CasTemp Wireless CTWReadAssembler_CLX34 AOI Setup and Use

CompactLogix/ControlLogix AOI(Add-On Instruction) for Heraeus CasTemp Wireless Input Telegram

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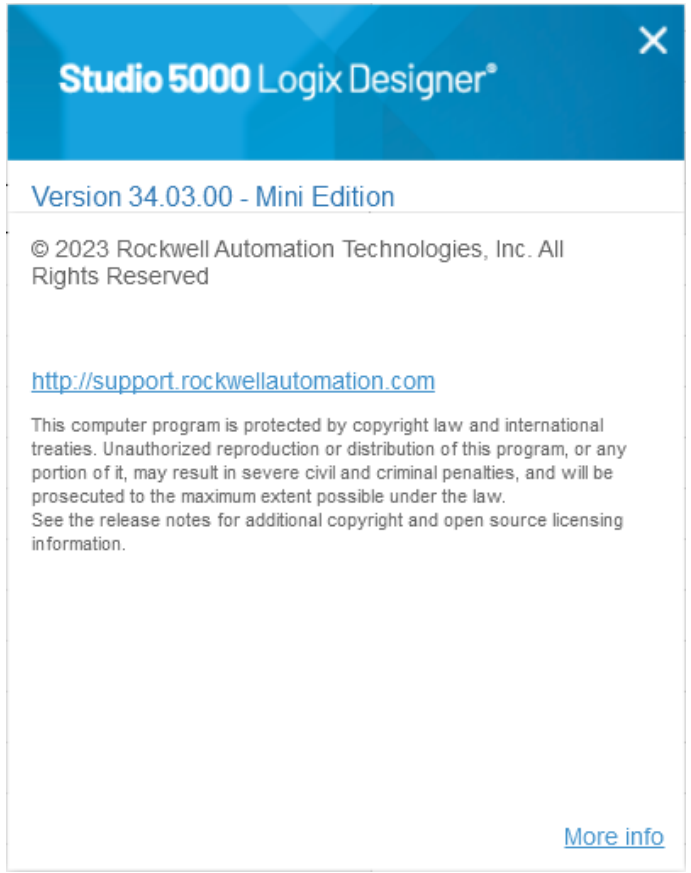
Link to Video Demonstration

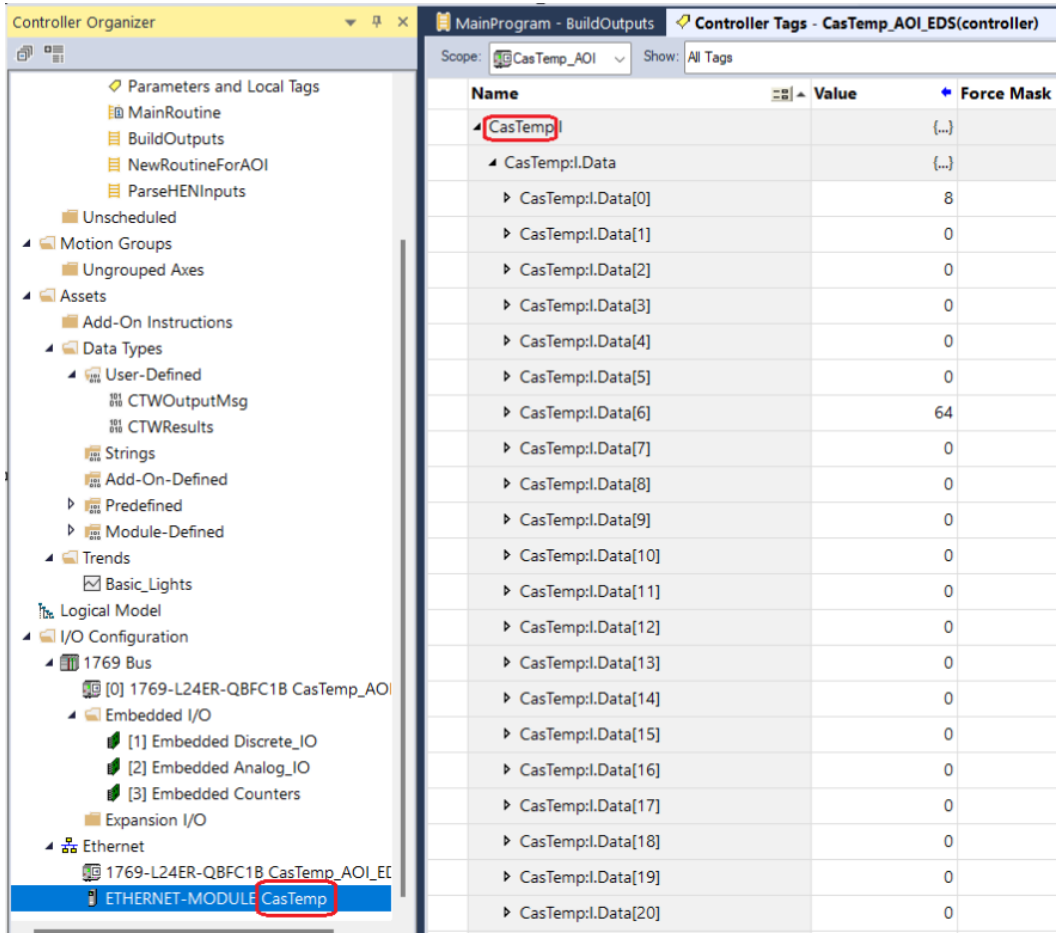
PLC Hardware and Software

- PLC data, configuration, and logic examples in this document are captured from:
  - Studio5000 Version 34.03.00 – Mini Edition
- The PLC used is a 1769-L24ER-QBFC1B CompactLogix 5370 Controller
- This document assumes an EIP connection between the ControlLogix/CompactLogix PLC and the CasTemp Wireless device has been configured successfully and the correct telegram installed.



PLC Global Input Tag From CTW

- The global tag name where the data from the CTW telegram will arrive will have the same name as the module that was set up to manage the communications to the CTW device.
- The array length is typically 128-bytes.



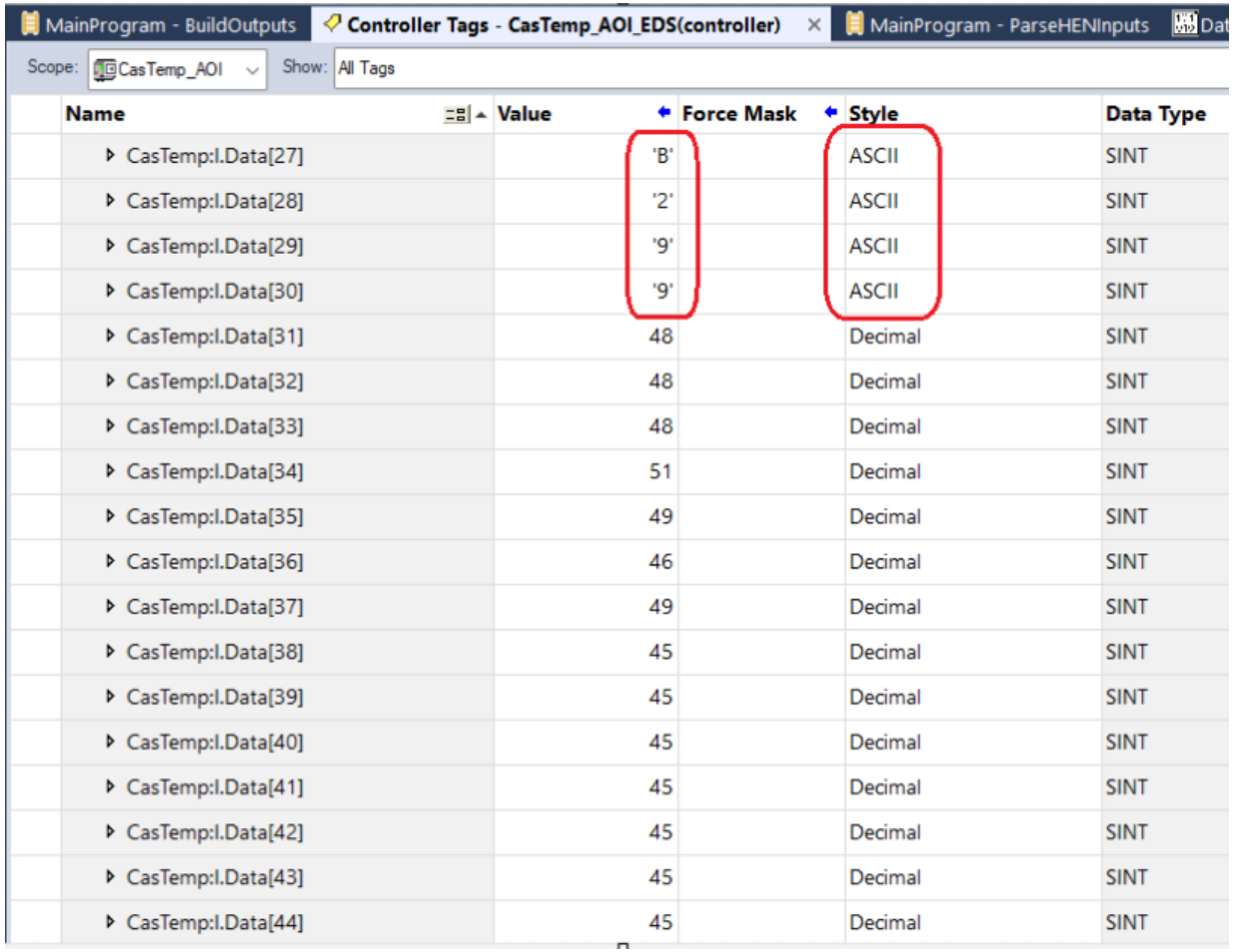
.ConnectionFaulted Status in Global Tags

- Module connections configured with the .EDS files include a ConnectionFaulted status bit in this case ‘CasTemp:I.ConnectionFaulted”.
- This bit can be monitored to evaluate the communication status between the PLC and the CTW.
- The AOI uses this bit as an optional parameter to more accurately parse the data passed to it via the CTW input data array.

