TECH NOTE – digiBOX Profinet Siemens

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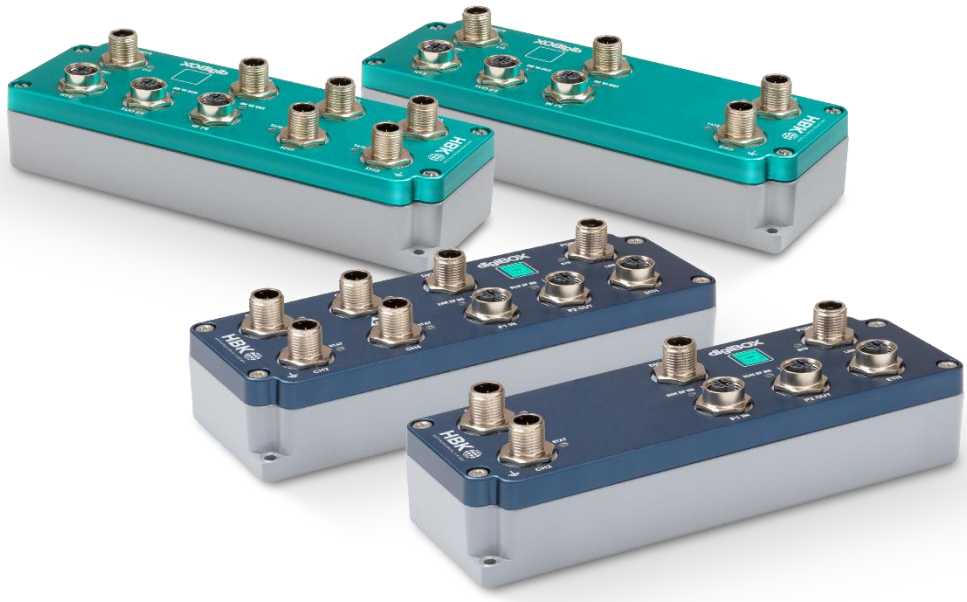

Table of Contents

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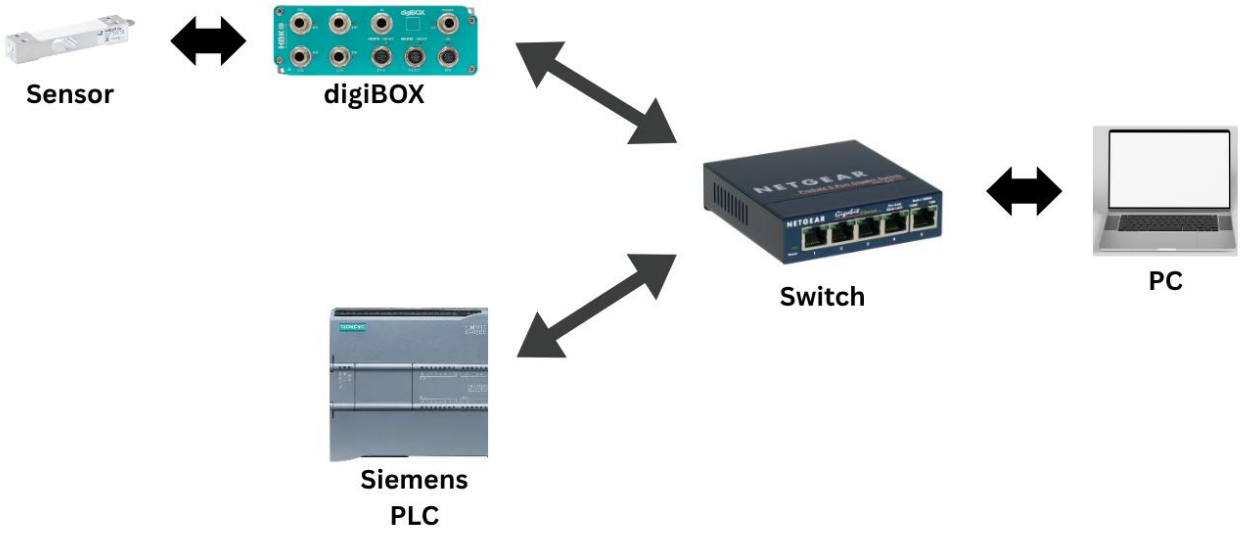
1. Description

This document explains how to connect the digiBOX to a Siemens PLC via PROFINET, covering both the hardware setup and the software configuration. It also provides a brief overview of the PROFINET-related functions the digiBOX can perform once the connection is established. To follow the steps in this guide, you will need to have TIA Portal installed.

2. Hardware Setup

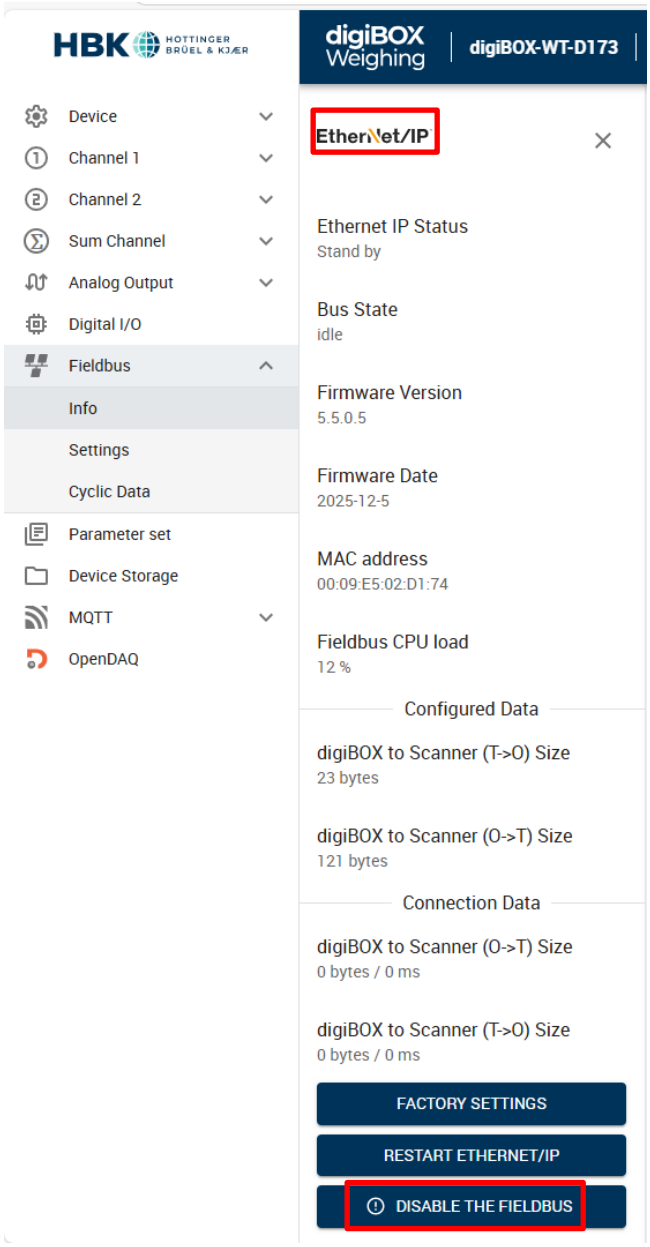
There will be a lot of ethernet cables used here. So, it is optimal to use an ethernet switch for the setup. The switch will then serve as a bridge for all the devices to the pc. Make sure that the switch has at least 4 available ports. The setup for this guide will look like this:

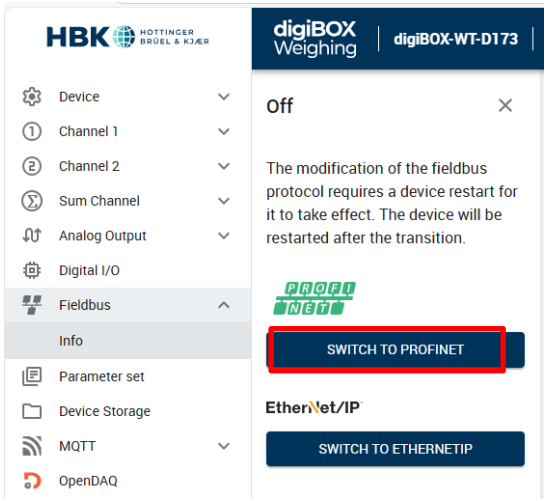


1. To connect the digiBOX to the sensor, we will use CON S3003 + cables on CH1.
2. For the Profinet connection, we will use the port P1 In. Connect P1 In to the switch with a RJ45 cable.
3. For the power supply, CON A2004 + AC/DC15V/550MA are used.
4. For the ethernet connection between digiBOX and PC, we will use a 4 pin connecting socket CON-S1023 + a RJ45 cable and attach it to the switch.
5. For this setup, we are using the Siemens S7 1214C AC/DC/Rly. Connect the plc to the switch with an ethernet cable.
6. Finally, connect the pc to the switch.

