



PNOZmulti project visualisation with PASvisu

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Product

Type: GUI, OPC/UA
Name: PNOZmulti, PASvisu
Manufacturer: Pilz GmbH & Co. KG, Safe Automation

Document

Release Number: 03
Release Date: 16 May 2024

Document Revision History

Release	Date	Changes	Chapter
01	2017-02-03	Creation	all
02	2017-02-07	Correction version	2.1
03	2024-05-16	Editorial revision	all

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May 2024

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To secure plants, systems, machines and networks against cyberthreats it is necessary to implement (and continuously maintain) an overall [Industrial Security concept](#) that is state of the art. Perform a risk assessment in accordance with VDI/VDE 2182 or IEC 62443-3-2 and plan the security measures with care. If necessary, seek advice from [Pilz Customer Support](#).

Abbreviations

Abbreviation / term	Description	Source
AN	A pplication N ote	 AN content (1002400)">www.pilz.com > AN content (1002400)
PNOZ	Pilz E-STOP positive-guided (DE: P ilz N OT-AUS- Z wangsgeführt)	 PNOZ">www.pilz.com > PNOZ
PSS	Programmable control system (DE: P rogrammierbares S teuerungssystem)	 PSS">www.pilz.com > PSS
PSS u2	PSS universal, 2 nd generation	 PSS u2">www.pilz.com > PSS u2
PAS	P ilz A utomation S uite (Software-Plattform)	
POU	P rogram O rganisation U nit	
OPC UA	O pen P latform C ommunications U nified A rchitecture	
NC	N ormally C losed	
NO	N ormally O pen	

Definition of Symbols

- Information that is particularly important is identified as follows:



CAUTION!

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



NOTICE

This describes a situation in which the product or devices could be damaged and also provides information on preventive measures that can be taken. It also highlights areas within the text that are of particular importance.



INFORMATION

This gives advice on applications and provides information on special features.

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1 Useful documentation

Reading the documentation listed below is necessary for understanding this Application Note. The availability of the software used, and its safe handling are also presupposed for the user.

1.1 Documentation from Pilz GmbH & Co. KG

No.	Description	Item No. /Download
1	Pilz international homepage, download section	www.pilz.com
2	Operating Manual PNOZ m B1	www.pilz.com > Download 1003790
3	Operating Manual PNOZ m EF 8DI4DO	www.pilz.com > Download 1002661
4		

1.2 Documentation from other sources of information

No.	Description	Item No. / Download
1		
2		
3		
4		

2 Used hardware

2.1 Pilz products

No.	Descriptions	Order number	Version	Number
1	PNOZmulti m B1	772101	1.1	1
2	PNOZ m EF 8DI4DO	772142	1.0	2
3	PNOZmulti Configurator	-	10.3.0	1
4	PASvisu	-	1.3.0	1

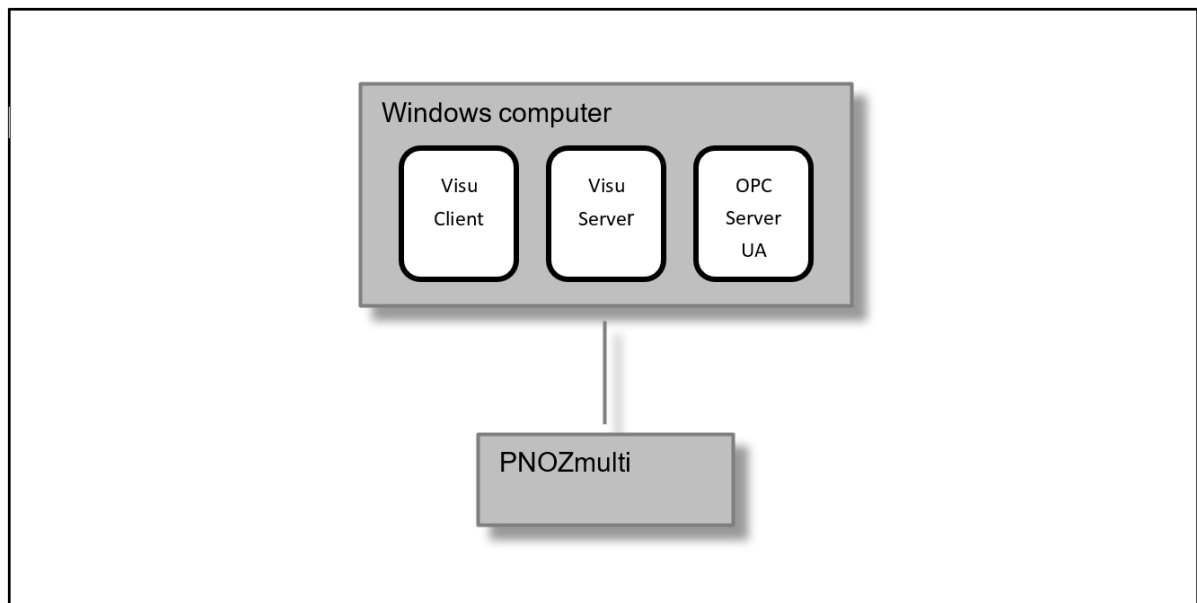
3 Application description

**INFORMATION**

Some software may not need installing because it is already installed. This also applies to some steps, which have already been done. In these cases, you simply can skip the related instructions and steps.

The example in this Application Note can be viewed as the simplest case of possible topologies:

- ▶ **Device 1:**
A Windows PC is the visualisation machine and has the following functions:
 - PNOZmulti engineering environment,
 - PASvisu engineering environment,
 - Visu display device,
 - Visu Server,
 - OPC UA Server
- ▶ **Device 2:**
A PNOZmulti is the PLC, which can be controlled and monitored using the visualisation PC.
- ▶ **Connection:**
An Ethernet cable (RJ-45) is used to connect the two devices.



3.1 Create a PNOZmulti project

Create a hardware configuration:

- ▶ Open the PNOZmulti Configurator.
- ▶ Drag the following modules from the left overview frame and drop them to the editor Configured Hardware.
 - Base Unit PNOZ m B1 (Base Units (PNOZmulti 2)).
 - Input/Output Module PNOZ m EF 8DI4DO (in Semiconductor Output Modules).
 - Input/Output Module PNOZ m EF 8DI4DO (in Semiconductor Output Modules), optional.
 - I/Os transmitted via the integrated interface (in Virtual I/O Modules/Interfaces).

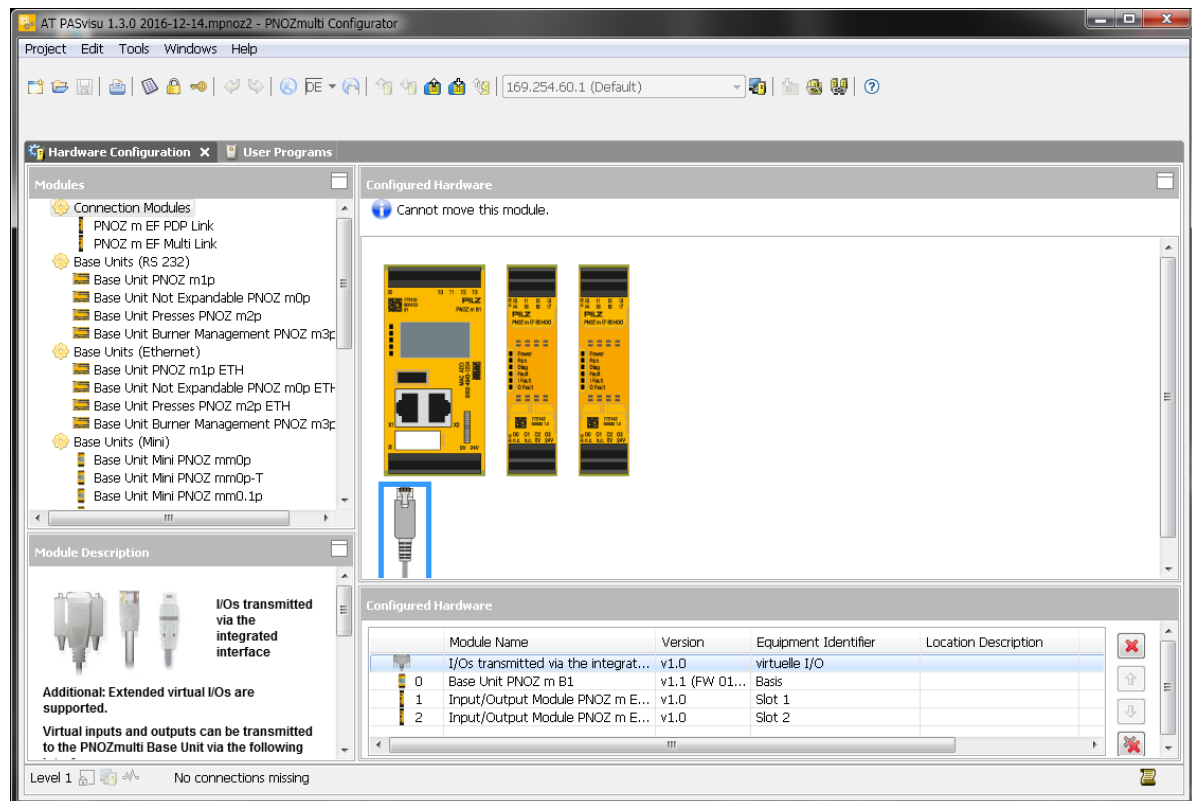


Figure 1: PNOZmulti Configurator HW

Program:

- ▶ I/O's of the I/O module.
- ▶ Virtual I/Os (optional, recommended, necessary when you want to write variables from the PASvisu project).