Name	Value	Force Mask	Style	Data Type
CasTemp:I	{...}	{...}		_005A:ABCC_81EA6AAD:I...
CasTemp:I.ConnectionFaulted	0		Decimal	BOOL
CasTemp:I.Data	{...}	{...}	Decimal	SINT[128]
CasTemp:I.Data[0]	8		Decimal	SINT
CasTemp:I.Data[1]	0		Decimal	SINT
CasTemp:I.Data[2]	0		Decimal	SINT
CasTemp:I.Data[3]	0		Decimal	SINT
CasTemp:I.Data[4]	0		Decimal	SINT
CasTemp:I.Data[5]	0		Decimal	SINT
CasTemp:I.Data[6]	64		Decimal	SINT
CasTemp:I.Data[7]	0		Decimal	SINT
CasTemp:I.Data[8]	0		Decimal	SINT
CasTemp:I.Data[9]	0		Decimal	SINT
CasTemp:I.Data[10]	0		Decimal	SINT
CasTemp:I.Data[11]	0		Decimal	SINT
CasTemp:I.Data[12]	0		Decimal	SINT
CasTemp:I.Data[13]	0		Decimal	SINT
CasTemp:I.Data[14]	0		Decimal	SINT
CasTemp:I.Data[15]	0		Decimal	SINT

Example of Module ID in Global Tags

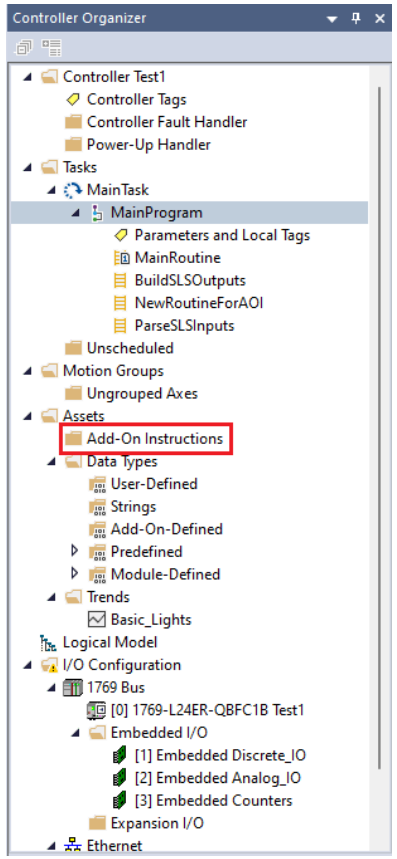
- The CTW telegram data starts at array element[27].
- In this case it is the Module ID = B299. If you change the display style dropdown to “ASCII” in the “Style” column, the values ‘B’ ‘2’ ‘9’ ‘9’ are displayed in the “Value” column as received from the CTW.

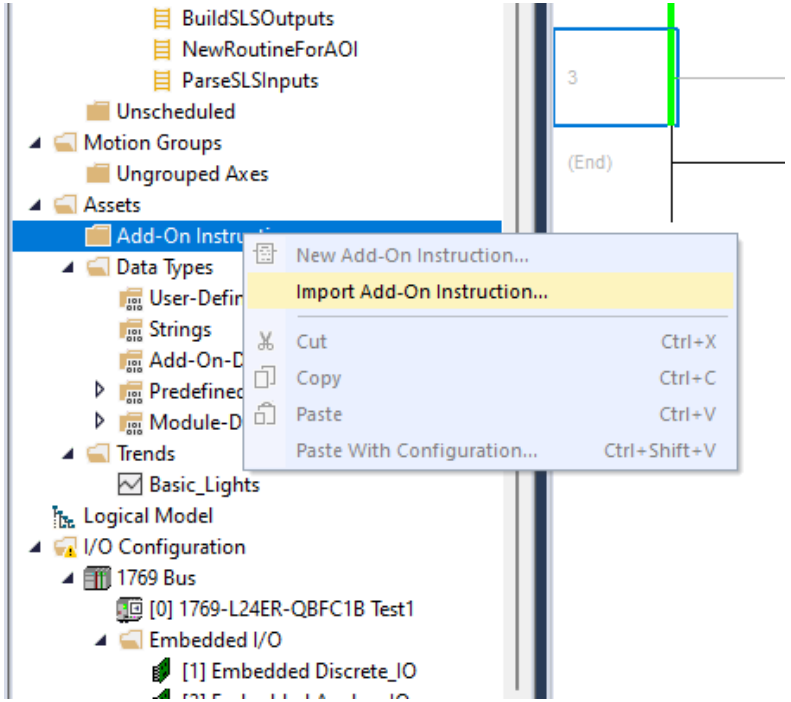


Name	Value	Force Mask	Style	Data Type
CasTemp:I.Data[27]	'B'		ASCII	SINT
CasTemp:I.Data[28]	'2'		ASCII	SINT
CasTemp:I.Data[29]	'9'		ASCII	SINT
CasTemp:I.Data[30]	'9'		ASCII	SINT
CasTemp:I.Data[31]	48		Decimal	SINT
CasTemp:I.Data[32]	48		Decimal	SINT
CasTemp:I.Data[33]	48		Decimal	SINT
CasTemp:I.Data[34]	51		Decimal	SINT
CasTemp:I.Data[35]	49		Decimal	SINT
CasTemp:I.Data[36]	46		Decimal	SINT
CasTemp:I.Data[37]	49		Decimal	SINT
CasTemp:I.Data[38]	45		Decimal	SINT
CasTemp:I.Data[39]	45		Decimal	SINT
CasTemp:I.Data[40]	45		Decimal	SINT
CasTemp:I.Data[41]	45		Decimal	SINT
CasTemp:I.Data[42]	45		Decimal	SINT
CasTemp:I.Data[43]	45		Decimal	SINT
CasTemp:I.Data[44]	45		Decimal	SINT

Importing the AOI (Add-On Instruction)

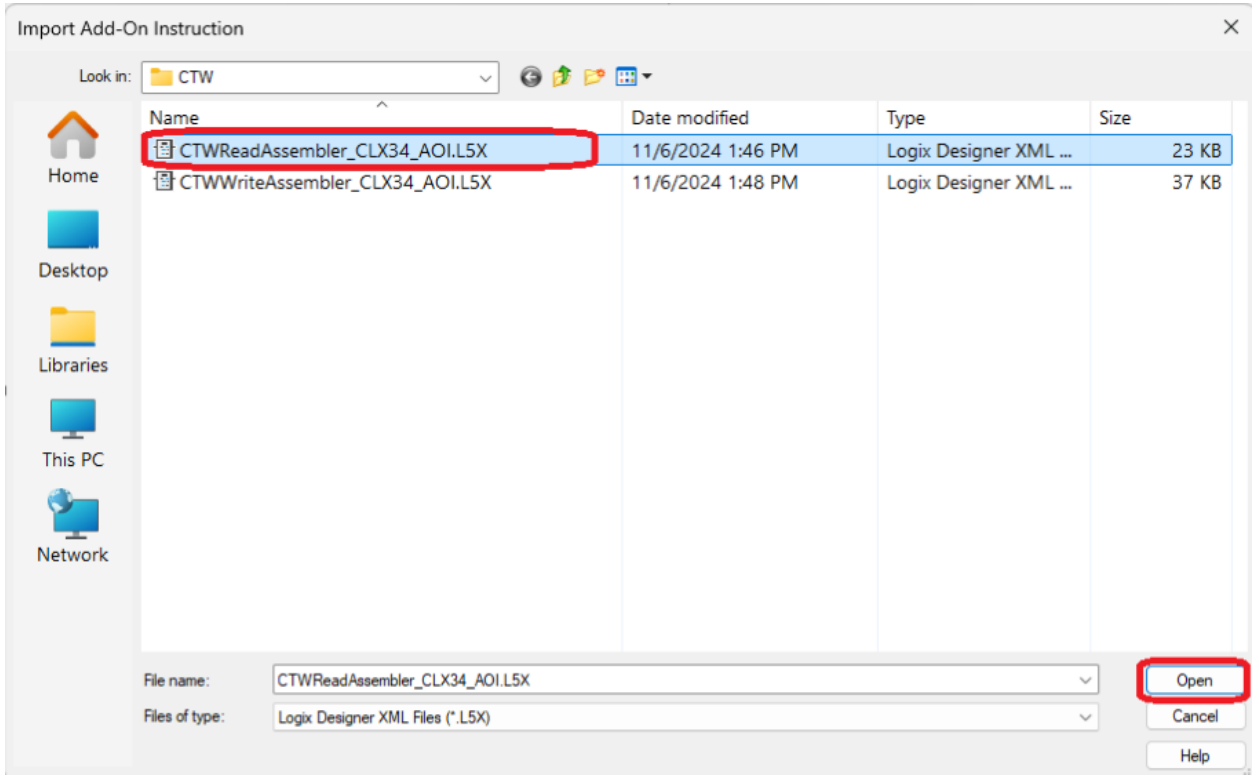
- After you have added the communication module and confirmed it's connection to the CTW it is time to import the CTW Add-On Instruction.
- The Add-On Instructions Folder is located in the Assets Folder on the Controller Organizer Tab of Studio 5000.
- Right-click the Add-On Instructions Folder to bring up the menu and select Import Add-On Instruction





