

# Quickstart guide to interface the OXM200 profile sensor via ProfiNet

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This document describes the steps necessary in order to interface the OX200 sensor via ProfiNet in combination with a Siemens PLC.

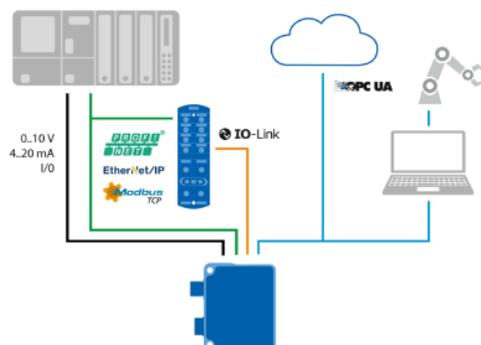
## 1 Basic setup

Profinet is a communication protocol that based on Ethernet TCP/IP. It is invented and refined from Siemens and the PROFIBUS User organization and standardized in the IEC 61158 and IEC 61784. Because of the standardization it is easy to integrate devices in existing PROFINET systems.

There are two things you need to communicate with a device via PROFINET:

1. PLC with possibility to communicate via PROFINET
  - Siemens PLC (Engineering tool: TIA Portal)
  - Other PLC with PROFINET slot card
2. GSDML File of the device (mostly called: GSD-File)
  - Description of functionality of the PROFINET IO-device
  - Comparable to IODD-File for IO-Link

### 1.1 Physical structure

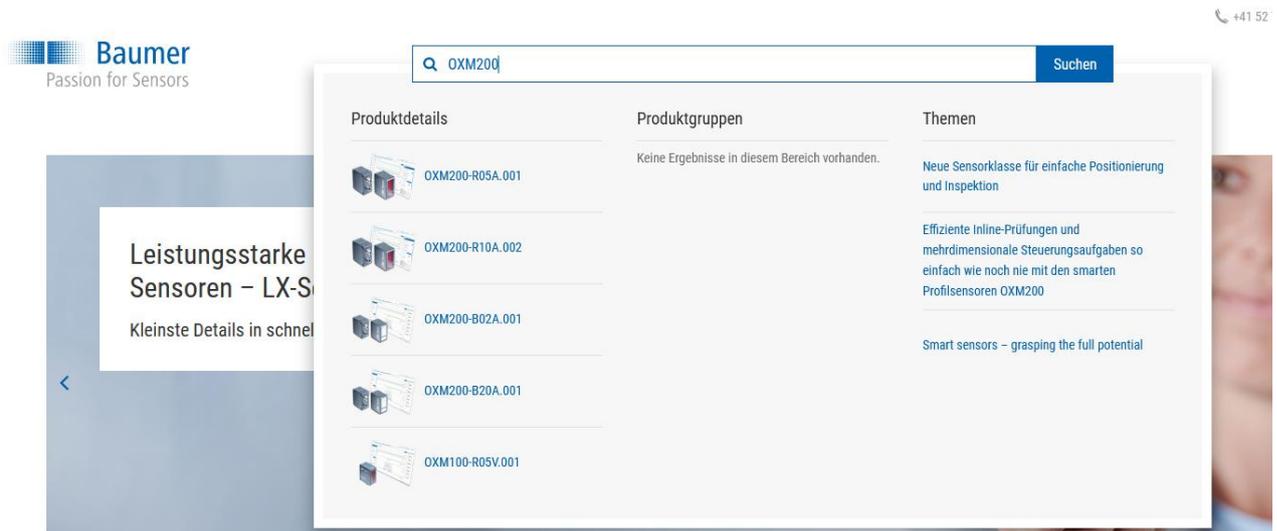


### 1.2 Download the GSD File from Baumer homepage

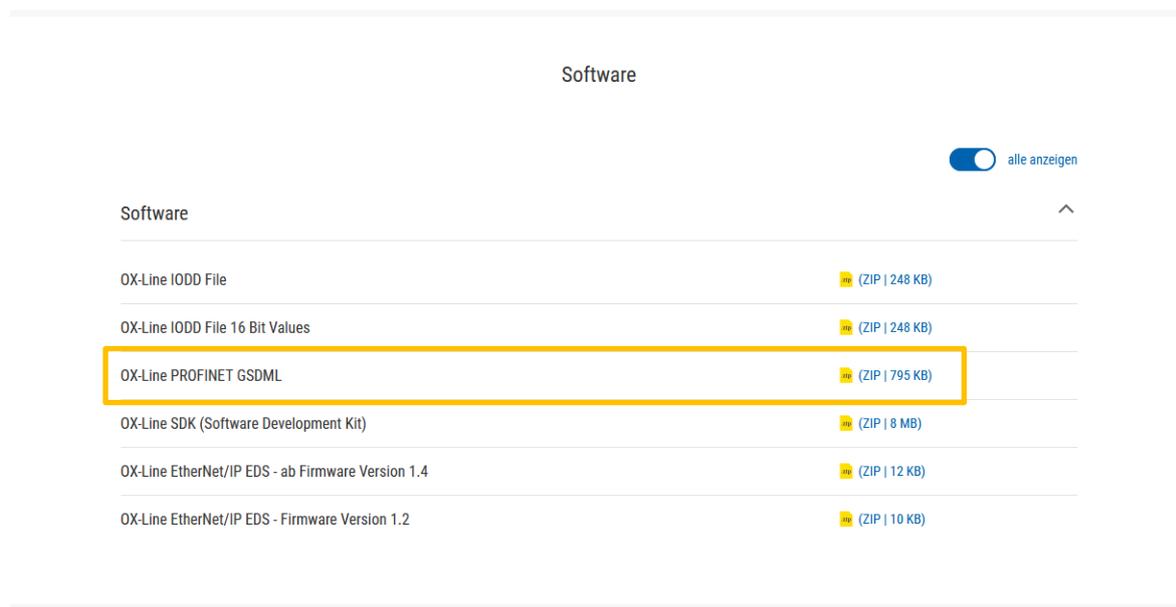
To tell the PLC which functionality a PROFINET IO-device has the manufacturer offers a GSD-File. It is an xml-File that can be downloaded from the manufactures homepage.

So if you want to download the GSD File of our OXM200 you have to follow these steps:

1. Open the Baumer homepage (<https://www.baumer.com/ch/de/>)
2. Go to the OXM200 product page by typing the article number or "OXM200" into the search bar



3. Scroll down to the "Download" Section. Here you can find the newest GSD-File as a zip folder.



4. Download it to your PC and unzip it. You should see the following content: Picture of OXM200 and GSD-File.  
➔ Now everything is prepared to start the project engineering in TIA portal!

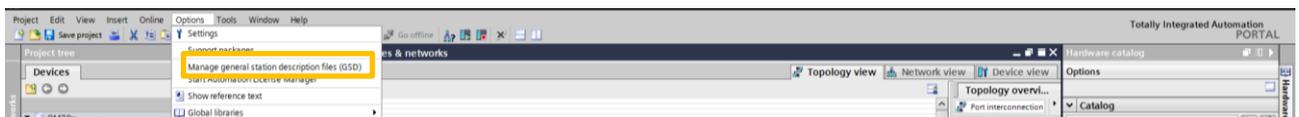
## 2 Integration of OXM200 into the operating environment

This example is based on TIA Portal version V15 and V17. The user interface of older versions may differ in some points. A Siemens PLC is used for integration of the OXM200. How to integrate the PLC into your operating environment wouldn't be part of this document.

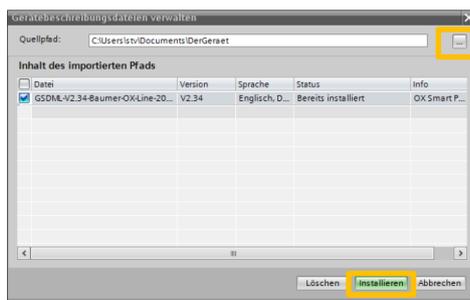
### 2.1 Install the GSD-File to the Hardware catalog

The first thing is to install the downloaded GSD-File to the TIA Portal.

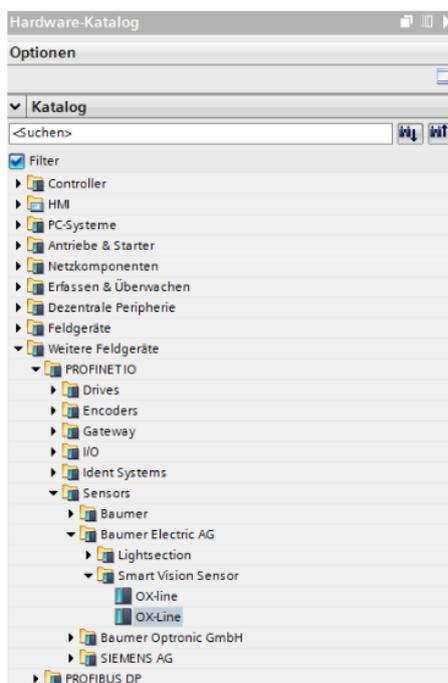
1. Select "Options" in the Tool bar
2. Go to "Manage general station description files (GSD)"

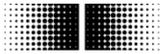


3. New window will be opened. Here you have to click on "... " and search for the downloaded GSD file on your computer. Select the GSD File and click on "Install".



4. If the GSD-File was installed successfully, you a confirmation message. Also the hardware catalog gets updated and you can see the OX-Line in the catalog on the right side of the screen.





