

4x50A

Implementation Guide

EthernetIP

4x50A EthernetIP communication module

Implementation using Rockwell Automation Studio 5000 Logix Designer AOI



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Introduction

This document is a guide for implementation of an Ethernet/IP interface for Eilersen capacitive load cells, with a Rockwell Automation Studio 5000 Logix Designer Add On Instruction (AOI).

The software also include three faceplate's corresponding with the AOI.

A faceplate for Studio 5000 View Designer, one for Factory Talk View Machine Edition (ME) and one for Factory Talk Site Edition (SE).

- The AOI can be used with Studio 5000 Logix Designer version 30.11 or later.
- The faceplate for Studio 5000 View Designer can be used with version 4 or later.
- The faceplate for FT View ME and FT View SE t can be used with version 11.0 or later

The AOI and faceplates isn't "locked" but can be modified to your own application.



IMPORTANT:

Please note that this PLC program block is only intended as an example for inspiration and is not as such a product on which Eilersen Electric A/S offers any warranty or support.

Furthermore, Eilersen Electric A/S is not responsible for any loss or damage caused as a result of using this program block.

Unauthorized copying and distribution of the program block is prohibited as it is the property of Eilersen Electric A/S.

Files

The following files can be found in the “Rockwell AOI & Faceplate” Zip file, see Figure 1:

- | | |
|--|------------------------------------|
| • Studio 5000 Logix Designer AOI | Eilersen_Basic_Startup.L5X |
| • Studio 5000 Logix Designer rung | Rung_Eilersen_Basic_Startup.L5X |
| • Studio 5000 Logix Designer ethernet-module | Eilersen_Loadcell.L5X |
| • Studio 5000 Logix Designer project | Eilersen_Add_On_Ins.ACD |
| • Studio 5000 View Designer faceplate | Eilersen_Add_On_Ins.vpd |
| • FactoryTalk View ME faceplate | AOI_Eilersen_FT_View_Studio_ME.apa |
| • FactoryTalk View SE faceplate | AOI_Eilersen_FT_View_Studio_SE.apb |

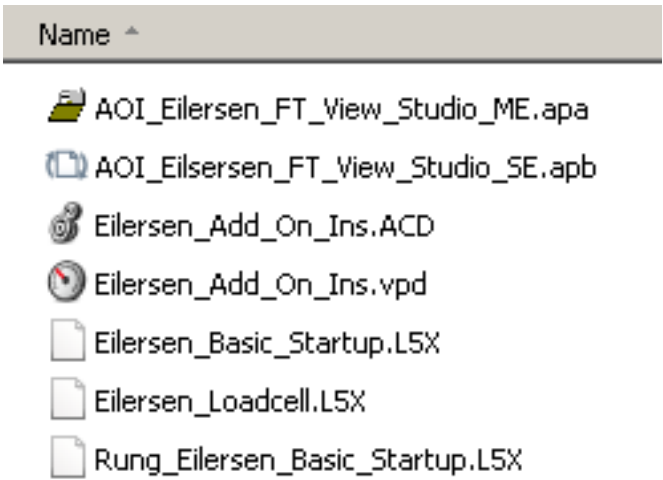


Figure 1 - Files included in the folder

Faceplate functionality

In this section there are only shown pictures from the Studio 5000 View Designer faceplate. All three faceplates have the same functionality but looks slightly different visually



Figure 2 - HMI AOI Faceplate

On the faceplate are shown two parameter values: “Net” and “Gross” weight. See Figure 2. Each of the parameters has a button for zeroing the weight:

- “Tare (Zero net weight)”
- and
- “>0< (Zero gross weight)”

When either of these buttons are pressed, a warning associated to that button are shown, as seen on Figure 3 and Figure 4.



Figure 3 - Tare warning display

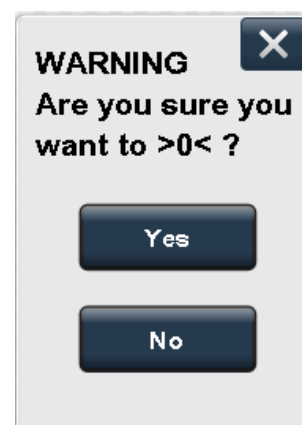


Figure 4 - >0< warning display

It is not possible to change modes when the “Permission” tag is sat false (0) on the AOI block or change between the different modes when a major error is active.

The alarm indicator seen on Figure 2, goes from green to red only if a major alarm occurs.

When the “Select AS Mode” button is pressed a popup appears, see Figure 5.

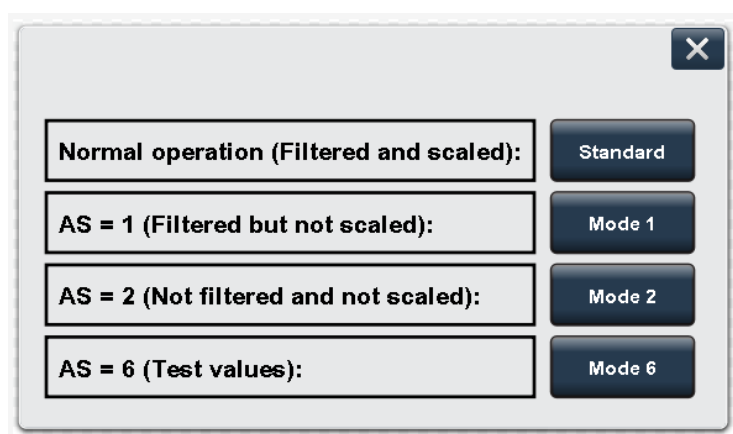


Figure 5 - AS mode popup

Here it is possible to select between four modes, which are:

- Standard: Filtered and scaled (Default mode)
- Mode 1: Filtered but not scaled (The signal is not scaled but it is “adjusted by the calibration factor” E.g. if there are 3 legs on a tank and only 1 load cell, the signal weight shown will be tripled)
- Mode 2: Not filtered and not scaled (The signal is not scaled but it is “adjusted by the calibration factor”)
- Mode 6 (Test mode): Shows hard coded signal values

These “AS” modes are described in more details in Eilersen user manual for the 4x50 module.