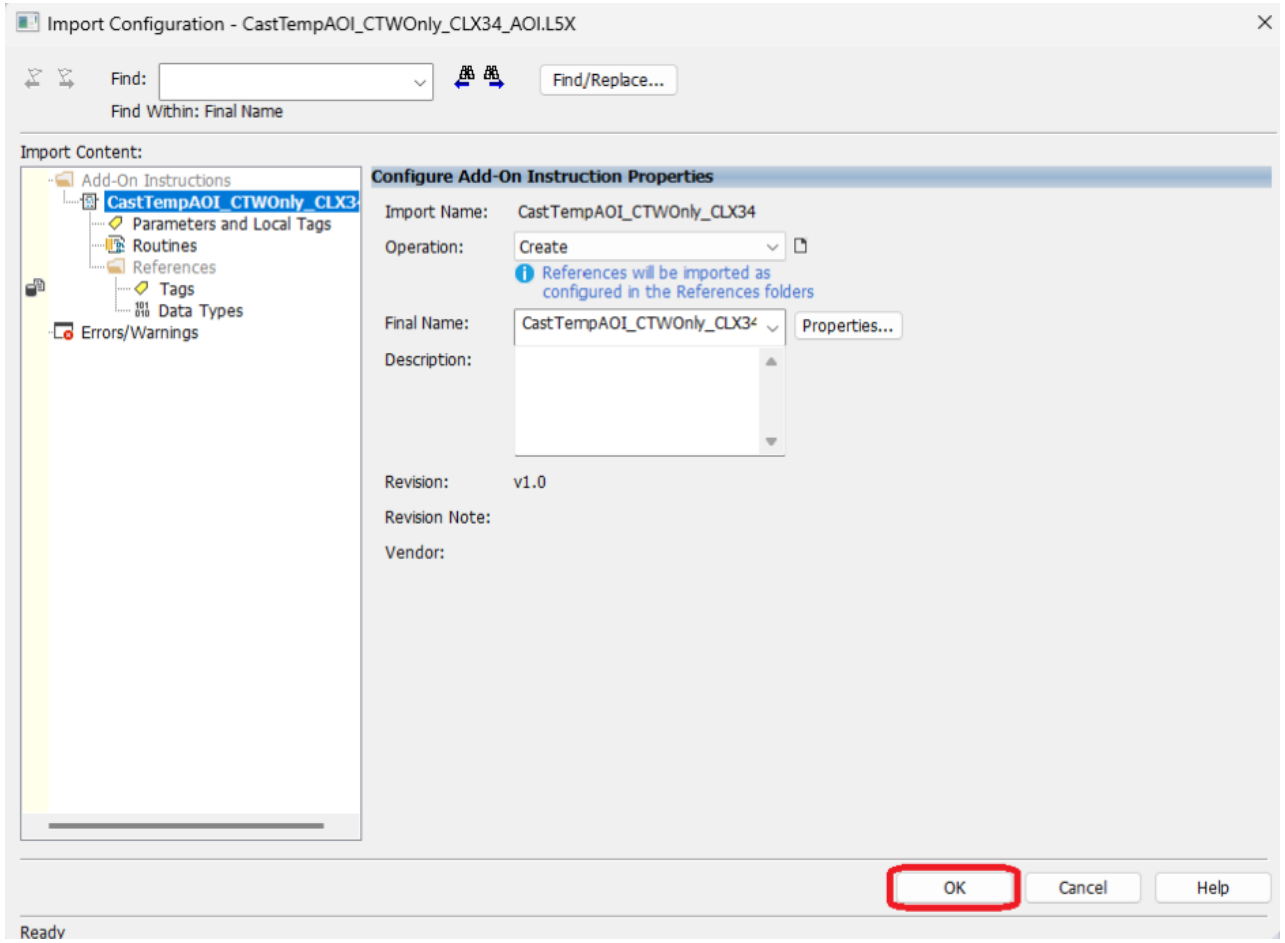
Importing the AOI (Cont.)

- Browse to the location you saved the CTW Add-On Instruction from HEN, and open that file to import it into your project. (This file will be named "CTWReadAssembler_CLX34_AOI.L5X “ or similar)



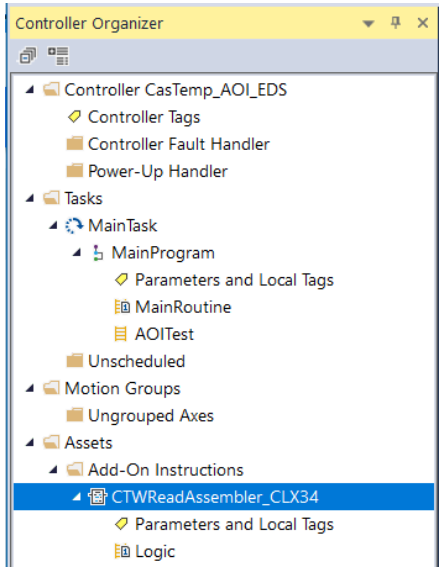
Importing the AOI (Cont.)

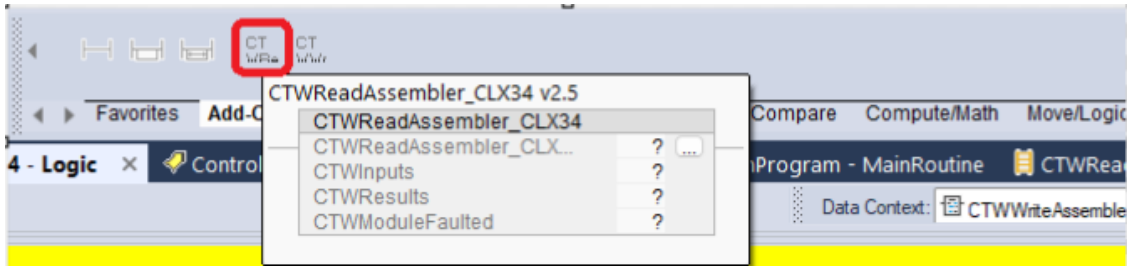
- A configuration window with details describing the Add-on instruction will pop up allowing you to confirm that you have selected the Add-On instruction you intended.
- Click the OK button to perform the import.



Importing the AOI (Cont.)

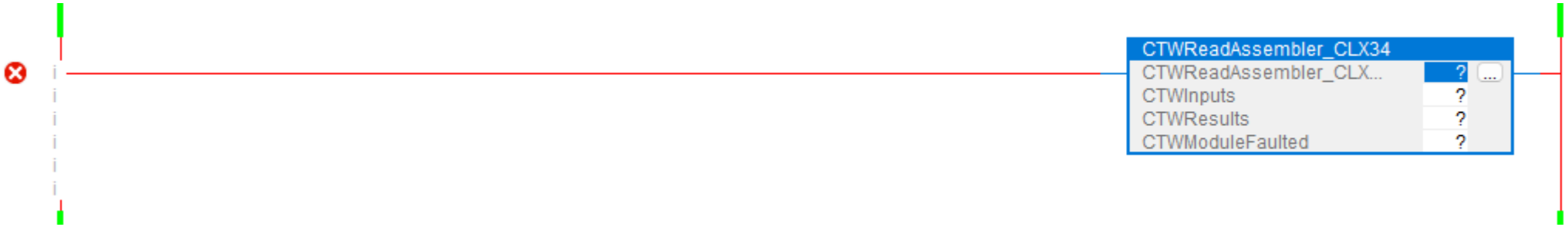
- Once the Import is complete the CTWReadAssembler_CLX34 will show up under the Add-On Instructions Folder under Assets and be available for use.
- The Add-On Instruction will be available on the element group toolbar in the Add-on group tab.
- An image of the AOI control will pop up if the mouse is hovered over the Add-On icon.