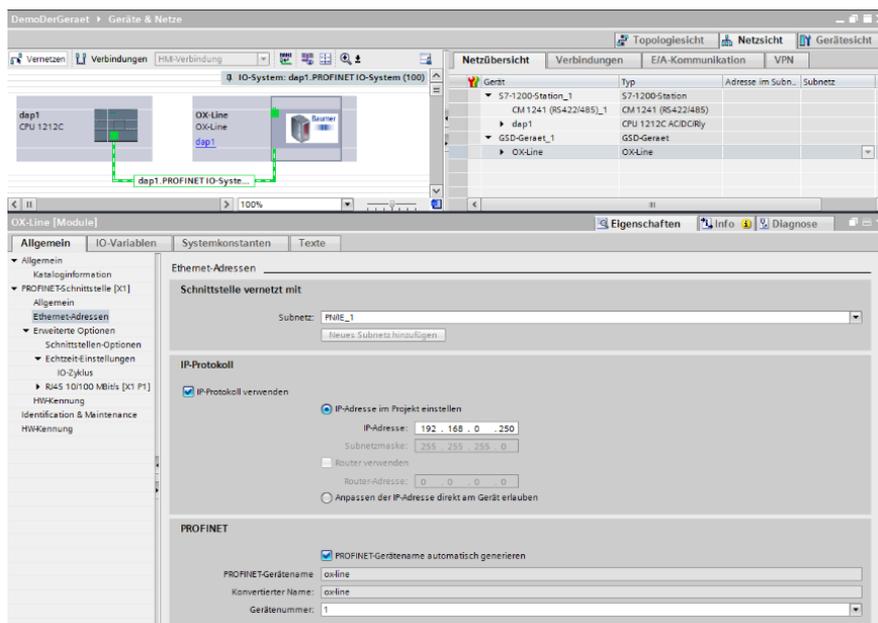
## HINT:

If you will receive an error message like the one below, you have to update your GSD checker (license). Please get in contact with the Support Center of your PLC manufacturer.



## 2.2 Integrate the OXM200 into your network

1. In the Devices and networks window in the tab Properties, you can set the IP address, the cycle time and other interface options. The combination of slots and modules is already preset.

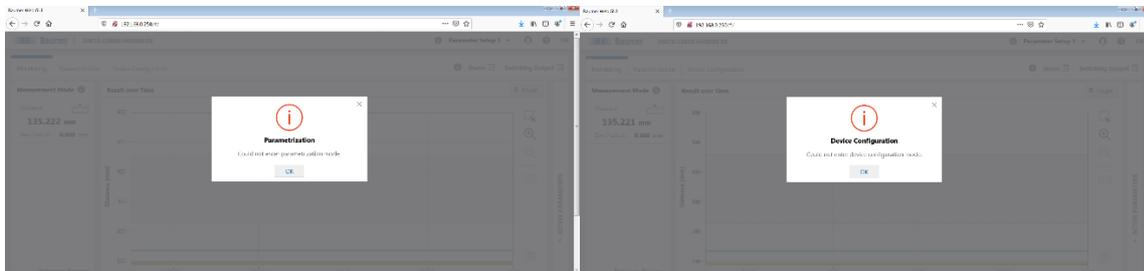


2. For the identification of an IO-Device in the PROFINET Network two things are important:
  - The device name (default: no name)
  - The IP Address (assigned automatically)

So you have to assign a unambiguous name to the OXM200. There are different possibilities how to assign a name to a device. In this case one possibility is explained. Therefore you have to go to the "Device view" (double click on device). In the bottom of the screen you see the "Properties" of the device and here you can type in the name of the OXM200. Afterward click on the small symbol over the device block to assign the new name.

**IMPORTANT:**

If you are connected via Profinet the web interface is only available in the Monitor Mode. Parametrization and Device Configuration Mode are blocked. You have to type the new IP address (automatically assigned in the PROFINET network) into your URL field of the browser.

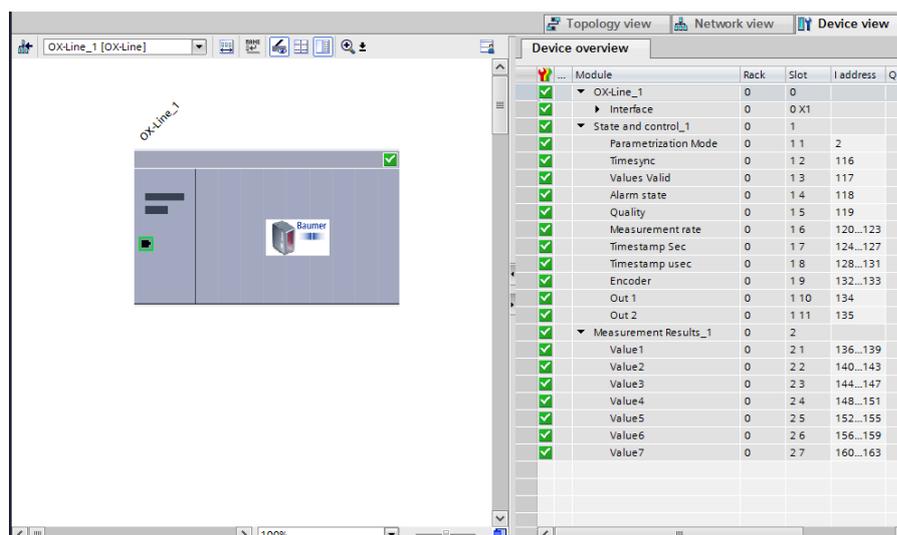


It may be that you can't reach the web interface of the OXM200. Then you have to check if your computer and the sensor are in the same subnet.

Examples:

	Not OK	OK	OK
IP Address PC	192.168.1.243	192.168.0.243	192.168.1.243
IP Address Sensor	192.168.0.250	192.168.0.250	192.168.0.250
Subnet Mask	255.255.255.0	255.255.255.0	255.255.0.0

3. If necessary, adjust the input address range of the data in the PLC process image and the name.



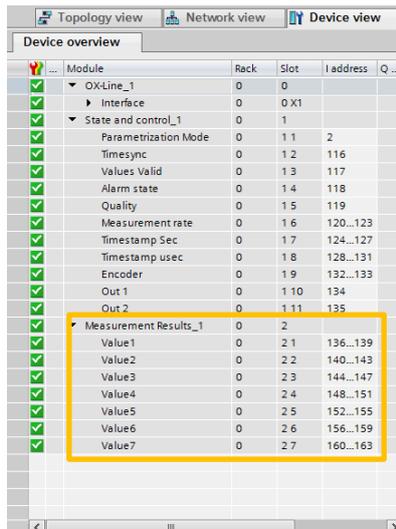
### 3 Reading measurement values (cyclic data)

For PROFINET communication there are two different types of data that a device can offer. The cyclic data and the acyclic data. Cyclic data is often used for measurement values because this data is updated with every cycle of the PLC system (minimum cycle time 1 ms) without an additional request.

#### 3.1 Monitor measurement values

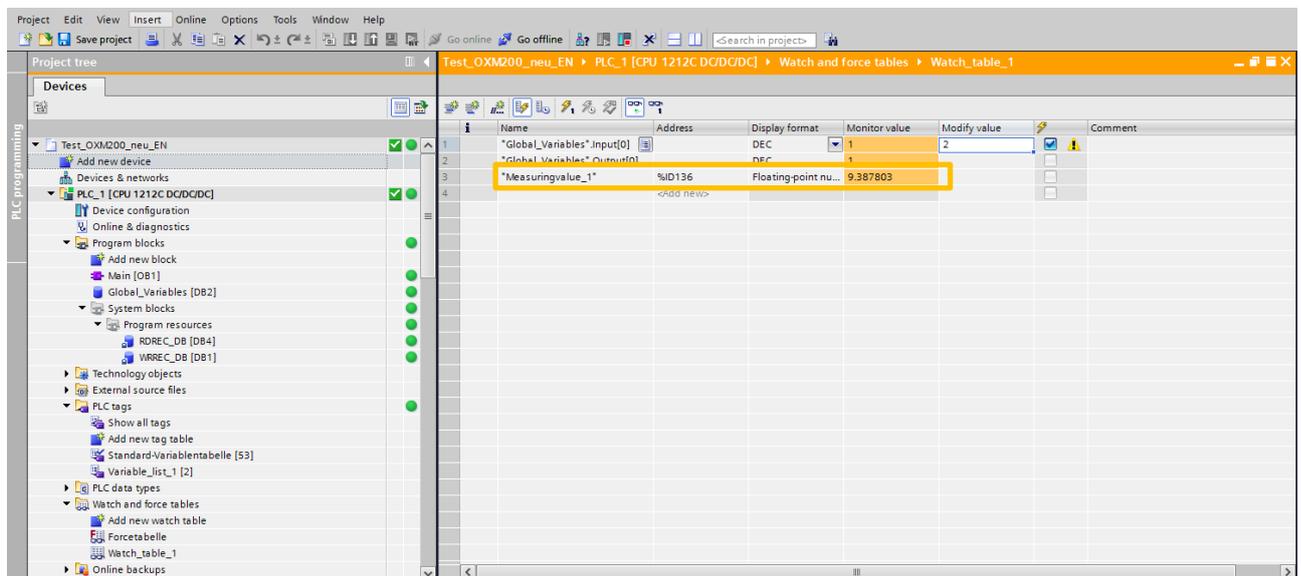
If you want to monitor the measurement values send from the OXM200 you can follow these steps.

