USER GUIDE

CUSTOM LOGIC

ENGINEERED
TO OUTRUN

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PURPOSE AND BASIC DESCRIPTION

Custom Logic is a new tool in the Ekip Connect 3 Software that lets you create your own logics for many applications.

Users can easily create connections and logics with devices, saving time on complex programming and extra wiring, and removing the need for external controllers.

The Custom Logic tool has a simple graphical interface, making it less complex than typical Programmable Logic Controllers (PLCs).
The most significant capabilities that the tool possess are as follows:

- Do not require a connection to circuit breakers during programming:
  The tool does not require a connection to the device during the logic configuration, Ensuring the comfort and safety of the operator.
- Creation of flexible logics using a visual approach:
  With a block-based visual strategy, the tool guides the user to use the available inputs on the device and combine them using the available operators. Moreover, the tool provides the necessary product configuration for each device to implement the logic (Bill of Material).
- Logic creation validation:
  The tool will allow for checks both on the correctness of the logic and on the verification of the behavior within the tool itself.

CREATE PROJECT

This chapter explains how to create a project using the Ekip Connect software. By creating a project, the user can save an encrypted file (.cl format) that contains the entire logic along with all the devices involved.
Creating a project does not require being connected to any device or having a specific license or user account.

This chapter also highlights and explains the various elements of a project without referring directly to a specific example.

Material required

Every Custom Logic (CL) project can be created and designed off-line, therefore without the need of any device connected to the laptop. It is required to:

- have installed the Ekip Connect 3 software (check for latest available version in ABB Library: *https://library.abb.com/d/1SDC20011X3000*)
- Purchase “Custom Logic Tool” license from the following ABB Marketplace link: *Custom Logic*

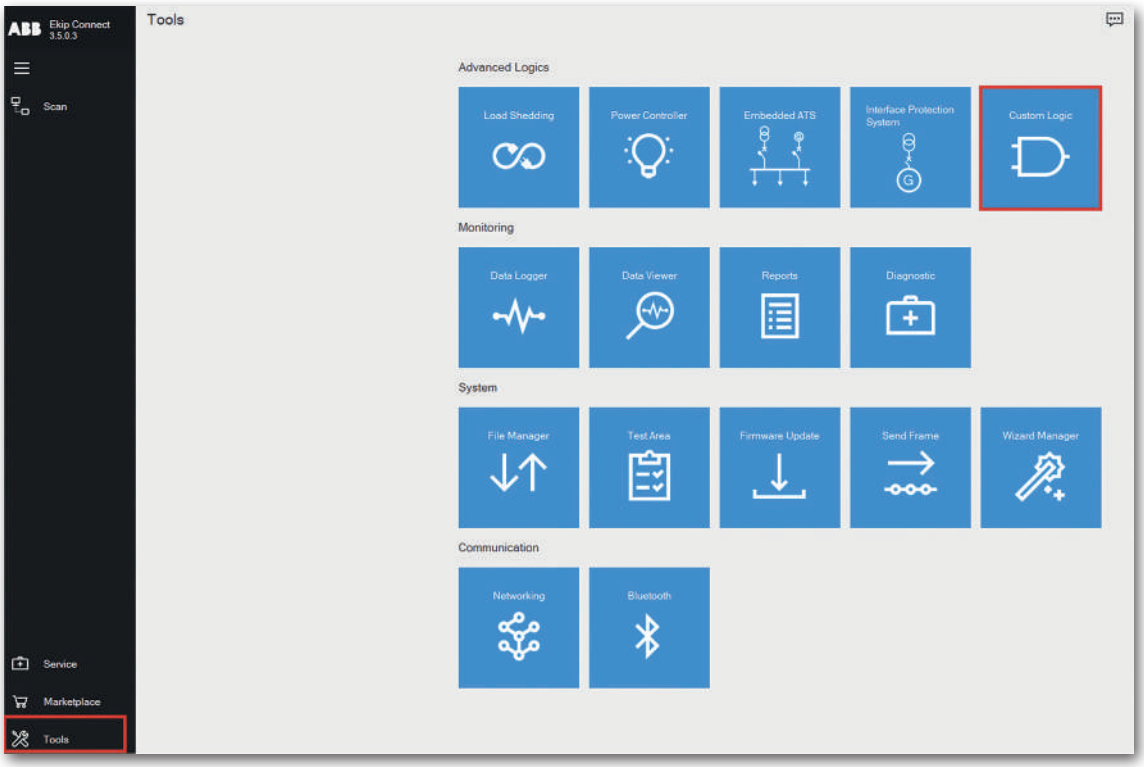
Once redeemed, the license becomes permanently linked to the device’s serial number.

Note: The Custom Logic license is required only to upload the logic onto the device. The license is linked to each individual device, not to the project. Logic must be uploaded by connecting directly to each device, where the license must be activated.

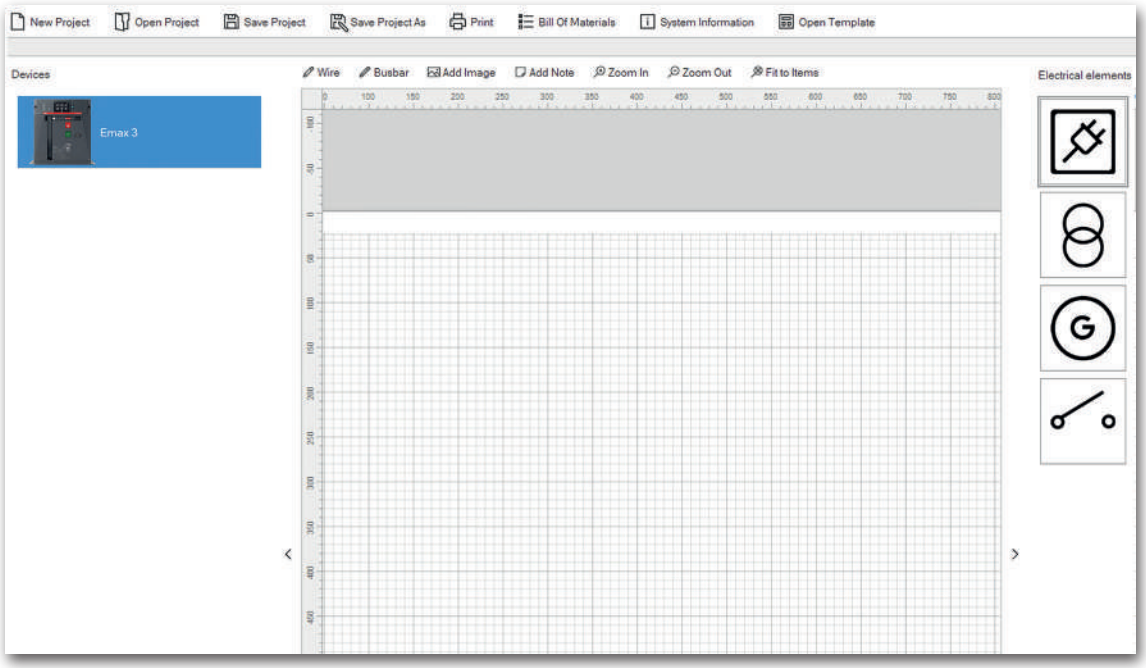
CREATE PROJECT

New Project

Open Ekip Connect software. Click on Tools → Custom Logic



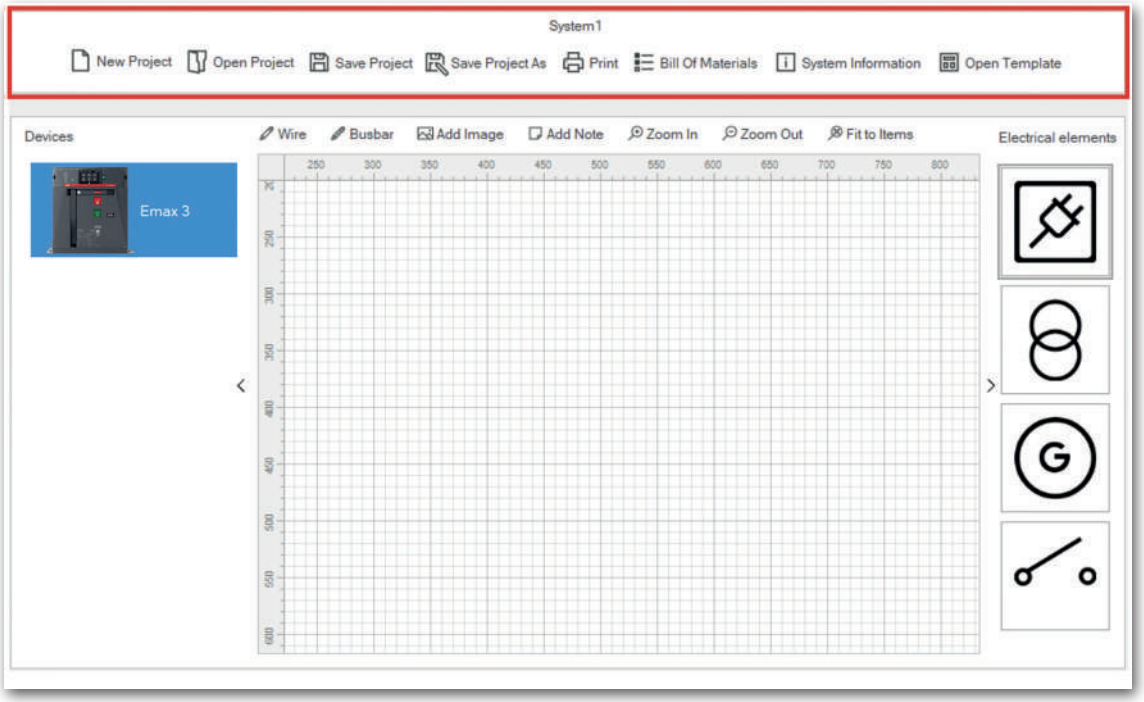
Here is an overview of the tool's main page:



Let's now analyze the meaning of each component of this page:

File management

At the top of the Custom Logic main page, there are several functionalities to manage the project:



New Project: start the new project

Open Project

Save Project

Save Project as

Print project: it creates a pdf file with all the information and materials of the project.

Bill of Materials: it automatically creates a list of materials (hardware and software) that is required to make the logic works as designed. This will be analyzed more in followings chapters.

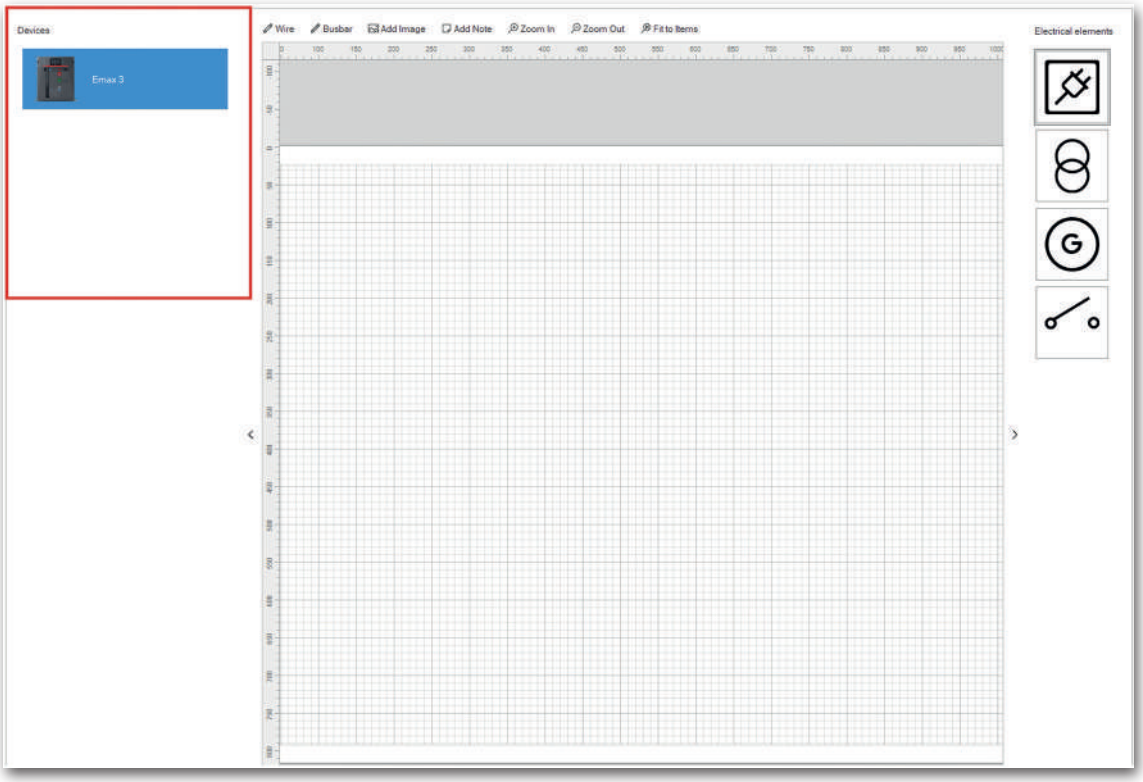
System Information: displays the history of all downloads and uploads for the devices within the project.

Open Template: Opens a list of preconfigured logics that can be downloaded directly to the devices.

Devices list

This is the list of devices that can be involved in the logic. To insert a device, either double-click on it or drag and drop it into the Diagram View.

The same type of device can be inserted multiple times, with a maximum of 20 devices allowed in the Diagram View.



Electrical elements

List of electrical elements that can be added into the diagram page.
To insert one device, double left clicks on it or drag and drop it in the diagram view.

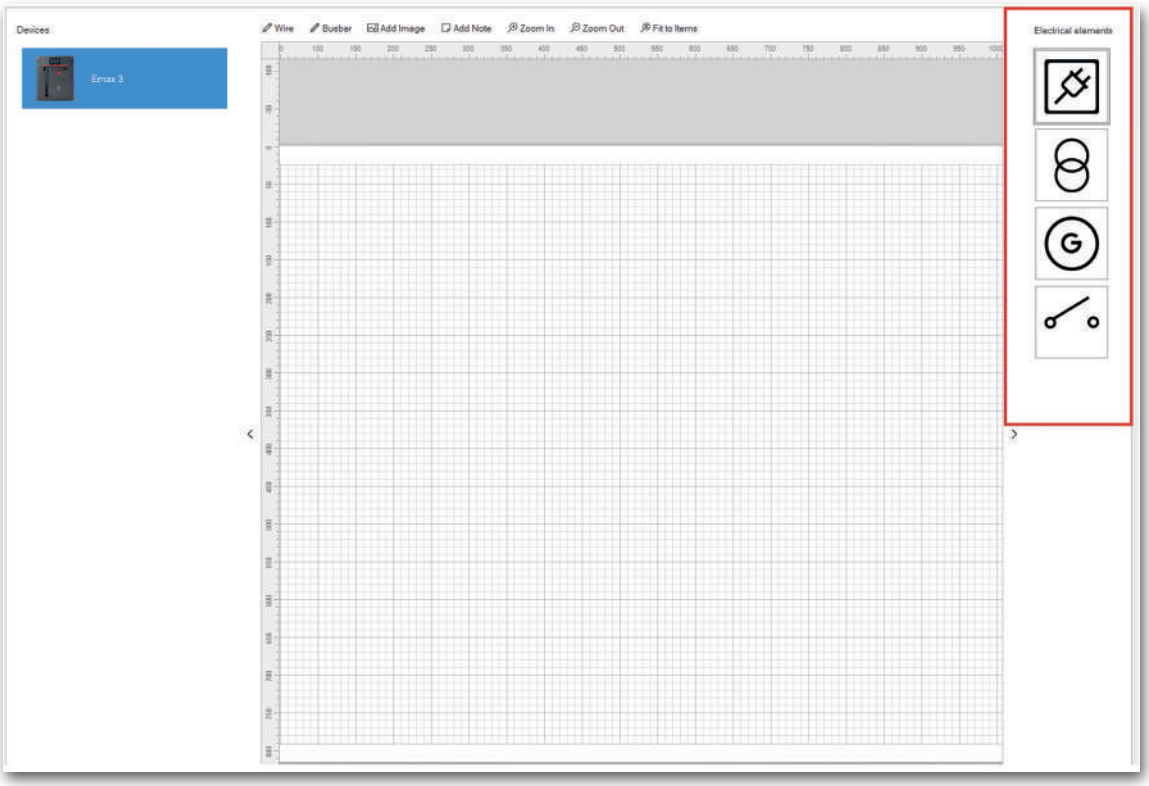
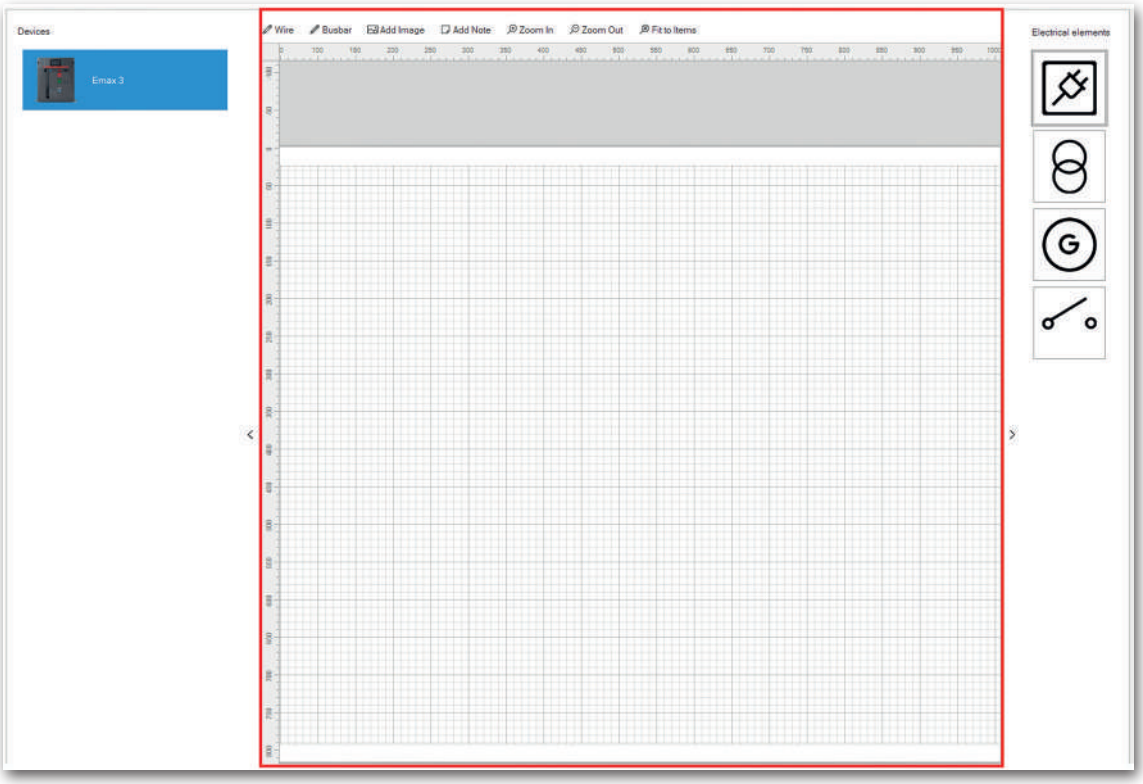


Diagram Page

It is a graphic representation of the system. It is possible to draw a single line diagram of the plant or some schematic that can help the user to understand better the entire system.



In addition of devices list and Electrical Elements, to fill the Diagram Page are present the following options:

Wire: draw thin lines to represent connections between objects in the single line diagram.

Busbar: draw thick lines to represent the busbar in the single line diagram.

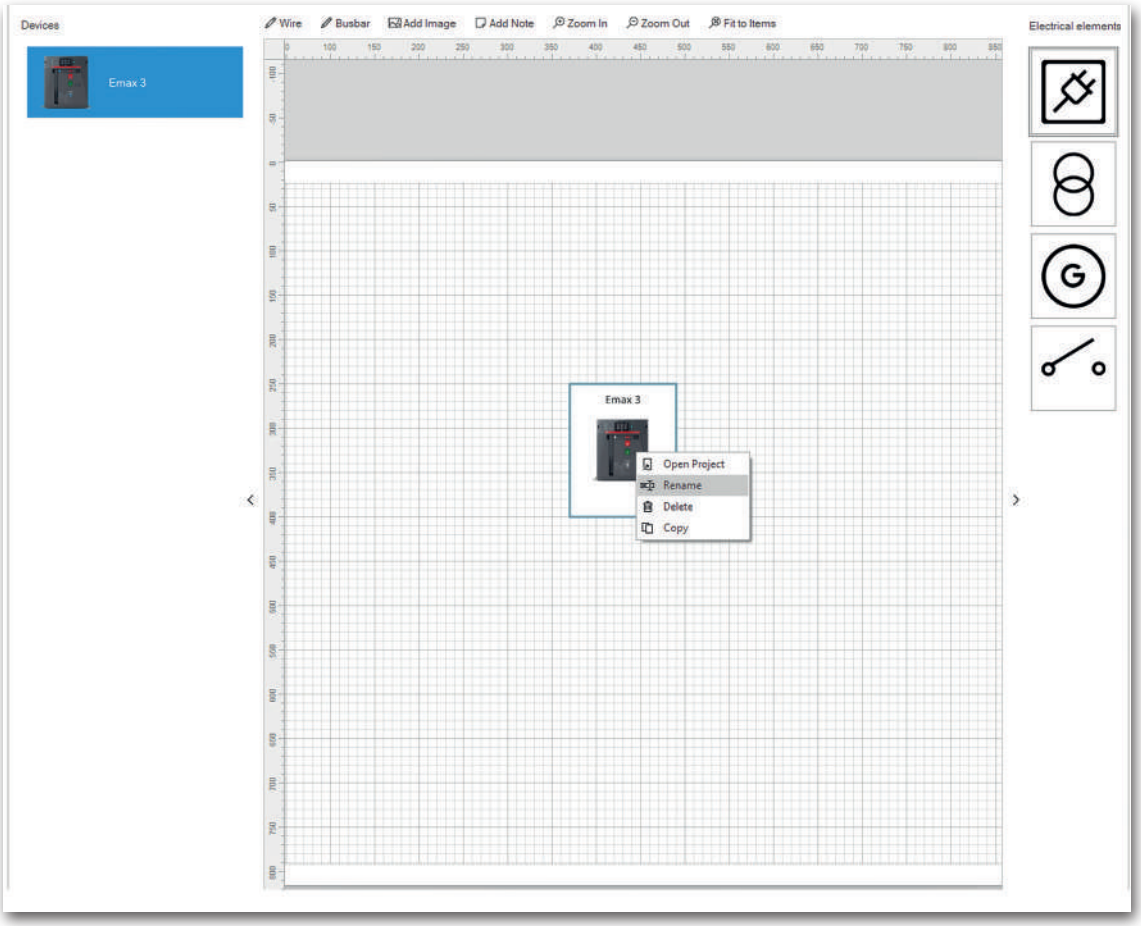
Add Image: insert an external image file in the page.

Add Note: insert a sticky note in the page.

Zoom In, Zoom Out & Fit to Items: adapt the graphic view of the page

Note: The diagram page is just a graphical representation and it's not defining any behavior of the logic.

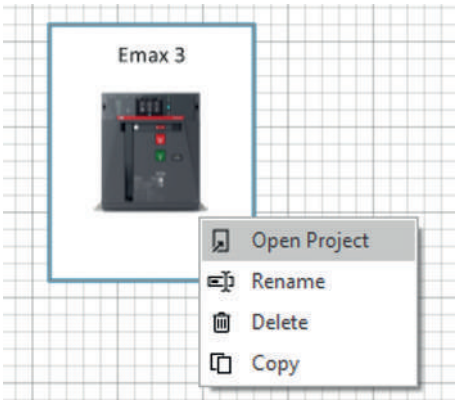
When a breaker is inserted in the page, it is possible to rename it by using the right click:



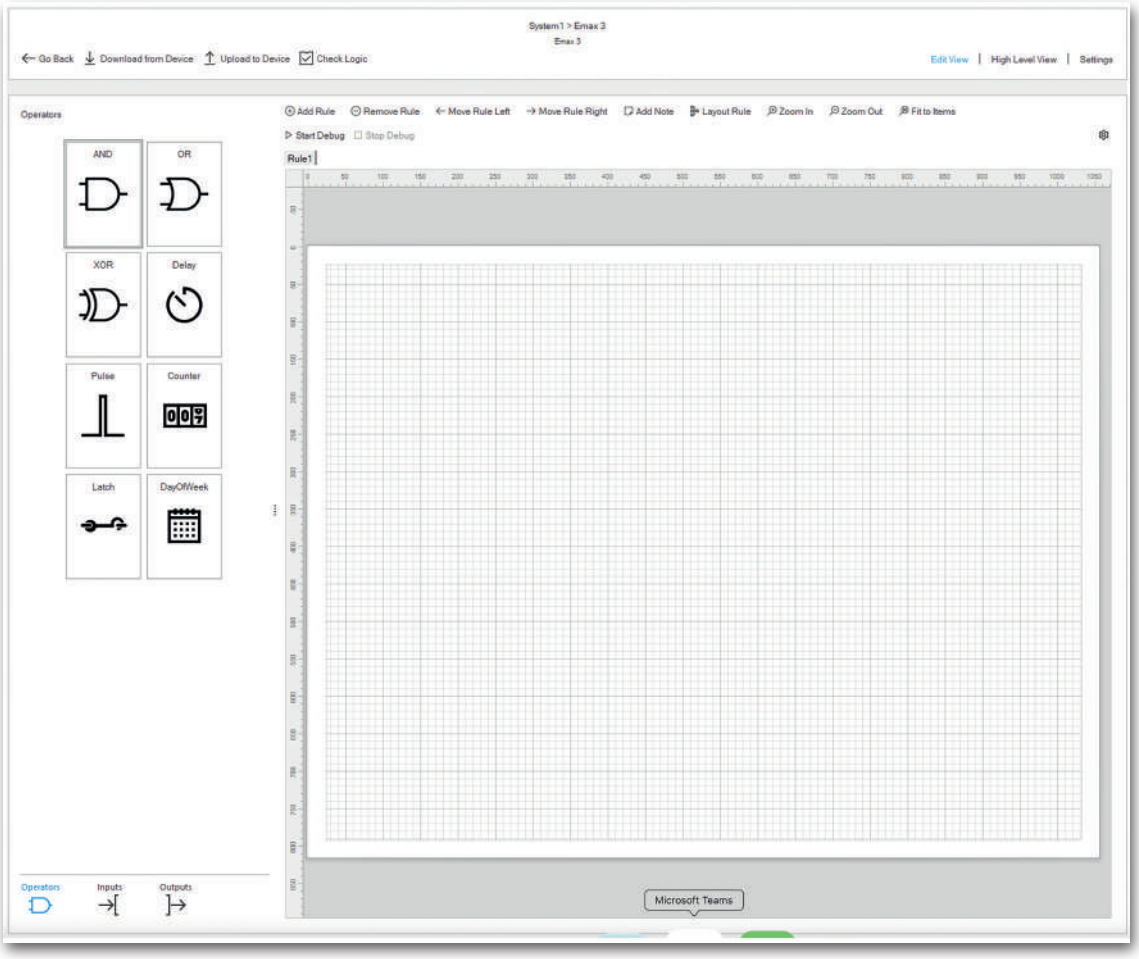
LOGIC DESIGN

After the devices are added to the diagram page, the logic must be programmed individually on each single device.

Therefore, select one device → right click → Open Project (or double left click) and the programming page opens:



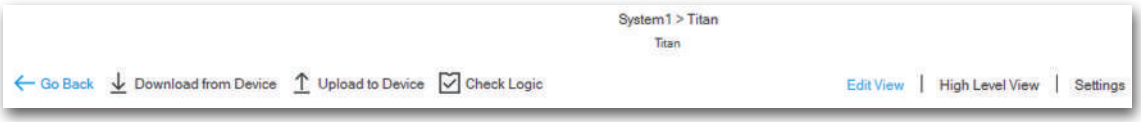
Here is an overview of the programming main page



In this page it is possible to implement the logic for the breaker selected.
Let's now analyze the meaning of each component of this page:

Logic features

After opening the project, tools and views appear at the top of the page to support project management.



Functionalities:

Go Back: it goes back to the diagram page

Download from Device: download the logic from the device to the laptop

Upload to Device: upload the logic from the laptop to the device

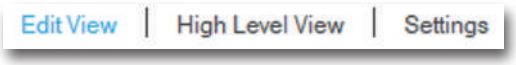
Check Logic: it checks if the logic does not present any error and if it is re-specting the device memory limit

Views:

- **Edit View**: Main page to program the logic
- **High level View**: page where is presented the interconnection between each logic block
- **Settings**: page where is presented the list of Programmable Status, Digital Output and Delay programmed in the logic

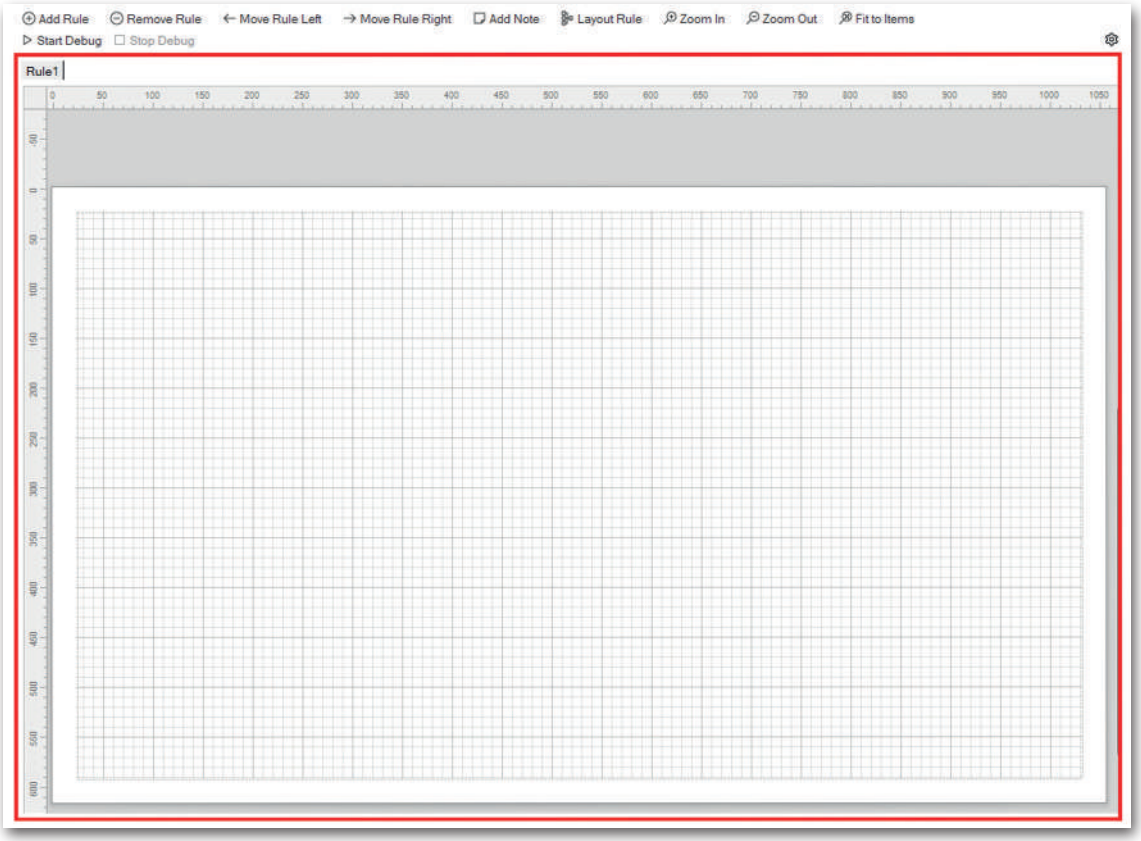
Edit View

This is the main page in which the logic is implemented.



Rules

Rule is the window where the user can insert Input, Output and Operator to program the logic.



Add Rule: insert a new Rule in the logic

Remove Rule: delete the selected Rule

Move Rule left: Move the selected Rule before the previous one

Move Rule Right: Move the selected Rule after the next one

Add Note: insert a sticky note in the Rule

Layout Rule: organize automatically the layout of the Rule

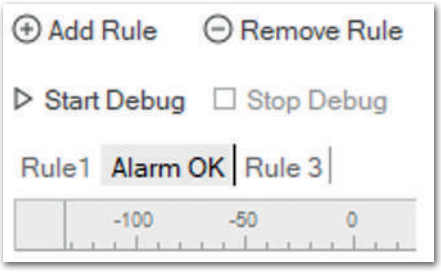
Zoom In: zoom more the selected Rule objects

Zoom Out: zoom less the selected Rule objects

Fit to item: zoom in/out automatically to adapt the view at the Rule

Note: Zoom In/Out can be done also by scrolling the mouse wheel + ctrl button.

For each Rule, it is mandatory to have at least one Input variable and only one Output.
Each Rule can be renamed by clicking directly in the Rule name.

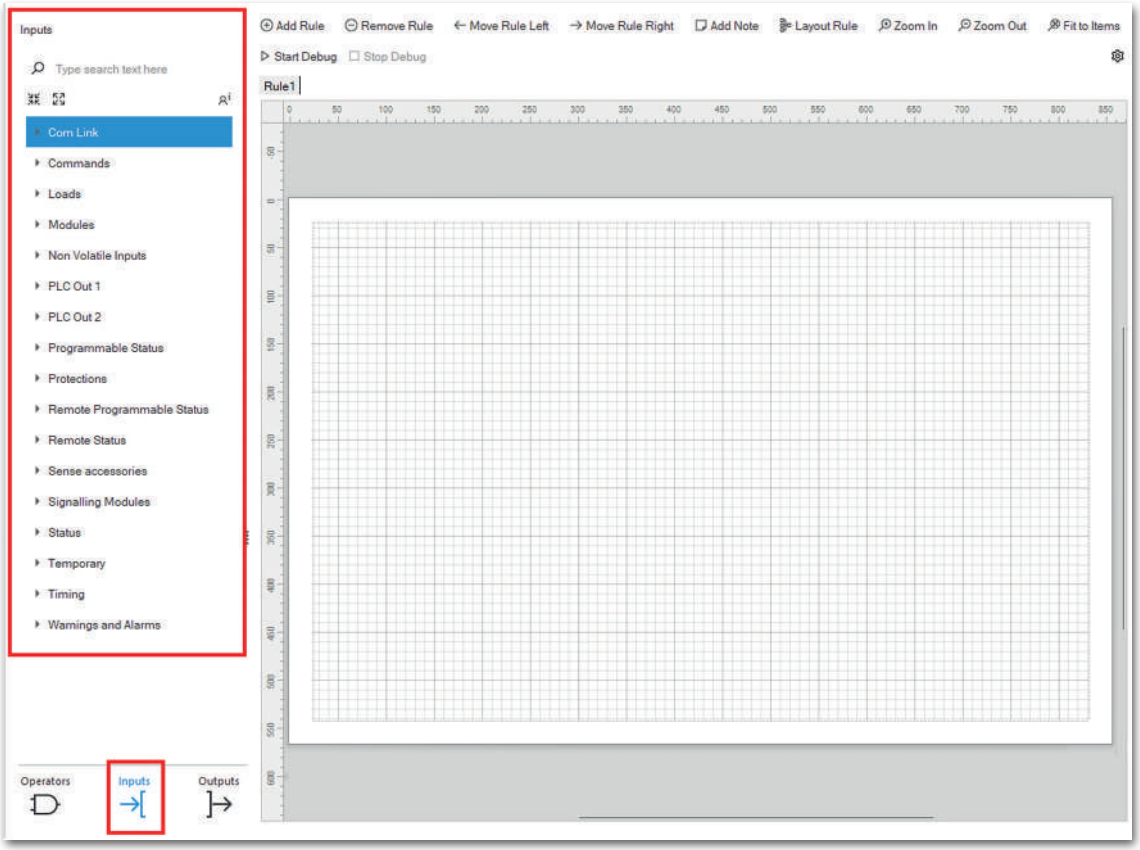


Note: the output can be “PLC Output”, “Temporary” or “Ekip Signalling” variable.