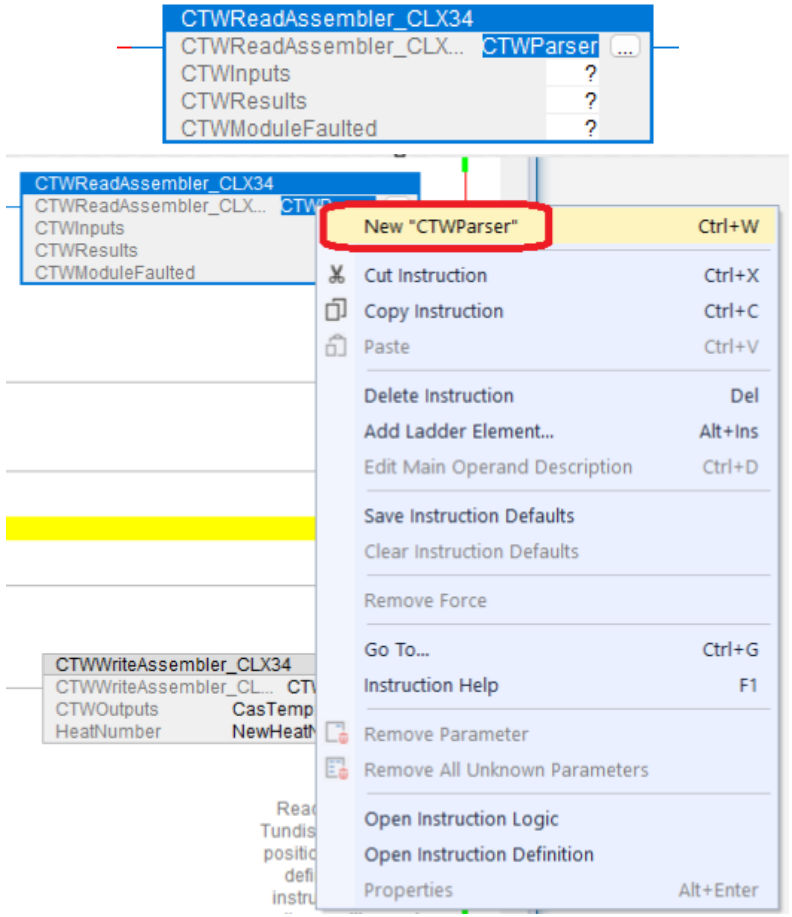
Adding the AOI to Ladder

- Edit or add an appropriate rung and drag the CTWReadAssembler_CLX34 instruction onto the rung.



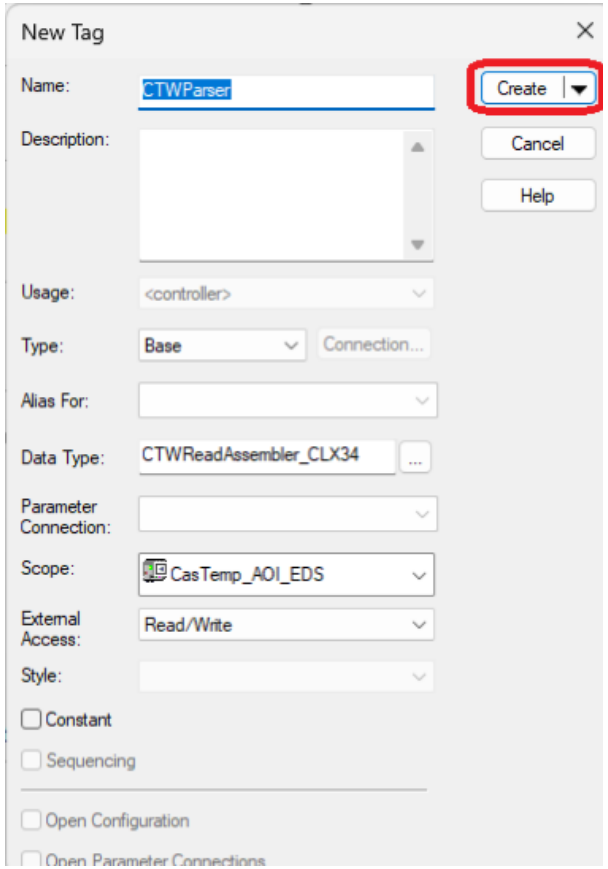
Adding the AOI to Ladder (Cont.)

- Start adding tags to the control. For the CTWReadAssembler_CLX34 Field:: Give the control an appropriate tag name….
- ...and then define that tag by right clicking the tag and selecting "New 'TagName' ".



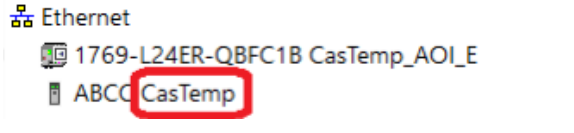
Adding the AOI to Ladder (Cont.)

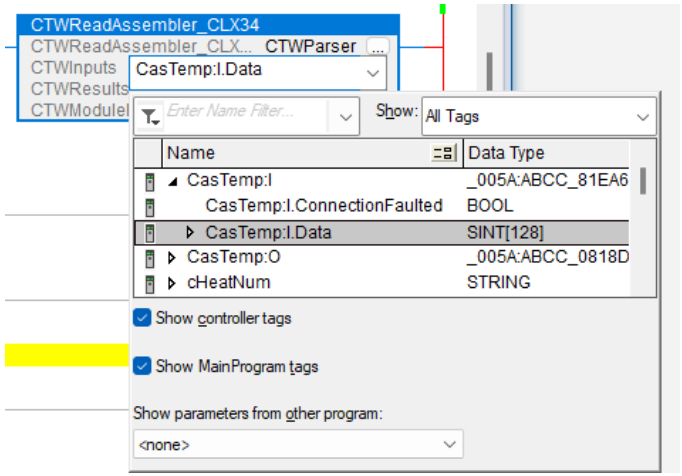
- This opens the New Tag window...just leave everything at the defaults and click the <Create> button.

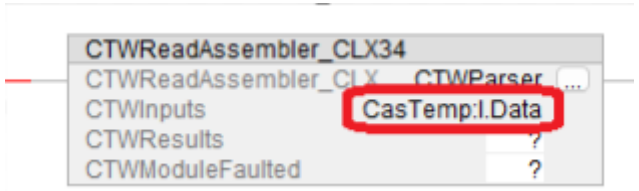


Adding the AOI to Ladder (Cont.)

- For the CTWInputs Field:: This is where you point the data from the incoming communication module to the AOI instruction. Notice the name you gave the module communicating with the CTW. In this case it is “CasTemp".
- Add the name of the Ethernet module in the program you are working on then click the down arrow beside that name. Expand the Tagname tree and select the one with the ":I.Data" added to the end. In this case it would be “CasTemp:I.Data".

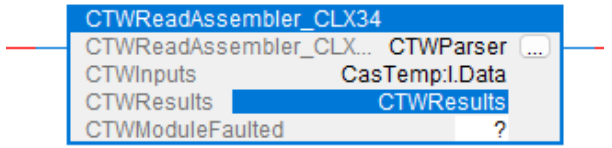


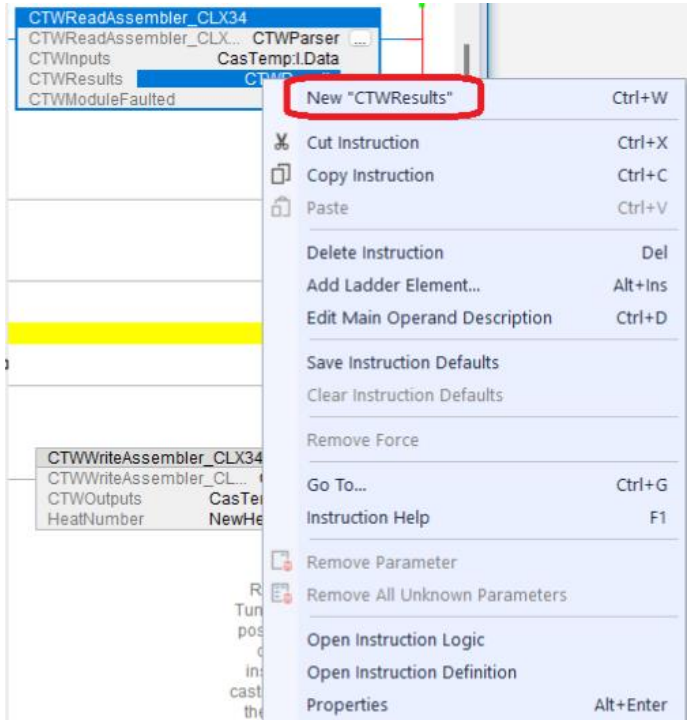




Adding the AOI to Ladder (Cont.)

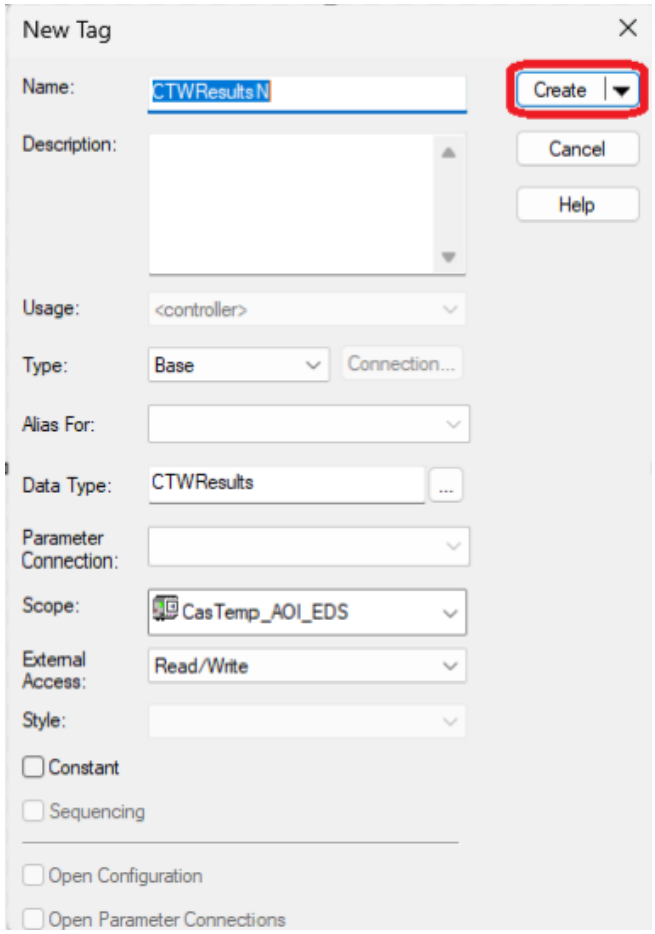
- For the Results Field:: Give the results an appropriate tag name...
- ...and then define that tag by right-clicking the tag and selecting "New 'TagName' ".