1. You have to choose which value of the 7 measured values you want to receive.



Module	Rack	Slot	I address	Q ...
OX-Line_1	0	0		
Interface	0	0 X1		
State and control_1	0	1		
Parametrization Mode	0	1 1	2	
Timesync	0	1 2	116	
Values Valid	0	1 3	117	
Alarm state	0	1 4	118	
Quality	0	1 5	119	
Measurement rate	0	1 6	120...123	
Timestamp Sec	0	1 7	124...127	
Timestamp usec	0	1 8	128...131	
Encoder	0	1 9	132...133	
Out 1	0	1 10	134	
Out 2	0	1 11	135	
Measurement Results_1	0	2		
Value1	0	2 1	136...139	
Value2	0	2 2	140...143	
Value3	0	2 3	144...147	
Value4	0	2 4	148...151	
Value5	0	2 5	152...155	
Value6	0	2 6	156...159	
Value7	0	2 7	160...163	

2. If you want to monitor these data you have to add the value into the “watch table” with the corresponding address.



Name	Address	Display format	Monitor value	Modify value	Comment
"Global_Variables".Input[0]		DEC	1	2	
"Global_Variables".Output[0]		DEC	1		
"Measuringvalue_1"	%ID136	Floating-point nu...	9.387803		
	<Add new>				

3. So you can fill up the table with all the needed variables.

#### IMPORTANT:

The data type Float32 is the same as a Real data type. In TIA Portal Real is used as data type.

- Now you have to compile your program by clicking on the “compile” symbol.



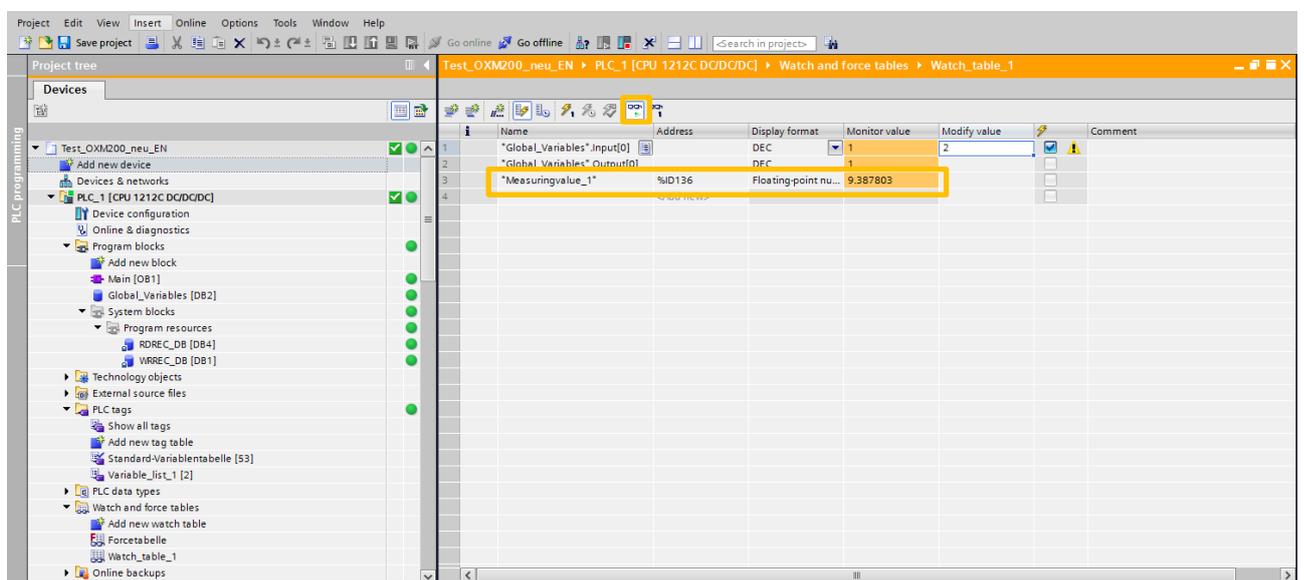
- Then you have to load the program to your device by clicking the “load to device” symbol.



- “Go online” with your PLC. Every device/ network and module should be marked in green for a error free configuration.



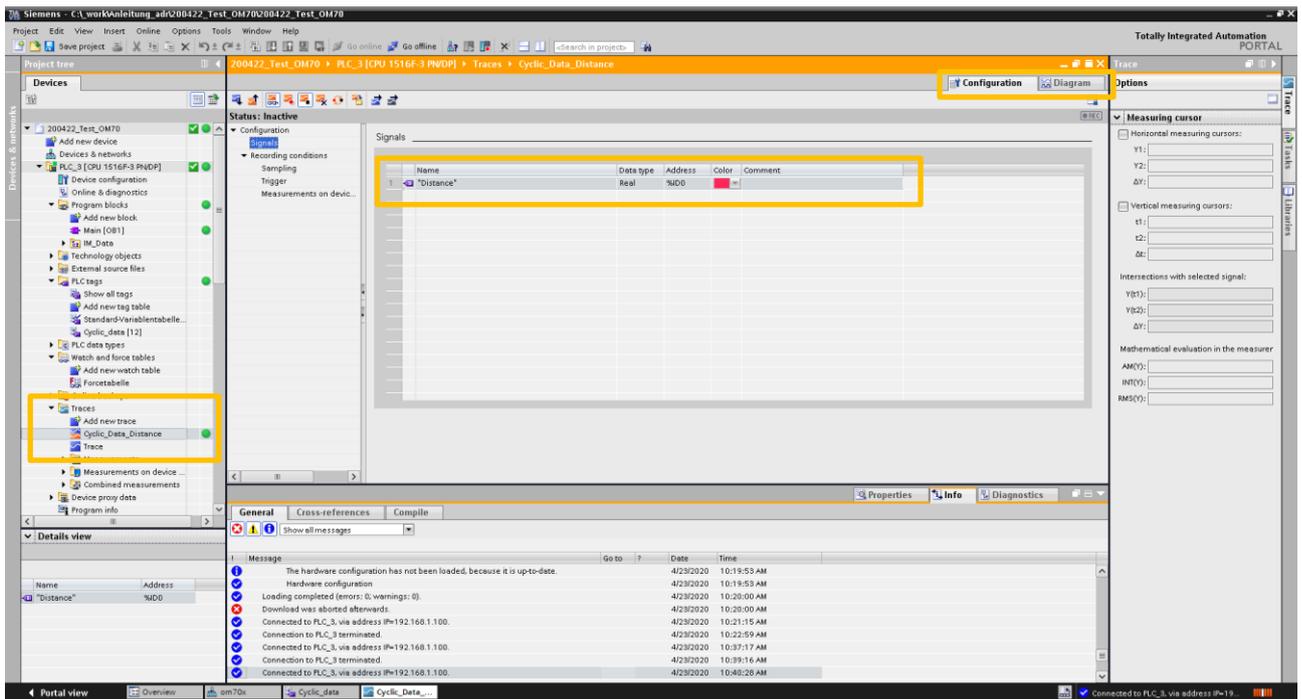
- To monitor the cyclic data you have to go to the watch Table and click on the “monitor” symbol.



### 3.2 Visualization of measurement values

If you want to visualize the cyclic data you can create a Trace to see a graph over time.

- You have to go to “Traces” and click on “Add new trace”. A new trace will appear and you can rename it by doing a right click. Now you can easily add the PLC tags as signals that should be displayed. As an example we will display the distance. If you have finished this process you can go to “Diagram” on the right corner on the top.



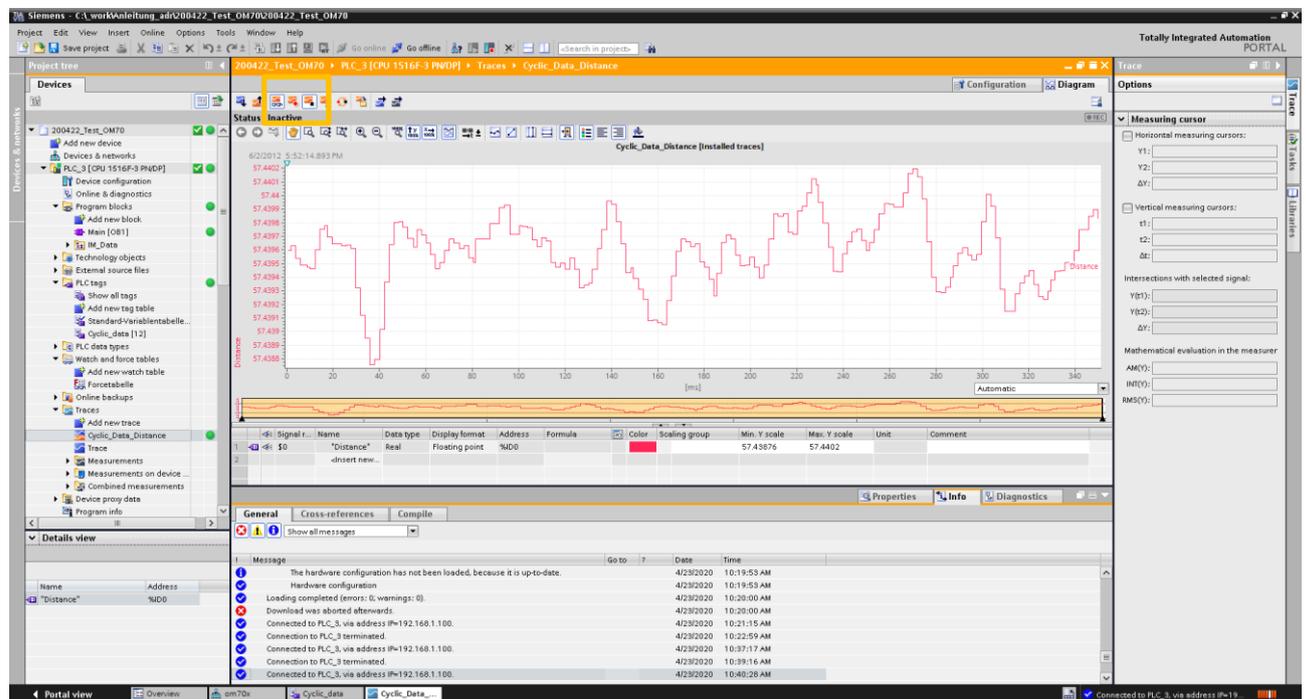
The screenshot shows the Siemens TIA Portal interface. In the 'Traces' section of the project tree, 'Cyclic\_Data\_Distance' is selected. The main window displays the configuration for this trace, including a table of signals:

Name	Data type	Address	Color	Comment
"Distance"	Real	%DD	Red	

Below the configuration, a message log shows the connection status to the PLC\_3 device.