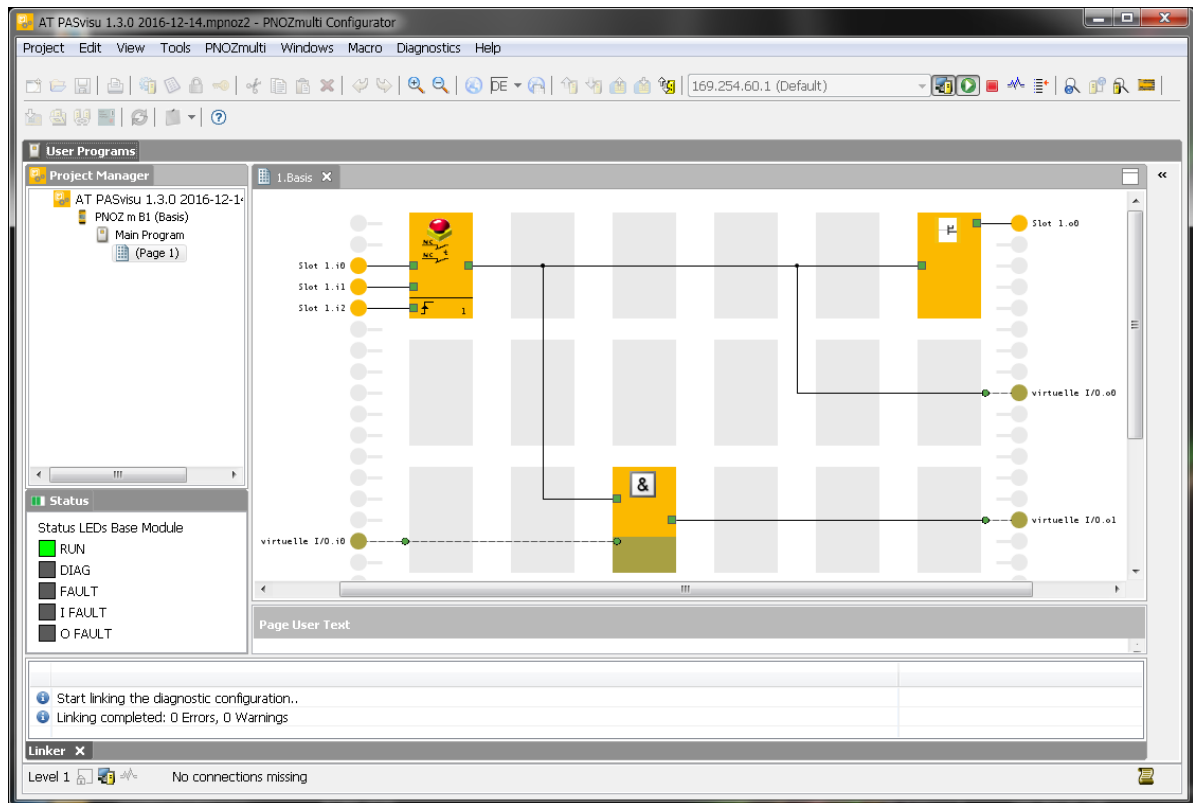


Figure 2: PNOZmulti Configurator Program

3.2 Wiring of PNOZmulti Hardware

- ▶ To follow the example of this Application Note it is recommended to wire inputs I0, I1, and I2 of the I/O module *PNOZ m EF 8DI4DO* to switches.

3.3 Installation of OPC Server

- ▶ Extract PVIS_Installer_2_1_0_3000831B07.zip.
- ▶ Start PVIS_PC_Installer_v_2_1_0_Build15.exe and install OPC Server UA.



Figure 3: Install PVIS Installer OPC

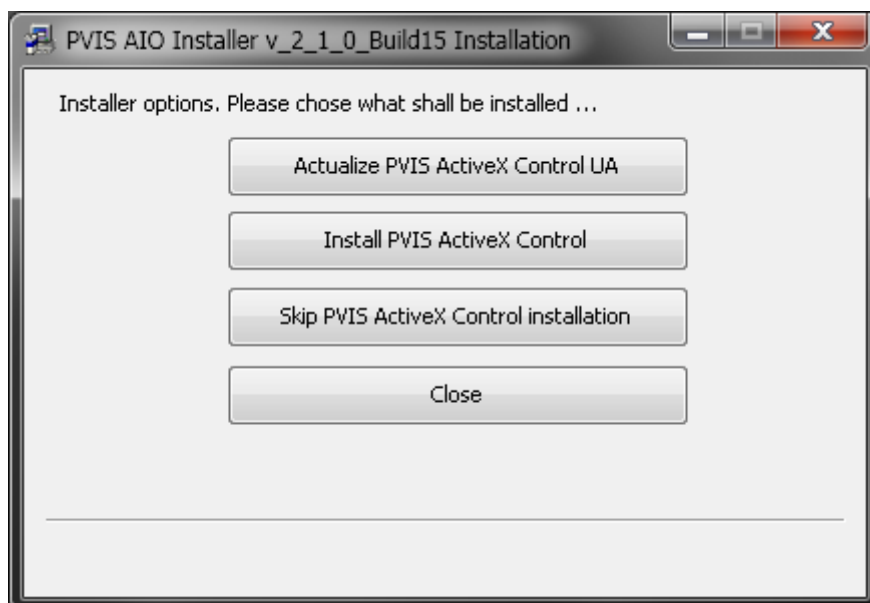


Figure 4: Install PVIS Installer ActiveX

3.4 Installation of PVIS OPC Configurator

- ▶ Extract *PVIS_OPC_Configurator_2_0_0_3000955A01.zip*, start *OPC_Config_2.0.0.exe* and follow the instructions.

3.5 Configure the OPC Server project

Configuring OPC project properties:

- ▶ After starting the PVIS OPC Configurator, please create a new project.
- ▶ *OPC Project – Address*: Insert the IP of the PC, which hosts the OPC UA Server. If the PC is the same use "localhost". Now press the blue arrow on the right next to the address text field.
(Note: If the PASvisu Server is running on a different PC/PMI, it is important to use the IP-address of the OPC Server instead of the PC-Name).
- ▶ *Namespace - Enable navigation ...*: Check this box if you require access to process data of PNOZmulti program (optional, recommended, required when you want to write variables from the PASvisu project).

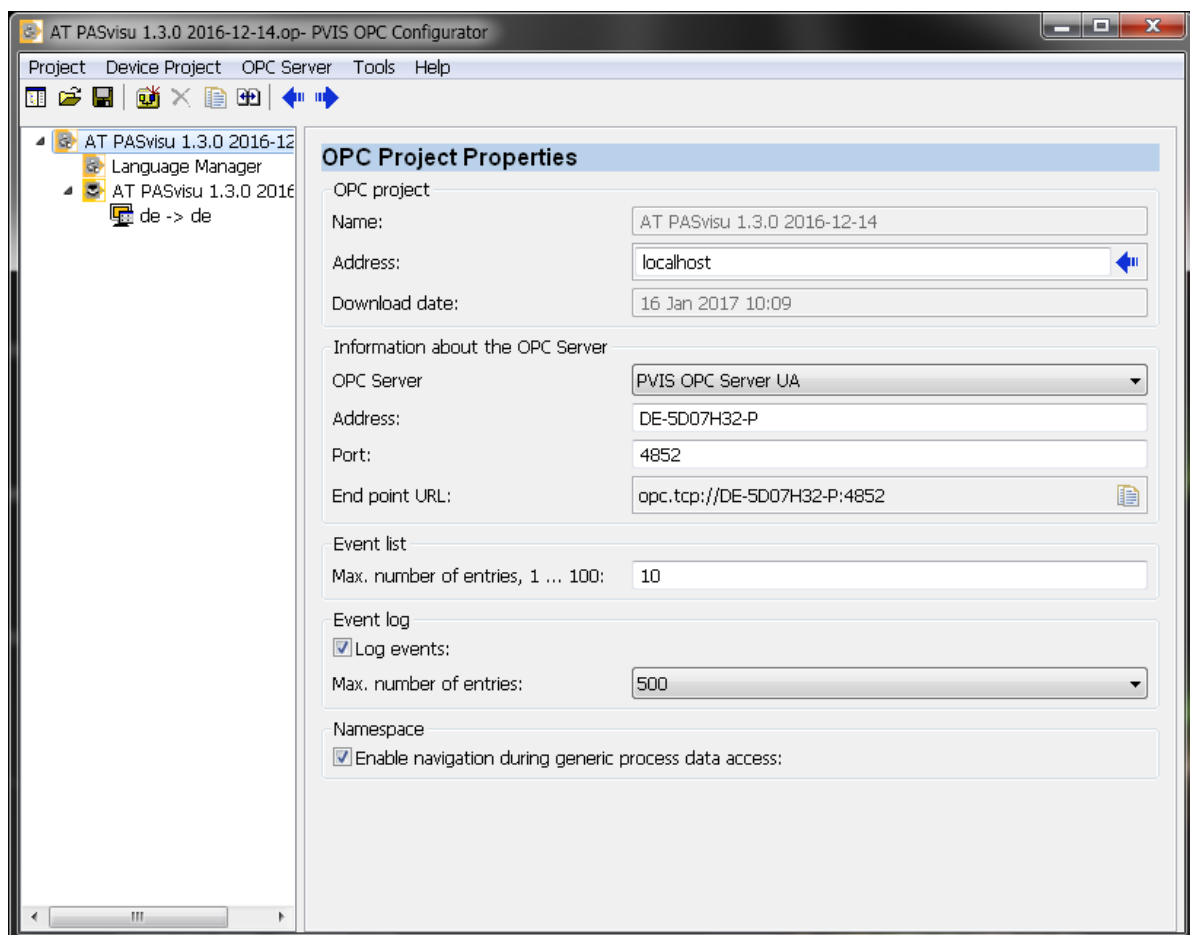


Figure 5: Configure PVIS OPC Configurator - OPC-Project

Configure the device project:

- ▶ Press Device Project – Add in main menu.
- ▶ Lower right hand side: Set the file type filter to “.mpnoz; .mpnoz2”.
- ▶ Choose a PNOZmulti project and open it.