Adding the AOI to Ladder (Cont.)

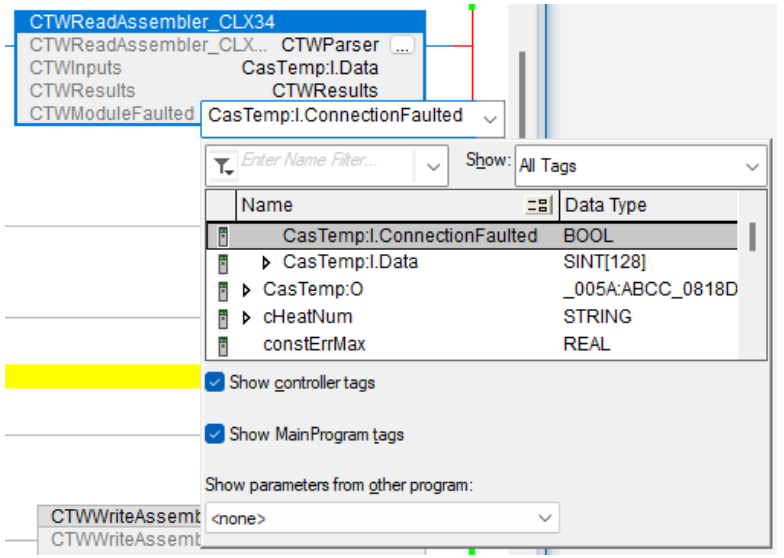
- This opens the New Tag window...just leave everything at the defaults and click the <Create> button.
- This CTWResults UDT tag will be where the parsed values from the inputs elements are placed.

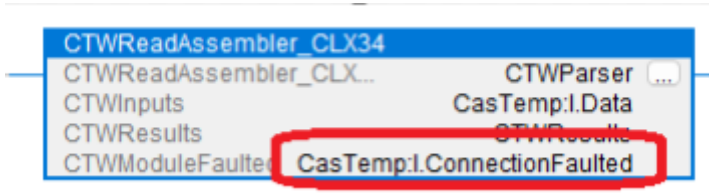


Adding the AOI to Ladder (Cont.)

CTWModuleFaulted Parameter for .EDS Configuration

- The last AOI parameter ‘CTWModuleFaulted’ is optional based on the type of communications module that was set up.
- The Ethernet communications modules set up with the .EDS files automatically create a ‘ConnectionFaulted’ bit. Add the name of the Ethernet module in the program you are working on then click the down arrow beside that name. Expand the Tagname tree and select the one with the ":I.ConnectionFaulted" added to the end. In this case it would be “CasTemp ":I.ConnectionFaulted ".





Adding the AOI to Ladder (Cont.)

CTWModuleFaulted Parameter for Generic Module Configuration

- The last AOI parameter ‘CTWModuleFaulted’ is optional based on the type of communications module that was set up.
- The Ethernet communications modules set up with the Generic Ethernet Module have no ConnectionFaulted bit available.
- Adding a Boolean tag to the ‘CTWModuleFaulted’ parameter can be used to control the parsing. Setting this bit to ‘OFF’ will allow the parsing of the incoming array elements from the CTW. Setting this bit to ‘ON’ will inhibit the parsing of the incoming array elements from the CTW.

Monitoring the Parsed Results

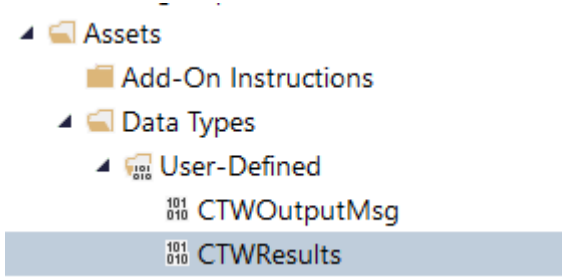
CTWModuleFaulted Parameter for Generic Module Configuration

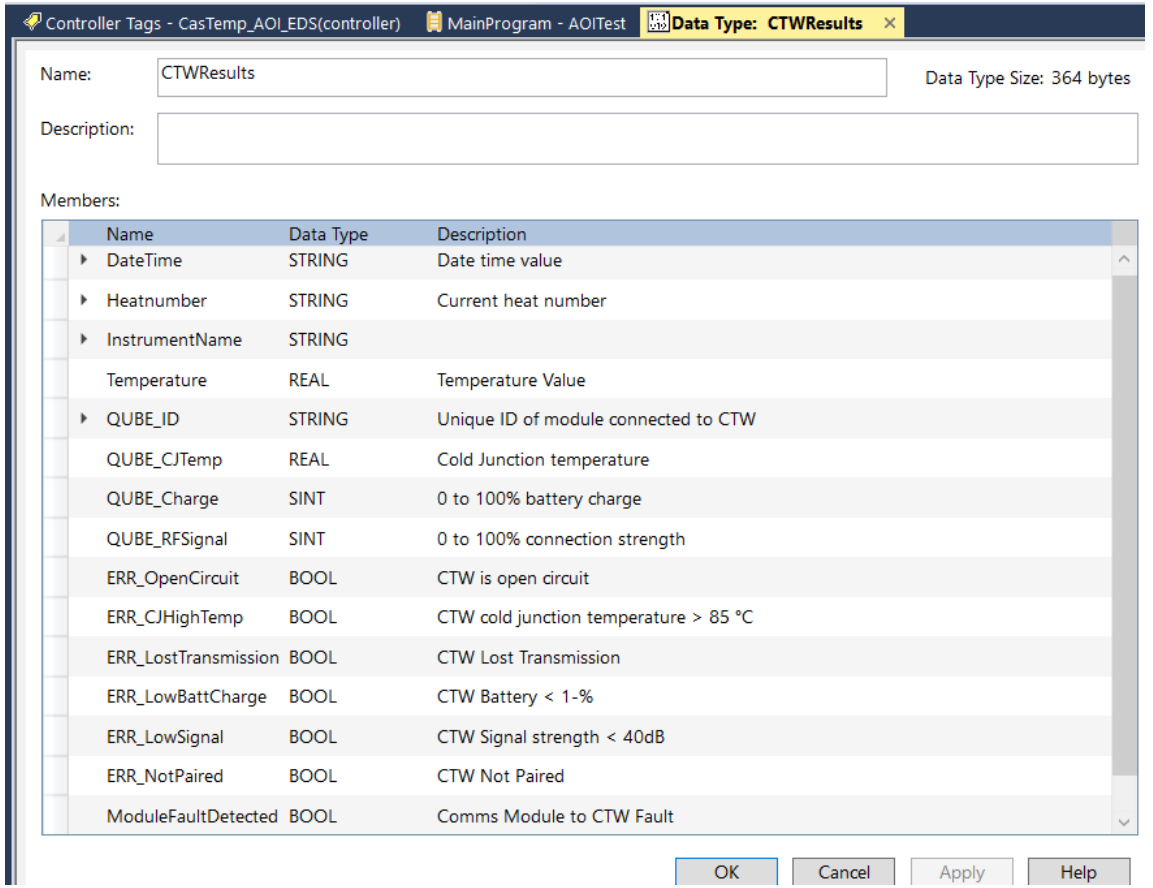
- In the controller tags window, locate the tagname that was put in the Add-on CTWResults parameter field.
- The parsed result data structure will look like this with the UDT CTWResults tagname reflecting your tagname choice. In this case it is CTWResultsN.
- Expand the CTWResults tag to display the individual data fields.
- Link to video demonstrating this procedure

CTWResultsN	{...}
CTWResultsN.DateTime	'1/8/1998 04:19:36'
CTWResultsN.Heatnumber	' '
CTWResultsN.InstrumentName	'CTWGMOffice'
CTWResultsN.Temperature	88.1
CTWResultsN.QUBE_ID	'B299'
CTWResultsN.QUBE_CJTemp	73.0
CTWResultsN.QUBE_Charge	98
CTWResultsN.QUBE_RFSignal	57
CTWResultsN.ERR_OpenCircuit	0
CTWResultsN.ERR_CJHighTemp	0
CTWResultsN.ERR_LostTransmission	0
CTWResultsN.ERR_LowBattCharge	0
CTWResultsN.ERR_LowSignal	1
CTWResultsN.ERR_NotPaired	0
CTWResultsN.ModuleFaultDetected	0