2. Click on symbols to start and stop the record.

-  : Observe ON
-  : Activate/ Deactivate recording



The screenshot shows the Siemens TIA Portal interface with the 'Cyclic\_Data\_Distance' trace running. The main window displays a graph of the signal 'Distance' over time, showing a fluctuating red line. The x-axis represents time in milliseconds (ms), ranging from 0 to 340. The y-axis represents the signal value, ranging from 57.4389 to 57.4402. Below the graph, a table lists the signal details:

Signal	Name	Data type	Display format	Address	Formula	Color	Scaling group	Min. Y scale	Max. Y scale	Unit	Comment
1	"Distance"	Real	Floating point	%DD		Red		57.43876	57.4402		
2	"insert new..."										

The message log at the bottom shows the connection status to the PLC\_3 device.

## 4 Read and write parameters (acyclic data)

For PROFINET communication there are two different types of data that a device can offer. The cyclic data and the acyclic data. Acyclic data is often used for parametrization of the device because this data is only updated on request.

To read and write acyclic data the standard instructions out of the Siemens library can be used.

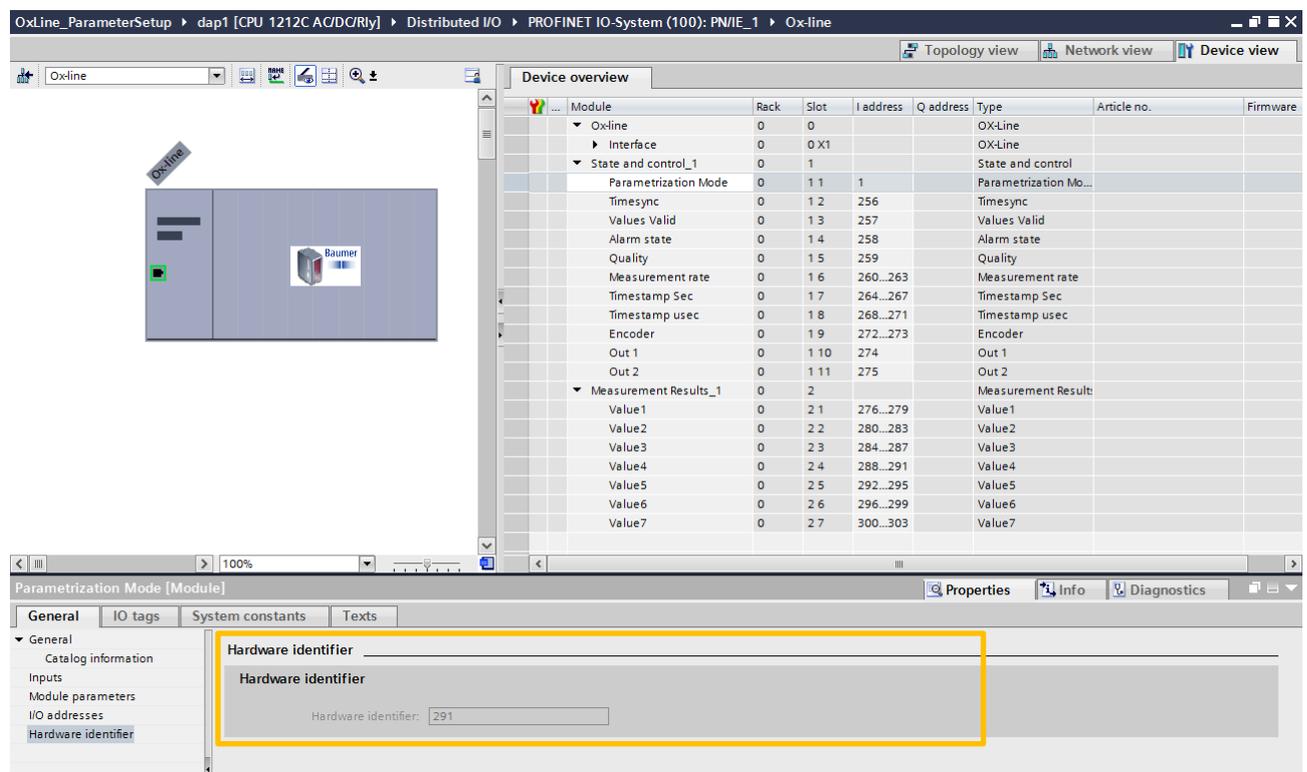
<https://support.industry.siemens.com/cs/mdm/109741593?c=81289924107&lc=en-CH>

- WRREC: Write data record
- RDREC: Read data record

Acyclic parameters have no I/O address, they have a Hardware identifier you need for their identification. In the OXM200 there is the possibility the change parameters with change of the whole parameter setup. There for will be used the module parameter "Parametrization Mode" of module "State and control\_1".

Double click at the module parameter and then you can find the Hardware identifier at the System constants of each module.

### TIA-Version 15:



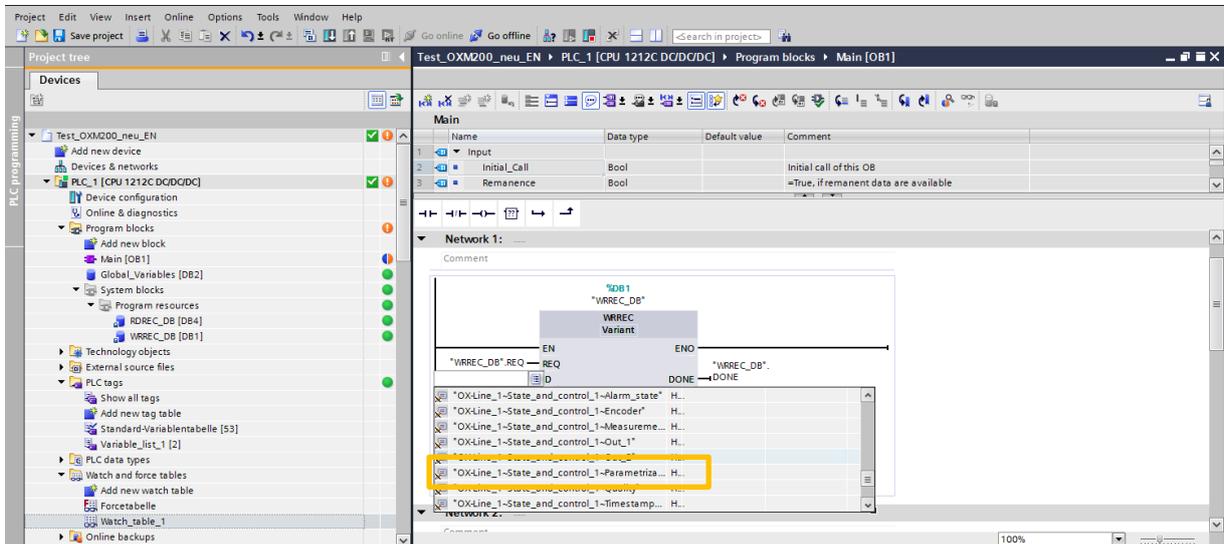
The screenshot shows the Siemens TIA Portal interface. The top window displays the 'Device overview' for an OX-line module. The table below represents the data shown in this overview:

Module	Rack	Slot	I address	Q address	Type	Article no.	Firmware
Ox-line	0	0			Ox-Line		
Interface	0	0 X1			Ox-Line		
State and control_1	0	1			State and control		
Parametrization Mode	0	1 1	1		Parametrization Mo...		
Timesync	0	1 2	256		Timesync		
Values Valid	0	1 3	257		Values Valid		
Alarm state	0	1 4	258		Alarm state		
Quality	0	1 5	259		Quality		
Measurement rate	0	1 6	260...263		Measurement rate		
Timestamp Sec	0	1 7	264...267		Timestamp Sec		
Timestamp usec	0	1 8	268...271		Timestamp usec		
Encoder	0	1 9	272...273		Encoder		
Out 1	0	1 10	274		Out 1		
Out 2	0	1 11	275		Out 2		
Measurement Results_1	0	2			Measurement Result:		
Value1	0	2 1	276...279		Value1		
Value2	0	2 2	280...283		Value2		
Value3	0	2 3	284...287		Value3		
Value4	0	2 4	288...291		Value4		
Value5	0	2 5	292...295		Value5		
Value6	0	2 6	296...299		Value6		
Value7	0	2 7	300...303		Value7		

The bottom window shows the 'Parametrization Mode [Module]' settings. The 'System constants' tab is active, and the 'Hardware identifier' field is highlighted with a yellow box, showing the value '291'.

