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SIEMENS OPEN LIBRARY

5 – HMI Alarm Generation

OCTOBER 11, 2016

Contents

1. Purpose

This document walks through automatically generating HMI alarms for Siemens HMIs. This overview covers tools included in the Open Library. Note that these tools are designed for use with Open Library structures and architecture only. Specifically, these may only be used to generate alarms for bit-packed Data Blocks. Use with any other alarm setup may not work.

2. Intended Use

This document is intended to be used by anyone utilizing the Open Library for PLC and HMI Development after the PLC code has been complete and alarms are ready to be generated.

3. Revision History

Version	Date	Author	Comments
1.0	2016-05-23	DMC	Initial Release
1.1	2016-06-20	DMC	No Changes
1.2	2016-08-23	DMC	No Changes
1.3	2016-10-11	DMC	No Changes

4. Open Library License

5. Hardware and Software Compatibility

This library was developed in TIA Portal V13 SP1. It has been tested on the S7-1200 and S7-1500 platforms, and untested modifications have been made for compatibility with S7-300 and S7-400. The PLC objects can be used with any HMI, however, the configuration of the faceplates is only available using a Comfort Panel or WinCC Advanced, and have been tested on a 7" Comfort Panel.

6. General Overview

Siemens Comfort Panels and WinCC Advanced Runtime use bits out of words to trigger alarms, and there are no methods to configure Boolean alarms. This library, however, utilizes bits for all alarms. To automate this process the Siemens Open Library includes a Microsoft Excel macro that utilizes a data block of Booleans to generate alarms.

6.1. Excel Macro

The Excel macro uses the definition of Data Blocks to automatically generate alarms. All of the source code is included as part of the Excel macro and can be edited in VBA for custom applications. The Excel macro will work with any non-optimized data block containing only Booleans. The Booleans can be placed directly in the Data Block, nested in User Defined Types, or nested in Structs.

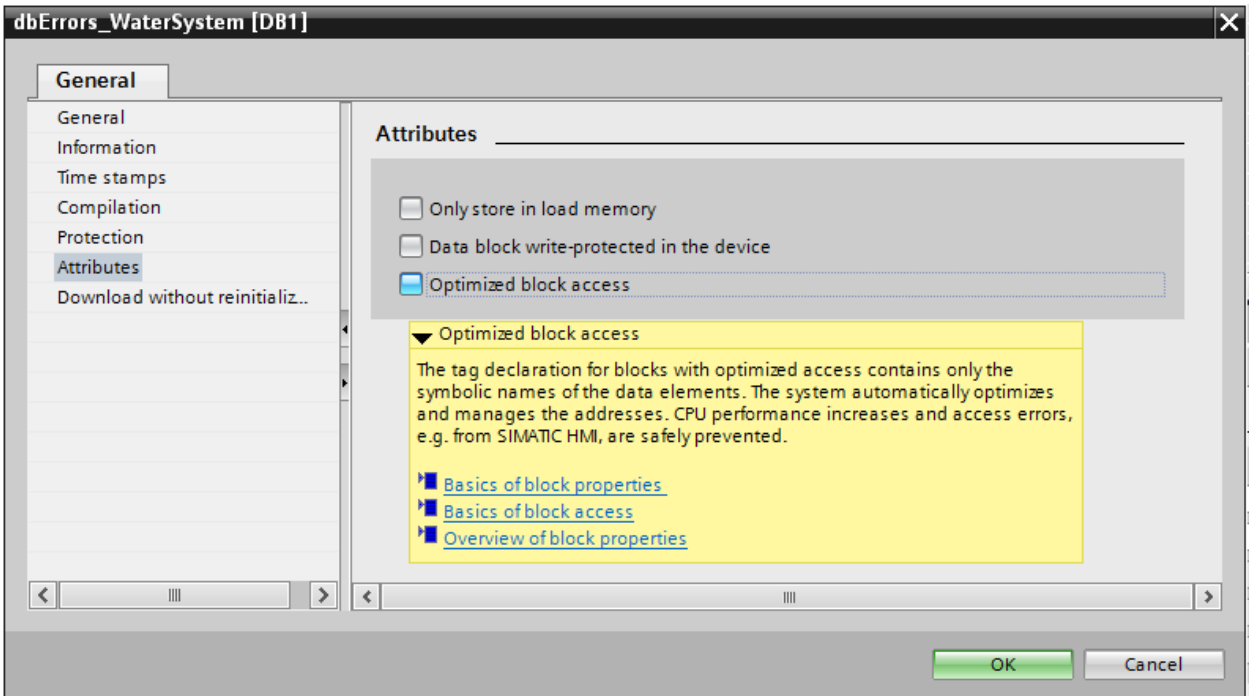
6.2. Alarm Special Considerations

The included Excel macro has the following special considerations in order for the system to function:

1. The Data Block must be non-optimized (applies to 1200/1500 only and is accessible via the properties of the Data Block). See Section 7 of this document or '2- Siemens Open Library - Initial Setup' for details about how to set up a non-optimized data block.
2. The User Defined Type, Struct, and/or individual Boolean comments will be utilized for the alarm text, so it is important to put in meaningful comments on each alarm.
3. The Excel macro will work with nested User Defined Types and Structs.
4. The Excel macro works only with data blocks containing only Booleans, so all automatically generated alarms will need to be Boolean alarms, and should be concentrated in Data Blocks.
5. The Excel macro utilizes the bit comments for alarm text, so arrays are not a recommended structure as they won't generate unique alarm text, but could be used by modifying the Excel Macro to grab relevant information from the array.

7. Verify Non-Optimized Data Blocks

To verify that a data block is non-optimized, right click on the data block and select 'Properties.' Under the 'Attribute' tab, verify the 'Optimized block access' is not checked. Choosing optimized block access permits the TIA Portal compiler to rearrange data to optimize space on the PLC. When using the alarm generator, however, the Macro utilizes data block position to determine address, so non-optimized blocks need to be used for correct functionality.



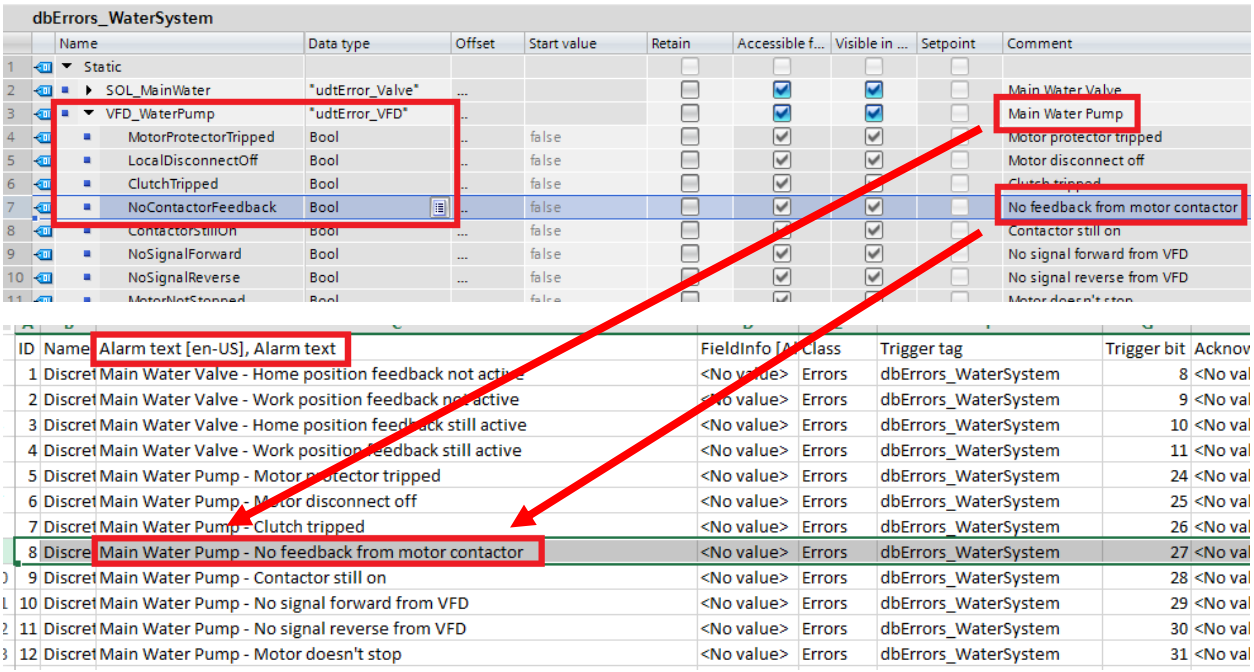
8. Alarm Naming Conventions

This section discusses how automated alarms are generated and how text will be created for the HMI. Alarm text will be created using the comments contained in the Data Block.