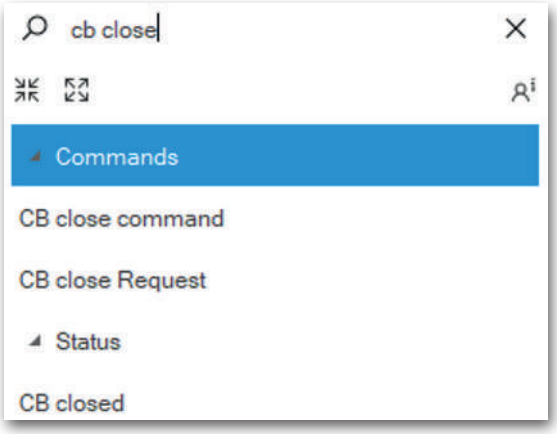
Inputs

According to the type of device selected, in the Inputs menu are present all the variable defined in the registers of the System Interface document.

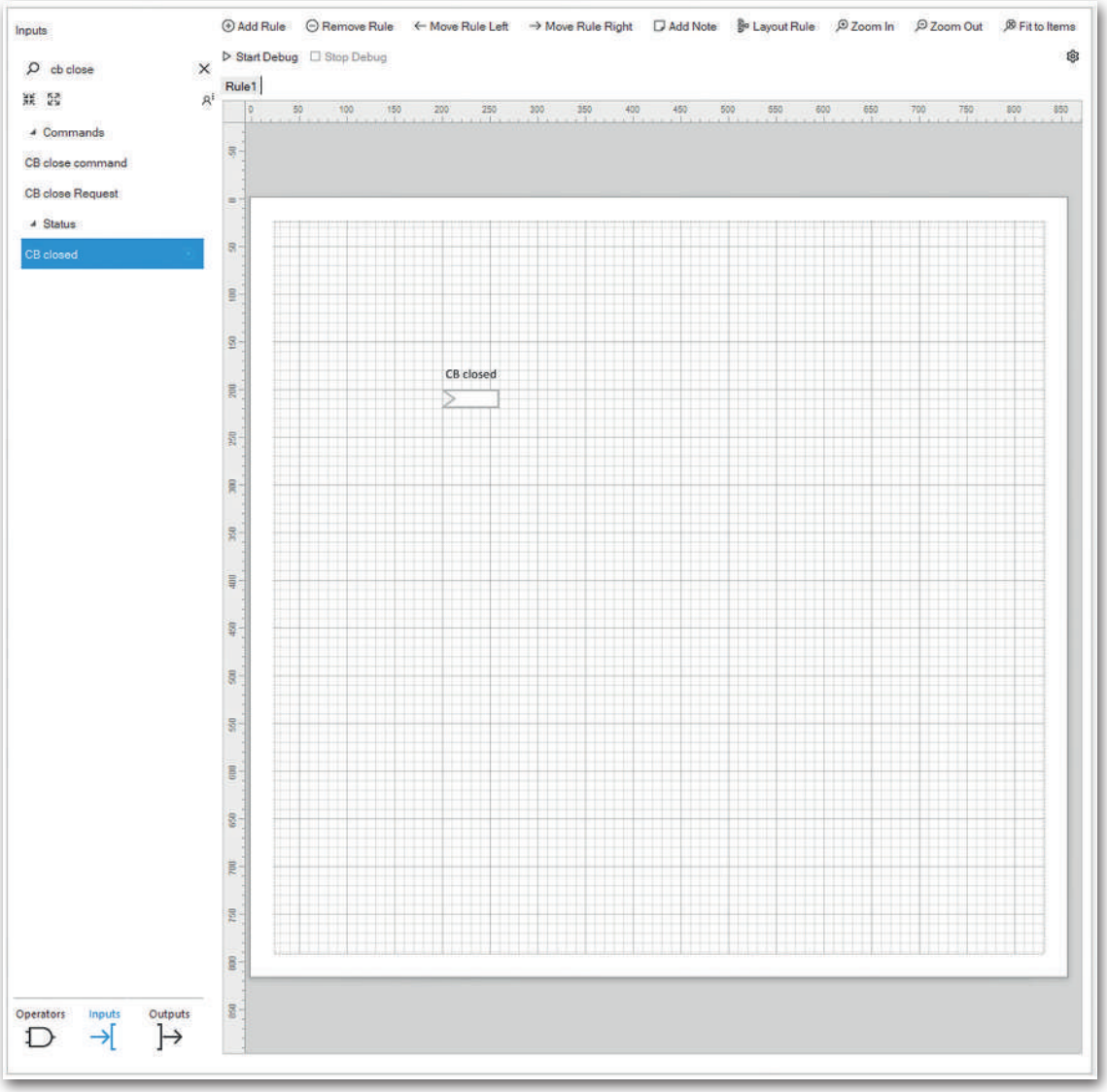
For additional detail, the document is available in ABB Library (*https://library.abb.com/d/1SDH001140R0001*):



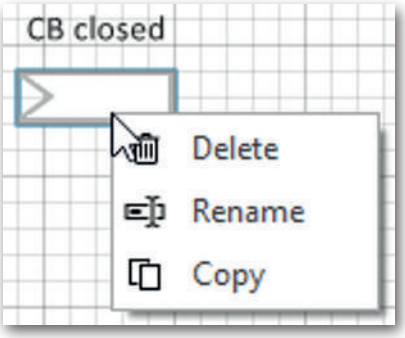
Every input variable can be searched manually by expanding the tree menu, or it can be searched by typing the name in the dedicated row:



To select the input, double left clicks on it or drag and drop it in the Rule:

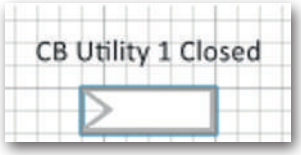


Each variable can be copied or deleted:

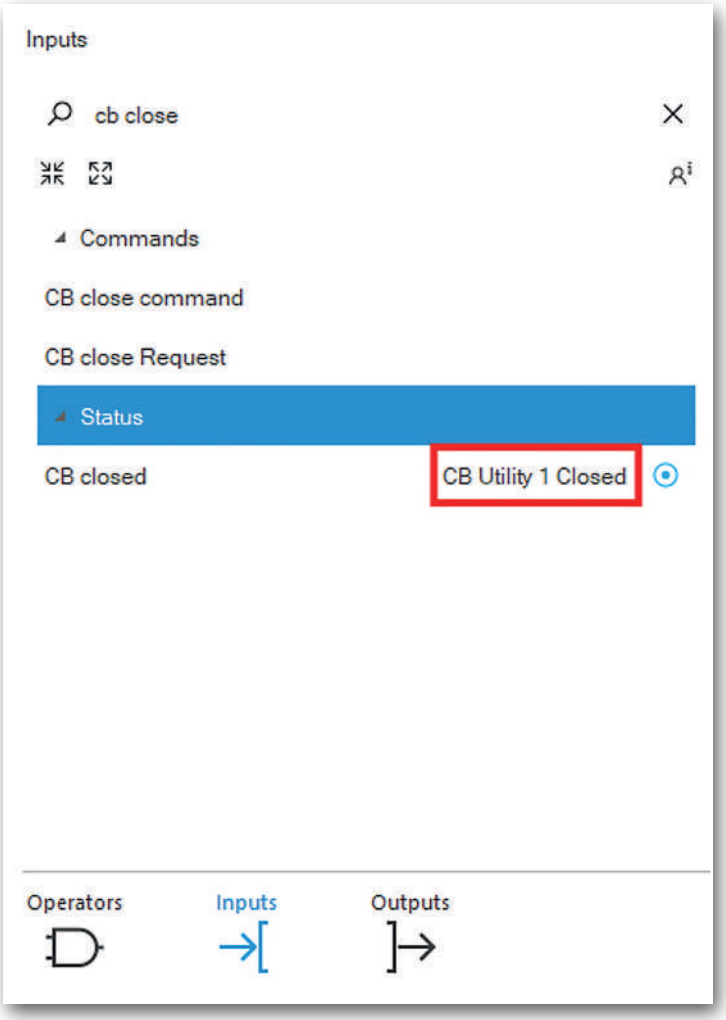


Every Input can be also renamed:

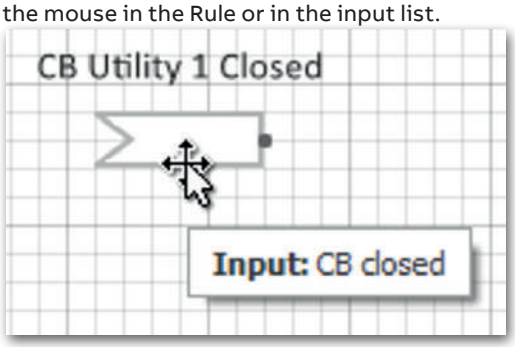
- by using right click → Rename or double click:



- from the Inputs menu list by typing the new name next to the variable:



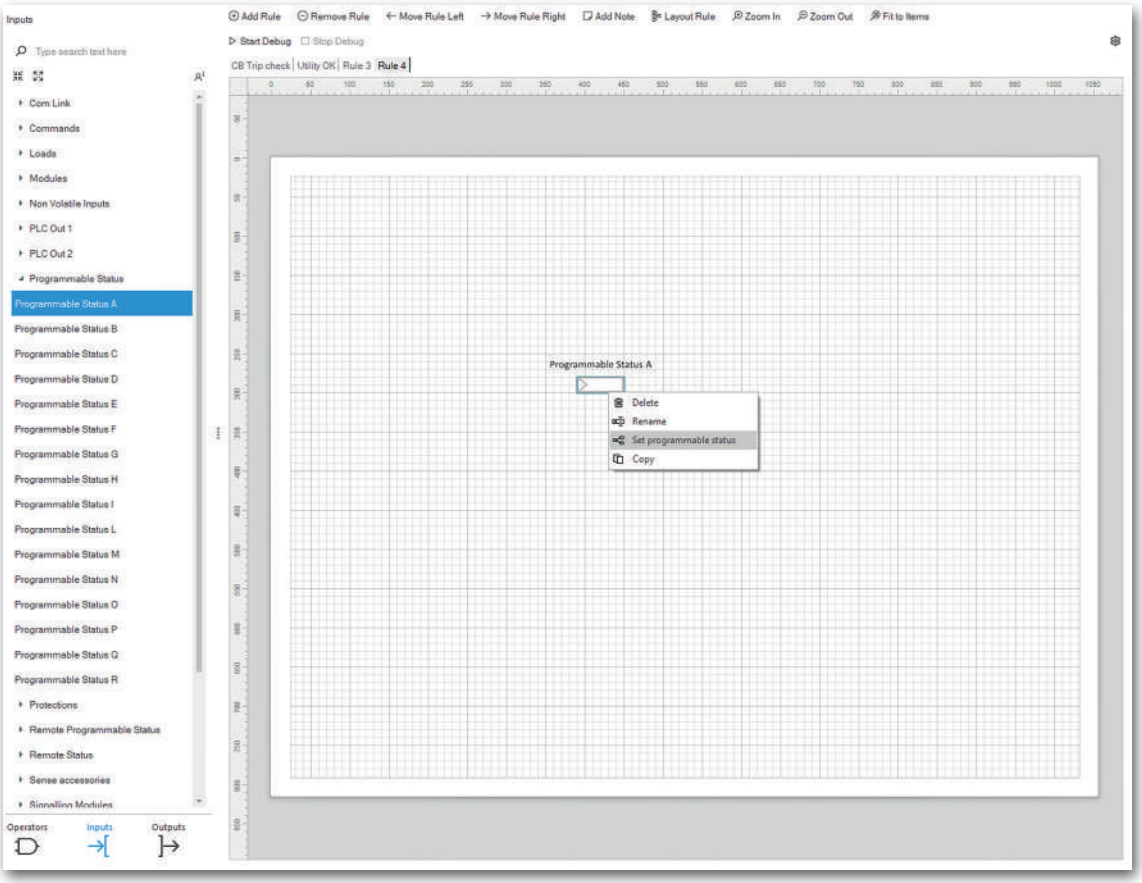
It is possible to see the connection between the new name and its source variable by pointing at it with the mouse in the Rule or in the input list.



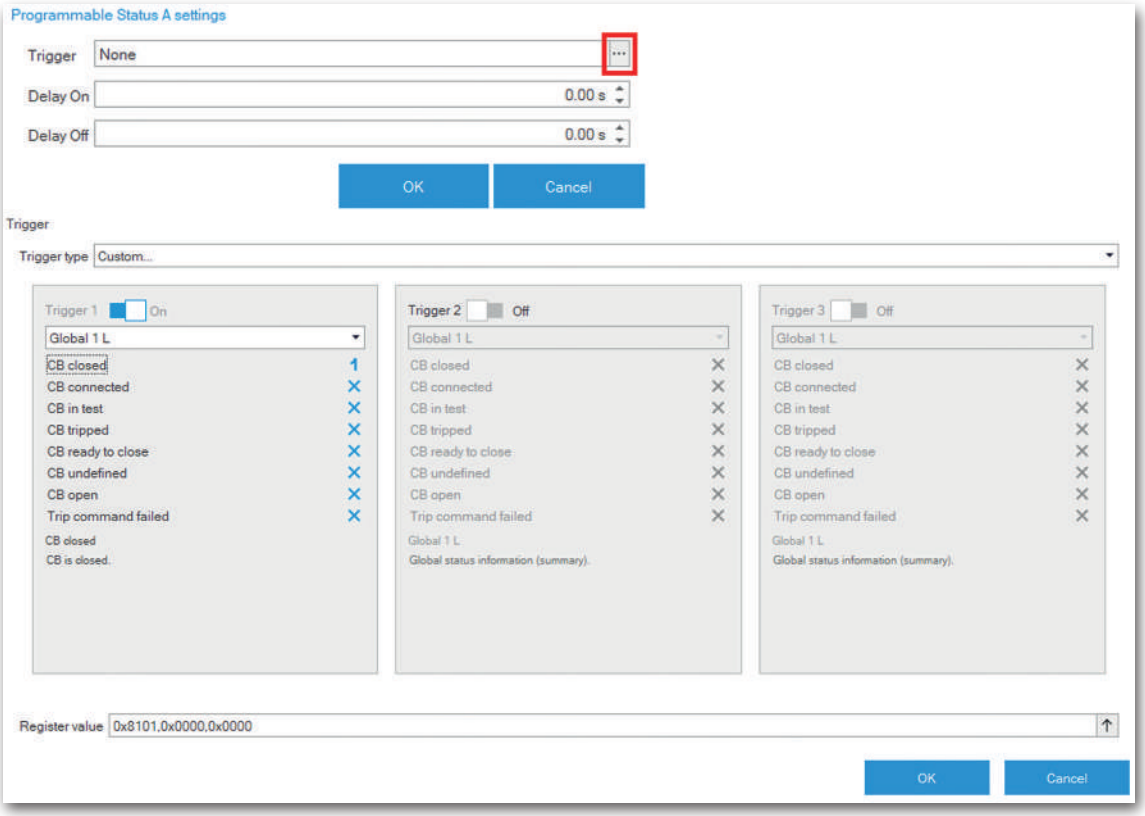
Once the input variable is inserted in a Rule, the following icon appears in the menu:

Programmable Status

The Programmable Status input can be programmed directly in the Rule by double-clicking (or right click) the selected Programmable Status variable



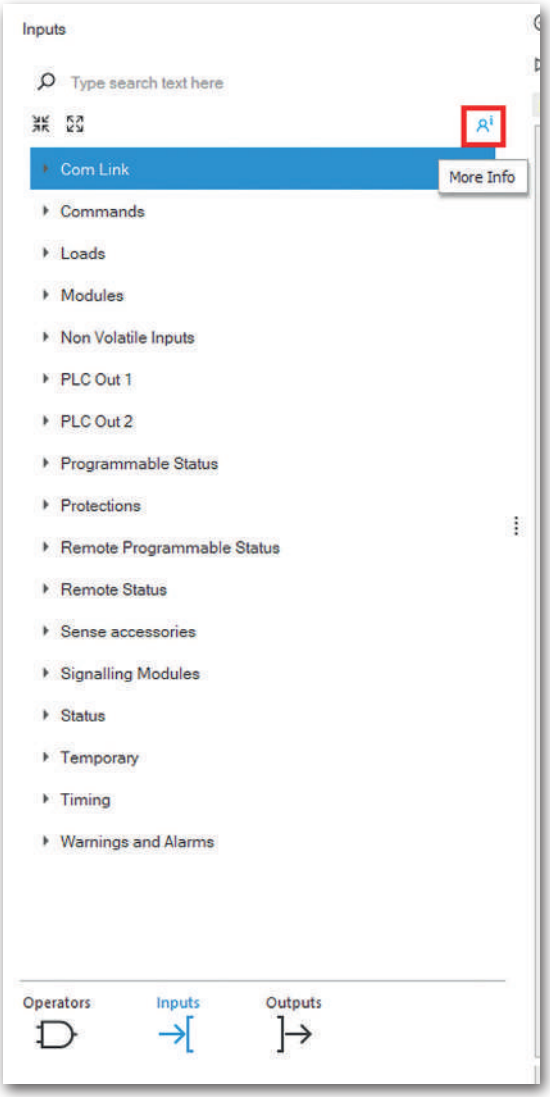
To select the Trigger, click on the 3 dots and select the variable connected to it (i.e. “CB closed)

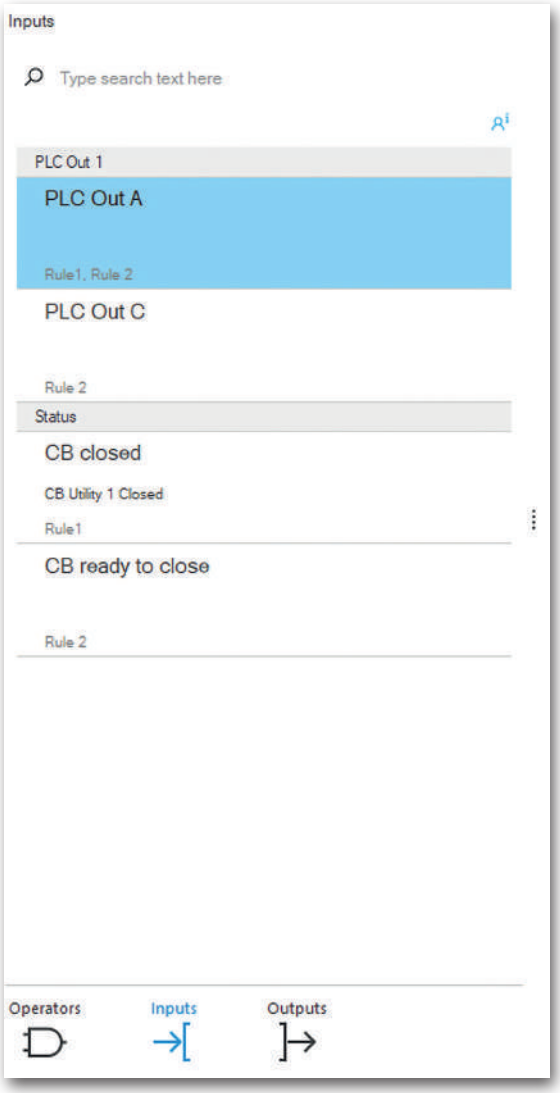


Note: it is possible to select the Delay On and Off values of the Programmable Status.

More Info

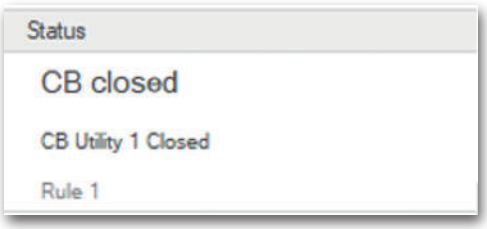
There is a way to have a list of all the Inputs involved in the logic by clicking on the icon “More Info”, the list of Inputs is presented:





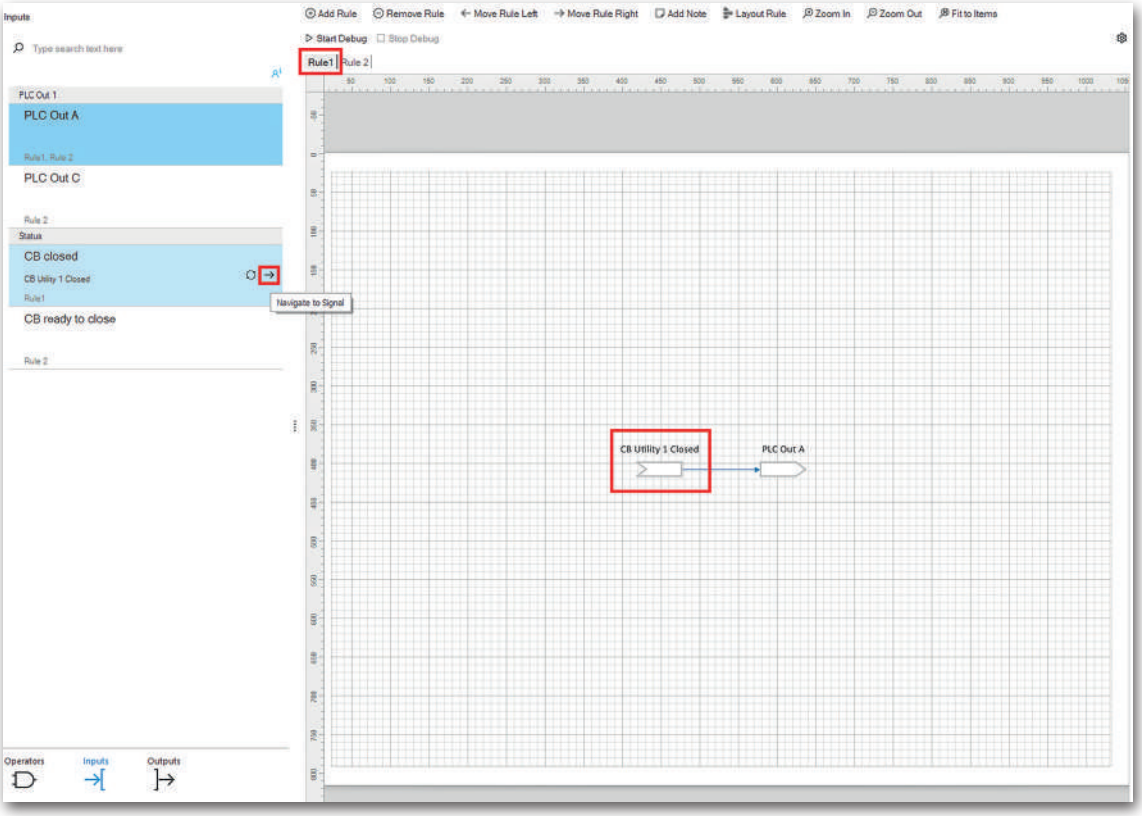
Each input variable corresponds to a cell, which is composed of a title and three rows:

- Title: Name of the register to which the variable belongs (i.e. “Status”)
- 1st row: input variable (i.e. “CB closed”)
- 2nd row: input variable tag (i.e. “CB Utility 1 Closed”)
- 3nd row: Rule where the variable has been inserted (i.e. “Rule 1”)



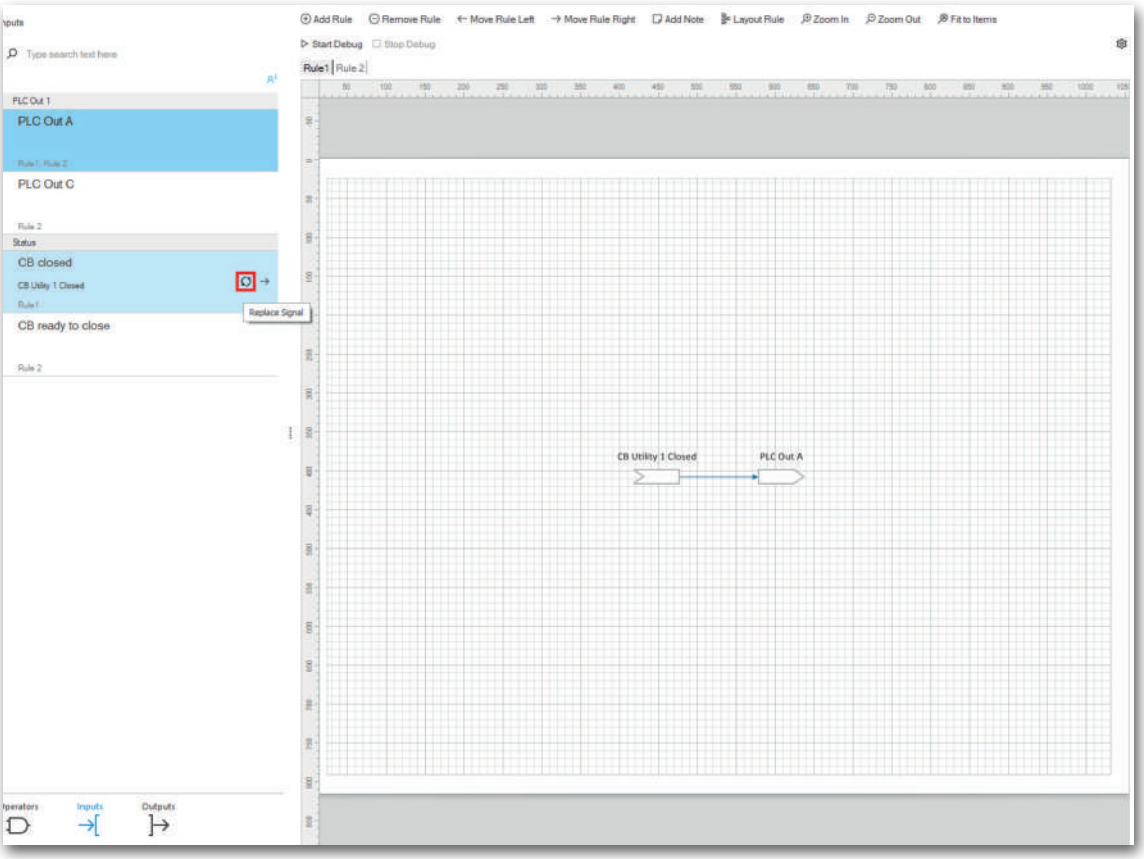
Navigate to Signal

By clicking on “Navigate to Signal”, it moves to the Rule where the selected input is present.
If the same input is present in more than one Rule, by clicking again the “Navigate to Signal” the diagram page move the next Rule.



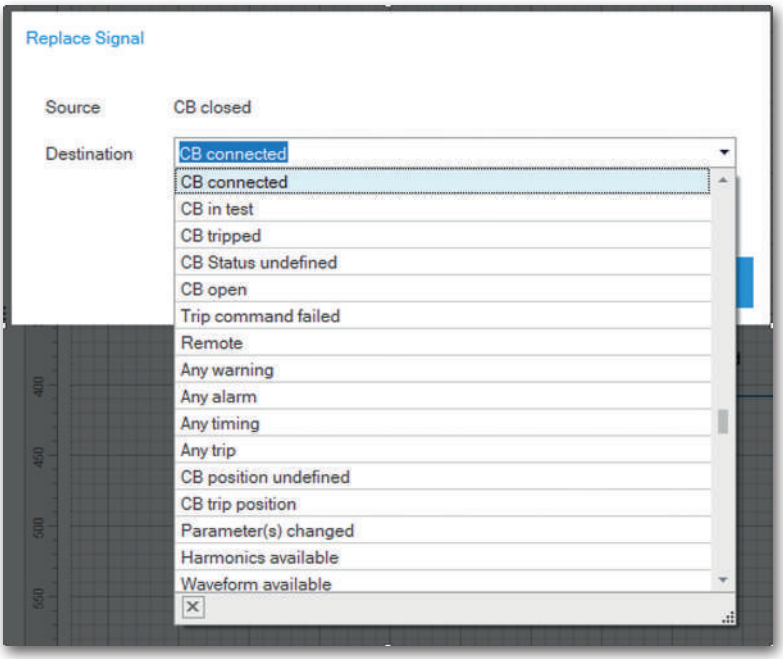
Replace Signal

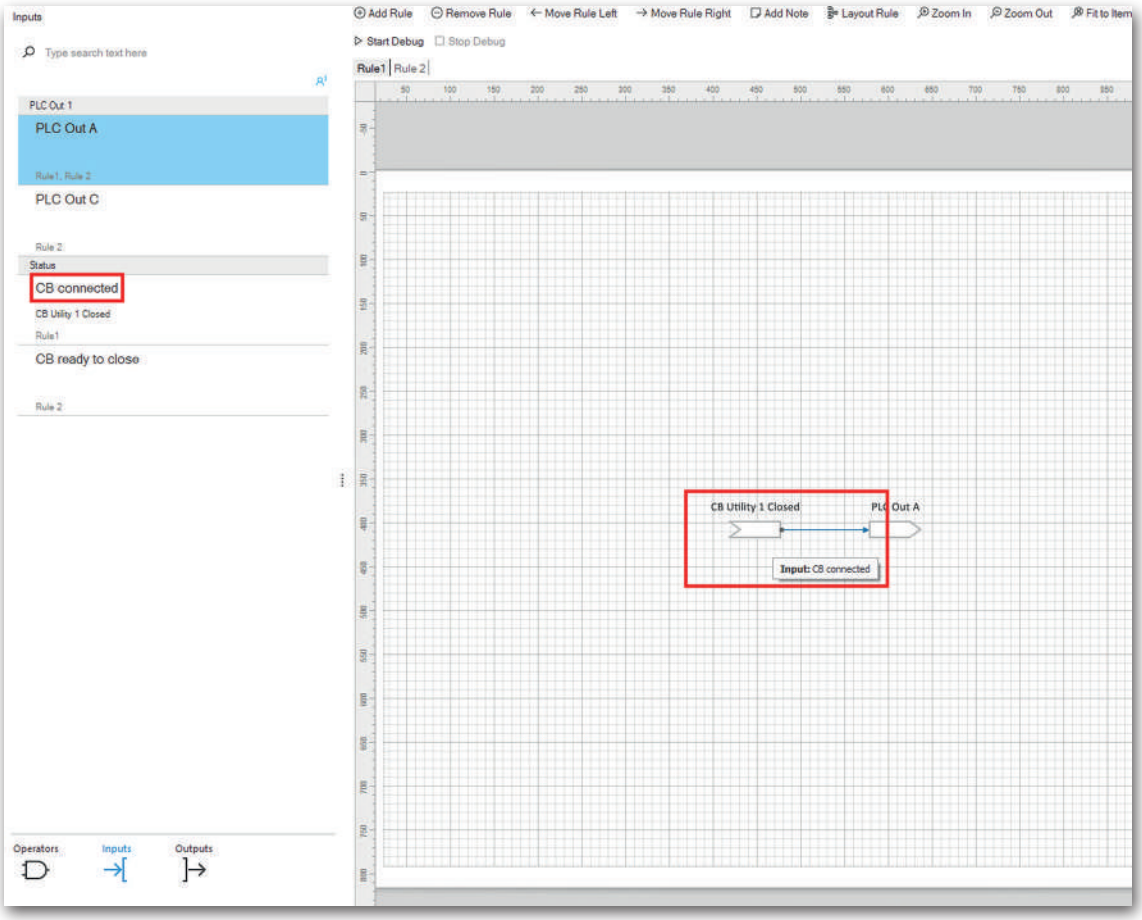
Each input can also be replaced with another directly from this page without losing any connections by clicking on ‘Replace Signal



Note: Replace Signal not available for PLC Output and Temporary registers

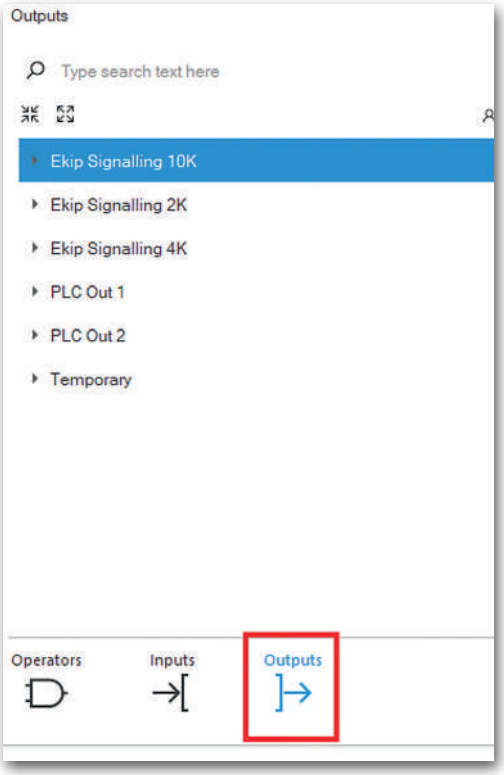
It opens a window where the variable can be replaced with another one selected from the tree menu. For example, in this case the variable “CB closed” is replaced with “CB connected”:



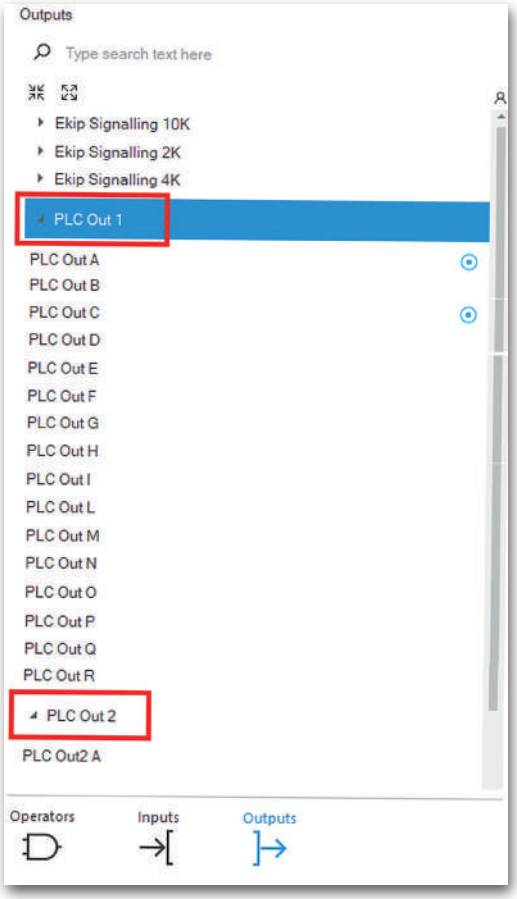


Outputs

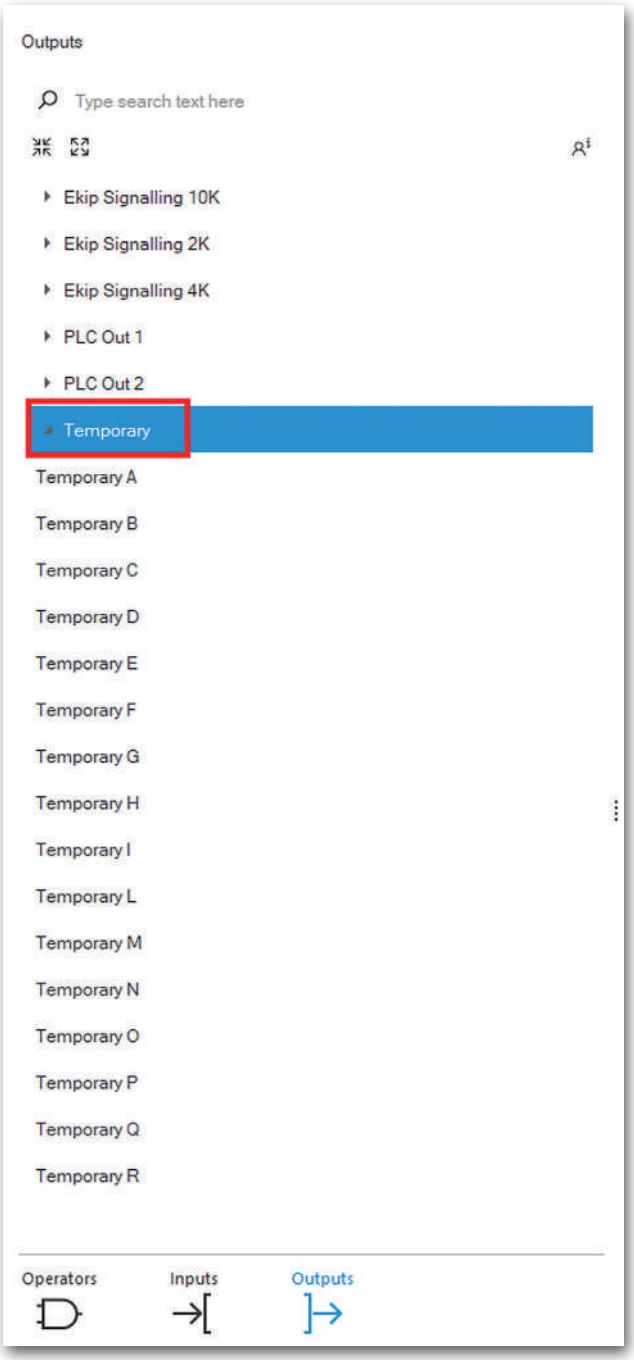
Each rule requires one output. Each output is a Boolean variable, but it can have different characteristics according to the register selected.



