

Rev 5.0

RASWin Quick Start Guide





Contents

1. Start a project.....	2
1.1. Add project information	2
2. Hazard Access Points definition.....	3
RASWin Practical example	3
3. Perform Risk assessment	4
3.1. Identify hazards	4
RASWin practical example	4
3.2. Hazard description.....	4
3.3. Risk estimation & Risk evaluation	5
RASWin practical example	5
3.4. Risk reduction	6
RASWin practical example	6
4. Definition of Safety Requirements Specifications (SRS)	8
4.1. Add the installation elements	8
RASWin practical example	8
4.2. Link elements.....	10
RASWin practical example	10
4.3. Define safety PLC I/O Parameters	11
RASWin practical example	11
5. PL Graphic calculation.....	12
5.1. Attach PL data to elements	12
RASWin practical example	12
5.2. Performance Level (PL) value calculation of Safety Functions.....	14
RASWin practical example	14
6. Validation.....	15
6.1. Define elements validation tests	15
RASWin practical example	15
6.2. Functional validation	16
RASWin practical example	16
7. How to generate reports in RASWin	17
8. System Requirements	19



Quick Start Guide

RASWin 5.0

This Quick Guide shows how to proceed directly to the Risk assessment in a few minutes, without a long familiarization or further training. Following the steps described in this guide, a big effort will may not be needed to generate the risk assessment documentation.

1. Start a project

Opening the program, you can start a project from the beginning.

If you already have the software open with another project, to start a new one, you must click on the icon highlighted in the image below or in the file section -> New (*Ctrl+N*)



1.1. Add project information

In order to give information and identify the characteristics of the project to be performed, you can add the information corresponding to the different fields present in the "General Information" module.

What if I don't know the information of whole fields?

In case of not knowing the required data in any of the fields, it does not affect the elaboration of the risk assessment, but that information will not appear in the final report.



2. Hazard Access Points definition

To start with the risk assessment of the machine, an image of the installation in question should be inserted, it is preferable to use a top view image.

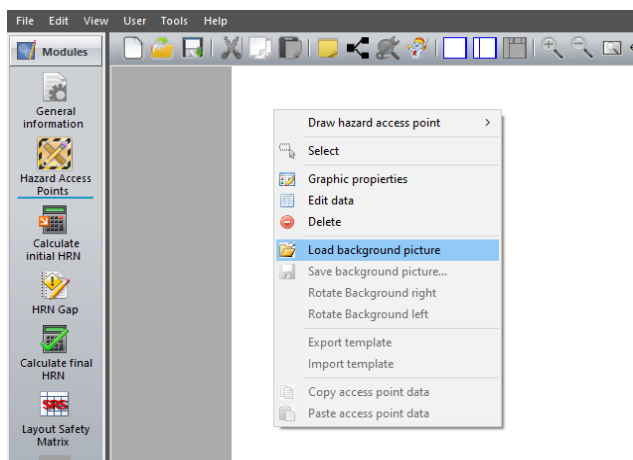
Then the installation should be segmented into different areas and a name should be added to each area.

How to split in zones an installation

There are no arbitrary criteria for dividing the installation into areas.

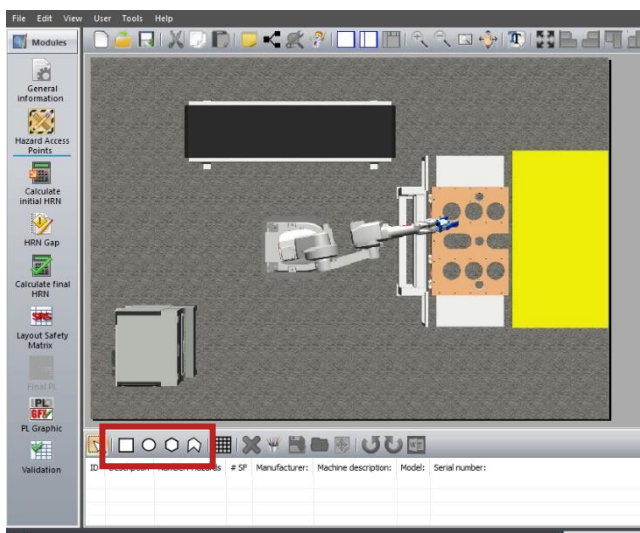
It is advisable to divide the installation into as many areas as necessary to be able to control the hazards of an installation without problems.

RASWin Practical example



1. Right click on the white sheet in “Hazard Access Point” module.
2. Add a background image choosing the menu item “Load background image”.
3. Then select the image of the installation.
4. The background image must have been loaded.

Once the image has been loaded, the next step is to draw the hazard zones in the layout of the installation.



5. Draw the zone by clicking in one of the four shape icons that are highlighted in the image.
6. Click on the initial point and click again on the final point of the zone.
7. Write the access point description on the pop-up window that will have appeared.
8. It is possible to use, as a zone image, the area of the background image contained in the drawn zone or by an image file

Access point defines a complete machine

If the area describes a complete machine, e.g. an injection injecting machine or a milling machine, the machine data can be added.



3. Perform Risk assessment

Once the machine has been defined, the risk assessment must begin, which consists of the identification of the hazards and their subsequent estimation, evaluation and reduction of the risk of each of these hazards.

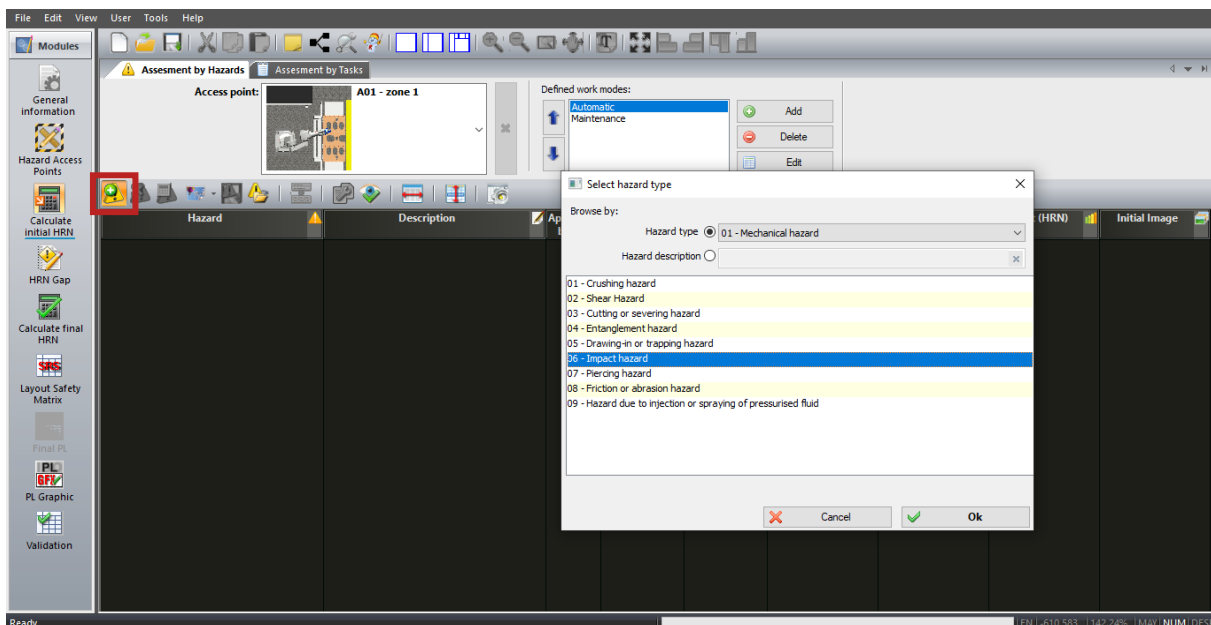
3.1. [Identify hazards](#)

In the first step of the risk assessment process, the hazards that exist in the defined areas must be identified for each phase of the life of the machine.

