

RASWIN Module SRS

Configuring Safety Parameters of Elements

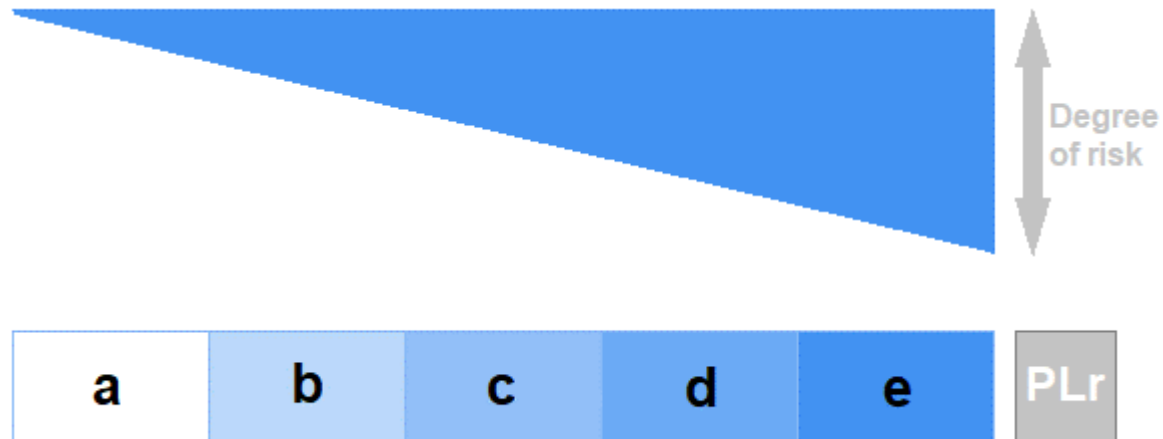
Performance Level?

PL Gfx Module

PL is a measure of the reliability of a safety function. This value depends on different parameters as Probability of failure or Mean time to failure.

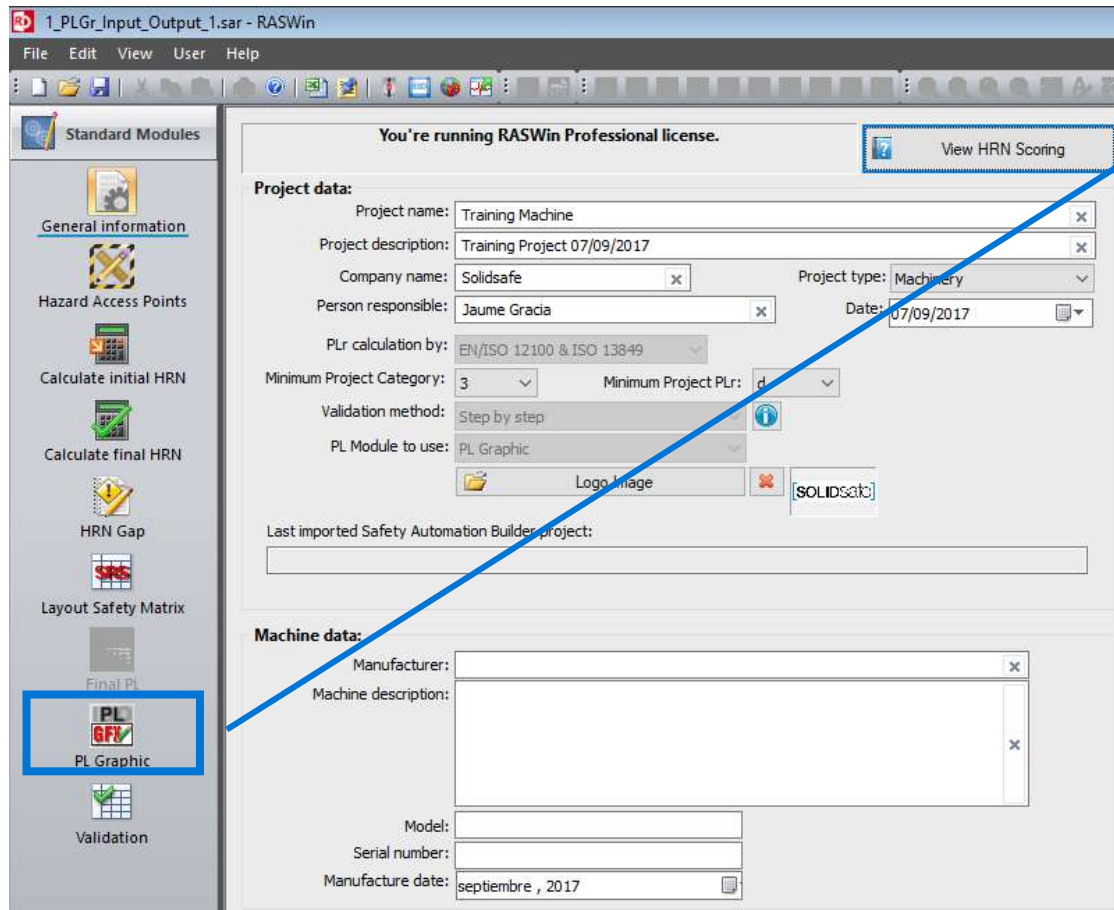
PL is divided into five levels (a-e).