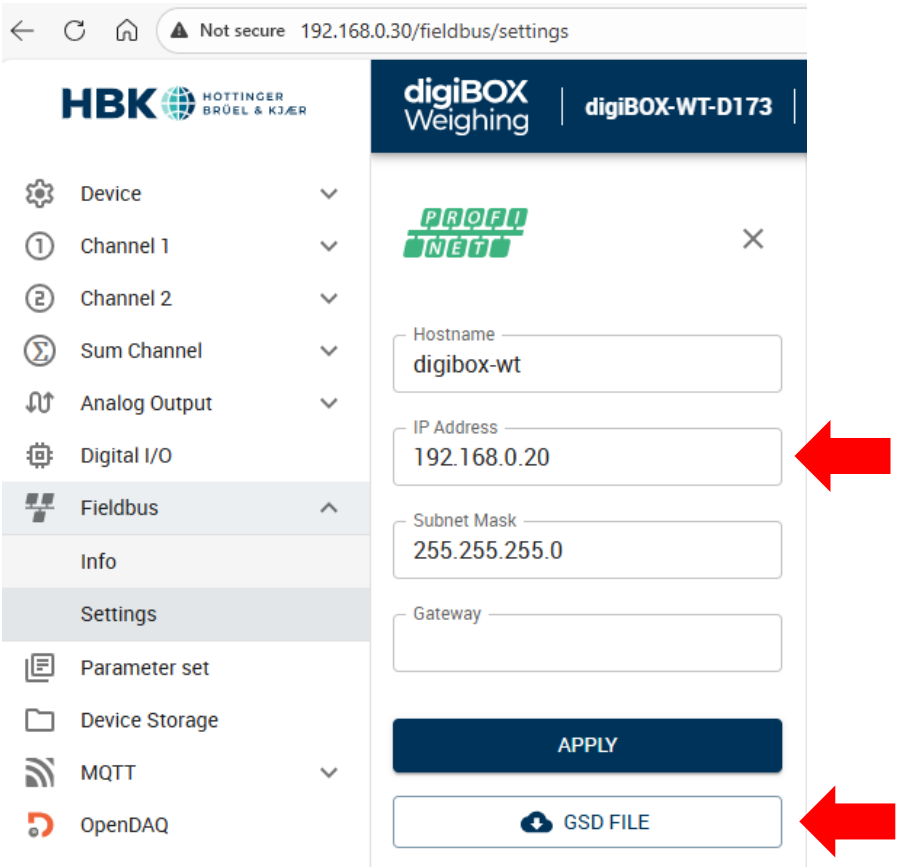
3. Setting up digiBOX

Open the digiBOX web interface. Make sure that the digiBOX is in Profinet mode. If it is in Ethernet/IP mode, then you can change by going to Fieldbus and clicking on “disable the Fieldbus”. Then, switch to Profinet. It will usually take some time for it to reload.





For the connections to work, all the devices must be on the same subnet. In this case, we are going to use the subnet 192.168.0.x. Now, set the digiBOX Profinet IP address. Don't forget to click on "Apply".

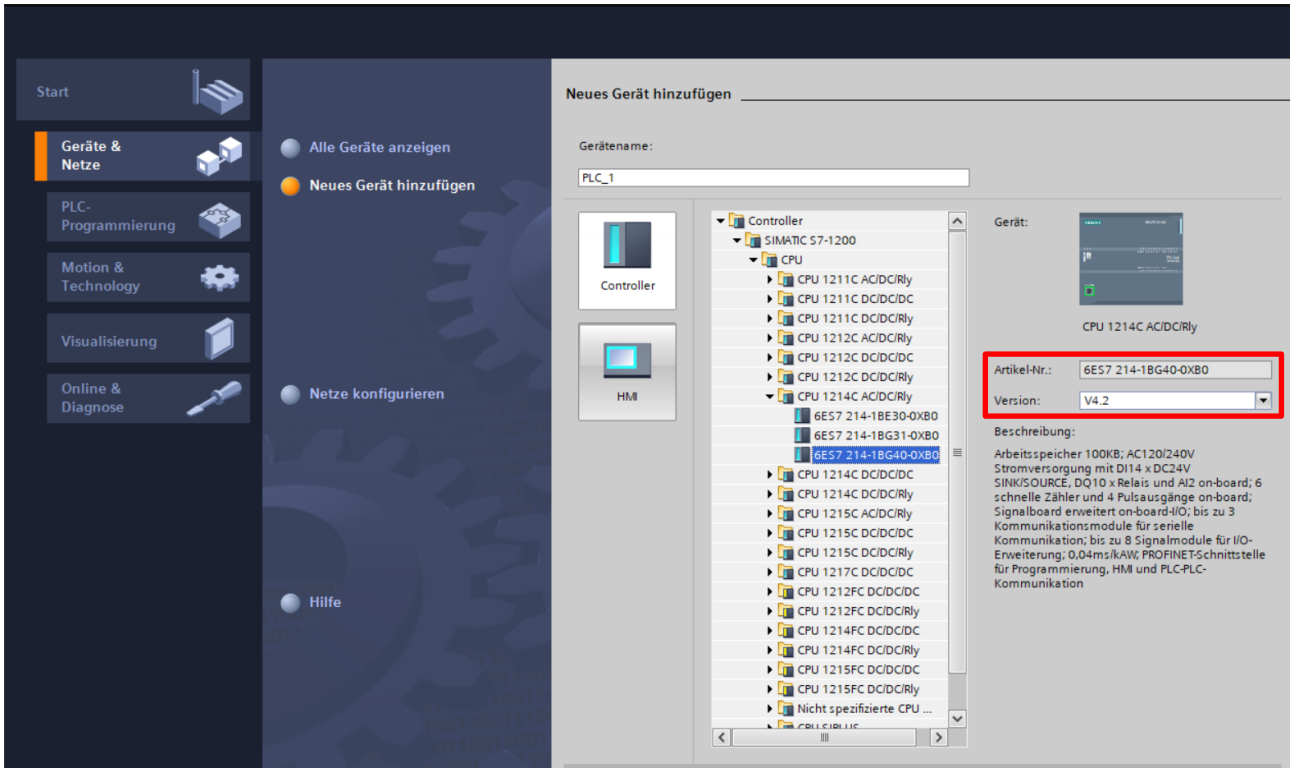


Then, download the GSD File here.