In Standard ISO 12100:2012, a list is presented with the typical hazards separated by type of hazard, such as mechanical, electrical or due to untimely operation, among others.

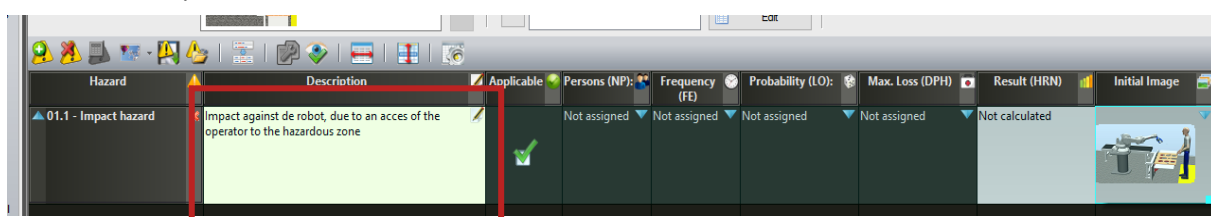
RASWin practical example

1. In “Calculate Initial HRN” module, select the access point.
2. Add all the work modes of the machine, e.g. automatic, maintenance, etc...
3. Select the work mode by clicking on it. The selected work mode will be highlighted in blue, as shown in the image.
4. Click on the icon highlighted in the following image, to add a new hazard for the selected work mode.
5. Select the hazard type and then select the hazard from the list. For example, we are selecting an “Impact hazard”.
6. Finally, you can add or not a description image of the hazard.



3.2. [Hazard description](#)

Now, a description of the hazard, must be written.





Quick Start Guide

RASWin 5.0

3.3. Risk estimation & Risk evaluation



In this step the Hazard Rating Number method is used to estimate the risk value of each hazard, before applying any corrective measure.

This method considers:

1. NP: The number of people who are exposed to the hazard, in the selected working mode.
2. FE: The frequency at which the operator is exposed to the hazard.
3. LO: The probability that the described hazard will occur.
4. DPH: The maximum loss that can occur in the event of the hazard occurring.

The expression to calculate the Hazard Rating Number (HRN) is:

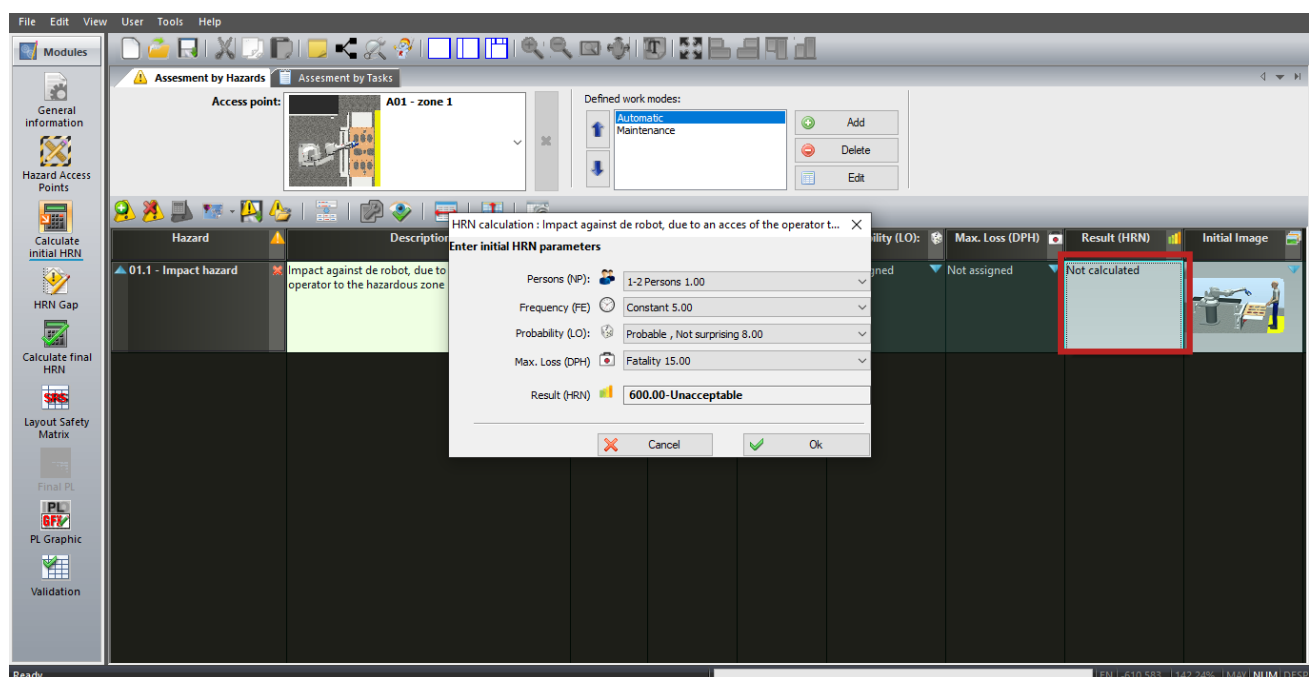
$$\text{HRN} = \text{NP} \times \text{FE} \times \text{LO} \times \text{DPH}$$

There are 4 typical HRN Results:

1. Negligible: $0 < \text{HRN} \leq 5$
2. Low but relevant $5 < \text{HRN} \leq 50$
3. High $50 < \text{HRN} \leq 500$
4. Unacceptable: $\text{HRN} > 500$

RASWin practical example

Select each parameter on the pop-up that appears once the description has been written, or by double clicking on the highlighted area.





Quick Start Guide

RASWin 5.0

3.4. Risk reduction



Once the installation hazards have been defined, the corrective measures to reduce the value of the risk of each hazard must be defined, based on the risk definition.

Each time a corrective measure is added to a hazard, the risk value of the hazard must be re-estimated, as well as the feasibility of working with the defined corrective measure.

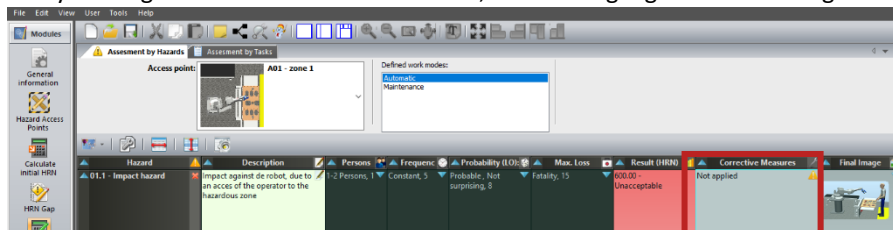
Example of corrective measures application

A typical example is that if a fence is added in a robotic cell, a perimeter fence is defined around the entire machine. After applying the corrective measure, the probability of the hazard occurring will be minimal since it is impossible to access the hazard. However, this is not a viable corrective measure since it must be possible to enter the robotic cell, so another corrective measure must be added, in this case a door with an interlocking.

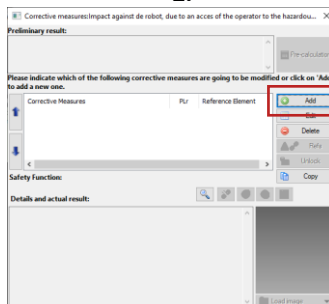
RASWin practical example

In the practical example two corrective measures will be implemented: A fence, and a safety door with interlock.

1. Add the fence by clicking on “Corrective Measures” cell, which is highlighted in the image.



2.



