



Weidmüller 

UR20-4COM-IO-LINK

1315740000

IO-Link with topGUARD in Siemens TIA Portal

Instructions to read and to write cyclic and non-cyclic data

**AN0049v02-UR20-4COM-IO-LINK with topGUARD in
Siemens TIA Portal**

Revision history

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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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Security notes

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 access cyclic and non-cyclic data of IO-Link slave devices using the Weidmüller UR20-4COM-IO-LINK module in Siemens Tia Portal. This example explains, how to read and to write a parameter of a Weidmüller topGUARD device with IO-Link communication interface.

3. Components

This chapter describes, which hardware and software components were used in the example project.

3.1. Hardware

The following table shows the hardware components which were used in the example project.

Device	Order Number
1 x Siemens S7 1212C DC/DC/DC	6AG1212-1AE31-4XB0
1 x UR20-FBC-PN-IRT	1334880000
1 x UR20-4COM-IO-LINK	1315740000
1 x PRO COM IO-LINK	2587360000
1 x topGUARD TGD FIM-C	2625000000
4 x TGD ELM-6	2624980000

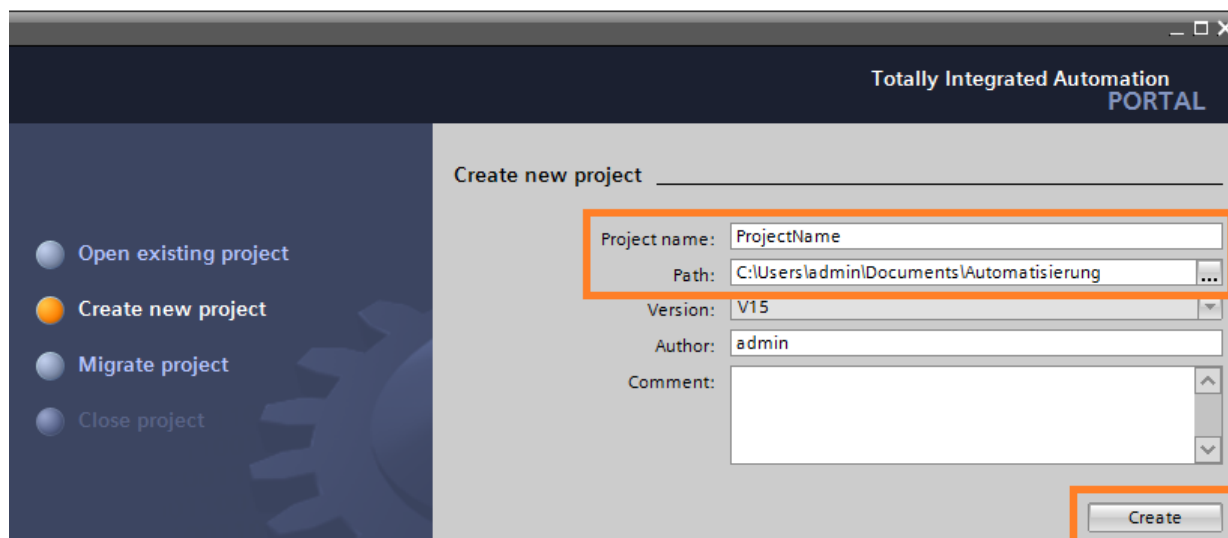
3.2. Software

The following table shows the software which was used in this example.

