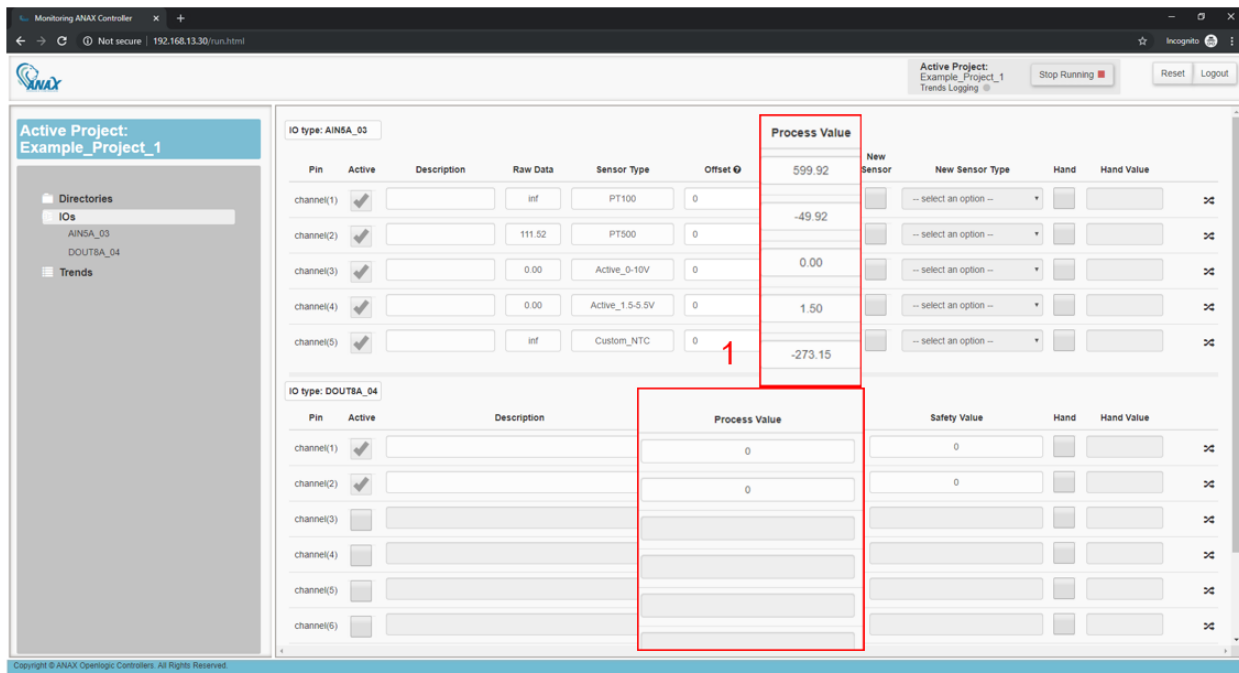


IOs section

4.6.1 Channels' handling

All channels both active and inactive of an IO are displayed in the IOs section (See Image below). The values of each active channel are updated every 500ms (See 1 of Image below).

All channel interactions are available only to the Administrator User Level.



IOs section of running mode

The parameters of each IO Type are explained in details below:

- **Common** parameters to all IOs:
 1. **IO type:** The type of one of the IOs that are declared in the IO Definition section of the currently active project.
 2. **Pin:** The different channels of an IO.
 3. **Active:** Checkbox indicating the Active/Inactive status of the channel. The Administrator Level user can enable Inactive channels meaning that an active channel set by the programmer cannot be deactivated from the run page whereas an inactive channel can be activated/deactivated from the Administrator Level user.
 4. **Description:** A user-defined description of a channel.
 5. **Process Value:** The current value of a channel. This value gets updated every 1 sec.
 6. **Hand:** Checkbox for the Administrator Level user to enable the “Hand Value” functionality.