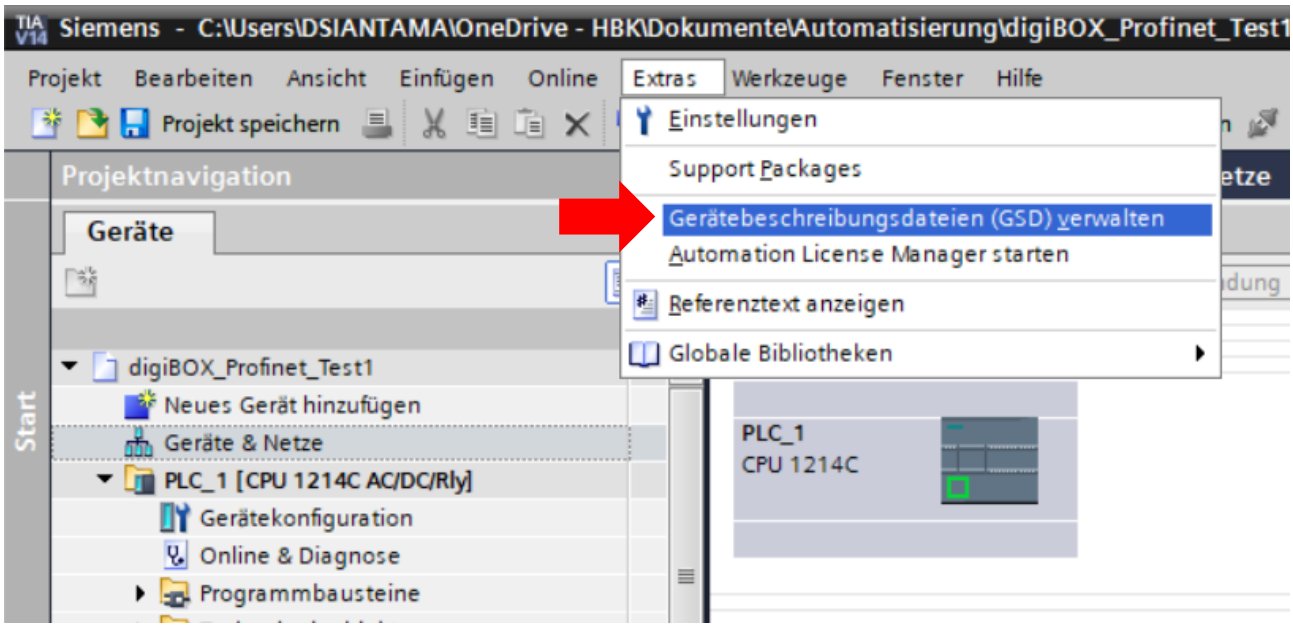
4. TIA Portal

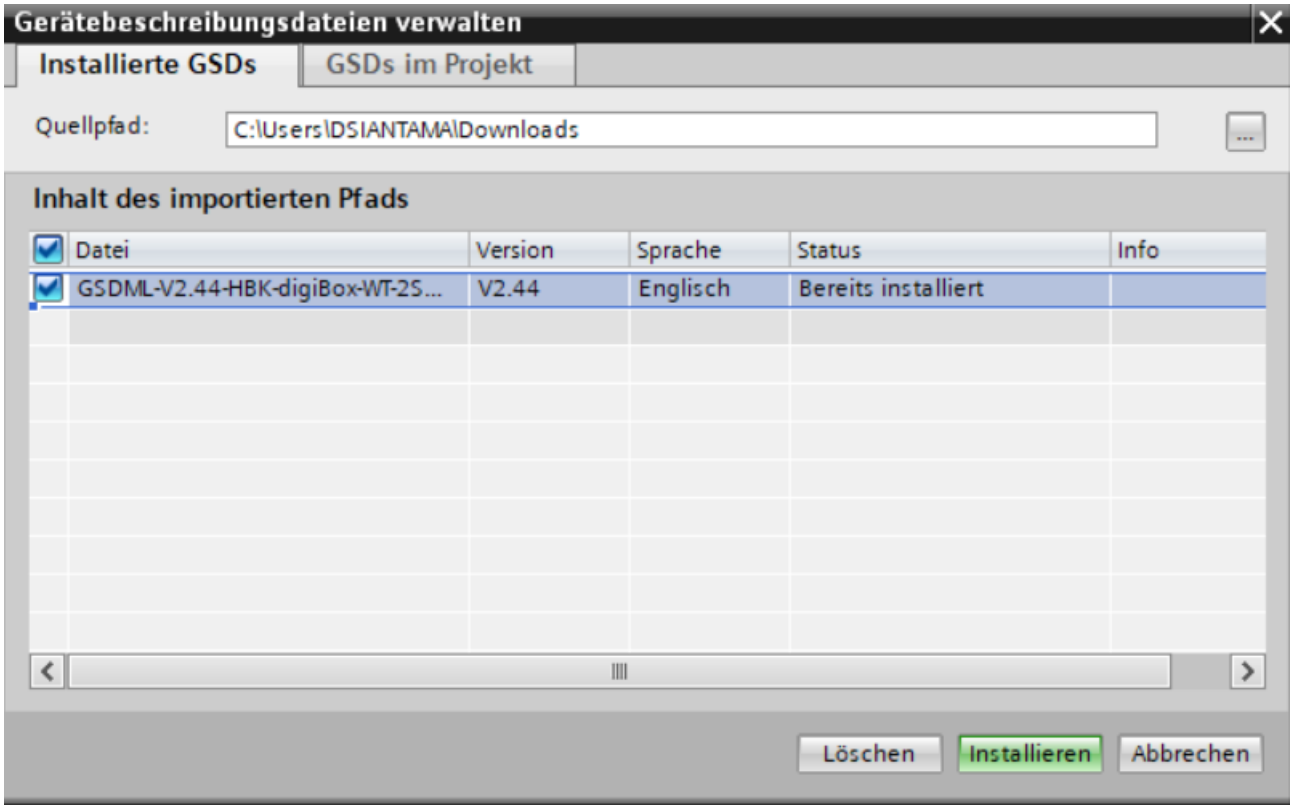
4.1. Initial Setup

- Create a new project
- Add a new device under "Devices & networks". Choose the PLC that are used and insert it here. Make sure you have the correct article number and firmware version.

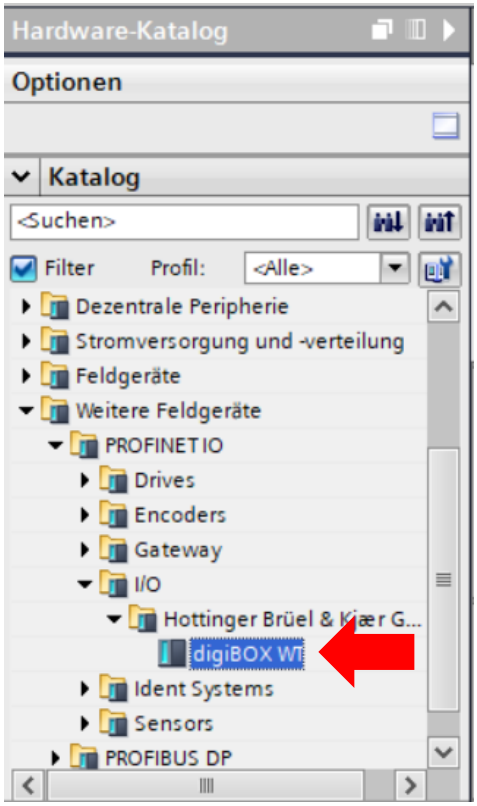


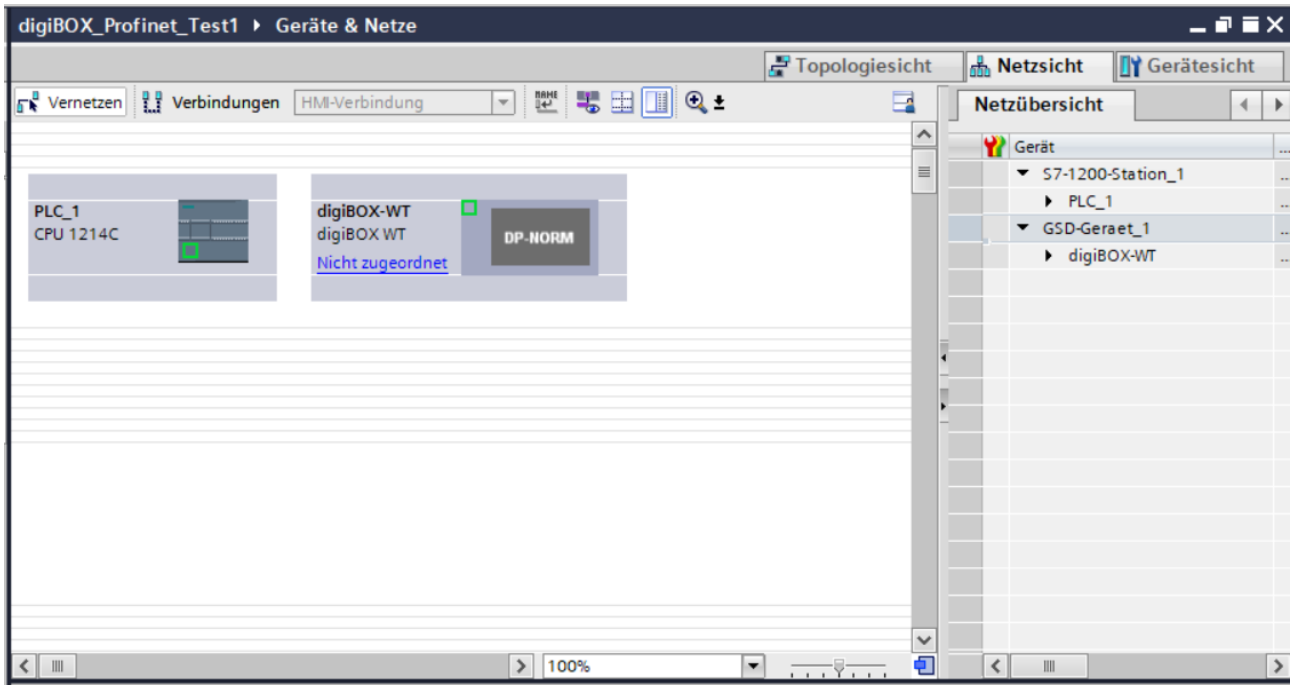
- Insert digiBOX to the project. You need to first install the GSD file to TIA Portal. Go to Extras and click on “Manage GSD files”. Then, install the digiBOX GSD file.