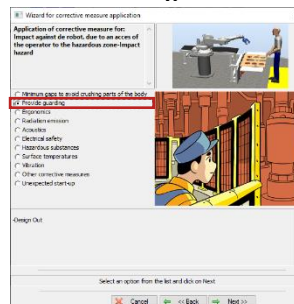
Click on “Add”.

3.



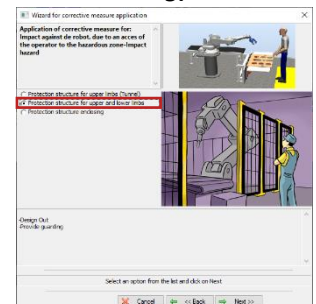
On the pop-up window, select “design out” and click “Next”.

4.

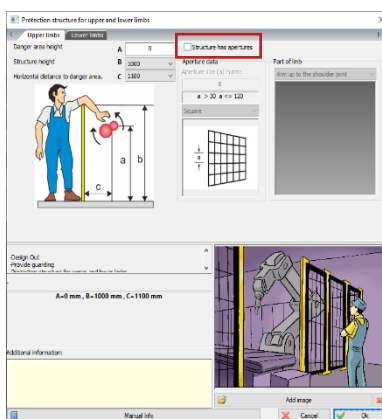


Select “provide guarding” and click “Next”.

5.



Select “Protection structure for upper and lower limbs” and click “Next”.



6. Add the height (A) of the hazardous point

7. Select a value of the Structure height (B) or the horizontal distance to hazardous point (C).

8. If parameter B has been selected, the parameter C is automatically calculated for RASWin, and vice versa.

9. In case that the fence that is being designed has apertures, mark the highlighted checkbox.

10. Write the aperture size e.g. 30mm, and select the shape of the aperture (Square, Slot or circular), and click OK.

11. The distance is the minimum between C and ds, which is calculated depending on the size of the apertures. Then write “additional information” if is necessary.

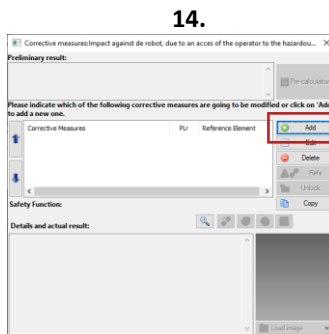
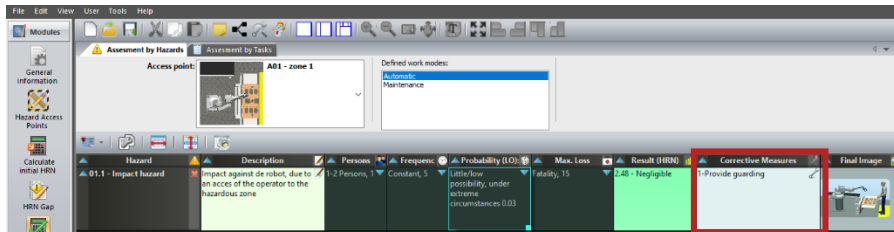
12. Recalculate the HRN on the pop-up window that appear, once the corrective measure has been applied.



Quick Start Guide

RASWin 5.0

13. Add the fence by clicking on “Corrective Measures” cell, which is highlighted in the image.



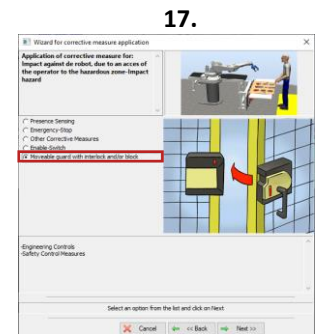
Click on “Add”.



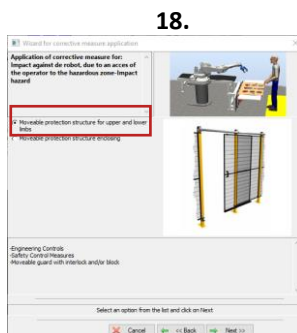
On the pop-up window, select “Engineering Controls” and click “Next”.



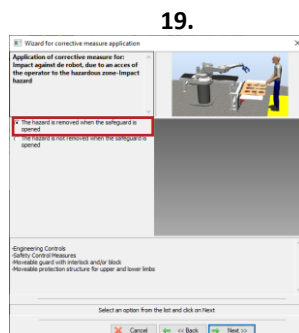
Select “Safety Control Measures” and click “Next”.



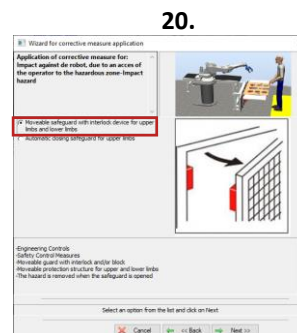
Select “Movable guard with interlock and/or block” and click “Next”.



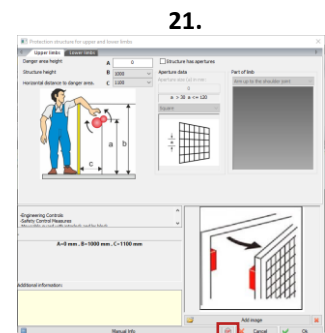
Select “Movable protection structure for upper and lower limbs” and click “Next”.



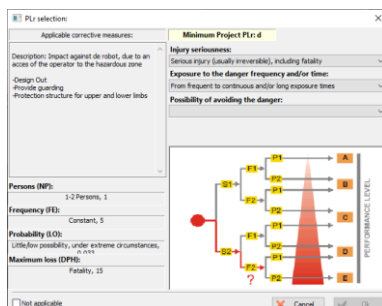
Select “The hazard is removed when the safeguard is opened” and click “Next”.



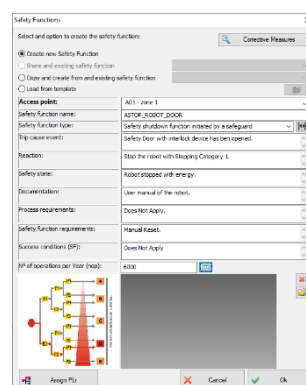
Select “Moveable safeguard with interlock device” and click “Next”.



Add the information in the same way as in the fence case and click on the highlighted icon.



22. On the pop-up window, select the parameters of “Injury seriousness”, “Exposure to the danger frequency” and possibility to avoid the danger



23. Write the safety function name, e.g. ASTOP_ROBOT_DOOR.

24. Then, fulfill the information of the safety function.

25. Finally, calculate the Number of Operations per year, (nop), of the safety function.

26. Then click OK, and the corrective measure window will appear again, then click OK again, and recalculate the HRN.



4. Definition of Safety Requirements Specifications (SRS)

Once the risk assessment of the installation has been carried out, the corrective measures that are not of the "design out" type must be added to the layout, in order to create a safety matrix.

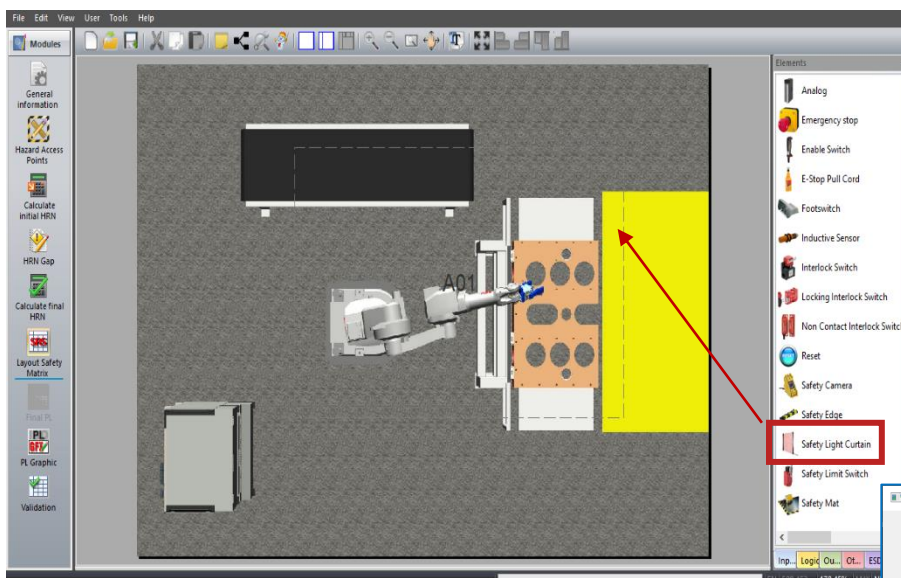
In the safety matrix, the functionality of the safety components of the installation must be reflected by means of a cause and effect matrix, generated in an excel file.