Software
Siemens TIA Portal V16

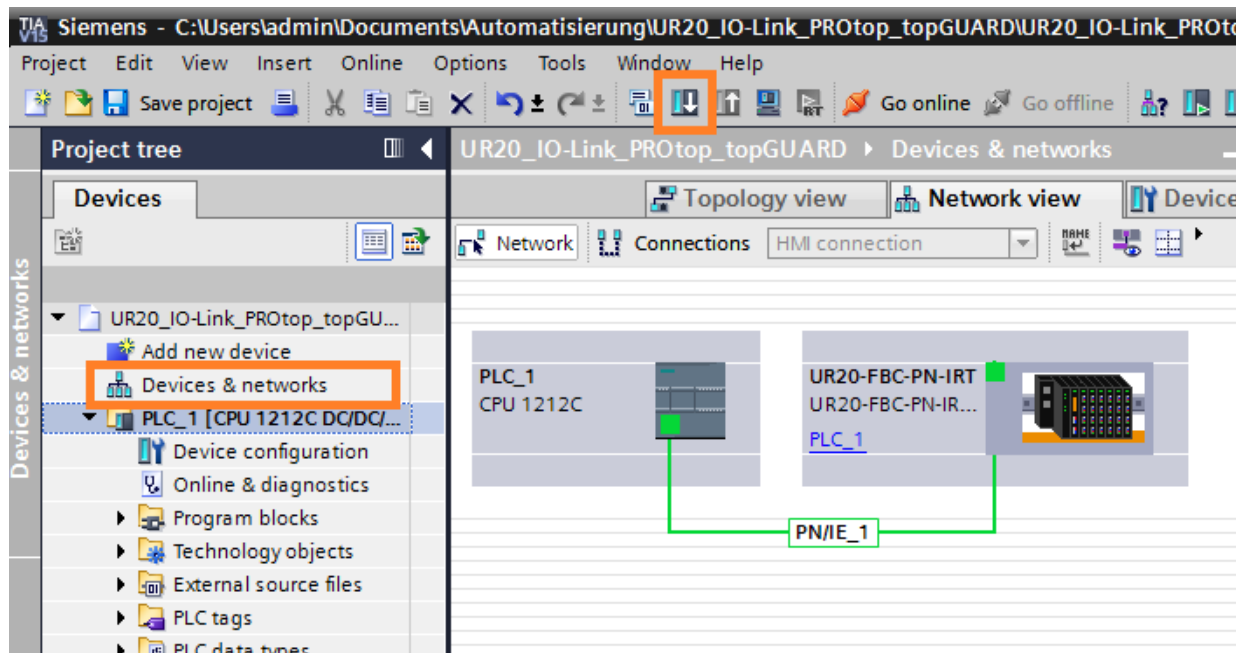
4. Create Project

Start TIA Portal and create a new project. Type in a project name, select a project path and click “Create”.