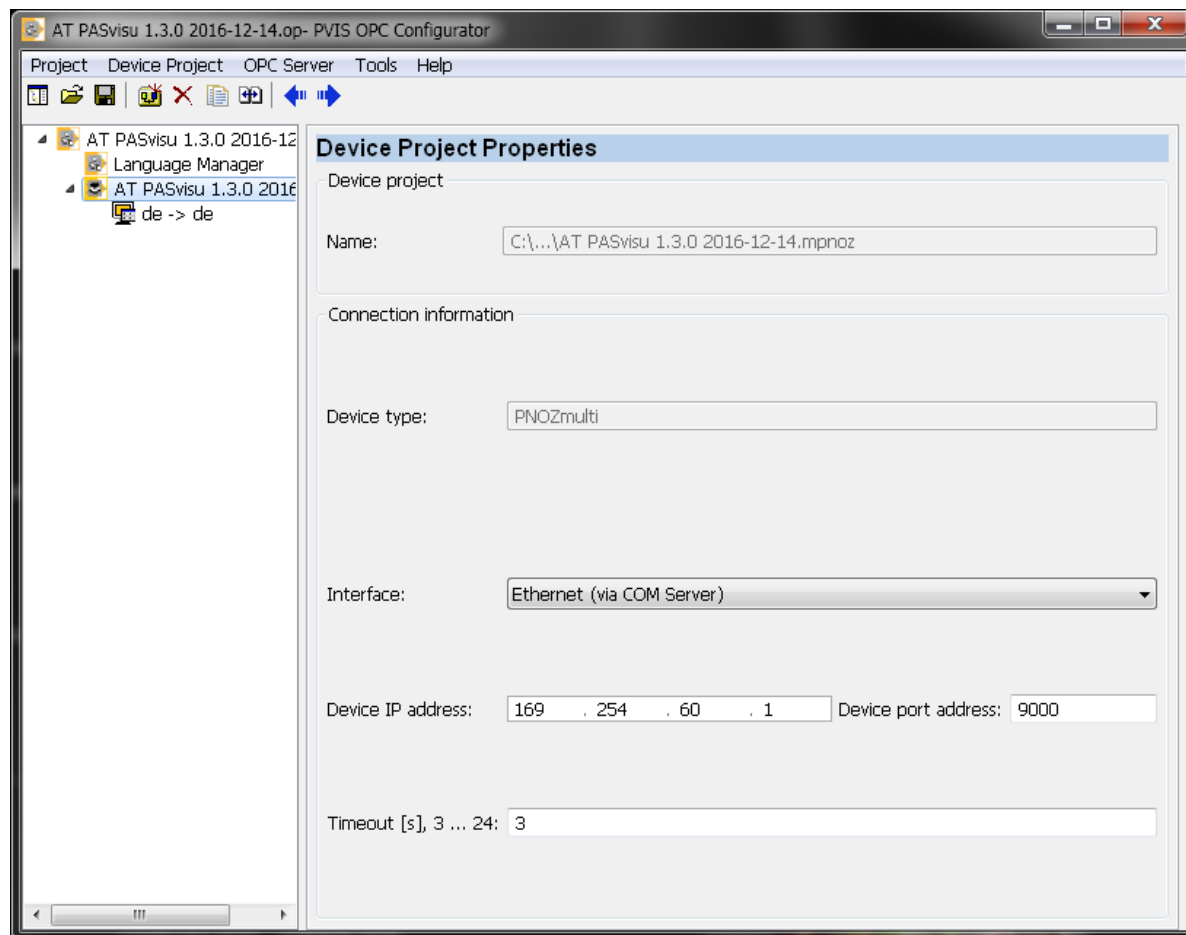


Figure 6: PVIS OPC Configurator – integrate the device project

Proceed an OPC project configuration download to the PC, which hosts the OPC UA Server:

- ▶ Press *Download OPC project -> OPC Server ...* in the main menu OPC Server.

3.6 Create a PASvisu project

- ▶ Press New in main menu Project.
 - Add all necessary values to the screen Create new project. Values in Project name, Project directory and Comment are up to you. Display unit and Page size have to match the displaying device.

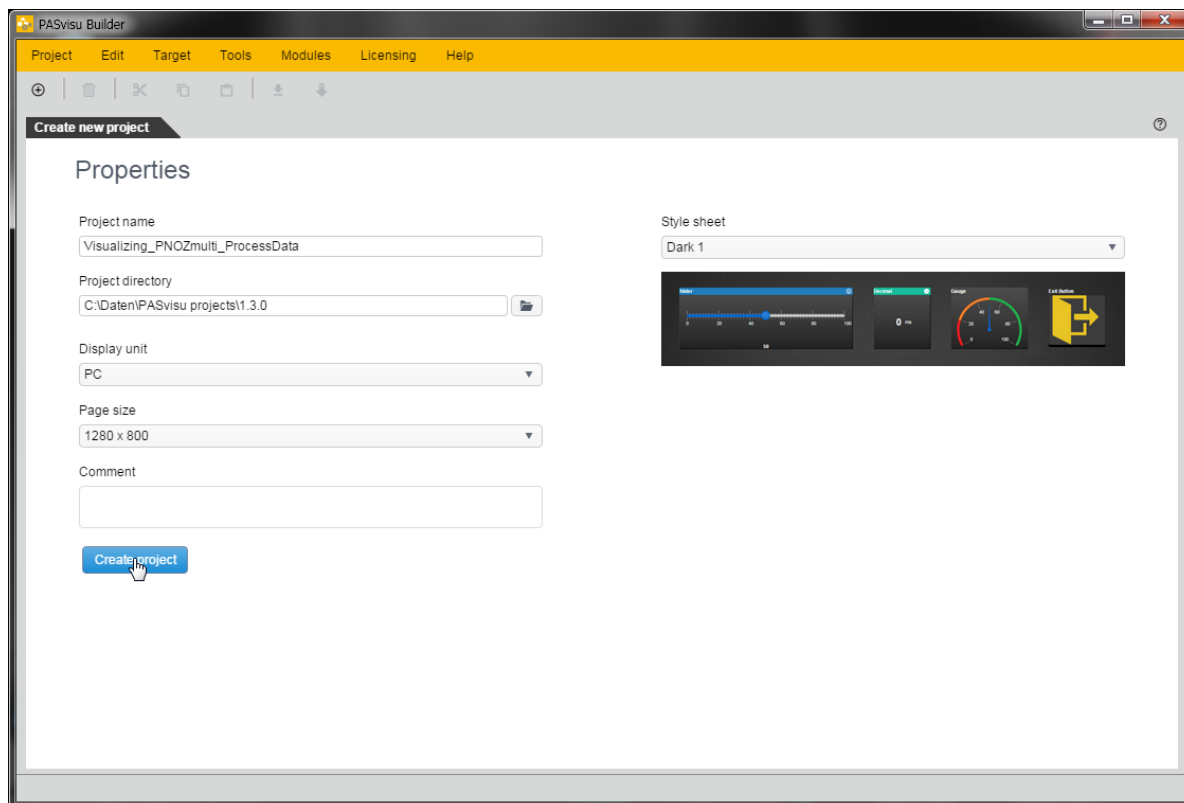


Figure 7: PASvisu-Create new project

- ▶ Press Button *Data Source Editor* in the button bar.
(You will be automatically navigated to that page when creating a new project).