7. **Hand Value:** A value that overwrites the process value of an IO channel. This value is sent directly to the running code of the routines and is set to the channel too. Trends logging and the display of the **Process Value** in the Run page are not affected.
- **Output IOs** additional parameters:
 1. **Safety Value:** A value that will be set to a channel upon project's termination or communication loss with the CON64A device.
 - **AIN5A** additional parameters:
 1. **Raw Data:** The unfiltered process value of a channel of an AIN5A.
 2. **Sensor Type:** The type of the configured sensor functionality of a channel.
 3. **Offset:** A value used to correct the process value of an AIN5A channel in case the reading of the channel is not correct.
 4. **New Sensor:** Checkbox for the Administrator Level user to enable the "New Sensor Type" functionality.
 5. **New Sensor type:** Selection box with all the available sensor types to overwrite the configured sensor of a channel of an AIN5A.
 - **CIO5A** additional parameters:

Offset(mA): A value used to correct the process value of an CIO5A channel in case the reading of the channel is not correct.

Depending on the type of the IO, the Administrator user Level can modify the following parameters:

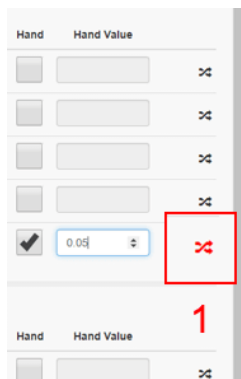
AIN5A: hand value, offset value, sensor type

CIO5A input channels: hand value, offset value

CIO5A output channel: hand value

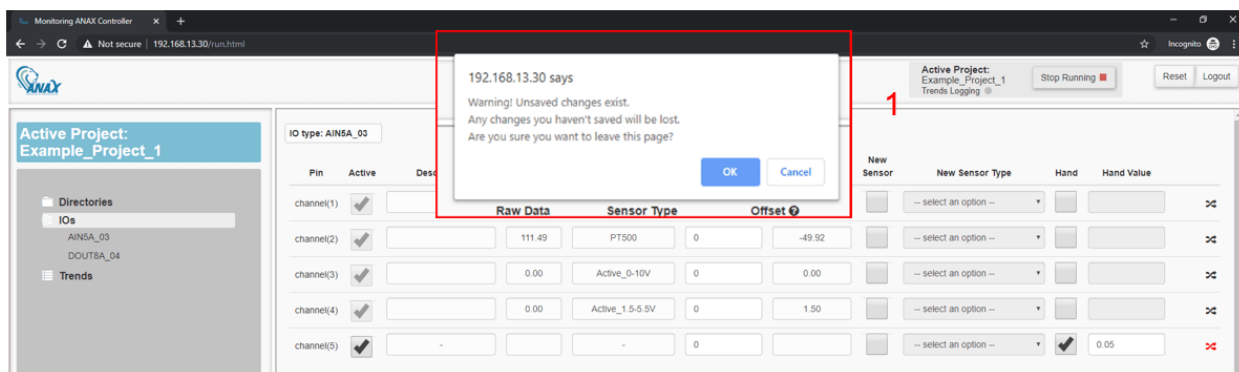
DOUT8A, ROUT5A, AOUT8A, DDIN5A, DIN8A: hand value

When a change is detected the 'apply changes' button that refers to the channel turns to red in order to indicate that unsaved changes exist. All existing changes related to an IO's channel need to be saved to the board by the 'apply changes' button in order to take effect. (See 1 of Image below)



Apply changes button.