8.1. Macro Alarm String Creation

The Excel macro will generate the alarm based on the following parameters:

1. For alarms not in a User Defined Type or Struct, the alarm string will be the Boolean comment string.
2. For alarms in a single or nested User Defined Types and/or Structs, the comment for each User Defined Type and/or Struct will be a prefix for the alarm.



dbErrors_WaterSystem

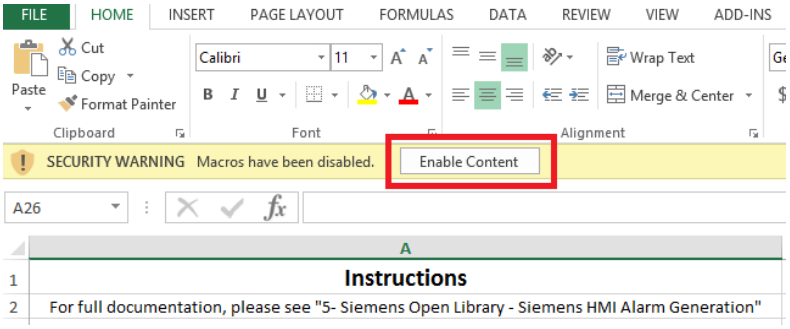
	Name	Data type	Offset	Start value	Retain	Accessible f...	Visible in ...	Setpoint	Comment
1	Static								
2	SOL_MainWater	"udtError_Valve"	...						Main Water Valve
3	VFD_WaterPump	"udtError_VFD"	...						Main Water Pump
4	MotorProtectorTripped	Bool	...	false					Motor protector tripped
5	LocalDisconnectOff	Bool	...	false					Motor disconnect off
6	ClutchTripped	Bool	...	false					Clutch tripped
7	NoContactorFeedback	Bool	...	false					No feedback from motor contactor
8	ContactorStillOn	Bool	...	false					Contactor still on
9	NoSignalForward	Bool	...	false					No signal forward from VFD
10	NoSignalReverse	Bool	...	false					No signal reverse from VFD
11	MotorNotStopped	Bool		false					Motor doesn't stop

ID	Name	Alarm text [en-US], Alarm text	FieldInfo [A	Class	Trigger tag	Trigger bit	Acknov
1	Discret	Main Water Valve - Home position feedback not active	<No value>	Errors	dbErrors_WaterSystem	8	<No val
2	Discret	Main Water Valve - Work position feedback not active	<No value>	Errors	dbErrors_WaterSystem	9	<No val
3	Discret	Main Water Valve - Home position feedback still active	<No value>	Errors	dbErrors_WaterSystem	10	<No val
4	Discret	Main Water Valve - Work position feedback still active	<No value>	Errors	dbErrors_WaterSystem	11	<No val
5	Discret	Main Water Pump - Motor protector tripped	<No value>	Errors	dbErrors_WaterSystem	24	<No val
6	Discret	Main Water Pump - Motor disconnect off	<No value>	Errors	dbErrors_WaterSystem	25	<No val
7	Discret	Main Water Pump - Clutch tripped	<No value>	Errors	dbErrors_WaterSystem	26	<No val
8	Discre	Main Water Pump - No feedback from motor contactor	<No value>	Errors	dbErrors_WaterSystem	27	<No val
9	Discret	Main Water Pump - Contactor still on	<No value>	Errors	dbErrors_WaterSystem	28	<No val
10	Discret	Main Water Pump - No signal forward from VFD	<No value>	Errors	dbErrors_WaterSystem	29	<No val
11	Discret	Main Water Pump - No signal reverse from VFD	<No value>	Errors	dbErrors_WaterSystem	30	<No val
12	Discret	Main Water Pump - Motor doesn't stop	<No value>	Errors	dbErrors_WaterSystem	31	<No val

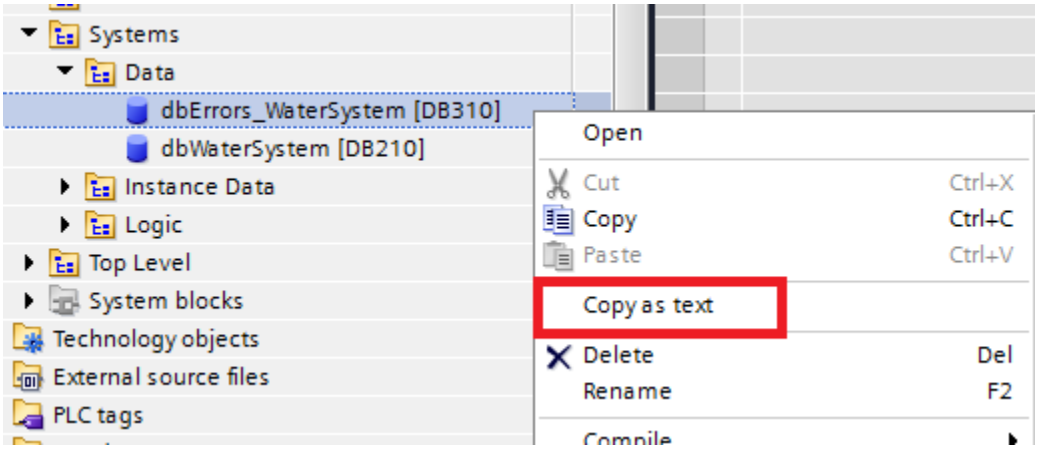
9. Excel Macro

The instructions below use an installation of Microsoft Office, specifically Microsoft Excel. However, the Open Library Alarm Generator is in a macro-enabled Open XML format (.xlsx) and is compatible with several open source office platforms.