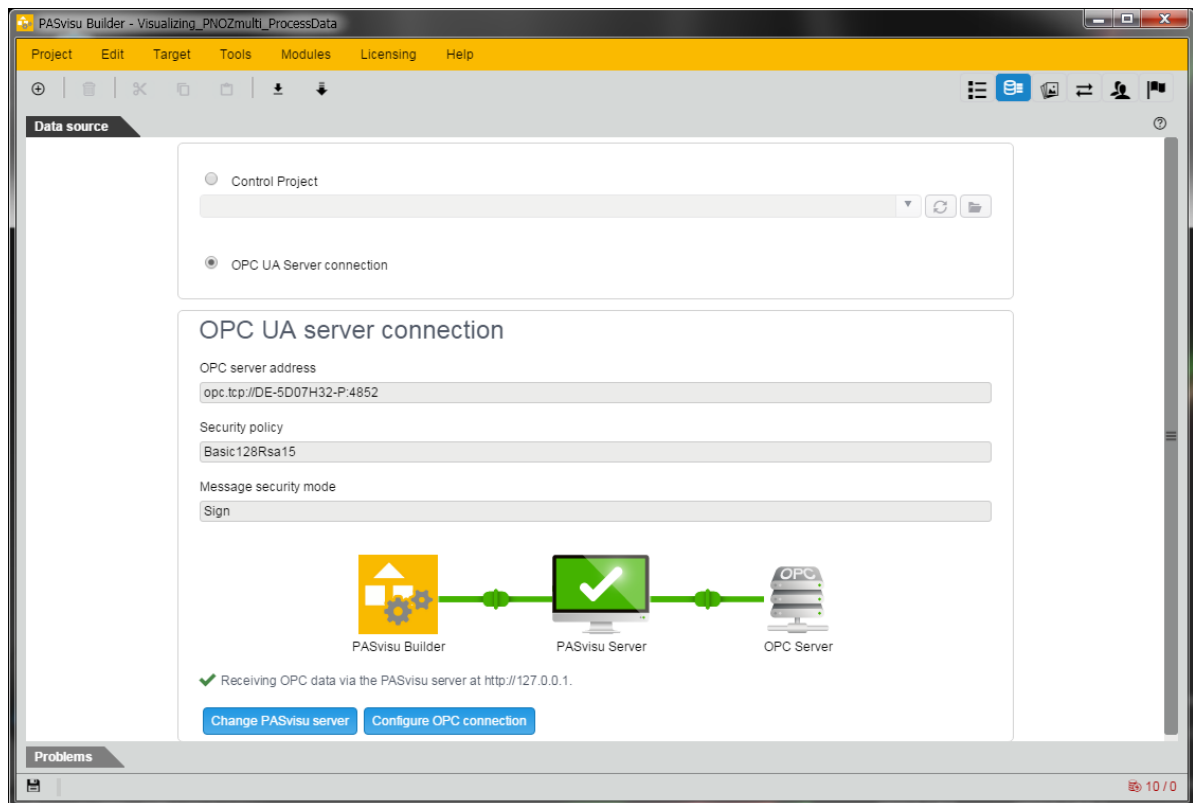


Figure 8: Configure Data Source

- ▶ Here you have to configure your OPC UA server. Click on the button *Configure OPC connection* and type in the OPC server you want to connect to. Then configure the security policy and security mode.

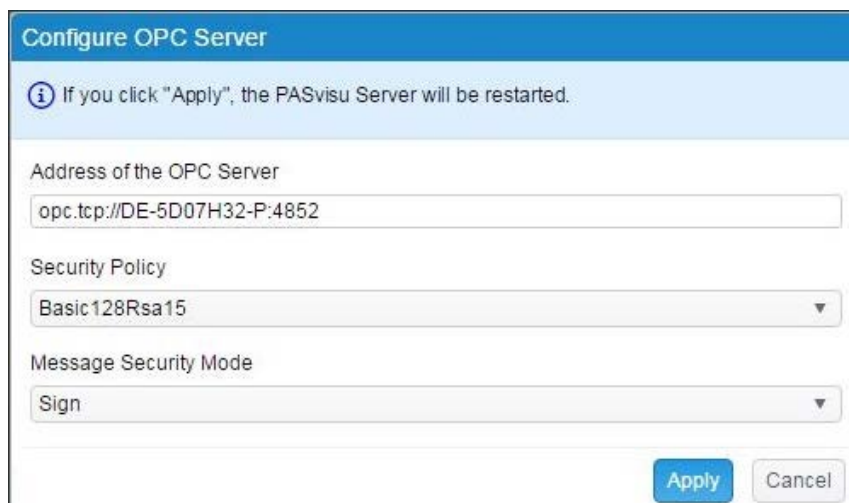


Figure 9: Configure OPC UA connection

(In your PVIS OPC Configurator, at End point URL you can find the address of your OPC server)

- ▶ It may take some time until the connection is established.
- ▶ You will get the message e.g. "Bad certificates" because they are not yet trusted.

3.7 Copy Certificates

- ▶ Now it is time to copy the certificates to achieve the correct connection between OPC server and PASvisu server.
You have two options to exchange the certificates.
- ▶ Copy from rejected to trusted:
 - In the folder `C:\ProgramData\Pilz\PASvisu Builder\pki\rejected` there should be the certificate of the PVIS OPC server. Copy this file to the trusted folder of the PASvisu Builder (`C:\ProgramData\Pilz\PASvisu Builder\pki\trusted`).
 - Now you will find the certificate of PASvisu in the PVIS OPC server folder `C:\ProgramData\Pilz\PVISOPCServerUA\pki\rejected`.
Copy the certificate into the trusted folder of the PVIS OPC (`C:\ProgramData\Pilz\PVISOPCServerUA\pki\trusted`) server and the connection should be good.
It is important to keep the correct order, first on PASvisu Builder side and second on OPC server side.
- ▶ Second option: Copy from own or trusted:
cert_Pilz_PVIS_OPC_Server_UA.der
has to be copied from
`C:\ProgramData\Pilz\PVISOPCServerUA\pki\own`
to
`C:\ProgramData\Pilz\PASvisu Builder\PKI\trusted`.

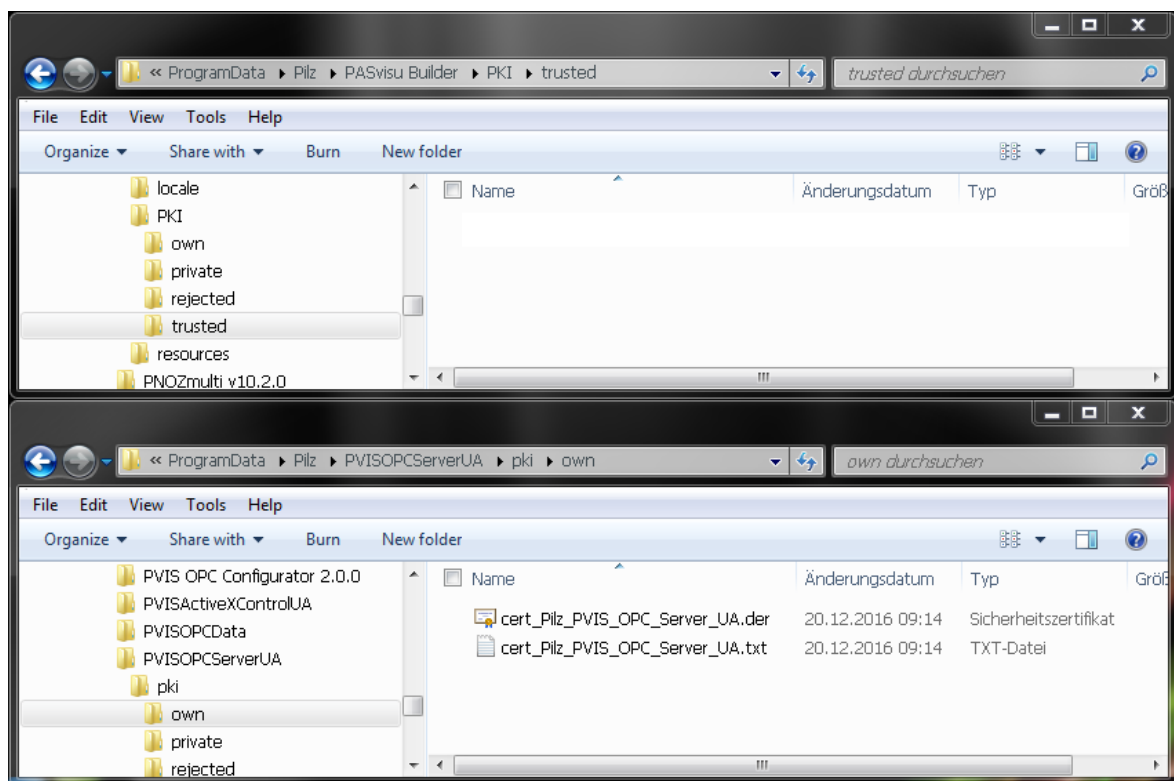


Figure 10: Explorer – Copy certificates

This has to be done also the other way round. Copy the certificate of the PASvisu Builder `cert_Pilz_PASvisu_OPC_UA.der` from `C:\ProgramData\Pilz\PASvisu Builder\pki\own` to `C:\ProgramData\Pilz\PVISOPCServerUA\pki\trusted`

After exchanging the certificates, you should be able to connect to the PVIS OPC server.

- ▶ Press Button Variable Editor in button bar.
 - In *Data Source tree* navigate to the node with the OPC Item, which shall be visualised in *Generic* you can among others, find these groups of items:
 I=Inputs, O=Outputs, Ivirtual=virtual Inputs, Ovirtual= virtual Outputs
 Note: Input of first module right from Base Module does start with 1. Further modules have 1+n.
 Note: Numbers which have a prefix “-” (e. g. -1.0) are intended for modules left from Base Module.