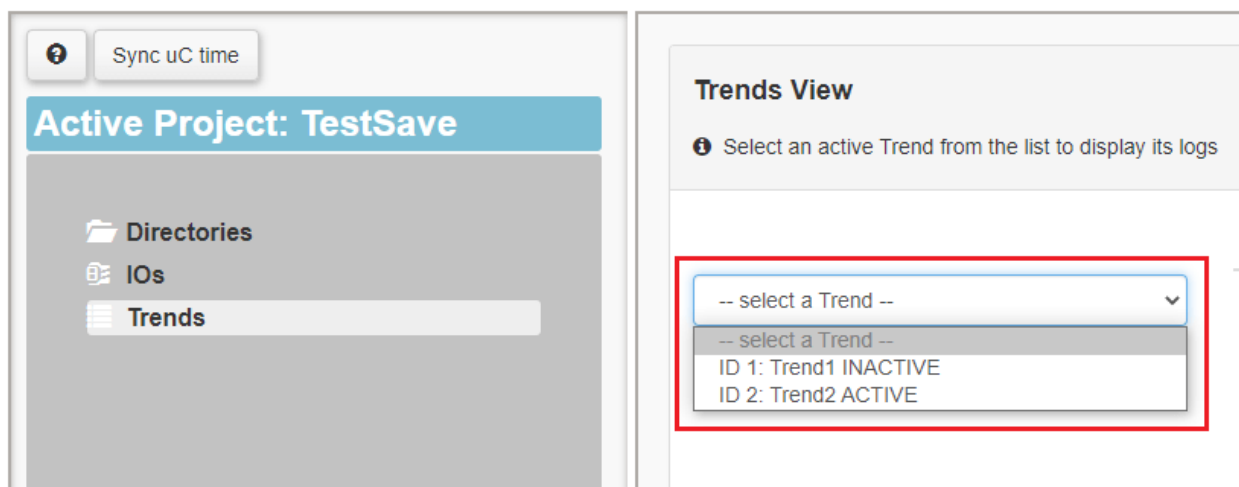
If the Administrator user tries to reload the IOs section, moves to another section or tries to log out from the run page he is being informed in case of existing unsaved changes in IOs section. (See 1 of Image below)



Alert window for unsaved changes.

