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Application Note for using PROtop / topGUARD with IO-Link in Rockwell Studio 5000

AN0011-PROtop_topGUARD_IO-Link_Rockwell

Revision history

Version	Date	Change log	Author
01	2019-09	First released version	W010843
02	2021-04	Minor corrections	W010843

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Content

1. Warning and disclaimer

Warning
Controls may fail in unsafe operating conditions, causing uncontrolled operation of the controlled devices. Such hazardous events can result in death and / or serious injury and / or property damage. Therefore, there must be provide safety equipment/ electrical safety design or other redundant safety features that are independent from the automation system.

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In order to protect equipment, systems, machines and networks against cyber threats, it is necessary to implement (and maintain) a complete state-of-the-art industrial security concept. The customer is responsible for preventing unauthorized access to his equipment, systems, machines and networks. Systems, machines and components should only be connected to the corporate network or the Internet if necessary and appropriate safeguards (such as firewalls and network segmentation) have been taken.

2. Abstract

This application note contains instructions how to set up PROtop and topGUARD devices with IO-Link communication interface in Rockwell Studio 5000 Logix Designer with Allen-Bradley hardware. It explains cyclic and acyclic access to I/O data of PROtop and topGUARD.

3. Requirements

The following hardware and software were used for this guide.

Hardware	Order Number
1 x Allen-Bradley Compact Logix	1769-L16ER-BB1B
1 x Allen-Bradley Point IO	1734-AENTR
1 x Allen-Bradley IO-Link Master	1734-4IOL
2 x PRO COM IO-LINK	2587360000
1 x PROtop 240W, 24V, 10A	2466880000
1 x topGUARD TGD FIM-C	2625000000
4 x TGD ELM-6	2624980000
4 x TGD ELM-12	2624990000

Software
Studio 5000 Logix Designer
IODD Weidmueller-PROtopIO-LINK
IODD Weidmueller-topGUARDIO-LINK

4. Create Project

Start Studio 5000 and create a new project. Select desired controller, type in a project name, select a project path and click "Next".
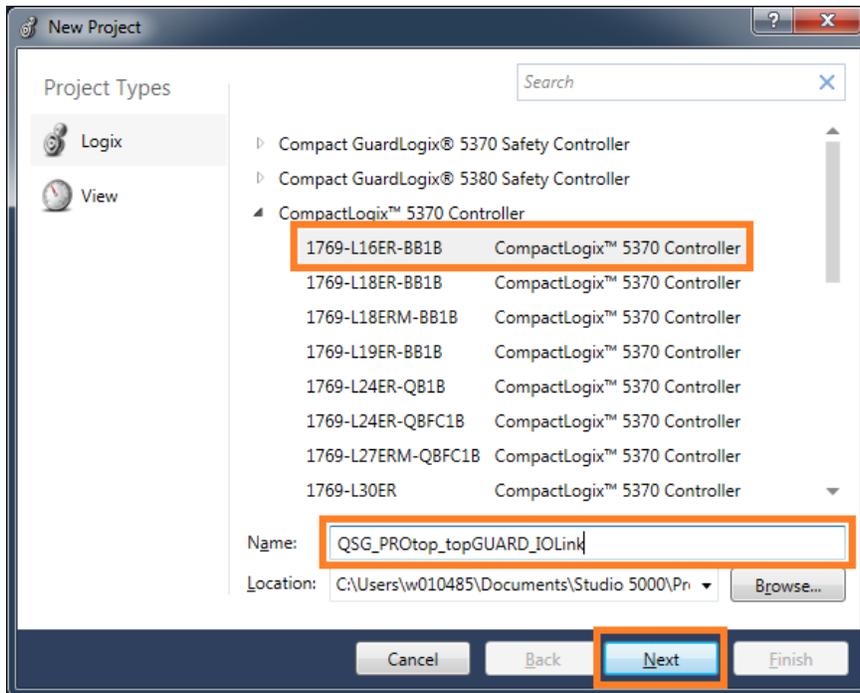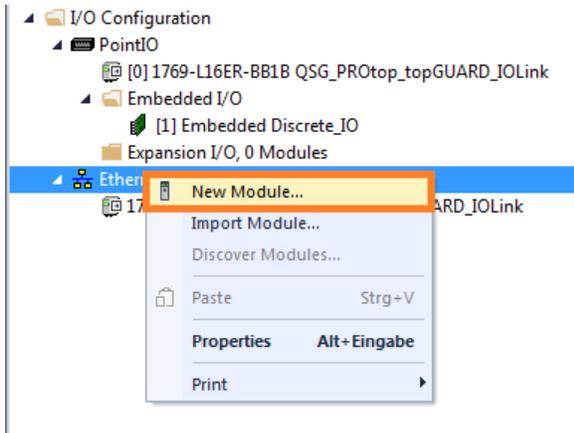