When a mode other than “Standard” is selected, the HMI will show a minor error.

It is not possible to change modes when the “Permission” tag is sat false (0) on the AOI block or change between the different modes when a major error is active.

When the “Calibration” button is pressed, a popup appears, see Figure 6.

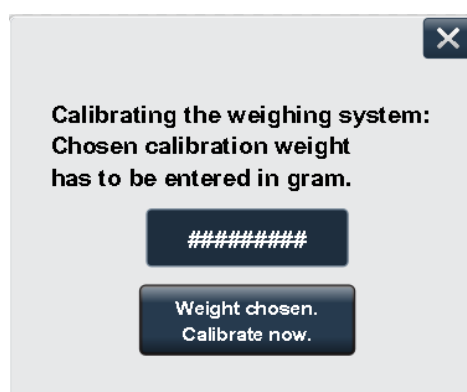


Figure 6 - Calibration popup window

From here it is possible to calibrate the weighing system.

Enter the known weight into the input display (in gram) and then pressing the “Weight chosen. Calibrate now.” button. After the system is calibrated you can see the calibration factor by pressing the “Service” button.

Make sure that the calibration factor is not too far off from what is described in Eilersen user manual section “System calibration of weighing system”

It is not possible to calibrate when the “Permission” tag is set false (0) on the AOI block or when a major error is active.

When the “Service” button is pressed, a popup appears, see Figure 7.

Load cells Info Raw input data Calibration factor: ####.####

Channel 1: Raw weight input data from module: #####
Channel 2: Raw weight input data from module: #####
Channel 3: Raw weight input data from module: #####
Channel 4: Raw weight input data from module: #####

Channel 1: Lc serial number: #####
Channel 2: Lc serial number: #####
Channel 3: Lc serial number: #####
Channel 4: Lc serial number: #####

Channel 1: Lc exponent: #####
Channel 2: Lc exponent: #####
Channel 3: Lc exponent: #####
Channel 4: Lc exponent: #####

Channel 1: Lc capacity: #####
Channel 2: Lc capacity: #####
Channel 3: Lc capacity: #####
Channel 4: Lc capacity: #####

Save the empty tank weight and zero signal.
Save ONLY when the tank is empty and clean.

Zeroing of weighing system

Saved "empty tank weight" signal values:

Channel 1: #####
Channel 2: #####
Channel 3: #####
Channel 4: #####

Figure 7 - Service popup

This is a service window, from here it is possible to:

- Read the raw signal value for each channel.
- Save the empty tank weight by pressing the “Zeroing of weighing system” button. (This is a raw calibration)
- Change the empty tank signal values manually.
- See each load cell’s serial number, exponent and capacity, by pressing the “Load cells Info” button.
- See the calibration factor.
- See the Raw input data from the ethernet-module, by pressing the “Raw input data” button. When pressed a new popup appears, see Figure 8.

Register	#####	
	Status	Signal
Channel 1	#####	#####
Channel 2	#####	#####
Channel 3	#####	#####
Channel 4	#####	#####

Figure 8 - Raw input data from ethernet-module

It is not possible to press the “Zeroing of weighing system” button or any of the numeric inputs, when the “Permission” tag is sat false (0) on the AOI block or when a major error is active.

When the button “Select Weight Unit” is pressed, a popup appears, see Figure 9.

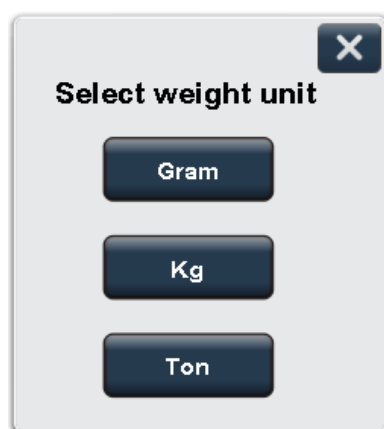


Figure 9 - "Chose Weight Unit" popup

From the popup it is possible to choose between the weight units: gram, kg, and ton.

It is possible to select the weight unit even if the “Permission” is sat false (0) on the AOI block.

It is not possible to choose a weight unit if an error is active.

The first time you use the faceplate:

IMPORTANT: The AOI, faceplate, Ethernet-Module and rung has been imported / set up.
All the parameters on the rung has been set.

See Implementation section later in this document.

- Make sure that the tank on the load cells is empty and clean.
- Press the “Select AS Mode” and chose your AS mode.
- Press “Service” and then press the “Zeroing of weighing system” button.
- Press “Load cells Info” and wait for at least 6 seconds, then close the popup window.
- Put the calibration weight in / on the tank.
- Press the “Calibration” button. Enter the calibration weight into the input display in gram.
- Press the “Weight chosen. Calibrate now.” button.
- Make sure that the weight now showing on the “Frontscreen”, is the same as the calibration weight.

The AOI and faceplate has been made to work with the information provided in Eilersen user manual for the 4x50 module.

Description of the AOI block

This section describes the required tags on the AOI-block as seen on Figure 10.