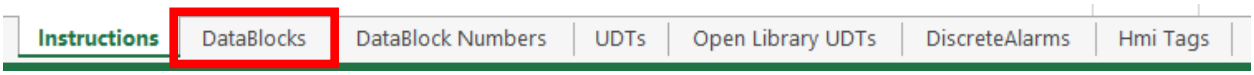
1. Open the "Open Library Alarm Generator.xlsm" document and click the "Enable Content" button, if prompted.



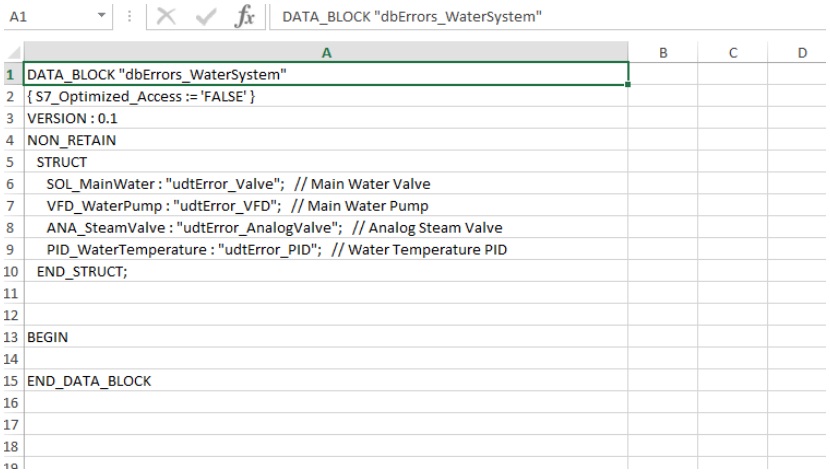
2. Open up the PLC project that contains the desired alarm data blocks.
3. Right click the Errors data block that contains the alarms and select "Copy as text"



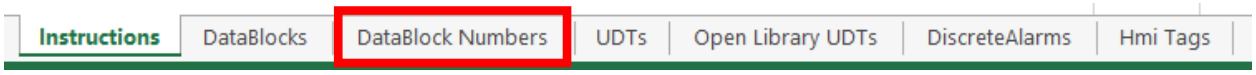
4. Navigate to the DataBlocks tab in the Excel document



5. Paste the copied contents into the next available row in column 'A'



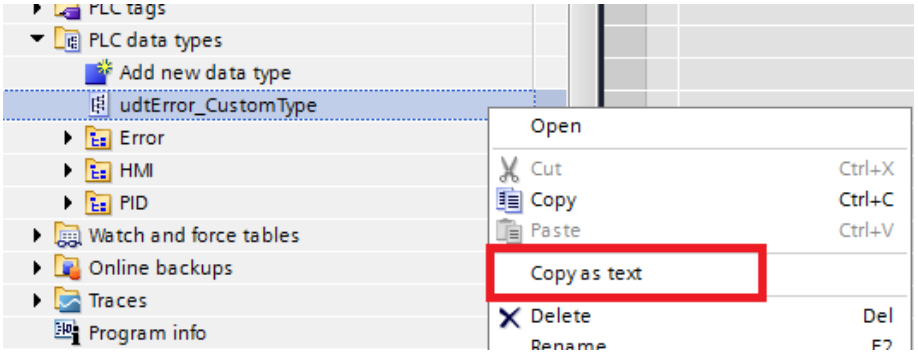
6. Navigate to the DataBlock Numbers tab



7. Add the Data Block name, number, and HMI connection name to the list

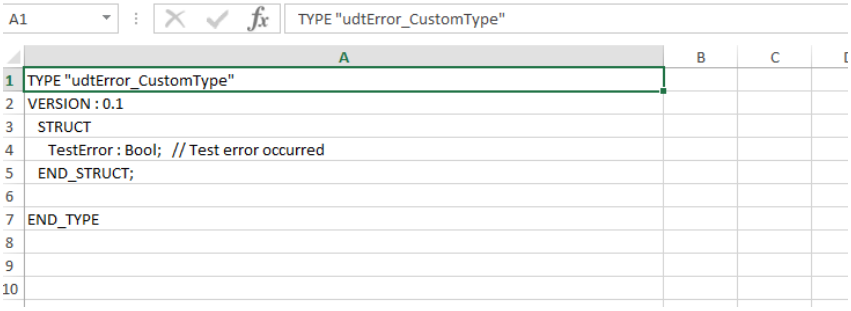
	A	B	C
1	Data Block Name	Data Block Number	HMI Connection Name (if not 'HMI_Connection_1')
2	dbErrors_WaterSystem	710	HMI_Connection
3	dbErrors_AirSystem	720	HMI_Connection
4			
5			
6			