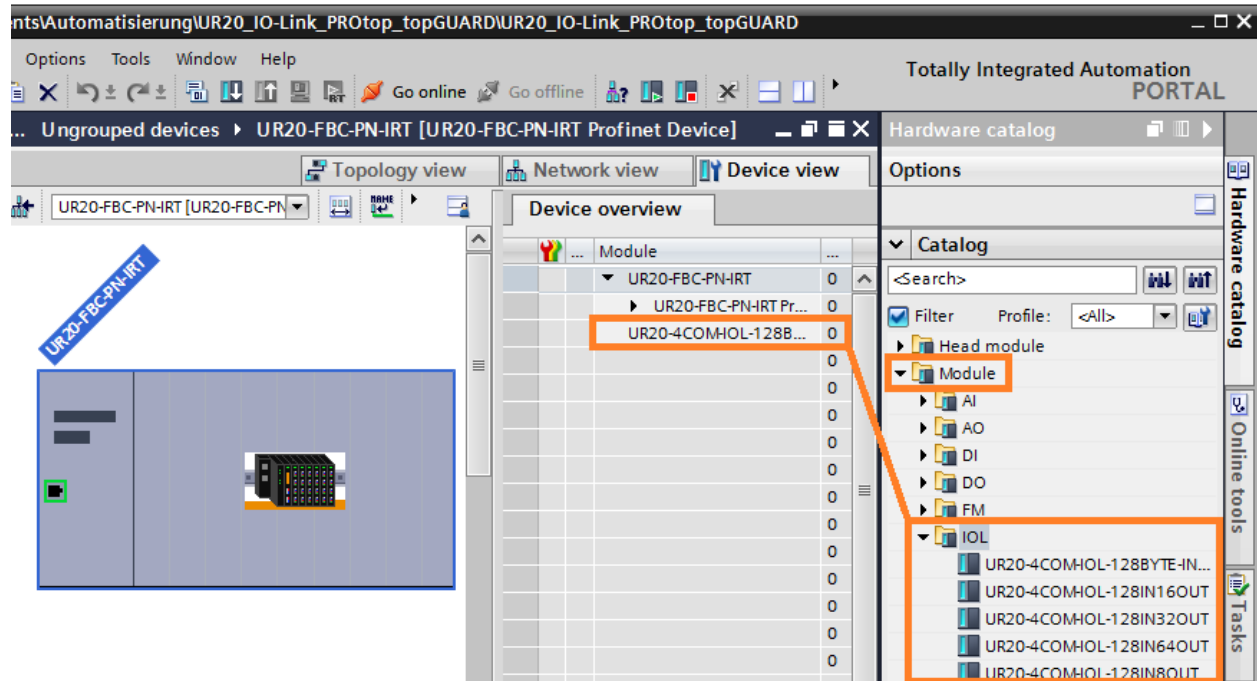
5. Hardware Setup

First set up a hardware configuration. Go to “Devices & networks” and simply drag and drop the devices from hardware catalog into network view. Connect the network adapters in the same way as the physical connection. Change IP-Addresses if necessary.

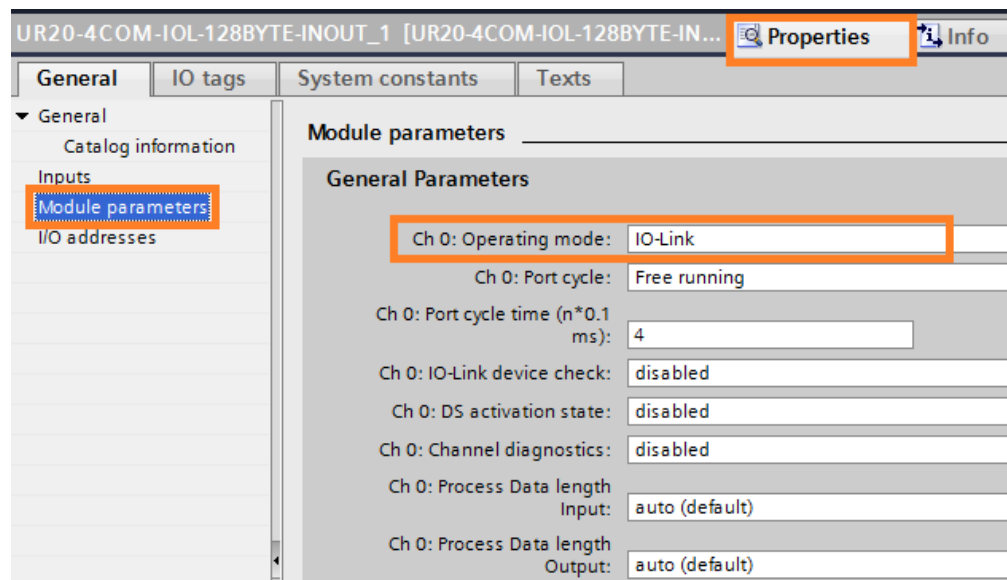


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Double click on UR20-FBC-PN-IRT device and select UR20-4COM-IOL IO-Link Master module from catalog and drag and drop it to the desired slot.



