HMI creation in REXYGEN HMI Designer

User guide

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Version 3.0.4
2025-03-27
Plzeň (Pilsen), Czech Republic

Contents

In the manual [1], the creation of a simple WebBuDi user interface is described in detail. The REXYGEN development tools also include the REXYGEN HMI Designer program, which is a tool for designing custom graphical visualisations using predefined components[1]. REXYGEN HMI Designer is based on the well-known open-source vector editor Inkscape™ https://inkscape.org/en/.

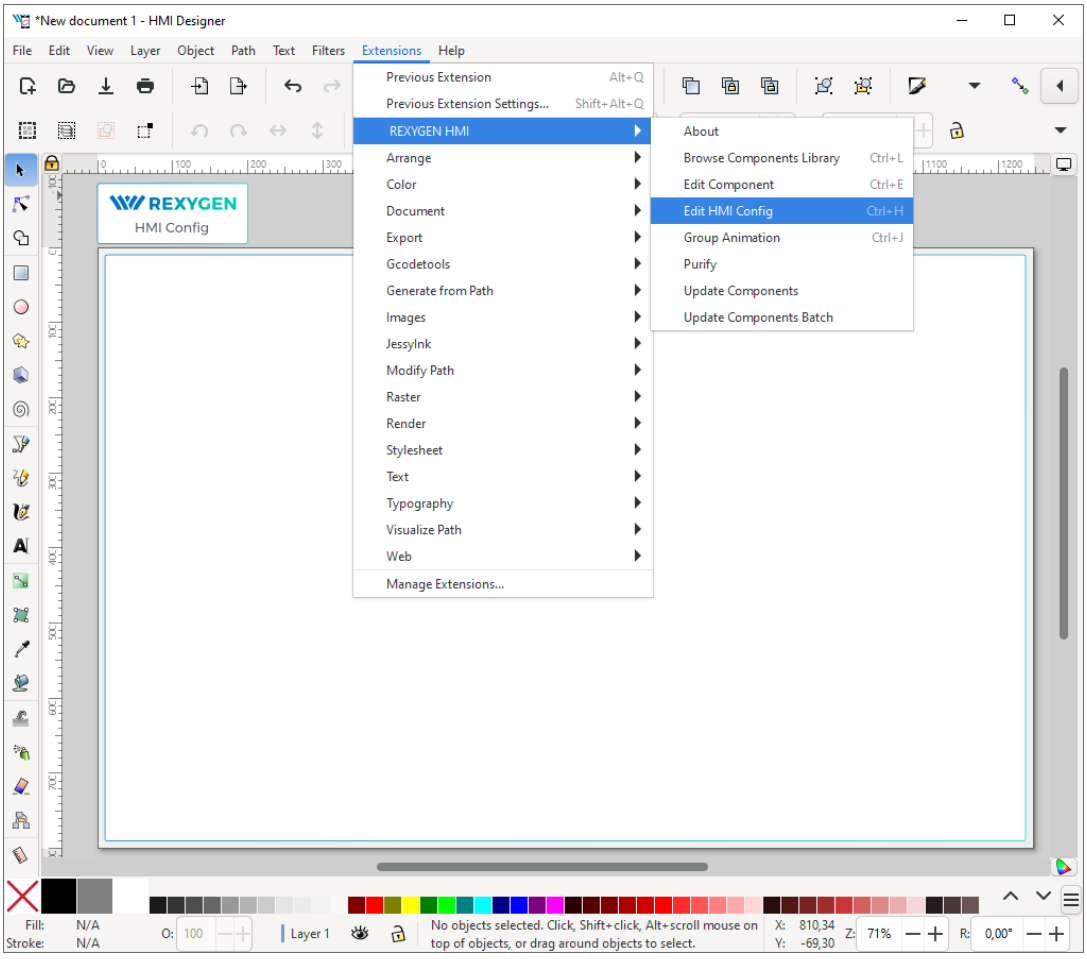
In this accompanying manual, we will develop an alternative HMI for example *0101-01*, the creation of which was described in [1]. Similar to the WebBuDi user interface, the SVG file created using REXYGEN HMI Designer will serve as a source file, which will become part of your REXYGEN project. During project compilation, the SVG file will be processed and converted into HTML, JS, and CSS files.

[1] Defining custom components is also possible, but it requires some programming in Javascript.