PL e gives the best reliability and is equivalent to the required at the highest level of risk



How to calculate the PL in RASWin?

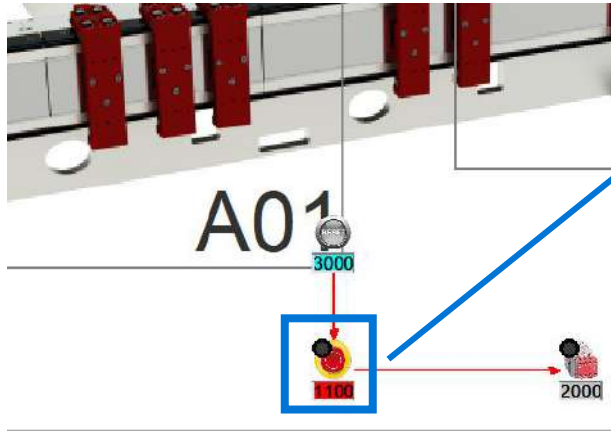
PL Gfx Module



1. Click on PL Gfx Module icon.

How to calculate the PL in RASWin?

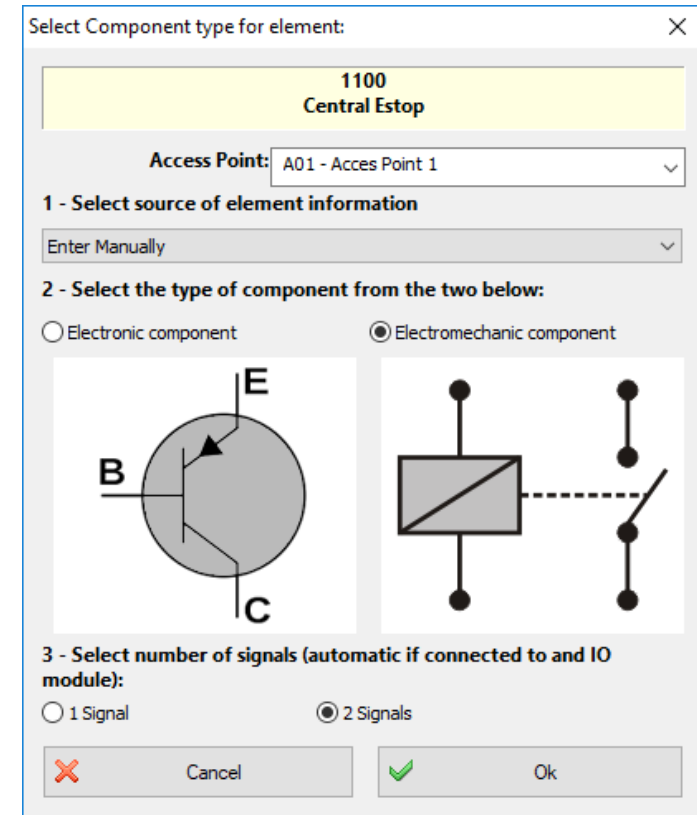
PL Gfx Module



1. To create a Safety Block of the Emergency Stop Button, double click on Estop icon.

2. Complete the following information and click "Ok":

- Access Point
- Type of component
- Number of signals




Step 1: Configuring the element

How to calculate the PL in RASWin?