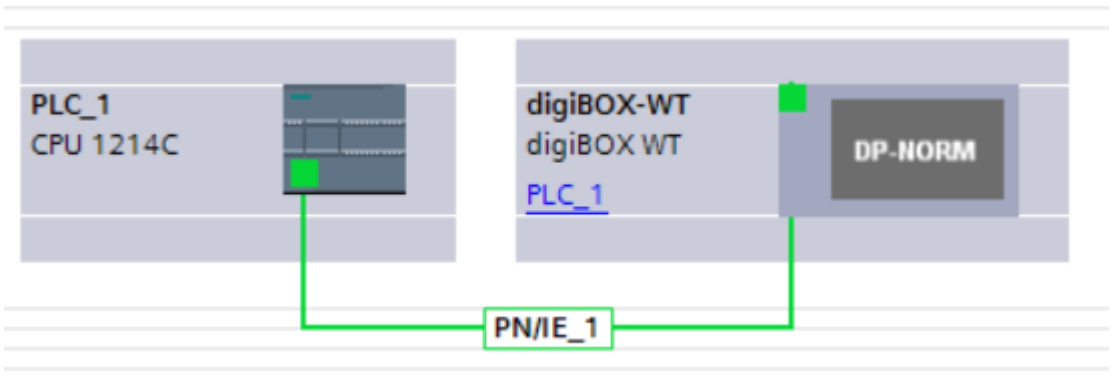


- Go to “Devices & networks”. Click on “Hardware Catalogue” and search for the digiBOX. It is located in the folder “Other field devices” → ”PROFINET IO” → “I/O” → “Hottinger Bruel Kjær GmbH”. Double click on it to add the digiBOX to the project.





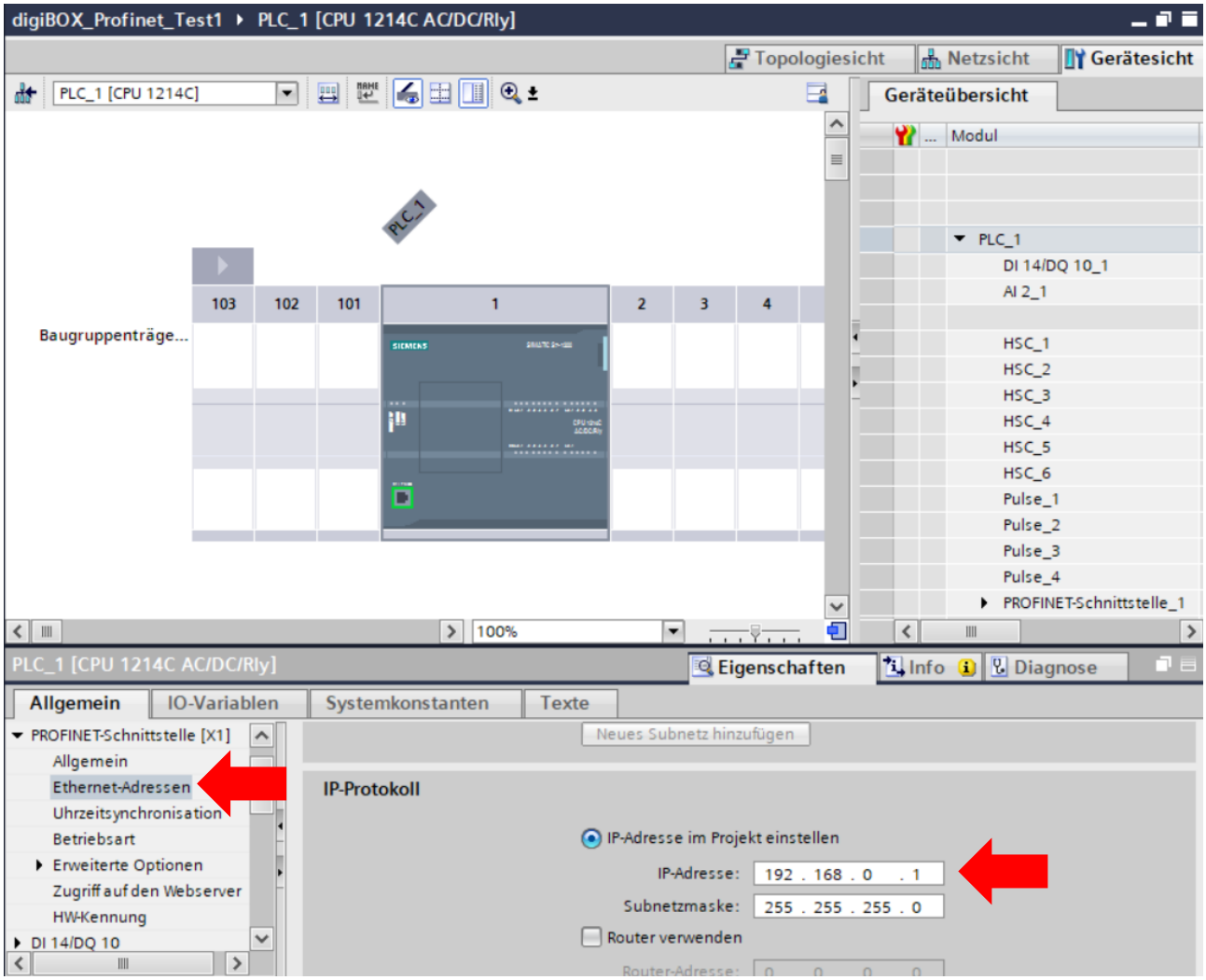
- Connect both devices by linking the green boxes.



4.2. Device Configuration

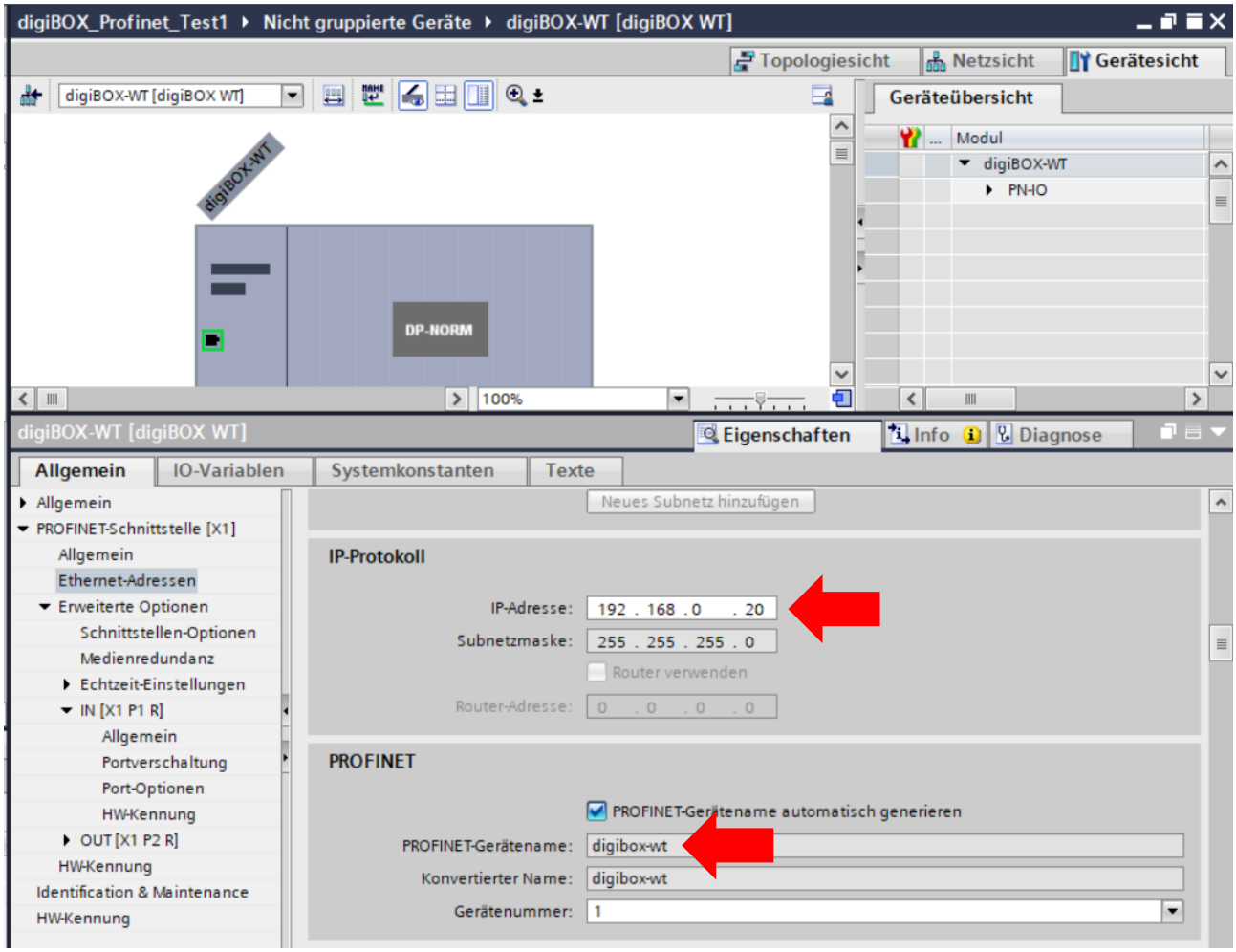
a. CPU 1214C

For the plc, you need to set the IP address to the subnet 192.168.0.x. Click on the PLC and go to the properties and then edit the IP address.