4.1. Add the installation elements

In this step, the safety components of the installation must be selected (input and output elements, as well as logic components).

RASWin practical example

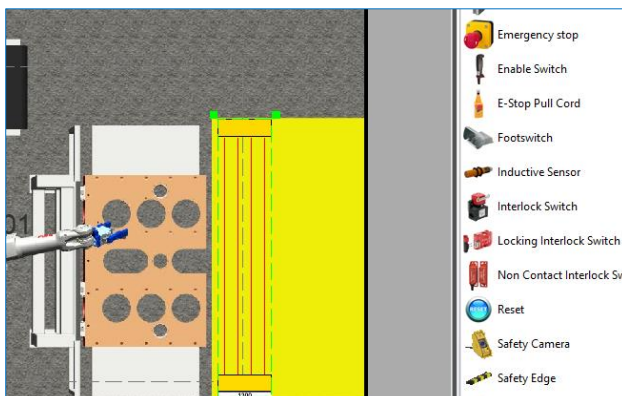
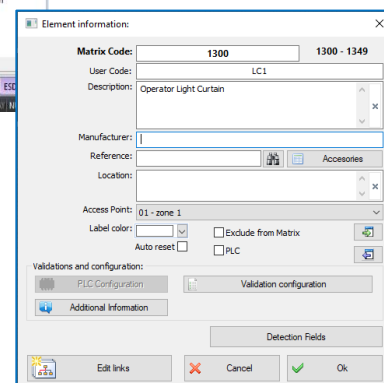
In the practical example, a light curtain, a safety PLC and a safety contactor will be added to the layout



1. To add the safety light curtain, click on the "Inputs" label in the elements panel, located to the right of the image.

2. Click on the "Safety Light Curtain" element and drag to the desired position.

3. Add the required information of the component, for example, the user code that corresponds to the code that the element has in the electrical diagrams and click "OK". (It is not mandatory to fill in all the fields).



4. Resize the Light curtain until it has approximately the position and size it will have in the installation.



Quick Start Guide

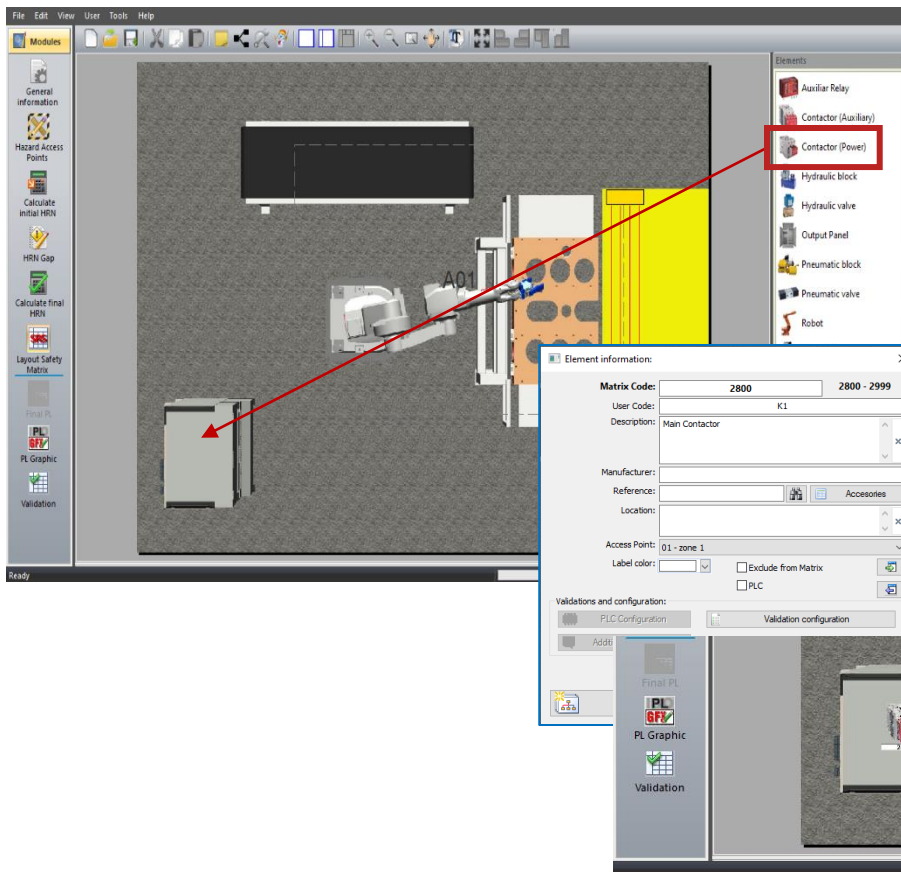
RASWin 5.0

How to change RASWin components identifiers

Raswin uses identifiers to differentiate between different types of devices.

If you are adding an element for the first time, a message will appear asking if you want to change the element identifiers.

If you click on "YES", a screen will appear where you can modify the default identifiers.



5. To add the safety contactor, click on the "Outputs" label in the elements panel, located to the right of the image.

6. Click on the "Contactor (Power)" element and drag to the desired position.

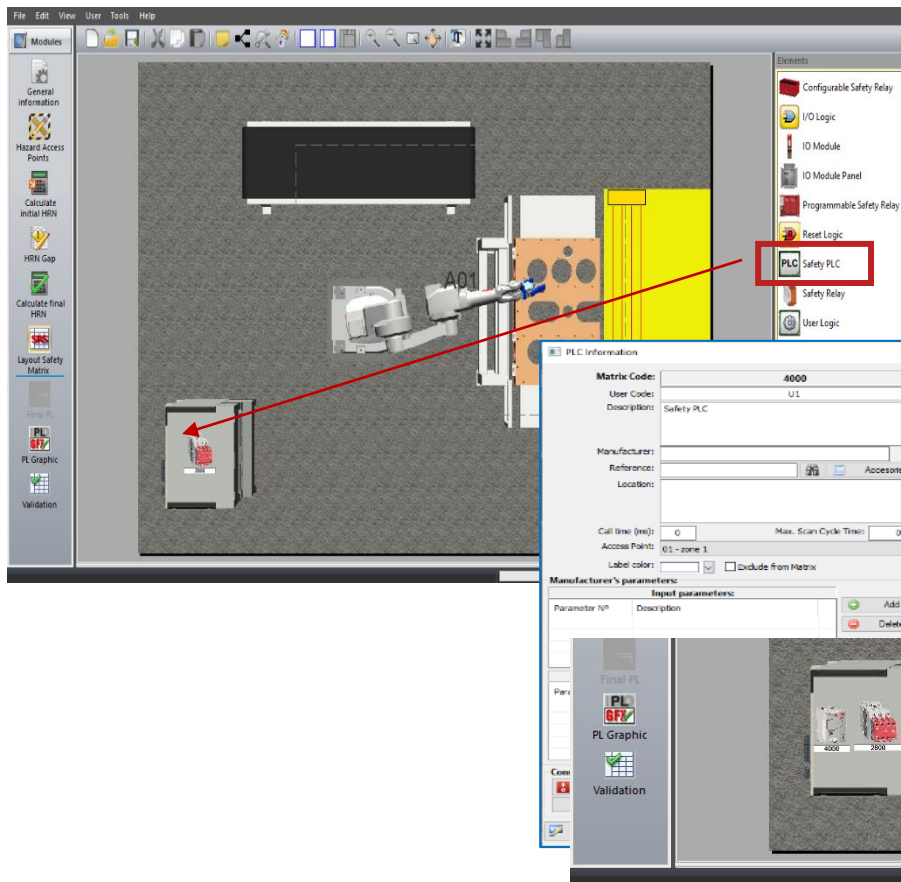
7. Add the required information of the contactor and click "OK".