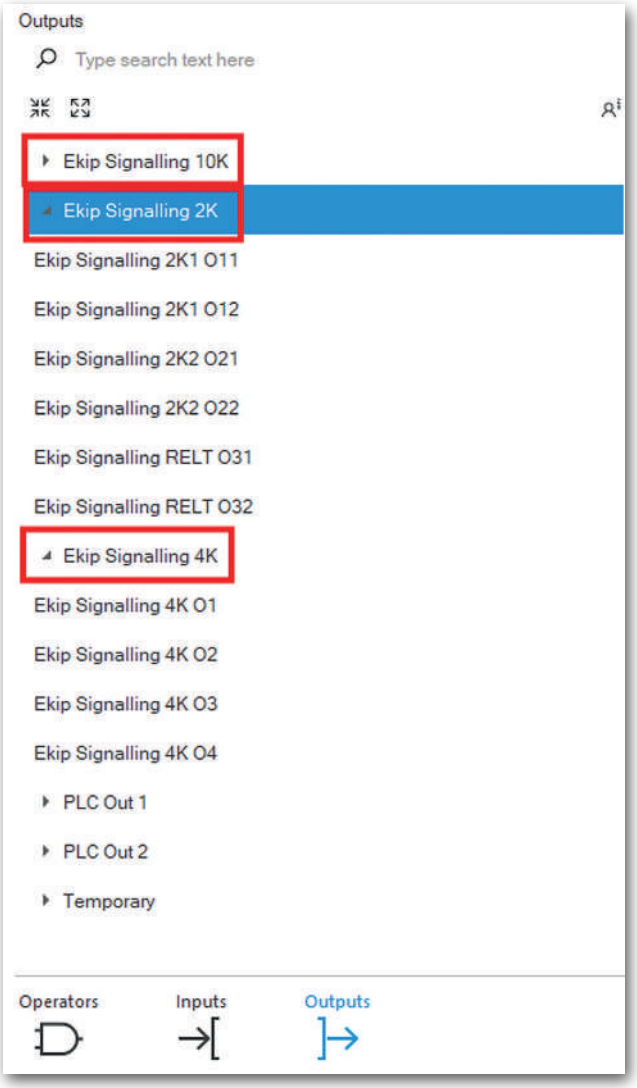
- PLC Out: composed by 2 registers (PLC Out 1 and PLC Out 2), with 16 outputs each. The status of these variables can be monitored in real time directly in the Custom Logic tool (presented in chapter Logic Design → Settings).



- Temporary: composed by 1 register with 16 outputs. The status of these variables cannot be monitored in real time since they remain as “internal” variable



- Ekip Signalling: composed by all the available digital output modules for Emax3:
  - Ekip Signalling 10K Link (composed by 10K-1, 10K-2 and 10K-3)
  - Ekip Signalling 2K (composed by 2K-1, 2K-2 and RELT)
  - Ekip Signalling 4K

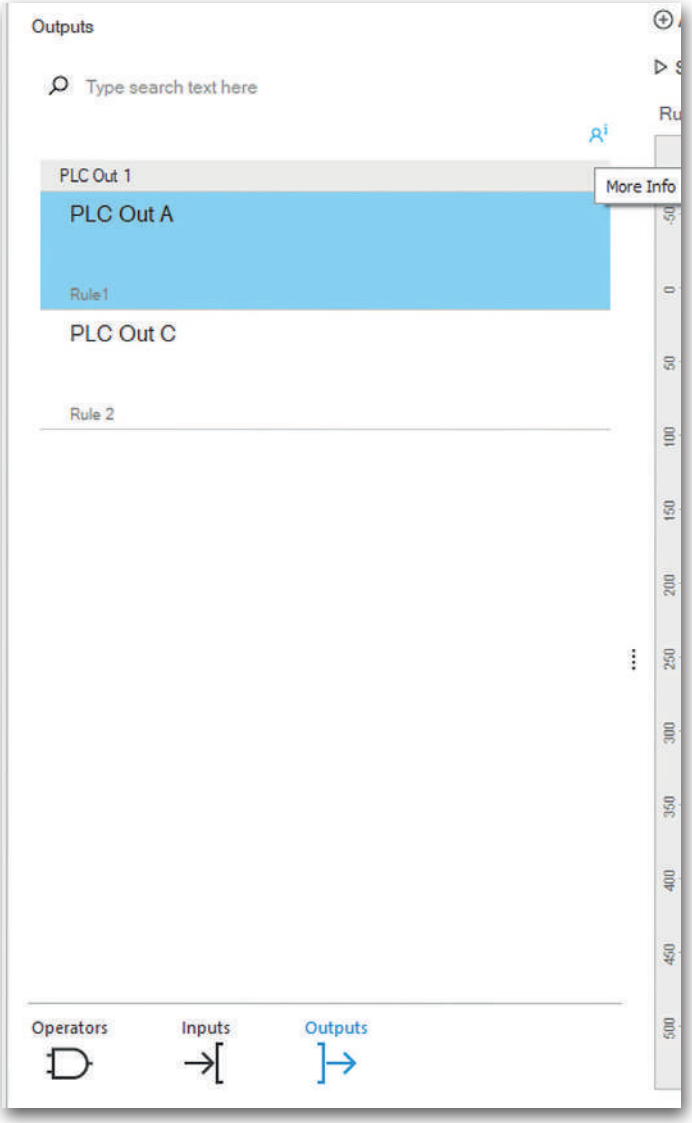


Note: The Custom Logic Tool will program directly the digital output inserted in the logic when it is uploaded in the device.

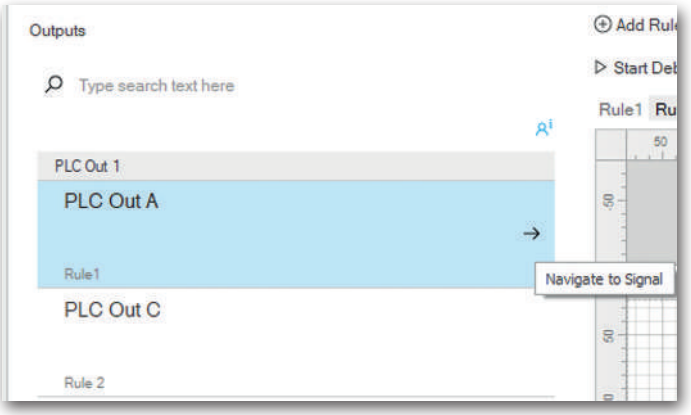
The functionalities present for the inputs (rename, search, drag and drop) are also present for all the Outputs. Each output can be delated directly in the Rule, but it cannot be copied because has to be unique.

More Info

The “More Info” page is also available for the Outputs.

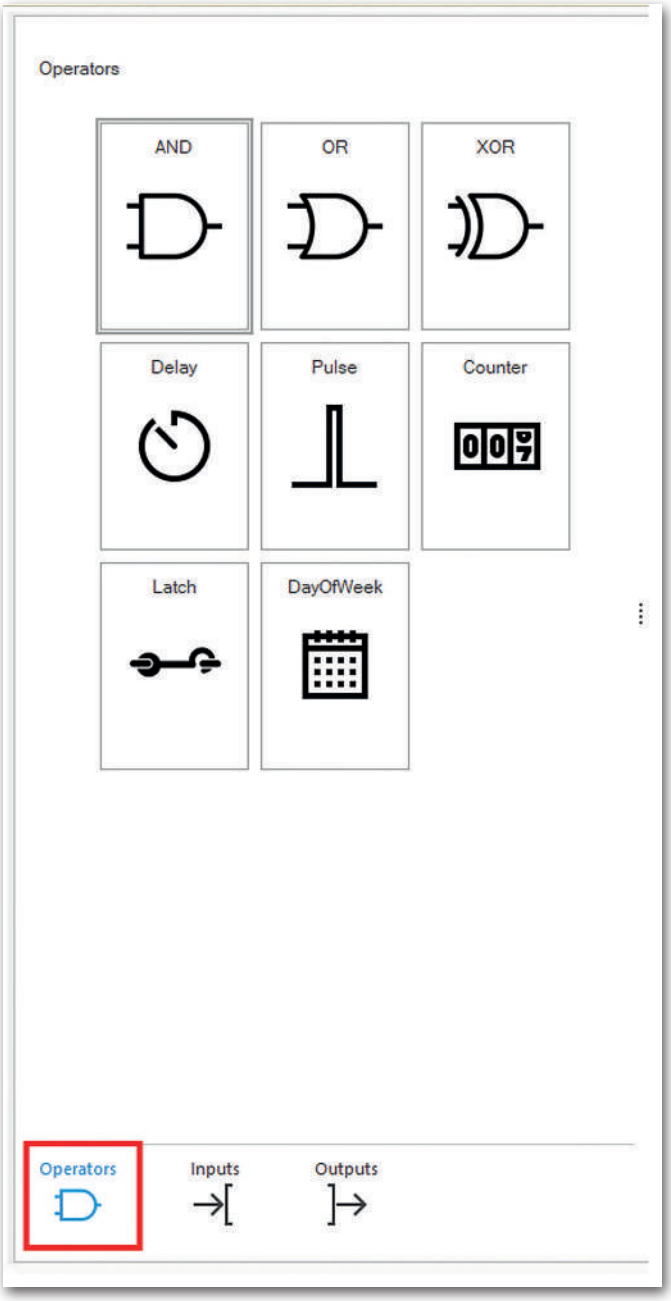


The function “Navigate Signal” is available, but “Replace Signal” is not available.



Operators

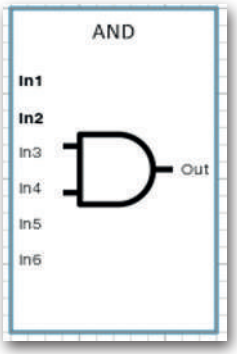
The Operator block is the computation function that is applied to one or more input and provide one output. The total list of operators available for that type of breaker is presented in this menu:



To select the operator, double-click on it or drag and drop it in the Rule. Each Rule can have more than one operator.

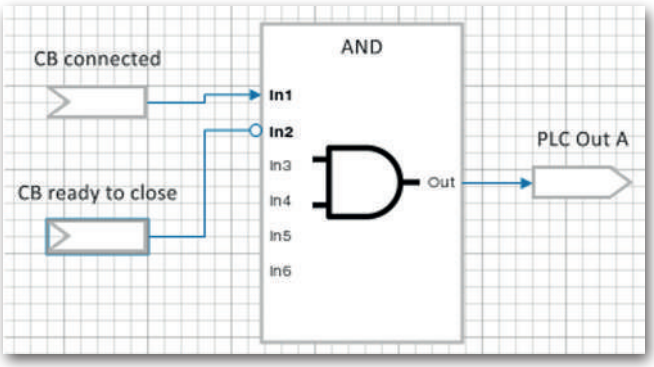
AND

It can have up to 6 input variables selected by the “Input” menu list. At least 2 inputs (In1 and In2) are mandatory.



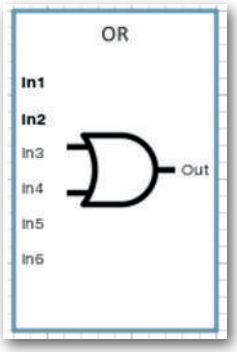
With right-click it’s possible to replace it with another compatible operator.
The operator can be also copied in the Rule.

Note: it is also possible to negate the input/output status for each variable connected to the operator by clicking directly to the single pin of the operator:



OR

Has the same characteristics of “AND” operator: It can have up to 6 input variables selected by the “Input” menu list. At least 2 inputs (In1 and In2) are mandatory.

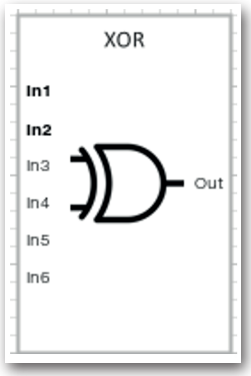


With right-click it’s possible to replace it with another compatible operator.
The operator can be also copied in the Rule.

Note: it is also possible to negate the input/output status for each variable connected to the operator by clicking directly to the single pin of the operator.

XOR

Has the same characteristics of “AND” & “OR” operator: It can have up to 6 input variables selected by the “Input” menu list. At least 2 inputs (In1 and In2) are mandatory.

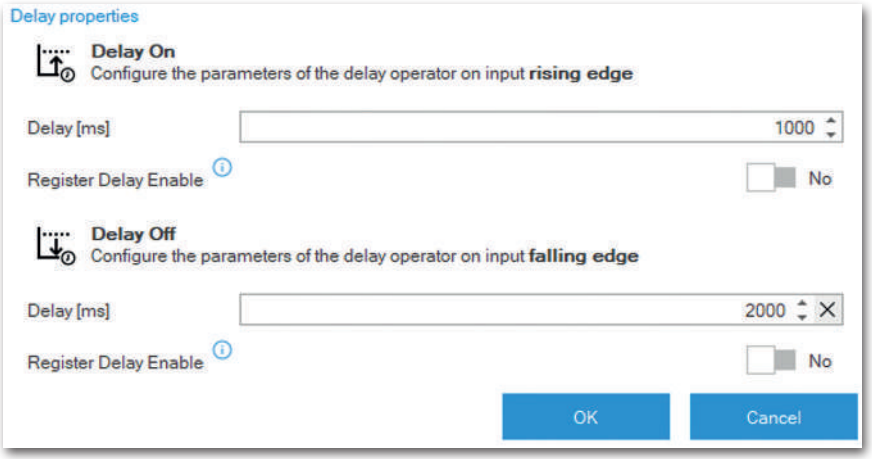


With right-click it’s possible to replace it with another compatible operator.
The operator can be also copied in the Rule.

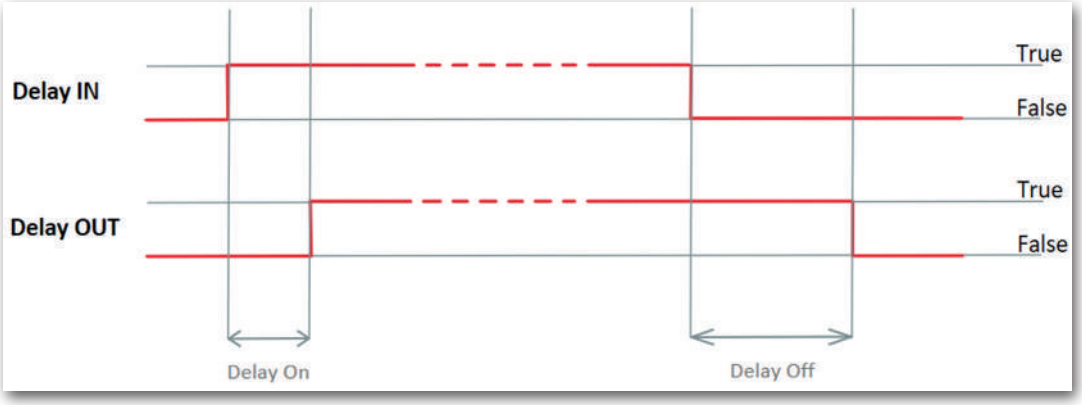
Note: it is also possible to negate the input/output status for each variable connected to the operator by clicking directly to the single pin of the operator.

Delay

It has 1 input and 1 output. To set the delays, double-click on the operator and define De-lay On and Delay Off values:

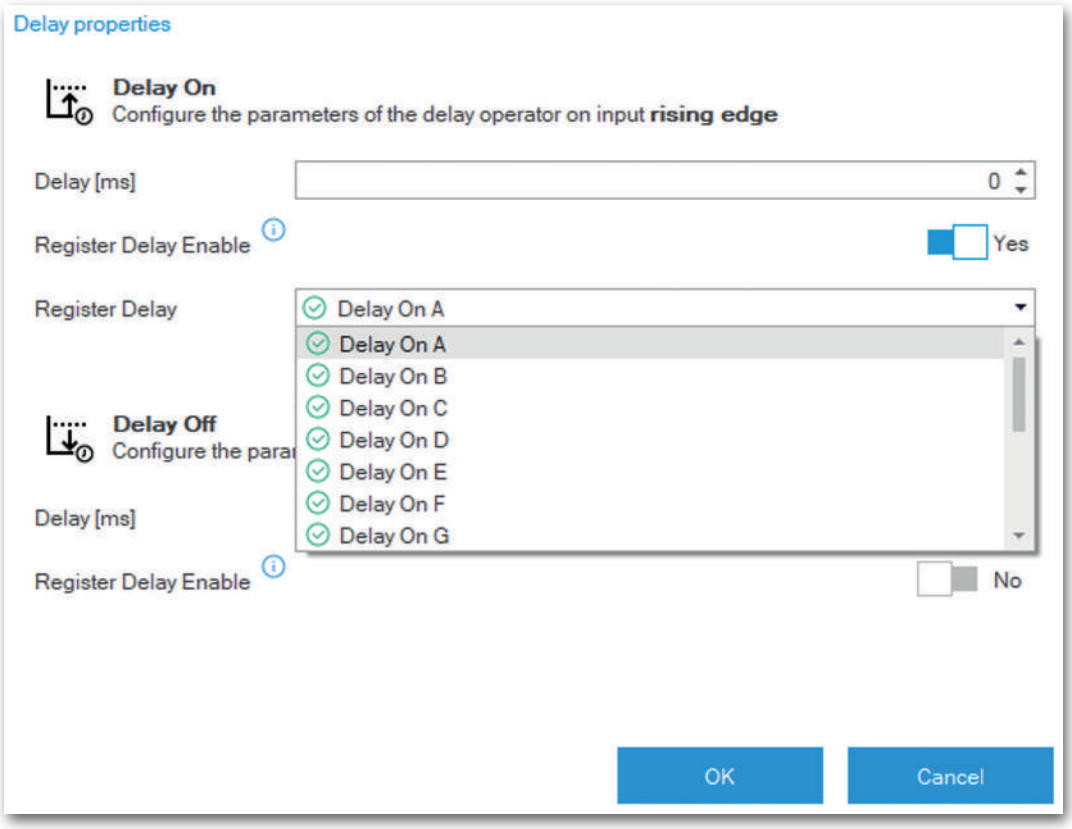


- Delay On: delay of output variable to become True after that input variable becomes True.
- Delay Off: delay of output variable to become False after that input variable becomes False.



Time diagram representation of Delay On/Off behavior

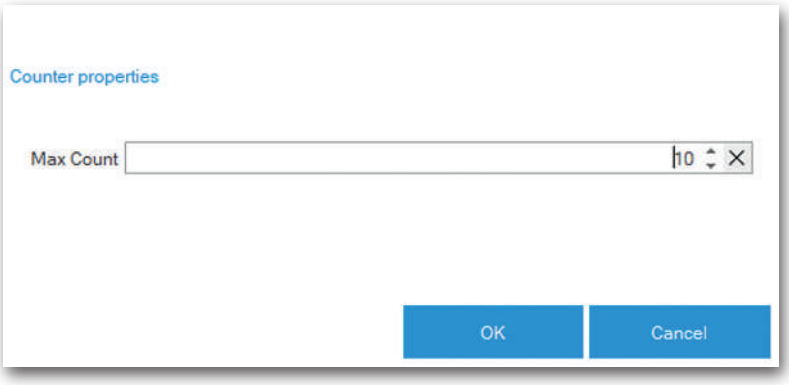
- Register Delay Enable: when this function is enabled, the specific On/Off delay can be stored in a register (Delay On A–O). This allows the delay value to be changed directly from the Classic View, without editing the project.

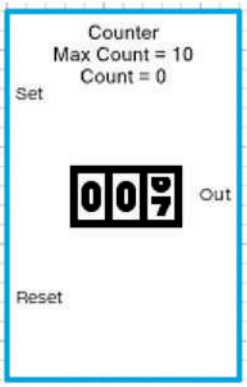


Each delay register can be linked to more than one delay block operator.

Counter

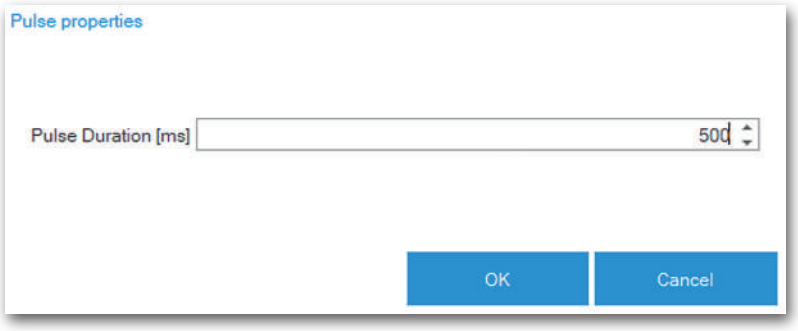
It has 2 inputs and 1 output. To set the max count, double-click on the operator and define the value:

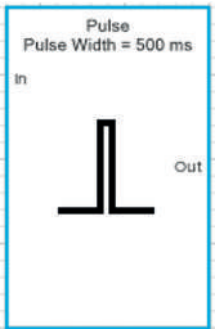




▶ **Counter operator behavior**: Each time the Set input becomes True, the counter increases by 1. When the counter reaches the Max Count value, the operator's output becomes True. If the Reset input becomes True, the counter resets to 0 and the output becomes False.

Pulse

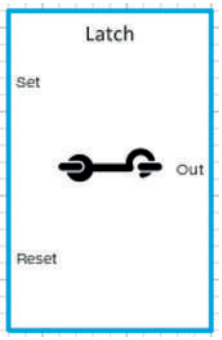




- **Pulse operator behavior**: when the input variable becomes True, the output also becomes True and stays True for the entire pulse duration. After the pulse duration ends, the output becomes False.

Latch

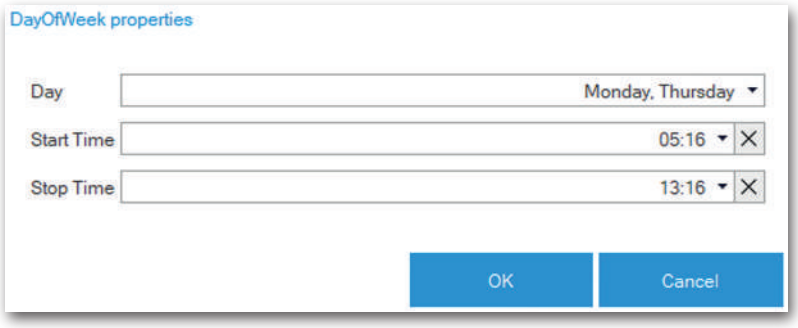
It has 2 inputs and 1 output.

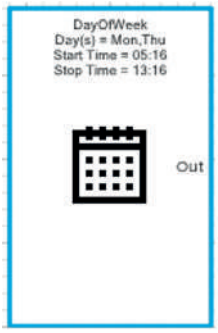


- **Latch operator behavior**: when the Set input becomes True, the output becomes True and stays True, even if the Set input goes back to False. The output only returns to False when the Re-set input becomes True.

DayOfWeek

It has just one output variable.
It is possible to define at least one day of the week and a specific time window.





- **DayOfWeek operator behavior**: When the internal clock of the breaker matches the defined parameters (day and/or a specific time window), the output becomes True. If the current time is outside these parameters, the output becomes False.

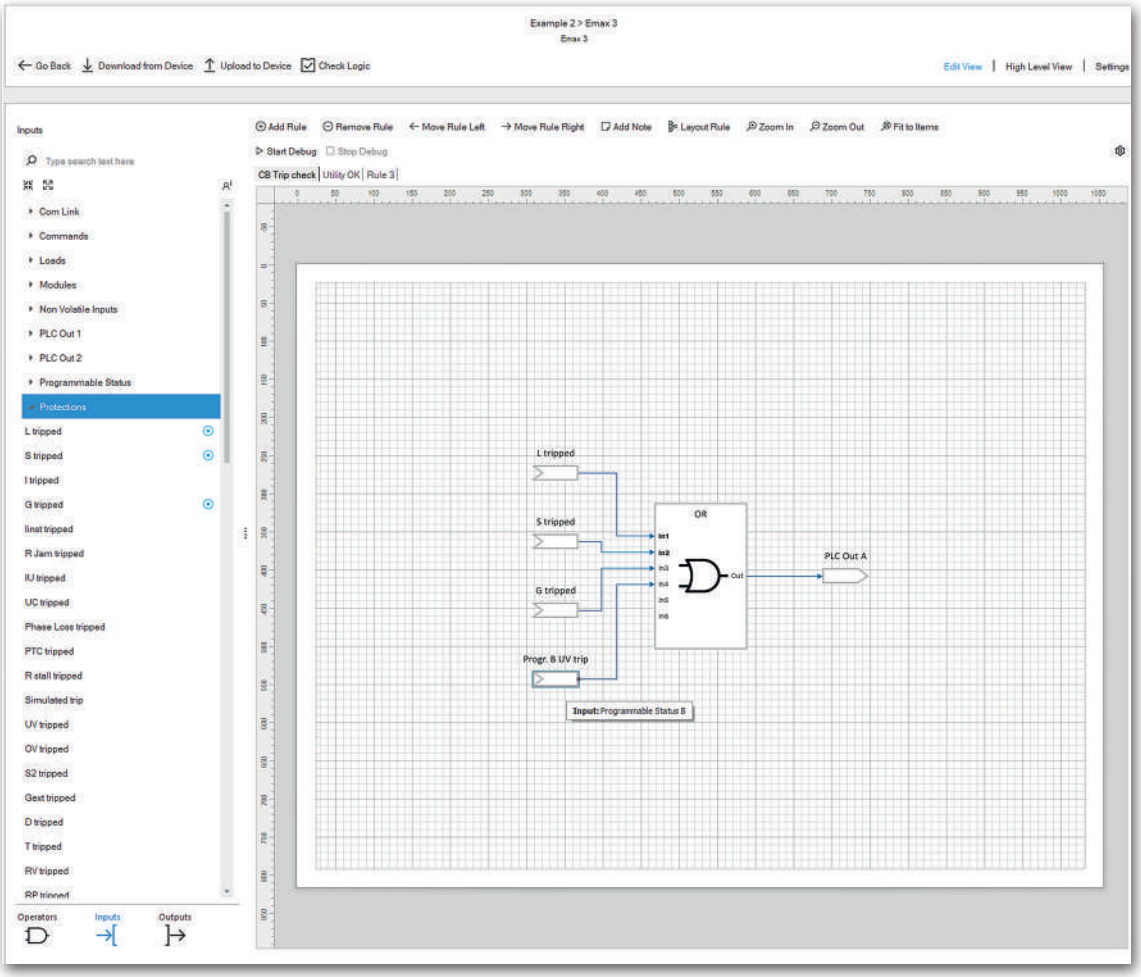
Edit View example

Here is presented a simple example that involves 3 Rules:

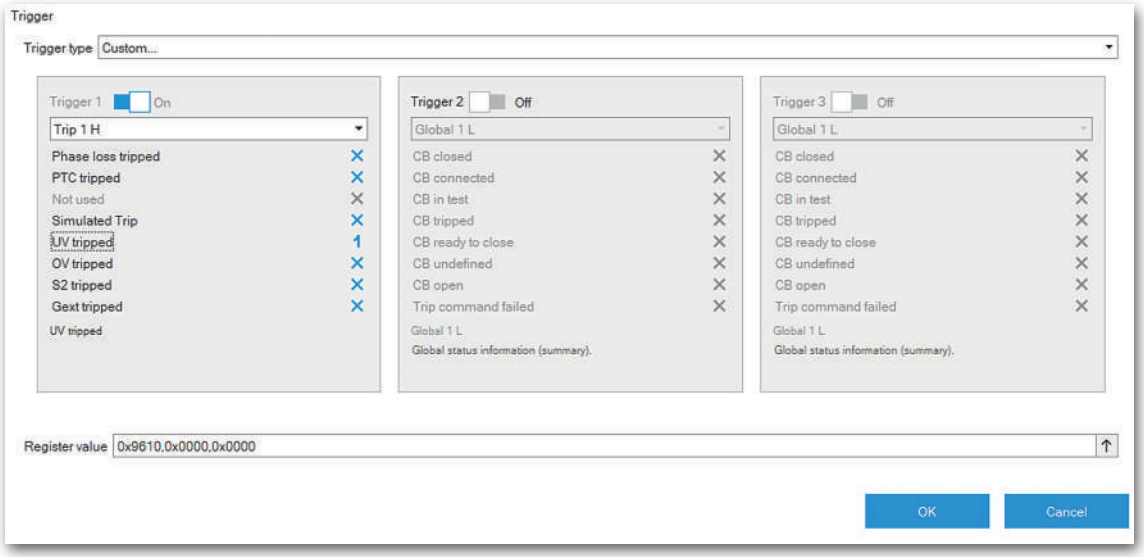
Rule 1: “CB Trip check”

Rule 1 Goal:

- The output is True if at least one of the following input variables is True: ‘L tripped’, ‘S tripped’, ‘G tripped’, or ‘Programmable Status B’.
- The output is False only if all input variables are False.



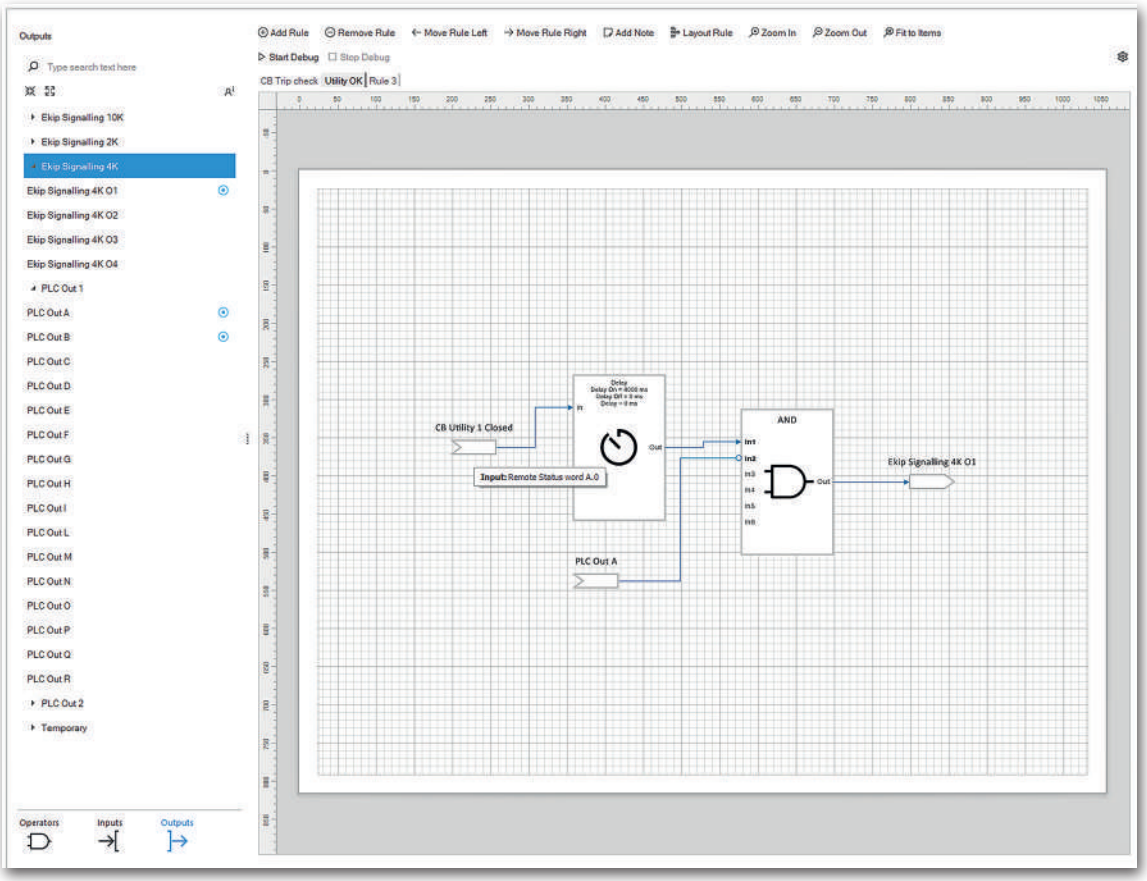
Programmable Staus B set with trigger “UV tripped” and renamed as “Progr. B UV trip”:



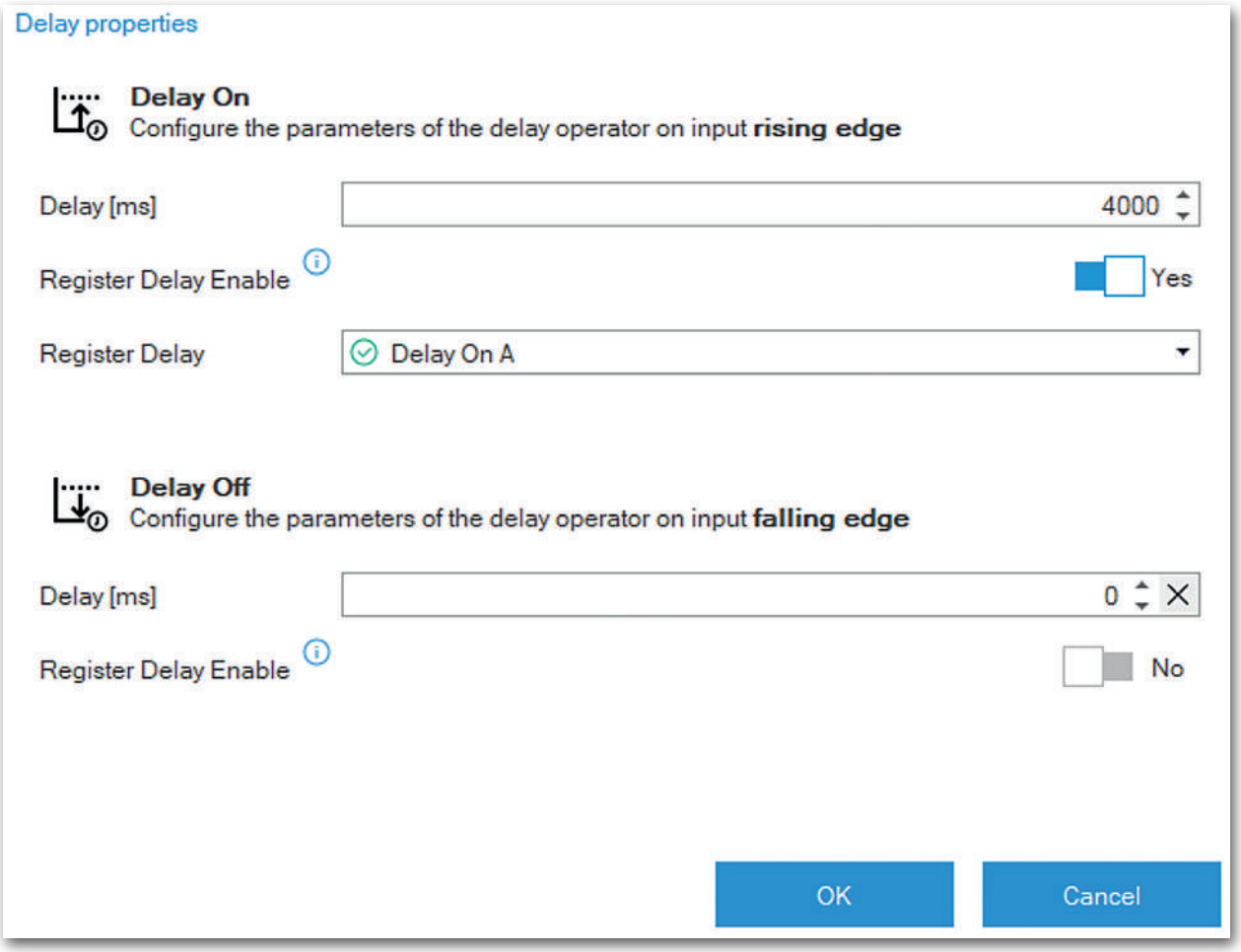
Rule 2: “Utility OK”