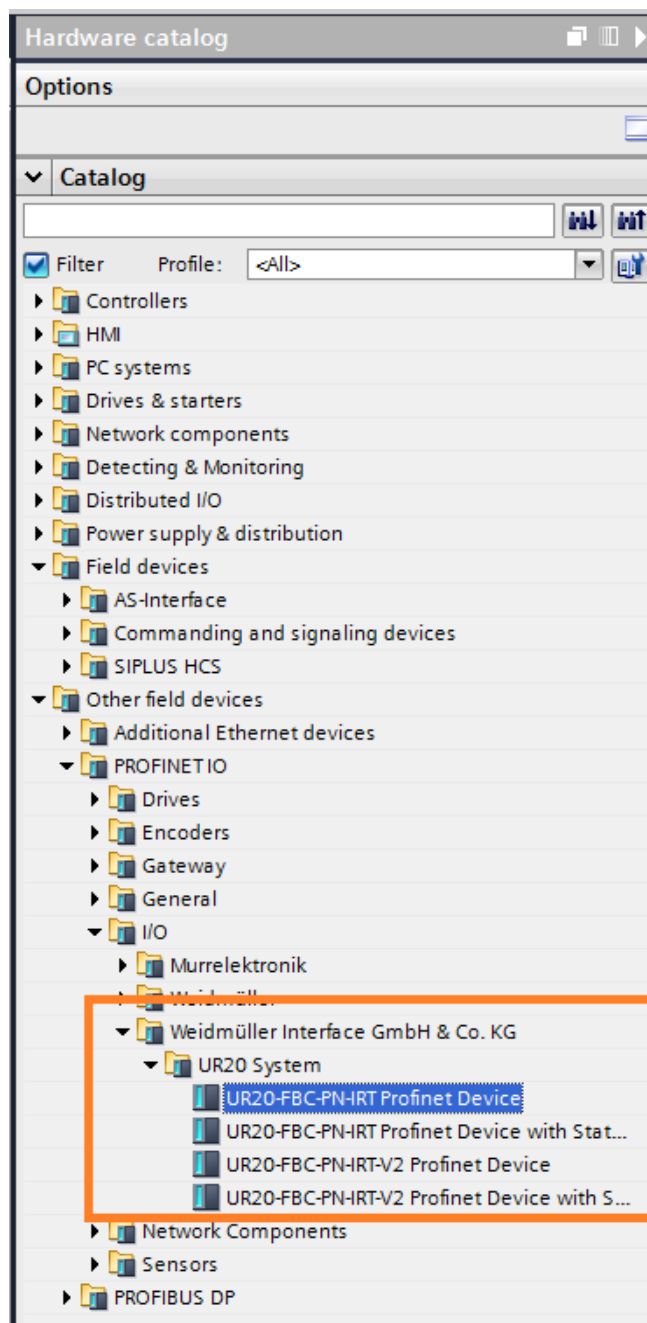
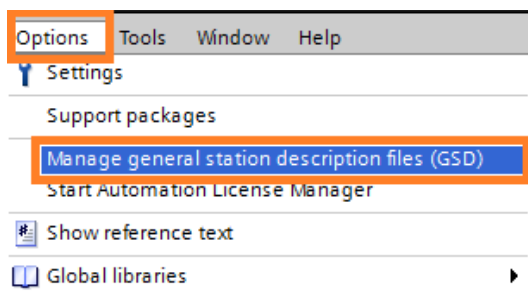
Do a right click on the UR20-4COM-IOL module you just added and select **Properties**. Navigate to **Module parameters** and change the operating mode of desired channels to **IO-Link**. Change other parameters if necessary.



When hardware setup is done please download the configuration to the plc.

In Case you can't find the right Weidmüller products in the TIA Portal hardware catalog, you need download the corresponding GSDML files from <https://www.weidmueller.com/>

To install the GSDML go to **Options - Manage general station description files.** Please restart TIA Portal after installation process.