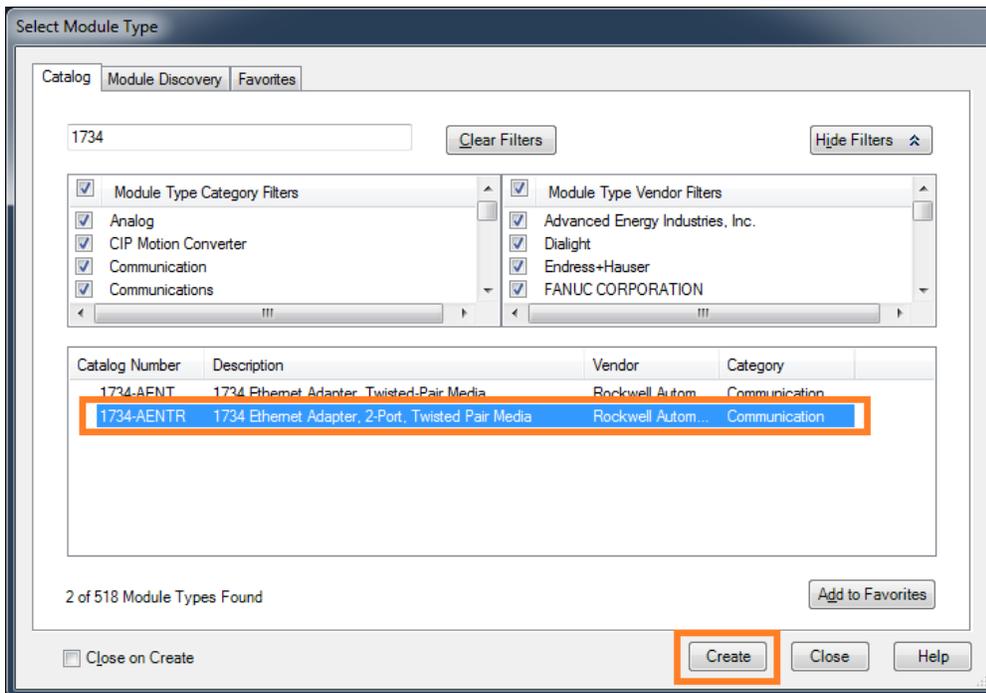Select revision, number of expansion modules and protection, then click "Finish"
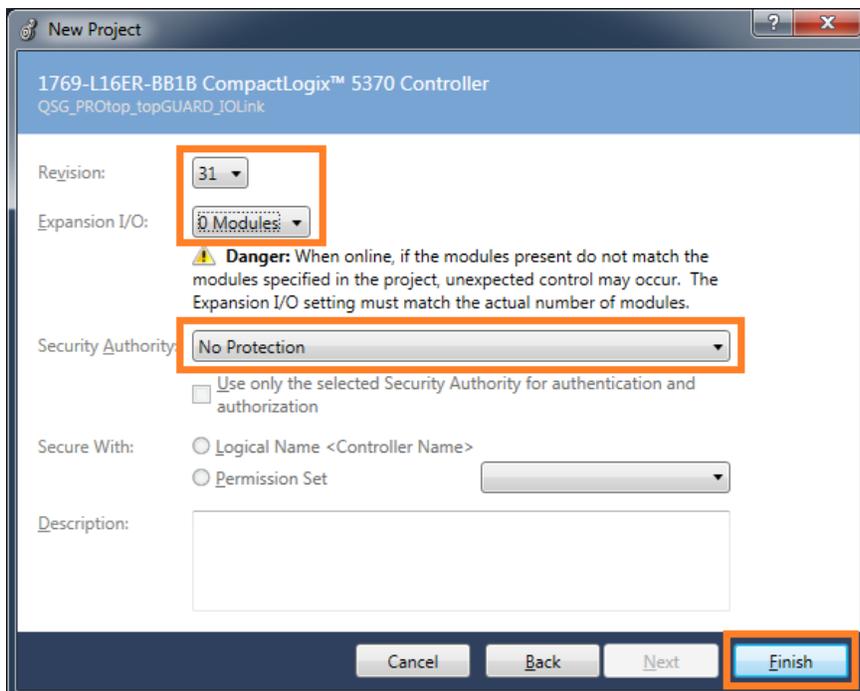
5. Hardware Setup

First set up a hardware configuration. Navigate to the "Ethernet" node in the project tree. Do a right click and select "New Module…"


Select 1734 Ethernet Adapter from catalog and click "Create".