Rule 2 Goal:

- The output (Ekip Signalling 4K O1) is True if both of this condition are respected:
  - Remote Status word A.0 is True after 4s
  - Rule 1 out is False
- The output is False only if at least one of the conditions are not respected



Delay On value connected to Register Delay On A (optional)

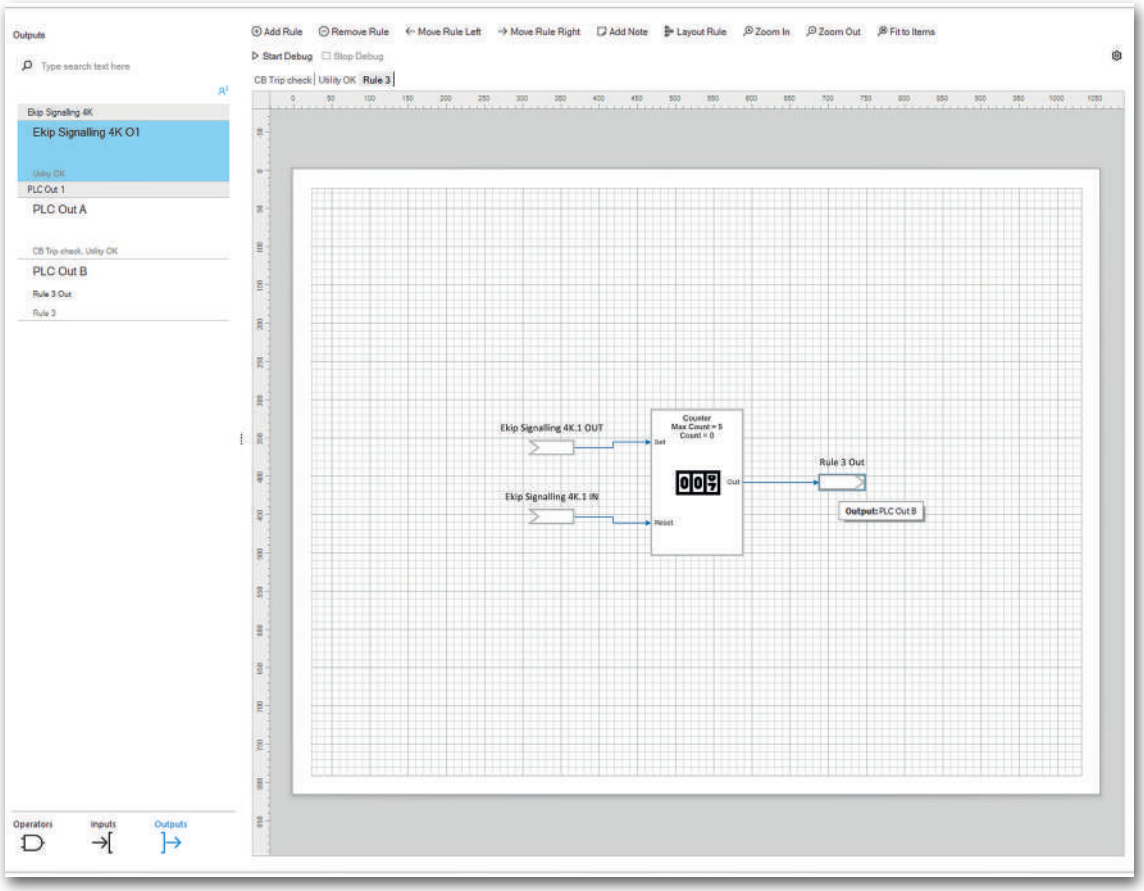


Rule 3

Rule 3 Goal:

- The output is True if the input variable “Ekip Signalling 4K.1 OUT” becomes True at least 5 times.
- The output is False if:

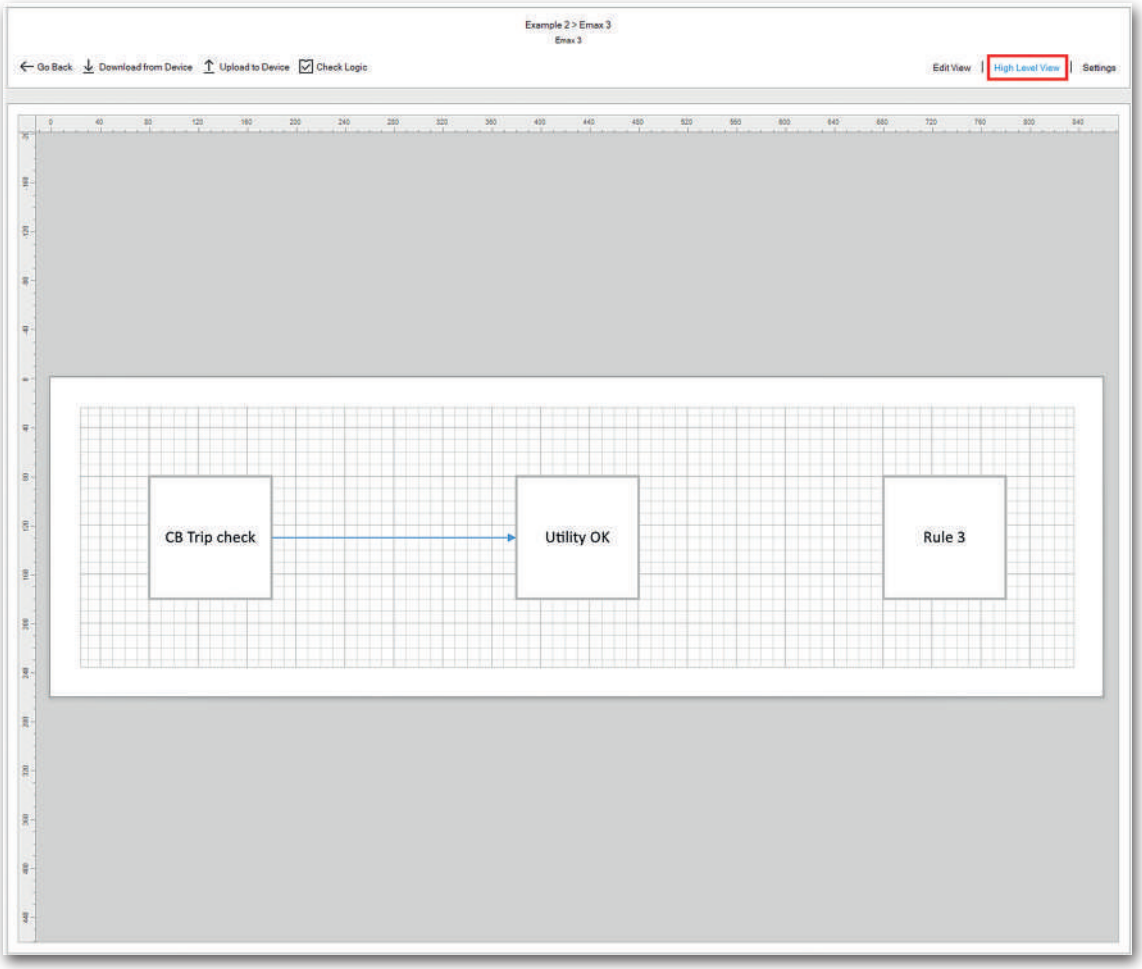
  - “Ekip Signalling 4K.1 OUT” becomes True less than 5 times
    or
  - “Ekip Signalling 4K.1 IN” becomes True



PLC Out B renamed as “Rule 3 Out”

High Level View

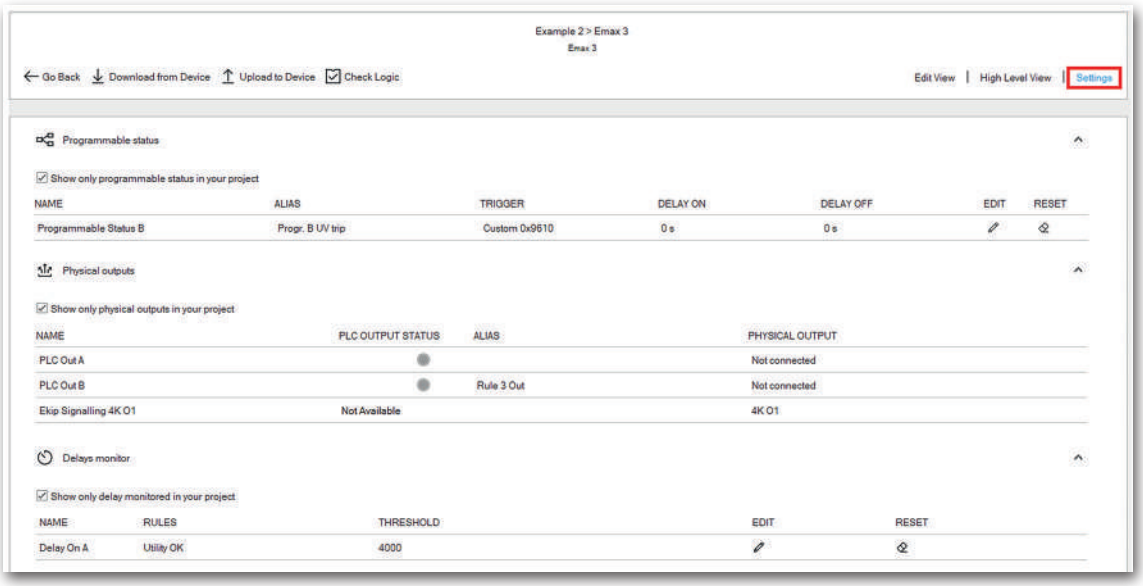
This page summarizes the complete logic of the individual device. It is useful to under-stand the correlation between inputs and outputs across the different Rules.



In this example, the output of the rule “CB Trip Check” is also used as an input for the rule “Utility OK”.

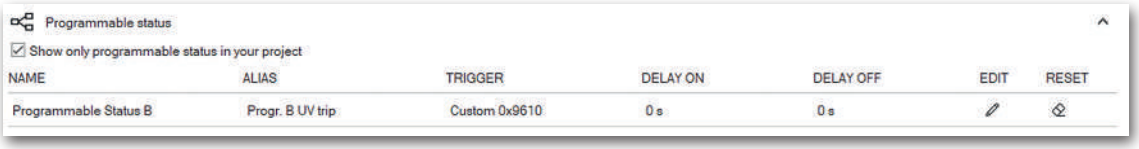
Settings

This page displays the overall programming of the Programmable Status, PLC Outputs, Ekip Signalling outputs and Delay Operators Monitor.

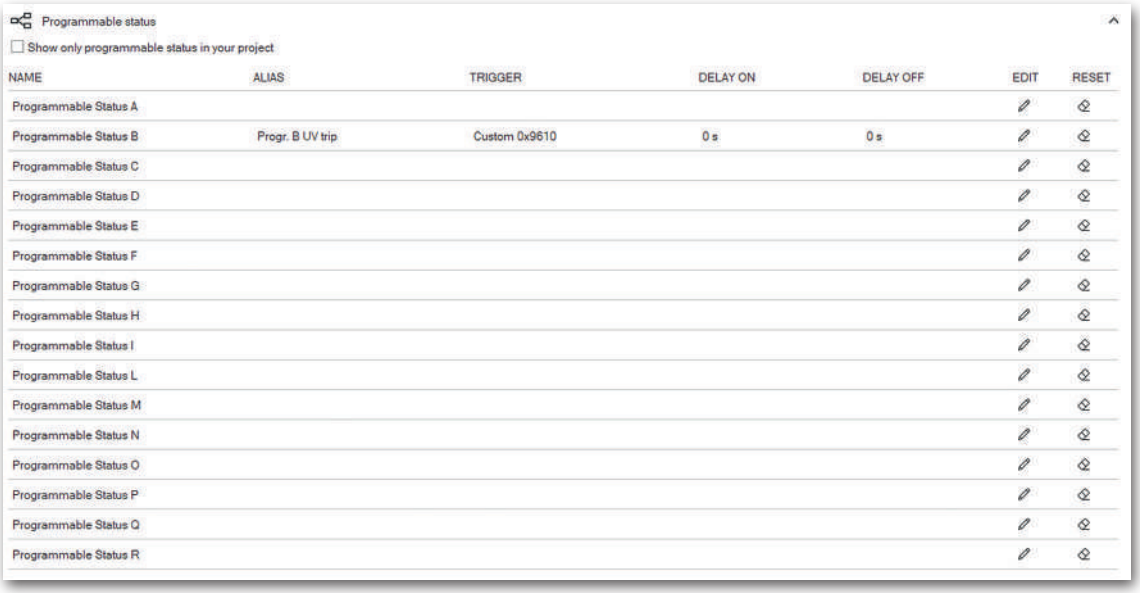


Programmable Status

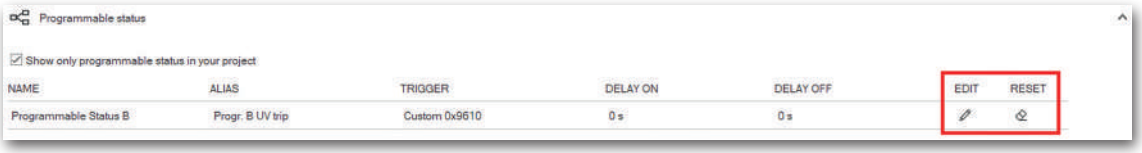
Once a Programmable Status variable is inserted into the Rule, the Programmable Status menu of the Settings page will be populated by highlighting the main information



For both lists, it can be chosen to view only the variables involved in the logic, or the en-tire list of vari-ables. To do this, simply uncheck the option “Show only programmable sta-tus / physical outputs / delay monitored in your project.”

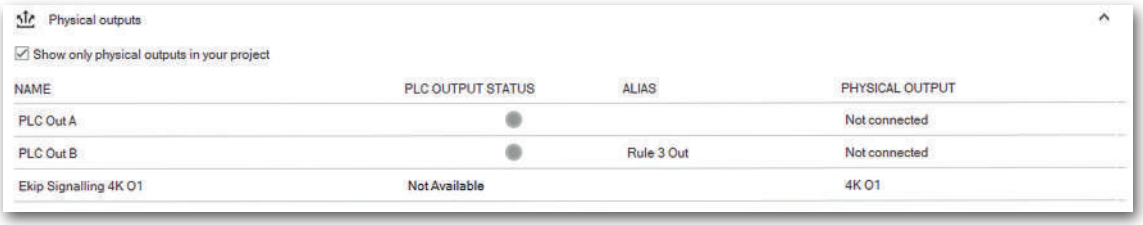


From the menu it is possible to edit or reset the configuration of each Programmable Status.



Physical outputs

Once a PLC Out or Ekip Signalling Out variable is inserted into the Rule, Physical outputs menu of the Settings page will be populated by highlighting the main information



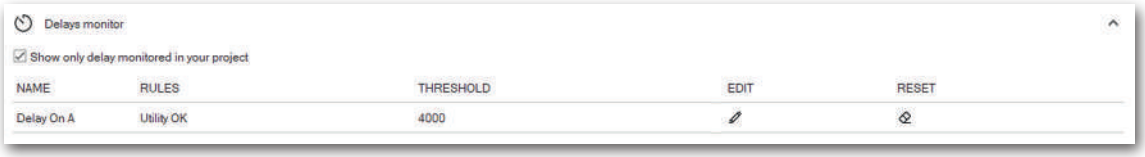
Since Temporary Outputs cannot be monitored, they are not shown in the menu.
Like in the Programmable Status menu, it can be chosen to view only the variables involved in the logic, or the entire list of variables.

If the user is connected to the device, the real-time status of each PLC output is presented in the list “PLC Output Status”, differentiated by colors, where:

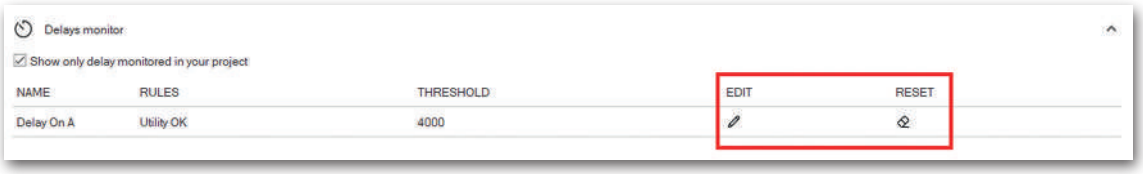
- Green corresponds to PLC Out Status = True
- Grey corresponds to PLC Out Status = False

Delay monitor

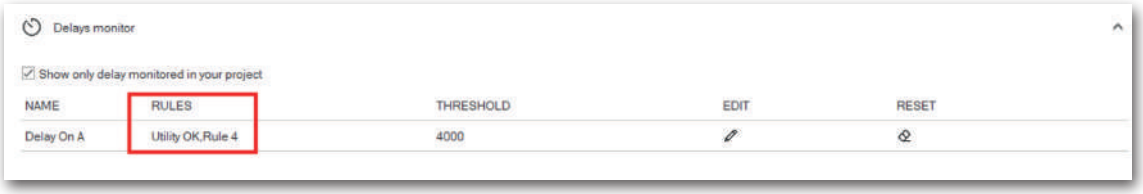
Once a Delay On/Off value is connected to a delay register, Delay monitor menu of the Settings page will be populated by highlighting the main information



From the menu it is possible to edit or reset the configuration of each Delay register.



Note: Each delay register can be linked to more than one delay block operator.



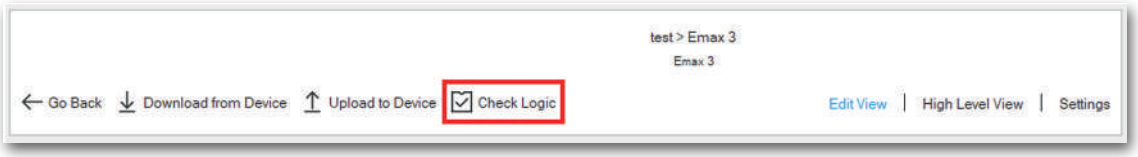
LOGIC AND PROJECT OFFLINE VALIDATION

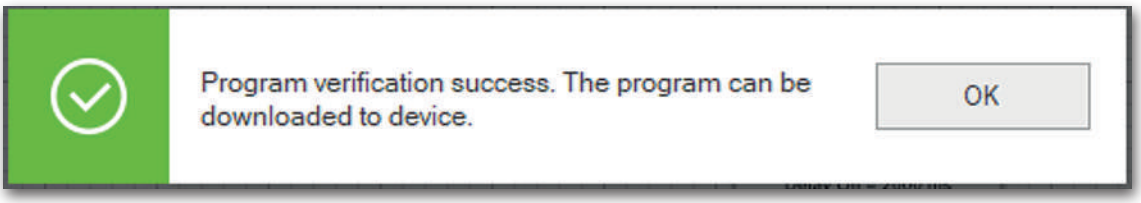
After writing a logic, it is necessary to verify its correctness and prepare the required documentation to ensure that the project is as complete and accurate as possible.

Check logic function

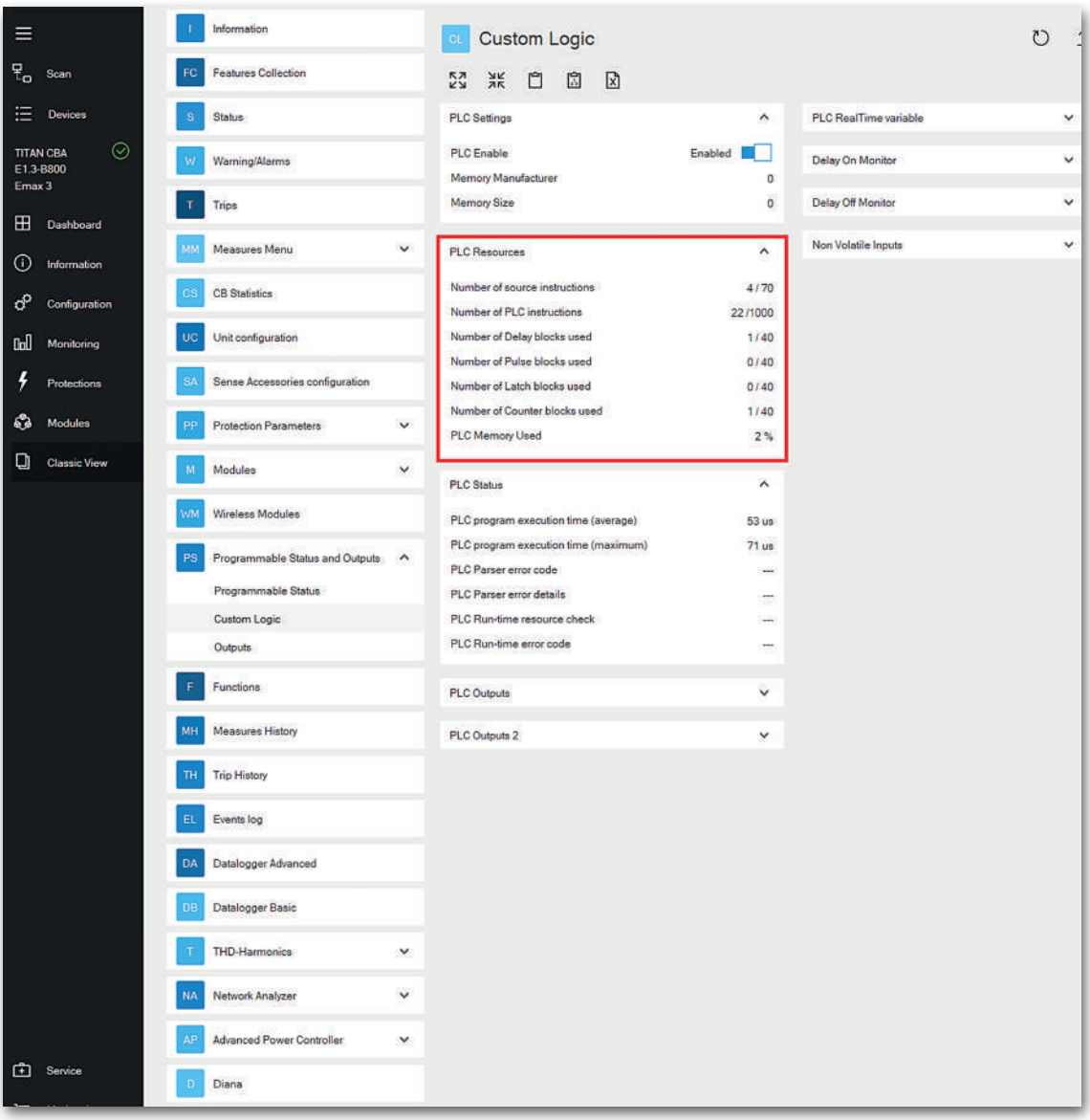
To verify the logic of each individual device, the 'Check Logic' function is available on the Edit View page, which checks:

- Input& Output connections: no variables in the rules without being connected to something
- Output Rules: one single Output for each Rule
- Operator conditions: every operator respects the operating requirements (Delay On/Off for Delay and Pulse, at least 2 inputs for AND/OR, etc…)
- Memory limits: the entire logic is respecting the memory limit of the device



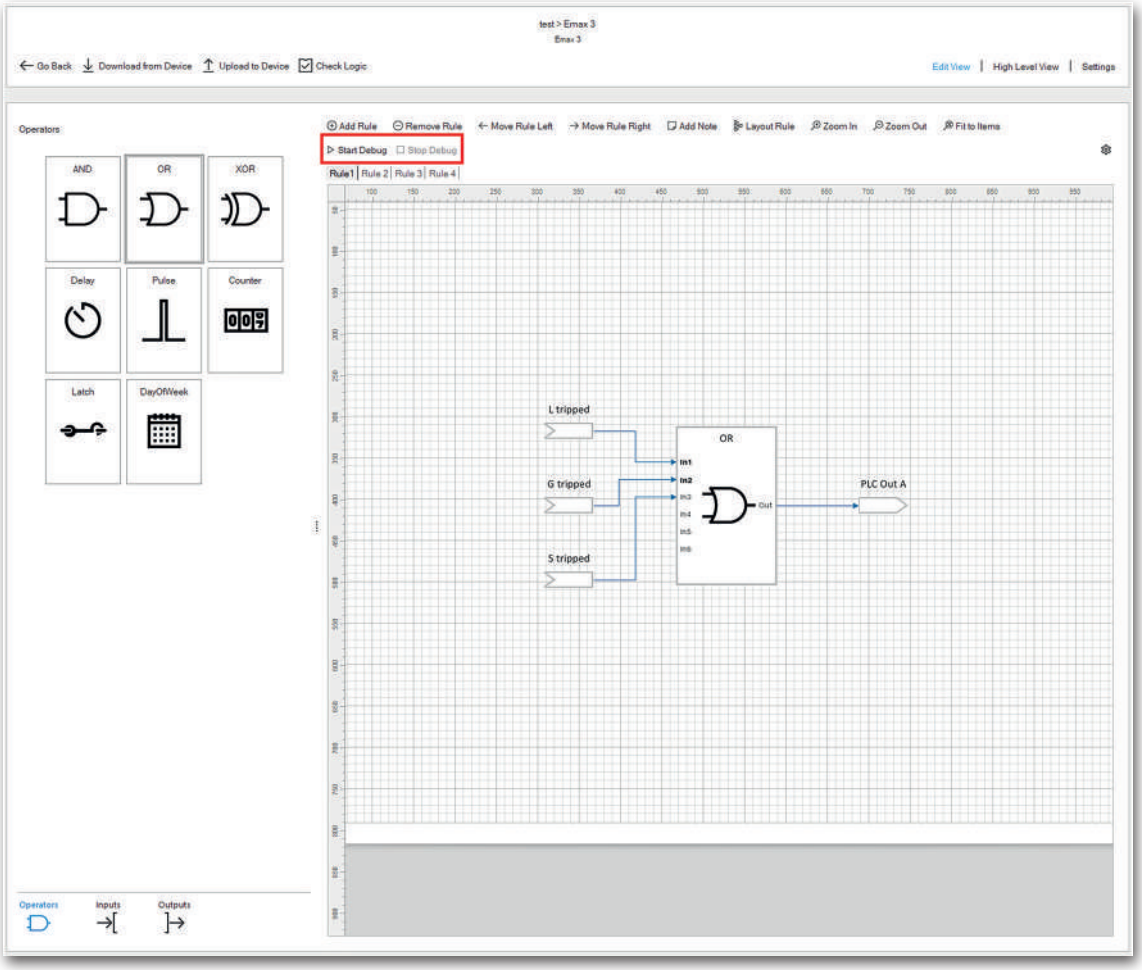


Note: once the logic is uploaded in the devices, is presenting more in details the memory limits in Classic View page:



Debug Mode

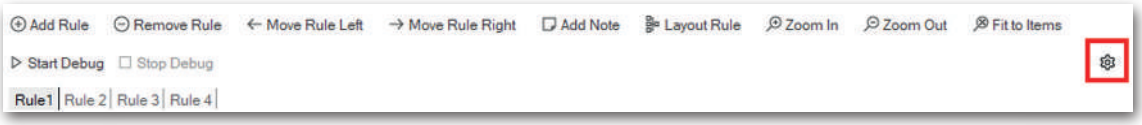
The designed logic can be tested by simulating it directly in Custom Logic, without needing to download it to the devices. The simulation can be performed on one device at a time only.
The simulation tool is called “Debug” function and is available on the Edit View page.

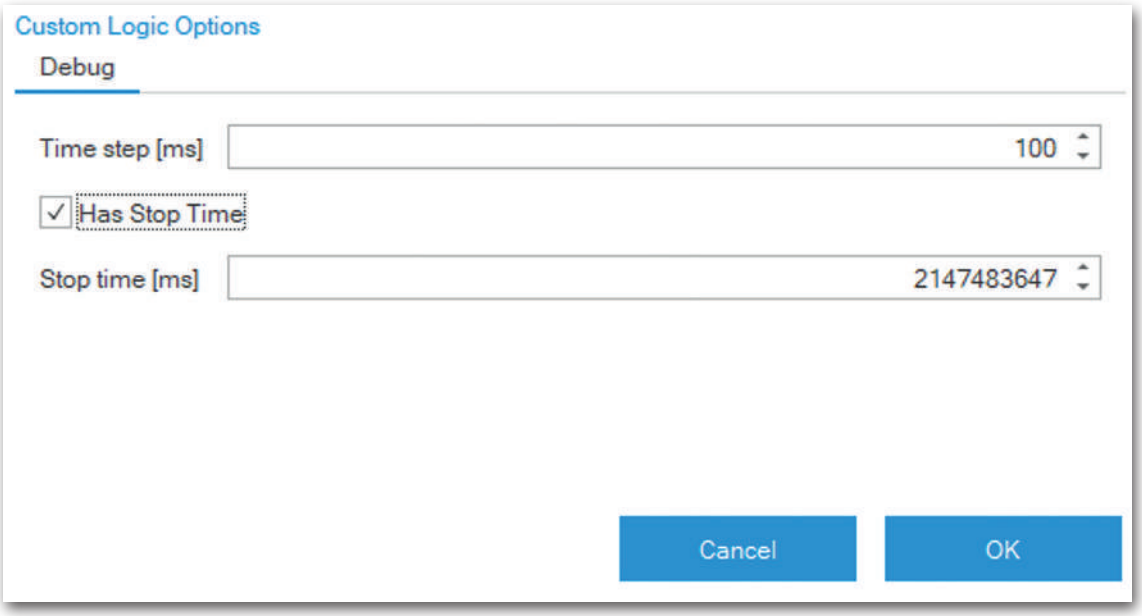


Debug settings

By clicking on the gear icon on the right side of the window, it's possible to set:

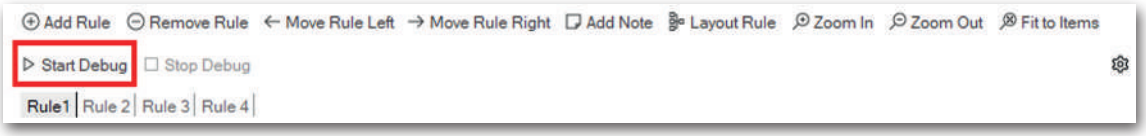
- Clock of the simulation
- End of infinite loop
- Stop time





Debug ON

To start the simulation, click on "Start Debug".