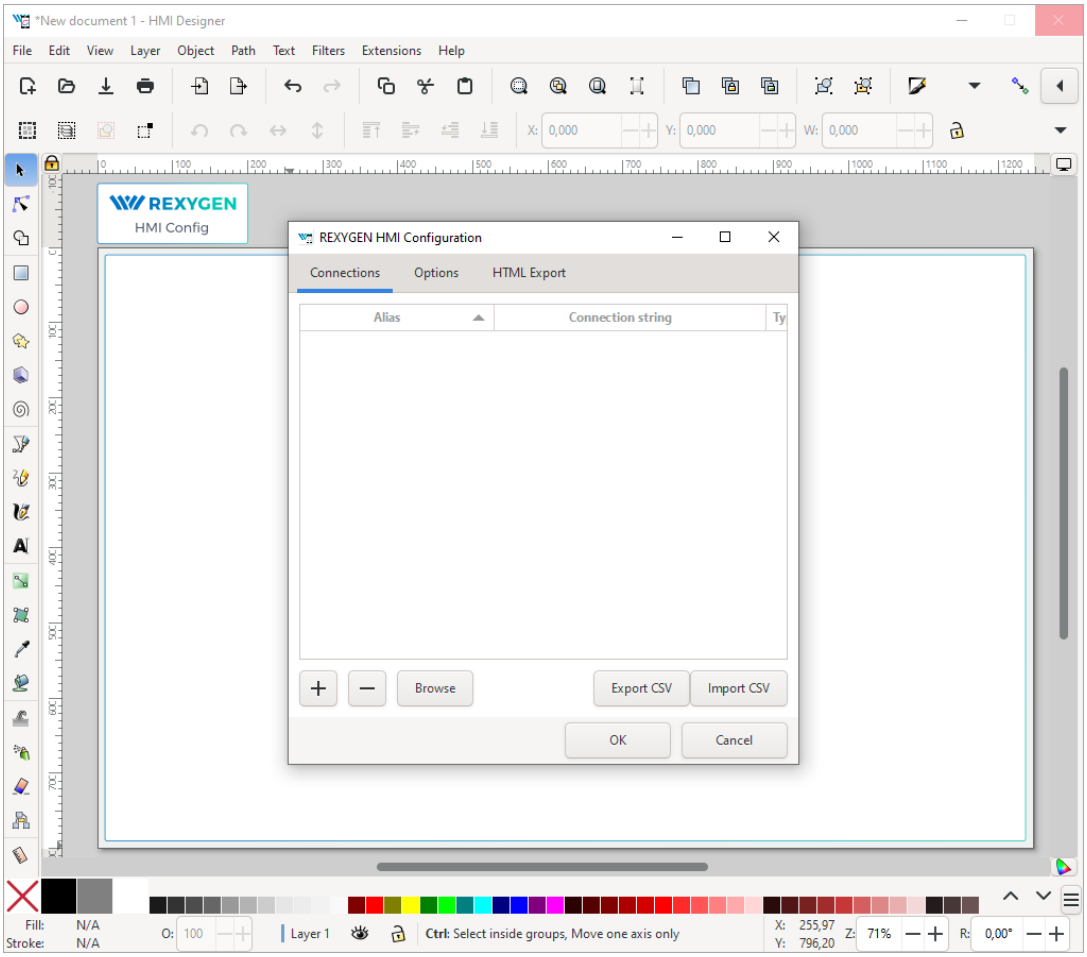
Chapter 1

Initializing the HMI design

After launching REXYGEN HMI Designer, you will find a blank page with an initialised visualisation. The HMI is configured through the *REXYGEN HMI* extension. In the menu, navigate to *Extensions* → *REXYGEN HMI* → *Edit HMI Config*.



This extension is represented by a special component in the top left corner above the drawing. The component contains general HMI settings. For now, close the configuration dialog by clicking the OK button.



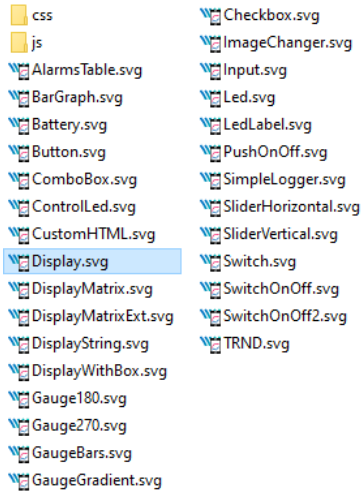
In order to include the HMI during the REXYGEN project compilation, the file name has to end with `.hmi.svg`. Save the file as e.g. `designer.hmi.svg` to the `hmisrc` subfolder of your project. Use the standard *File* → *Save as* menu.

Note: If you want to replace the WebBuDi interface with the REXYGEN HMI Designer interface just delete the `index.hmi.js` and save the HMI as `index.hmi.svg`.

Chapter 2

Adding the first HMI components

Now we will add some displays and inputs. The REXYGEN HMI Designer contains a library of components which you can use to build your HMI. The library is available through *Browse Components Library* extensions. Navigate to *Extensions* → *REXYGEN HMI* → *Browse Components Library* (Ctrl+L). It will open the explorer window with several folders. Open the `GENERAL` folder and drag&drop the `Display` to the drawing. The display will be used as an indicator of the remaining time in the `TIMER` function block.



For configuration of the display settings select the display by mouse click on top of it and use the *Edit Component* extension from *Extensions* → *REXYGEN HMI* → *Edit Component* (Ctrl+E). When the configuration dialog is opened you can change the *Title* to *Display_remaining*. The *Edit Component* dialog has two tabs: *Data points* and *Options*.