Eilersen_Basic_Startup	
This is a basic startup AOI block for Eilersen load cells. This add-on instruction can ...	
Eilersen_Basic_Startup	Eilersen_AOI_Faceplate
Eilersen	Eilersen_Loadcell:I
SWE_1	0
SWE_2	0
Channel_1	1
Channel_2	1
Channel_3	0
Channel_4	0
Permission	1
Output_AS_Value	Eilersen_Loadcell:O.Data[1]
ALMD_No_Answer_1	No_Answer_1
ALMD_No_Answer_2	No_Answer_2
ALMD_No_Answer_3	No_Answer_3
ALMD_No_Answer_4	No_Answer_4
ALMD_Power_Failure_1	Power_Failure_1
ALMD_Power_Failure_2	Power_Failure_2
ALMD_Power_Failure_3	Power_Failure_3
ALMD_Power_Failure_4	Power_Failure_4
ALMD_New_Lc_Or_Lc_Swapped_1	New_Lc_Or_Lc_Swapped_1
ALMD_New_Lc_Or_Lc_Swapped_2	New_Lc_Or_Lc_Swapped_2
ALMD_New_Lc_Or_Lc_Swapped_3	New_Lc_Or_Lc_Swapped_3
ALMD_New_Lc_Or_Lc_Swapped_4	New_Lc_Or_Lc_Swapped_4
ALMD_Normal_Operation_NOT_Selected_1	Normal_Operation_Not_Selected_1
ALMD_Normal_Operation_NOT_Selected_2	Normal_Operation_Not_Selected_2
ALMD_Normal_Operation_NOT_Selected_3	Normal_Operation_Not_Selected_3
ALMD_Normal_Operation_NOT_Selected_4	Normal_Operation_Not_Selected_4
Lc_Status_0_Channel_1_Hex_Number	16#0000
Lc_Status_1_Channel_2_Hex_Number	16#0000
Lc_Status_2_Channel_3_Hex_Number	16#0000
Lc_Status_3_Channel_4_Hex_Number	16#0000

Figure 10 - AOI Block

Don't change the operand associated tag names, otherwise you would need to rename the tags on the associated faceplates.

Operand	Format	Description
Eilersen_Basic_Startup	Tag	Input data from the 4X50 Ethernet module.
SWE_1	Immediate	This is the physical SWE.1 switch setting, must be sat true (1) or false (0), as on the 4X50 Ethernet module.
SWE_2	Immediate	This is the physical SWE.2 switch setting, must be sat true (1) or false (0), as on the 4X50 Ethernet module.
Channel_1	Immediate	This must be set true (1) if a loadcell is connected to channel 1, if not then this must be set false (0).
Channel_2	Immediate	This must be set true (1) if a loadcell is connected to channel 2, if not then this must be set false (0).
Channel_3	Immediate	This must be set true (1) if a loadcell is connected to channel 3, if not then this must be set false (0).
Channel_4	Immediate	This must be set true (1) if a loadcell is connected to channel 4, if not then this must be set false (0).
Permission	Tag Immediate	Set permission true (1) if all users are allowed to operate the HMI faceplate. Set false (0) if no one is allowed, except to change the weight unit and to open the service window.
Output_AS_Value	Tag	Output data to the 4X50 Ethernet module.
ALMD_No_Answer_1	Tag	Channel 1 ALMD alarm, Hex code: 0040, 0080 or 0800. See Eilersen 4X50 User manual for a code explanation.
ALMD_No_Answer_2	Tag	Channel 2 ALMD alarm, Hex code: 0040, 0080 or 0800. See Eilersen 4X50 User manual for a code explanation.
ALMD_No_Answer_3	Tag	Channel 3 ALMD alarm, Hex code: 0040, 0080 or 0800. See Eilersen 4X50 User manual for a code explanation.
ALMD_No_Answer_4	Tag	Channel 4 ALMD alarm, Hex code: 0040, 0080 or 0800. See Eilersen 4X50 User manual for a code explanation.
ALMD_Power_Failure_1	Tag	Channel 1 ALMD alarm, Hex code: 0010. See Eilersen 4X50 User manual for a code explanation.
ALMD_Power_Failure_2	Tag	Channel 2 ALMD alarm, Hex code: 0010. See Eilersen 4X50 User manual for a code explanation.
ALMD_Power_Failure_3	Tag	Channel 3 ALMD alarm, Hex code: 0010. See Eilersen 4X50 User manual for a code explanation.

ALMD_Power_Failure_4	Tag	Channel 4 ALMD alarm, Hex code: 0010. See Eilersen 4X50 User manual for a code explanation.
ALMD_New_Lc_Or_Lc_Swapped_1	Tag	Channel 1 ALMD alarm, Hex code: 0020. See Eilersen 4X50 User manual for a code explanation.
ALMD_New_Lc_Or_Lc_Swapped_2	Tag	Channel 2 ALMD alarm, Hex code: 0020. See Eilersen 4X50 User manual for a code explanation.
ALMD_New_Lc_Or_Lc_Swapped_3	Tag	Channel 3 ALMD alarm, Hex code: 0020. See Eilersen 4X50 User manual for a code explanation.
ALMD_New_Lc_Or_Lc_Swapped_4	Tag	Channel 4 ALMD alarm, Hex code: 0020. See Eilersen 4X50 User manual for a code explanation.
ALMD_Normal_Operation_NOT_Selected_1	Tag	Channel 1 ALMD alarm, indication that the Ethernet module is not in normal operation mode.
ALMD_Normal_Operation_NOT_Selected_2	Tag	Channel 2 ALMD alarm, indication that the Ethernet module is not in normal operation mode.
ALMD_Normal_Operation_NOT_Selected_3	Tag	Channel 3 ALMD alarm, indication that the Ethernet module is not in normal operation mode.
ALMD_Normal_Operation_NOT_Selected_4	Tag	Channel 4 ALMD alarm, indication that the Ethernet module is not in normal operation mode.
Lc_Status_Channel_1_Hex_Code		Here are shown channel 1 status code in Hex. NOTE: If multiple errors are present the hex code values are OR'ed together.
Lc_Status_Channel_2_Hex_Code		Here are shown channel 2 status code in Hex. NOTE: If multiple errors are present the hex code values are OR'ed together.
Lc_Status_Channel_3_Hex_Code		Here are shown channel 3 status code in Hex. NOTE: If multiple errors are present the hex code values are OR'ed together.
Lc_Status_Channel_4_Hex_Code		Here are shown channel 4 status code in Hex. NOTE: If multiple errors are present the hex code values are OR'ed together.