## TIA-Version 17:

In this version, the hardware identifier can be found in a different place. However, it is also possible to select the module variable at the input of the function block.



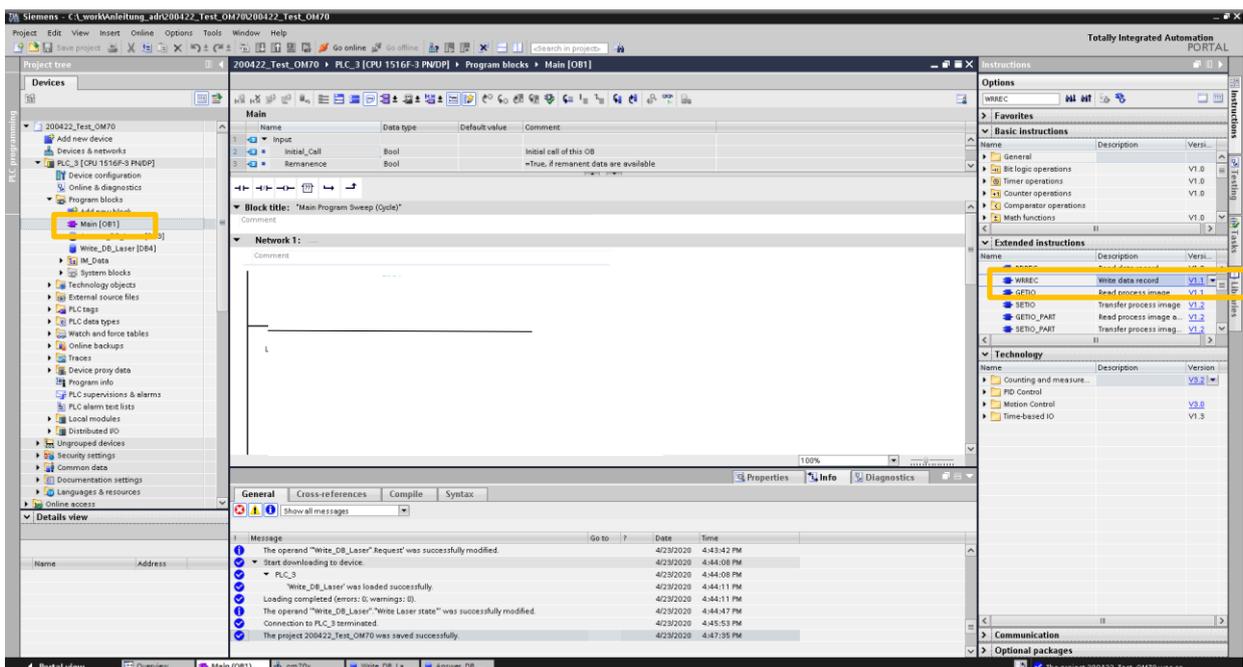
## 4.1 Write parameters – Parameter setup change on OXM200

To write acyclic data you have to generate a small program into your “Main” routine. This routine is repeatedly called and processed by the PLC.

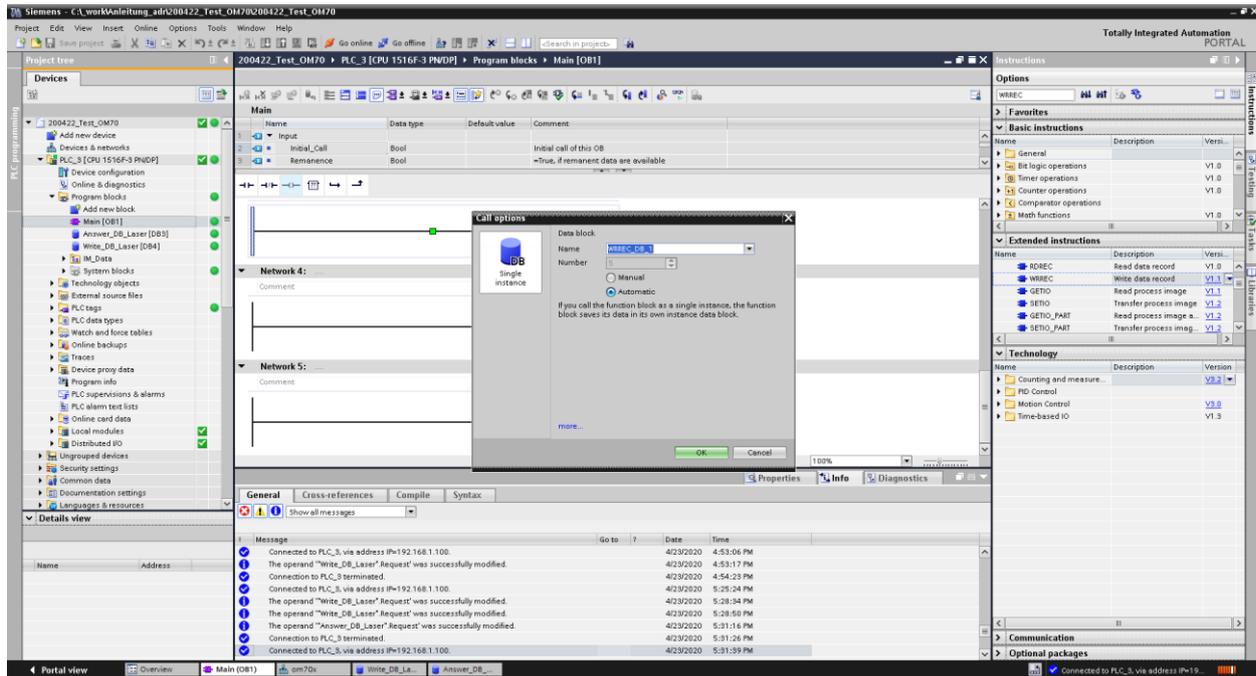
1. “Go offline” if you are still online with your PLC.



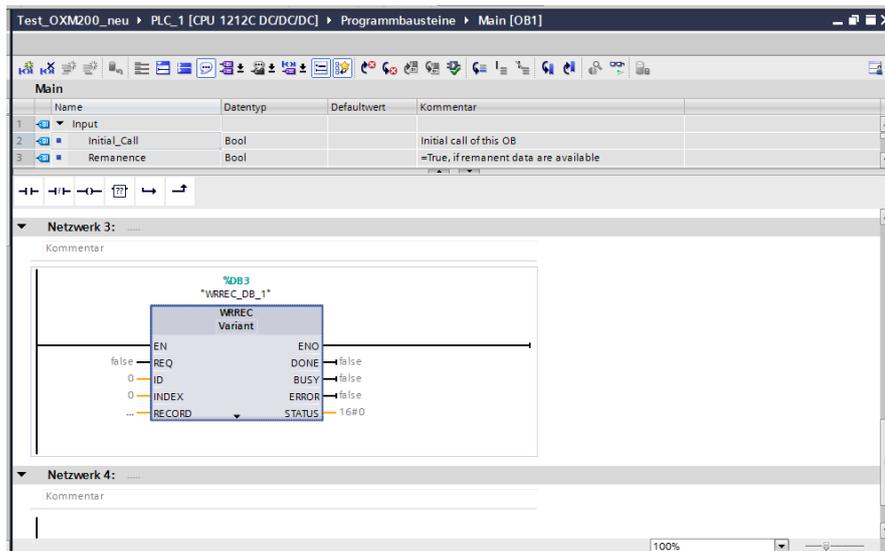
2. Go to the “Main” routine and search at “Instructions” for the WRREC.



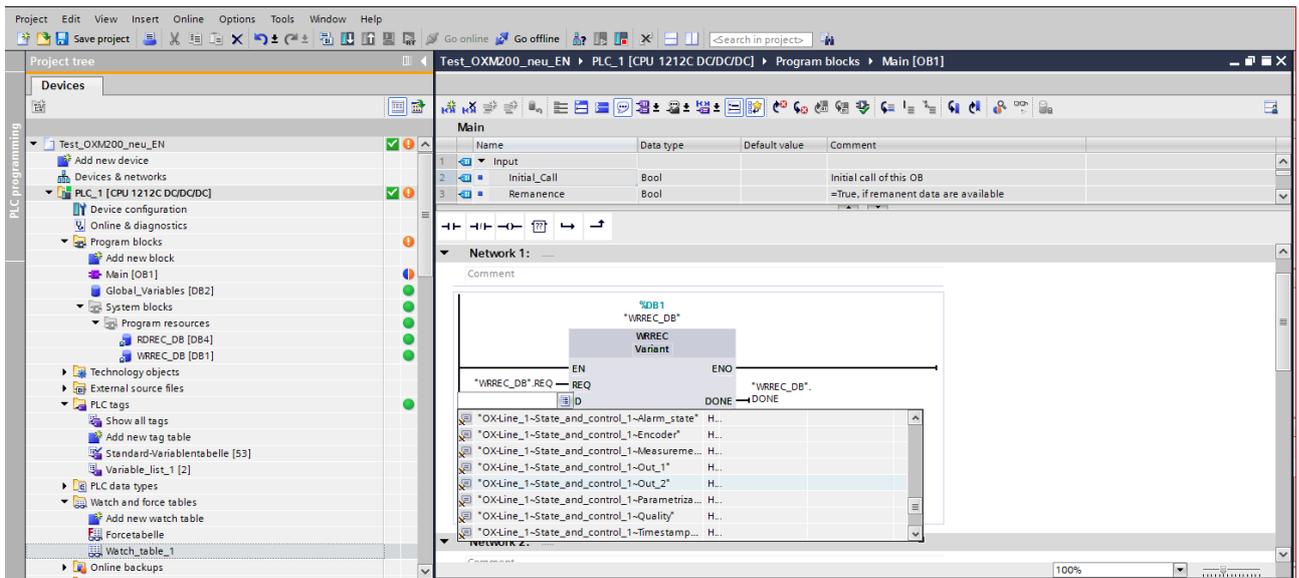
3. Add the Function block to your main routine by Drag&Drop. Choose a name for the Function block.