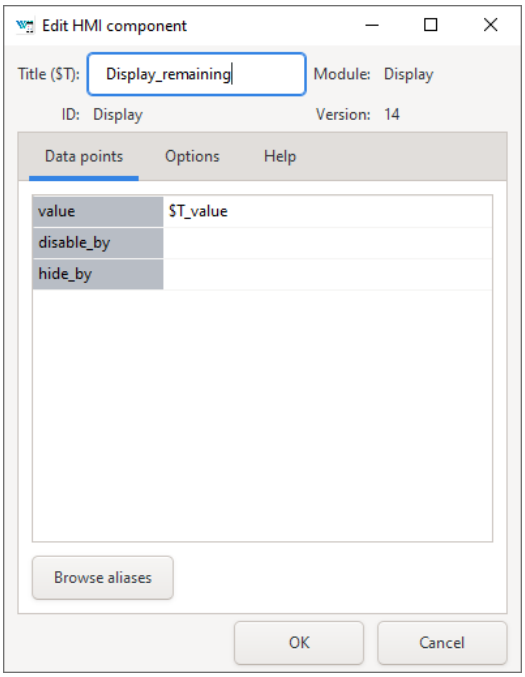
The *Data points* tab contains three items defining the behavior and animations of the component. Each data point contains an alias, which is in fact a connection to live data from the REXYGEN algorithm.

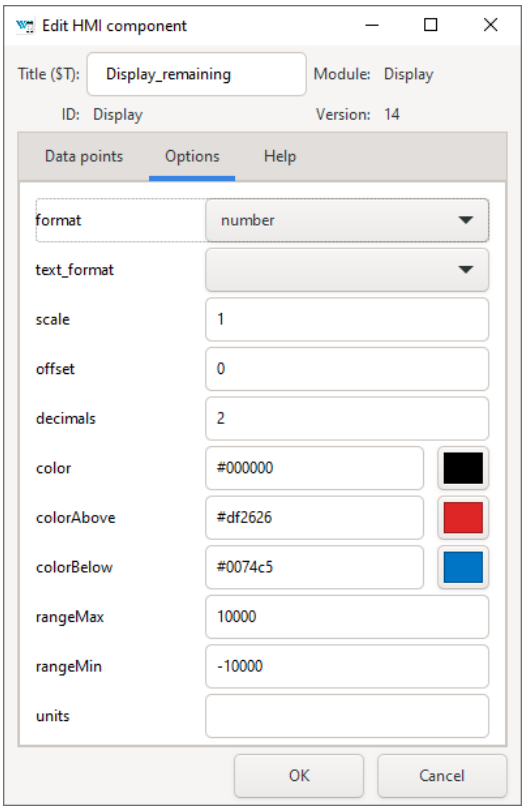
- `value` – The value to display.
- `disable_by` – If true the display is disabled and data are no longer updated.
- `hide_by` – If true the display is hidden.

The `value` property contains `$T_value`. The `$T` will be later automatically substituted by the *Title* of the component, resulting in the `Display_remaining_value` alias. The `disable_by` and `hide_by` data points are optional. Leave them blank at the moment.

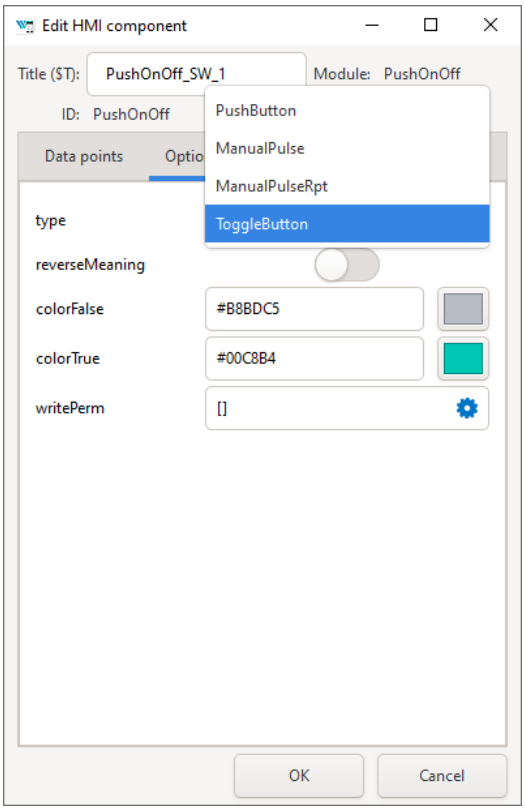
The *Options* tab contains several properties which are specific for the Display component. You can find the description of each component and property in [2]. Leave the default values for now and press OK.

Note: Each component is in fact one SVG group with unique content. You can copy the components all over the screen using copy (Ctrl+C) and paste (Ctrl+V) approach.