Additional Information

PLC Results Msg UDT Field Definition



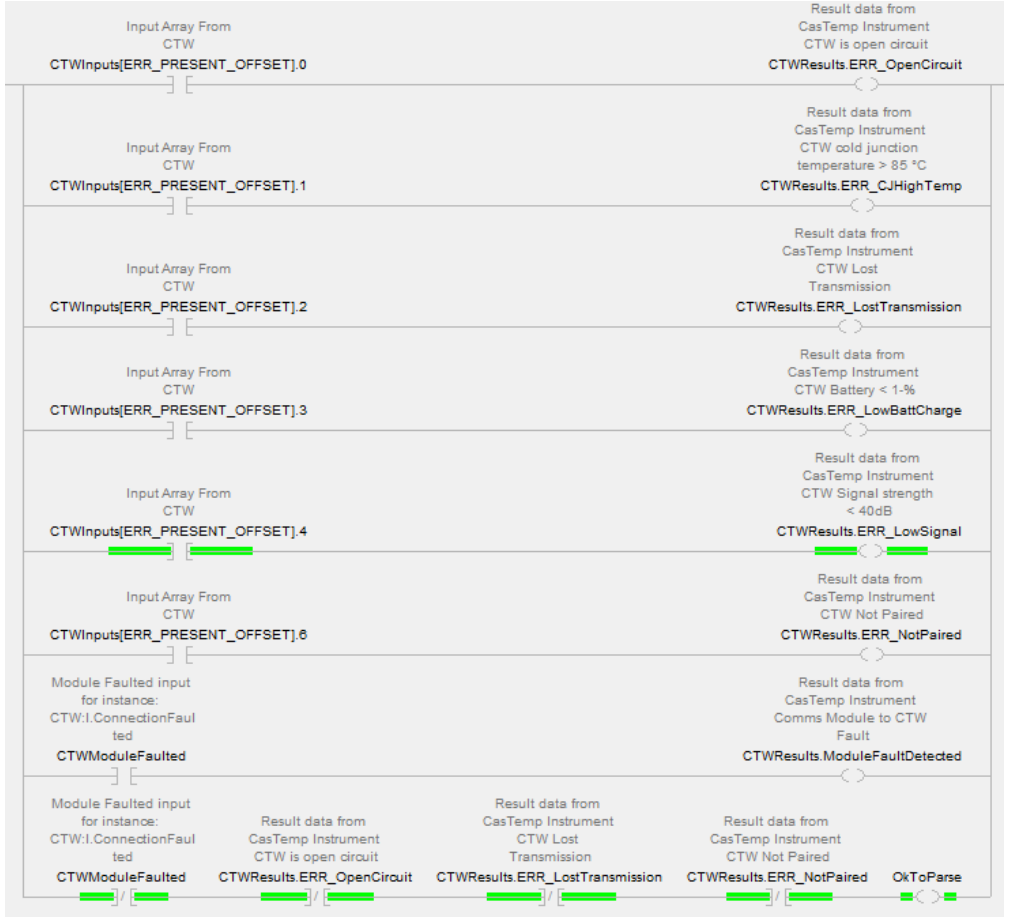


Additional Information

The HEN AOI Encapsulates: Parse the Binary Based Results

- In this CTW telegram the ErrorPresent result starts at array element[31].
  - ERR_PRESENT_OFFSET = 31
- The bit offset is described in the manual.
- An ‘OkToParse’ OTE instruction is operated off of the error status’ and will be used to make decisions about default values.

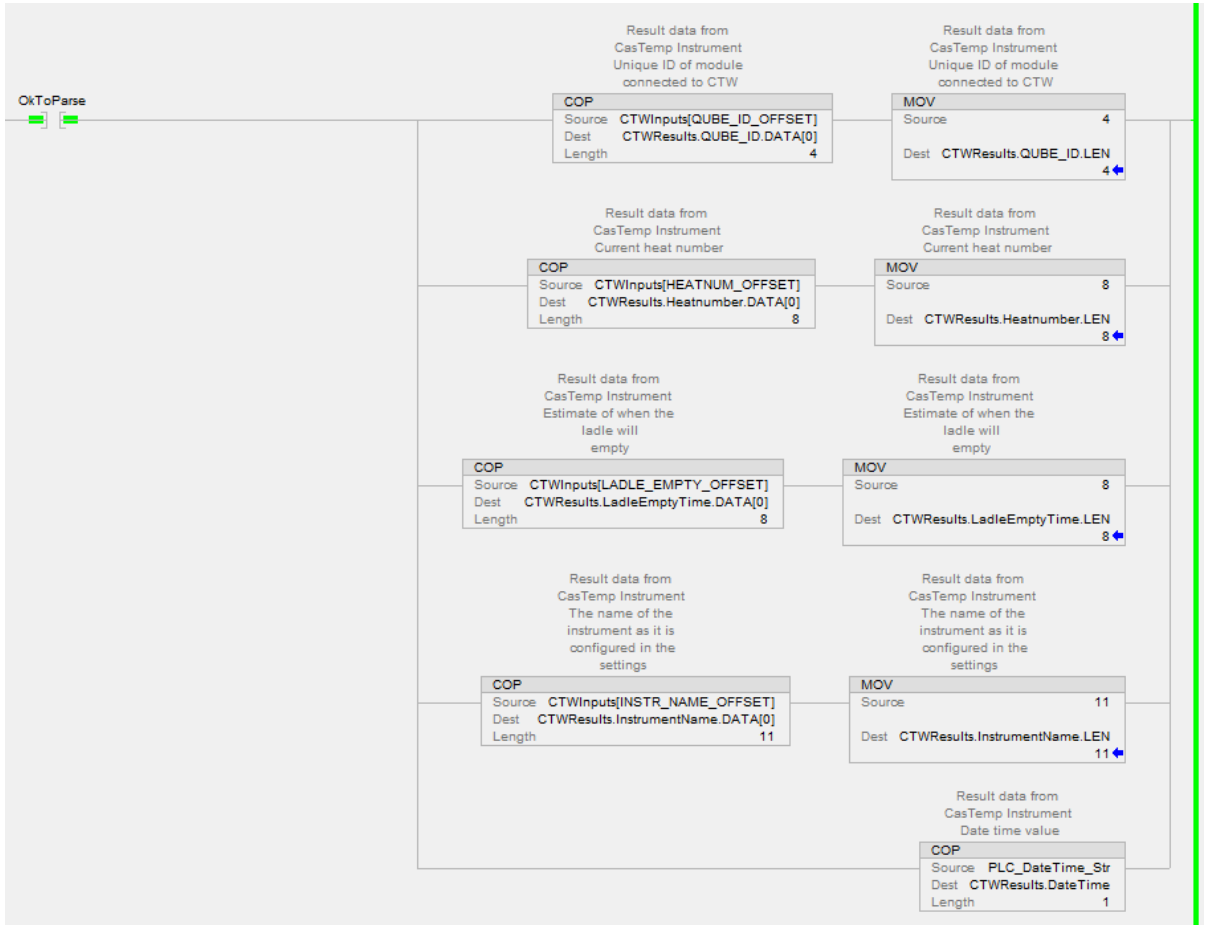
ErrorPresent[0]	Bit 1 = CTW is open circuit	1 byte
	Bit 2 = CTW cold junction temperature > 85 °C	1 byte
	Bit 3 = CTW lost transmission	1 byte
	Bit 4 = CTW battery charge is critical (charge < 10%)	1 byte
	Bit 5 = CTW signal strength is critical (strength < 40dB)	1 byte
	Bit 6 = Reserved for future use	1 byte
	Bit 7 = Instrument is not paired with CTW	1 byte
	Bit 8 = Not used	1 byte



Additional Information

The HEN AOI Encapsulates: Parse the Text Based Results - No errors

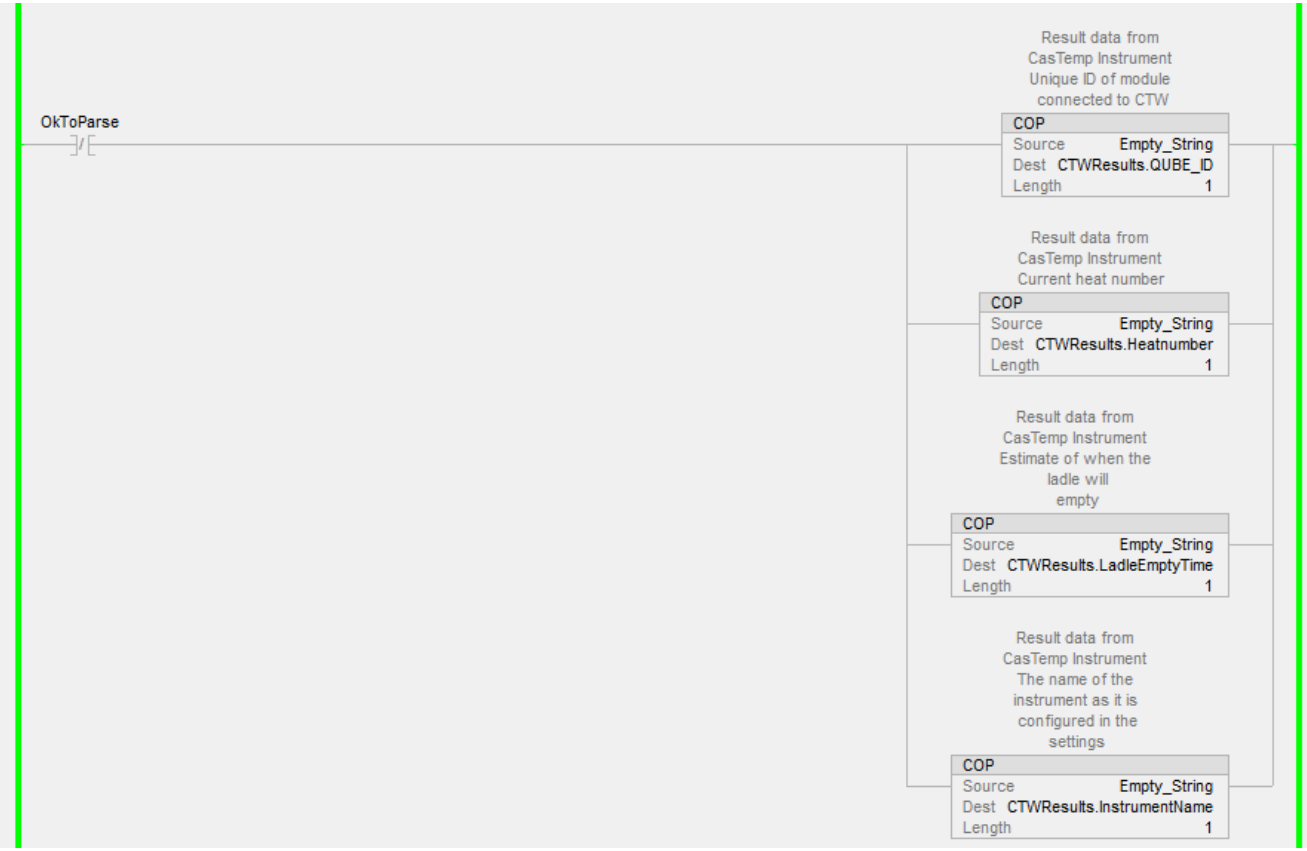
- Perform these operations for the text based telegram items when there are no errors as indicated by the ‘OkToParse’ XIC instruction.
- Copy the byte array elements for each text based result to the data array of a string variable.
- Set the string variable length to the length of the result byte array.