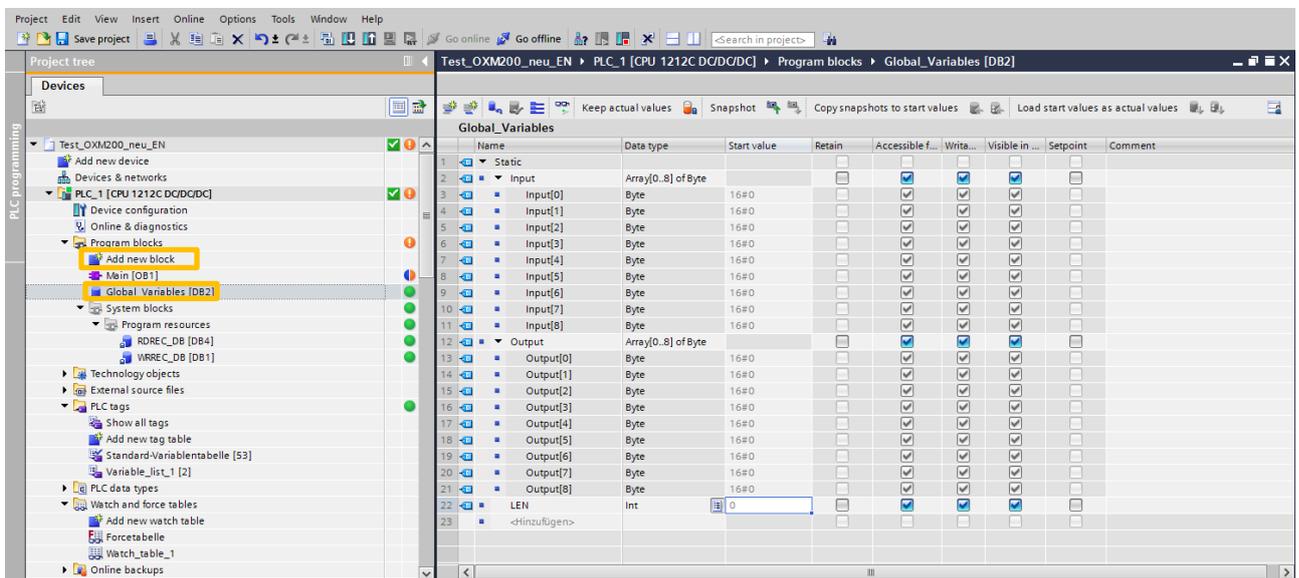
4. Empty function block is looking like this.



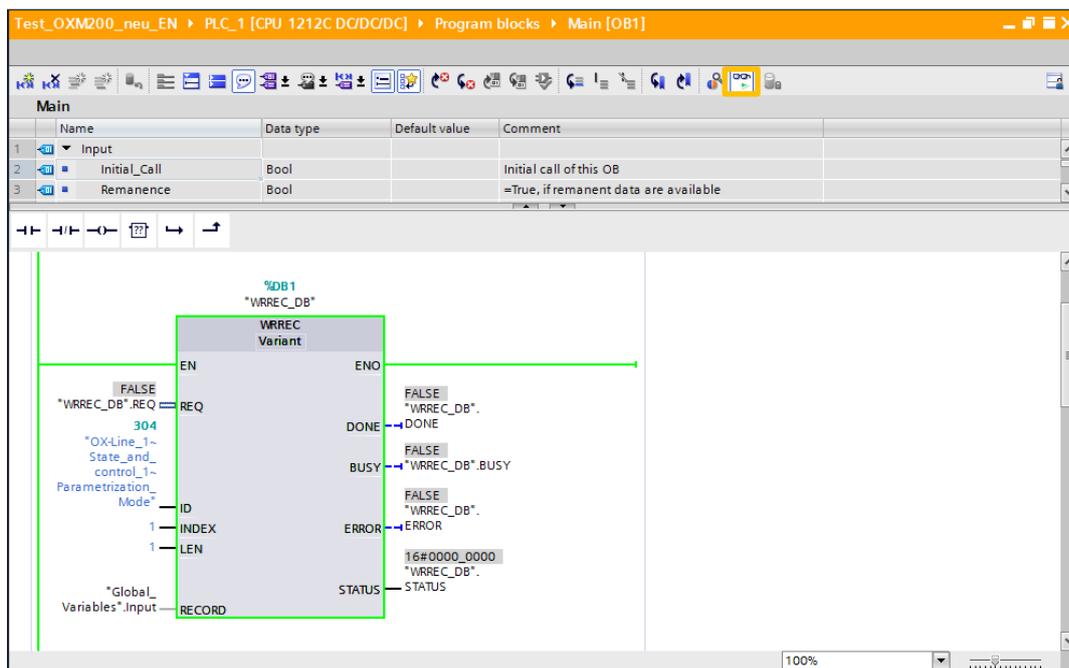
5. The ID specifies which acyclic module is to be written. Here the hardware ID of "Parametrization Mode" can be entered or the module can be selected from the preselection. The INDEX and LEN can always be filled with 1 for the OXM200.



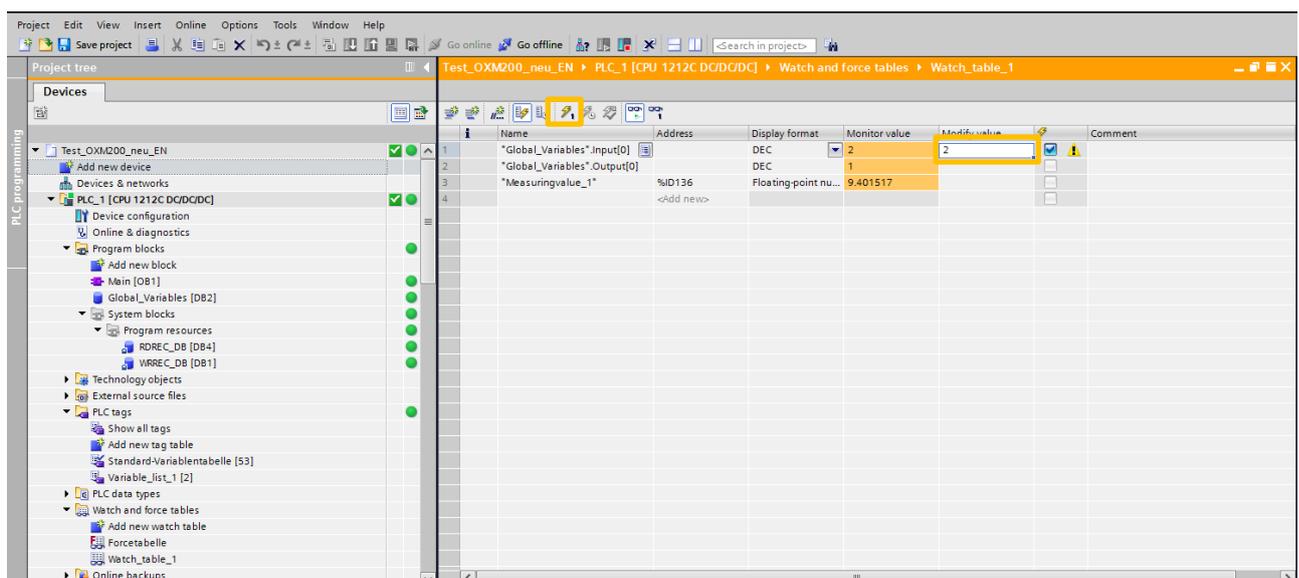
6. Variables for the other Inputs/ outputs should be created by adding a new global Data block. Afterwards you can add all needed variables into the table. Data type can be checked in the manual for laser state variable or for the other variables by sliding over the end of the connections at the function block.



7. "Go online" and turn on the monitoring by clicking at the symbol.