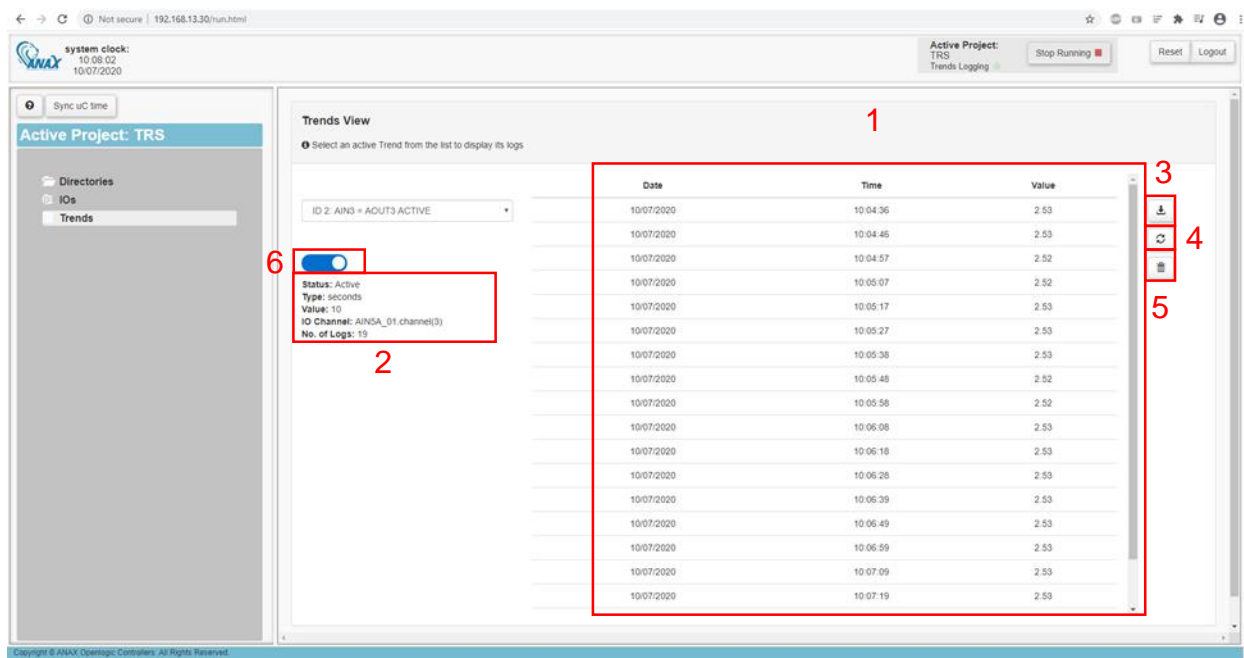
4.7 Trends Section

The Trends Section is available on the Run Page when an active project exists. Upon clicking the 'Trends' option from the left side menu, the Trends View is loaded including a list with the active Trends for the specific project (See 1 of Image below). Each Trend is represented by its ID, its description and its active status (ACTIVE/INACTIVE).



Trends section on Run Page

Upon selecting a Trend, the existing logged data for the Trend are loaded and displayed (See 1 of Image below). On the left side of the data the Trend's settings are displayed too. (See 2 of Image below). The user can download the list of logs in a .csv file by clicking the corresponding button (See 3 of Image below) or reload the Trend's data by clicking the 'refresh' button (See 4 of Image below). For the Administrator user Level, extra buttons exist to (1) clear all logged data from the board for the selected Trend (See 5 of Image below), and (2) activate/deactivate the selected Trend (See 6 of Image below).



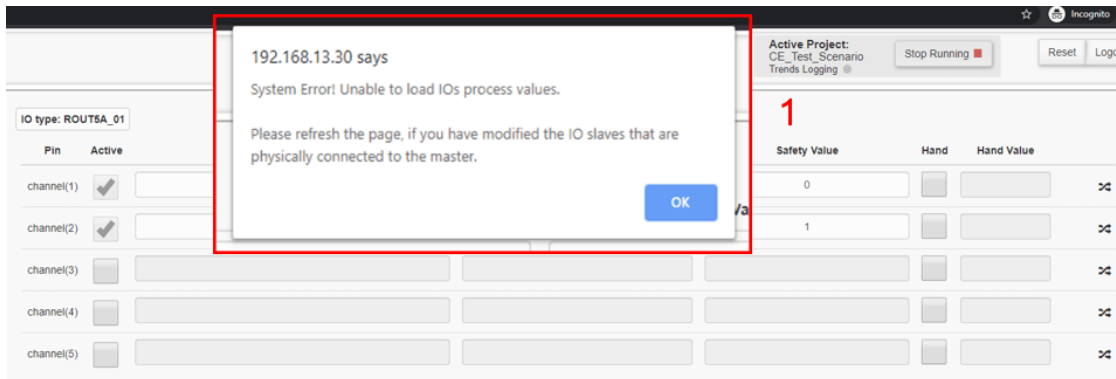
Selected Trend's Logged Data

5 IOs Reordering

It is possible that the IOs of the currently active project are reordered physically or replaced with same IO types in case something is not functioning correctly.

In a successful reordering of IOs, the system reads the new order of the IOs and reactivates the Active project of the CON64A.

If necessary, any user of the run page shall be informed with an appropriate message in order to refresh the page and reload the new order of the IOs (See 1 of Image below).