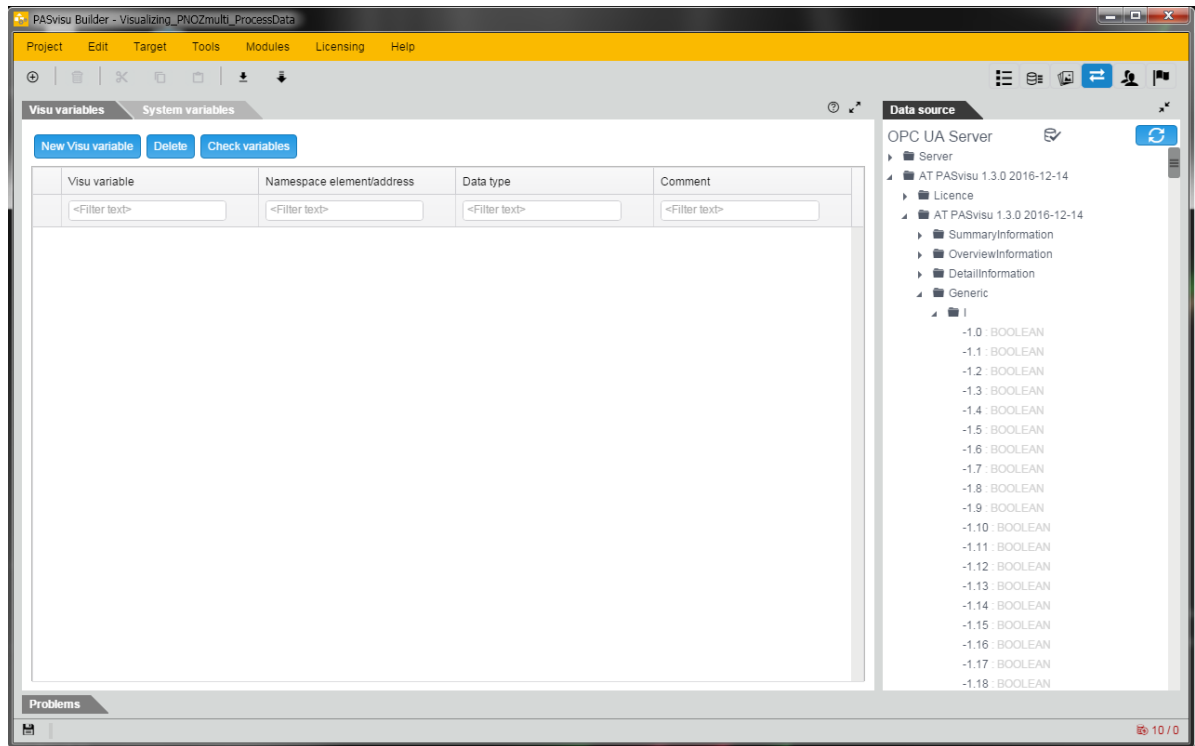


Figure 11: PASvisu data source connect with Visu variables 1

In *DetailInformation* you will find the diagnostic items
 There you will find the timestamp, priority, description, ... for the events.
 You also find the actions and remedies.

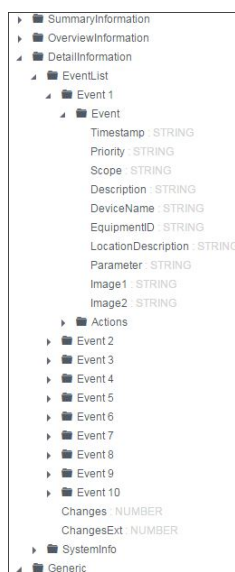


Figure 12: Part of variable tree from the OPC UA server

- Right click this item and chose *New Visu variable*.

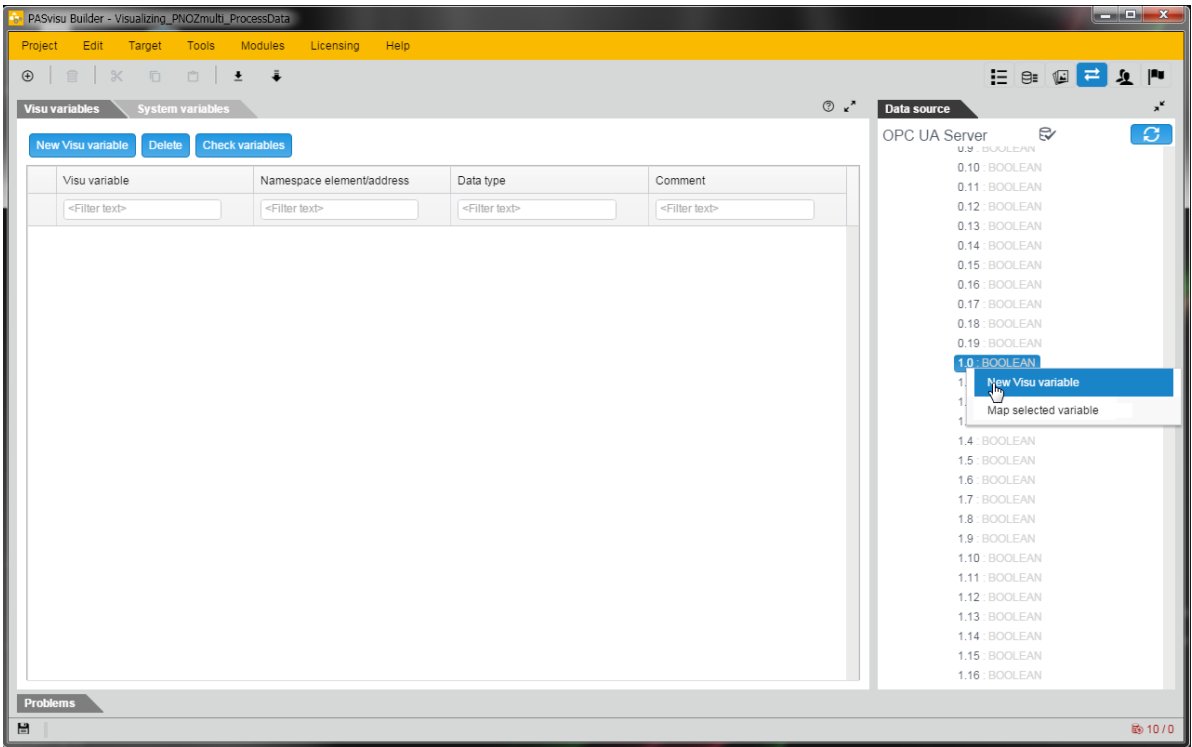


Figure 13: PASvisu data source connect with Visu variables 2

- With clicking into the Visu variables column the name of the Visu variable can be changed. That enhances the possibility to better find it again (optional, recommended).

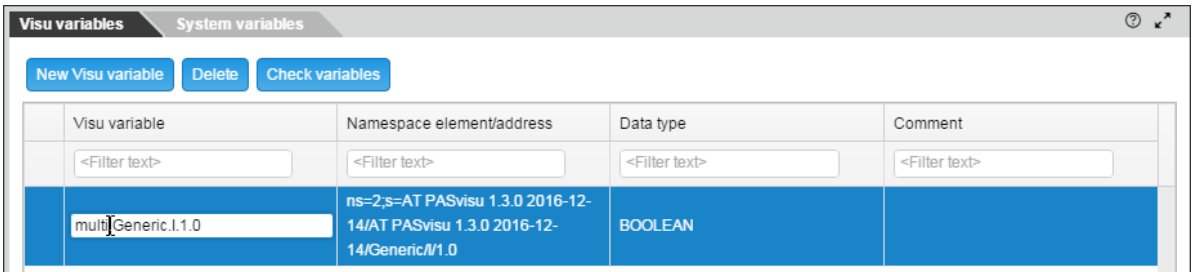


Figure 14: PASvisu data source connect with Visu variables 3

- Create Visu variables for all OPC Items, which shall be visualised or controlled by Visu elements (here for the example: I1.0, I1.1, I1.2, O1.0; Ivirtual0.0, Ovvirtual0.0, Ovvirtual0.1).