PL Gfx Module

Step 2: Fill the Input Safety Block Information

Enter component data manually:

Subsystem information		Category
Name:	Central Estop	Document:
Documentation:	Emergency Stop Button (pull to release)	
Reference:	XXX-XXXX	
Manufacturer:	Rockwell Automation	
Performance level (PL)	a	PFH [1/h]: 1
Reasoning:		
Operation period:	20	Shortest period of operation: 20
		 Load file ...

! Error Central Estop: this subsystem must use the basic safety principles, modify this requirement into the Category tab.
Information Central Estop: In category B and 1 systems, the DCAvg is not considered.
Warning The indicated number of signals does not match the signals required for the specified category

<< Back
Cancel
Ok

1. Complete the Subsystem information.
2. Load an image that describes the subsystem.

How to calculate the PL in RASWin?

PL Gfx Module

Enter component data manually:

Subsystem information: Category

Category requirements:

- Fundamental safety functions are in use.
- Safety principles of proven efficiency
- First failure tolerance
- Failure accumulation does not lead to safety function loss.
- MTTFd is high
- DCAvg is high, including fault accumulation
- CCF is equal to or greater than 65.

B requirements must be applied, together with proven effective safety principles. Parts relating to safety are to be designed so that:

- a single fault in any of these parts does not lead to safety function loss and
- said fault is detected at the time of or before the next safety function request, but if this detection is not possible, an accumulation of undetected faults must not lead to safety function loss.

When a single fault is produced, the safety function is always performed. The

Reasoning:

Dual channel architecture, requires high level of verification

Reasoning buttons: << Back, Cancel, Ok

Annotations:

1. Click on the Category tab.
2. Select the category of the architecture used.
5. Select the Category requirements.
6. Click "Ok"

How to calculate the PL in RASWin?

PL Gfx Module



1. On the Component Information window, click on "CCF".

How to calculate the PL in RASWin?

PL Gfx Module



On CCF window, there are two options to enter the parameters:

1. Directly
2. Selecting applied measurements

Option 1: Directly

CCF Measures

Enter CCF value directly

Total points: Minimum required: 65 points

Select applied measurements to determine CCF

Measurement	Points
-------------	--------

Total points: Minimum required: 65 points

1. Select "Enter CCF value directly"

2. Enter the Total CCF points

Step 5: Adding CCF Value

How to calculate the PL in RASWin?

PL Gfx Module

Option 2: Selecting applied measurements

CCF Measures

Enter CCF value directly

Total points: Minimum required: 65 points

Select applied measurements to determine CCF

Measurement	Points
-------------	--------

Total points: Minimum required: 65 points

1. Select "Select applied measurements to determine CCF"

2. Click on "Add"

Step 5: Adding CCF Value

How to calculate the PL in RASWin?

PL Gfx Module

Type	Measurement
Assessment, analysis	
Competition, training	
Design, application, experience	
Diversity	
Environment	
Isolation, Segregation, Diversity	

Measurement point:

Total points:

Select the measurements type agree with the element.

Step 5: Adding CCF Value

How to calculate the PL in RASWin?

PL Gfx Module

CCF Measures

Enter CCF value directly

Total points: Minimum required: 65 points

Select applied measurements to determine CCF

Measurement	Points
Physical separation between signal paths: sufficient wiring separation in piping, isolation distances and lea...	15.00
Use different technologies/design principles or physical principles, for example: first programmable electron...	20.00
Protection against over-voltage, over-pressure and over-current etc	15.00
Use components of proven capability	5.00
Does the design take into account the analysis results of failure modes and their effects to avoid the com...	5.00
Have the designers and maintenance personnel been trained to understand the causes and consequence...	5.00