Type in a name for the module and select the IP-Address. Next you need to change "Chassis Size" in the "Module Definition" window. The size depends on how many modules are connected to the POINT IO station. In this example only the 4IOL module is connected so a chassis size of 2 is selected. Make sure "Series" and "Revision" match your physical module. Click "OK".
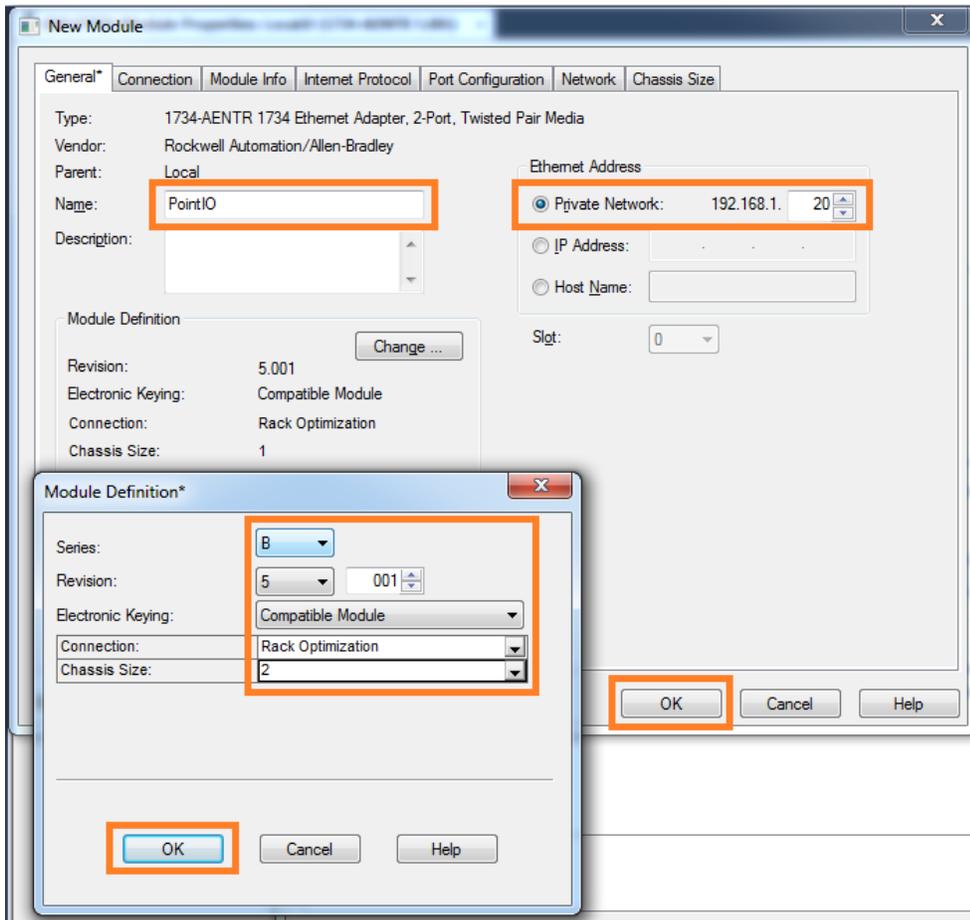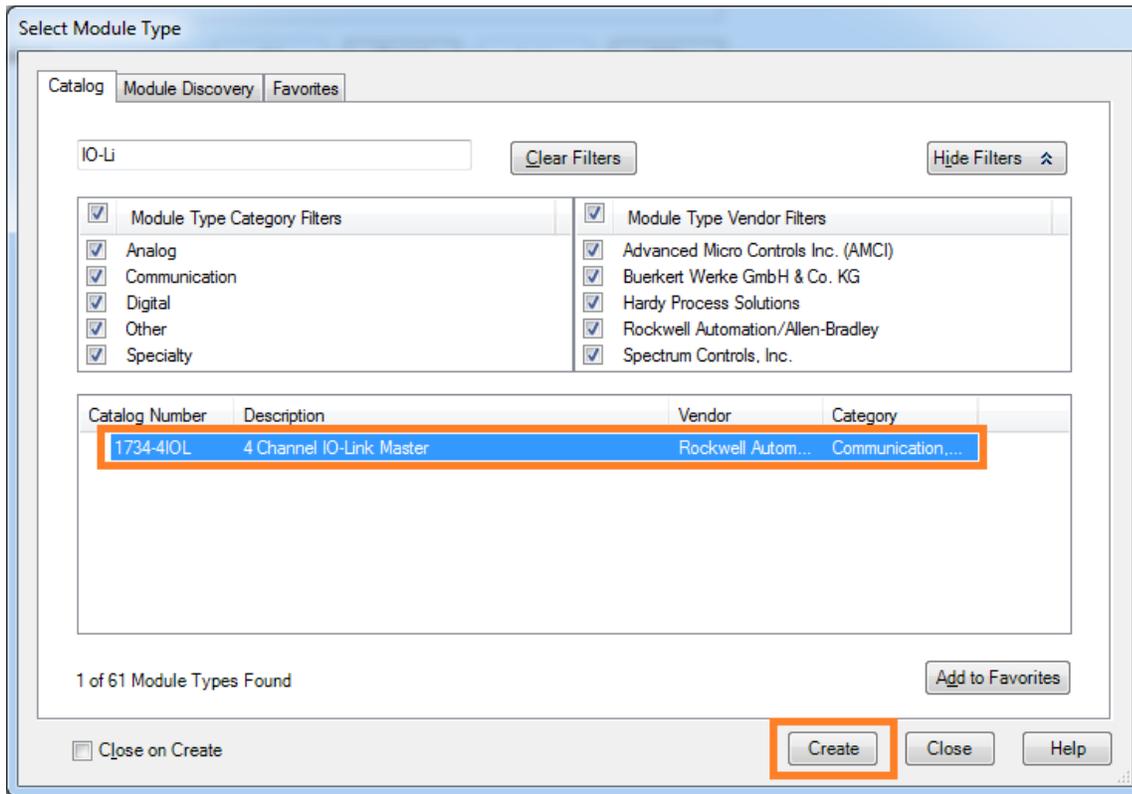