8. Resize the contactor until it has approximately the position and size it will have in the installation.



Quick Start Guide

RASWin 5.0



9. To add the safety contactor, click on the "Outputs" label in the elements panel, located to the right of the image.

10. Click on the "Contactor (Power)" element and drag to the desired position.

11. Add the required information of the contactor and click "OK".

12. Resize the contactor until it has approximately the position and size it will have in the installation.

4.2. [Link elements](#)

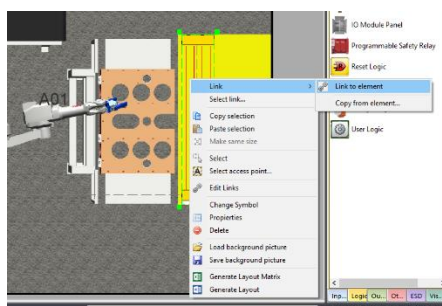
The safety matrix is a cause and effect matrix, which shows the relationship between input and output components of the installation.

It does not reflect the actual installation at the electrical level, but is a conceptual matrix.

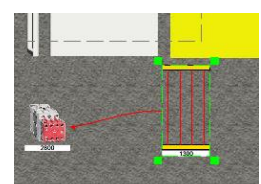
RASWin practical example

In this practical example, the safety barrier will be linked to the contactor, which means that when the safety barrier is crossed, the general contactor must switch and stop the installation.

In addition, the PLC will be linked to the two elements of the installation, to reflect that the PLC controls both devices.



1. To link the Light curtain and contactor, start selecting the light curtain, and then right click on it.
2. Select link to element, then a translucent arrow will appear
3. Click in the contactor, then a red arrow will link the light curtain and the contactor.

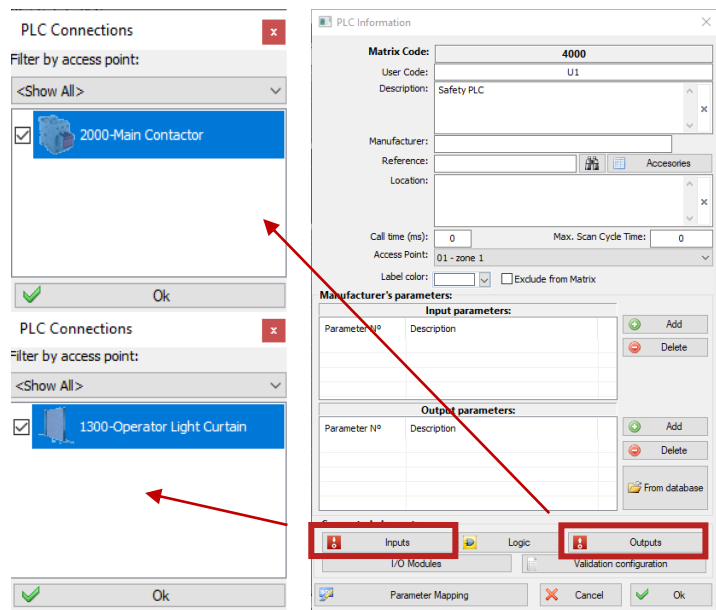




Quick Start Guide

RASWin 5.0

- To link the PLC with both components, double click on the PLC, and the "PLC information" window will appear.
- Click on "Inputs", and select the light curtain, then click "OK".
- Click on "Outputs" and select the contactor, then click "OK".



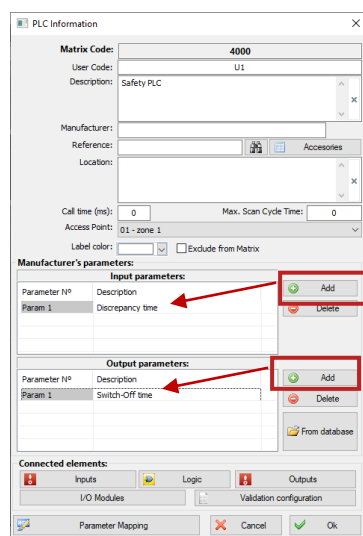
4.3. Define safety PLC I/O Parameters

To end this section, the programmer must be informed about the configuration aspects of the PLC inputs and outputs.

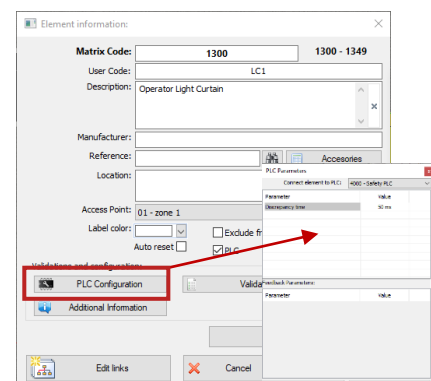
This is because sometimes, when adding a corrective measure, a response time value must be entered for safety distance calculation, and the PLC configuration affects that value. Therefore, the configuration parameters must be defined so that what has been defined corresponds to reality.

RASWin practical example

In this practical case, the "discrepancy time" parameter is added for input components, and the "switch-off delay" parameter is added for output components.



- Click on "Add" next to "Input parameters:".
- Write "Discrepancy time" on the description of the parameter.
- Click On "Add" next to "Output parameters:".
- Write "Switch-Off time" on the description of the parameter and click "OK".
- Then, double click on the light curtain in the layout.
- Click in "PLC Configuration", that is highlighted in the image.
- And write 50ms as a discrepancy time.
- Repeat from 5 to 7 for the contactor and write 0ms as a Switch-Off time.





Quick Start Guide

RASWin 5.0

5. PL Graphic calculation

Once the installation has been defined and designed. Both the electrical diagrams and the PLC program must be checked.

To perform the PL calculation, you must imagine the path of the electrical signal from the element that initiates the safety function to the component that performs it.

Concept of Performance Level

The concept of performance level is assigned to the components and the safety functions.

A whole installation does not have a PL value, but will have different safety functions, each with its PL value.

5.1. Attach PL data to elements

In this module a failure probability at hour (PFHd) will be assigned to the different elements.

Depending on this value, a performance value (PL) will be assigned.

This value can be obtained in different ways depending on the type of element.

There are two typical element types:

- **Electronics:** For this type of component the component manufacturer will give the value of PL, PFHd and Category. This last value is related to the control structure of the component.
- **Electro-mechanical:** For this type of components, the PFHd value must be calculated, by means of the MTTF value (Mean Time To Failure), which is related to the B10d value (Lifetime of the device).