Implementation guide

AOI Import

Open the Studio 5000 Logix Designer project in which you wish to implement the AOI in.

In the “Controller Organizer” Right click on “Add-On Instructions” and select “Import Add-On Instruction...”.

Find and open the folder “Rockwell AOI & Faceplate”, select the file “Eilersen_Basic_Startup.L5X” and open it.

A popup appears called “Import configuration” when that happens click “OK”.

The AOI folder should look as seen on Figure 11.

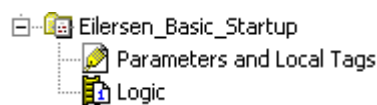


Figure 11 - AOI folder Eilersen_Basic_Startup

Ethernet-Module

You can either chose to import the configuration of the module into the IO configuration (see “Import” section below) – or you can choose to make the configuration manually (see “Create new module” section below).

Import

Note: Import of the Ethernet-Module in version 30 and 31, is not possible if the controller is in IP mode: A1/A2 Linear/DLR. It is however possible if the controller is in IP mode: A1/A2 Dual-IP.

It is possible to import the Ethernet-Module in version 32, regardless of the IP mode.

Under I/O Configuration right click either on A1, A2 or A1/A2 and select “Import Module...”. Find and open the folder “Rockwell AOI & Faceplate”, select the file “Eilersen_Loadcell.L5X” and open it. A popup appears called “Import configuration”, when that happens click “OK”. Double click on the imported Ethernet-Module and make sure it looks like Figure 12.

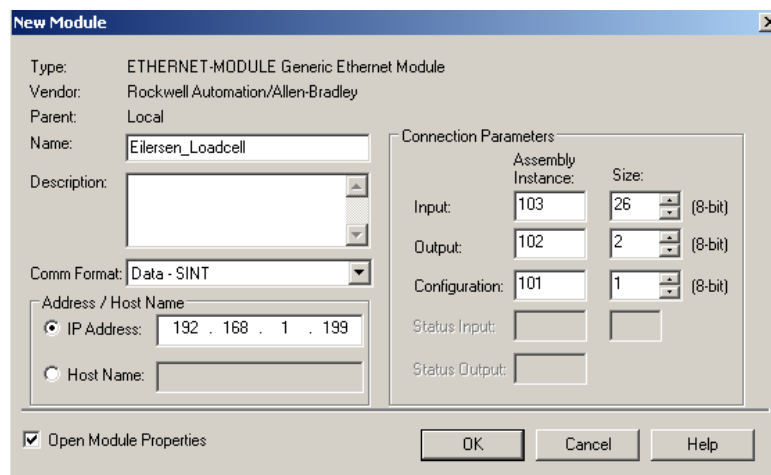


Figure 12 - Ethernet-Module setup done

Create new module

Under I/O Configuration right click either on A1, A2 or A1/A2 and select “New Module...”. When a popup appears type: Ethernet module. The module called “ETHERNET-MODULE” appears, as seen on Figure 13. Click on the module and then click “Create”. A new popup appears and should look like Figure 14.

Catalog Number	Description	Vendor	Category
ETHERNET-MODULE	Generic Ethernet Module	Rockwell Autom...	Communication

Figure 13 - Catalog used Ethernet-Module

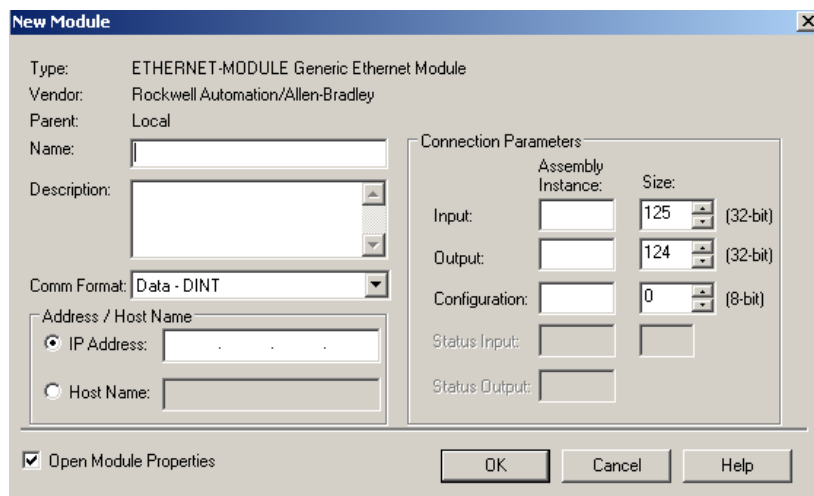


Figure 14 - Ethernet-Module blank

See Eilersen 4X50 user manual for configuration of the module or configure it as shown in Figure 12.

It is very important that the name of the module is “Eilersen_Loadcell”. If you change that name, you also need to change the Faceplates and assign it your new name.

Rung Import

Before importing the rung, make sure you have imported the AOI, and either imported the Ethernet-Module or created a new Ethernet-Module configuration.

Select the empty rung you want to import to, then right click the rung and select “Import Rungs...”.

Find and open the folder “Rockwell AOI & Faceplate”, select the file “Rung_Eilersen_Basic_Startup.L5X” and open it.

A popup appears called “Import configuration”, when that happens click “OK”.

The rung should look the same as on Figure 10 and you should under “parameters and Local Tags” have the tags shown on Figure 15.

The tag names should not be altered, otherwise this will give errors when using the associated faceplate.