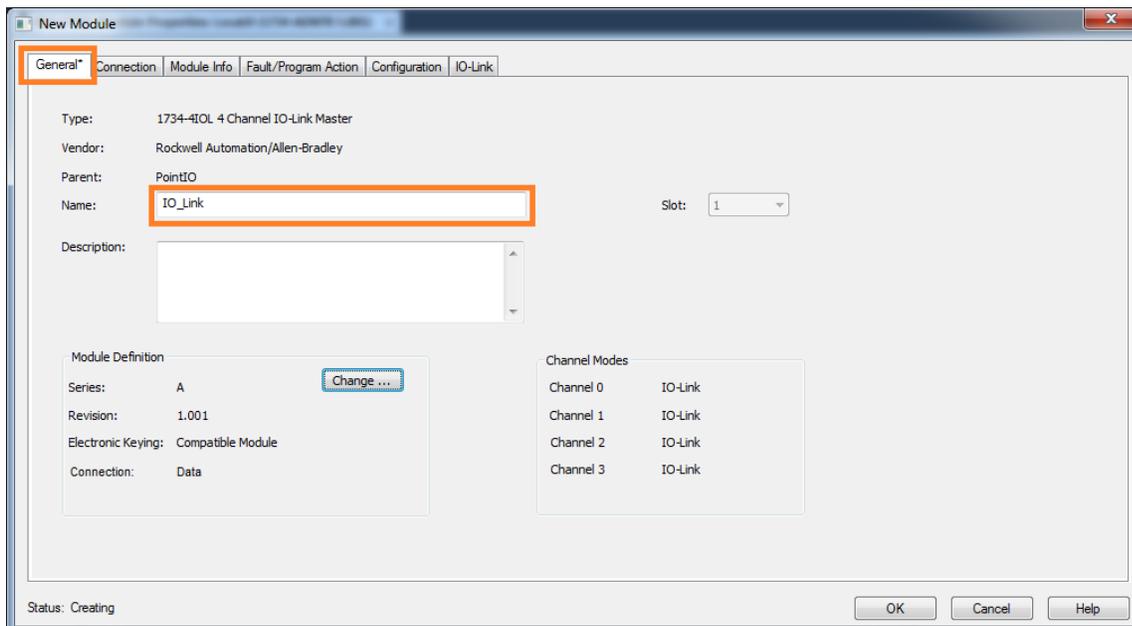Navigate to ne created 1734-AENTR module, do a right click and select "New Module…"
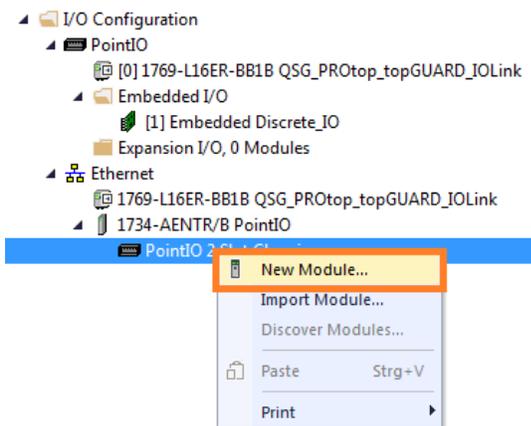
Select 1734-4IOL module and click "Create"

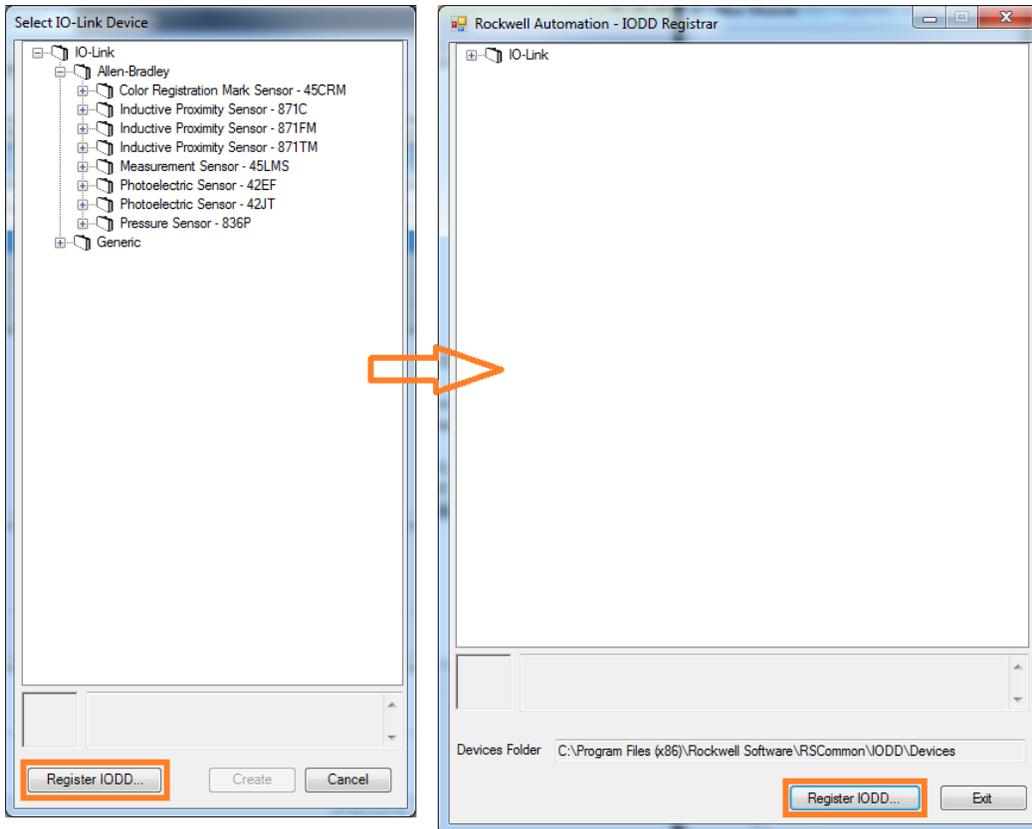Type in a name for the IO-Link module and make sure series and revision are correct.