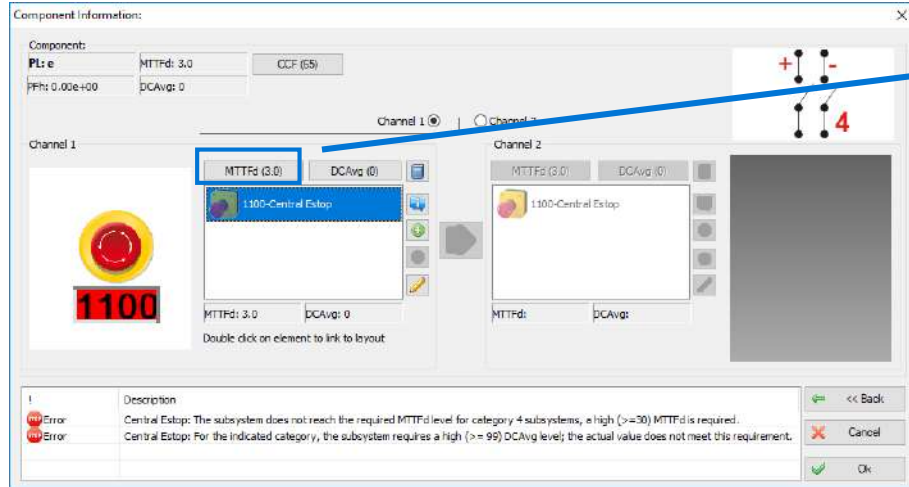
Total points: Minimum required: 65 points

The measurements selected will be appear

Step 5: Adding CCF Value

How to calculate the PL in RASWin?

PL Gfx Module



1. Select MTTFd.
2. (Optional) Enter the MTTFd value directly
3. Click on Determine MTTFd value from B10d value.
4. Add a B10d value and a additional process cycles.
5. If the B10d value of the element is not known, click on “typical components values”, and select the component type.
6. Press enter on the keyboard.

Step 6: Adding MTTFd Value

How to calculate the PL in RASWin?

PL Gfx Module

Option 1: Directly

Element MTTFd (Central Estop)

Enter the MTTFd value directly

MTTFd: a

Failures per hour rate: FIT

MTTFd level:

Failure exclusion

Typical component values

Determine MTTFd value from the B10d value

B10d: Cycles

Process cycles:

T10d:

SFT nop:

MTTFd: a

MTTFd level:

Operation period:

Operation period:



There are two option to enter the parameters:

1. Directly
2. Determining MTTFd value from the B10d value

1. Select MTTFd.

2. Enter the MTTFd value directly

How to calculate the PL in RASWin?

PL Gfx Module

Option 2: Determine MTTFd value from B10d

Element MTTFd (Central Estop)

Enter the MTTFd value directly

MTTFd: a MTTFd level:

Failures per hour rate: FIT Failure exclusion

Typical component values

Determine MTTFd value from the B10d value

B10d: Cycles Process cycles:

T10d: SFT nop

MTTFd: a MTTFd level:

Operation period:

Operation period:

1. Select "Determine MTTFd value from B10d value".

2. Add a B10d value and a additional process cycles.

3. Press enter on the keyboard.

How to calculate the PL in RASWin?

PL Gfx Module

Element MTTFd (Central Estop)

Enter the MTTFd value directly

MTTFd: a MTTFd level:

Failures per hour rate: FIT Failure exclusion

Determine MTTFd value from the B10d value

B10d: Cycles Process cycles:

T10d: SFT nop:

MTTFd: a MTTFd level:

Operation period:

Typical component values

Select component type

- Auxiliary relays and contactors with light loads (mechanical load)
- Auxiliary relays and contactors with maximum loads
- Contactor with light loads (mechanical load)
- Contactors with rated loads
- Emergency shutdown device with maximum A operation demands
- Emergency shutdown device, independent of load A
- Hydraulic components
- Mechanical components
- Pneumatic components
- Position switch (with separate actuator, safeguarded with block), independent of load A
- Position switch, independent of load A
- Proximity switches with light loads (mechanical load)
- Proximity switches with maximum loads
- Pushbutton (for example, validation switches) independent of load A

5. If the B10d value of the element is not known, click on “typical components values”, and select the component type.

How to calculate the PL in RASWin?