Now we will add controls for all the switches (CNB blocks). All of them will be controlled using the *PushOnOff* components. Add them from the library. Select the first *PushOnOff* and open the editor dialog *Extensions* → *REXYGEN HMI* → *Edit Component* (*Ctrl+E*). Change the title to *PushOnOff_SW_1* and select the *Options* tab. Select the `ToggleButton` item in the `type` property list. Close the *Edit Component* dialog using OK button. Copy-paste the button three times and remember to change the titles to *PushOnOff_SW_2*, *PushOnOff_SW_3*, *PushOnOff_SW_4*.

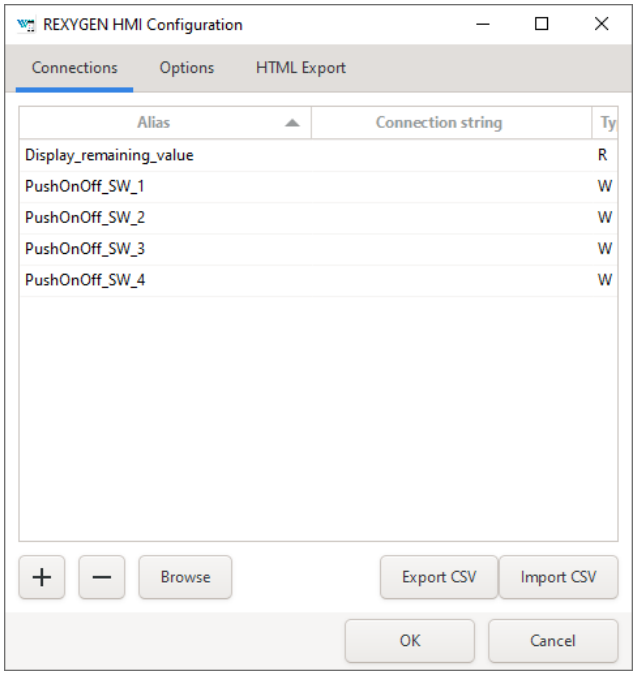


Now we have four *PushOnOff* buttons and one *Display* and we want to link all components with live data from the target device.

Chapter 3

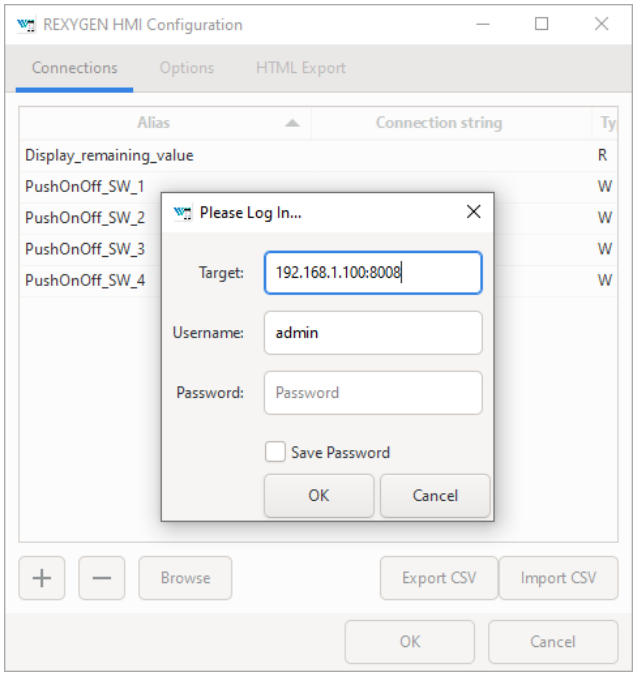
Linking HMI components with the running algorithm

Open the *HMI Configuration* dialog either using *Extensions* → *REXYGEN HMI* → *Edit HMI Config* or just unselect all components in the drawing (click outside any component) and press *Ctrl+E*. The configurator parses all components and creates a list of used *Aliases*. Each of them should be linked with one signal in the running algorithm. You can either fill in each connection string manually or you can use the *Browse* function.