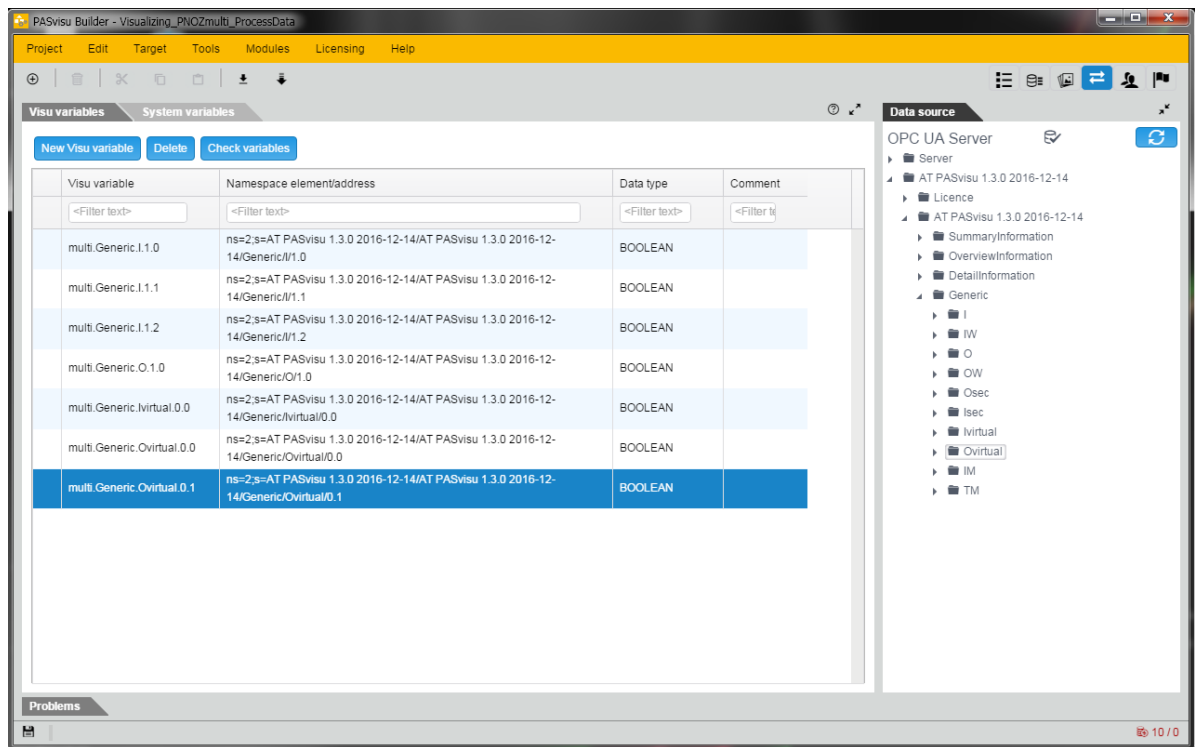


Figure 15: PASvisu data source connect with Visu variables 4

- ▶ Press Button *Page Editor* in button bar.
- ▶ Click the *Tiles* Tab on the right of Page Editor.
 - Drag & drop a *Boolean status display* tile into the page area and change the size by dragging the blue border.

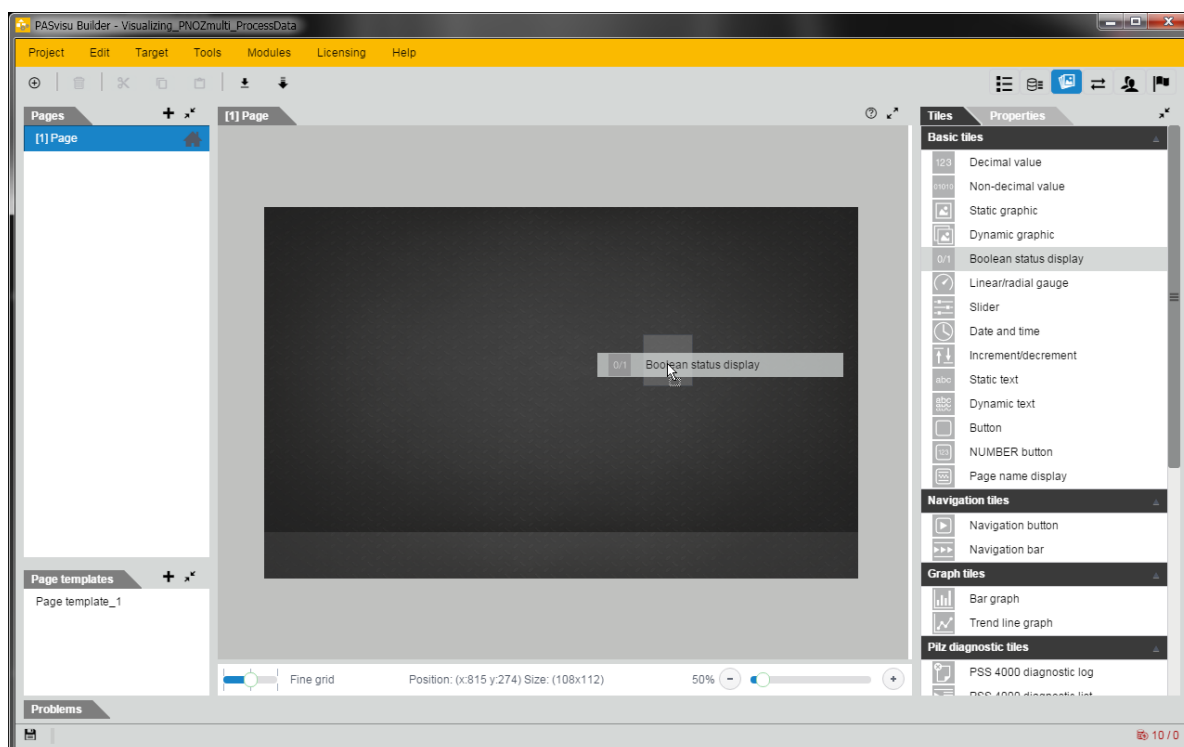


Figure 16: PASvisu edit page 1

- ▶ Click the Properties Tab right of *Page Editor*.
 - Chose or enter a variable in Data item field.
 - Using the fields *Graphic for TRUE* and *Graphic for FALSE* alternative graphics can be chosen, just click the  icon and choose a picture, or choose a picture from library or import a picture from a directory.

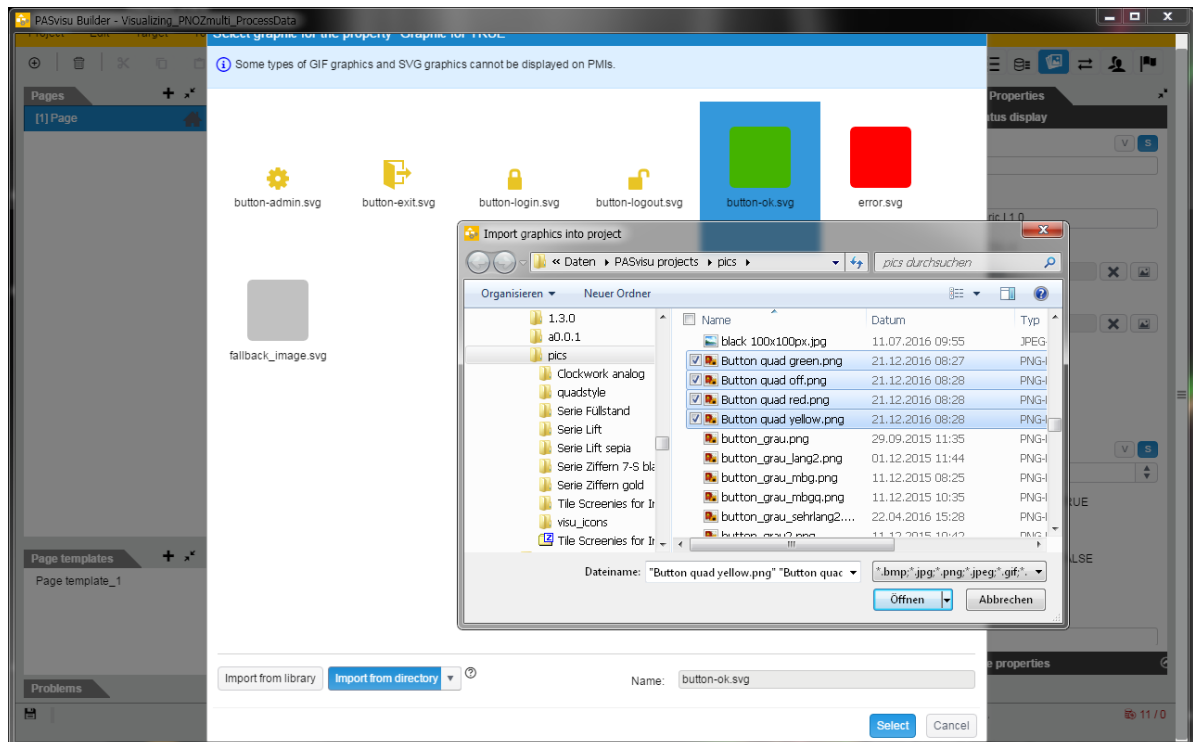


Figure 17: PASvisu picture import from directory

- Uncheck the *Show border* and *Show tile* background checkboxes; this improves the look of the graphics (optional, recommended).

- ▶ Click the tile in the Page Editor.
 - Press *Ctrl+C* and *Ctrl+V* to copy and paste the tile.
 - Drag & Drop the *new created* tile to the position where it is to be displayed.
- ▶ Click the *Properties* Tab right of *Page Editor* while the tile is still marked.
 - Chose a new Variable in field Data item (...I.1.1).
 - Repeat the last steps until all tiles for Inputs, Outputs and virtual In- and Outputs have been placed and configured.