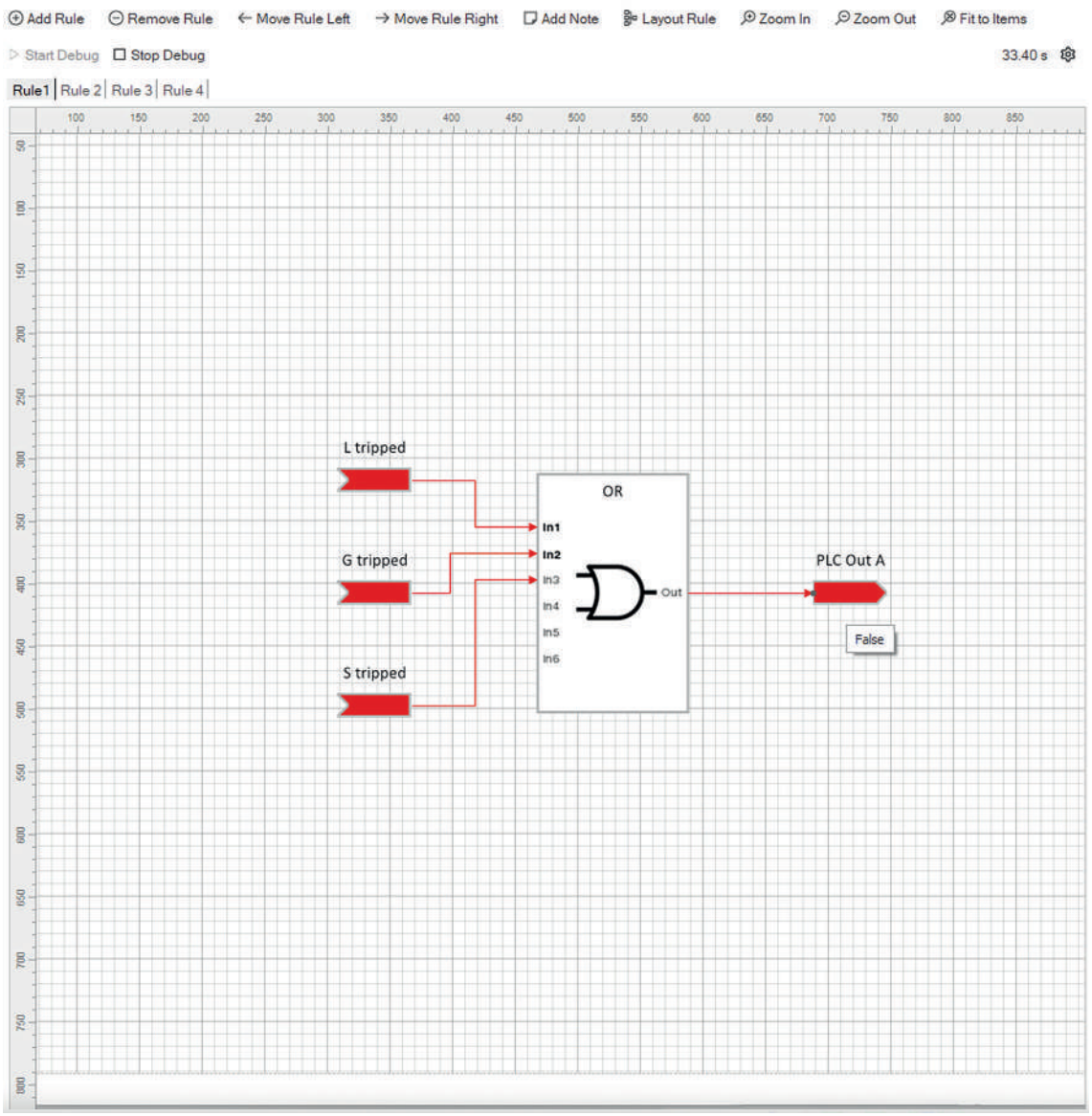


Variable status

Each input/output it is colored in real-time according to their status:

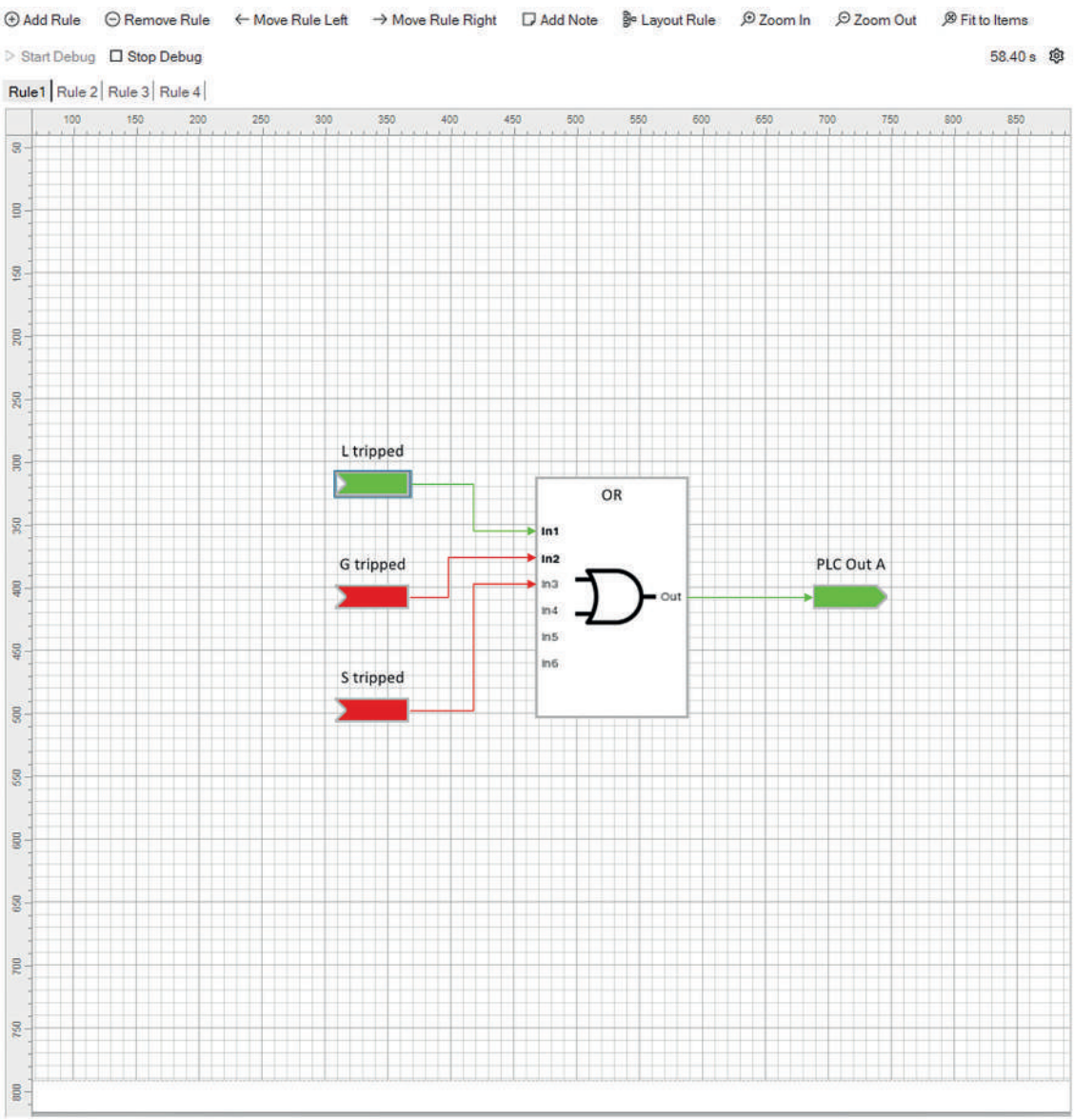
- Green = True
- Red = False

In addition, by moving the mouse on each variable, a label with the status appears:



Input status definition

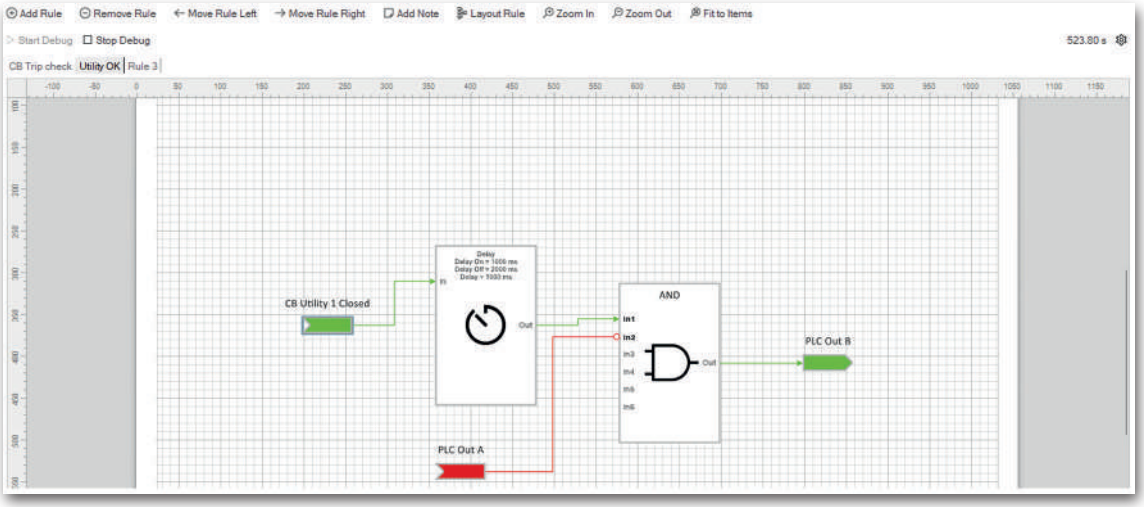
To test the logic, the status of each input variable can be defined by clicking directly on it:



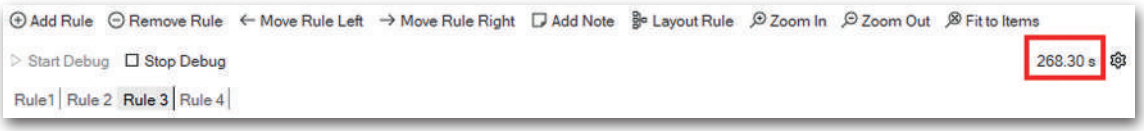
Time and date Operators

The Operators that depend on date and time (“Delay”, “Pulse” and “DayOfWeek”) are respecting the real time characteristics to replicate the real behavior of the logic in the simulation.

For example, in the above Rule, the Delay operator is programmed with a Delay On = 1000ms. So, when the input of Delay operator becomes True, the output becomes True after 1s:

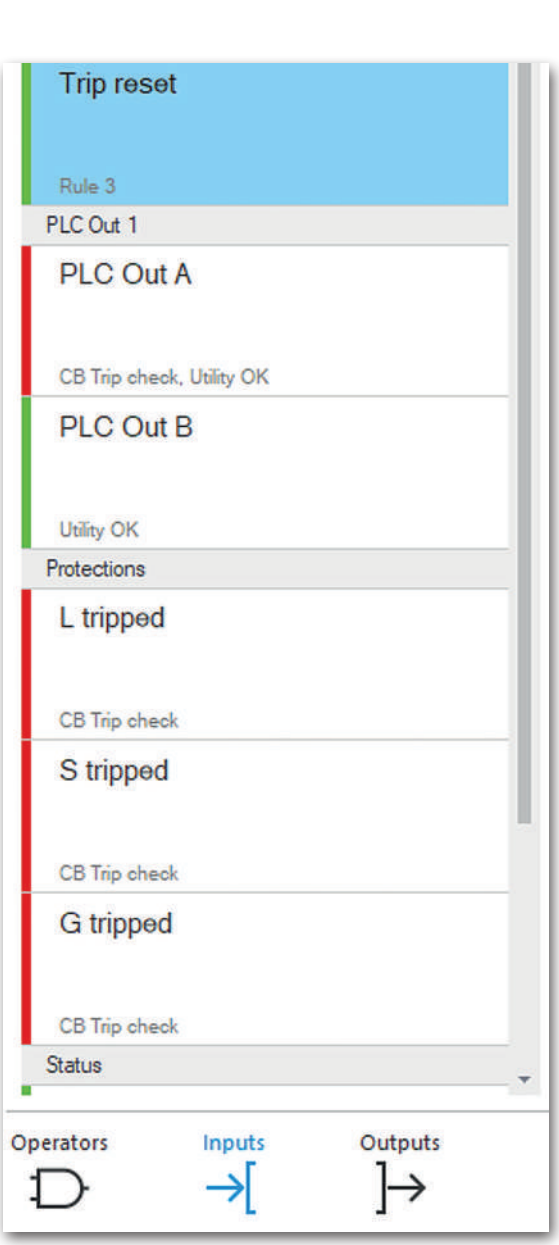


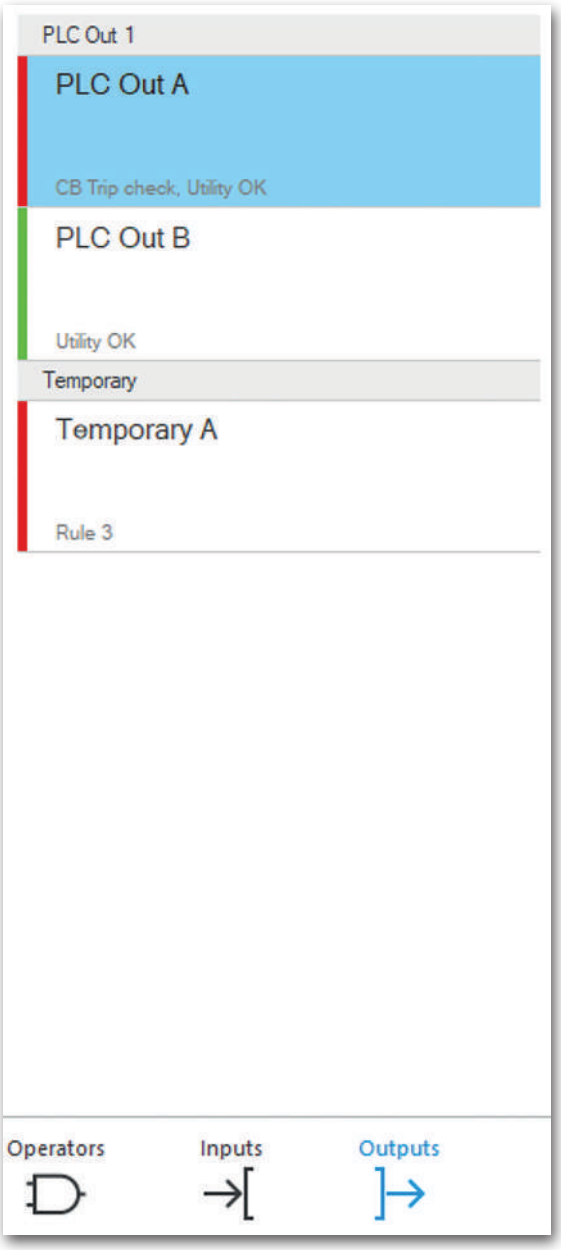
Note: close to the gear icon, the clock timer starts to count once the “Start Debug” button is On.



More Info page status

Clicking on the icon “more info” for Inputs or Outputs, the real-time status of all the variables involved in the logic is showed:

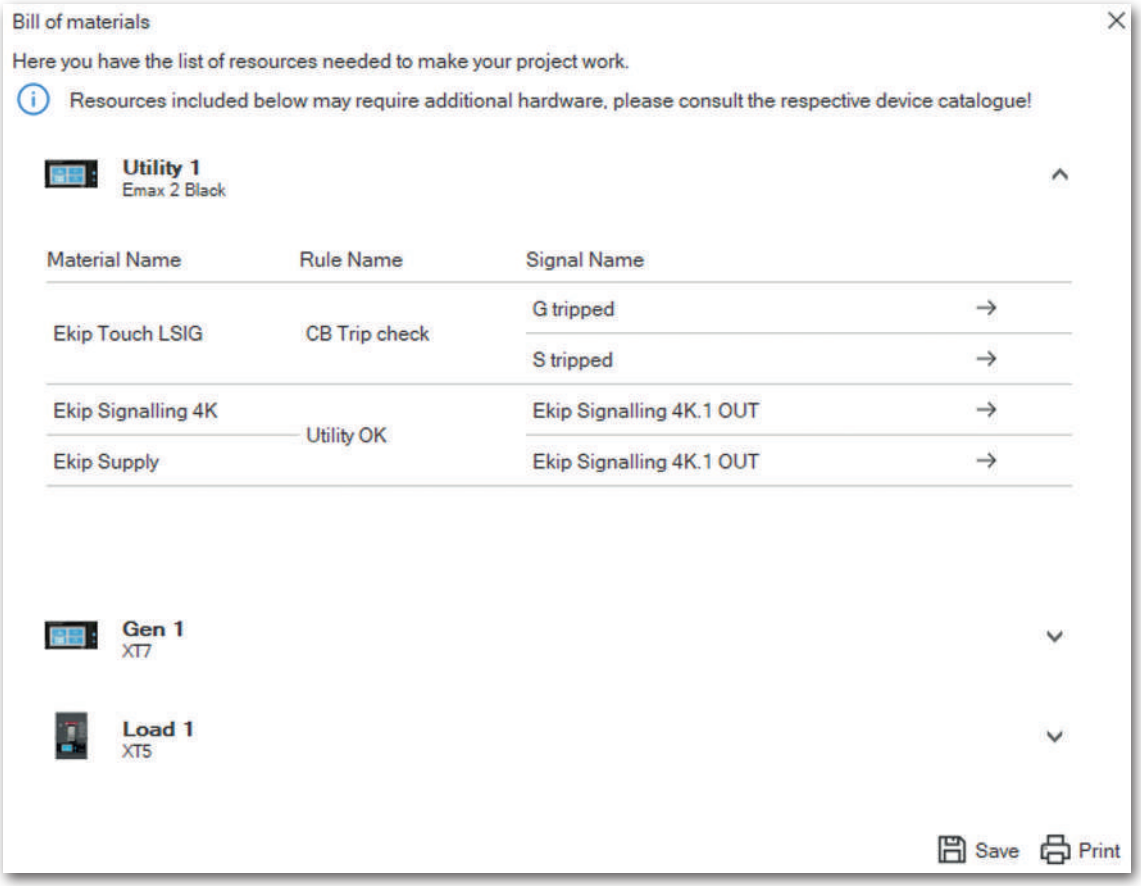




Project functions

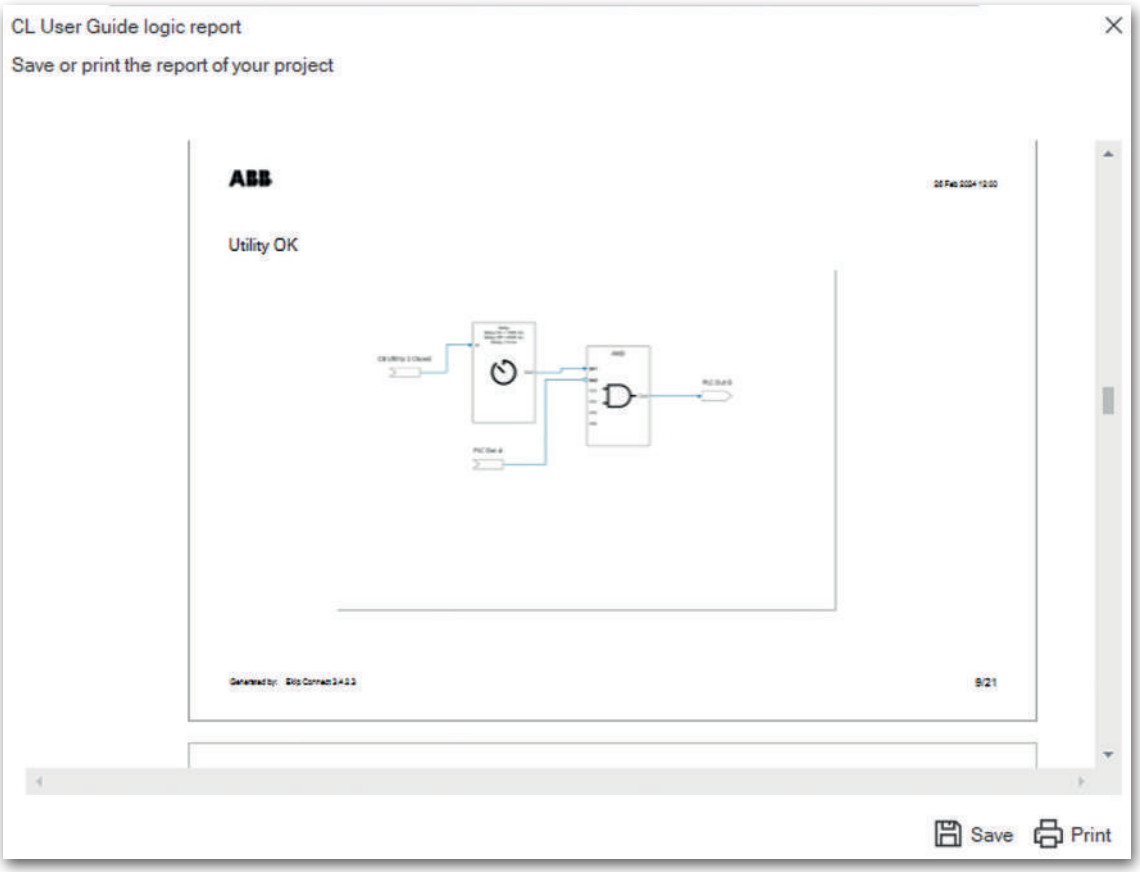
After verifying the logic of a single device, it is possible to return to the Diagram Page and proceed with the programming of the other devices.
Once the checks for each individual device have been completed, the project documentation can be prepared.

- Save Project: Save or update locally the project file with the function
- Bill of Materials: The BoM is automatically created by collecting all the information provided by the logic of each device in the project.



Note: Resources included inside Bill of material may require additional hardware, please consult the respective device catalog.

- Print Project: Create a pdf file that summarize the entire project



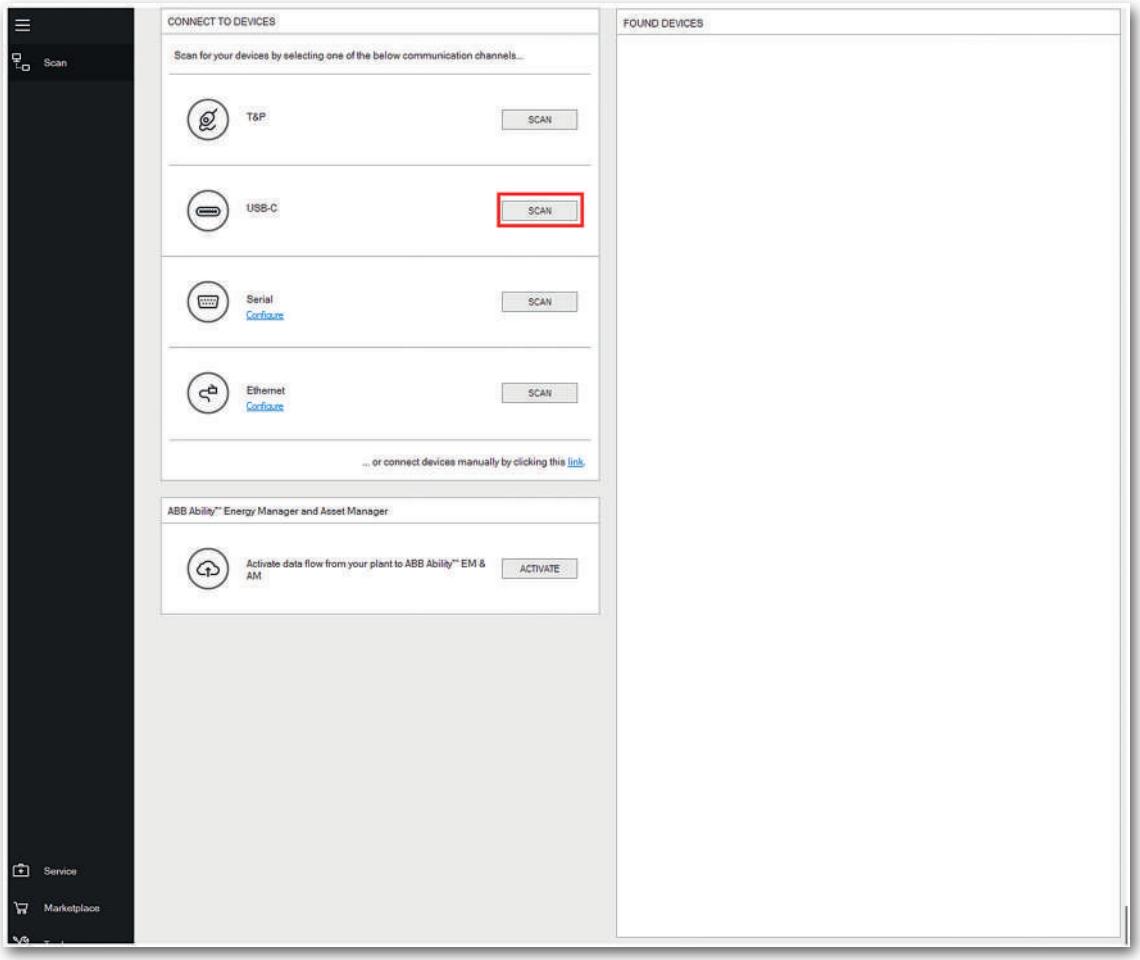
LOGIC COMMISSIONING

Logic Commissioning

To upload the logic in each breaker it is mandatory to be connected to them.

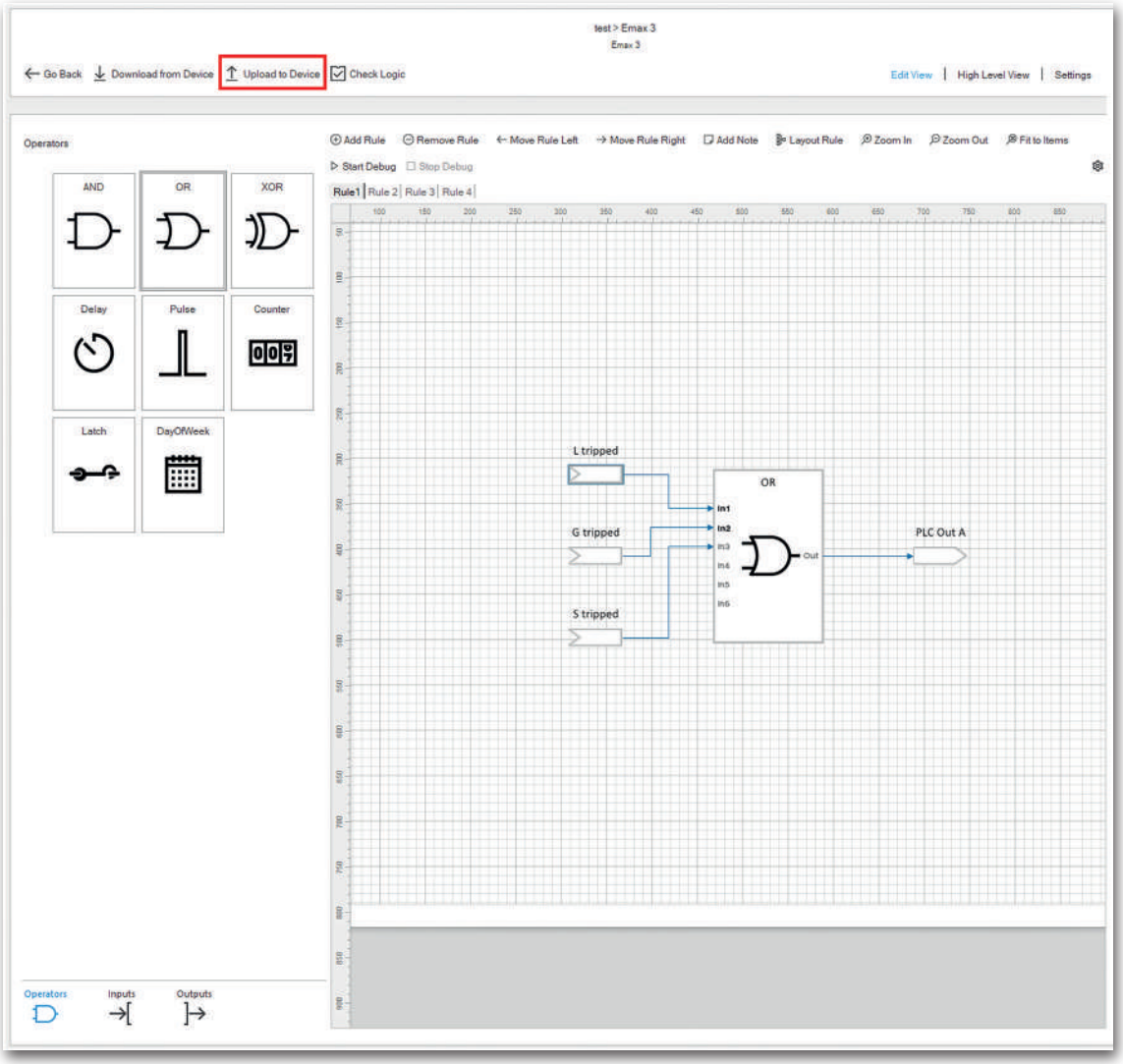
Devices connection

The connection to the breaker can be done via USB-C connector:



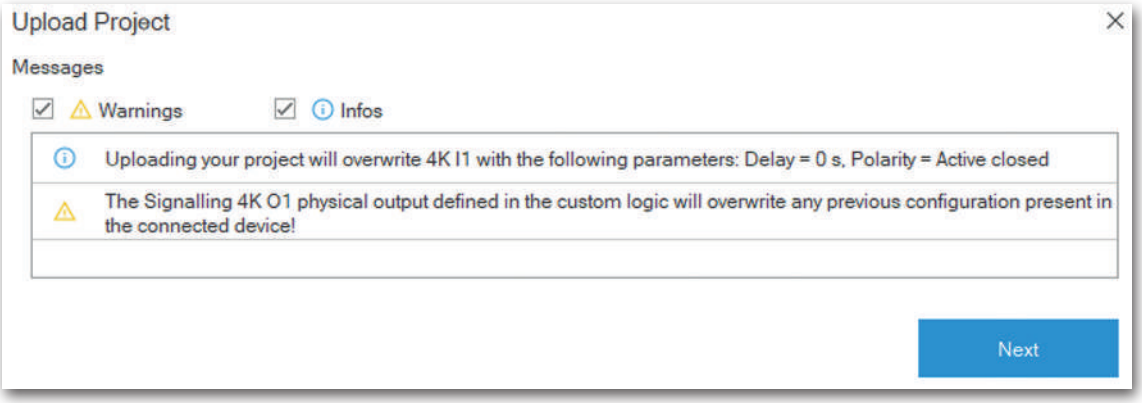
Device logic upload

After the connection is established in Ekip connect, select the corresponding device on the diagram page. Reopen the Custom Logic Tool and. in the Edit View, press the function “Upload to Device” to download the logic:



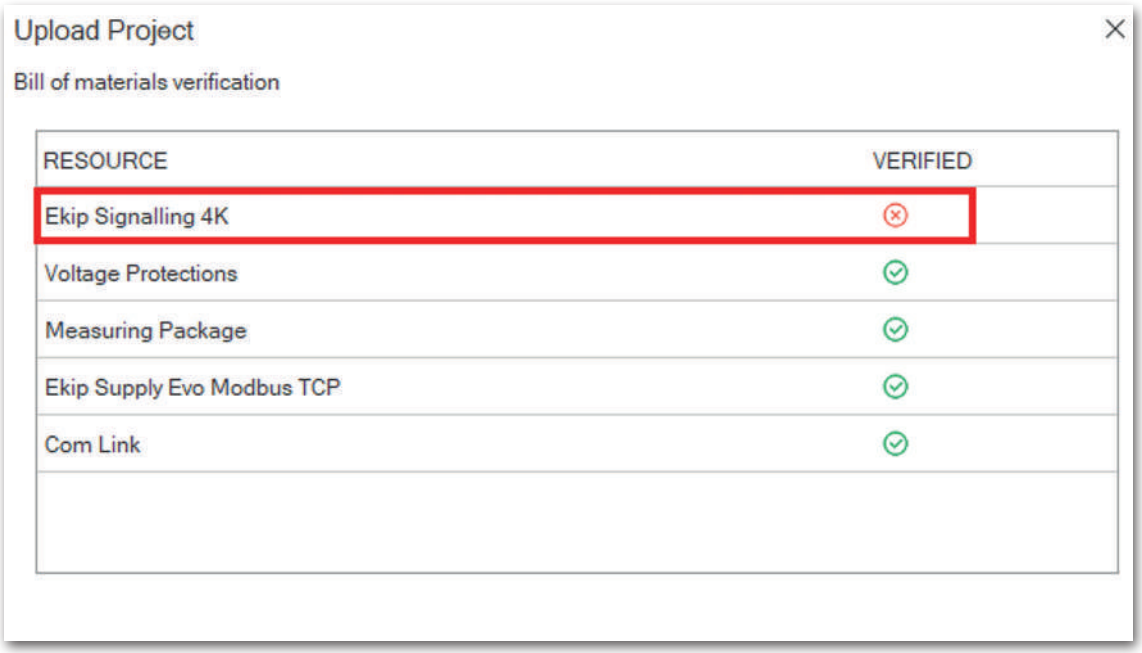
Before doing the upload, the tool makes all the check and gives a summary of:

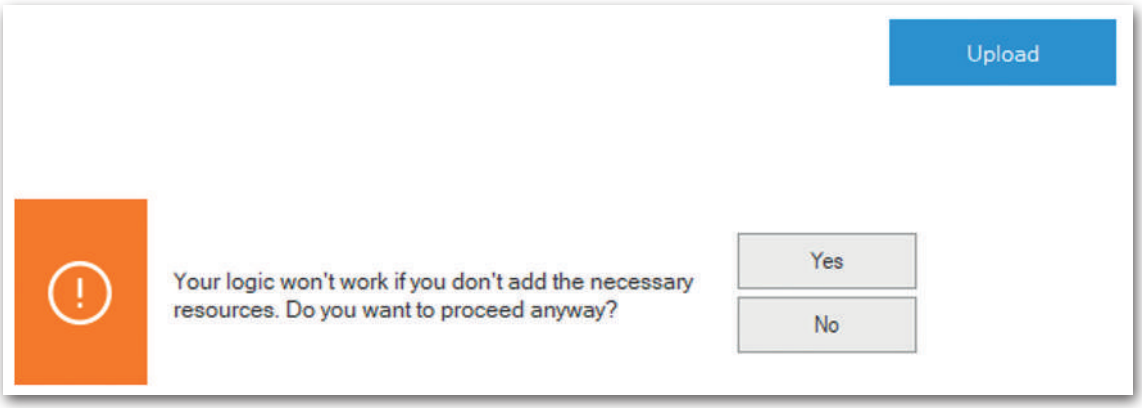
- List of signalling output and input that will be programmed
- Presence of any error in the logic
- hardware and licenses package presence in the connected device.



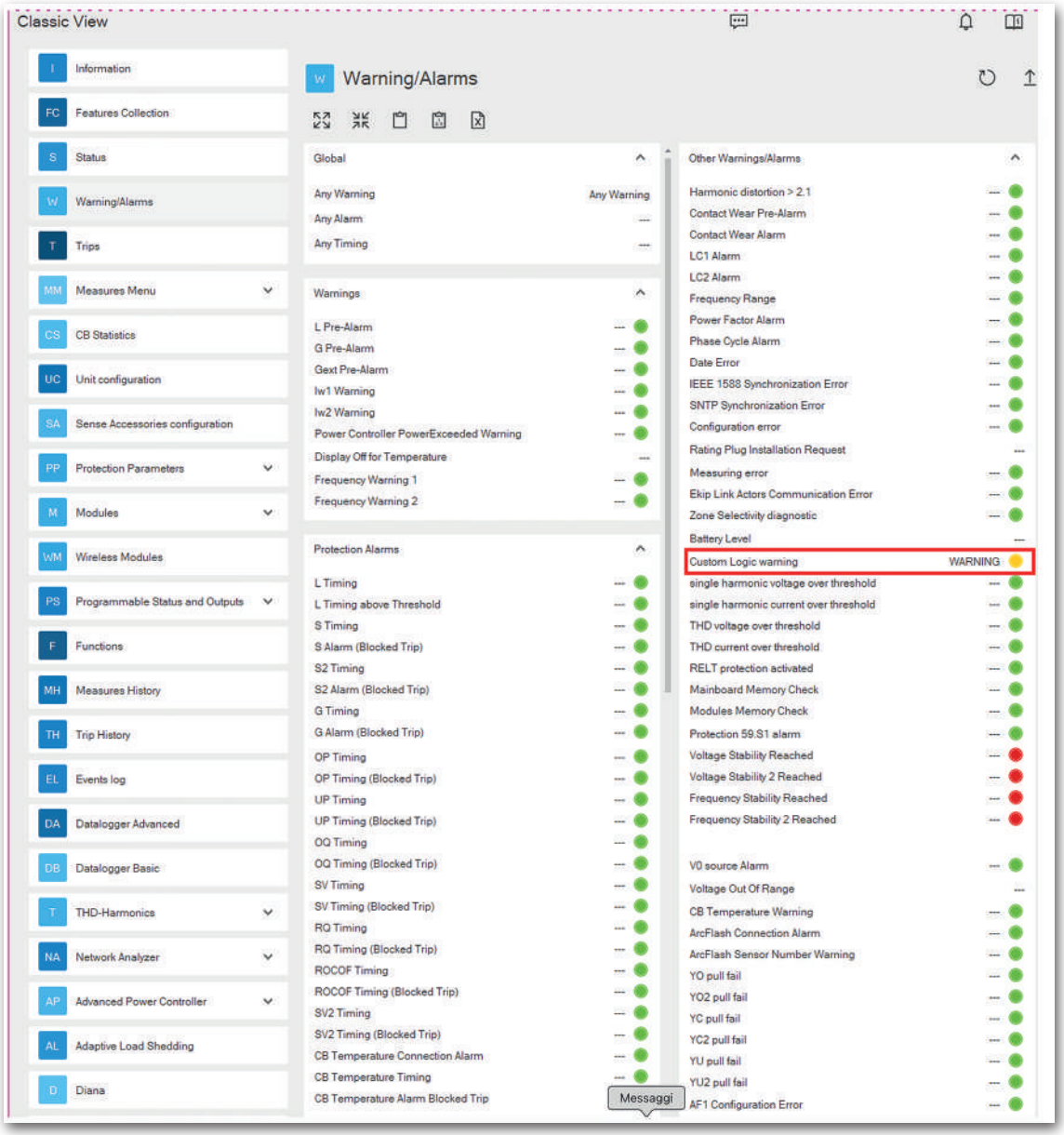
After that, the logic can be uploaded to the breaker.

Note: If the device lacks one or more hardware components or licenses required by the logic, the download is not blocked. However, an alert message will appear in Ekip Connect, and an error message will be displayed on the device.


Upload Project
Bill of materials verification
RESOURCE
VERIFIED
Ekip Signalling 4K
Voltage Protections
Measuring Package
Ekip Supply Evo Modbus TCP
Com Link


Upload
Your logic won't work if you don't add the necessary resources. Do you want to proceed anyway?
Yes
No

After the upload, a warning message will appear in the HMI and in the “Warning/Alarms” menu in Ekip Connect (click on Classic View → Warning/Alarms):

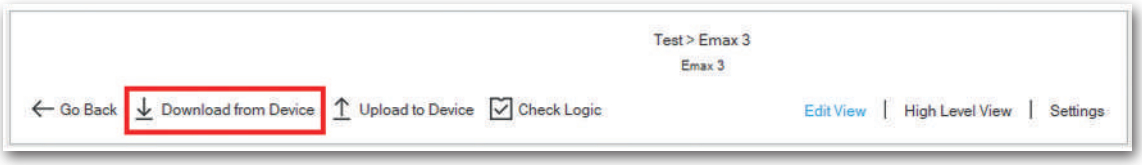


To analyze better the Alarm, it is possible to check in detail in the classic view page by clicking on Classic View → Programmable Status and Outputs → Custom Logic → PLC Sta-tus:

Note: The warning alarm on the device appears only when Ekip Signalling OUT is missing.
If other equipment is missing (i.e. Measuring package, or Ekip Suplly Evo Modbus TCP), this is shown only in Ekip Connect during the logic upload process.