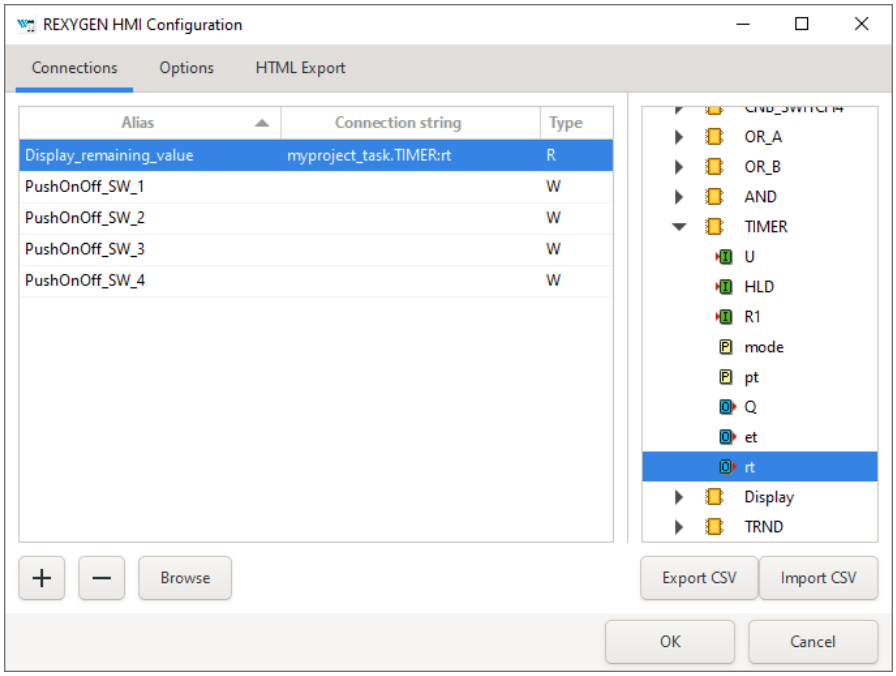


The *Browser* requires a target device with running algorithm. Make sure the algorithm is running, see manual [1]. Also the target URL must be set. Press *Browse* button. The login dialog will be opened. Change `Target` to `192.168.1.100:8008` (replace 192.168.1.100 with the IP address of your platform). Unless you changed the login

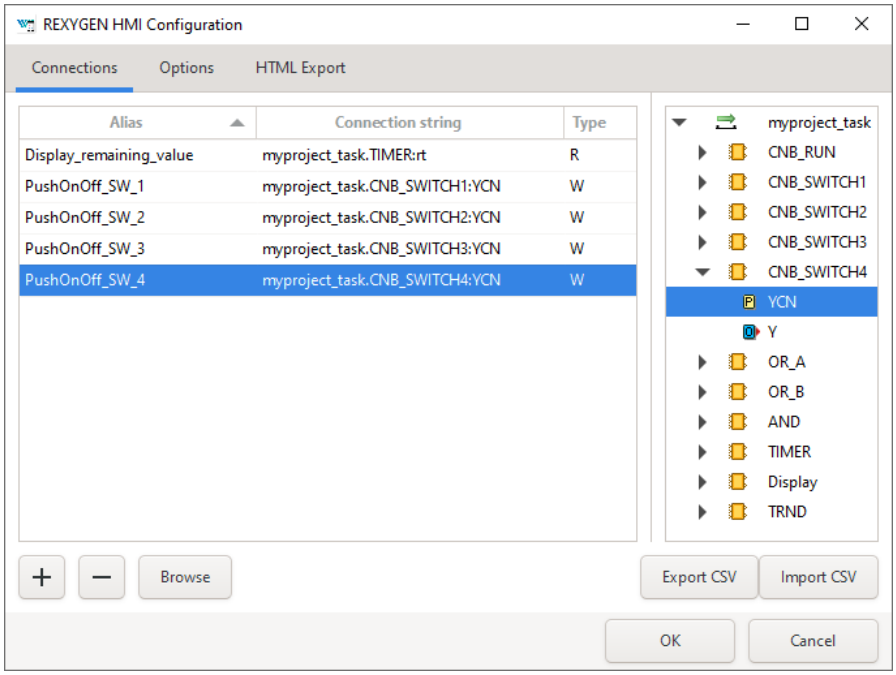
credentials, use the default username `admin` with an empty password. After a successful login the connection tab is expanded with a tree-view of the running algorithm (you have already seen this tree-view in algorithm diagnostics).



Select *Connection String* field of the `Display_remaining_value` item and afterwards browse the tree to the `TIMER` block and **double-click** the `rt` parameter. The connection string of the parameter is copied to the `Display_remaining_value` alias, which is shown in the next figure.