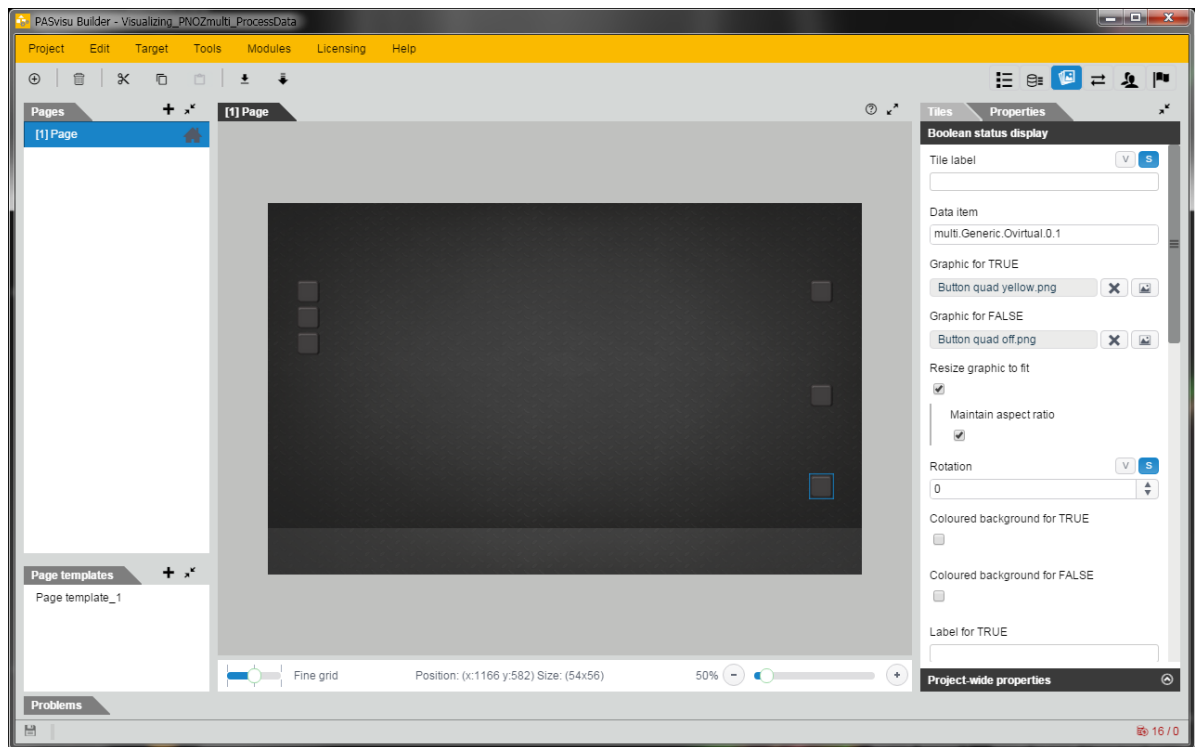


Figure 18: PASvisu edit page 2

- ▶ Click the *Tiles* Tab right of Page Editor.
 - Drag & drop a *Pushbutton* tile into the page area and change the size by dragging the blue border.
- ▶ Click the Properties Tab right of *Page Editor* while the tile is still marked.
 - Chose a new Variable in field *Data item* (...Ivirtual.1.1).
 - Using the fields *Graphic for operated* and *Graphic for not operated* alternative graphics can be chosen (optional), just click the  icon and choose a picture or choose a picture from library or import a picture from a directory.
 - Uncheck the *Show border* and *Show tile background* checkboxes; this improves the look of the graphics (optional, recommended).

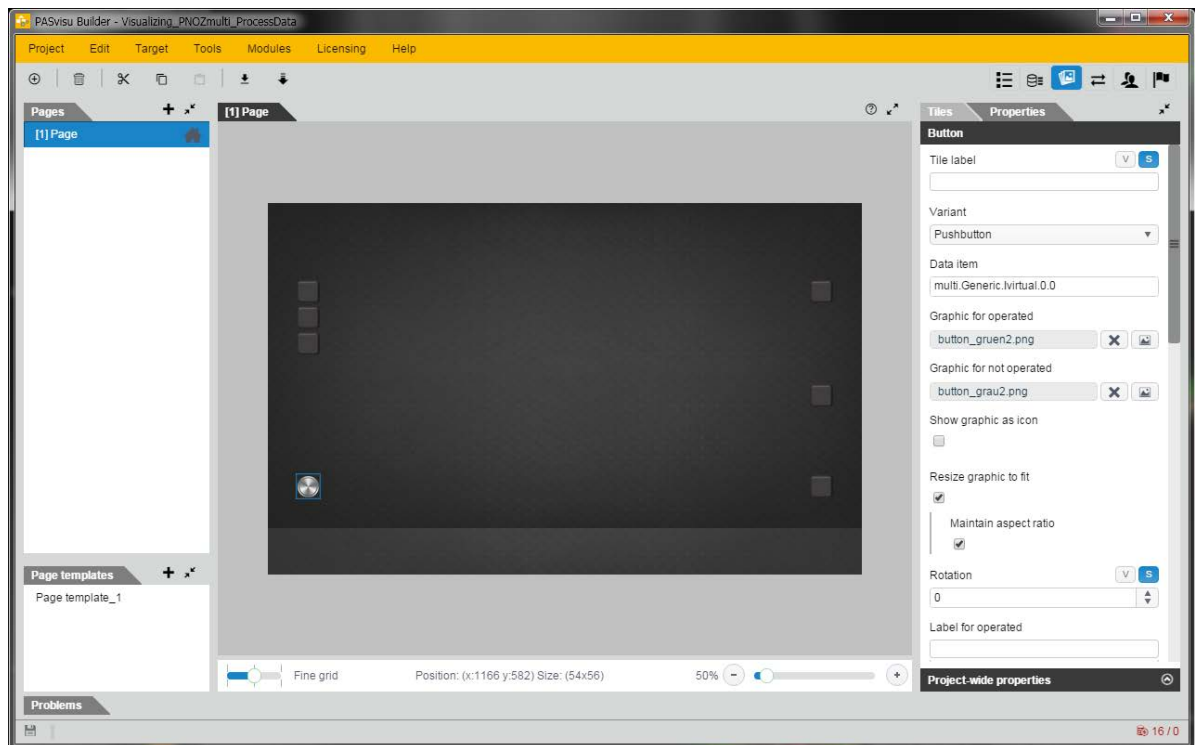


Figure 19: PASvisu edit page 3

- ▶ Click the *Tiles* Tab right of *Page Editor*.
 - Drag & drop a *Static Graphic* tile into the page area and change the size by dragging the blue border.
- ▶ Click the *Properties* Tab right of *Page Editor* while the tile is still marked.
 - Chose a picture in *Graphic field* (to follow the example of this Application Note, use a screenshot of the program in PNOZmulti Configurator).

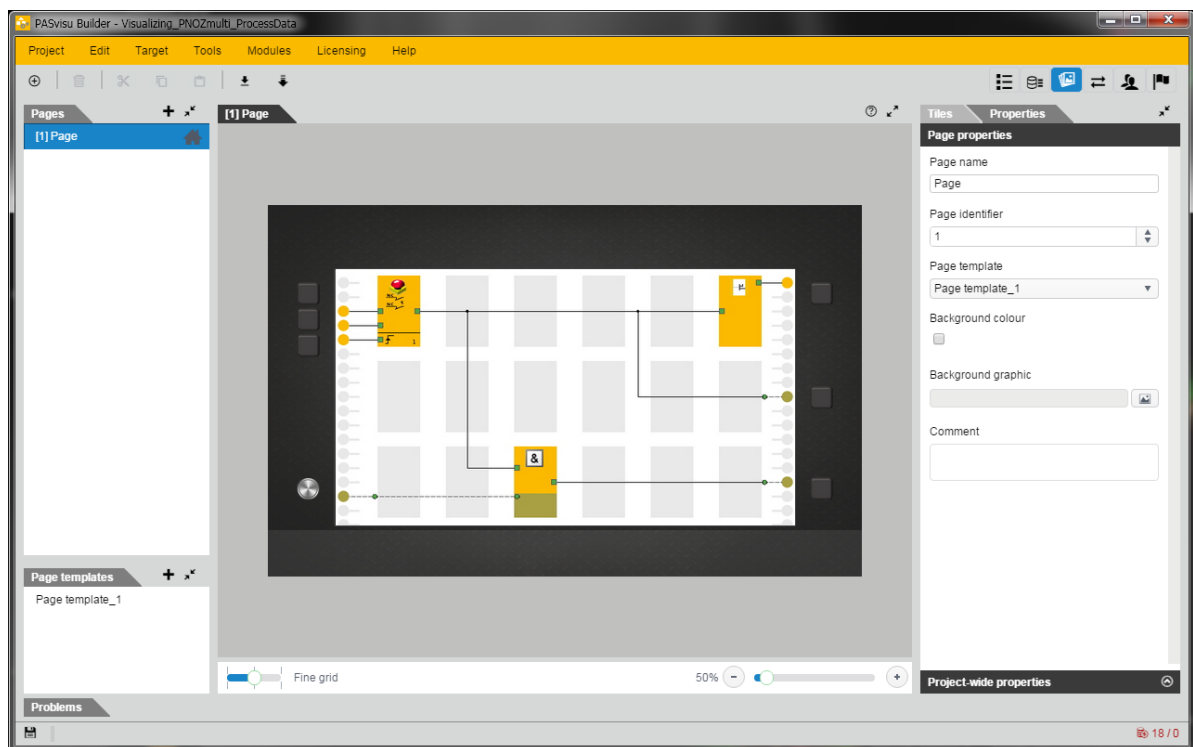


Figure 20: PASvisu edit page 4

3.8 Download the Visu project

- ▶ Press *Target* - *Download* in main menu. Project download view opens.
 - Press the *Download* button in *PASvisu Server information* area.