8. Repeat steps 3-7 for each Errors data block containing HMI alarms.
9. If you are not using custom Error UDTs, you can skip to step 14.
10. Right click the custom Error UDT and select "Copy as text"

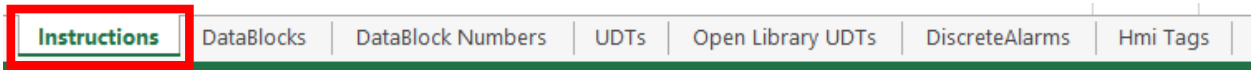


11. Navigate to the UDTs tab of the Excel document

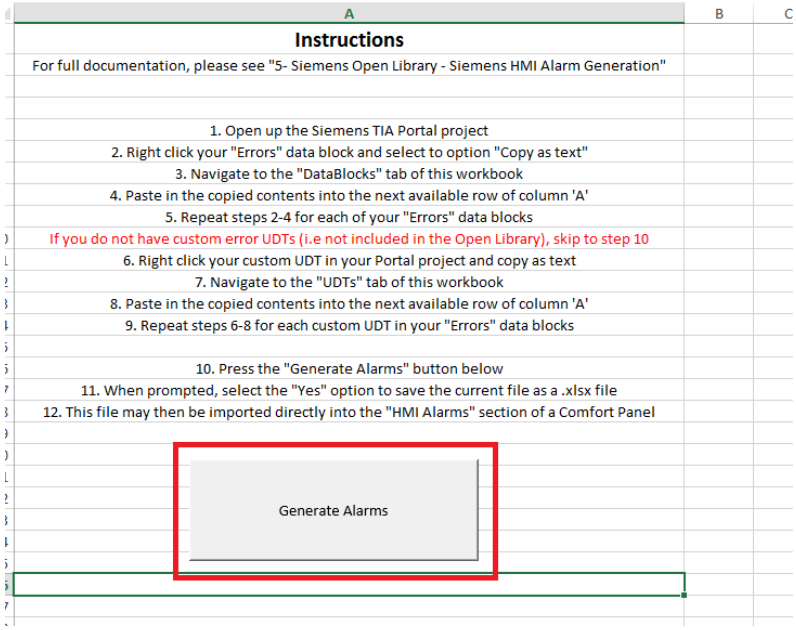
12. Paste the copied contents into the next available of column 'A'



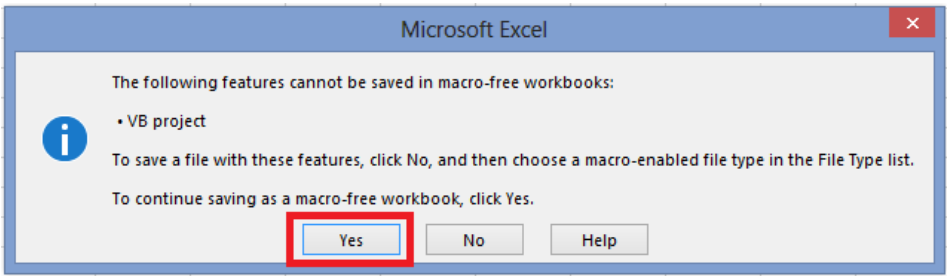
13. Repeat steps 10-12 for each custom Error UDT used in your Errors data blocks
14. Navigate back to the Instructions tab

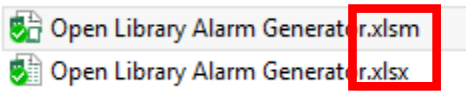


15. Press the Generate Alarms button



16. If you are prompted with any errors that occurred, make sure to resolve them before trying again.
17. If alarm generation was successful, Excel will prompt you to save a file without macros enabled. Select Yes. This will save a copy of the current workbook with an identical name but with an ".xlsx" file extension instead of ".xlsm". This is done so that the workbook can be imported into TIA Portal properly.