Change to "IO-Link" tab and click "Change…".
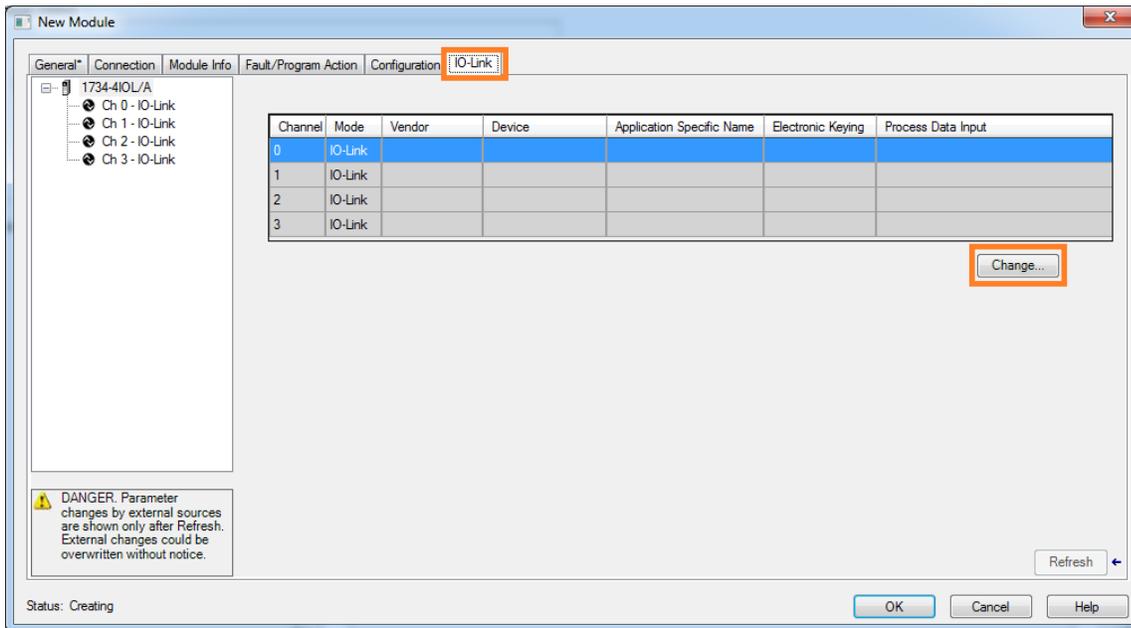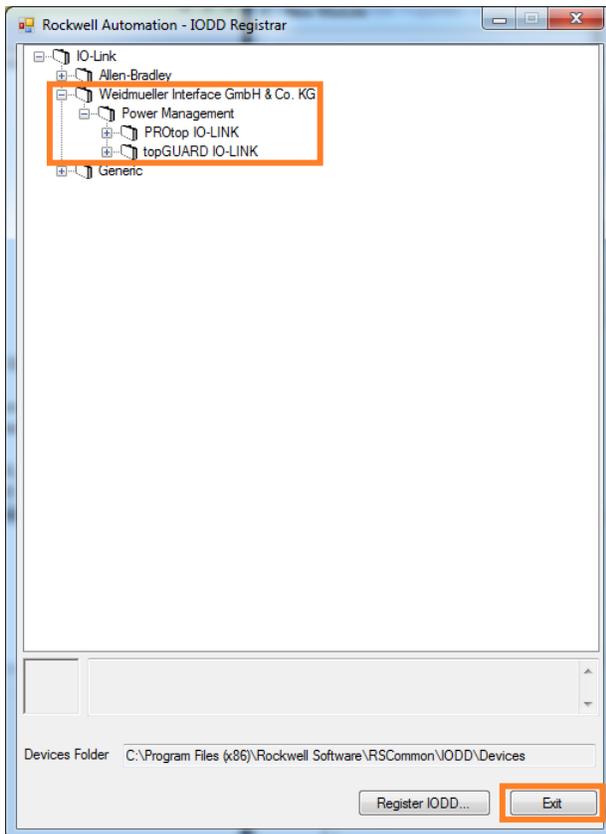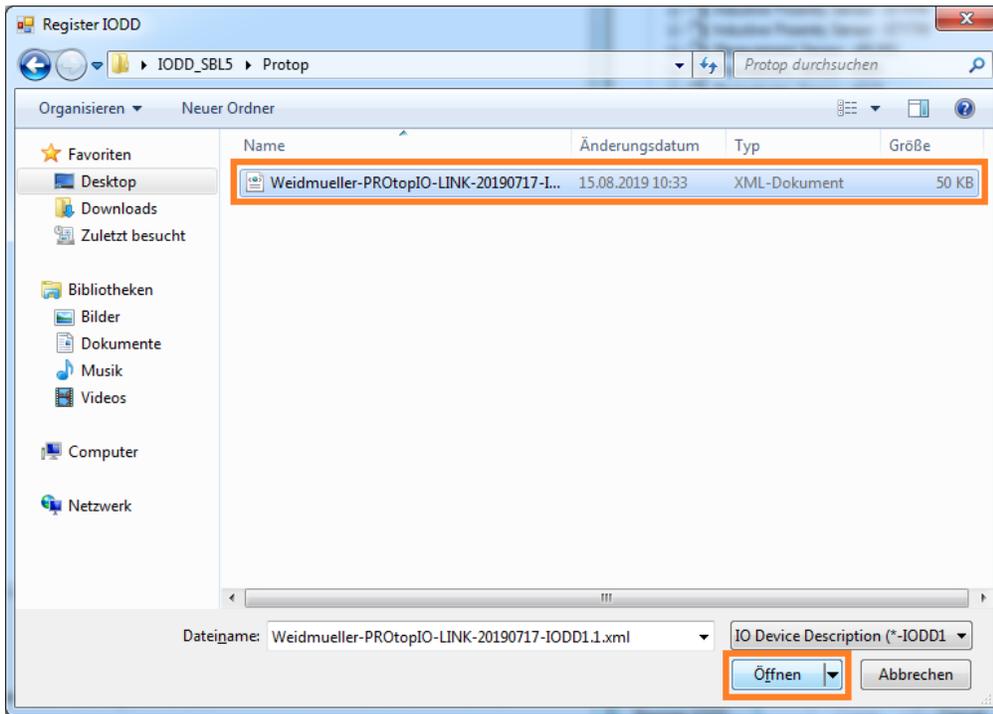