PL Gfx Module

Component Information:

Component:
PL: e MTTFd: 3.0 CCF (65)
PFh: 0.00e+00 DCAvg: 0

Channel 1 | Channel 2

Channel 1: MTTFd (3.0) DCAvg (0)
1100-Central Estop
MTTFd: 3.0 DCAvg: 0
Double click on element to link to layout

Channel 2: MTTFd (3.0) DCAvg (0)
<...>
MTTFd: DCAvg:

Diagram: A schematic diagram showing a central component with a red circle and the number 1100, connected to a power source (indicated by a red plus sign) and a load (indicated by a red minus sign). The diagram is labeled with a red '4'.

Messages:

!	Description
Error	Central Estop: The subsystem does not reach the required MTTFd level for category 4 subsystems, a high (≥ 30) MTTFd is required.
Error	Central Estop: For the indicated category, the subsystem requires a high (≥ 99) DCAvg level; the actual value does not meet this requirement.
Error	Not all the elements of the component are linked to layout elements

Buttons: << Back, Cancel, Ok

Select DCAvg.

Step 7: Adding DCAvg Value

Copyright 2017, Solidsafe S.L. INC. All Rights Reserved

How to calculate the PL in RASWin?

PL Gfx Module

Option 1: Directly

Element DC Average (Central Estop)

Enter DC value directly

Diagnostic coverage (DC): % DC level:

Reasoning:

Select applied measurements to evaluate DC

Select measurement from the list

Measurement type:

Measurement description:

DC range: % a %

depends on:

Diagnostic coverage (DC): % DC level:

This measurement alone is not sufficient for the following performance levels:



There are two options to enter the parameters:

1. Directly
2. Select "Select applied measurements to evaluate DC"

1. Select "Determine MTTFd value from B10d value".

2. Enter the Diagnostic Coverage value directly

2. If it cannot be entered directly, click on Select applied measurements to evaluate DC.

How to calculate the PL in RASWin?

PL Gfx Module

Option 2: Selecting applied measurements

Element DC Average (Central Estop)

Enter DC value directly

Diagnostic coverage (DC): % DC level:

Reasoning:

Select applied measurements to evaluate DC

Measurement type:

Measurement description:

DC range: % a %

depends on:

Diagnostic coverage (DC): % DC level:

This measurement alone is not sufficient for the following performance levels:

1. Select "Select applied measurements to evaluate DC".

2. Select measurement from the list.

How to calculate the PL in RASWin?

PL Gfx Module

Measurement selection for DC

Type: Input device

Measurement: Logic

Test stimulus by cy

Plausibility, for example, use of normally open and normally closed, mechanically guided

Cross monitoring of input signals without dynamic testing

Control input signal crossed monitoring with dynamic testing, in the event that short-circuits are not detectable for I / O multiple

Crossed monitoring of input signals and of the intermediate results in Logic (L) and temporal control and logic by the program flow and detection of static faults and short-circuits (for multiple I/O)

Indirect monitoring (for example, control by a pressure switches, electric control of the actuator positions)

Direct monitoring (for example, electrical control of the position of the control valves, monitoring of the electromechanical devices by mechanically linked elements)

Fault detection by the process

Monitoring of some characteristics of the sensor (response time, analogue signal range, for example, electrical resistance, capacitance)

DC range: 0 % a 0 %

depends on:

This measurement alone is not sufficient for the following performance levels:

Cancel Accept (OK)

1. Select the device type agree whit the component.

2. Select the measurement type agree whit the component.

3. Click "Ok".

All the information will appear

Element DC Average (Central Estop)

Enter DC value directly

Diagnostic coverage (DC): 0 % DC level: None

Reasoning:

Select applied measurements to evaluate DC

Select measurement from the list

Measurement type: Input device

Measurement description: Crossed monitoring of input signals and of the intermediate results in Logic (L) and temporal control and logic by the program flow and detection of static faults and short-circuits (for multiple I/O)