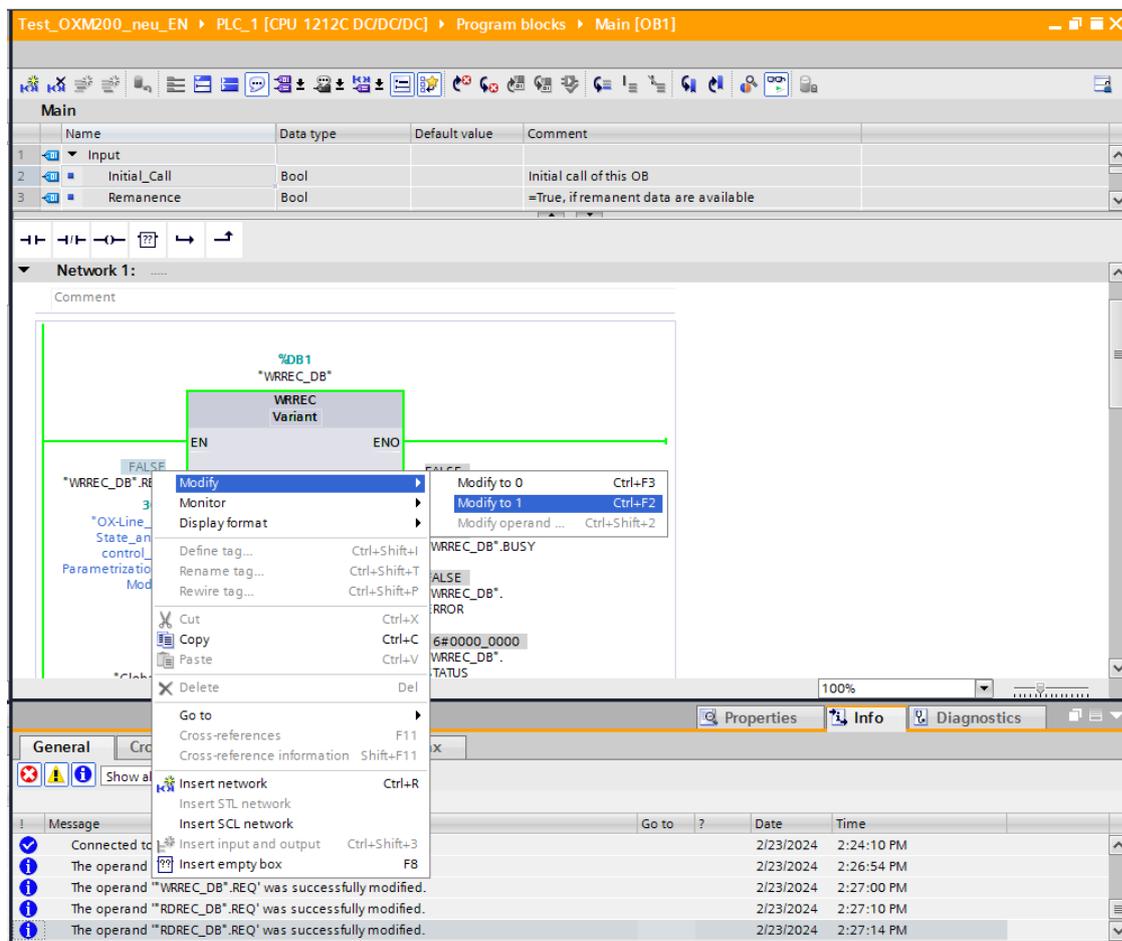


8. Select the new parameter setup number in the column "Modify value" and press the flash button.



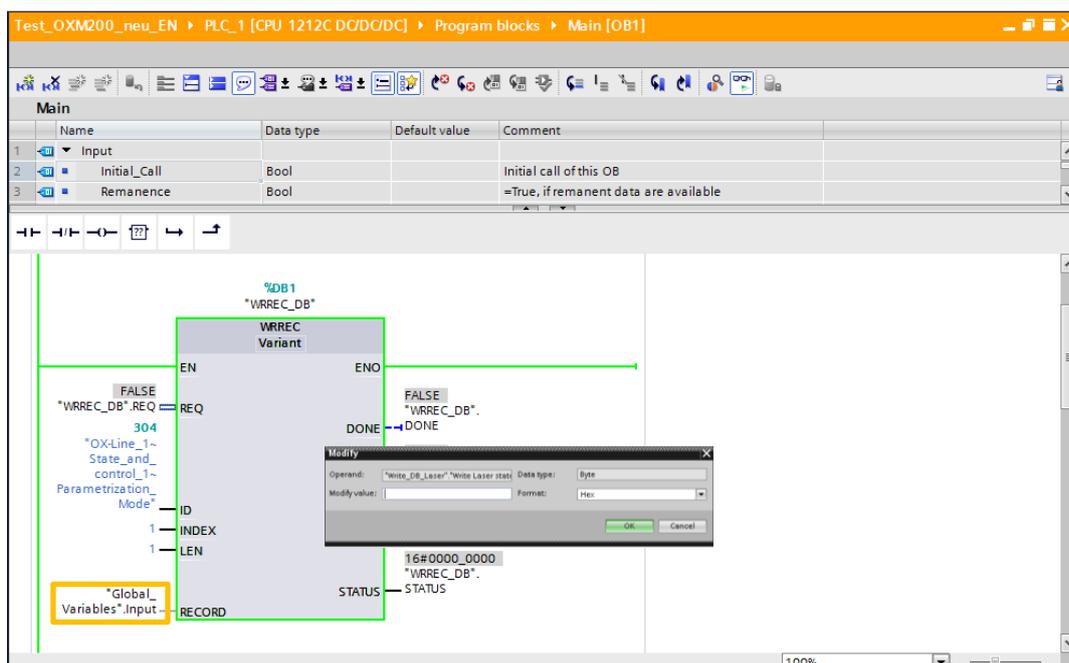
Name	Address	Display format	Monitor value	Modify value	Comment
"Global_Variables".Input[0]		DEC	2	2	
"Global_Variables".Output[0]		DEC	1		
"Measuringvalue_1"	%ID136	Floating-point nu...	9.401517		

9. To write the acyclic parameter setup change you have to enable the function block via Request "REQ" Input variable. You can do so by doing a right click on the variable and click "Modify" and the "Modify to 1". Now this function block is executed with every cycle of the PLC.

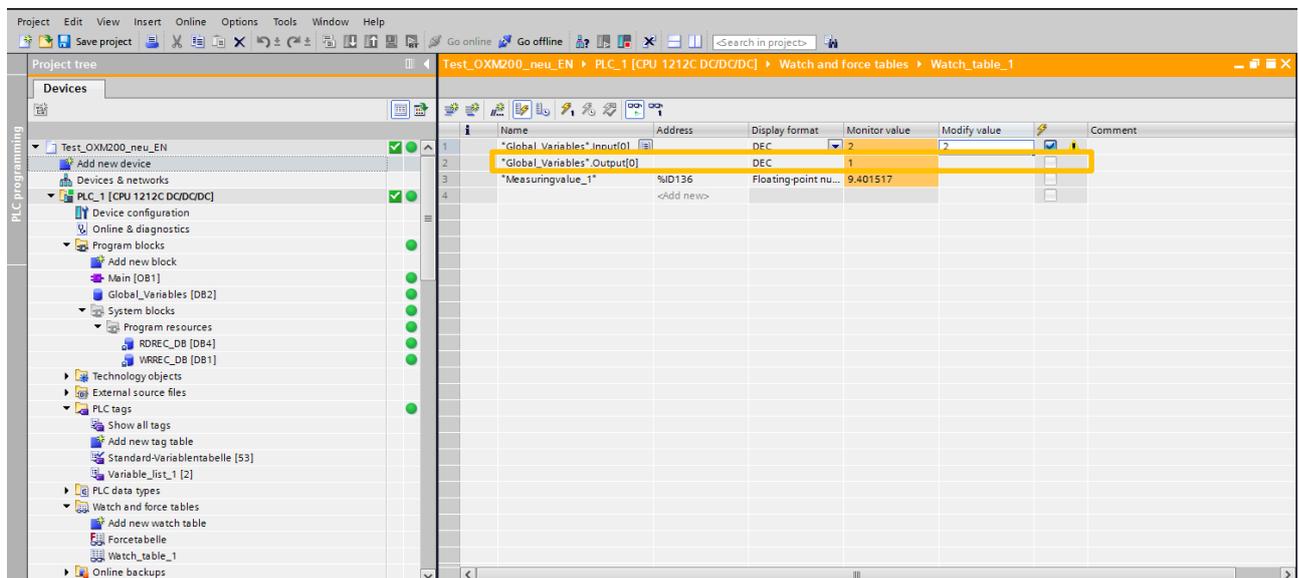


HINT:

Value can also change clicking on the “RECORD” variable and on “Modify operand...” and type the needed values.



10. The parameter setup should now change on the sensor and with an RDREC you can read the new value in the watch table



11. The output variables “DONE”, “BUSY”, “ERROR” and “STATUS” gives you information about the behavior of the function block.

Done: Writing of the parameter is done

Busy: Writing of the parameter is in process

Error: An error is occurred

Status: Analysis of the status of the function block

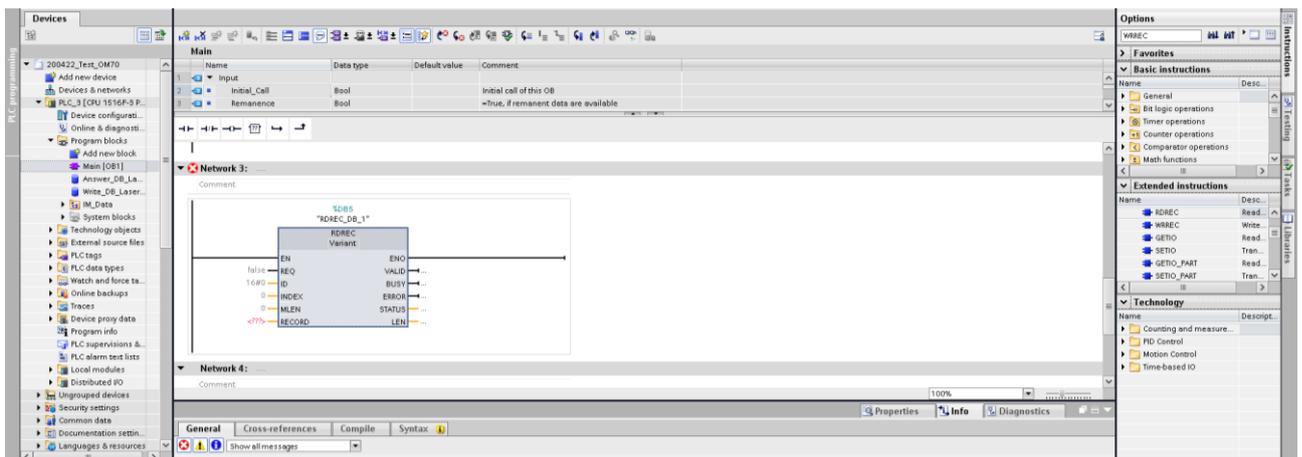
<https://support.industry.siemens.com/cs/mdm/109741593?c=72768331915&lc=en-CH>

- ➔ Now you know how to write parameters via acyclic data. In this example the function block above tries to write this parameter with every cycle of the PLC. This doesn't make sense in most of the cases. So as an outlook the customer has to create a program around this function block. You will need a State-Machine which enables and disables the block when needed.