The AOI tags in the rung should not be altered, otherwise this will give errors when using the associated faceplate.

Name	Usage	Value
Power_Failure_4	Local	
Power_Failure_3	Local	
Power_Failure_2	Local	
Power_Failure_1	Local	
Normal_Operation_Not_Selected_4	Local	
Normal_Operation_Not_Selected_3	Local	
Normal_Operation_Not_Selected_2	Local	
Normal_Operation_Not_Selected_1	Local	
No_Answer_4	Local	
No_Answer_3	Local	
No_Answer_2	Local	
No_Answer_1	Local	
New_Lc_Or_Lc_Swapped_4	Local	
New_Lc_Or_Lc_Swapped_3	Local	
New_Lc_Or_Lc_Swapped_2	Local	
New_Lc_Or_Lc_Swapped_1	Local	
Eilersen_AOI_Faceplate	Local	

Figure 15 - Imported tags with the rung

Faceplates

The sample code contains faceplates for Studio 5000 View Designer, for FTView Studio ME and for FTView Studio SE

Faceplate for Studio 5000 View Designer

Studio 5000 View Designer faceplates can't be imported / exported. To implement the pre-designed faceplate into your own project, follow the description below.

Find and open the folder "Rockwell AOI & Faceplate" and open the "Eilersen_Add_On_Ins.vpd" file.

When opened, right click on the folder called "Load_cell" under the User-Defined Screens. Click on "Copy" and go to your own View Designer project.

Right click "User-Defined Screens" and click on "Paste". Now you should have the AOI faceplate in your own project.

When the faceplate is in your project you will have to connect the buttons to the correct popup screen.

The buttons and popup's are called the same E.g.



Select_Weight_Unit

To connect the popup screen to the button:

Click on the button and go to “Events” see Figure 16.

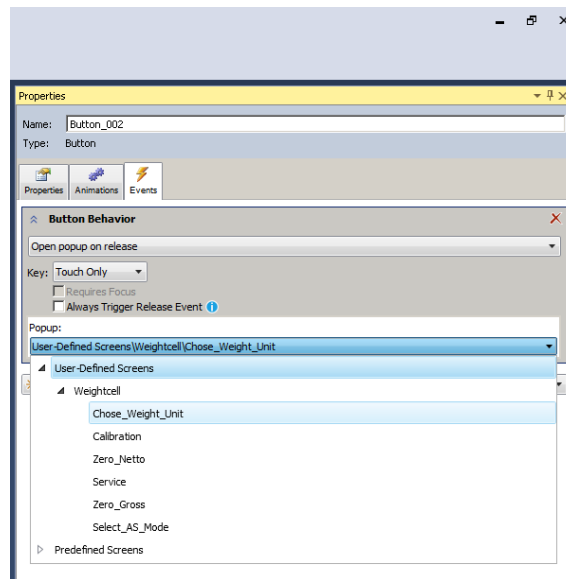


Figure 16 - Connect button press to popup

Do this for every button on the “Frontscreen”. Also do this for the button called “Raw input data” in the “Service” popup.

When verifying the project, NOTE that if the controller reference name in your View Designer project, is called something other than “Eilersen_Add_On_Ins_View”, you will get warnings as seen on Figure 17.

Errors	
Description	
Invalid tag. Undefined controller reference: ::Eilersen_Add_On_Ins_View	\MainProgram.Eilersen_AOI_Faceplate.Cal_Factor
Invalid tag. Undefined controller reference: ::Eilersen_Add_On_Ins_View	\MainProgram.Eilersen_AOI_Faceplate.Cal_Load
Invalid tag. Undefined controller reference: ::Eilersen_Add_On_Ins_View	\MainProgram.Eilersen_AOI_Faceplate.Chosen_AS_Value_Is_0
Invalid tag. Undefined controller reference: ::Eilersen_Add_On_Ins_View	\MainProgram.Eilersen_AOI_Faceplate.Chosen_AS_Value_Is_1
Invalid tag. Undefined controller reference: ::Eilersen_Add_On_Ins_View	\MainProgram.Eilersen_AOI_Faceplate.Chosen_AS_Value_Is_2
Invalid tag. Undefined controller reference: ::Eilersen_Add_On_Ins_View	\MainProgram.Eilersen_AOI_Faceplate.Chosen_AS_Value_Is_3_4_5
Invalid tag. Undefined controller reference: ::Eilersen_Add_On_Ins_View	\MainProgram.Eilersen_AOI_Faceplate.Chosen_AS_Value_Is_6

Figure 17 - Undefined controller reference Errors

To correct these errors, do one of the following things:

- Change the controller reference name in your View Designer project to “Eilersen_Add_On_Ins_View”.
- Go to the tab “Edit” and click on the “Find and Replace...”. See Figure 18 on what to find and where to find it. Under the “Replace with” type your controller reference name. Click on “Replace All”.

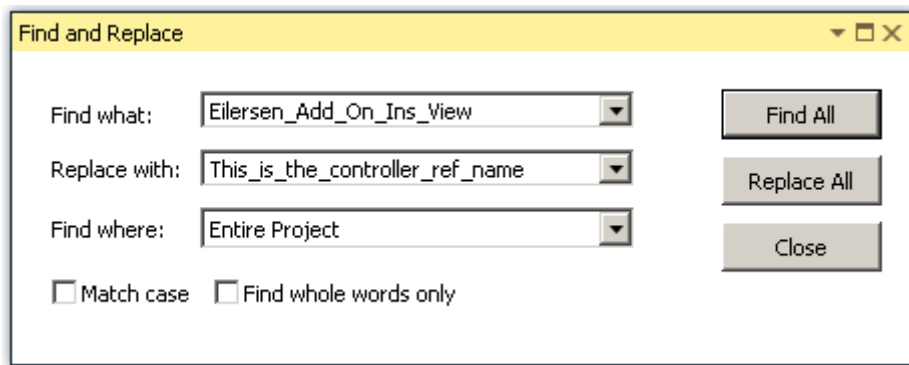


Figure 18 - Find and Replace to remove warnings/errors

Faceplates for FTVIEW ME

Use the program: *Factory Talk View ME Application manager* (included in FTVIEW Studio package) to unpack the AOI_Eilersen_FT_View_Studio_ME.APA for the FTVIEW ME faceplate application