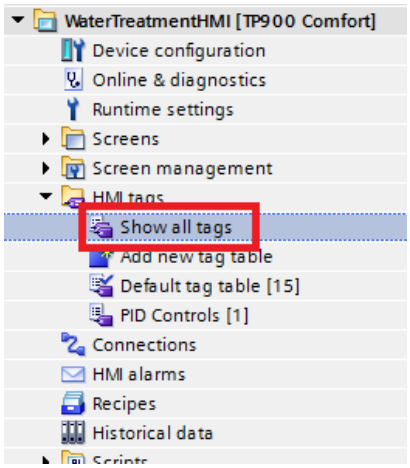

Microsoft Excel
The following features cannot be saved in macro-free workbooks:
• VB project
To save a file with these features, click No, and then choose a macro-enabled file type in the File Type list.
To continue saving as a macro-free workbook, click Yes.
Yes
No
Help


Open Library Alarm Generator.xlsm
Open Library Alarm Generator.xlsx

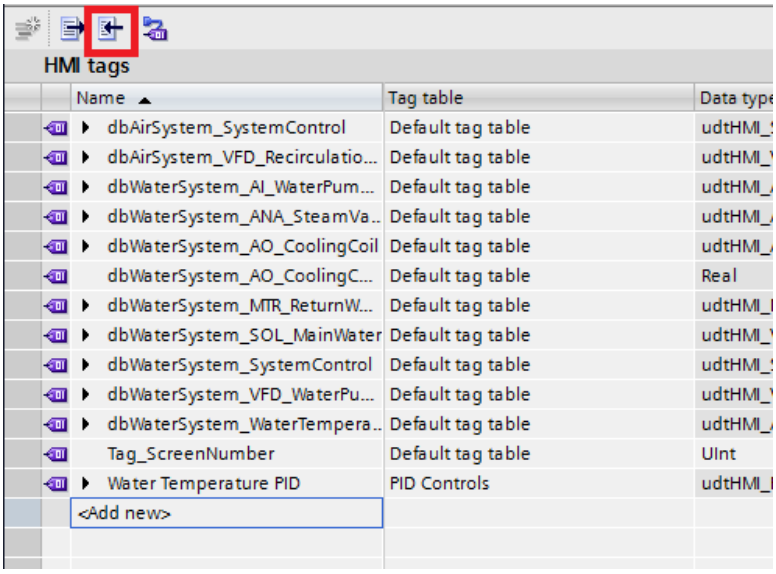
10. Importing Alarms to a Comfort Panel

Once an ".xlsx" alarm file has been created, it may be imported directly to TIA Portal. It is important to note that the file format created is compatible with WinCC Comfort panels and WinCC Advanced.

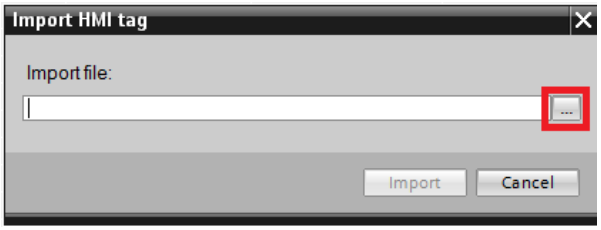
1. Open the "Show all tags" section of the Comfort Panel



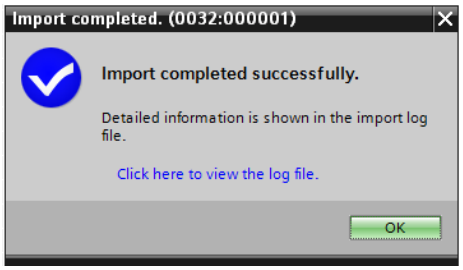
2. Press the Import button in the top left corner



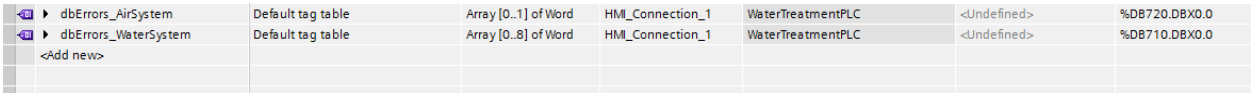
3. Browse for the generated ".xlsx" file and press the Import button



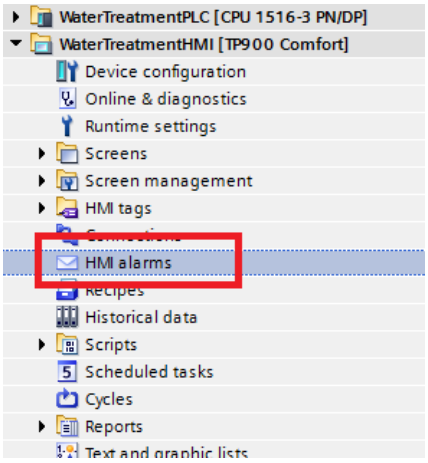
4. Once completed, you will get prompted with a success dialog