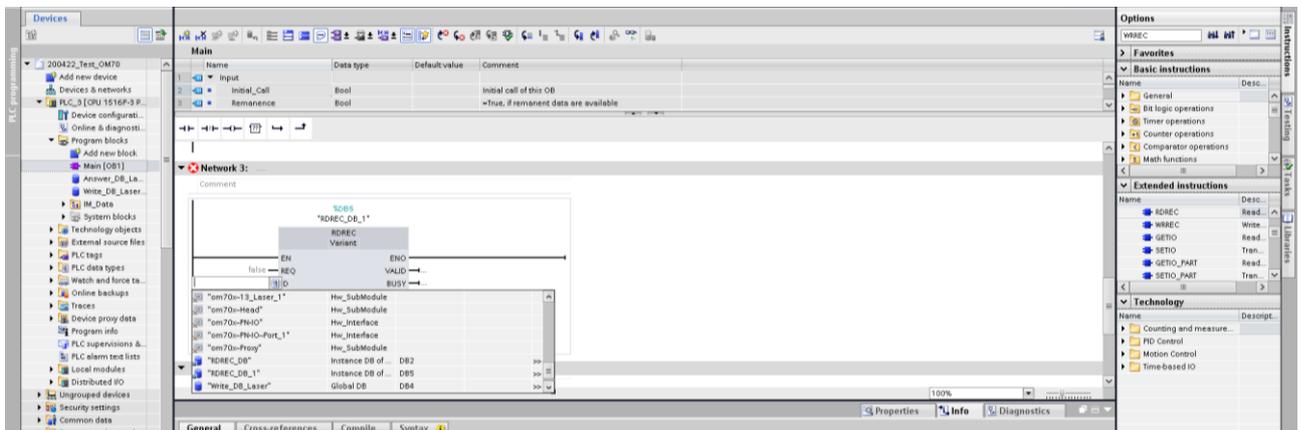
## 4.2 Read parameters

Reading acyclic data is very similar to the writing process. You have to take the RDREC command instead of the WRREC command.

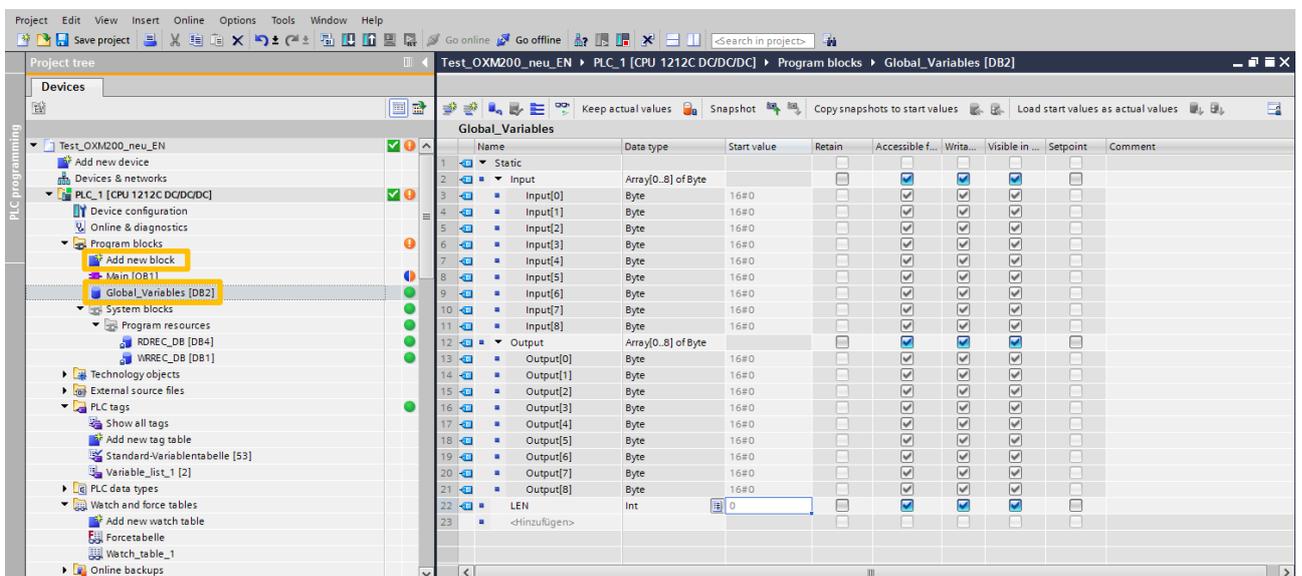
1. Go to your main program and add the RDREC function block (Searching for RDREC and Drag&Drop).



- The ID specifies which acyclic module is to be written. Here the hardware ID of "Parametrization Mode" can be entered or the module can be selected from the preselection. The INDEX and LEN can always be filled with 1 for the OXM200.

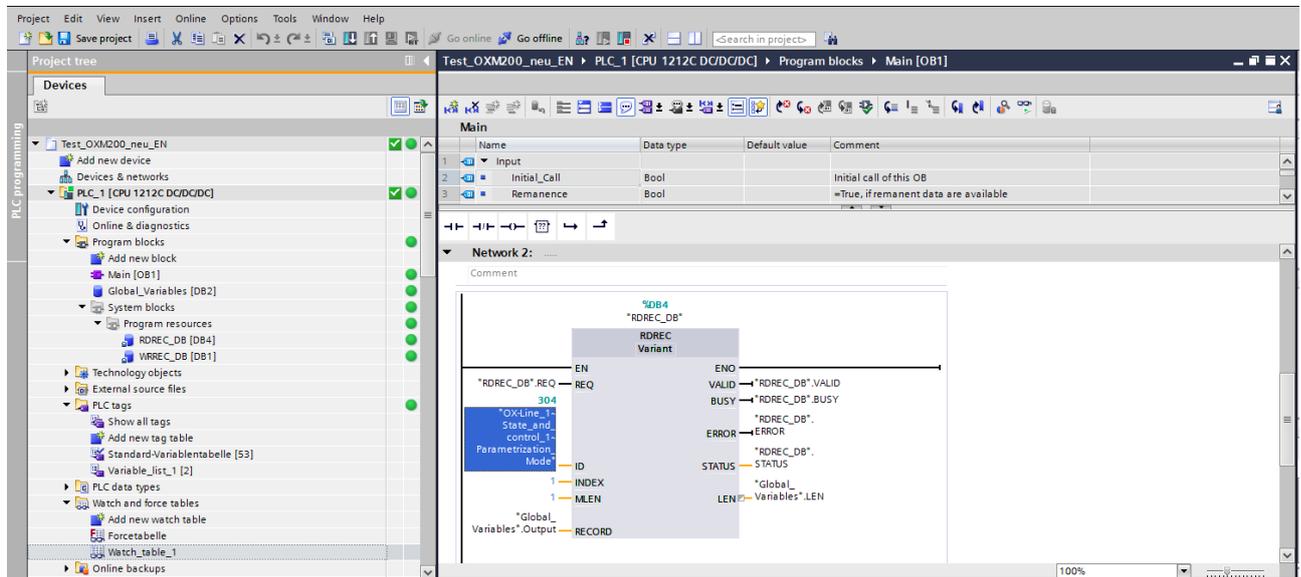


- Variables for the Inputs/ outputs should be created by adding a new global Data block. Afterwards you can add all needed variables into the table. Data type can be checked in the manual for laser state variable or for the other variables by sliding over the end of the connections at the function block.





- The difference to the write command is that also a Variable for the Length is needed. This describes the byte length of the fetched data record. For this case it is only one byte that is read. You can now monitor the values by clicking on the symbol and enable the function block by changing the REQ variable to 1 (TRUE). At the RECORD variable you will see the state of the Laser (ture/ false = on/ off).



- The output variables “VALID”, “DONE”, “BUSY”, “ERROR” and “STATUS” gives you information about the behavior of the function block.

Valid: Data record was received and valid for one cycle

Done: Writing of the parameter is done

Busy: Writing of the parameter is in process

Error: An error is occurred

Status: Analysis of the status of the function block

<https://support.industry.siemens.com/cs/mdm/109741593?c=72768331915&lc=en-CH>

- ➔ Now you know how to read parameters via acyclic data. In this example the function block above tries to write this parameter with every cycle of the PLC. This doesn't make sense in most of the cases. So as an outlook the customer has to create a program around this function block. You will need a State-Machine which enables and disables the block when needed.