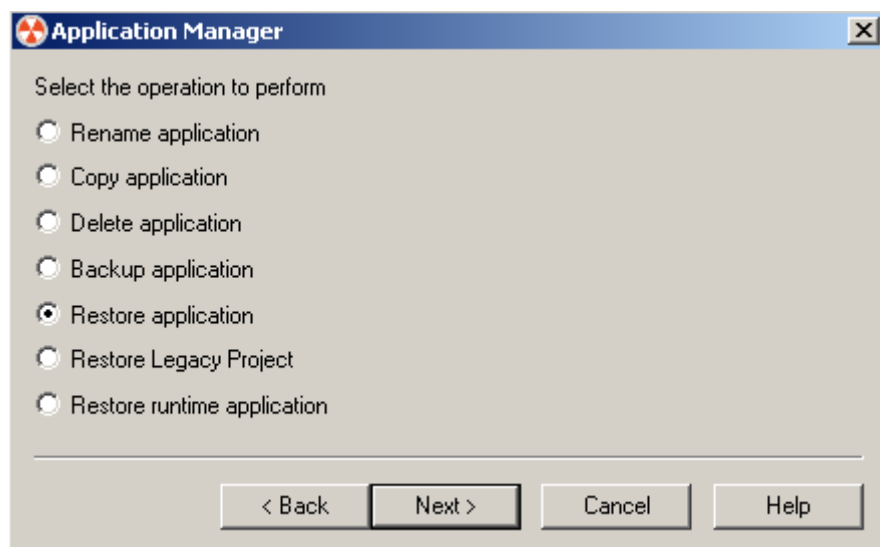


Figure 19 – Factory Talk View ME Application Manager

The FTVIEW ME application contains a display: *Eilersen_ME_Display* (see figure 20)

This display works as a “Parameter file” based display.

A corresponding parameter file: *Tag_Path_Parameter* are included in the project

The #1 parameter should point to the corresponding parameter set for the AOI instruction in the PLC program (See figure 10)

This Eilersen_ME_Display contain a faceplate similar to the “Studio 5000 View Designer faceplate” described earlier in this document. It has the same structure and the same functionality. Please refer to earlier sections in this document for description of functionality

Export / Import the full “faceplate-display” or Copy paste the faceplate into a new empty display in your own FT View ME application

Implement the display and the parameter file into your application as you may find best.