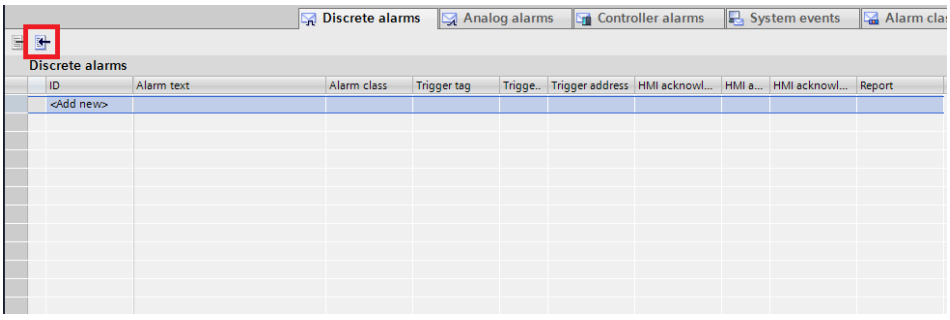
5. Press Ok and check to make sure that all tags were imported correctly



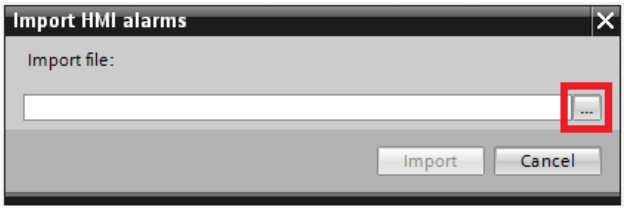
6. Open the HMI Alarms section



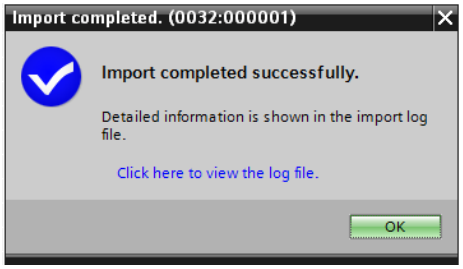
7. Press the Import button in the top left corner



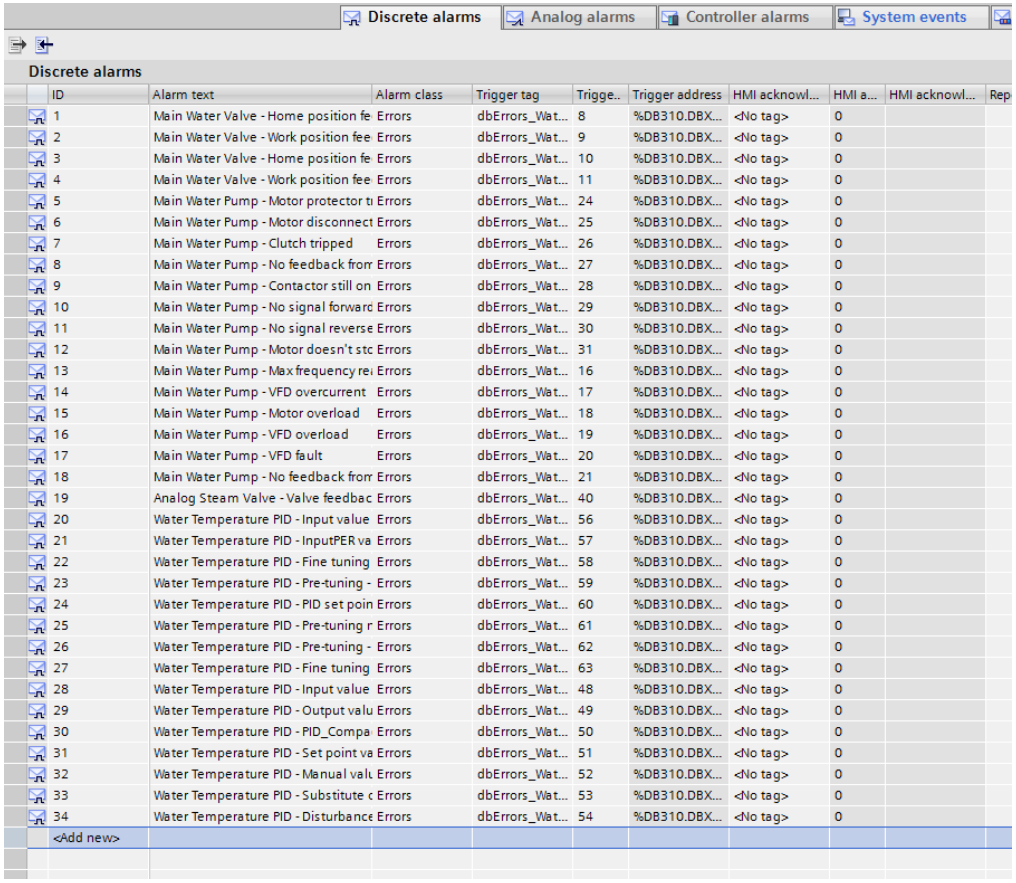
8. Again, browse for the generated ".xlsx" file and press the Import button