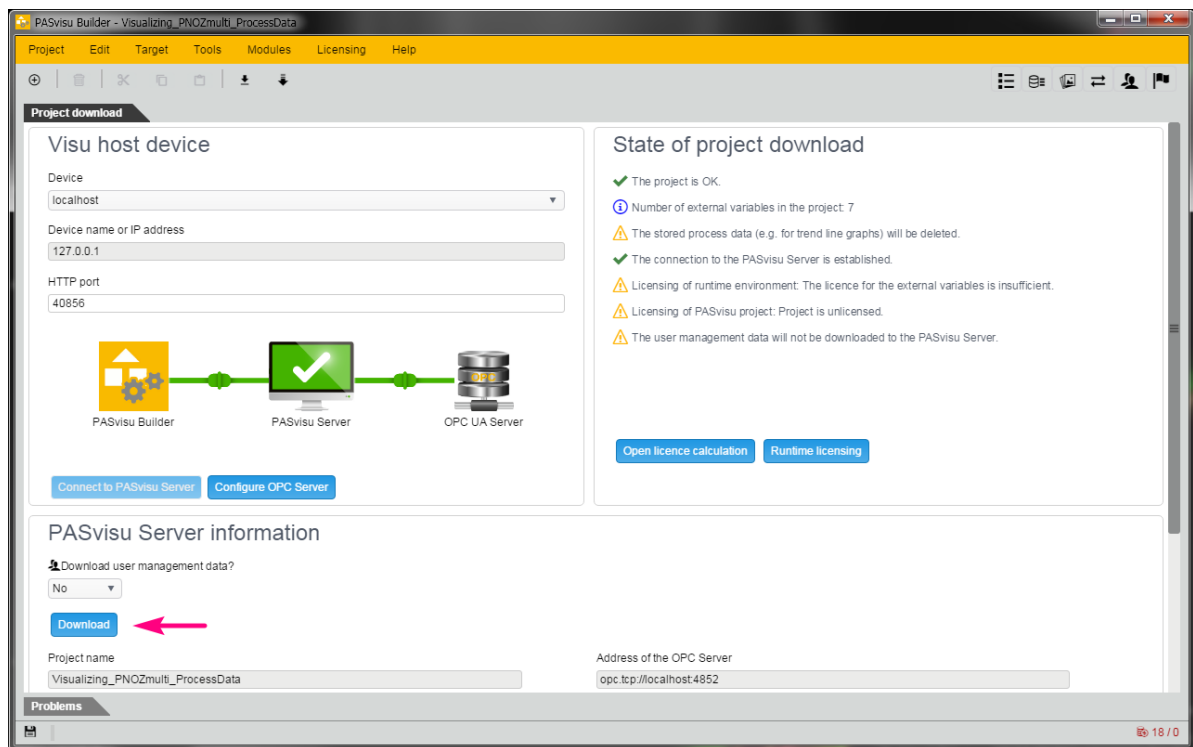


Figure 21: PASvisu download page 1

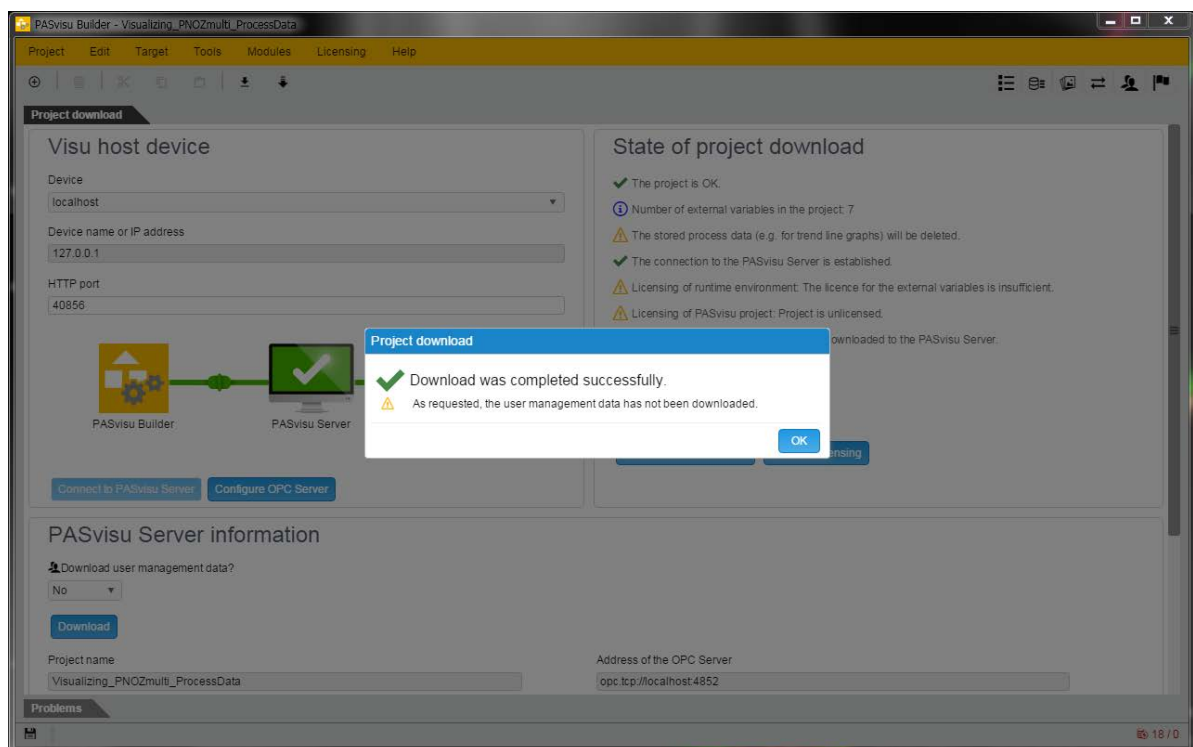


Figure 22: PASvisu download page 2

- After downloading successfully, the PASvisu client will open and you will see the visualisation.

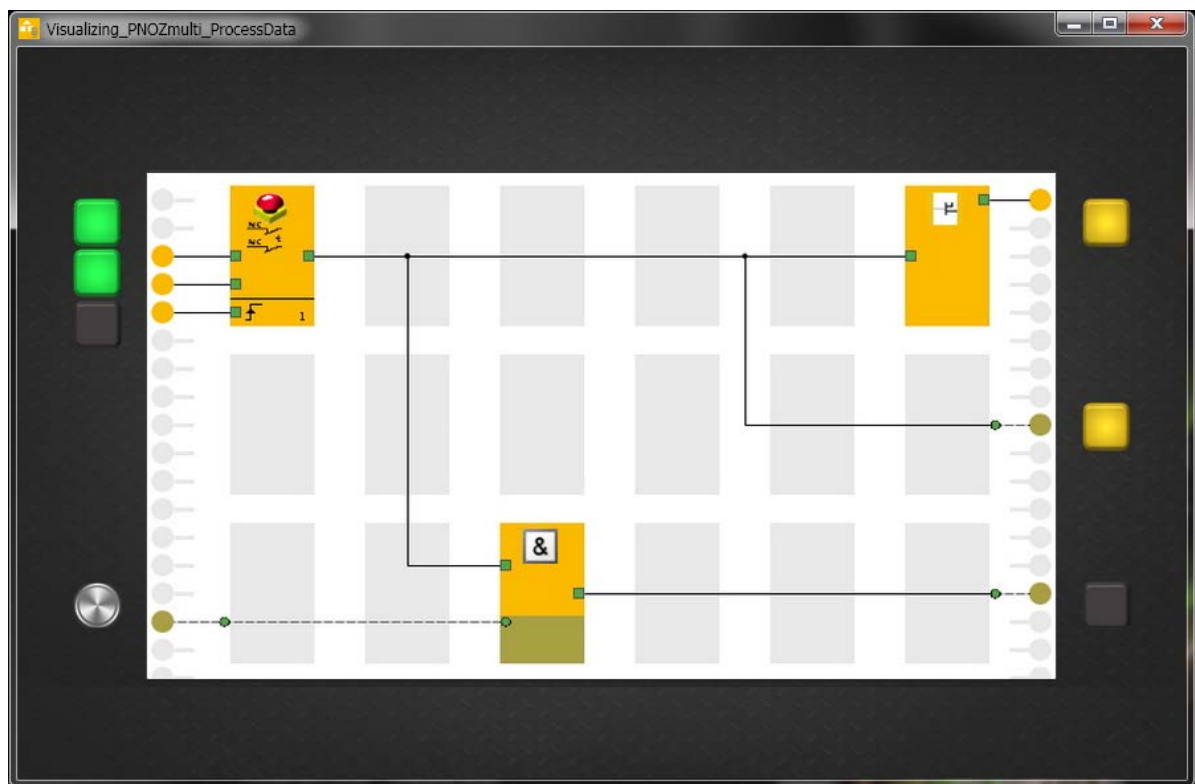


Figure 23: PASvisu client live view

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Pilz develops environmentally-friendly products using ecological materials and energy-saving technologies. Offices and production facilities are ecologically designed, environmentally-aware and energy-saving. So Pilz offers sustainability, plus the security of using energy-efficient products and environmentally-friendly solutions.



We are represented internationally. Please refer to our homepage www.pilz.com for further details or contact our headquarters.

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