Additional Information

The HEN AOI Encapsulates: Parse the Text Based Results - Error Present

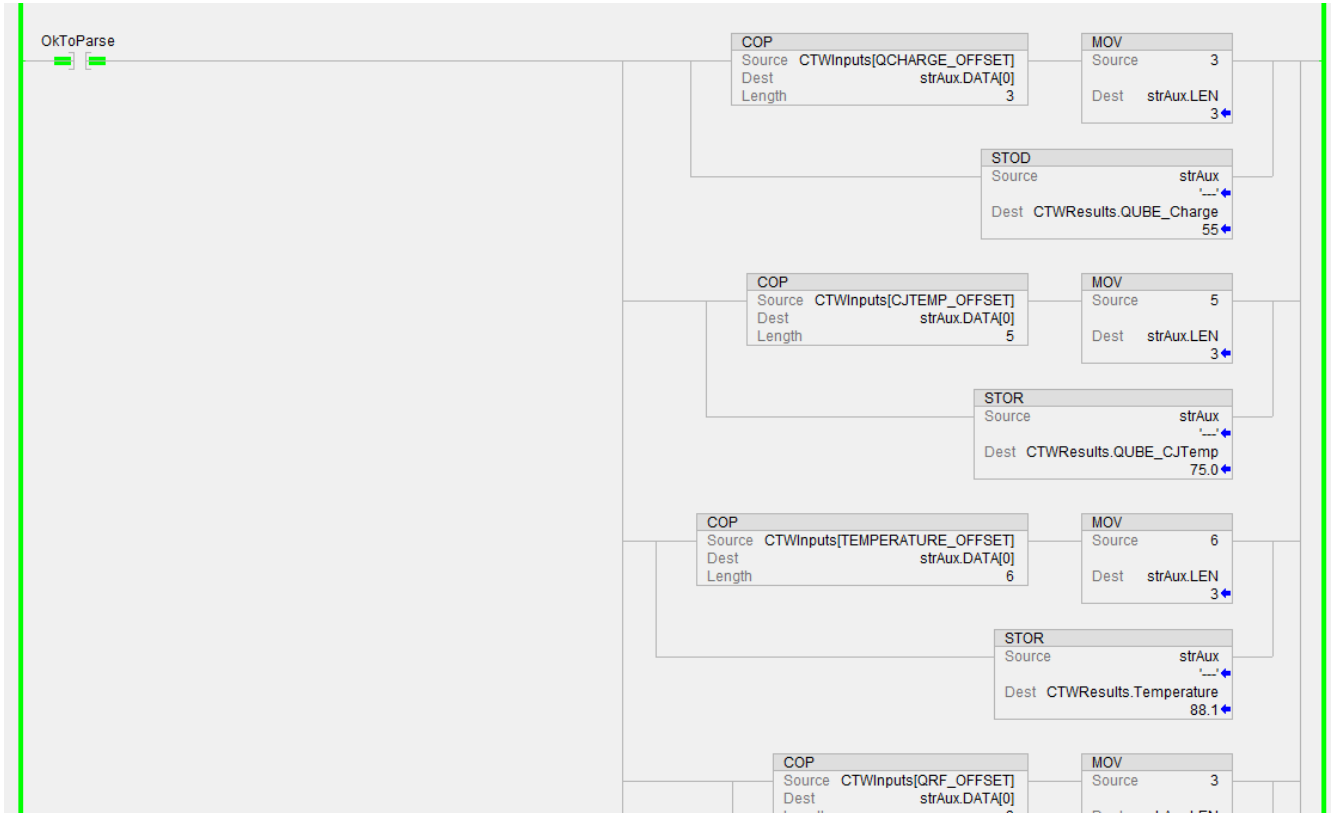
- Perform these operations for the text based telegram items when there are errors present as indicated by the ‘OkToParse’ XIO instruction.
- Copy the Empty_String variable to the string variable for each CTW result as a default.



Additional Information

The HEN AOI Encapsulates: Parse the Single Based Results - No errors

- Perform these operations for the single based telegram items when there are no errors as indicated by the ‘OkToParse’ XIC instruction.
- In this instance the temperature values are sent in a 6-byte array of ASCII hex format (see example below)
  - TEMP_OFFSET = 41
- Copy the byte array elements for each text based result to the data array of a string variable.
- Set the string variable length to the length of the result byte array.
- Use a STOR instruction to convert that string value to a float.



Example temperature Input from CTW::

CasTemp:I.Data[41]	16#30		Hex	SINT	CasTemp:I.Data[41]	'0'		ASCII	SINT
CasTemp:I.Data[42]	16#30		Hex	SINT	CasTemp:I.Data[42]	'0'		ASCII	SINT
CasTemp:I.Data[43]	16#38		Hex	SINT	CasTemp:I.Data[43]	'8'		ASCII	SINT
CasTemp:I.Data[44]	16#38		Hex	SINT	CasTemp:I.Data[44]	'8'		ASCII	SINT
CasTemp:I.Data[45]	16#2e		Hex	SINT	CasTemp:I.Data[45]	'.'		ASCII	SINT
CasTemp:I.Data[46]	16#31		Hex	SINT	CasTemp:I.Data[46]	'1'		ASCII	SINT

Additional Information

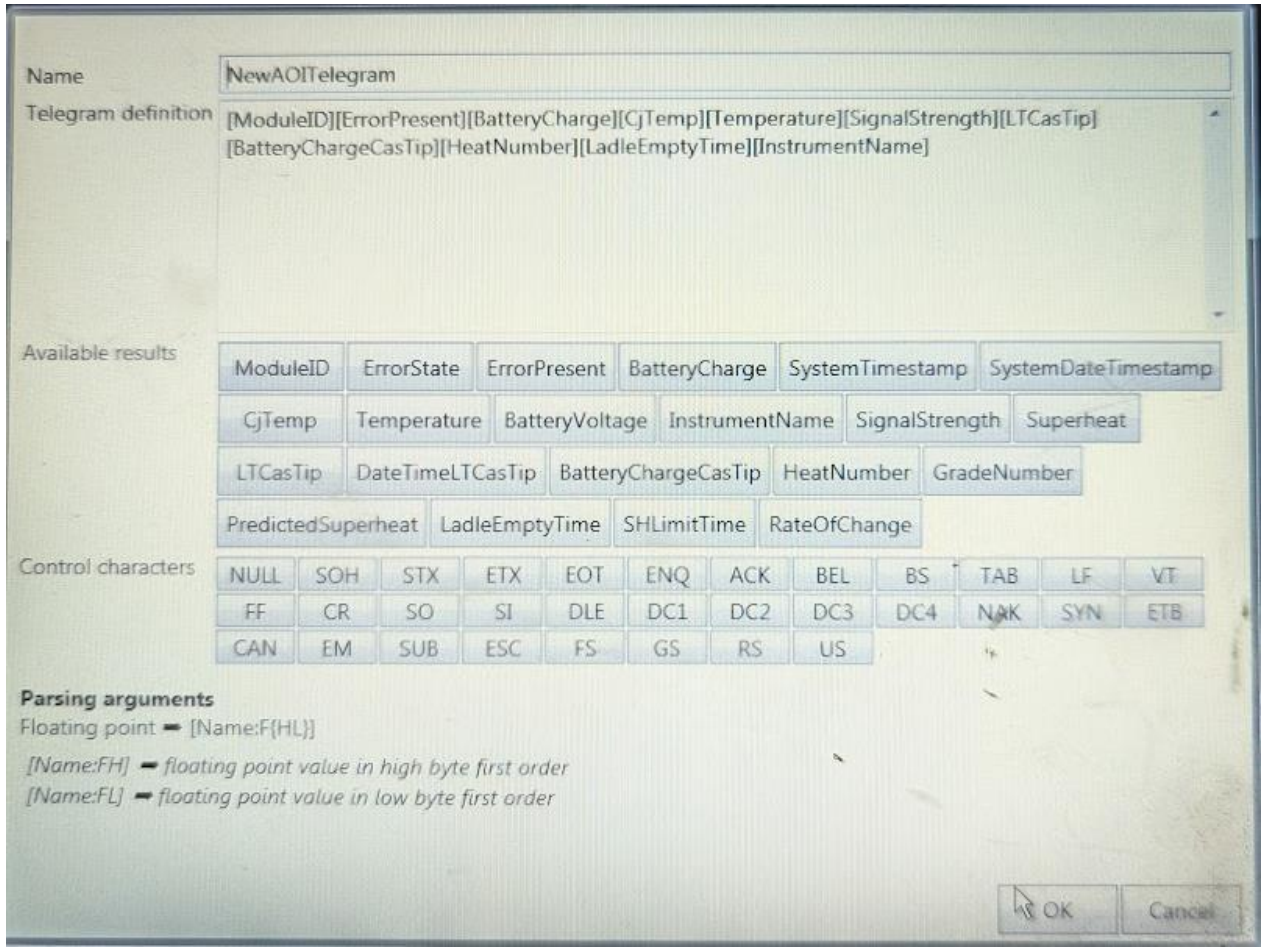
The HEN AOI Encapsulates: Parse the Single Based Results - Error present