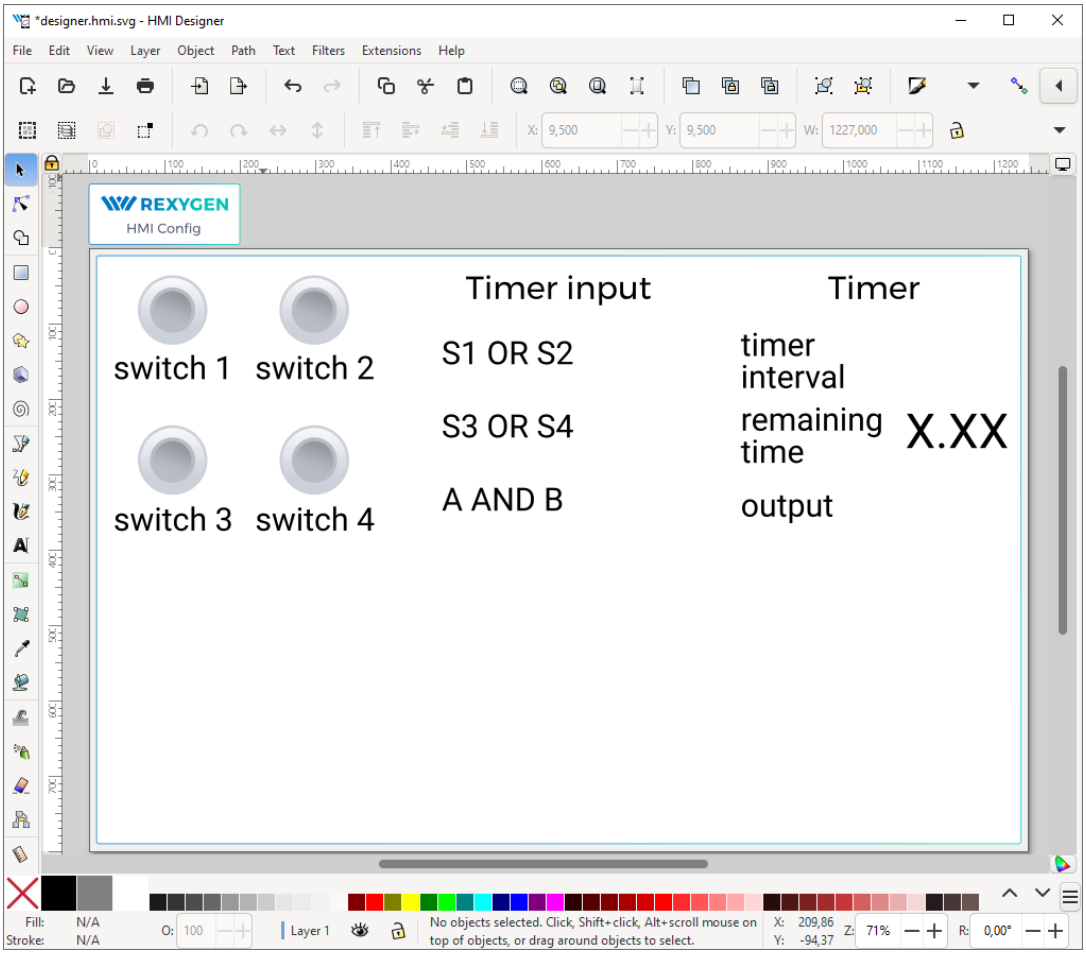


Once the display is linked we will also link the switches. Just browse the tree to `CNB_SWITCH1`, select the *Connection String* field of the *PushOnOff_SW_1* alias and double-click the `YCN` parameter. Repeat this for the remaining connection strings. Afterwards press OK to save the settings and close the dialog.



The interactive components in REXYGEN HMI Designer are just parts of the drawing. The user can position the components arbitrarily and add as many decorative static components to as needed. We will add some text descriptions to distinguish individual buttons. Use the *Text Tool* (F8), click anywhere in an empty space and start typing. Pick the *Selector Tool* (F1) afterwards and move the texts and buttons.

Note: More information about custom drawing can be found in Inkscape tutorials (See the *Help* → *Tutorials* → *Inkscape: Basic*)



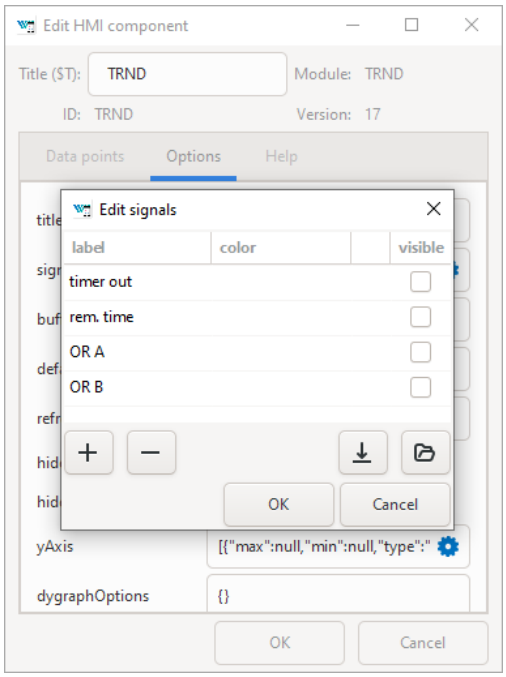
Chapter 4

Adding more HMI components

Next we will add more components to control the timer and show the status of the `OR` and `AND` blocks. Open the Elements library (Ctrl+L) and add one *Input* and four *Led* components. The LEDs will show the status of Boolean values and the *Input* will be used for changing the default timer interval value.

In the *Led* components just edit the `Title` via the *Edit Component* extension (select the component by single click and press Ctrl+E). The titles should be `Led_OR_A`, `Led_OR_B`, `Led_AND`, and `Led_TIMER_OUT` respectively. Finally edit the *Input* component by changing the `Title` to `Input_interval`.