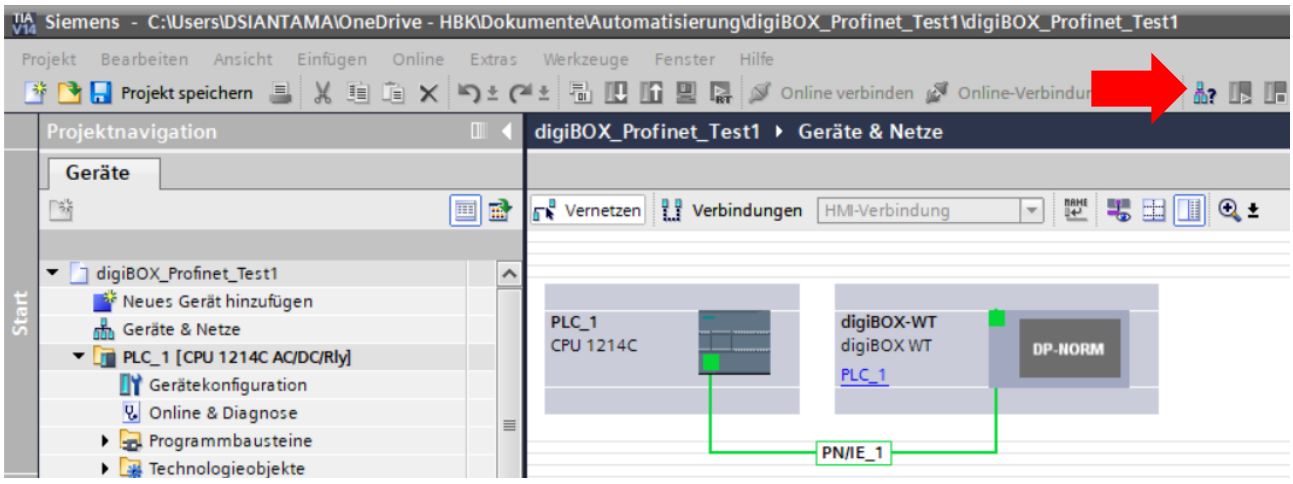
b. digiBOX

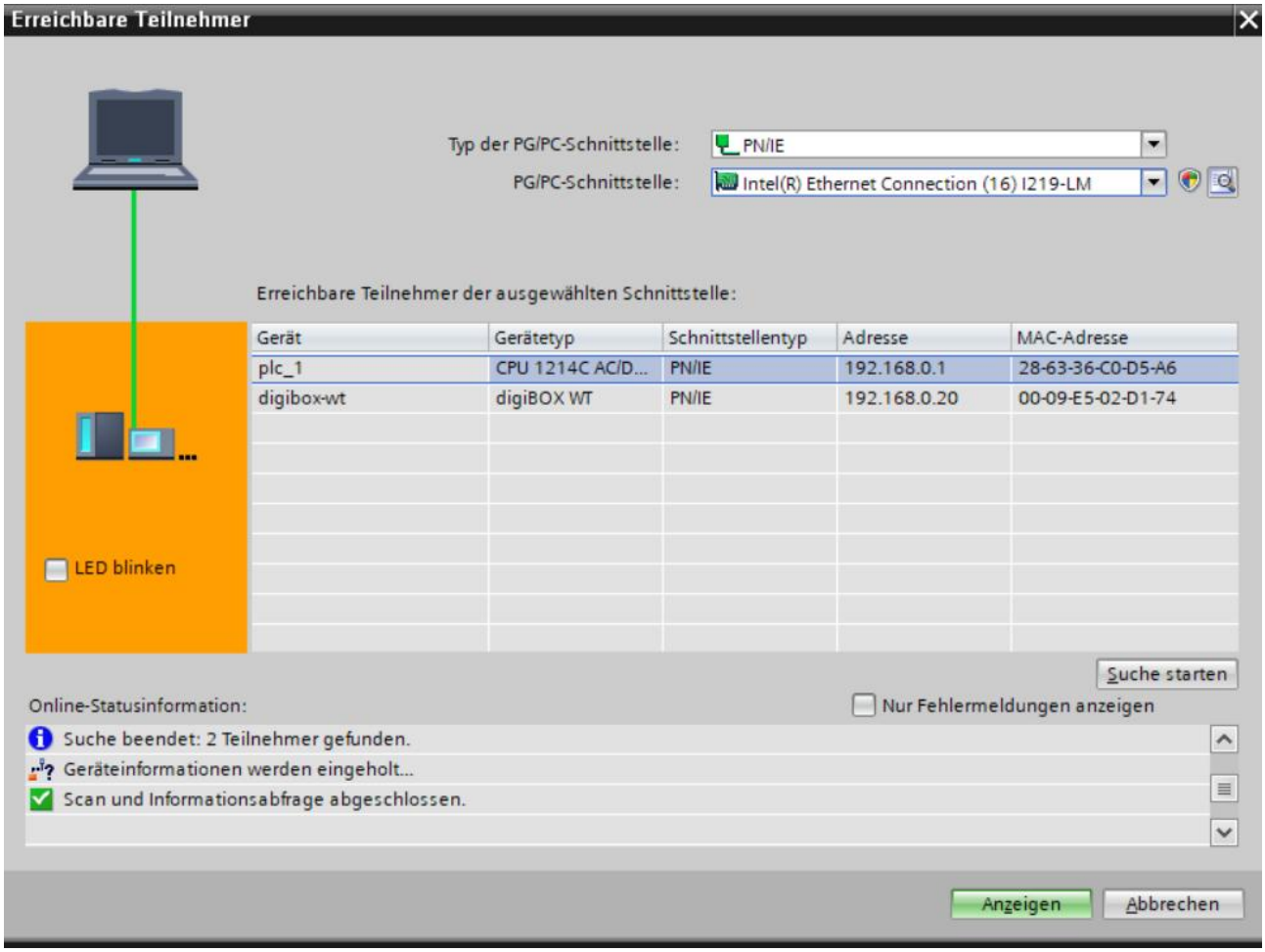
The settings here should be the same as what you input on the web interface (Profinet host name and IP address).



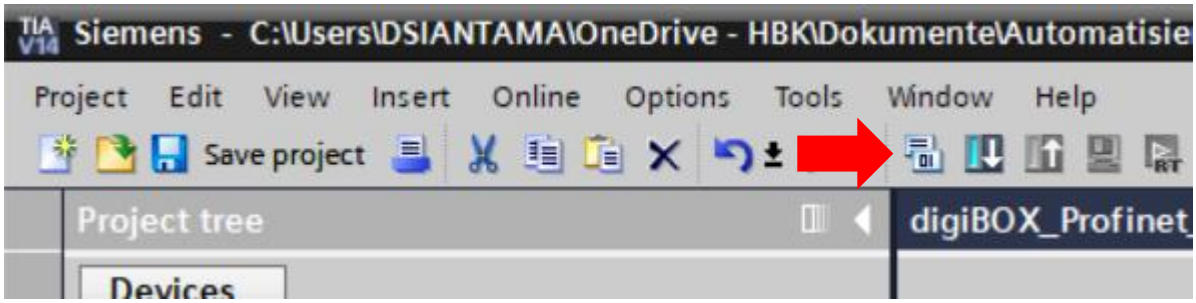
4.3. Profinet Connection

Click on “accesible devices” and search for the PLC.