You first need to register the IODD files of PROtop and topGUARD. Click "Register IODD…" to open the file dialog.
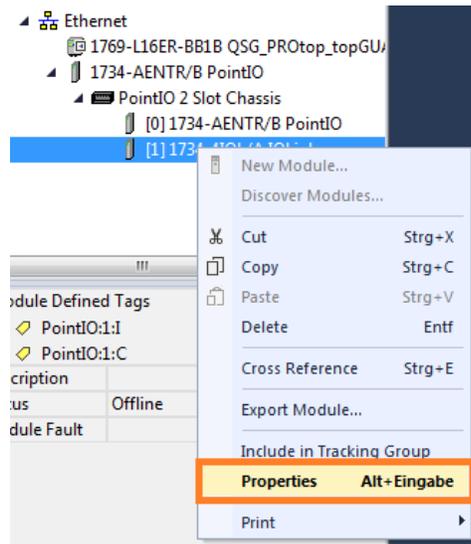
Open the IODD files for PROtop and topGUARD.

When the import was done successfully PROtop and topGUARD appear in the IO-Link device tree.

Please restart Studio 5000 Logix Designer.

Navigate again to "IO-Link" tab in 1734-4IOL properties window.

Click "Change…" then select a channel and click "Change Device". Select device for the desired channel and click "Create". In this example PROtop is connected to channel zero and topGUARD is connected to channel one.
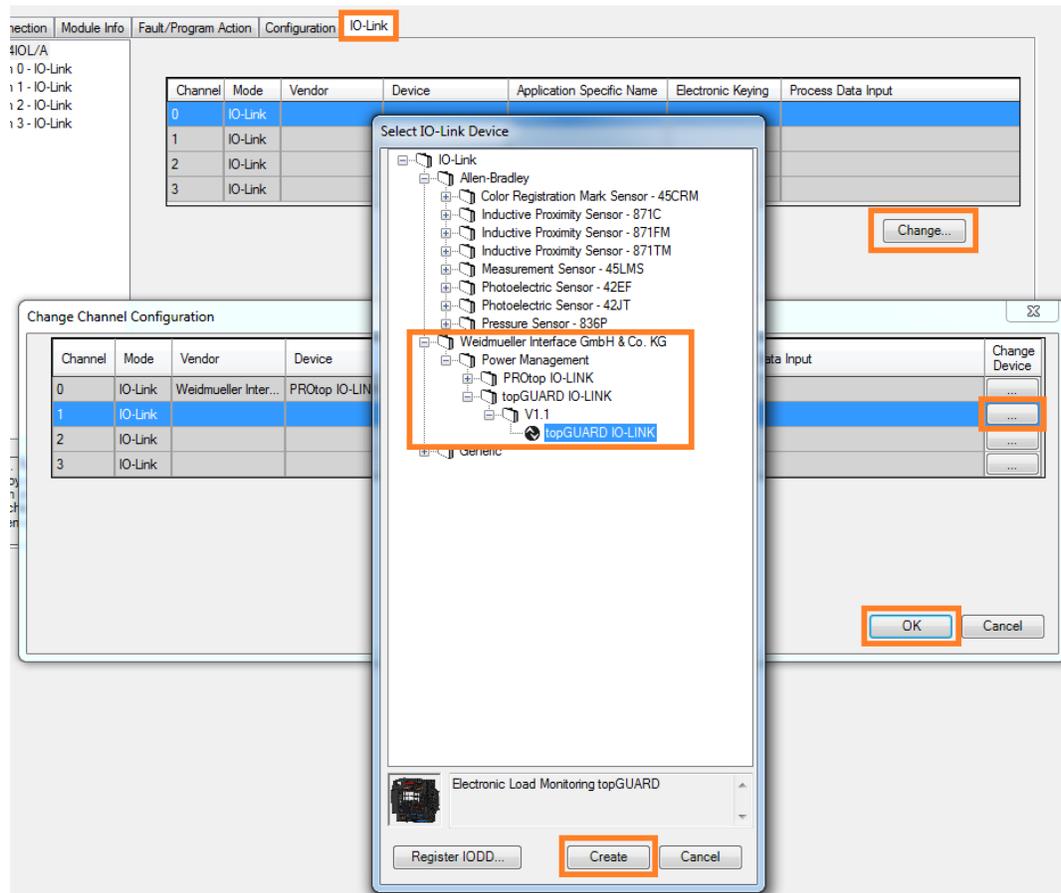
To download the project to the controller you first need to set the device path. Click on the network symbol and select the controller from the device tree. Optional: Click "Set Project Path" to save the path for this project. Click "Download" to transfer the project to the controller.
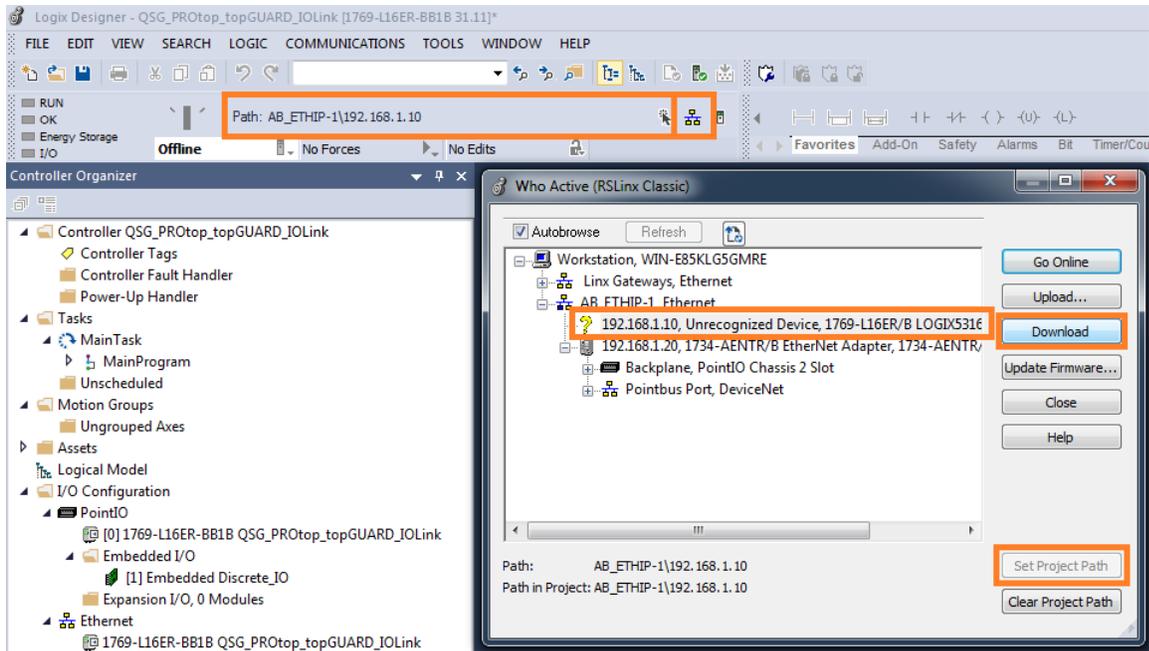
6. Program

When hardware setup is done you can start creating a program to read and write data to the connected IO-Link devices. IO-Link data is divided into cyclic data like process data and acyclic data like parameter or device data.

Process Data

When download was done successful you should now be online. Please check the status LEDs in the top left corner. "Run Mode", "Controller OK" and "I/O OK" should light solid green. To read or to write process data open "Controller Tags" and navigate to the input or output data of the IO station. The tag name refers to the name of the AENTR module in hardware configuration. In this example Ch0Data[0] and Ch0Data[1] display the PROtop output voltage.

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Parameters

To read or to write acyclic data Rockwell uses the Message (MSG) instruction. You find the MSG instruction in the element group "Input/Output". You can simply drag and drop it into your code.

To use this instruction, you first need to create a message tag in "Controller Tags" with data type "MESSAGE"