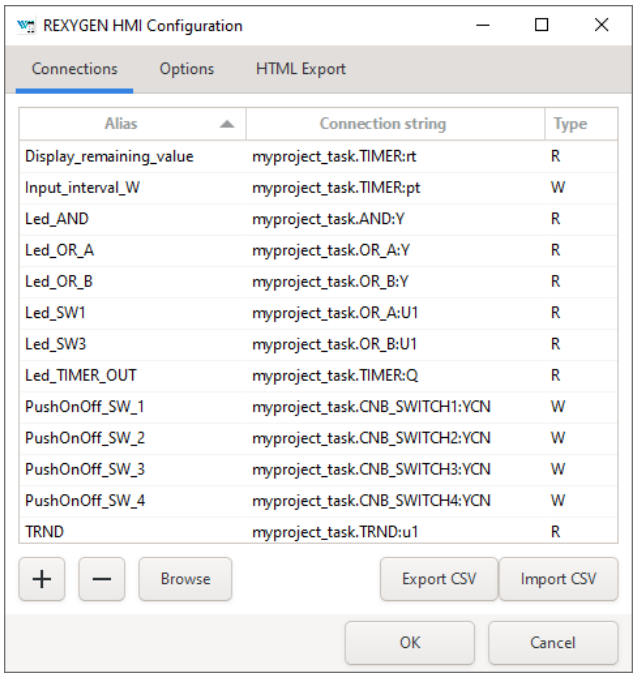
The last component we need is a graph showing the time-plot of data from the `TRND` block. Use the components library (Ctrl+L) and add a *TRND* component. You can adjust its size to fit the desired position. Edit the component (Ctrl+E) and change the `Title` to `TRND` and switch to the *Options* tab. Double-click the `signals` property. Add the following labels using the plus (+) button: `timer out`, `rem. time`, `OR A`, `OR B`. These labels will be shown in the legend of the graph.


Edit HMI component
Title ($T):
TRND
Module:
TRND
ID:
TRND
Version:
17
Data points
Options
Help
Edit signals
label
color
visible
timer out
rem. time
OR A
OR B
OK
Cancel
yAxis
[{"max":null,"min":null,"type":"
dygraphOptions
{}
OK
Cancel

Chapter 5

Additional links to the running algorithm

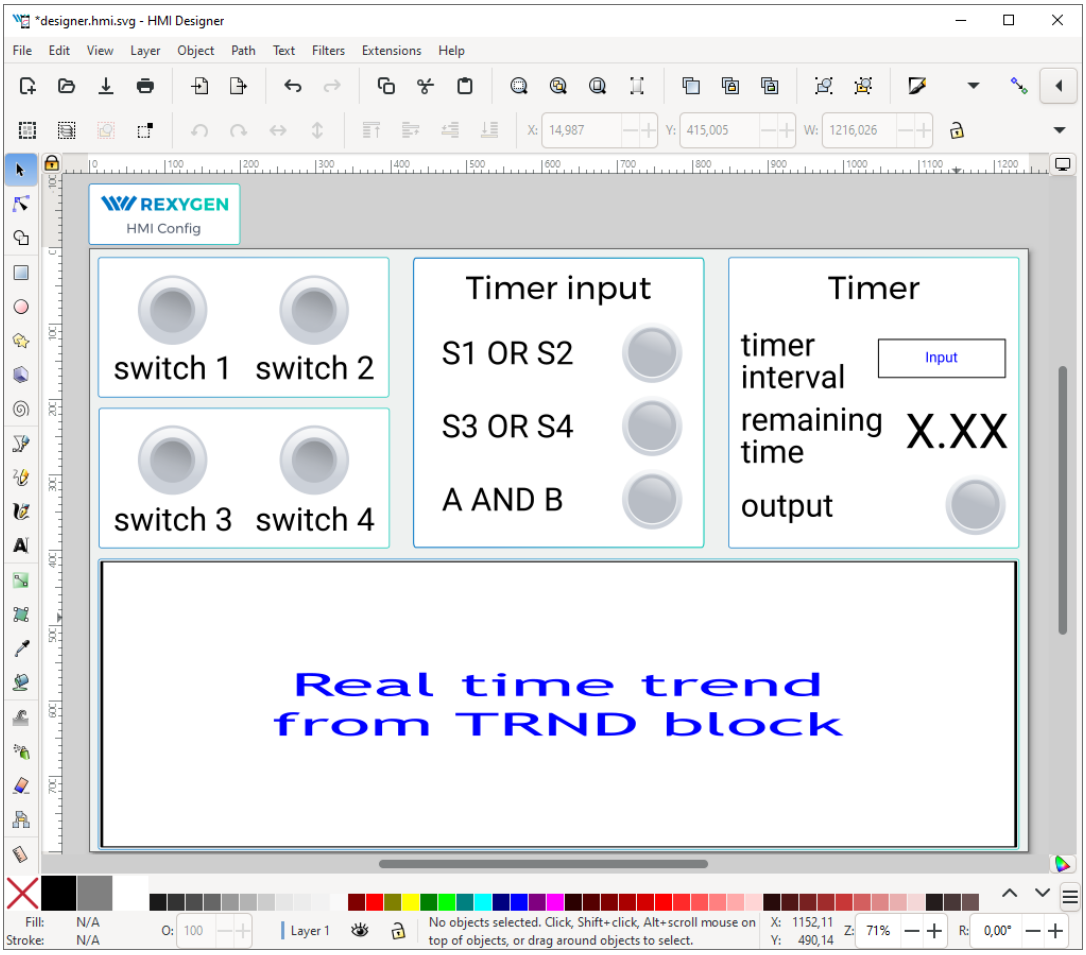
When all the components are in place we link them to the running algorithm again. Just repeat the procedure described in Section 3, open the *HMI Configuration* dialog (*Extensions* → *REXYGEN HMI* → *Edit HMI Config*) and browse the running algorithm to pair the remaining aliases with corresponding connection strings. The list is shown in the following image.