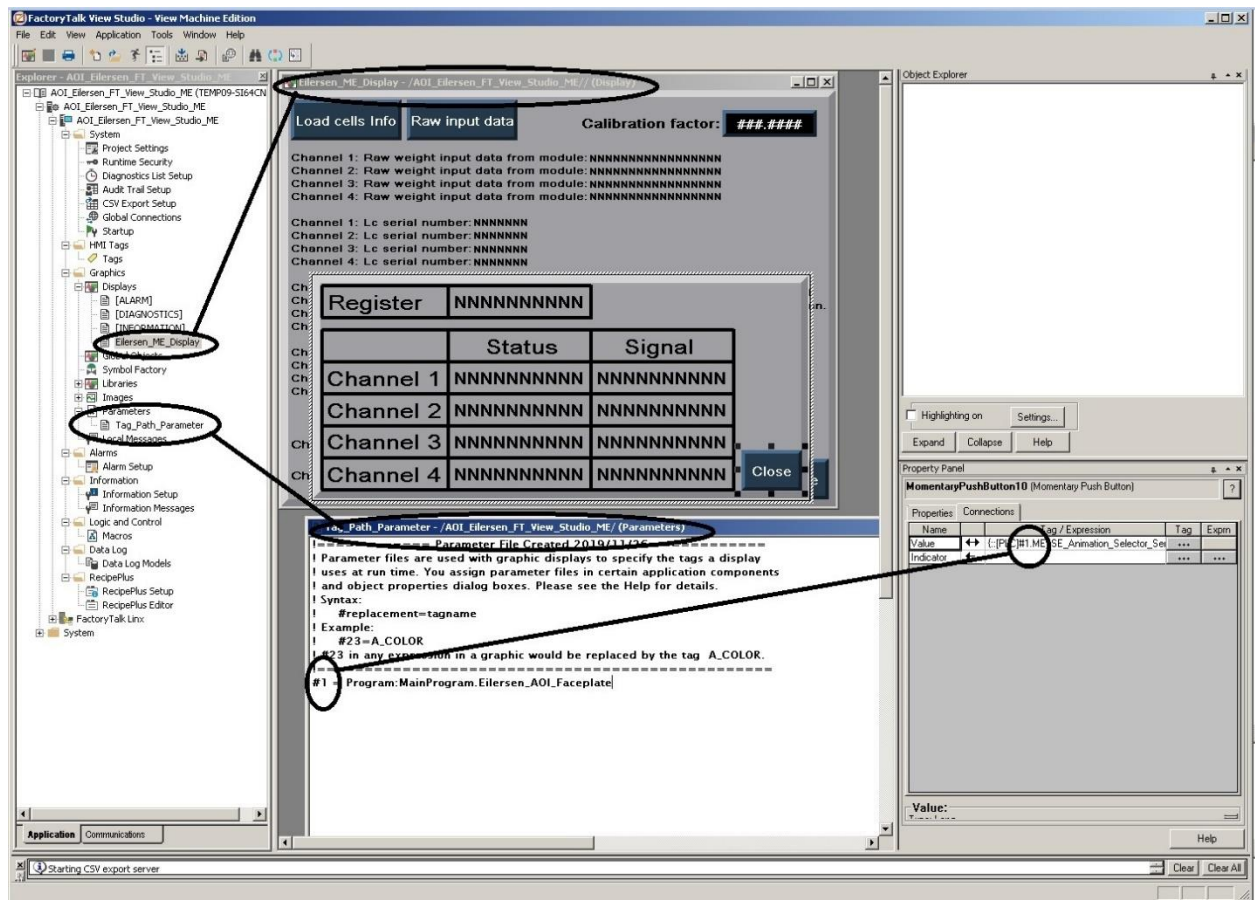


Figure 20 - FTView ME Studio

For further assistance on how to work with FTView ME Studio, faceplates and parameter files please seek help in the FTView ME Studio F1 based help and/or in the corresponding programming user manual.

Faceplates for FTVIEW SE

Use the program: *Factory Talk View SE Application manager* (included in FTVIEW Studio package) to unpack the AOI_Eilersen_FT_View_Studio_SE.APB FTVIEW SE faceplate application.

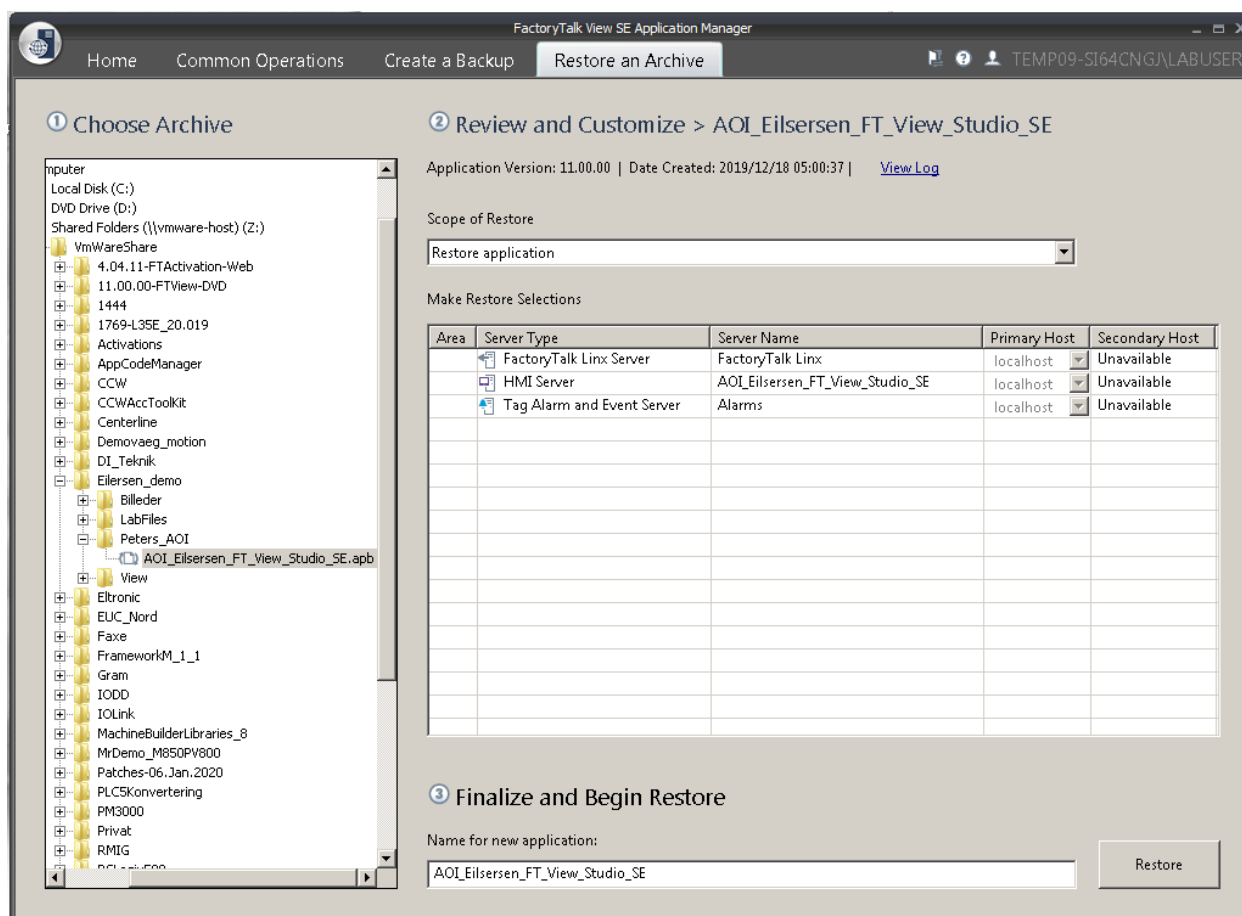


Figure 21 - Factory Talk View SE Application Manager

The FTVIEW SE application contains a display: *Eilersen_SE_Display* (see figure 22)

This display works as a “Parameter file” based display.

A corresponding parameter file: *Tag_Path_Parameter* are included in the project

The #1 parameter should point to the corresponding parameter set for the AOI instruction in the PLC program (See figure 10)

This Eilersen_SE_Display contain a faceplate similar to the “Studio 5000 View Designer faceplate” described earlier in this document. It has the same structure and the same functionality. Please refer to earlier sections in this document for description of functionality

Export / Import the full “faceplate-display” or Copy paste the faceplate into a new empty display in your own FT View SE application

Implement the display and the parameter file into your application as you may find best.