9. Once completed, you will get prompted with another success dialog



10. Press Ok and check to make sure that all alarms were imported correctly



ID	Alarm text	Alarm class	Trigger tag	Trigge..	Trigger address	HMI acknowl...	HMI a...	HMI acknowl...	Rep
1	Main Water Valve - Home position fe	Errors	dbErrors_Wat...	8	%DB310.DBX...	<No tag>	0		
2	Main Water Valve - Work position fee	Errors	dbErrors_Wat...	9	%DB310.DBX...	<No tag>	0		
3	Main Water Valve - Home position fe	Errors	dbErrors_Wat...	10	%DB310.DBX...	<No tag>	0		
4	Main Water Valve - Work position fee	Errors	dbErrors_Wat...	11	%DB310.DBX...	<No tag>	0		
5	Main Water Pump - Motor protector ti	Errors	dbErrors_Wat...	24	%DB310.DBX...	<No tag>	0		
6	Main Water Pump - Motor disconnect	Errors	dbErrors_Wat...	25	%DB310.DBX...	<No tag>	0		
7	Main Water Pump - Clutch tripped	Errors	dbErrors_Wat...	26	%DB310.DBX...	<No tag>	0		
8	Main Water Pump - No feedback from	Errors	dbErrors_Wat...	27	%DB310.DBX...	<No tag>	0		
9	Main Water Pump - Contactor still on	Errors	dbErrors_Wat...	28	%DB310.DBX...	<No tag>	0		
10	Main Water Pump - No signal forward	Errors	dbErrors_Wat...	29	%DB310.DBX...	<No tag>	0		
11	Main Water Pump - No signal reverse	Errors	dbErrors_Wat...	30	%DB310.DBX...	<No tag>	0		
12	Main Water Pump - Motor doesn't stc	Errors	dbErrors_Wat...	31	%DB310.DBX...	<No tag>	0		
13	Main Water Pump - Max frequency re	Errors	dbErrors_Wat...	16	%DB310.DBX...	<No tag>	0		
14	Main Water Pump - VFD overcurrent	Errors	dbErrors_Wat...	17	%DB310.DBX...	<No tag>	0		
15	Main Water Pump - Motor overload	Errors	dbErrors_Wat...	18	%DB310.DBX...	<No tag>	0		
16	Main Water Pump - VFD overload	Errors	dbErrors_Wat...	19	%DB310.DBX...	<No tag>	0		
17	Main Water Pump - VFD fault	Errors	dbErrors_Wat...	20	%DB310.DBX...	<No tag>	0		
18	Main Water Pump - No feedback from	Errors	dbErrors_Wat...	21	%DB310.DBX...	<No tag>	0		
19	Analog Steam Valve - Valve feedbac	Errors	dbErrors_Wat...	40	%DB310.DBX...	<No tag>	0		
20	Water Temperature PID - Input value	Errors	dbErrors_Wat...	56	%DB310.DBX...	<No tag>	0		
21	Water Temperature PID - InputPER va	Errors	dbErrors_Wat...	57	%DB310.DBX...	<No tag>	0		
22	Water Temperature PID - Fine tuning	Errors	dbErrors_Wat...	58	%DB310.DBX...	<No tag>	0		
23	Water Temperature PID - Pre-tuning -	Errors	dbErrors_Wat...	59	%DB310.DBX...	<No tag>	0		
24	Water Temperature PID - PID set poin	Errors	dbErrors_Wat...	60	%DB310.DBX...	<No tag>	0		
25	Water Temperature PID - Pre-tuning r	Errors	dbErrors_Wat...	61	%DB310.DBX...	<No tag>	0		
26	Water Temperature PID - Pre-tuning -	Errors	dbErrors_Wat...	62	%DB310.DBX...	<No tag>	0		
27	Water Temperature PID - Fine tuning	Errors	dbErrors_Wat...	63	%DB310.DBX...	<No tag>	0		
28	Water Temperature PID - Input value	Errors	dbErrors_Wat...	48	%DB310.DBX...	<No tag>	0		
29	Water Temperature PID - Output valu	Errors	dbErrors_Wat...	49	%DB310.DBX...	<No tag>	0		
30	Water Temperature PID - PID_Compa	Errors	dbErrors_Wat...	50	%DB310.DBX...	<No tag>	0		
31	Water Temperature PID - Set point va	Errors	dbErrors_Wat...	51	%DB310.DBX...	<No tag>	0		
32	Water Temperature PID - Manual valu	Errors	dbErrors_Wat...	52	%DB310.DBX...	<No tag>	0		
33	Water Temperature PID - Substitute c	Errors	dbErrors_Wat...	53	%DB310.DBX...	<No tag>	0		
34	Water Temperature PID - Disturbance	Errors	dbErrors_Wat...	54	%DB310.DBX...	<No tag>	0		
<Add new>									