Chapter 6

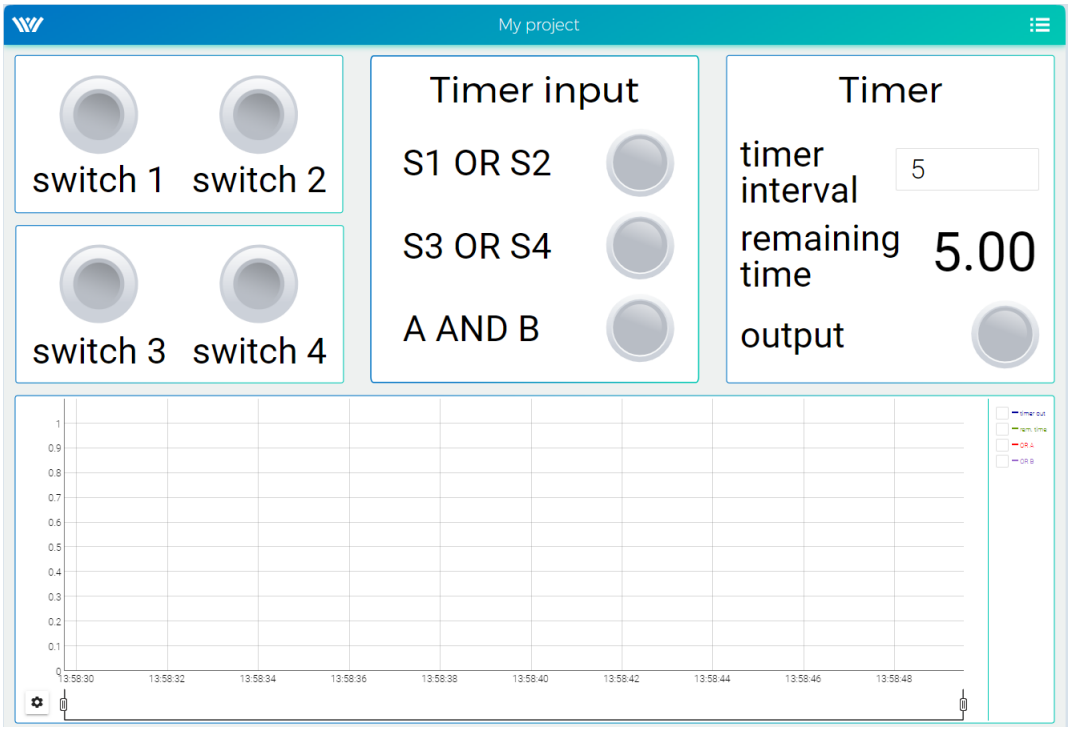
The final steps

Congratulations, your first graphical HMI is almost ready! Add a few rectangles which will visually divide the HMI into individual sections. Use the *Rectangle Tool* (F4), draw the rectangle, pick a color from the palette and send the rectangle to the background using the End key. Do not forget to save the drawing.



As mentioned earlier, the **.hmi.svg* files in the `hmisrc` folder are automatically processed while the project is compiled in the REXYGEN Studio application. The project main file must contain the `HMI` block with `GenerateRexHMI` parameter set to `on`. This was already set when creating the first project in the manual [1], so you should have everything ready.

Once you compile the project again and download it to your platform, the HMI will be accessible via a web browser. Navigate to `http://192.168.1.100:8008/hmi/designer.html` (replace 192.168.1.100 with the IP address of your platform). You will see your HMI with live data.



This tutorial covers only the very basic components. If you want to get more information about additional components, see [2].

Bibliography

[1] REX Controls s.r.o.. *First Project*, 2024. →.

[2] REX Controls s.r.o.. *REXYGEN HMI – User manual*, 2024. →.

Documentation reference number: 17159