Alert message on Run Page related to reordering

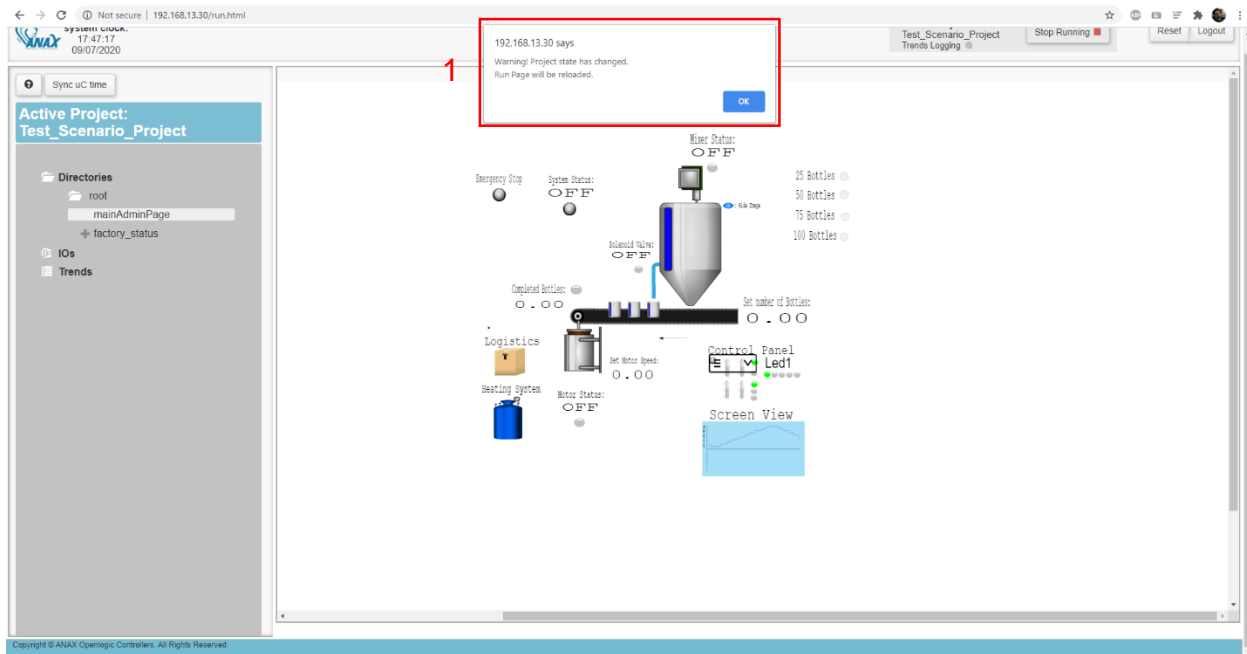
6 Programming/Run pages synchronization

In this section the functionality of pages synchronization is described depending on the browser and action taken.

Mozilla Firefox / Google Chrome

Case where programming and run pages are on the same window of the same browser.

1. Upon clicking 'Stop' button from run page the project gets deactivated. Run page is reloaded and the active programming page is automatically updated.
2. Upon clicking 'Start' button from run page the project gets re-activated. Run page is reloaded and the active programming page is automatically updated.
3. Upon clicking 'Stop' button from programming page the project gets deactivated. Programming page is automatically updated and run page gets reloaded (See 1 of image below).
4. Upon performing an activation from the programming page, the run page issues an alert message which informs the user that the project state changed and that the page will automatically reload in order to show the new state of the project.

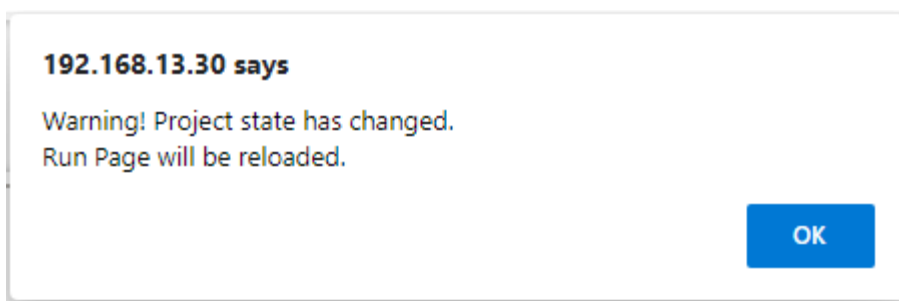


Run page upon detecting deactivation.