Name	Value	Force Mask	Style	Data Type
▷ MessageWrite_PROtop	{...}	{...}		MESSAGE

Click on the "…" button to configure the MSG instruction
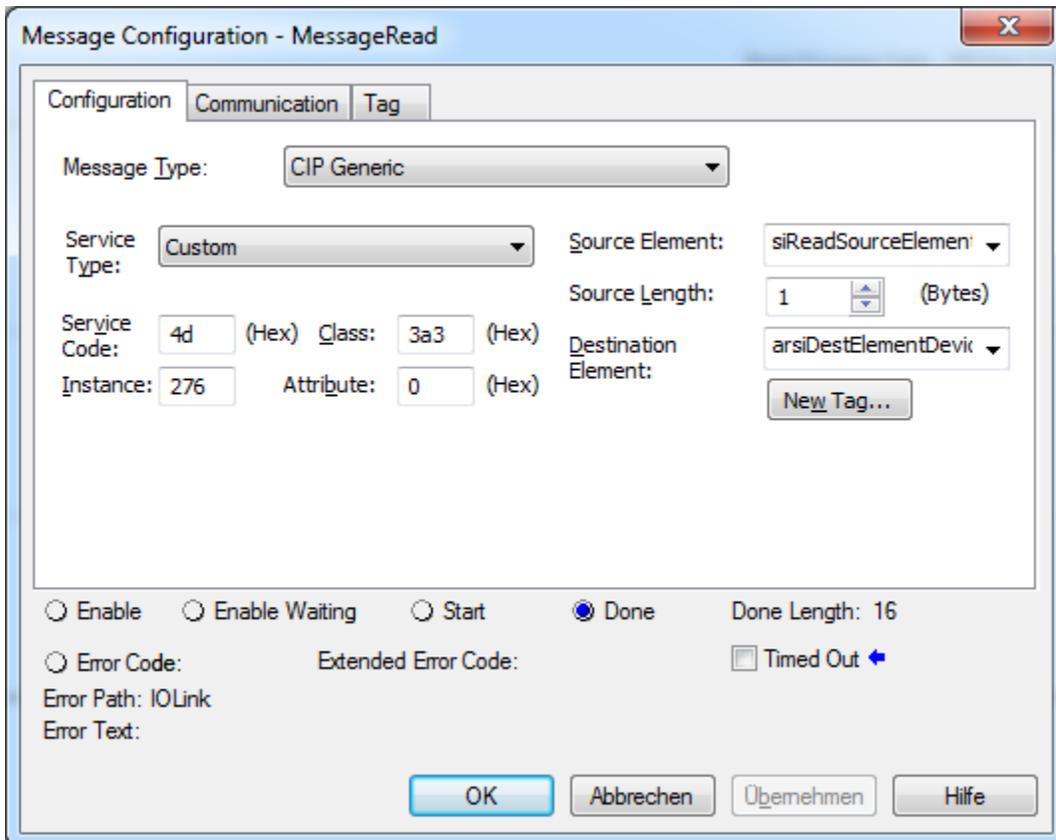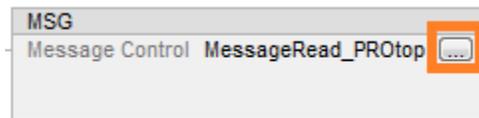
This screenshot shows all necessary information to configure the message instruction. For further information please see Rockwell POINT I/O 4 Channel IO-Link Master Module user manual. To find out the index or subindex of a parameter you want to read or to write please see PROtop / topGUARD IO-Link manual.

Message Configuration

In this tab	For this item	Type or choose		
Communication	Path	the IO-Link Master module.		
Configuration	Message Type	CIP Generic		
	Service Type	Custom		
	Service Code (Hex)	the applicable service code		
		Service Code	**Service Name**	**Description**
		4B	Read_Subindex	Reads a parameter value from the IO-Link device.
		4C	Write_Subindex	Writes a parameter value to the IO-Link device.
		4D	Read_Index	Reads an entire index (all parameters within an index) from the IO-Link device (uses subindex 0)
		4E	Write_Index	Writes an entire index (all parameters within an index) to the IO-Link device (uses subindex 0).
	Class	3A3		
	Instance	the device-specific parameter index value as specified by the device vendor. Refer to Locate the Parameter Index or Subindex Value in the IODD File on page 48 for more information.		
	Attribute	0		
	Source Element	one of the following according to the service code.		
		4B (read subindex)	source_array where source element data type is SINT[2]. In this case SINT[0] is subindex as provided by the Device vendor, SINT[1] is the channel number from where the data has to be read. The channel value ranges from 0 to 3. The value must be in hex. Refer to Read Subindex Request Parameters on page 48 for more information.	
		4C (write subindex)	a local source tag that contains data that is to be sent with the service. The source element will have a byte for the subindex number, a byte for the channel number, followed by the bytes of data that need to be written. Refer to Write Subindex Request Parameters on page 48 for more information.	
		4D (read index)	source_array where source element data type is SINT. In this case the SINT is the channel number from where the data has to be read. The channel value ranges from 0 to 3. The value must be in hex. Refer to Read Index Request Parameters on page 48 for more information.	
		4E (write index)	a local source tag that contains data that is to be sent with the service. The source element will have a byte for the index number, a byte for the channel number, followed by the bytes of data that need to be written. Refer to Write Index Request Parameters on page 48 for more information.	
		Refer to Locate the Parameter Index or Subindex Value in the IODD File on page 48 for more information.		
	Source Length (bytes)	one of the following according to the service code.		
		4B (read subindex)	the length of the source element.	
		4C (write subindex)	the length of the source element.	
		4D (read index)	the length of the source element.	
		4E (write index)	the length of the source element.	
	Destination Element	destination_array tag that will contain data received from the service. The controller tag specified in destination element must be SINT[X] or DINT[X] data type, where X refers to number of bytes of data. This size is to be provided by the device vendor. This size is the size of parameter that is being read or written to the IO Link device.		