DC range: 99 % a 99 %

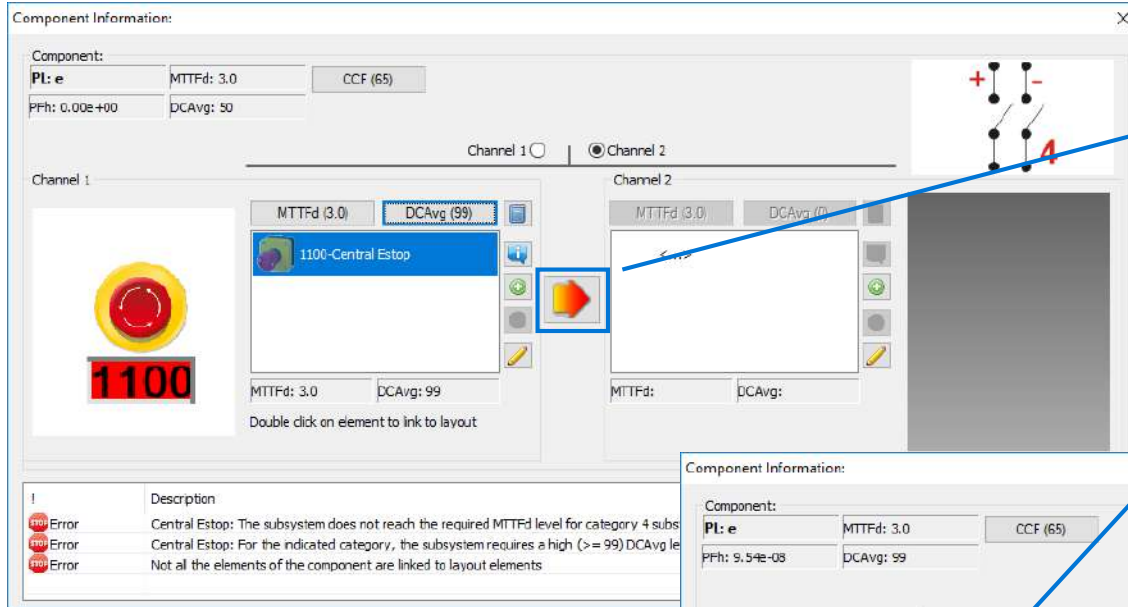
DC level: None

This measurement alone is not sufficient for the following performance levels:

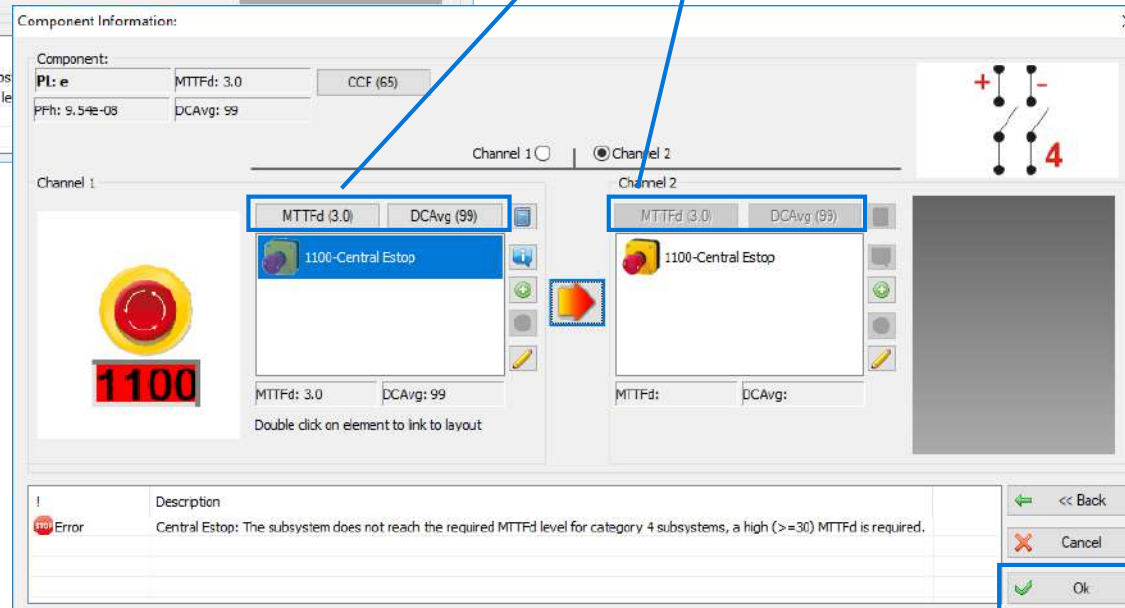
How to calculate the PL in RASWin?