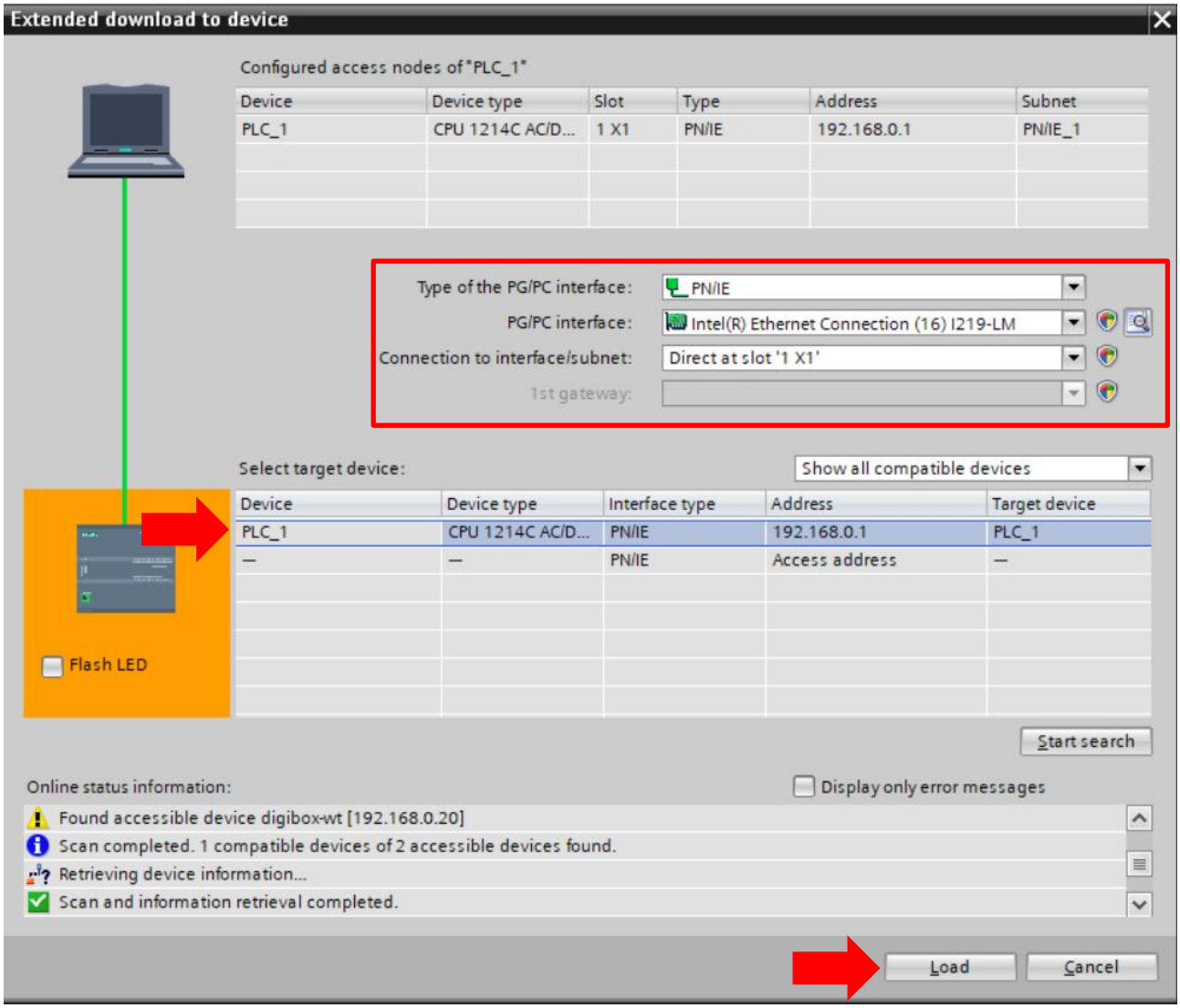




Then, save the project and compile the configurations.



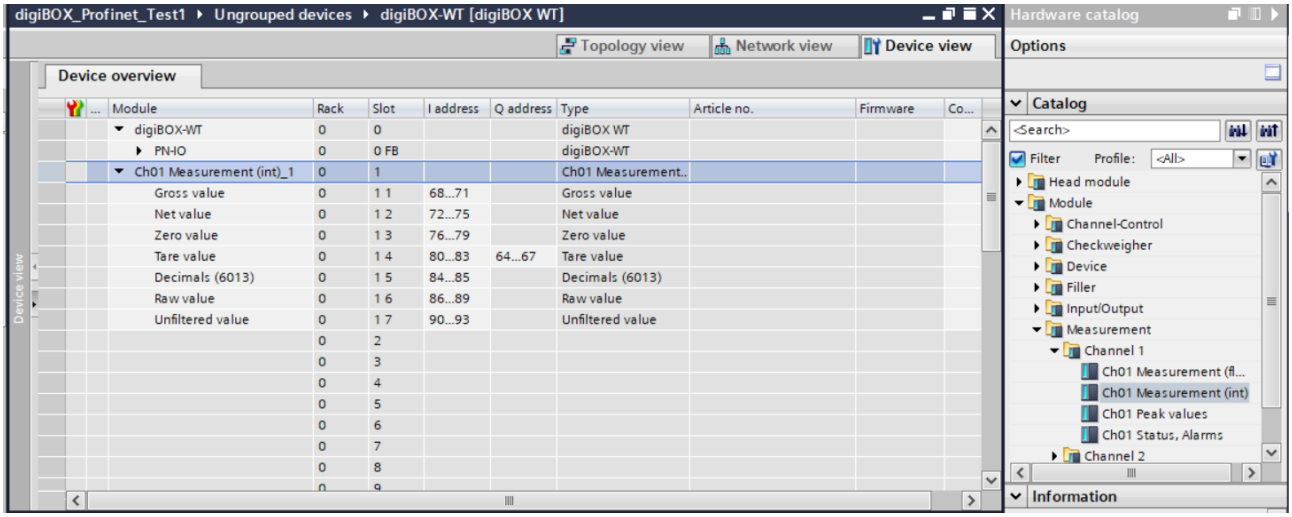
Now, load the configuration to the real plc. Before doing that, select the correct interface. Click on “Start search” and then select the plc to load.

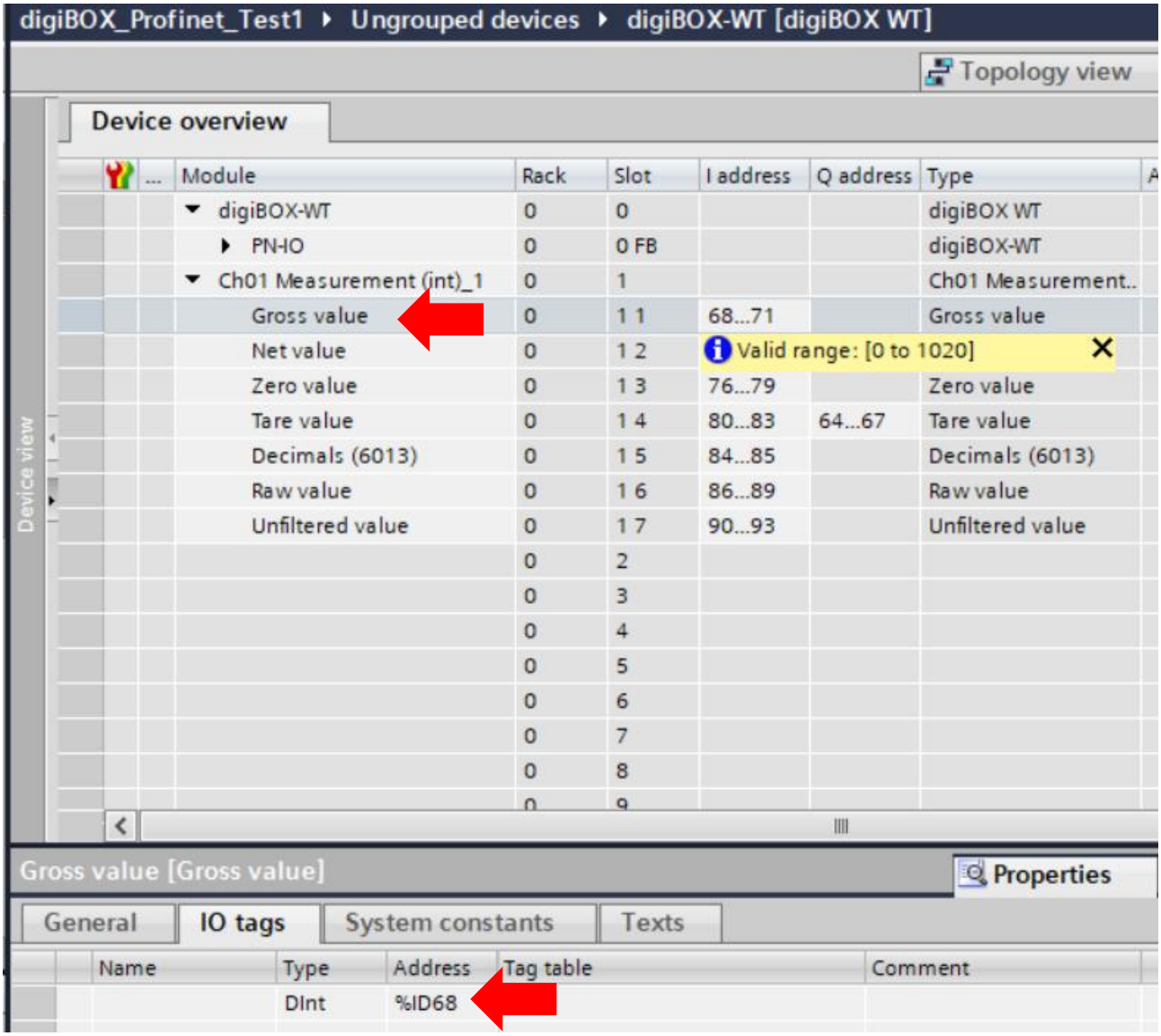


When a new window pops up, click on “without manual synchronisation” and select the “Stop all” on the drop-down menu. Finally, click on “finish”.