Logic reading

In the opposite direction, it is also possible to read the logic that is installed on the breakers.
In the Edit View, press the function “Download from Device” to open the logic saved in the device:

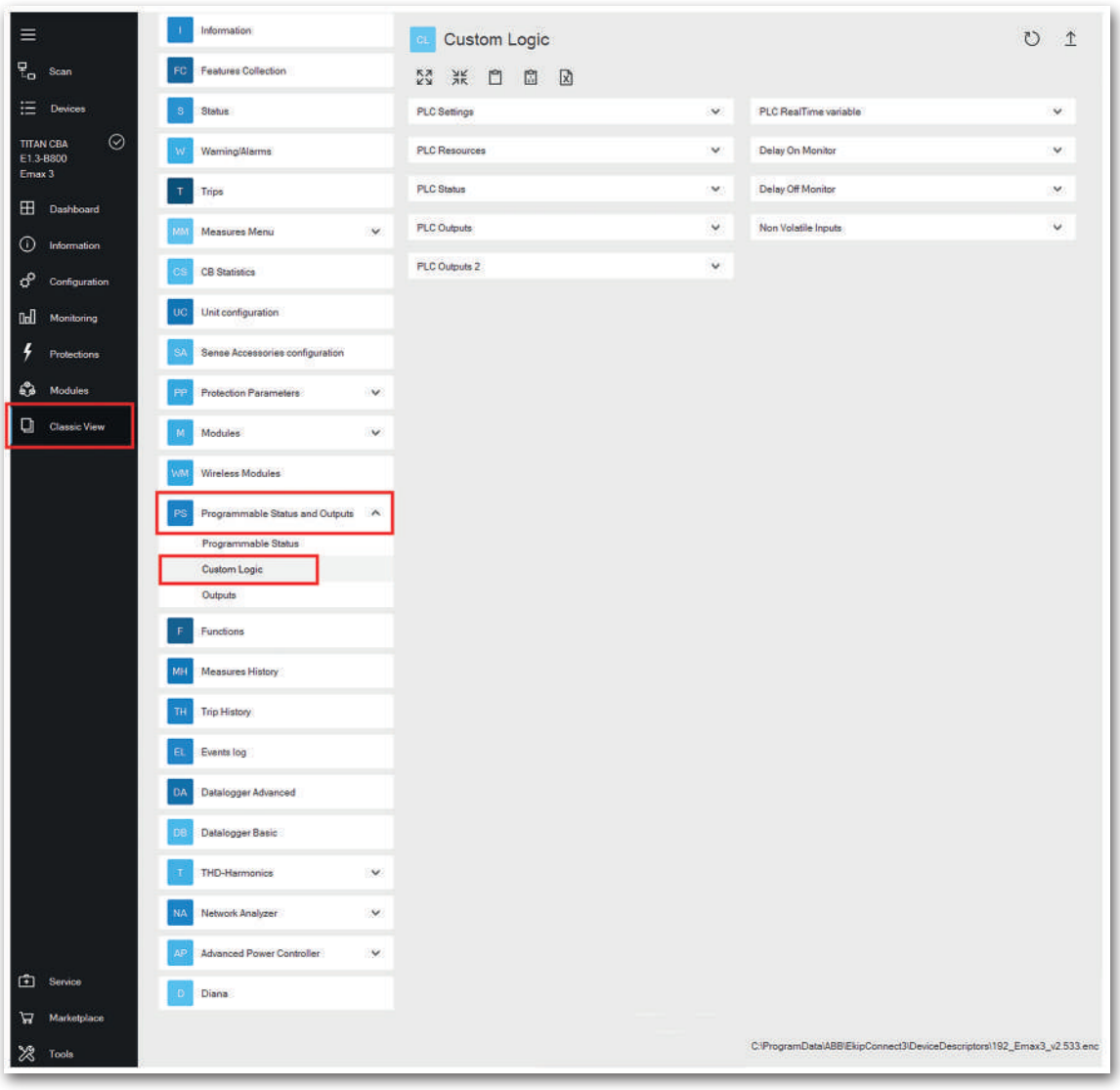


Note: downloading from the device, it will overwrite the logic that is open in the file.

CLASSIC VIEW PAGE

Logic Management from Classic View: once the logic has been uploaded to the device, it is also possible to manage certain parts of it not only from the Tool page, but also from the Classic View page.

Click on Classic View → Programmable Status and Outputs → Custom Logic



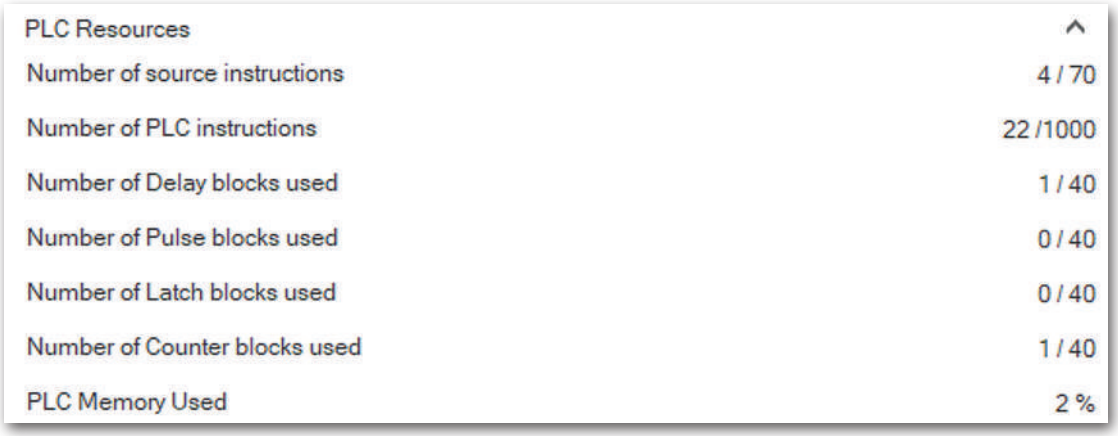
Classic View functionalities

From this page it is possible to use some feaatures without the need to pass from the tool

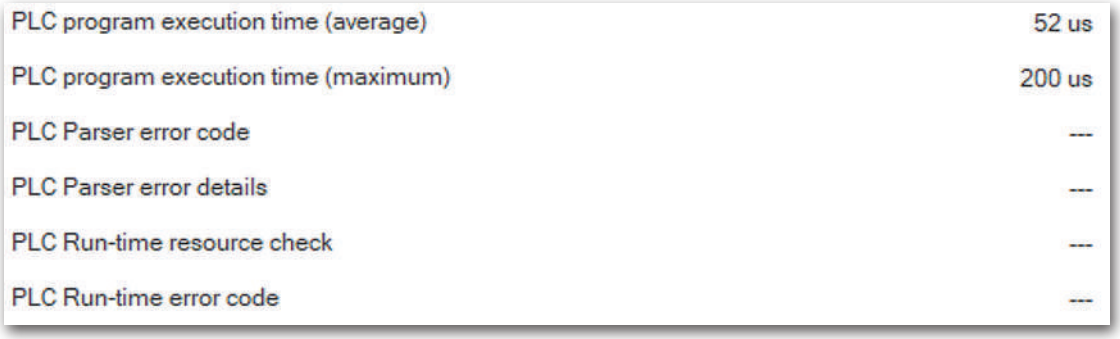
- PLC Enable/Disable

Note: when the Custom Logic (PLC) is enable, an icon is present also in the HMI of Ekip Aware

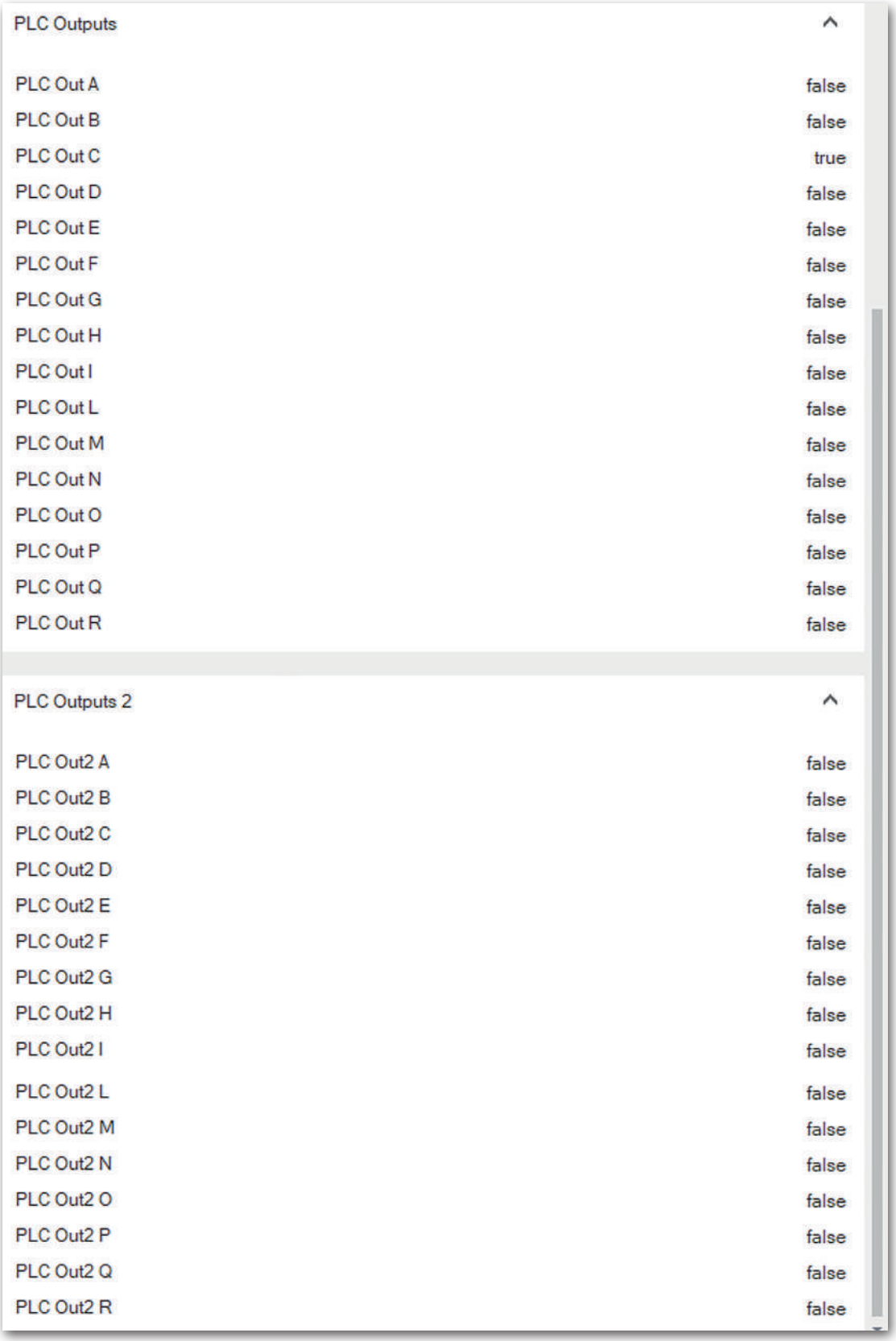
- PLC Resources: it present how the logic is distributed in the device memory and especially how much of it has bees used



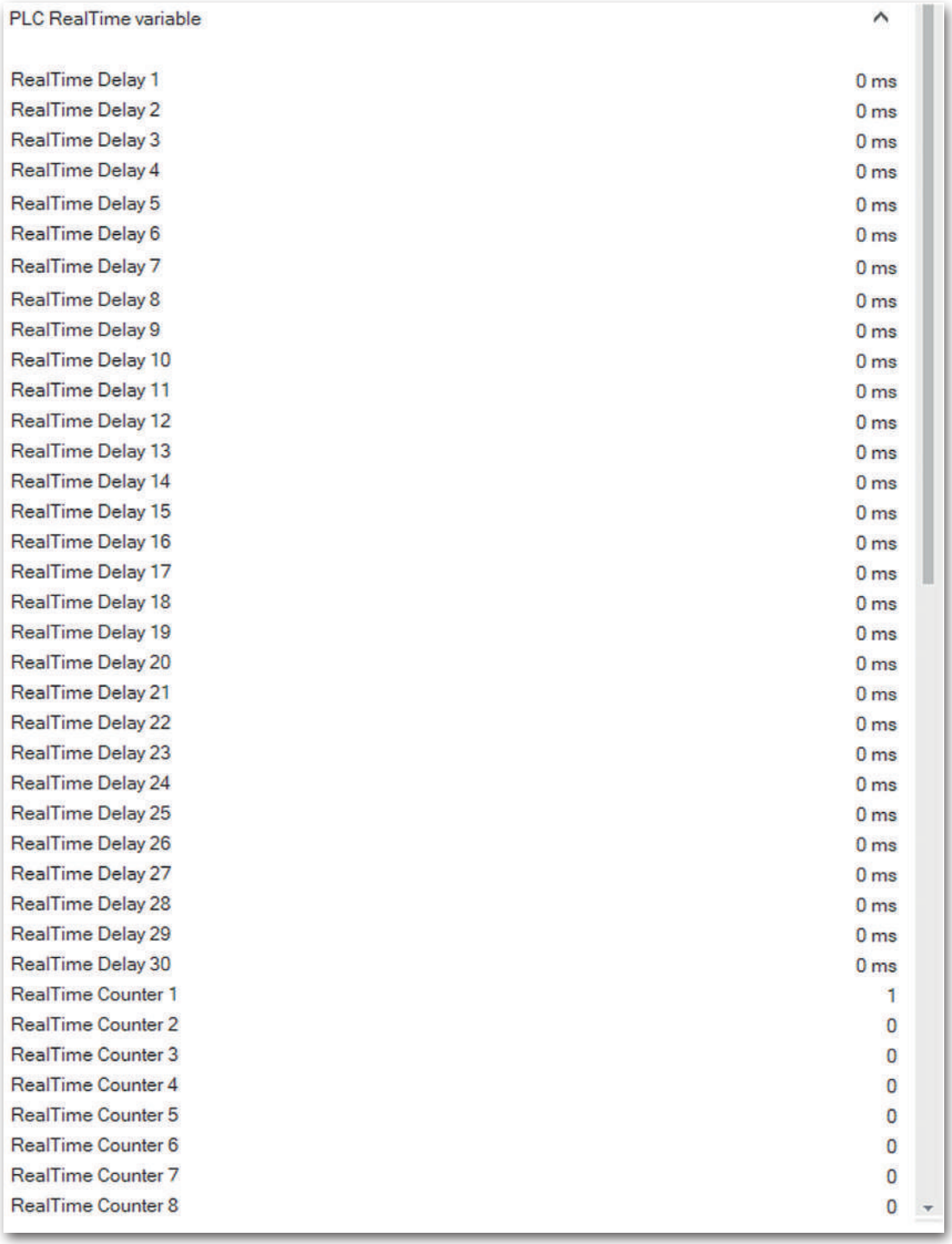
- PLC Status: it presents the execution time and any eventual error



- PLC Outputs: it shows in real time the status of the PLC Outputs 1&2 variable



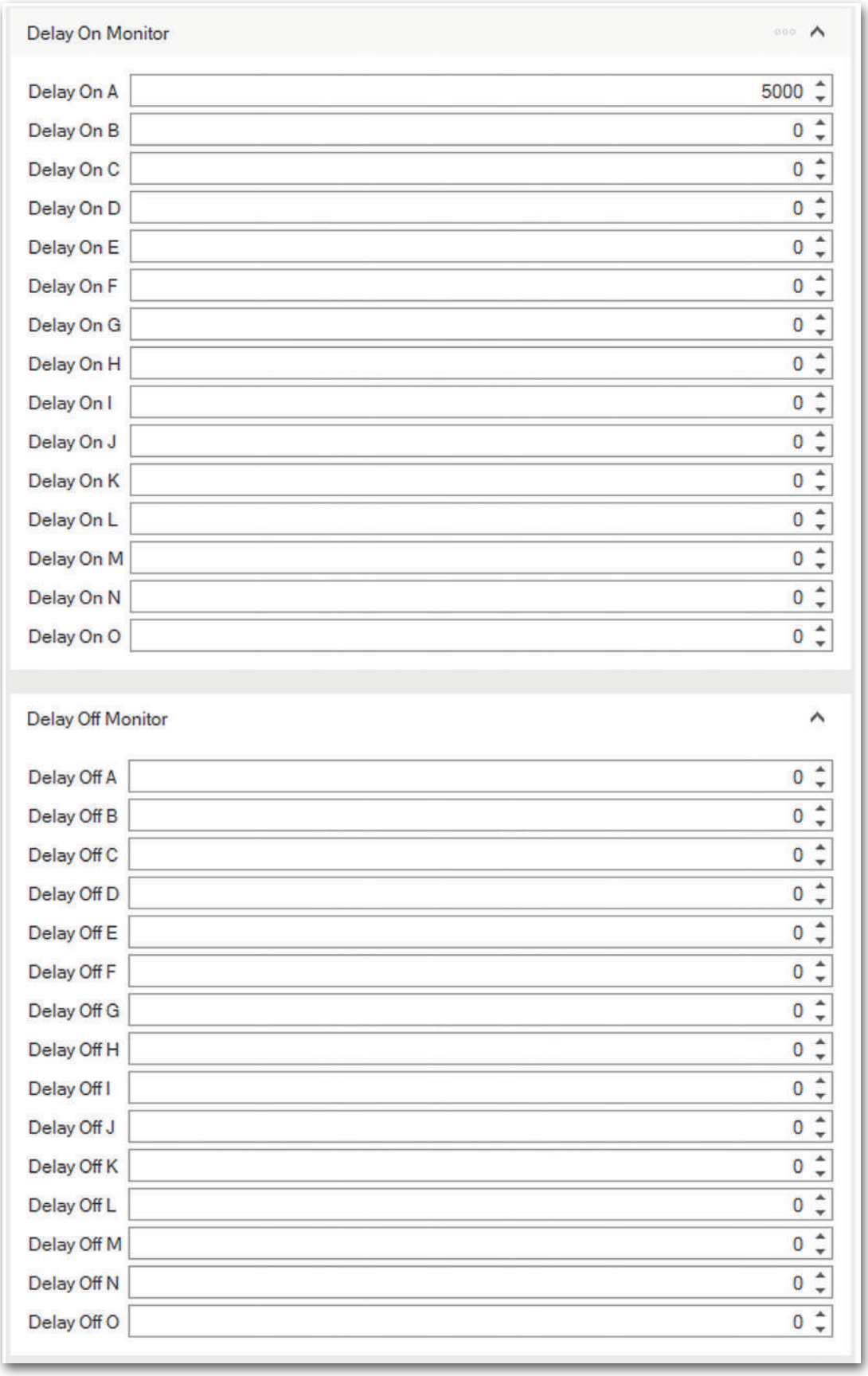
- PLC RealTime variable: it shows in real time the status of each delay operator time (RealTime Delay 1 – 30) and Counter operator number (RealTime Counter 1 – 30)



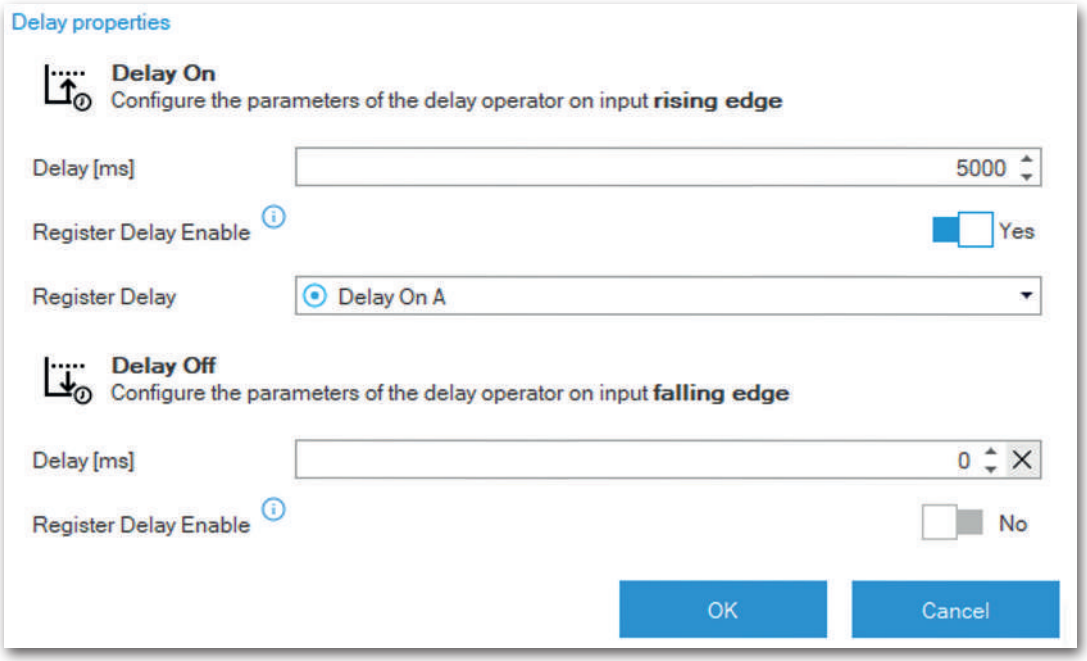
Note: The number associated with each register (1–30) refers to the order in which the operators (Delay/Counter) are positioned in the logic, starting from Rule 1 to the last rule added to the project.

Note 2: The Real-Time Delay value does not differentiate between Delay On and Delay Off. For the same register, both delays are monitored in real time.

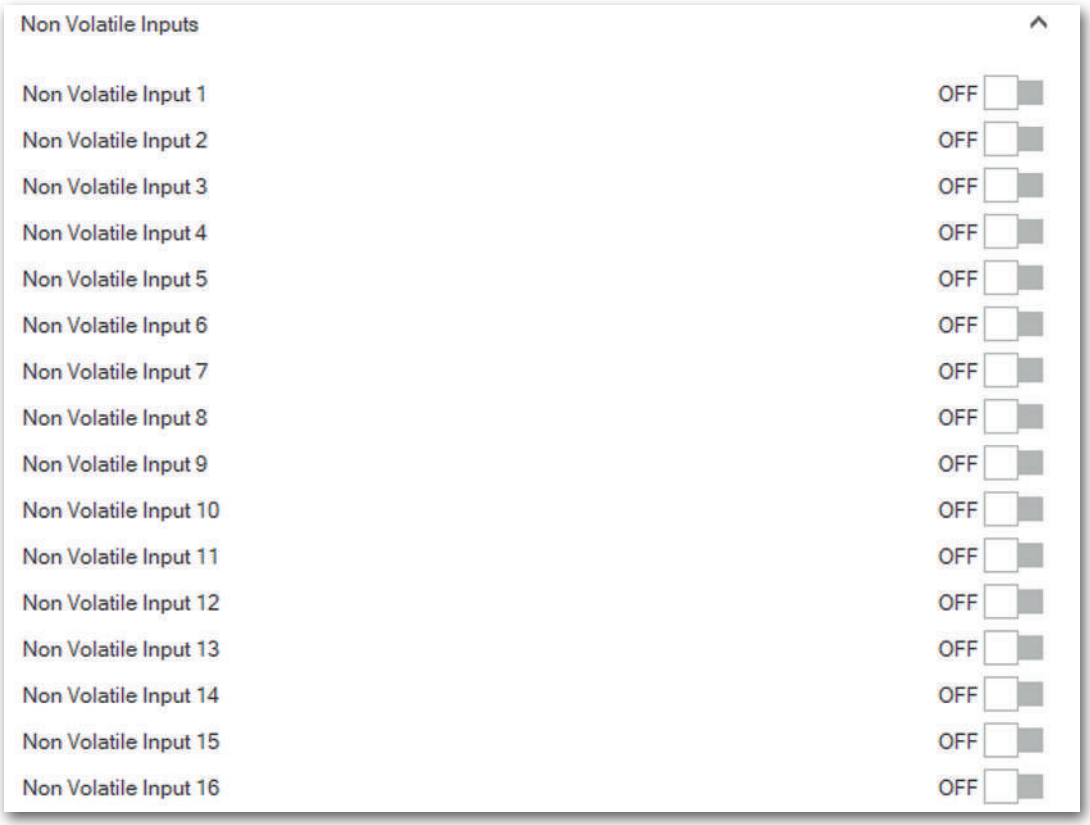
- Delay On & Off Monitor: functionallity where the register Delay On A – O and Delay Off A – O can be modified without editing the project.



Note: the link between the Delay On/Off register and the Delay Operator has to be done in the project



- Non Volatile Inputs: free boolean variable that can be controlled from the Classic View



APPLICATION EXAMPLE

This chapter presents an example that illustrates all the steps and features used to design and implement a logic on the breaker.

Note: The purpose of the following example is to demonstrate how to implement a logic step by step, highlighting most of the functionalities described in the previous chapters.
This is not a real case study.

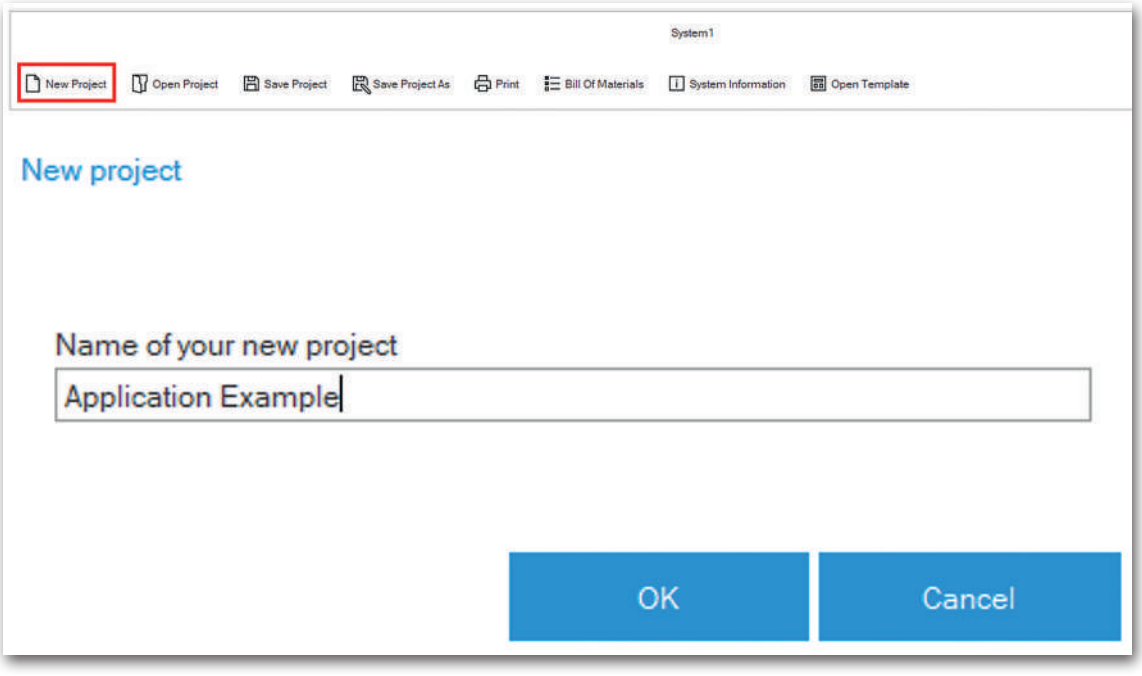
Logic description and requirements

CONDITION	REQUIREMENT	ACTION
1	[CB open] AND [NOT [CB ready to close]]	4k Out 01 = On
2	4K Out 01 (Condition 1) = On	4k Out 02 = On for 5s, and then, 4k Out 02 = Off
3	[UV tripped] OR [L tripped]	PLC Out C = True
4	Counter [PLC Out C] = 10	Temporary A = True
	4k In 01 = On	Counter [PLC Out C] = 0

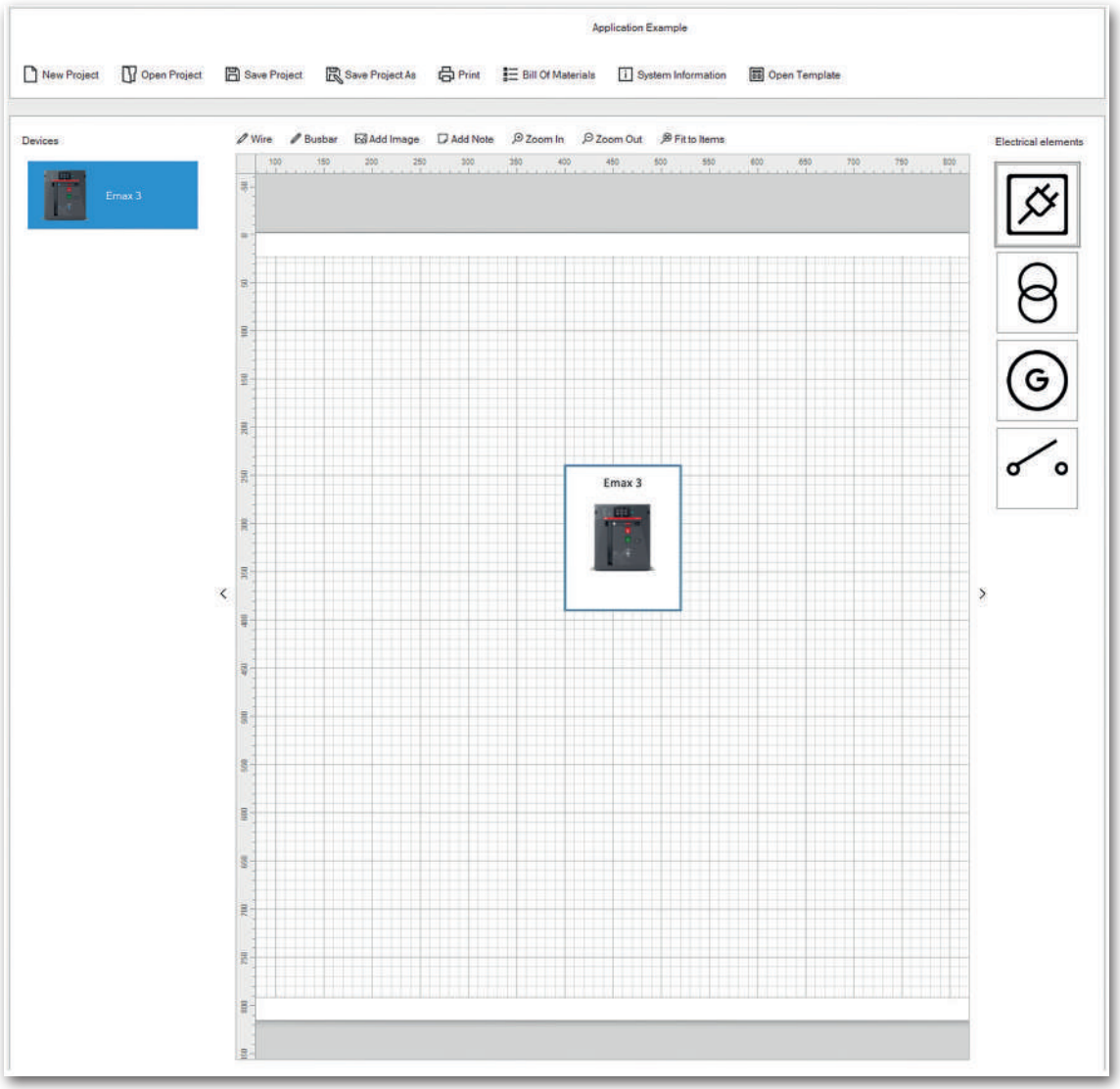
Logic development

Create Project

Create a new project and define the name (i.e. “Application Example”).

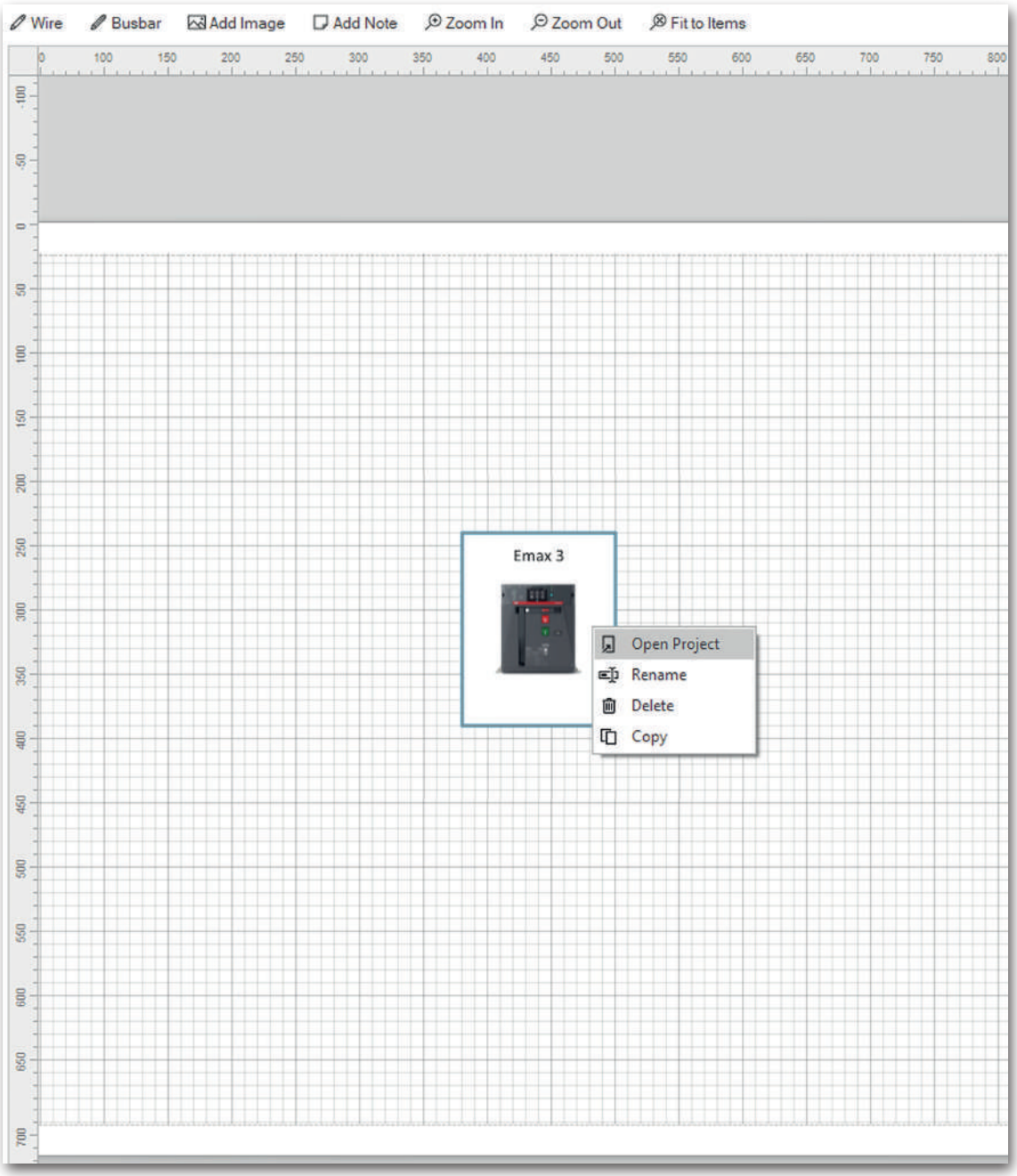


Insert the device in the required for the logic in the diagram page. In this case, it is Emax 3.