Microsoft Edge or Pages on different windows regardless of browser

In a cross-browser setup, a functionality has been added in the run page which constantly checks for a project status change. When the programmer changes the project status the run page automatically issues a warning and reloads (see 1 of Image below). If the project status change is performed from the run page, then the programming page issues a warning and reloads only on a crucial programmer action. Upon performing one of these crucial actions in the programming page, the user is informed when a change is detected on the state of the project. If the project status is not correct in the programming page, the crucial action is prevented and the page is reloaded in order for the settings to be updated. The actions considered as crucial for the system performance are:

1. Programming page
 - a. UI update
 - b. Firmware update
 - c. IO Addressing
 - d. Modification of IO Configuration
 - e. Python library deletion
 - f. Compile and Activation of a project
2. Run page
 - a. Stop/Start
 - b. Reset
 - c. Loading of Trends
 - d. Loading of Graphic pages
 - e. Loading of IOs



Run page automatic message issue for reload on a project status change in a cross browser setup.

7 Active Sessions

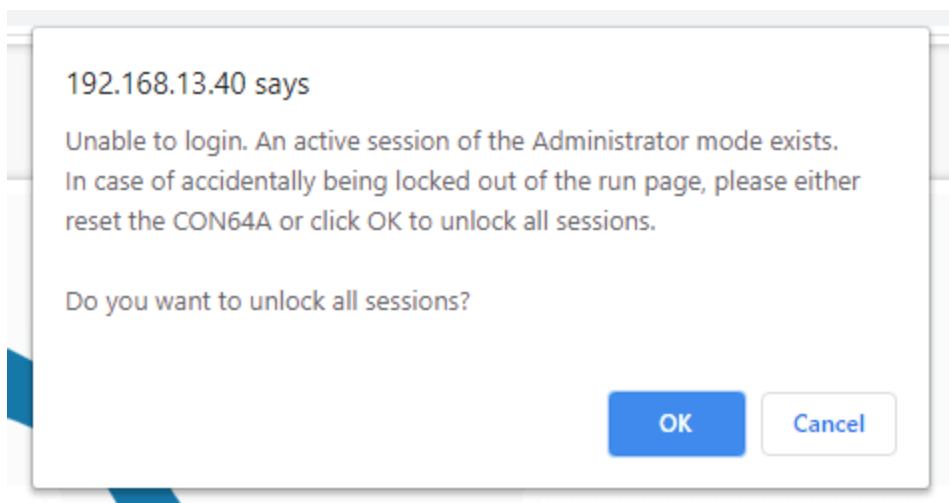
In this section the functionality that handles the existence of multiple UI tabs is described. Restrictions have been applied to the number of allowed active sessions in order to protect and ensure the system's functionality. Regardless of the browser, window or computer only one active session is allowed per user level, hence, one session of programming page and one session of run page is allowed per user role.

A session is considered active when a user role performs a login and inactive upon logging out or closing the window or tab.

In case the MCU is powered off while a session is active, the session will be released upon power up of the MCU.

In case of trying to login either as a programmer or as a user while another active session exists, the appropriate message is displayed and login is prohibited (See 1 of image below).

The UI locks a session only if a user has logged in and the page has fully loaded.



Existing active session for the Administrator User.