5. Accessing Data via Profinet with digiBOX

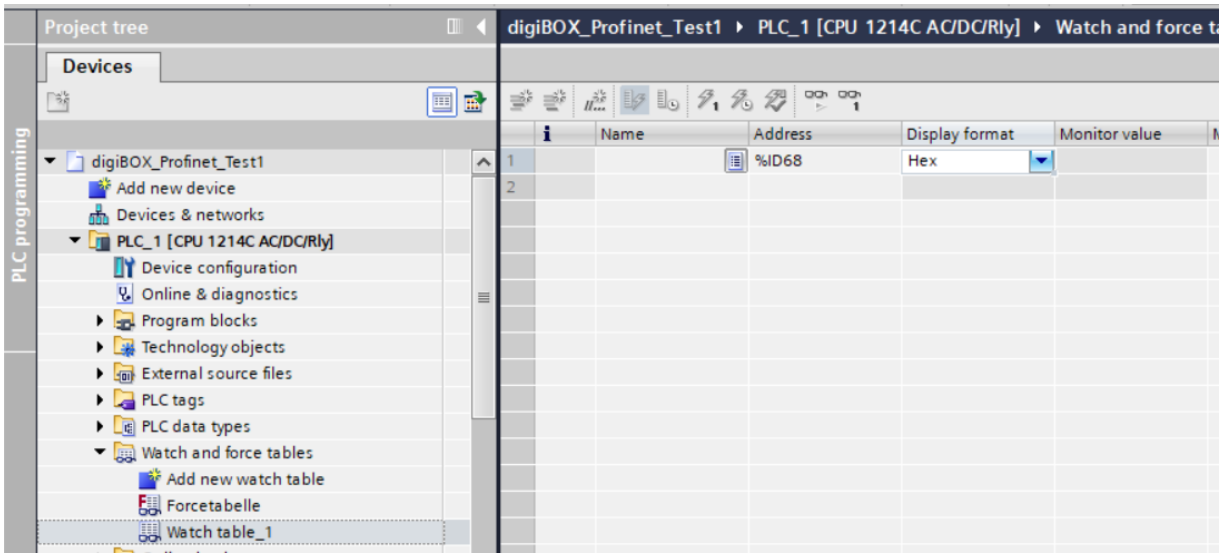
Now, we can access the data from digiBOX via Profinet in TIA Portal. But first, we need to configure the digiBOX so that we are able to receive and send data. Click on the digiBOX and go to hardware catalog. Inside the folder “Module”, there are several functionalities that the digiBOX can perform. Go to “Measurement” → “Channel 1” and double click on “Ch01 Measurement (Int).



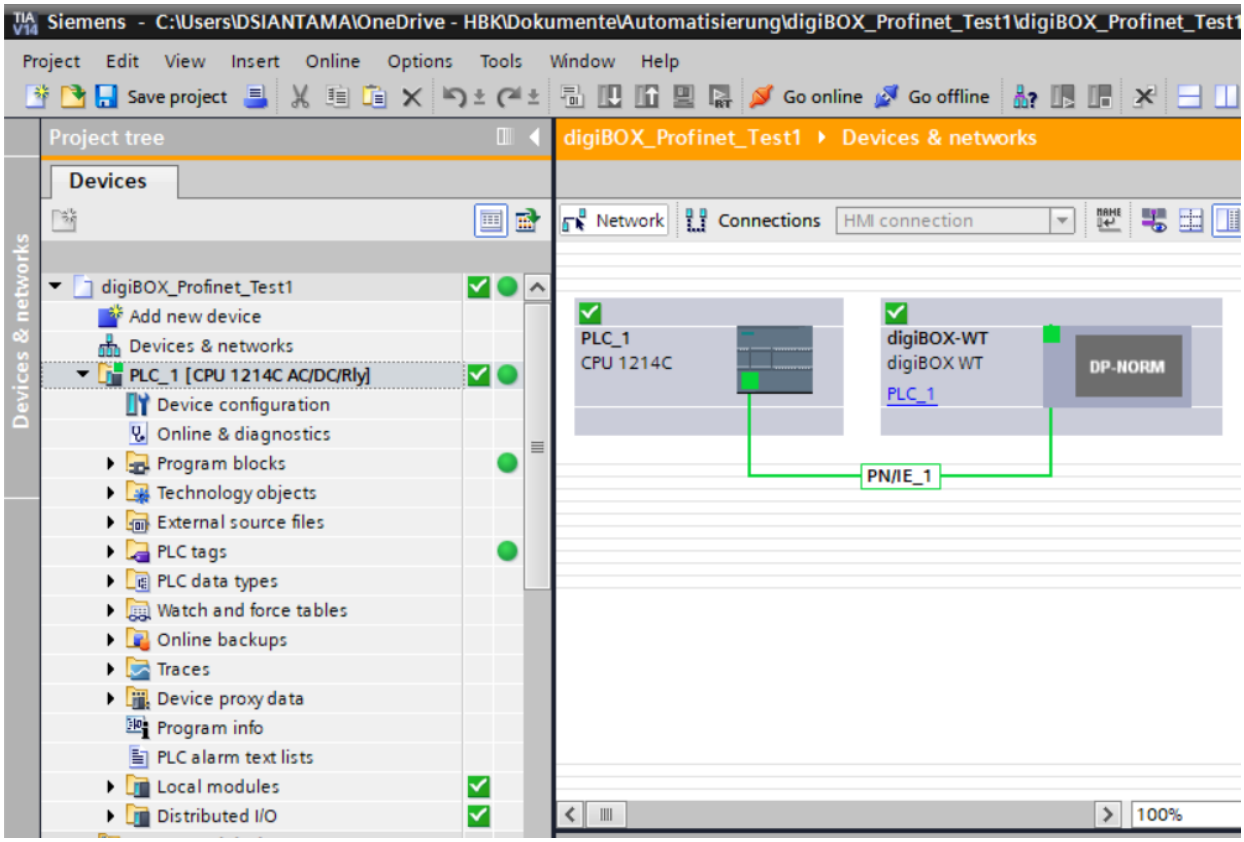


We are going to try to get the gross value of the weight measured on channel 1. In order to do this, we must access the data stored in the address %ID68.

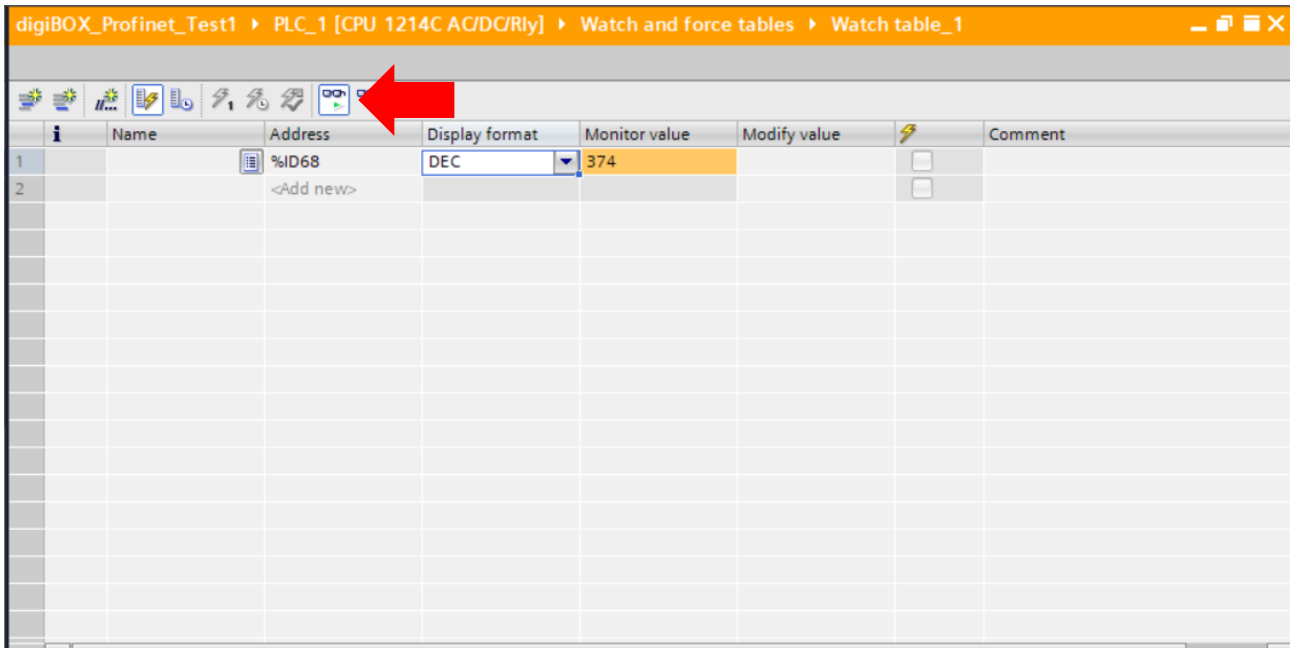
Now, add a new watch table and enter the address of the data we want to access. You can change the way that the value will be displayed (Hex, Decimal, etc). Make sure to load the configuration to the real plc again (You need to do this each time you change something).