Logic design

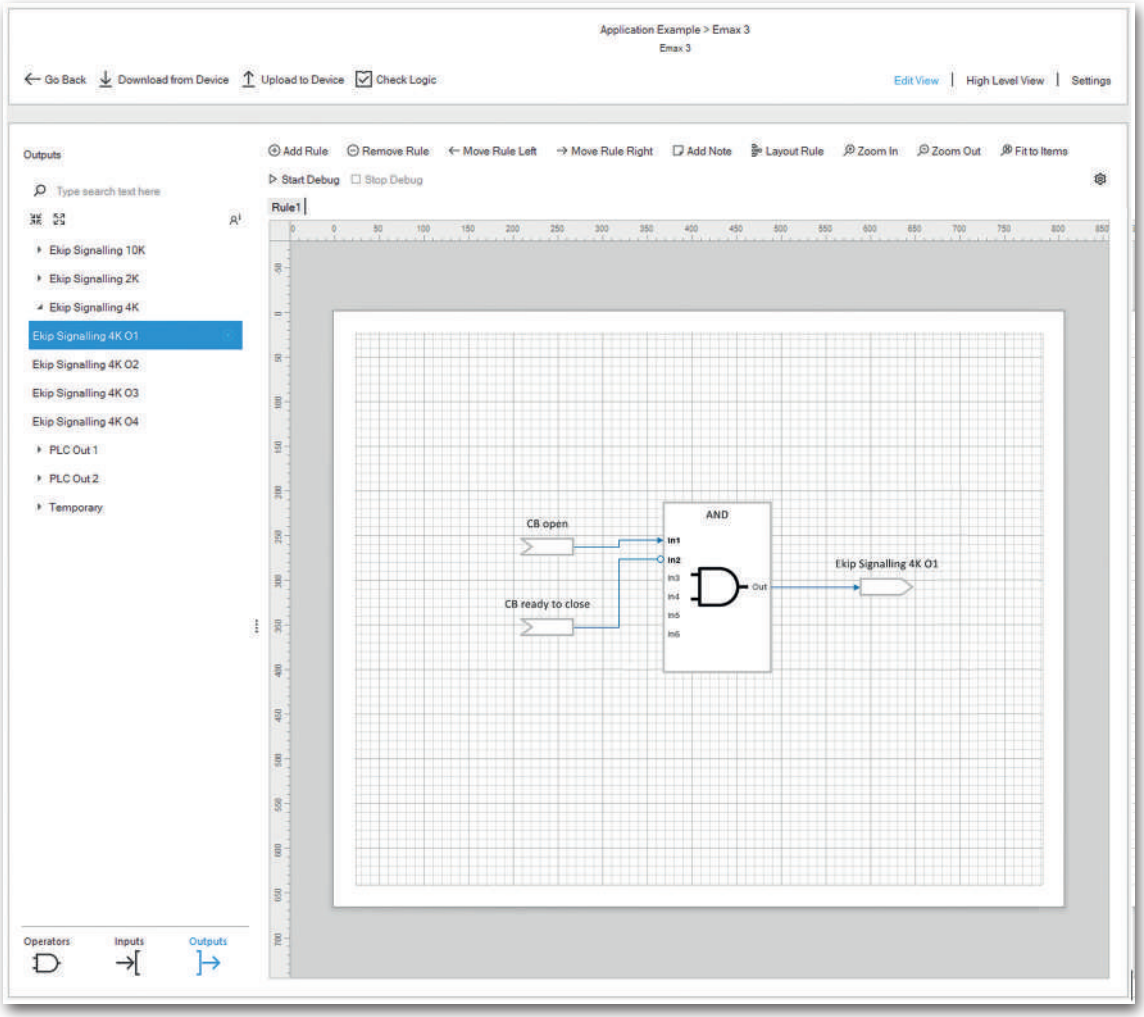
Click on “Open Project” on the device and insert the variables, operators and outputs required in the logic description.



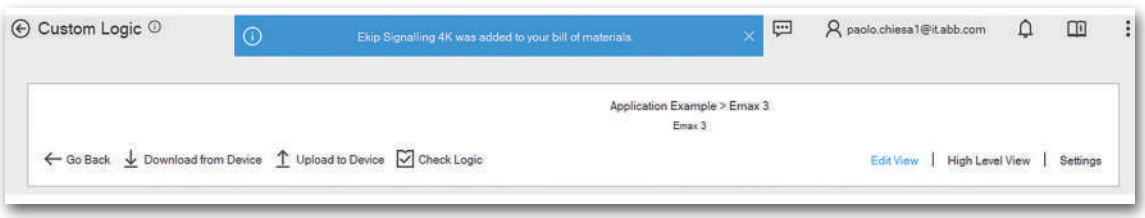
Rule 1: Condition 1

CONDITION	REQUIREMENT	ACTION
1	[CB open] AND [NOT [CB ready to close]	4k Out 01 = On

1. Rename Rule1 to “Condition 1”
2. Insert input variables (CB open, CB ready to close) to Rule 1
3. Insert Operator AND
4. Connect input variables to input of AND operator and negate “CB ready to close”
5. Insert output variable “Ekip Signalling 4K O1”
6. Connect Out of AND operator to “Ekip Signalling 4K O1”
7. Click on “Layout Rule” function to organize automatically the view of the Rule (op-tional)



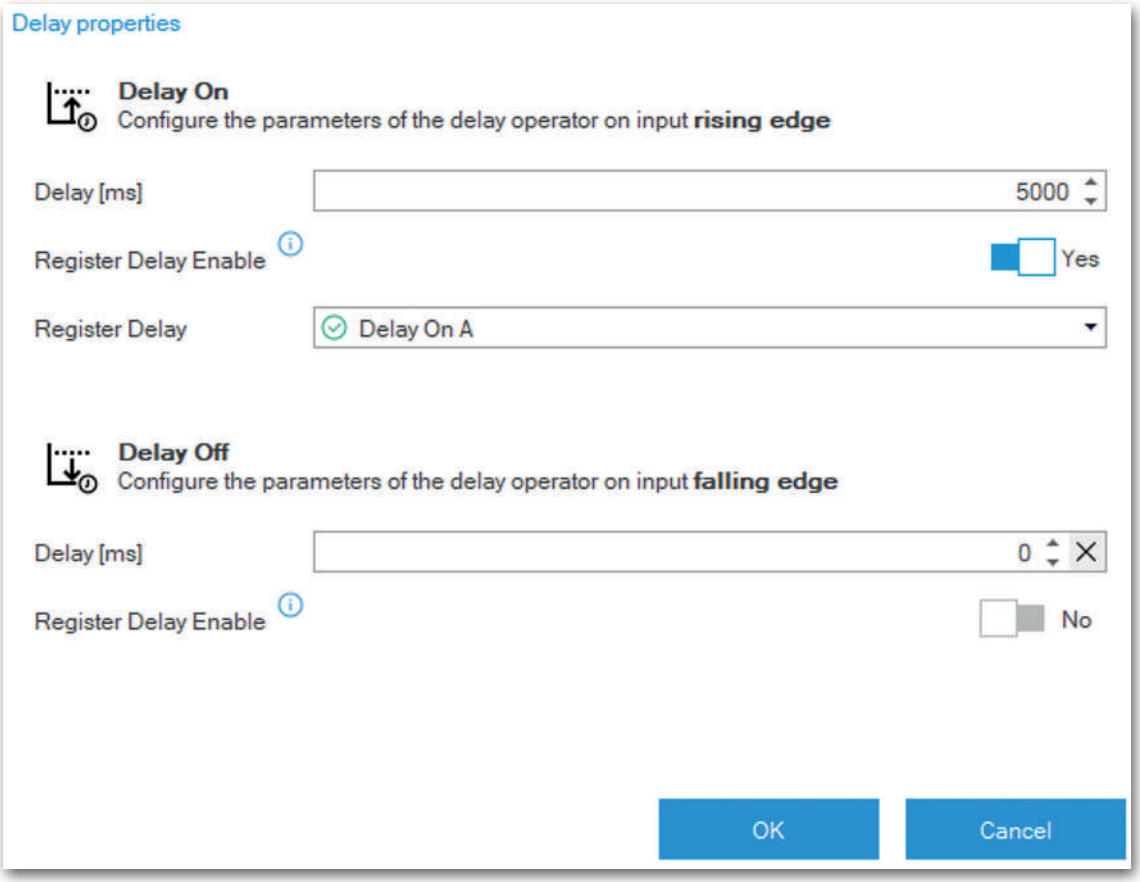
Note: Ekip Signalling 4k will be inserted in the BoM



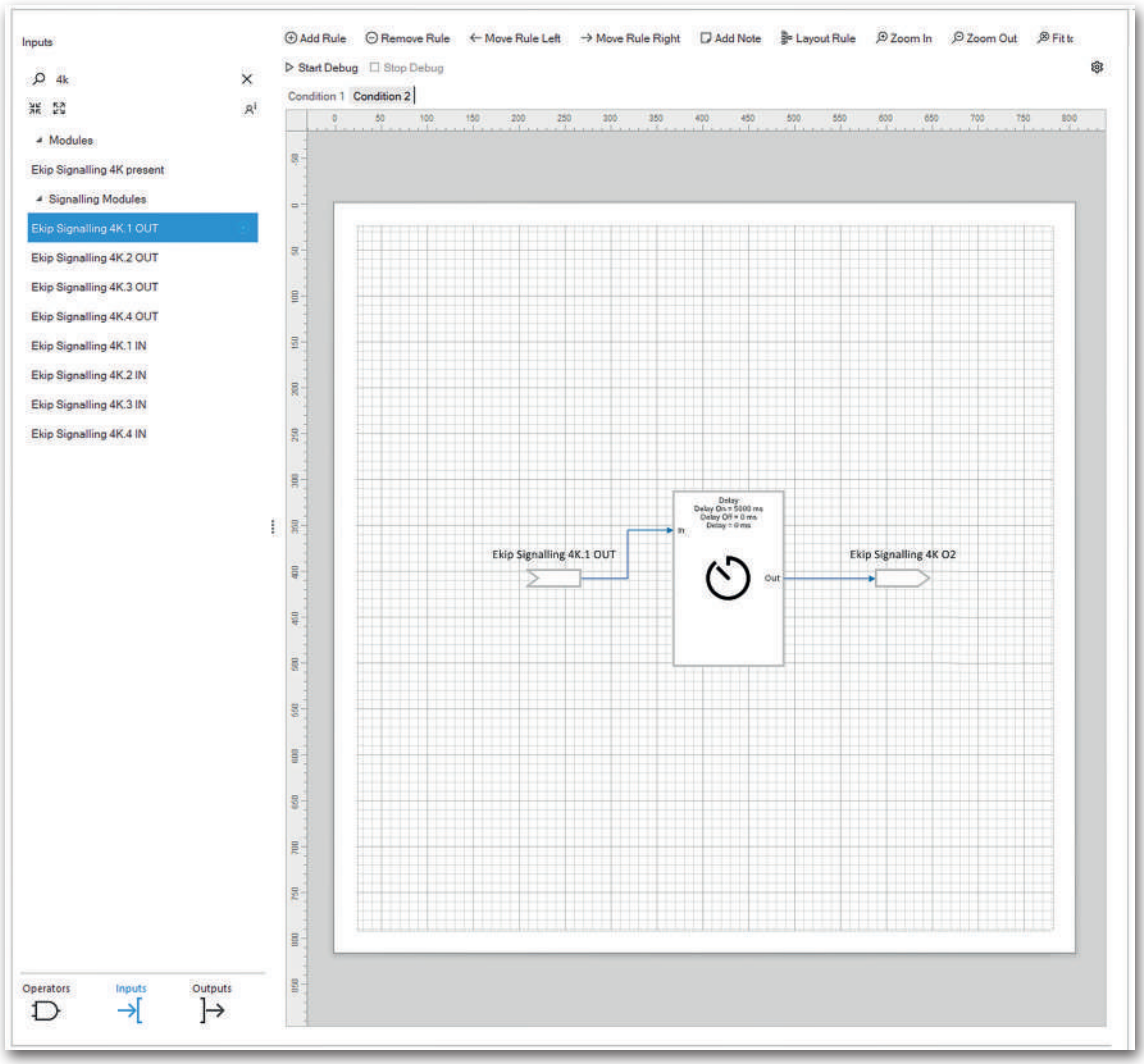
Rule 2: Condition 2

CONDITION	REQUIREMENT	ACTION
2	4K Out 01 (Condition 1) = On	4k Out 02 = On for 5s, and then, 4k Out 02 = Off

1. Click on Add Rule
2. Rename Rule2 to “Condition 2”
3. Insert input variables (4K Out 01) to Rule 2
4. Insert Delay Operator
5. Double click on the Delay operator to set Delay On value = 5000ms
6. Enable the “Register Delay Enable” and select “Delay On A” register (optional)



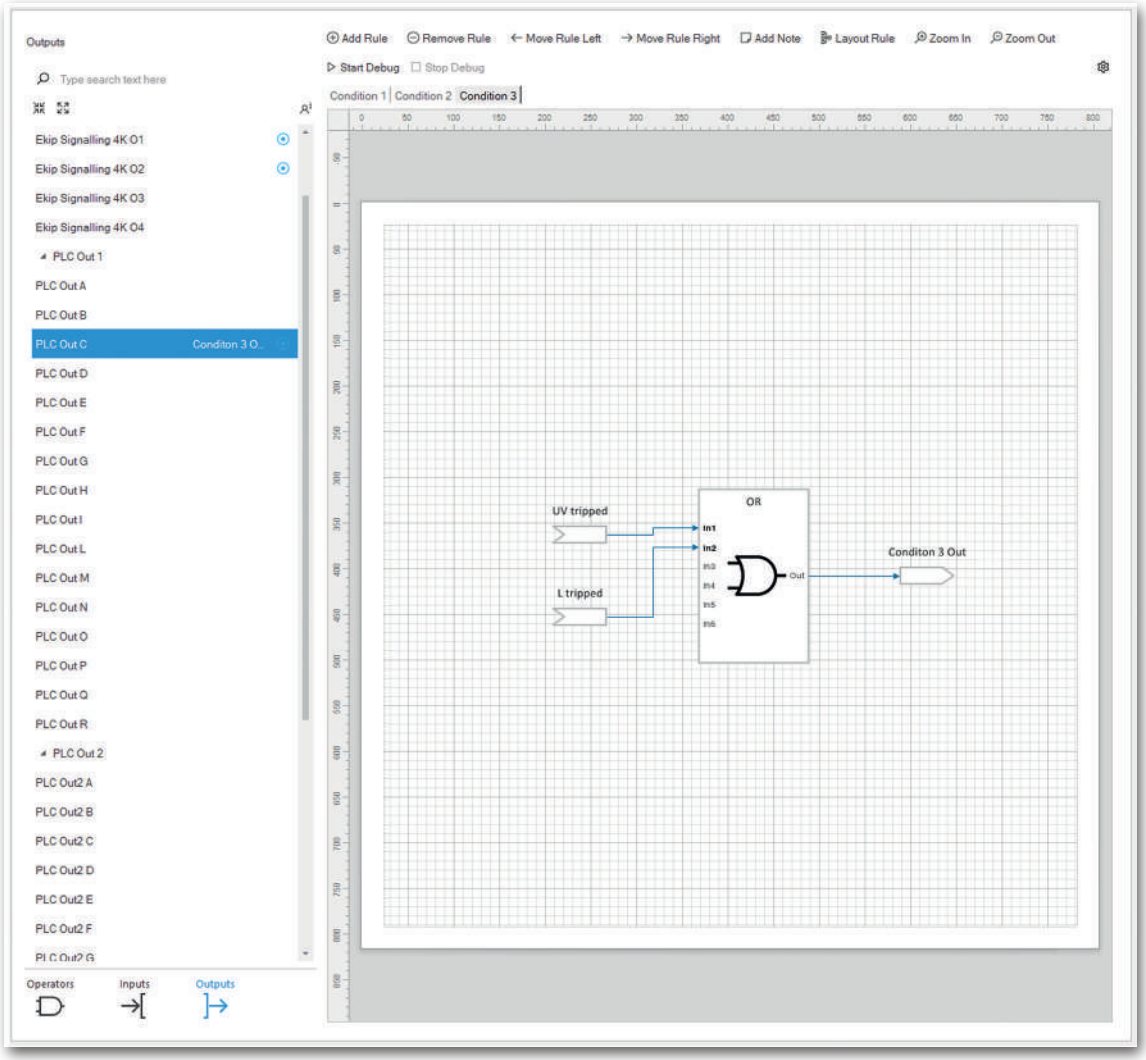
7. Connect “4K.1 OUT” input variables to input of Delay operator
8. Insert output variable “Ekip Signalling 4K O2”
9. Connect Out of Delay operator to “Ekip Signalling 4K O2”
10. Click on “Layout Rule” function to organize automatically the view of the Rule (optional)



Rule 3: Condition 3

CONDITION	REQUIREMENT	ACTION
3	[UV tripped] OR [L tripped]	PLC Out C = True

1. Click on Add Rule
2. Rename Rule3 to “Condition 3”
3. Insert input variables (UV tripped, L tripped) to Rule 3
4. Insert OR Operator
5. Connect “UV tripped”, “L tripped” input variables to input of OR operator
6. Insert output variable “PLC Out C”
7. Connect Out of OR operator to “PLC Out C”
8. Right click on PLC Out C and rename it as “Condition 3 Out” (optional)
9. Click on “Layout Rule” function to organize automatically the view of the Rule (optional)

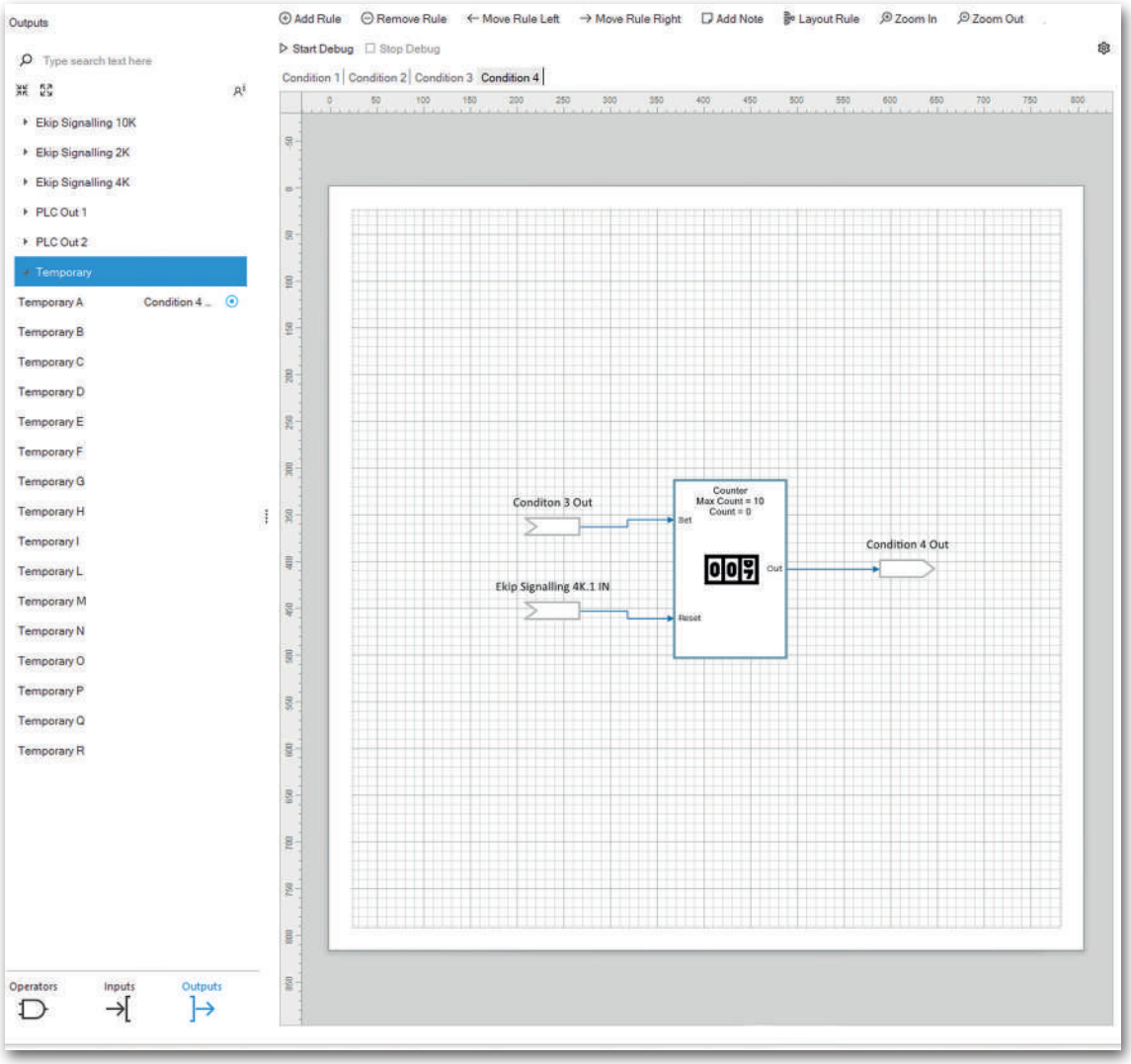


Note: Voltage Protection and Measuring packages will be inserted in the BoM

Rule 4: Condition 4

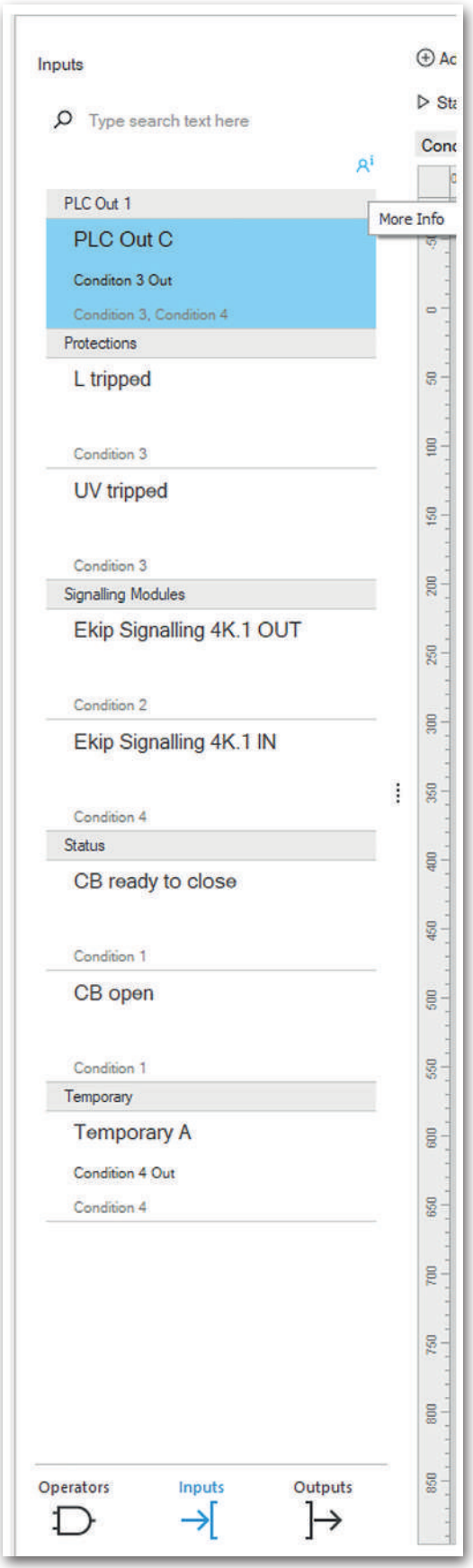
CONDITION	REQUIREMENT	ACTION
4	Counter [PLC Out C] = 10	Temporary A = True
	4k In 01 = On	Counter [PLC Out C] = 0

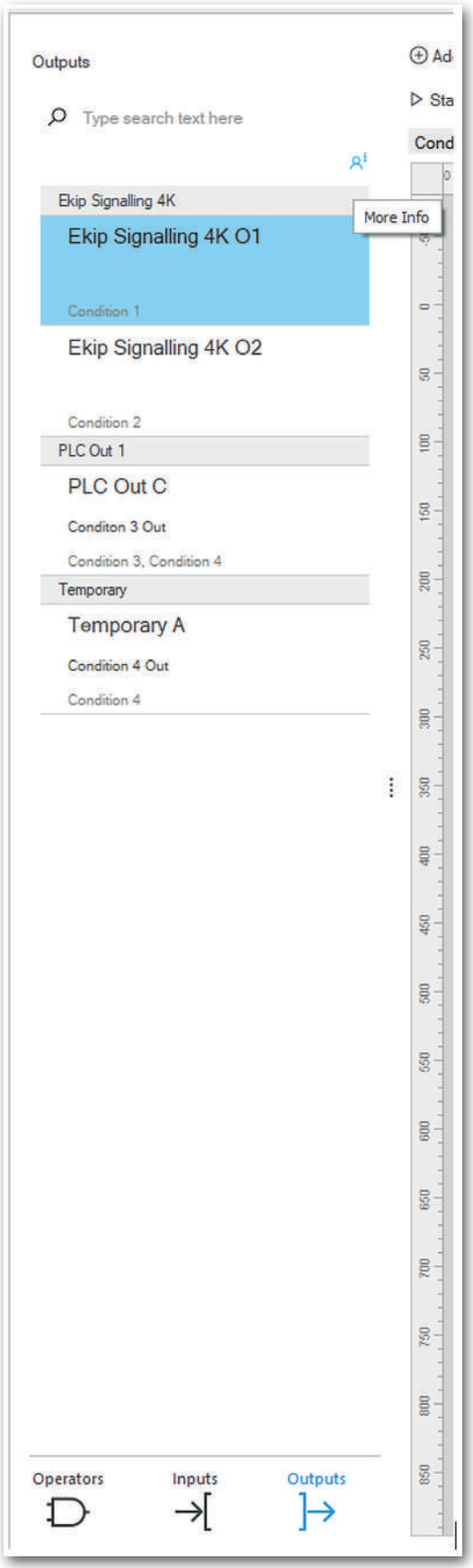
1. Click on Add Rule
2. Rename Rule4 to “Condition 4”
3. Insert input variables (PLC Out C, 4k In 01) to Rule 4
4. Insert Counter Operator
5. Double click on the Counter operator to set Max Count value = 10
6. Connect “PLC Out C” input variable to Set input of Counter operator
7. Connect “4K In 01” input variable to Reset input of Counter operator
8. Insert output variable “Temporary A”
9. Connect Out of Counter operator to “Temporary A”
10. Right click on Temporary A and rename it as “Condition 4 Out” (optional)
11. Click on “Layout Rule” function to organize automatically the view of the Rule (optional)



Logic check

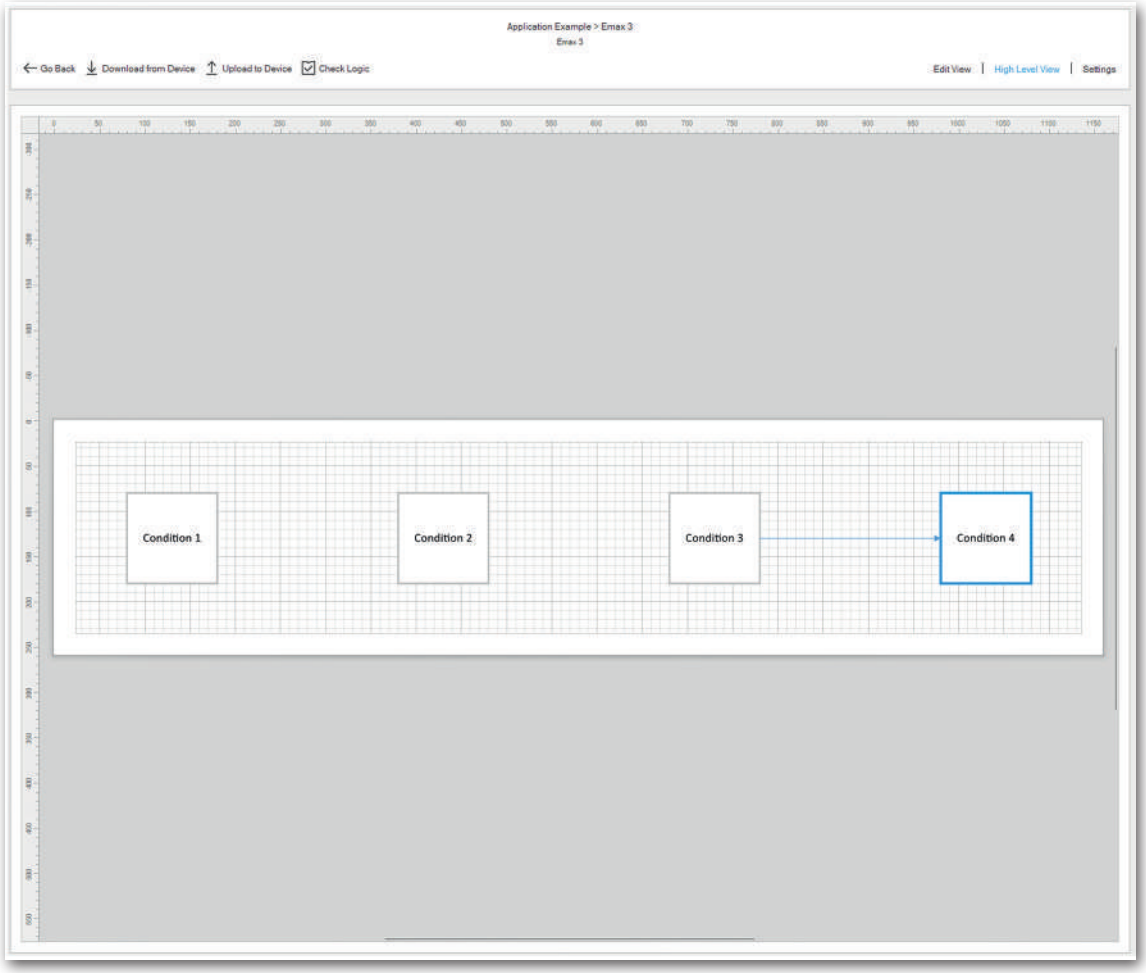
More info
Check Input and Output involved in the logic.





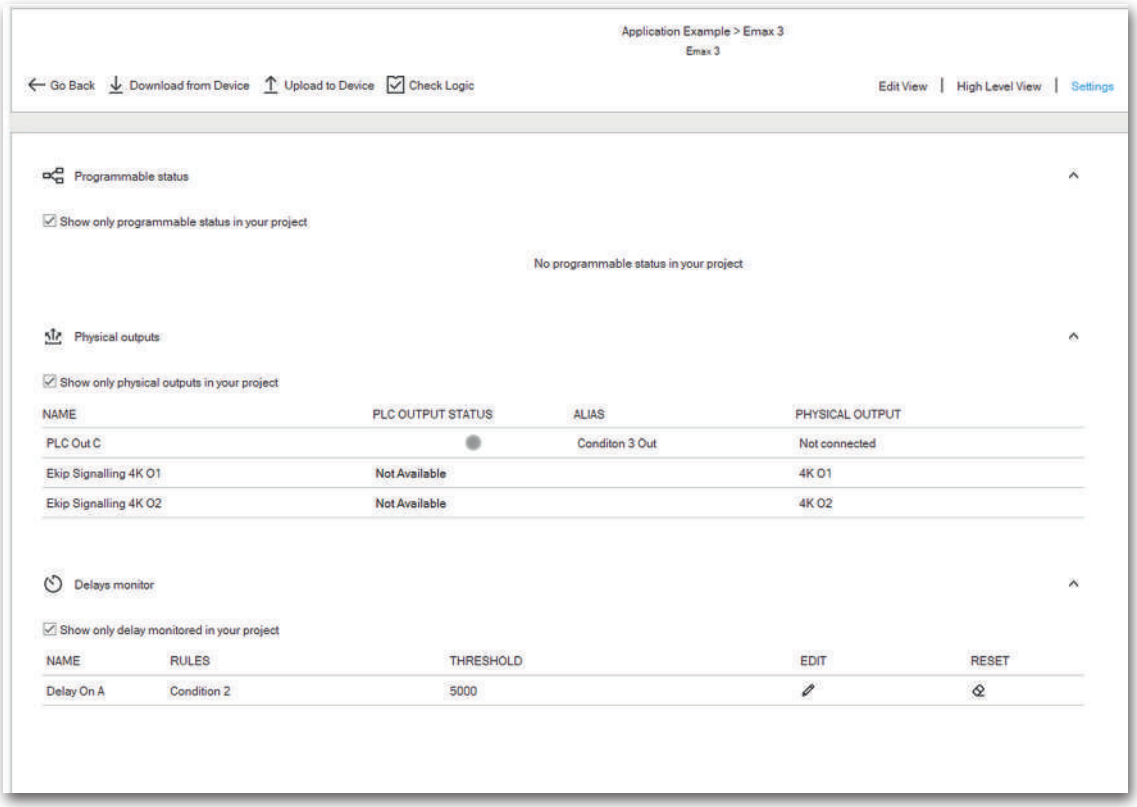
High Level View

Check the connection between the Rules



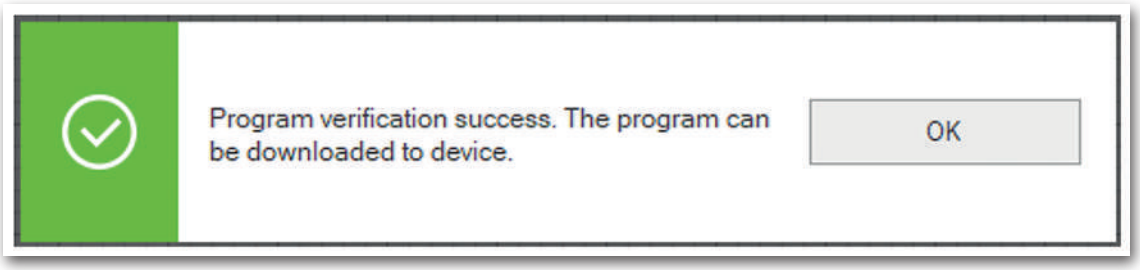
Settings

Check all the PLC output and physical output configurations.



Check Logic

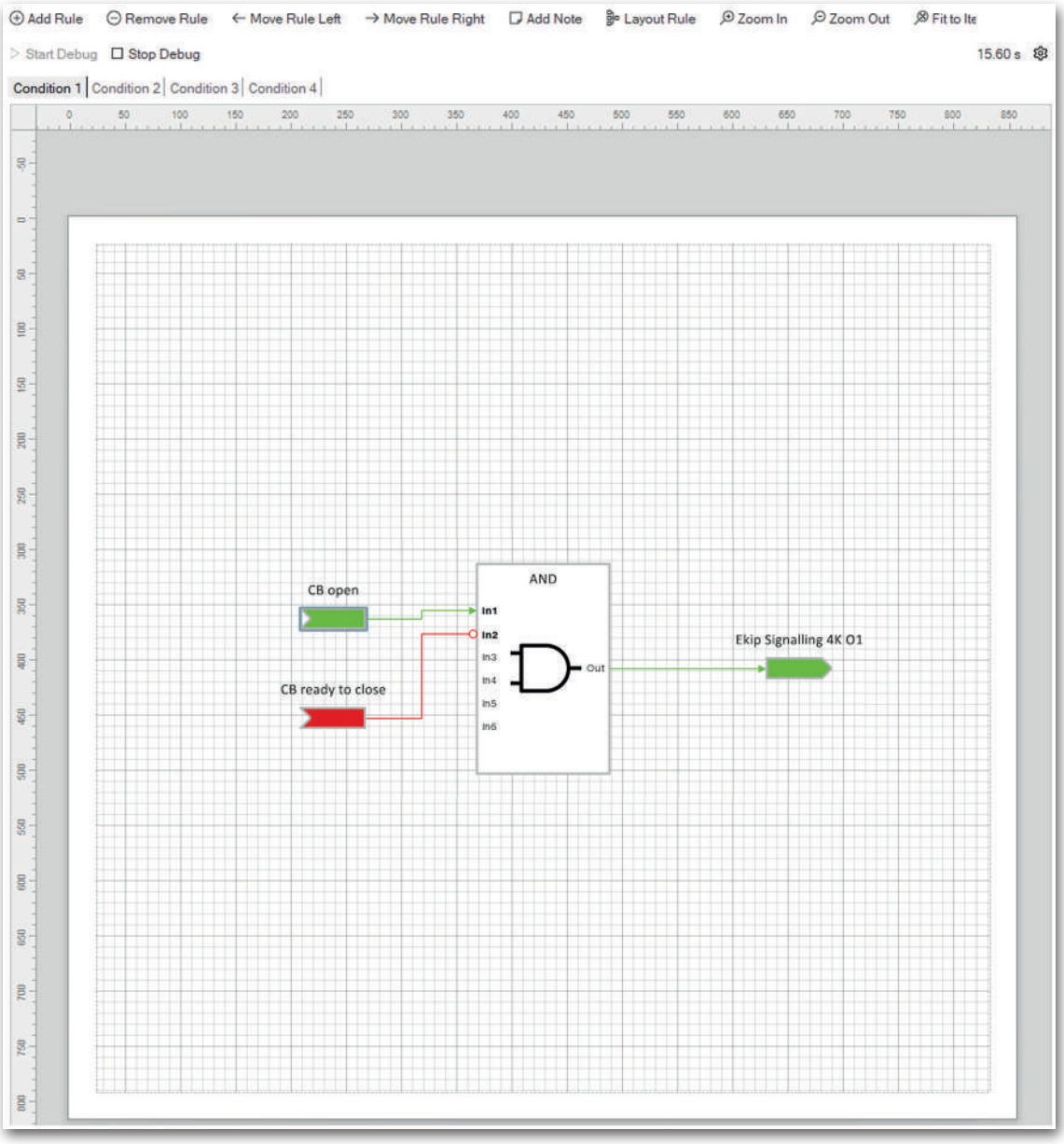
Use to function “Check Logic” to be sure that there is no presence of any error and if the logic is respecting the CB memory limit.