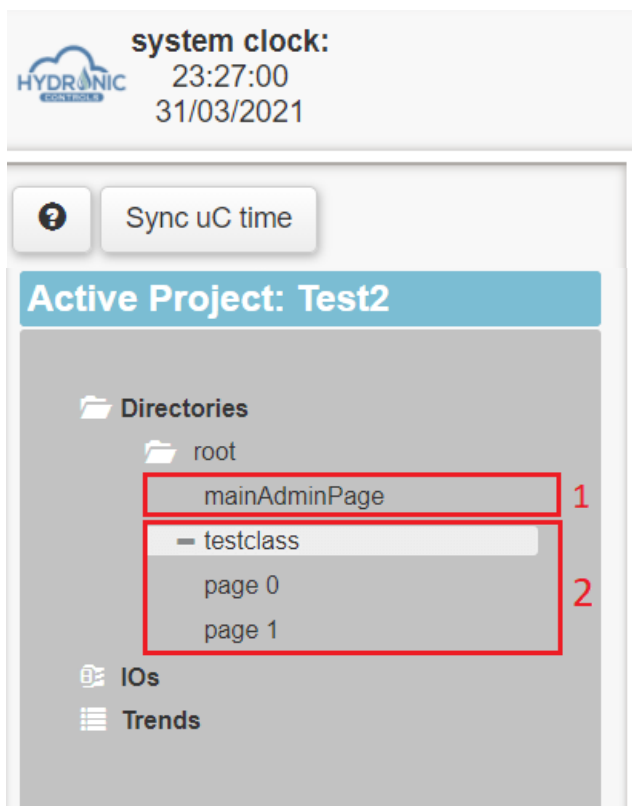
8 Graphics

In this section the features related to the graphics display on the run page and user interactions with them is described. The designed graphic pages are meant to offer interaction with the system's code wherever this possible.

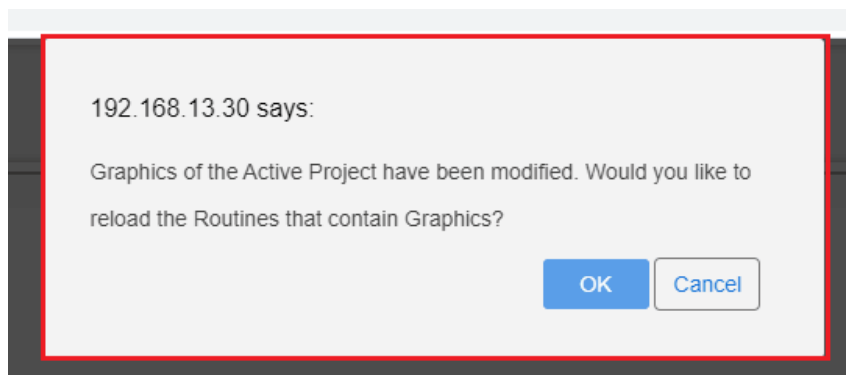
8.1 Displaying graphic pages

Access to the graphic pages is possible from the Active project explorer on the left side of the Run page. Upon loading of the Run page, the Main Scr of the Active project will be loaded. Under the 'Directories' section in the explorer the user may see all the available graphic pages for display and navigate to a desired one directly. This section displays the project folder structure with the created folders and routines if they have graphics designed.

All 'scr' routines of the project are listed (See 1 of Image below) and only the 'con' routines that contain at least one page with graphics designed in them (See 2 of Image below).



All the graphic pages may be dynamically updated when the programmer applies changes to them. When the run page detects any change on the programmer's side, the user is informed in order to refresh run page and load the new pages. (See Image below).



Graphics Changed Alert

8.2 Interactive Items

In this section all the items that the user is able to interact with are described. The user will see a hand mouse pointer when hovering on them, so he can understand that he is able to interact with them.

8.2.1 Buttons

Two types of Buttons are available:

Momentary: This button type is a momentary button meaning that it requires continuous compression to remain "on". The initial state of the button upon loading, is always set to "off", thus it is affecting the connected variable immediately. Upon clicking, and for as long as it is clicked, a high value (1) will be set to the connected variable. Upon releasing, a low value (0) will be set to the connected variable.

Maintained: This button type is a latching button meaning that it requires the user to press the switch once and will then remain. The initial state of the button is decided based on the readings of the connected variable upon loading. Upon clicking for ON, a high value (1) will be set to the connected variable. Upon clicking for OFF, a low value (0) will be set to the connected variable.



Buttons items

8.2.2 Check Box

The check box object can be checked/unchecked for True/False state. The initial state of the box is decided based on the readings of the connected variable upon loading. When checked a high value (True) will be set to the connected variable. Upon unchecking, a low value (False) will be set to the connected variable.