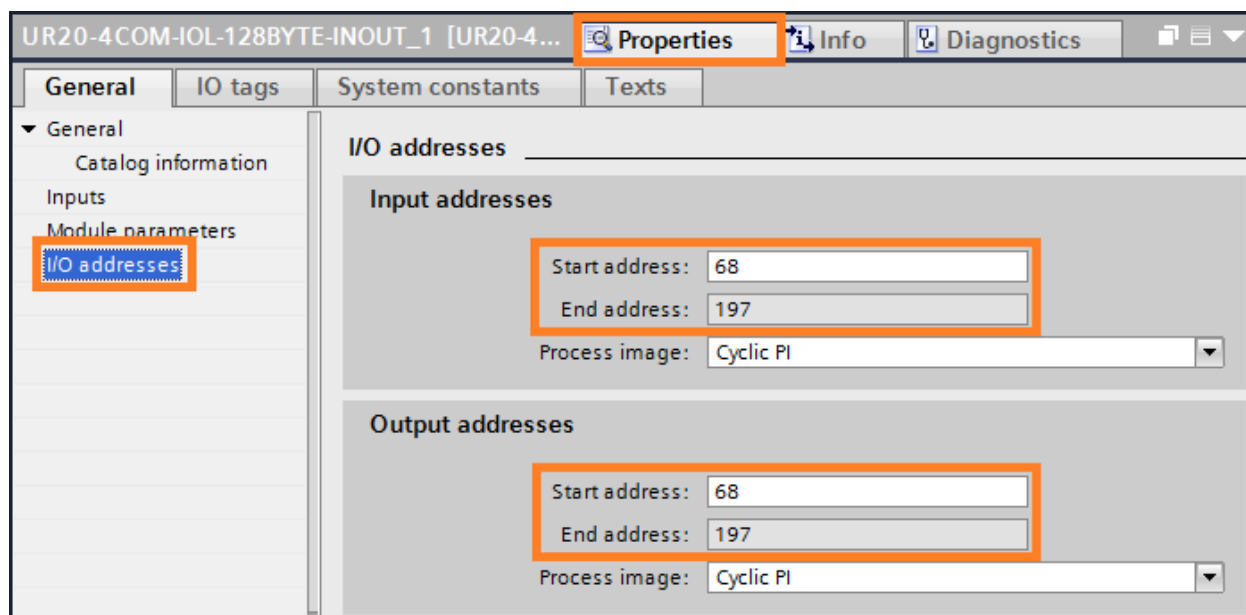


6. Program

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

6.1. Process Data

To read or to write process data you first need to find out the address range of the UR20-4COM-IO-LINK module.



- Input addresses 68 ... 197
- Output addresses 68 ... 197

(Addresses in you project may differ due to other connected IO devices.)

Based on these addresses you can start to create tags. Please refer to the register description of your IO-Link slave device. In this example the IO-Link slave device is a Weidmüller topGUARD station with PRO COM IO-Link interface module.

4.1 Process data in

Table 1: Process data in for topGuard IO-LINK					
No. of top Guard Fuse	Parameter	Type	Bit-Off-set	Length [Bits]	Comment/ Description
N=31	TGD-ELM Load Alarm Warning	Bool	127	1	See below!
	TGD-ELM Load Pre-Warning	Bool	126	1	See below!
	TGD-ELM Short Circuit Switch Off	Bool	125	1	See below!
	TGD-ELM Device Failure	Bool	124	1	See below!
....	TGD-ELM Load Alarm Warning	Bool	...	1	See below!
	TGD-ELM Load Pre-Warning	Bool	...	1	See below!
	TGD-ELM Short Circuit Switch Off	Bool	...	1	See below!
	TGD-ELM Device Failure	Bool	...	1	See below!
N=2	TGD-ELM Load Alarm Warning	Bool	7	1	See below!
	TGD-ELM Load Pre-Warning	Bool	6	1	See below!
	TGD-ELM Short Circuit Switch Off	Bool	5	1	See below!
	TGD-ELM Device Failure	Bool	4	1	See below!

Siemens - C:\Users\admin\Documents\Automatisierung\UR20_IO-Link_PROtop_topGUARD\UR20_IO-Link_PROtop_topGUARD

Project Edit View Insert Online Options Tools Window Help

Save project Go online Go offline Search in project

Project tree UR20_IO-Link_PROtop_topGUARD > PLC_1 [CPU 1212C DC/DC/DC] > PLC tags > Standard-Variable...

Devices

UR20_IO-Link_PROtop_top...

Add new device

Devices & networks

PLC_1 [CPU 1212C DC/DC/DC]

Device configuration

Online & diagnostics

Program blocks

Technology objects

External source files

PLC tags

Show all tags

Add new tag table

Standard-Variable...

PLC data types

Watch and force tab...