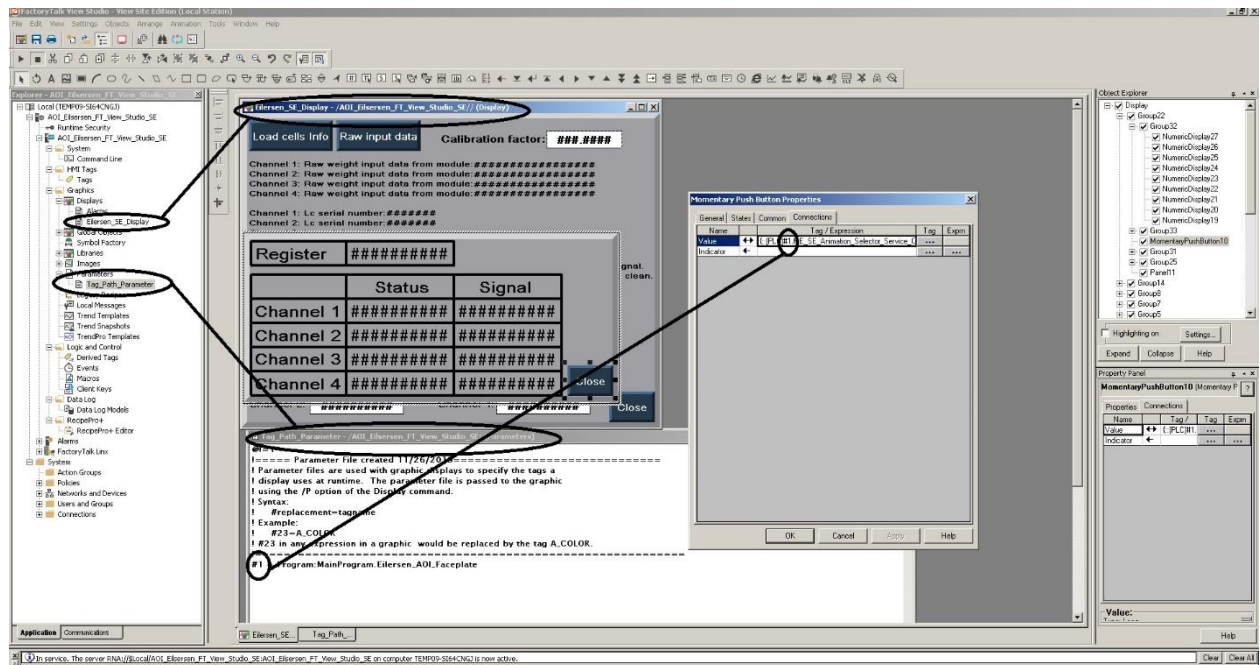


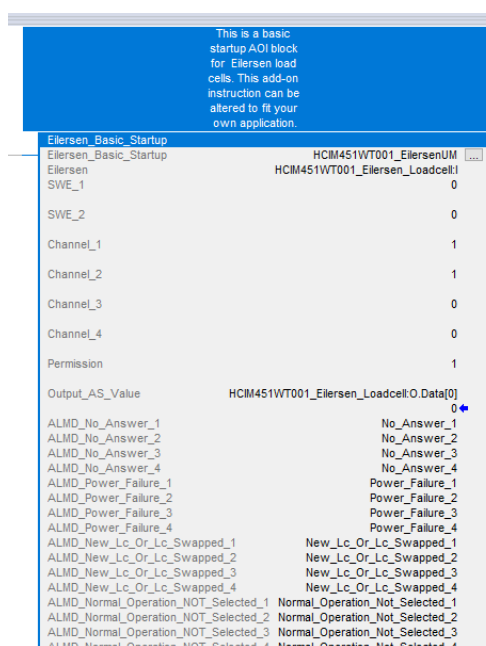
Figure 22- FTView SE Studio

Appendix – FAQ , Tips and Tricks

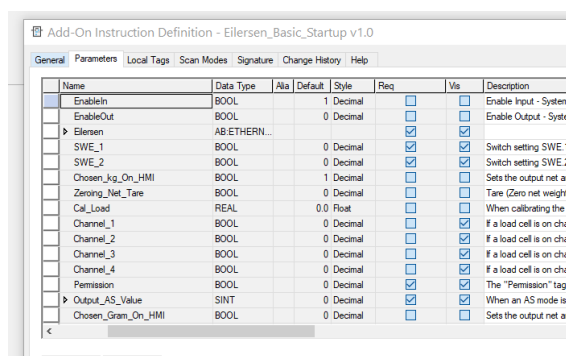
This section contains Frequently Asked Questions (FAQ), Tips and Tricks related to the Add On Instruction (AOI) for the Rockwell Automation Studio 5000 Logix when communicating with the 4x50A EthernetIP module. This appendix is to be considered a supplement in addition to the information stated in the preceding sections.

Why values written to parameters may be overwritten?

Some users have experienced that when writing to parameters, the written value is immediately overwritten by another different value. In this example **Channel_3** when trying to activate this channel by setting it to 1, it was immediately overwritten by 0.



The cause of this seemed to be, that in the "Add-On Instruction Definition" window for the **Channel_3** parameter **Req** was set to selected (a check mark was present in the box) and also the **Default** value was set to 0. The issue was solved by deselecting **Req** (by removing the check mark in the box) for the **Channel_3** parameter, and it could then be changed normally without being overwritten.



Revision History

Date	Author	Rev.	Update
2020-08-21	HJA	3v0	<i>Initial document created. (based on Guide_Add_On_Ins_Eilersen_V3 from Rockwell)</i>
2020-11-27	HJA	3v0a	<i>Added disclaimer in the introduction.</i>
2023-08-10	HJA	3v0b	<i>Added "Appendix – FAQ , Tips and Tricks".</i>

Contact

With further questions or improvement suggestions please contact us:

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