Check Box item

8.2.3 Radio Button

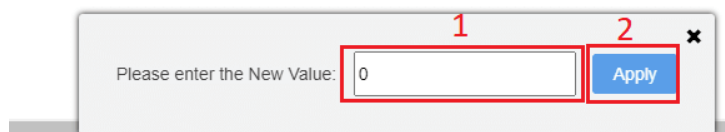
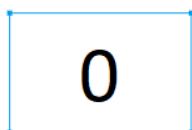
The radio button object may be used to assign to the connected variable a programmer's pre-defined value. When the user checks the radio button in run page, this value will be set to the connected variable. When the user unchecks the radio button, the variable gets the zero (0) value.



Radio Box

8.2.4 Text or Number Input

When the user clicks in a text or number input object a text field shows up (See 1 of Image below). In this field, the user can insert the desired value for the connected variable and then click the apply button (See 2 of Image below). When the graphics are loaded, in the object's position, the current value of the connected variable is displayed.



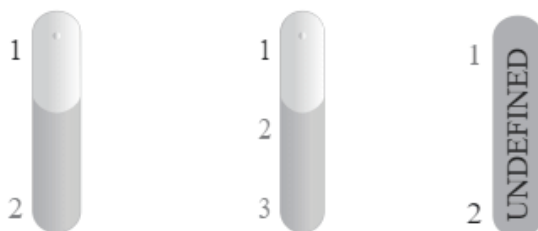
Text or Number Input

8.2.5 Position Switch (2) & (3)

The Position Switch object is offered in two variants, one with two different positions and another with three different positions. Based on the variant it is connected to a variable to get the corresponding two (2) or three (3) values.

The programmer has pre-defined the values for each position during design. The switch state changes by clicking on the desired position or is updated automatically when the value of the connected variable is updated from the uController. Depending on its position the switch assigns the selected value to the connected variable.

Both switches support an UNDEFINED state, which appears only when the connected variable has other value than the defined levels on the switch.



Position Switch (2) & (3) items

8.2.6 Drop-Down Menu

The Drop-Down object shall be connected to a variable in which up to five different values may be assigned. The programmer shall configure for each dropdown selection the displayed label and the value to be assigned to the connected variable.

The user can click on the Drop-Down Menu and then make a selection based on the displayed label (See 1 of Image below). Clicking on the Apply button (See 2 of Image below) the corresponding value will be set to the connected variable and the selection is displayed next to the Drop-Down Menu object image (See 3 of Image below).



Drop-Down Menu item

The displayed label of the Drop-Down Menu has also the ability to change automatically in case the connected variable changes (i.e. from the python code). In case the connected variable has a value different than the 5 predefined values, the displayed label shows the word “Undefined” (state Undefined).

8.3 Value display Items

In this section all the items that display a connected variable’s value to be observed are described.

8.3.1 Simple Plot

The Simple Plot Object is connected to a variable of arithmetic type in order to graphically display its value in time. The values of the variable are depicted to the left side of the Plot.



Animation Plot item

8.3.2 LED DI

The 'LED DI' is an illumination object and refers to digital values, hence, it is connected to a binary variable. The 'LED DI' is set to color ON or OFF options according to the value of the variable. The colors are pre-defined by the programmer.

8.3.3 LED AN

The 'LED AN' is an illumination object based on the value of analog variables, hence, it is connected to a variable which takes values in a pre-defined range. Min and Max values (range) are selected by the programmer, in order to calculate its min and max blinking frequency depending on the analog value readings. The 'LED AN' is blinking according to the value of the analog variable, the calculated frequency and the colors selection.

LED DI



LED AN



Led DI and AN Items

8.3.4 Text or Number Output

The Text or Number Output object shall be connected to a variable of string or number type respectively. The value of the connected variable is displayed.

Running..

6 . 0 0

Text and Number Output