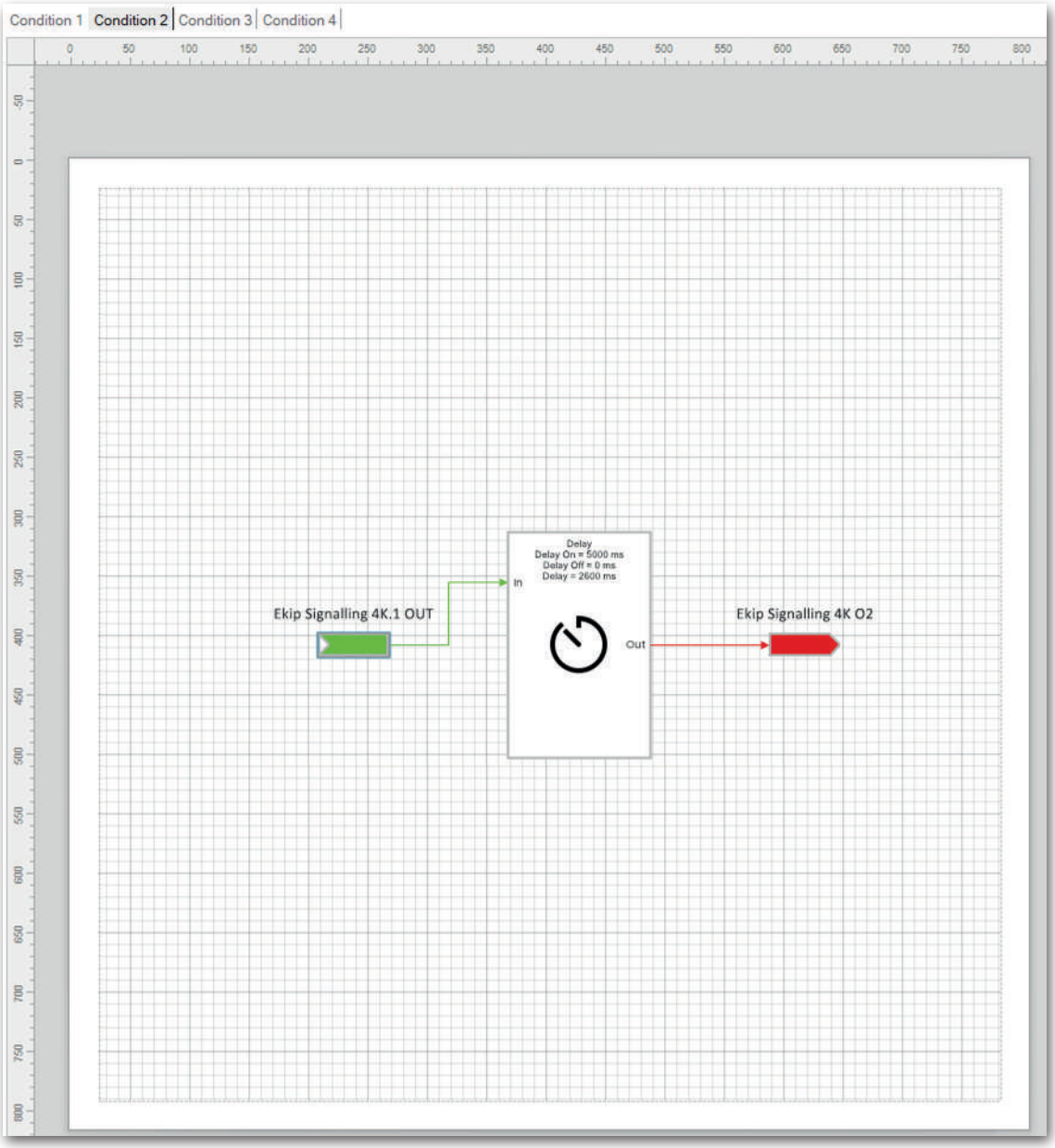
Debug mode

Check the behavior of the logic by changing in real time the input variable status

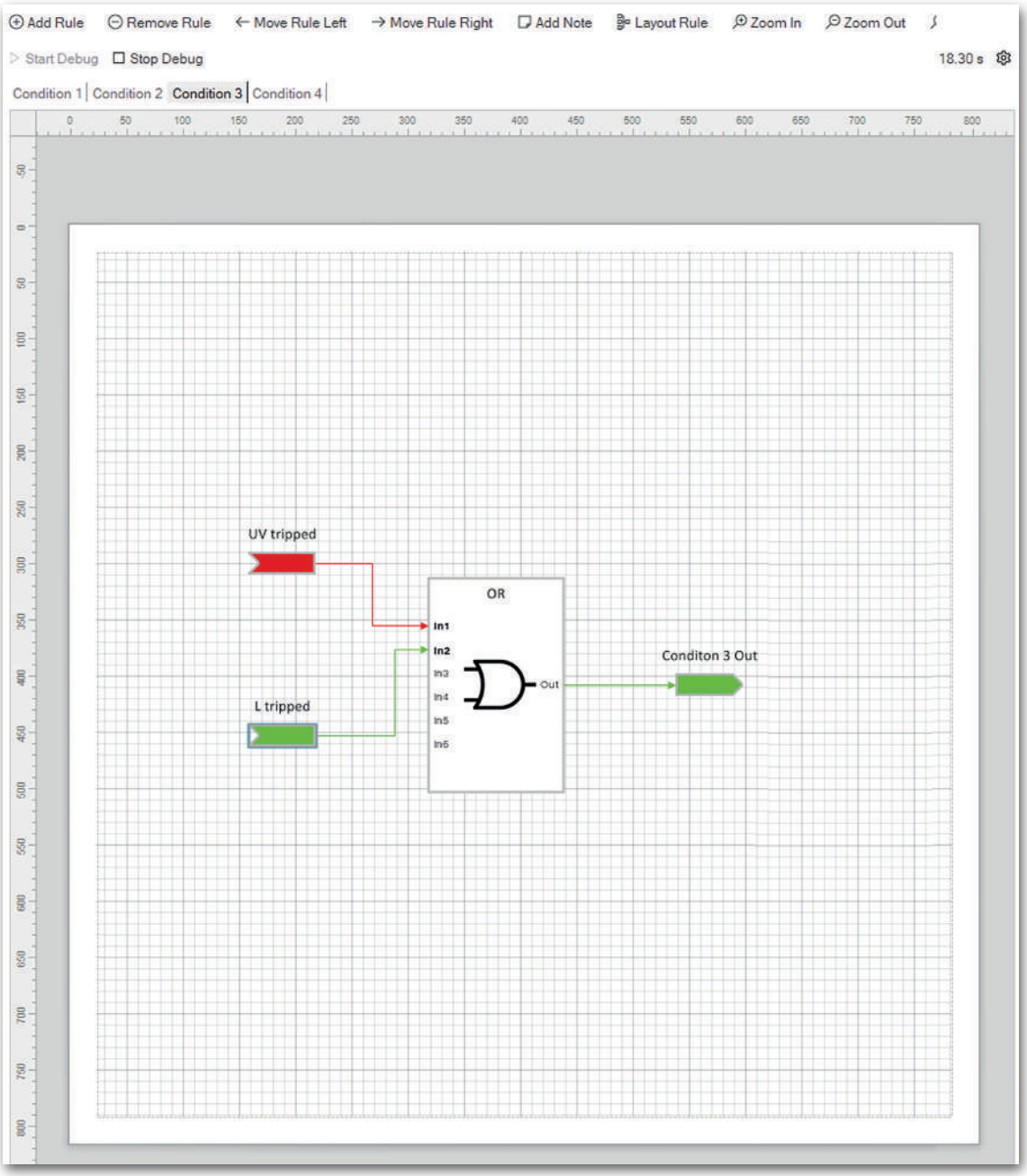
Condition 1:



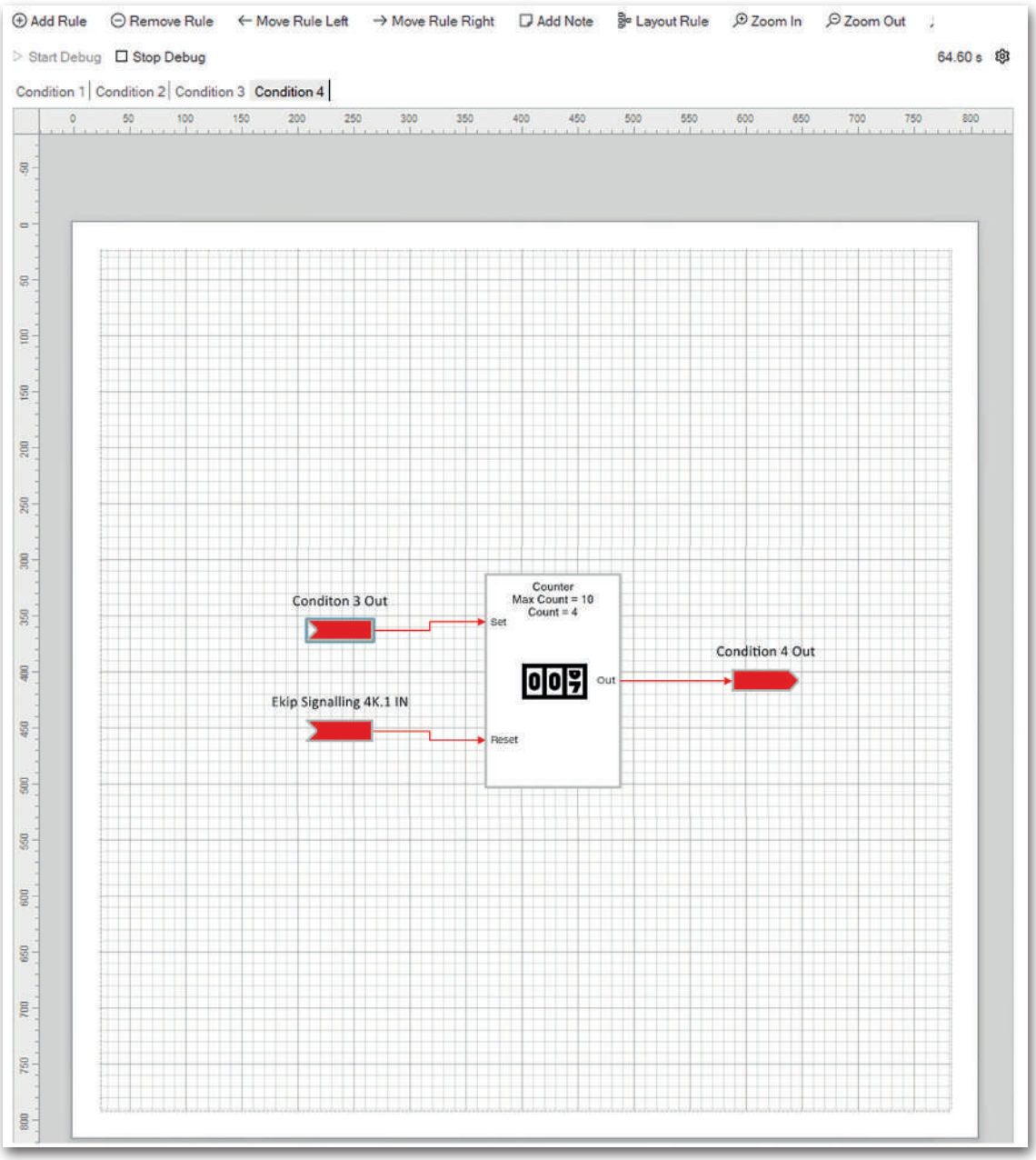
Condition 2:


Condition 1
Condition 2
Condition 3
Condition 4
Delay
Delay On = 5000 ms
Delay Off = 0 ms
Delay = 2600 ms
In
Out
Ekip Signalling 4K.1 OUT
Ekip Signalling 4K O2

Condition 3:


Add Rule
Remove Rule
Move Rule Left
Move Rule Right
Add Note
Layout Rule
Zoom In
Zoom Out
Start Debug
Stop Debug
18.30 s
Condition 1
Condition 2
Condition 3
Condition 4
UV tripped
L tripped
OR
In1
In2
In3
In4
In5
In6
Out
Conditon 3 Out

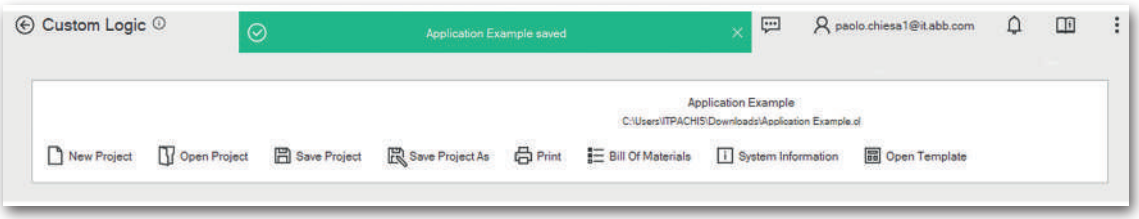
Condition 4:



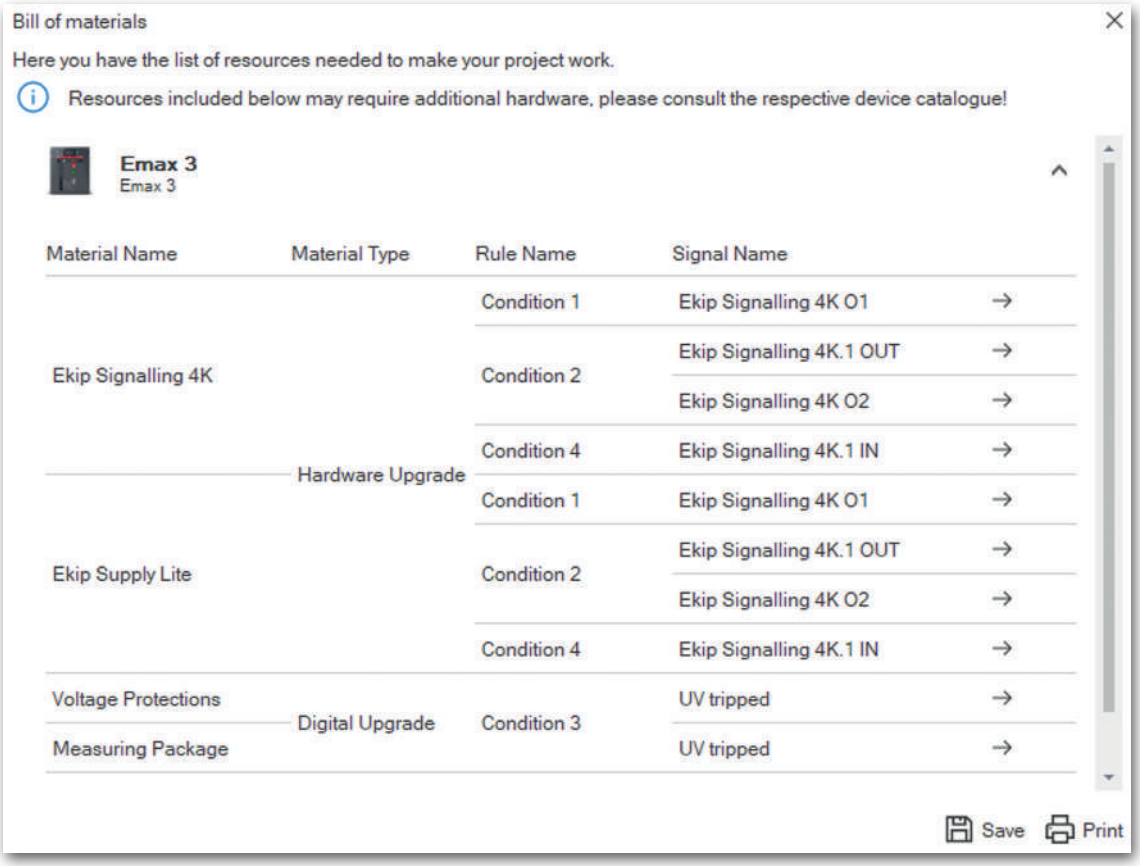
Project check

More info

Click on “Save Project” in the diagram page to save a .cl file locally in the computer..



Bill of Materials
Click on “Bill Of Materials” in the diagram page to have the:

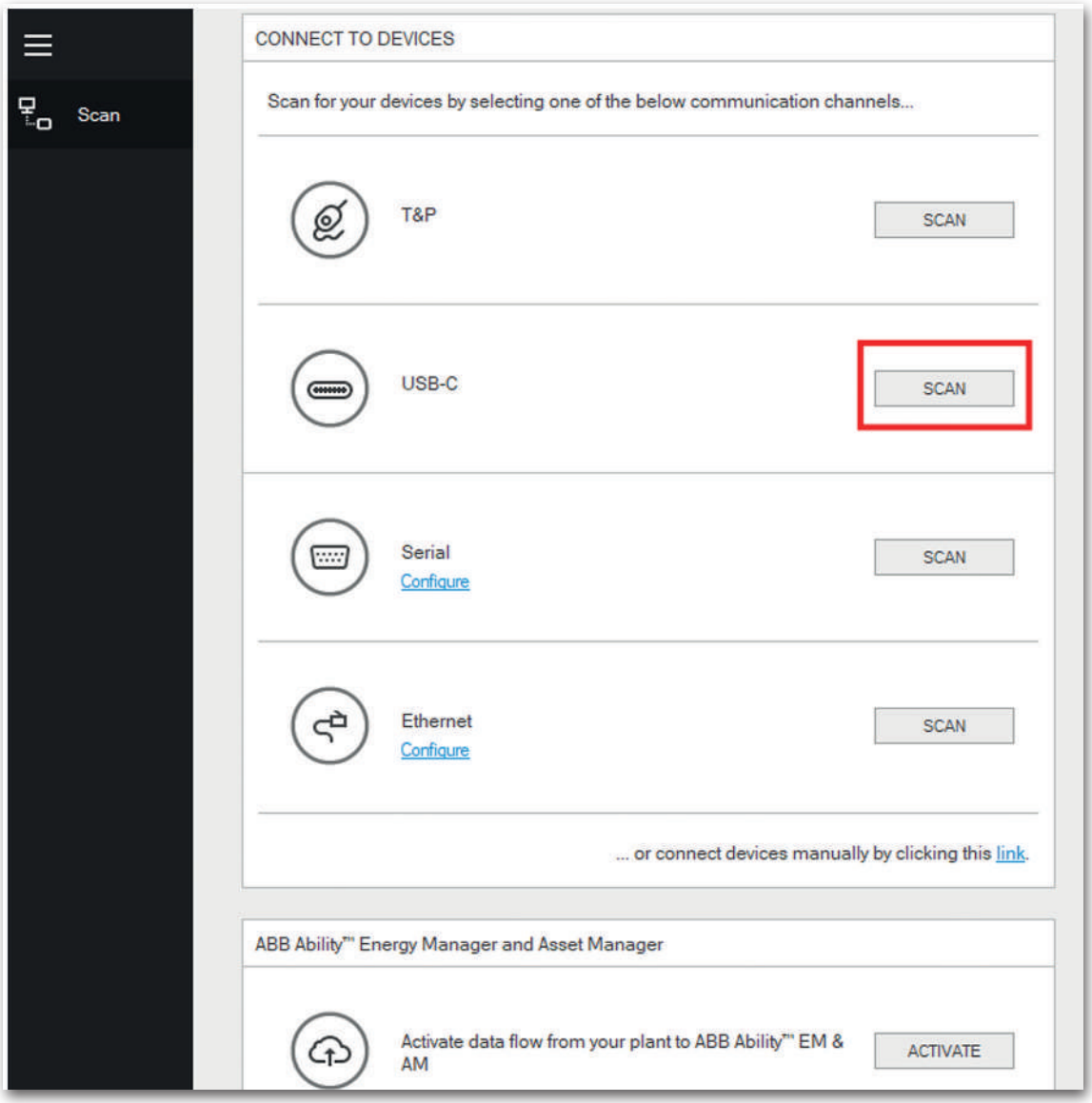


Note: the BoM can be saved as a pdf or printed.

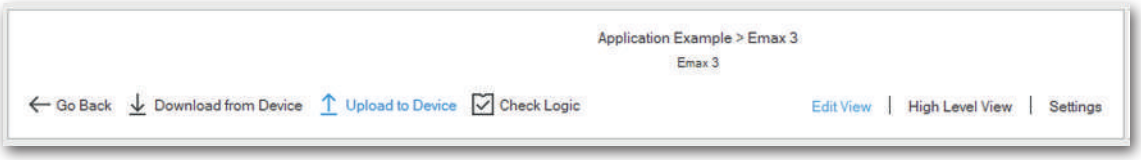
Print Project
Click on “Print” in the diagram page to save locally a pdf file of the entire project or to print it directly:

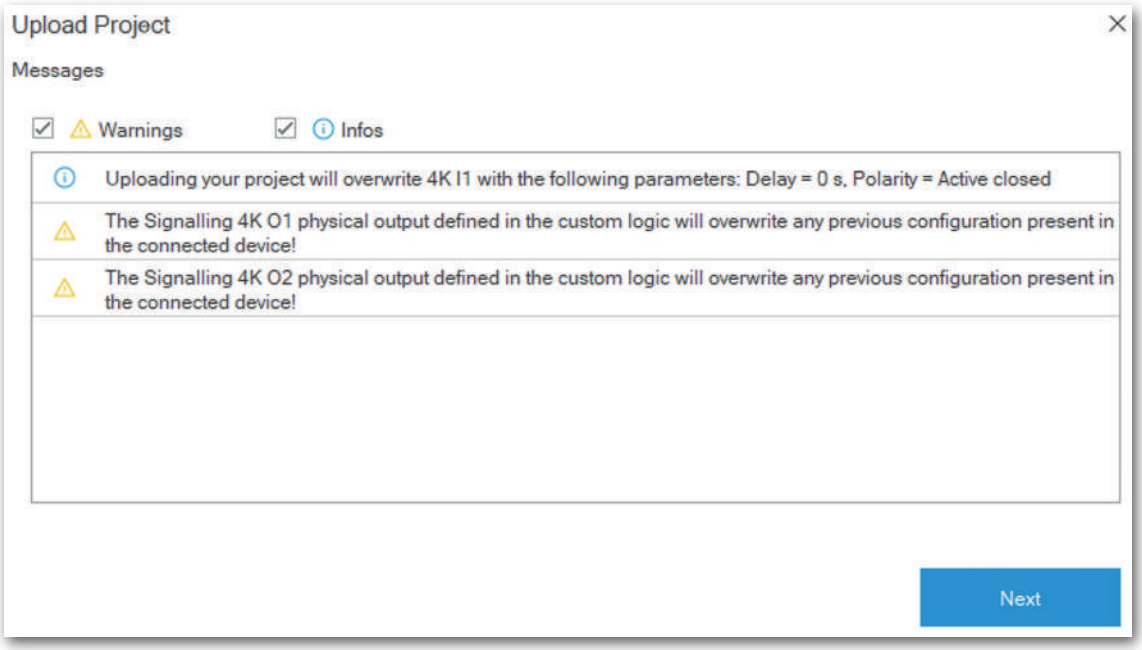
Logic Upload

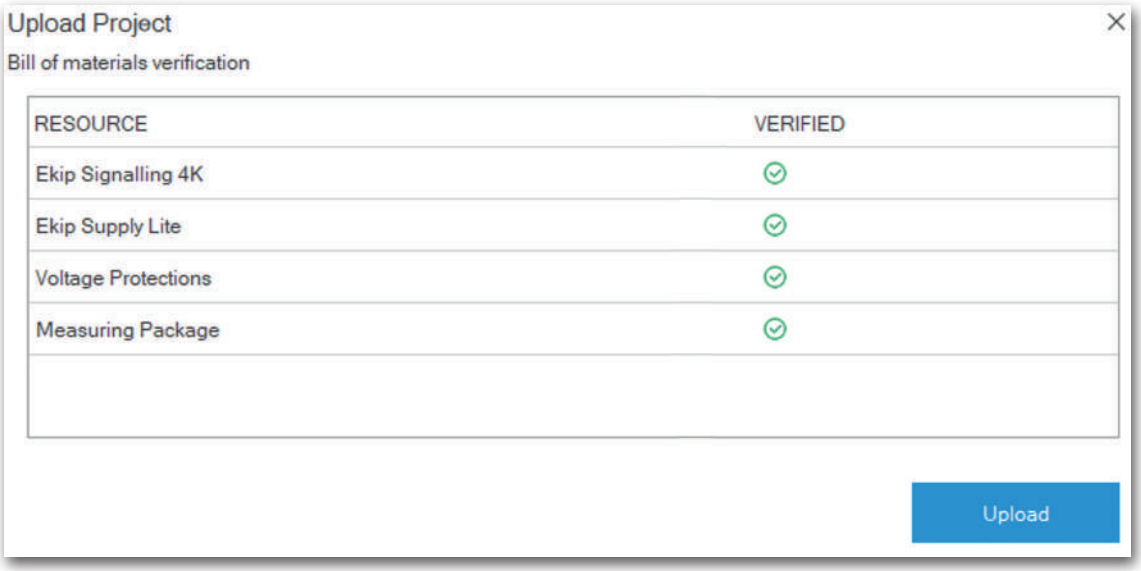
Connect the laptop to the device and scan it in Ekip Connect.

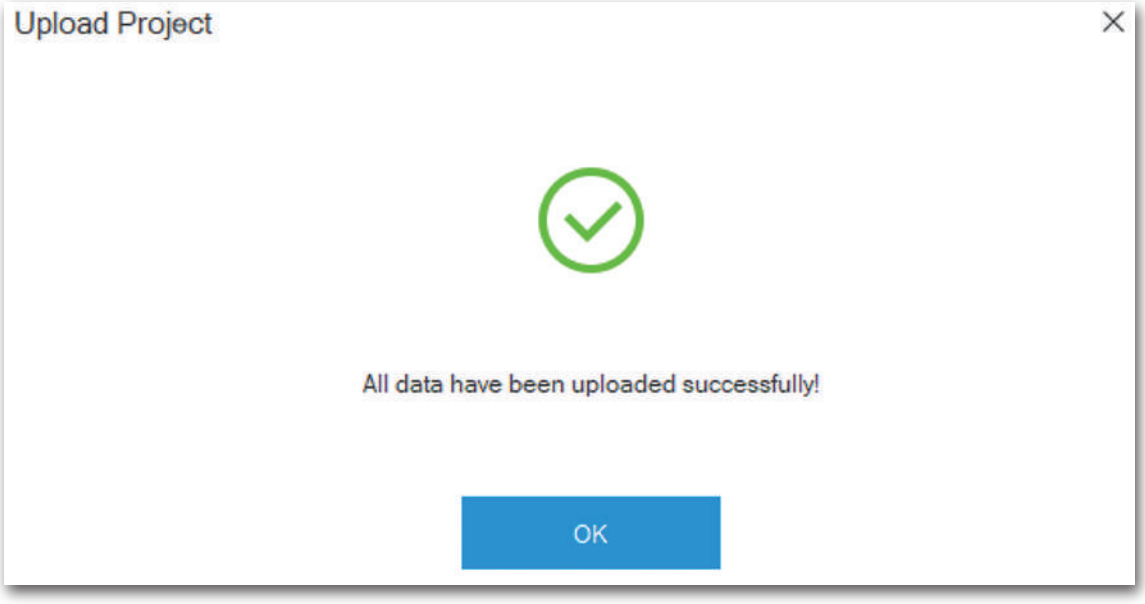


Reopen the tool Custom logic and click on “Upload to device” and follow the procedure







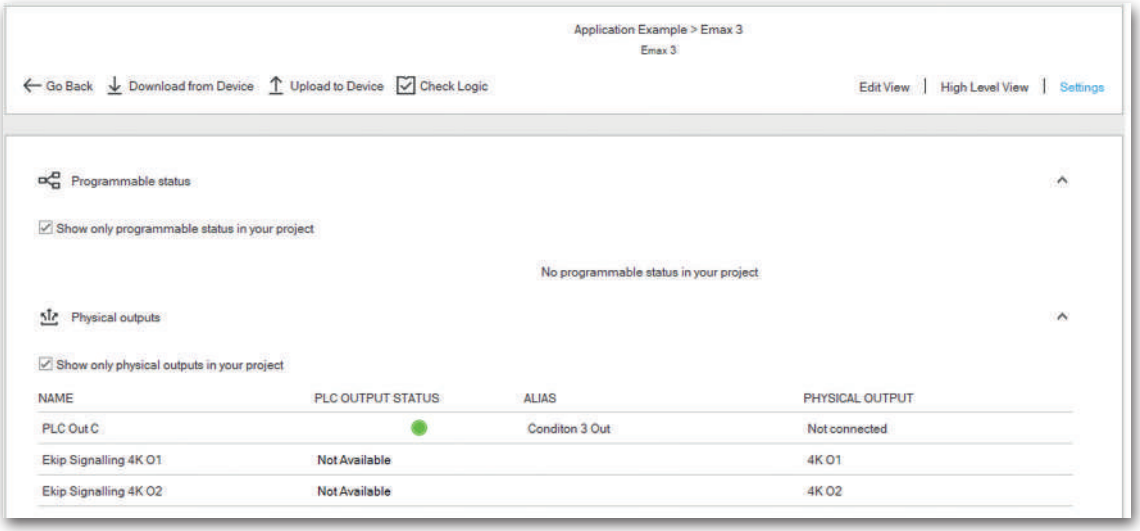


Note: The device must be equipped with the licenses and hardware listed in the Bill of Materials to ensure that the logic works properly.

Logic device test

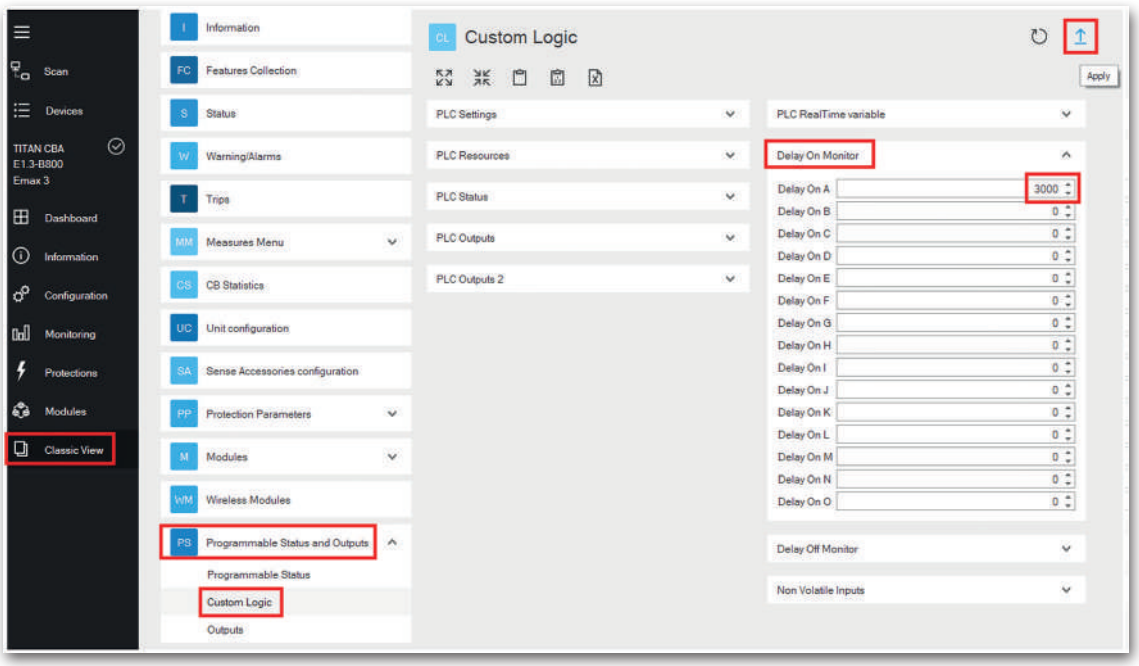
Logic Validation: now that the logic has been downloaded to the breaker, the conditions listed in the table in the chapter “Logic Description and Requirements” should be replicated.
For each condition, it must be verified that the corresponding action is correctly executed.

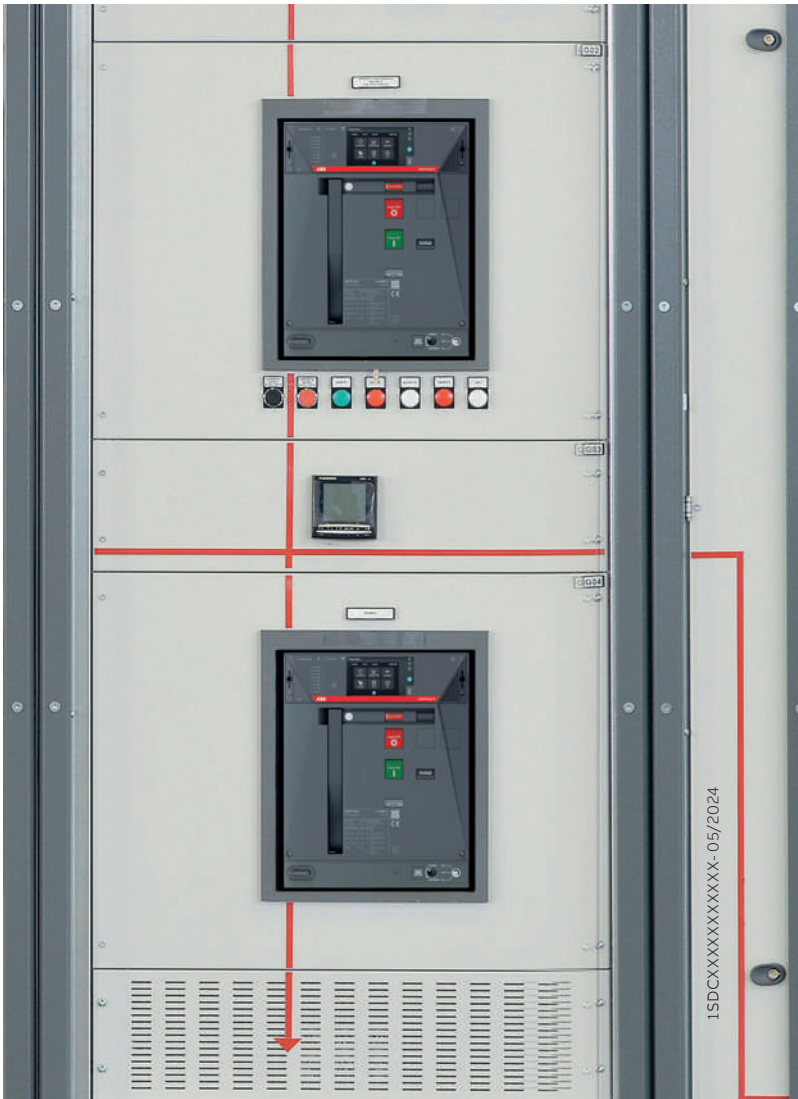
Note: It is possible to view the real-time status of each PLC Out in the ‘Settings’ window of the tool. A connection to the device is required



Delay value change

To modify the Delay On value in Rule2, select the Delay On A register in the Classic View menu. For example, set 3000ms instead of 5000ms.
Click on Classic View → Programmable Status and Outputs → Custom Logic → Delay On Monitor → Delay On A → set 3000 → Apply





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