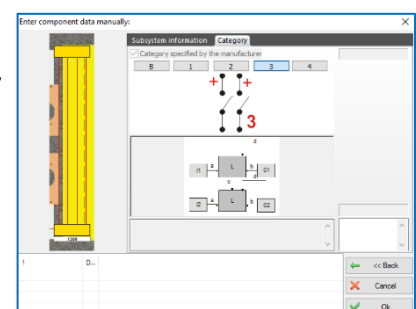
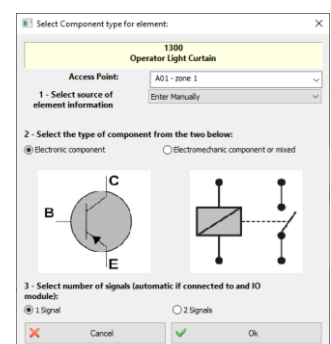
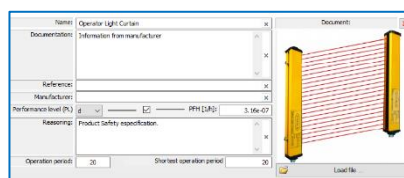
Recommendation

It is recommended to receive training in ISO 13849-1, in order to be able to use this module, because it uses complex concepts that cannot be explained in a quick product guide.

RASWin practical example

To add the PL value to the light curtain, go to the "PL Graphic" module:

1. Double click on the image of the barrier, in the layout.
2. Select "Electronic component".
3. Select 2 signals. (If the component is category 2, 3 or 4 you must select "2 Signals", if it is category B or 1, Select "1 Signal")
4. Fill in all the empty fields about the component and add an image of it.
5. Select the PL value provided by the manufacturer, and mark the checkbox located just to the right (In case the manufacturer provides the PFH value of the product, you should not mark the checkbox, but enter the value manually).
6. Click on the "Category" label, and select the category of the component, according to the information provided by the manufacturer.
7. Then click "OK".





Quick Start Guide

RASWin 5.0

Lights on the layout components

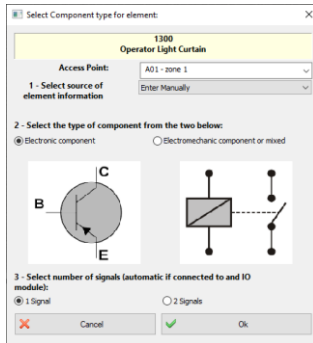
In PL Graphic the installation components, are linked by blinking lights of different colours:

Red: The component has no PL data attached.

Orange: The component has PL data attached but is not associated with any safety function.

Green: The component has PL data attached, and is associated with a safety function, correctly.

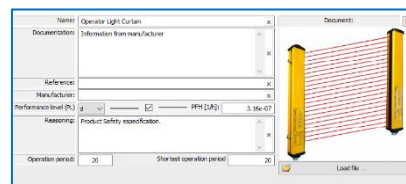
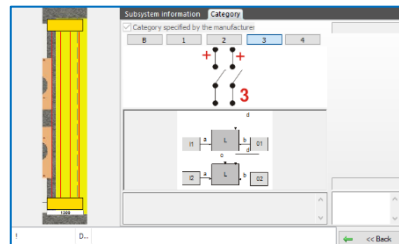
To add the PL value to the PLC, repeat the same procedure than with the light curtain:



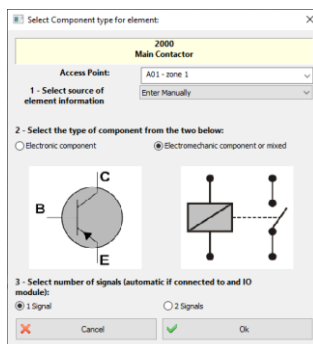
8. Double click on the image of the PLC, in the layout.

9. Select "Electronic component" and select "2 signals".

10. Select the PL and category values provided by the manufacturer and click "OK".

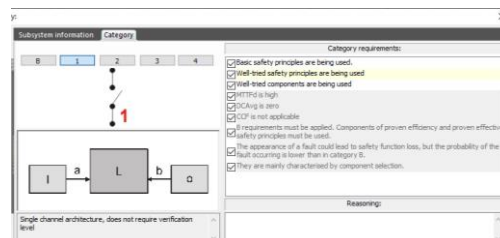


To assign a PL value to the contactor:



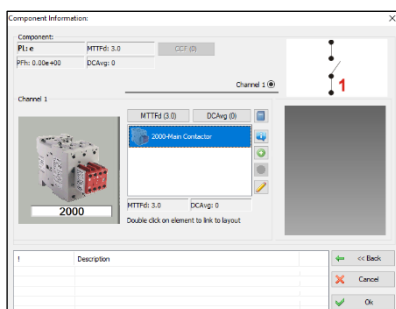
11. Double click on the image of the contactor, then select "electromechanic component" and "1 Signal".

12. Add the information of the component. Now it is not possible to select a PL and PFHD value due to the manufacturer cannot give it, because it is not an electronic device.

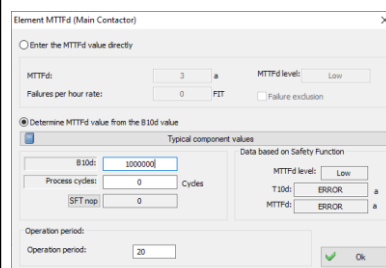


13. Click the "Category" tab and select Category 1. Then select the category requirements that device meets.

14. Once the Category information is entered, click on "OK".



15. In the new window, select the contactor and click on "MTTFd"



16. Click on "Determine MTTFd value from B10d value."

17. Write 1.000.000 on B10d and click.

18. Click "OK".

Typical component values

If the value of the B10 or B10d of the component, is unknown or the manufacturer cannot give it, then is possible to use a typical value depending on the component type. This value is taken from an ISO 12100:2012 table.



Quick Start Guide

RASWin 5.0

5.2. Performance Level (PL) value calculation of Safety Functions

Once all components have PL data, these components must be linked to the various safety functions.

The result of the PFHD value, and therefore the PL value, of the safety function will be the sum of the PFHD values of all components participating in that safety function.

RASWin practical example

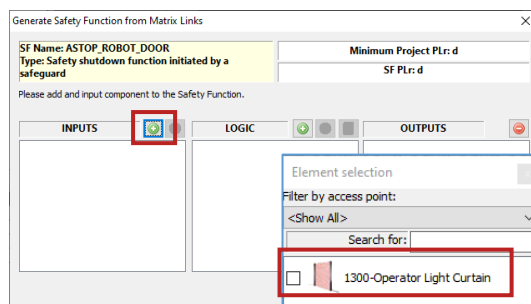
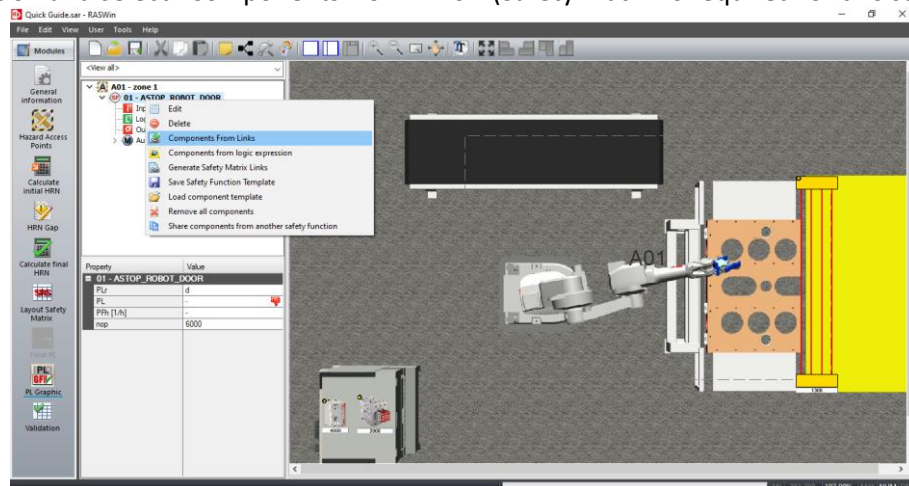
In the practical example, the light curtain, the PLC and the contactor will be linked to the previously created safety function.