PL Gfx Module

Step 8: Copy the Safety Parameters Values to Channel 2

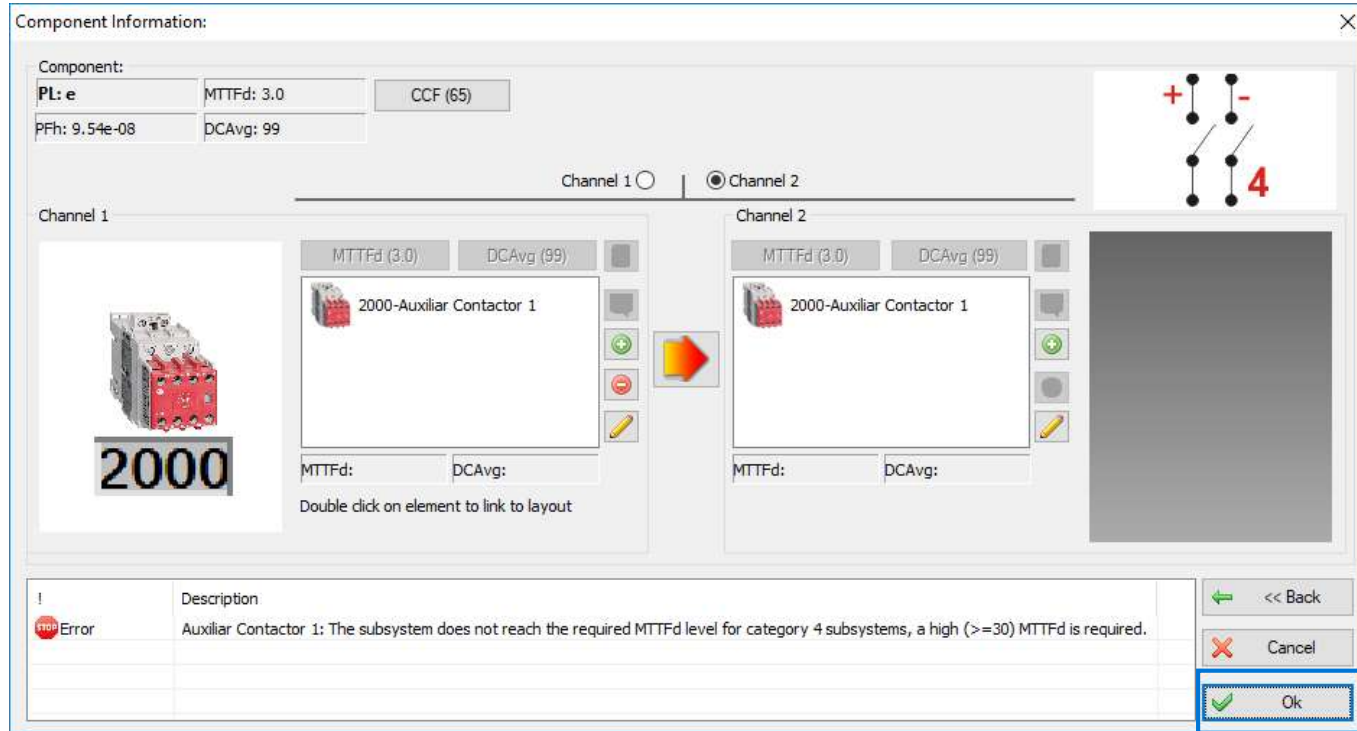


1. To add the Safety Parameters to the channel 2, click on the arrow in the middle of both channels.
2. The values on channel 1 and channel 2 will be the same.
3. Click "Ok".



How to calculate the PL in RASWin?

PL Gfx Module



1. Repeat the same procedure for the output element.

2. Click "Ok"

Step 9: Repeat for each element on the layout