Online backups

Device proxy data

Program info

PLC alarm text list

Standard-Variablen-tabelle

	Name	Data...	Addr...	Monitor value	Acces...	Retain	Writa...	Visibl...
1	I_xTGDELMDeviceFailure_1	Bool	%I85.0	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	I_xTGDELMDeviceFailure_2	Bool	%I85.4	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	I_xTGDELMDeviceFailure_3	Bool	%I84.0	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	I_xTGDELMDeviceFailure_4	Bool	%I84.4	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	I_xTGDELMLoadAlarmWarning_1	Bool	%I85.3	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	I_xTGDELMLoadAlarmWarning_2	Bool	%I85.7	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	I_xTGDELMLoadAlarmWarning_3	Bool	%I84.3	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8	I_xTGDELMLoadAlarmWarning_4	Bool	%I84.7	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9	I_xTGDELMLoadPreWarning_1	Bool	%I85.2	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	I_xTGDELMLoadPreWarning_2	Bool	%I85.6	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11	I_xTGDELMLoadPreWarning_3	Bool	%I84.2	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
12	I_xTGDELMLoadPreWarning_4	Bool	%I84.6	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
13	I_xTGDELMShortCircuitSwitchOff_1	Bool	%I85.1	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
14	I_xTGDELMShortCircuitSwitchOff_2	Bool	%I85.5	TRUE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
15	I_xTGDELMShortCircuitSwitchOff_3	Bool	%I84.1	FALSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
16	I_xTGDELMShortCircuitSwitchOff_4	Bool	%I84.5	TRUE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
17	<Add new>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Download the project to the plc. When you switch to online view, you should see process data values.

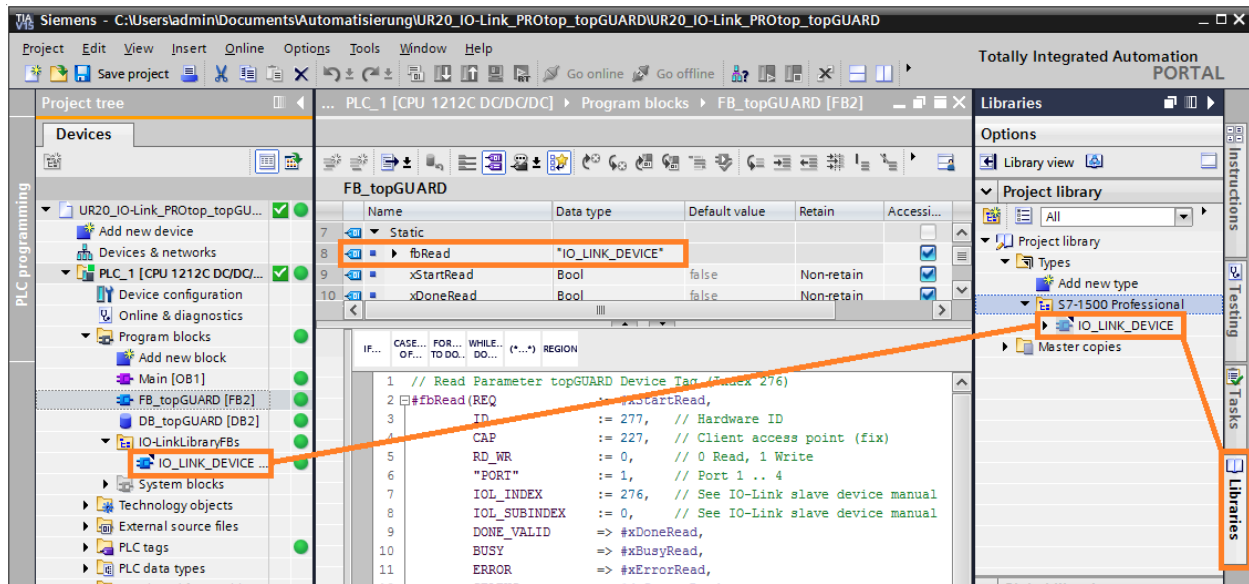
6.2. Parameter

To read or to write non-cyclic data Siemens provides a function block called “IO_LINK_DEVICE” which is part of the Siemens IO-Link library available on their website.