Creating new Safety Functions

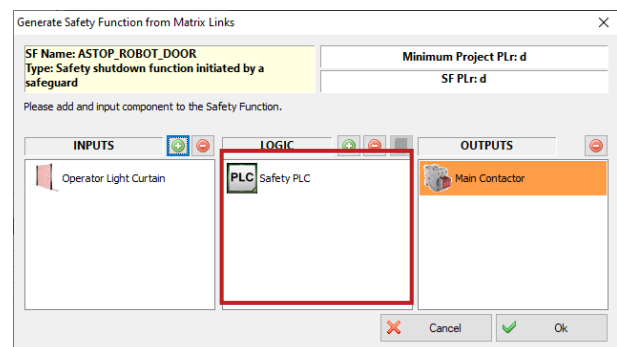
To create a new safety function, in the "PL Graphic" module, right click on the area and select "Add safety function".

Then, you can create a new one or copy the definition of an existent one.

1. To add components to the safety function, in the guided way or semi-automatic, right click on the safety function and select "Components from links". (Safety matrix is required for this step).



2. Click on the "Inputs" icon, which is highlighted in the image.
3. Select the input
4. Then, all the output components linked with the selected input will appear. Select the output of the safety function.
5. The logic components between the input and the output will automatically appear, then click "OK".





Quick Start Guide

RASWin 5.0

6. Validation

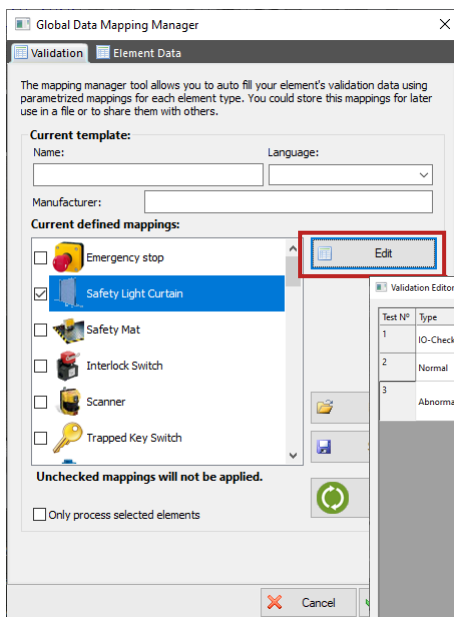
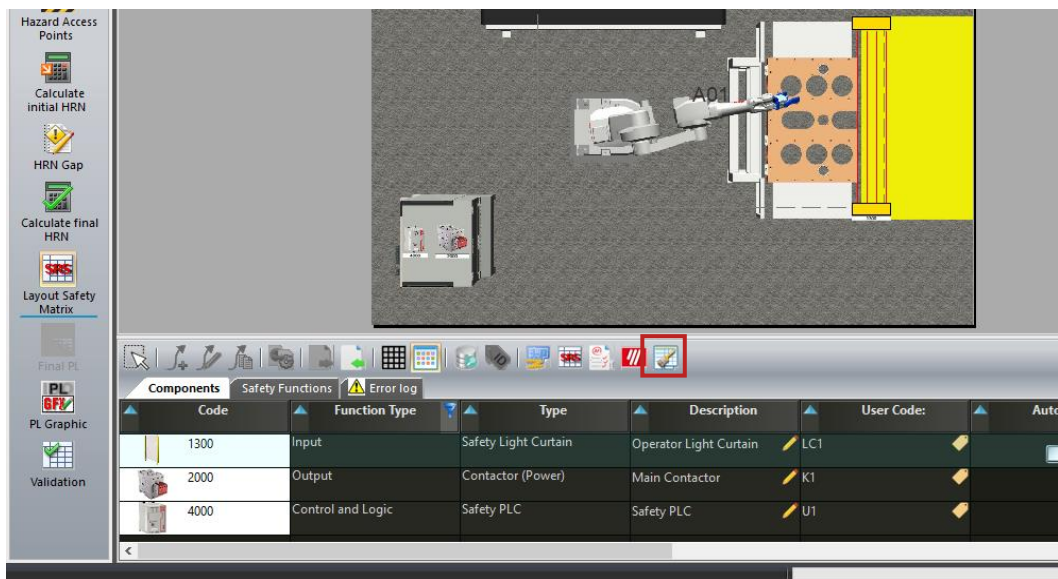
The last step to generate all the necessary documentation to obtain the technical file required to support the CE marking of the installation, is to perform a functional validation of the installation.

6.1. [Define elements validation tests](#)

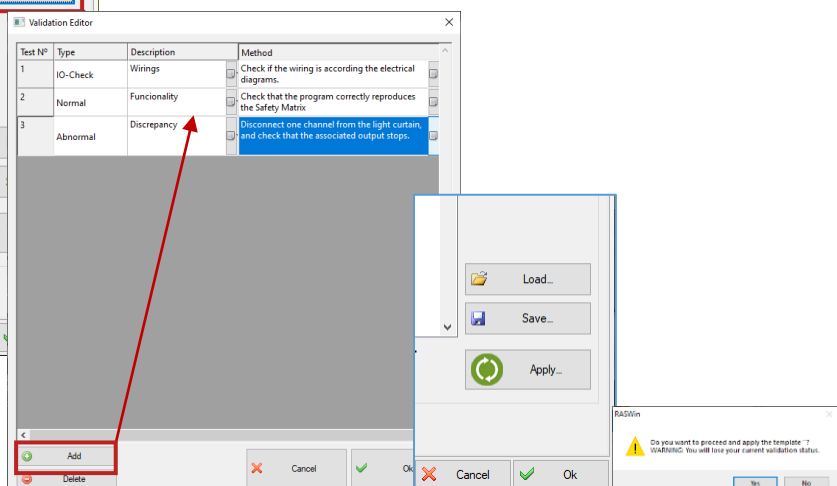
Different validation tests can be defined in RASWin depending on the type of element and the control architecture. Go to “*Layout Safety Matrix*” module to define the elements tests.

RASWin practical example

1. Click on the highlighted icon on the image.



2. Select the Safety Light Curtain and click “Edit”.
3. Click “Add” and type the test information. Repeat as many times as necessary and click “Ok”.
4. Click “Apply”.
5. Click “Yes” on the message that appears.





Quick Start Guide

RASWin 5.0

6.2. Functional validation

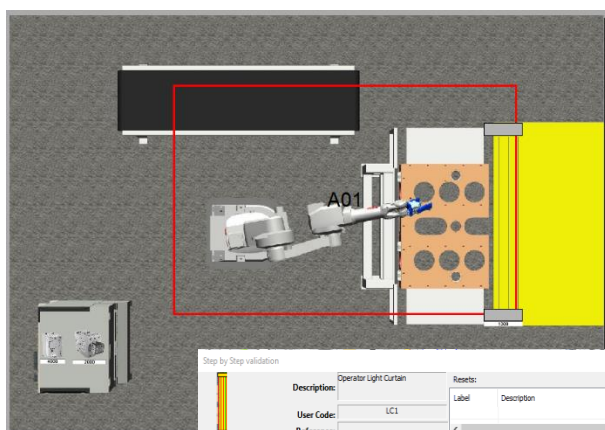


Go to “Validation” module to start the functional validation of the installation components. To carry out the validation, the tests must be marked, one by one, that are made in the final installation, (Once it has been mounted in its definitive location).

The checklist shows both the tests to be carried out on the component and the outputs linked to it. This is done in order to define whether the malfunction occurs in the element or in the program or in the wiring of the output. For example, if we have several outputs linked to an input element, and when performing a discrepancy test, we check that all the outputs work correctly, except one, we will be able to identify the part of the program that fails, in an easier way.