- Perform these operations for the single based telegram items when there are errors present as indicated by the ‘OkToParse’ XIO instruction.
- Copy the ERRVAL_MINUS999 variable to the single variable for each CTW result as a default. (in this case = -999.0) or
- Copy the ERRVAL_ZERO variable to the single variable for each CTW result as a default. (in this case = 0) whichever case is appropriate

Additional Information

Required CTW Output Telegram

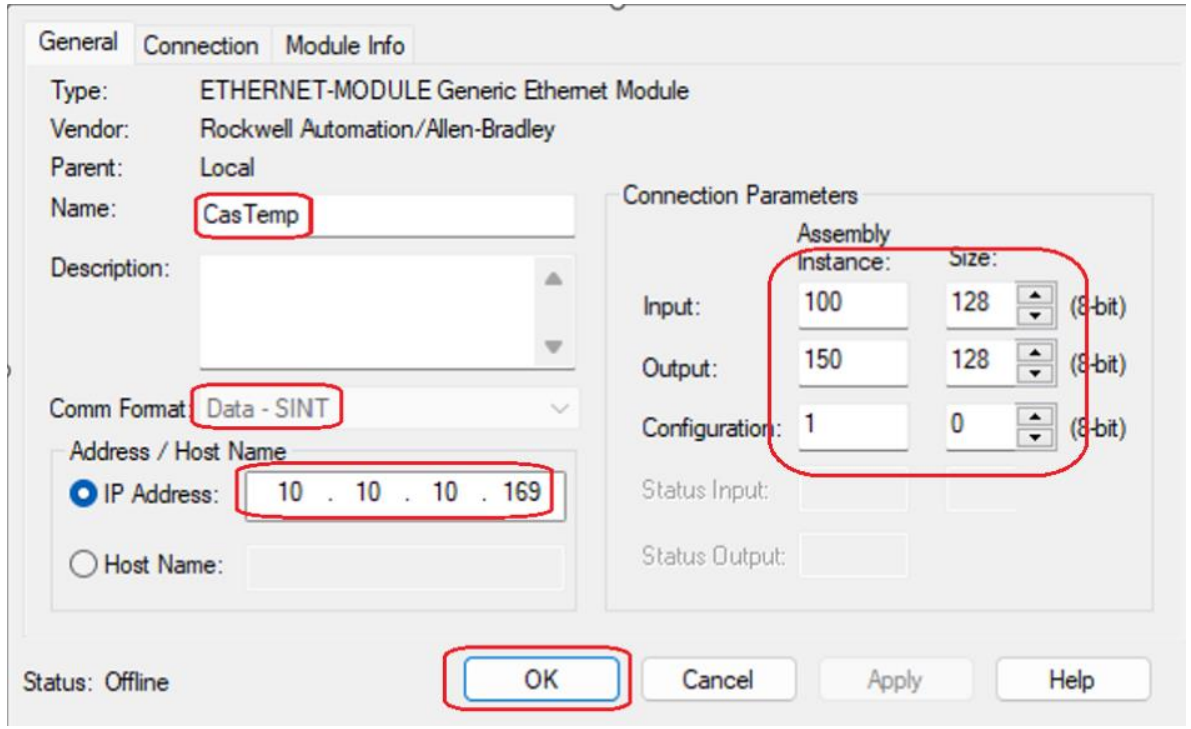
- The CTW telegram used here consists of the results displayed. This order must be maintained for the AOI to function correctly.
- Note that in this case those results are left in the native formatting and the PLC logic to follow will handle parsing the results into the desired data types as required.



Additional Information

Module Connection Option 1 – Generic Ethernet Module

- Name the module. In this case ‘CasTemp. The controller tags automatically created to manage the data from this module will use this name (ie CasTemp:I.Data[0]).
- Change the Comm format to SINT.
- Add the EIP address for the CTW instrument. In this example ‘10.10.10.169’.
- Enter the Connection Parameters as shown on the screenshot .
- Click <Ok>

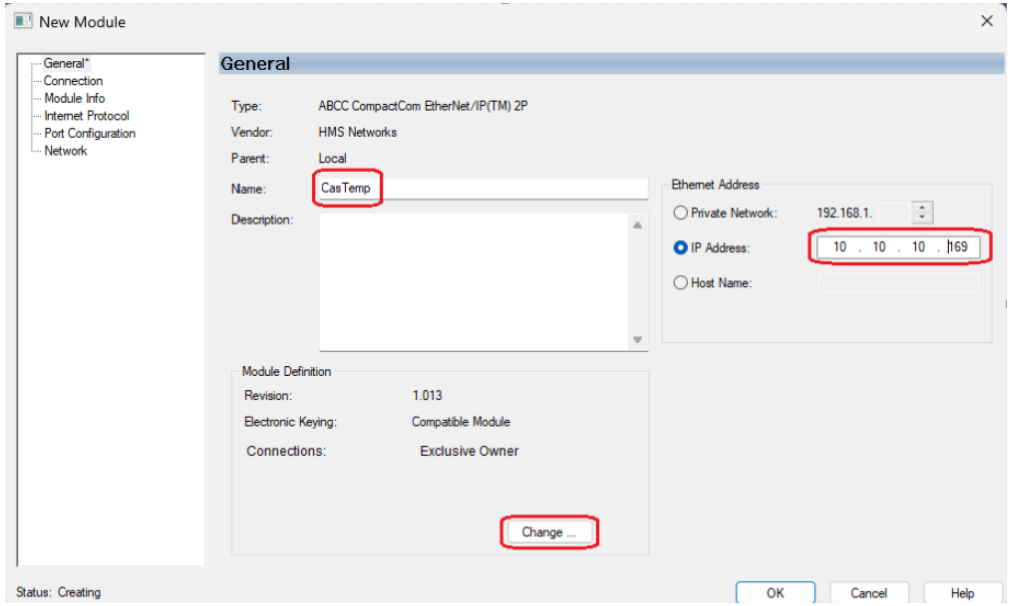


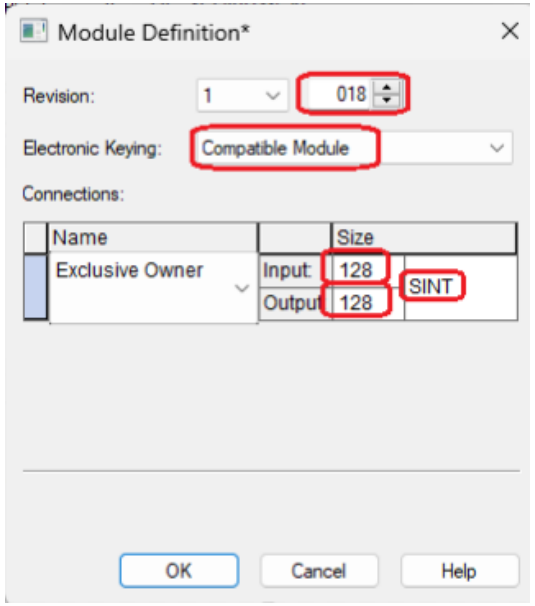
Additional Information

Module Connection Option 2 – Anybus M30

005A0000002E0100.eds

- Name the module. In this case ‘CasTemp. The controller tags automatically created to manage the data from this module will use this name (ie CasTemp:I.Data[0]).
- Change the Comm format to SINT.
- Add the EIP address for the CTW instrument. In this example ‘10.10.10.169’.
- Enter the Connection Parameters as shown on the screenshot .
- Click <Ok>





Additional Information

Module Connection Option 3– Anybus M40

005A002B00370100.eds

- Name the module. In this case ‘CasTemp. The controller tags automatically created to manage the data from this module will use this name (ie CasTemp:I.Data[0]).
- Change the Comm format to SINT.
- Add the EIP address for the CTW instrument. In this example ‘10.10.10.169’.
- Enter the Connection Parameters as shown on the screenshot .
- Click <Ok>