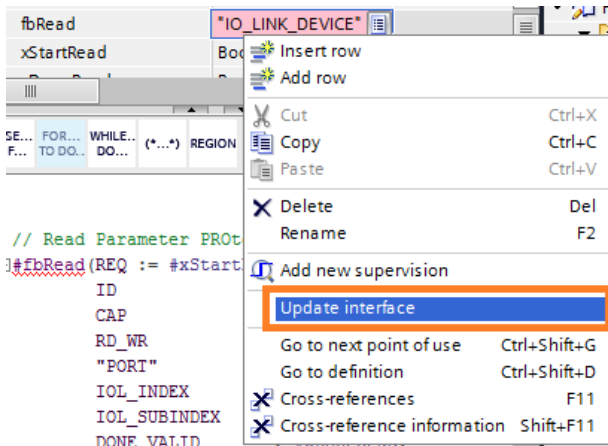
<https://support.industry.siemens.com/cs/document/82981502/acyclic-read-and-write-with-the-io-link-library?dti=0&lc=en-WW>

Please see library documentation how to install the library.

When the library was installed successfully, you can drag the IO_LINK_DEVICE function block from the library into the “Program blocks” folder in you project tree.



Now you can use the IO_LINK_DEVICE FB in your program. You may need to update the FB interface.



To read or to write parameters the function block requires some input tags (see function block comments). For detailed information please see Siemens library documentation. To find out the index or subindex of a parameter you want to access please see register description of the connected IO-Link slave device.

6.3. Example

The following picture shows an example code to read and to write the topGUARD parameter “Device Tag” at index 276.

```

1 // Read Parameter topGUARD Device Tag (Index 276)
2 #fbRead(REQ      := #xStartRead,
3   ID            := 277, // Hardware ID
4   CAP           := 227, // Client access point (fix)
5   RD_WR         := 0,   // 0 Read, 1 Write
6   "PORT"        := 1,   // Port 1 .. 4
7   IOL_INDEX     := 276, // See IO-Link slave device manual
8   IOL_SUBINDEX  := 0,   // See IO-Link slave device manual
9   DONE_VALID    => #xDoneRead,
10  BUSY           => #xBusyRead,
11  ERROR          => #xErrorRead,
12  STATUS         => #dwStatusRead,
13  IOL_STATUS     => #dwIOL_StatusRead,
14  RD_LEN         => #iLengthRead,
15  RECORD_IOL_DATA := #arbIOL_DataRead);
16
17 // Copy read data array to char array
18 FOR #i := 0 TO 231 DO
19   #archIOL_DataRead[#i] := BYTE_TO_CHAR(#arbIOL_DataRead[#i]);
20 END_FOR;
21
22 // Write Parameter topGUARD Device Tag (Index 276)
23 #fbWrite(REQ      := #xStartWrite,
24   ID            := 277, // Hardware ID
25   CAP           := 227, // Client access point (fix)
26   RD_WR         := 1,   // 0 Read, 1 Write
27   "PORT"        := 1,   // Port 1 .. 4
28   IOL_INDEX     := 276, // See IO-Link slave device manual
29   IOL_SUBINDEX  := 0,   // See IO-Link slave device manual
30   LEN           := 16,  // See IO-Link slave device manual
31   DONE_VALID    => #xDoneWrite,
32   BUSY           => #xBusyWrite,
33   ERROR          => #xErrorWrite,
34   STATUS         => #dwStatusWrite,
35   IOL_STATUS     => #dwIOL_StatusWrite,
36   RECORD_IOL_DATA := #arbIOL_DataWrite);
37
38 // Copy char array to write data array
39 FOR #j := 0 TO 231 DO
40   #arbIOL_DataWrite[#j] := CHAR_TO_BYTE(#archIOL_DataWrite[#j]);
41 END_FOR;

```

The hardware id in your project may differ due to other connected devices. It can be found in the UR20-4COM-IO-LINK module properties.