RASWin practical example

In RASWin if the component has been correctly validated, will be shown in color, but if it isn't it will be shown in grey.



1. To validate the light curtain, do double click on the icon of the light curtain in the layout.
2. Mark the tests that have been successfully passed.
3. Mark also the Software validation the drawing validation (If the program and the electrical diagrams are ok) Also mark the resets that are associated to the element.
4. Repeat the same procedure for all the components.

Step by Step validation

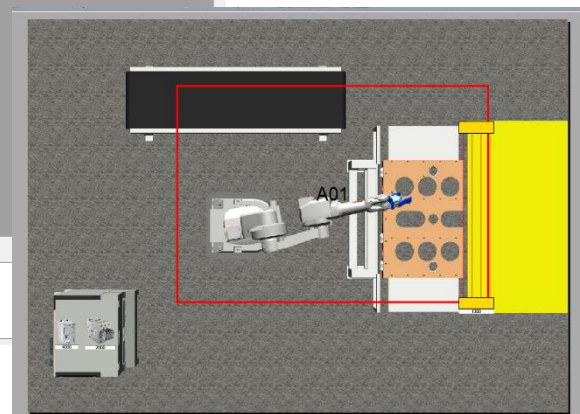
Description: Operator Light Curtain
User Code: UC1
Reference: < >

Resets: Label Description Logic: < >

☒ Software validation
☒ Drawing validation
☒ PLC Configuration

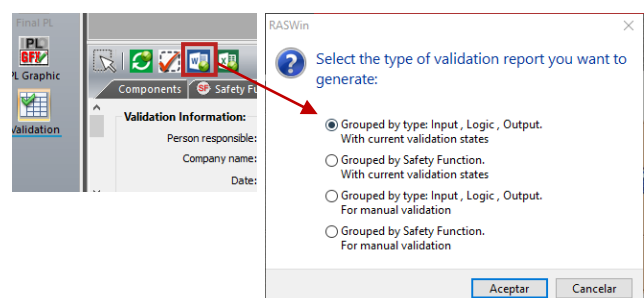
Test...	Type	Description	Status
1	IO-Check	Wiring Check if the wiring is according the electrical diagrams.	Pass
2	Normal	Functionality Check that the program correctly reproduces the Safety Matrix.	Pass
3	Abnormal	Discrepancy Disconnect one channel from the light curtain, and check that the associated output stops.	Fail

Tests validation comments: < > Other comments: < >



6. To generate the validation report, click on the highlighted icon and click in the first option. There are two options to generate the report. Group the elements by type or by safety function. If you select the option of grouping by safety function, an element will appear as many times as functions, in which it participates.

7. The validation report will be opened in word.





7. How to generate reports in RASWin

Once both the risk analysis and the CP calculation have been completed, a full or partial project report must be generated.

In RASWin, different types of reports can be generated, depending on which parts of the project are added to the report.

On the other hand, it is possible to print on the default sheet "Empty template" or on a template created by the user.

To generate de report:

The image shows the RASWin software interface. On the left, the 'File' menu is open, showing options like 'New', 'Open', 'Save', 'Generate report', 'Export to Safety Automation Builder', 'Export background picture', 'Export to ISM...', 'Export to CSV...', 'Print', 'Print preview', and 'Configure printer'. The 'Generate report' option is highlighted. On the right, the 'Generate report' dialog box is open. It has a 'Print By:' dropdown set to 'Assessment by Hazards'. Under 'Indicate the documentation to be included:', there are several checkboxes: 'Access point and summary table distribution', 'Hazard analysis', 'List standards for each measure', 'Residual Hazards Only', 'Performance Level Summary table', 'Performance Level analysis EN-ISO-13849-1/ANSI/RIA TR 15.306', 'Instruction Manual', 'HRN Gap', 'SF information', and 'Task/Hazards table'. The 'Format options' section includes 'Global image scale' (40), 'Minimum font size' (8), 'Language' (English), 'Font type for report' (Arial), 'TOC Levels' (5), and checkboxes for 'Create table of contents' and 'Use hyperlinks on TOC'. The 'Access points to generate' section shows 'From 1 to 1' and a list of templates, with 'Empty Template.doc' selected.

1. Click on "File"
2. Click on "Generate report".
3. The boxes to the right of the image must be checked to select the different parts of the project.
4. Select the template.
5. configure the print parameters
6. Click on "Accept".

If you prefer the option that the software generates the report directly in a template created by the user, the user must consider some things like:

- The width of the tables in the RASWin report is fixed, so you should create a template with the margins with a size that accepts the width of these tables. It is advisable to use the margins configuration of the "Empty template".
- To create the template, you should use bookmarks. RASWin enters the report of each of its parts from different bookmarks. The relationship between bookmarks and each of the parts of the project is as follows:

Bookmark	Usage
RASWIN_RPTINFO	General Information and machine environmental limits (always present)
RASWIN_APSUMMARYTAB	Access point distribution and summary if selected
RASWIN_HAZARDANALISYS	Main Risk Assessment if selected
RASWIN_IMANUAL	Instruction Manual if selected
RASWIN_SFINFO	Safety Information if selected



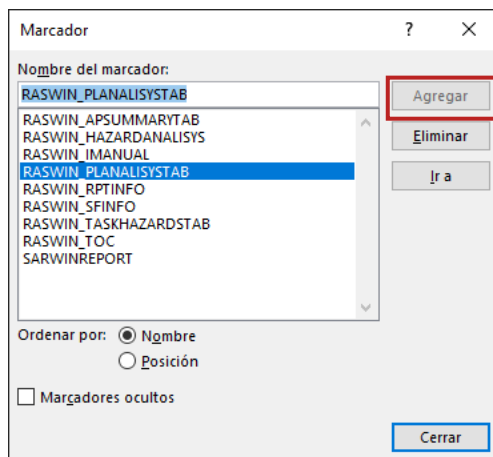
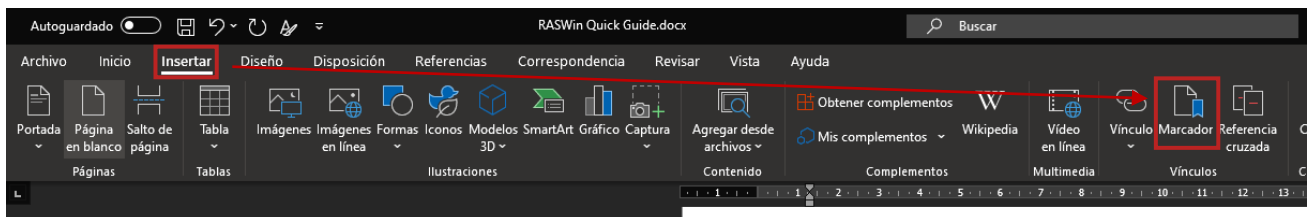
Quick Start Guide

RASWin 5.0

RASWIN_TASKHAZARDSTAB	Hazard's task table
RASWIN_PLANALISYSTAB	PL Analysis
SARWINREPORT	Print the whole report. (Only the information that is marked)
RASWIN_TOC	Table of contents if selected (by default it is)

To add bookmarks in word:

1. Click in insert
2. Click in Bookmarks



3. Click in add bookmarks



8. System Requirements

Local Computer	PC Compatible with network card if license runs in a server.
Operating System	Windows 7 x64 bits or above, recommended Windows 10.
RAM	4Gb recommended
Hard Disk Free Space	150Mb For the software installation.
Third party Software	Microsoft Excel to generate Excel reports. Microsoft Word to generate reports Word reports.