Now, we need to run the program. Click on"Go online". If you are successful, you will see green checkmarks.



Go back to the watch table and click on “Monitor all”. Now you can see the weight measured on channel 1 updating on real time.

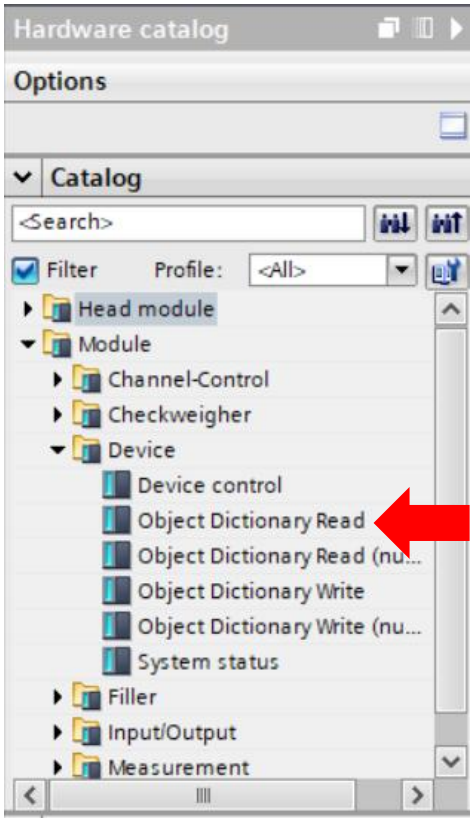


6. Object Dictionary Read and Object Dictionary Write

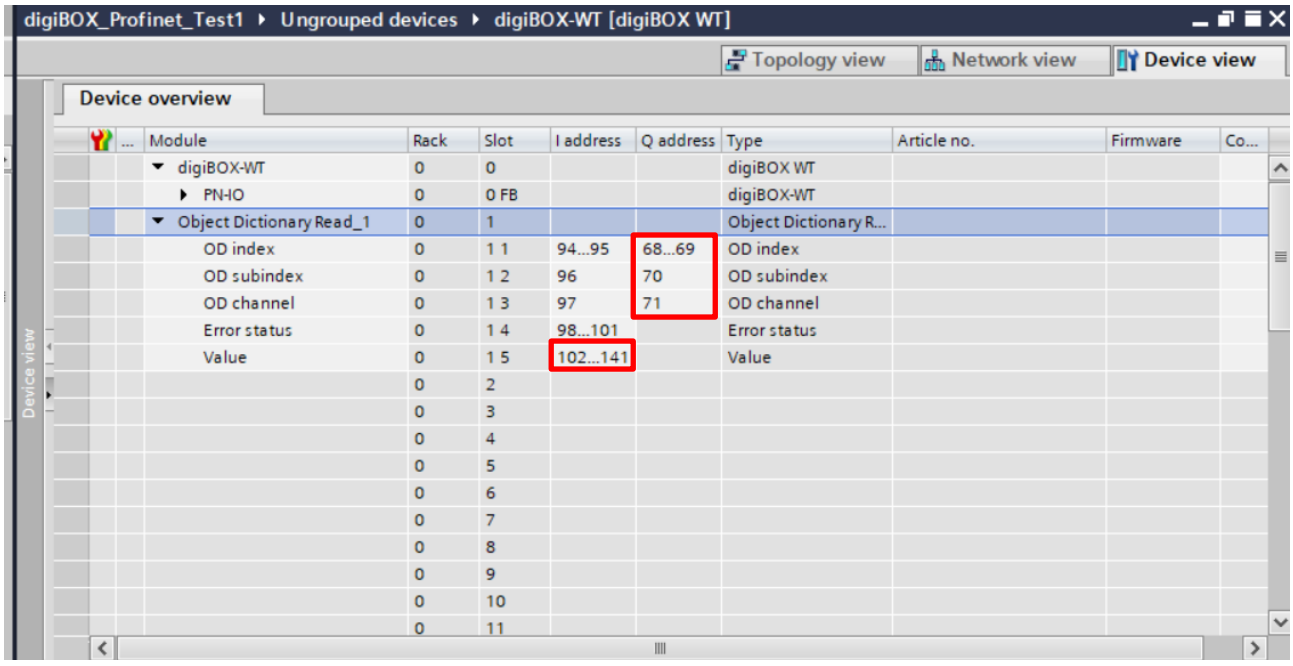
The digiBOX provides two functions that allow you to read or write values at specific locations based on an object’s index and subindex, as defined in the Object Dictionary. These functions are ODRead and ODWrite. ODRead is used to retrieve the value of an object at a given address, while ODWrite allows you to send a payload to that address. In TIA Portal, you can enter the target index, subindex, and, when required, the payload to perform the desired read or write operation.

a. OD Read

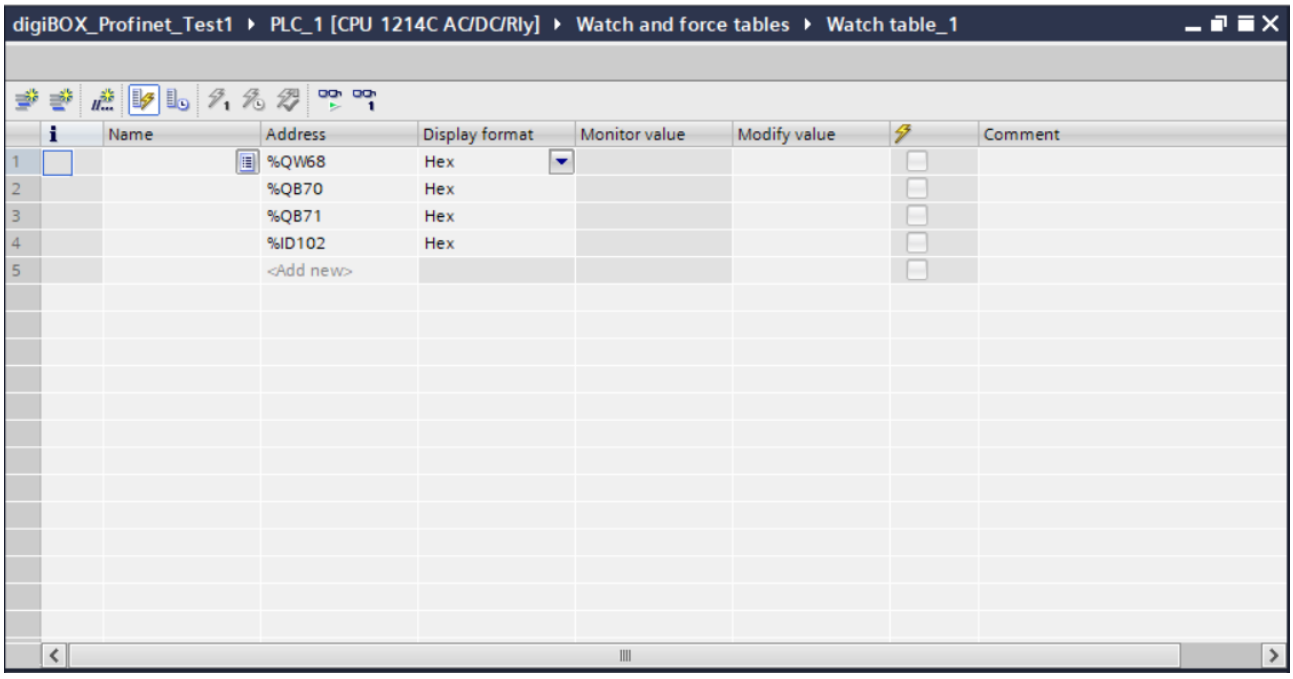
To use the OD read function, we need to first configure the digiBOX like what we did on section 5. Navigate to “Device” and inside you can see the Object Dictionary Read module.



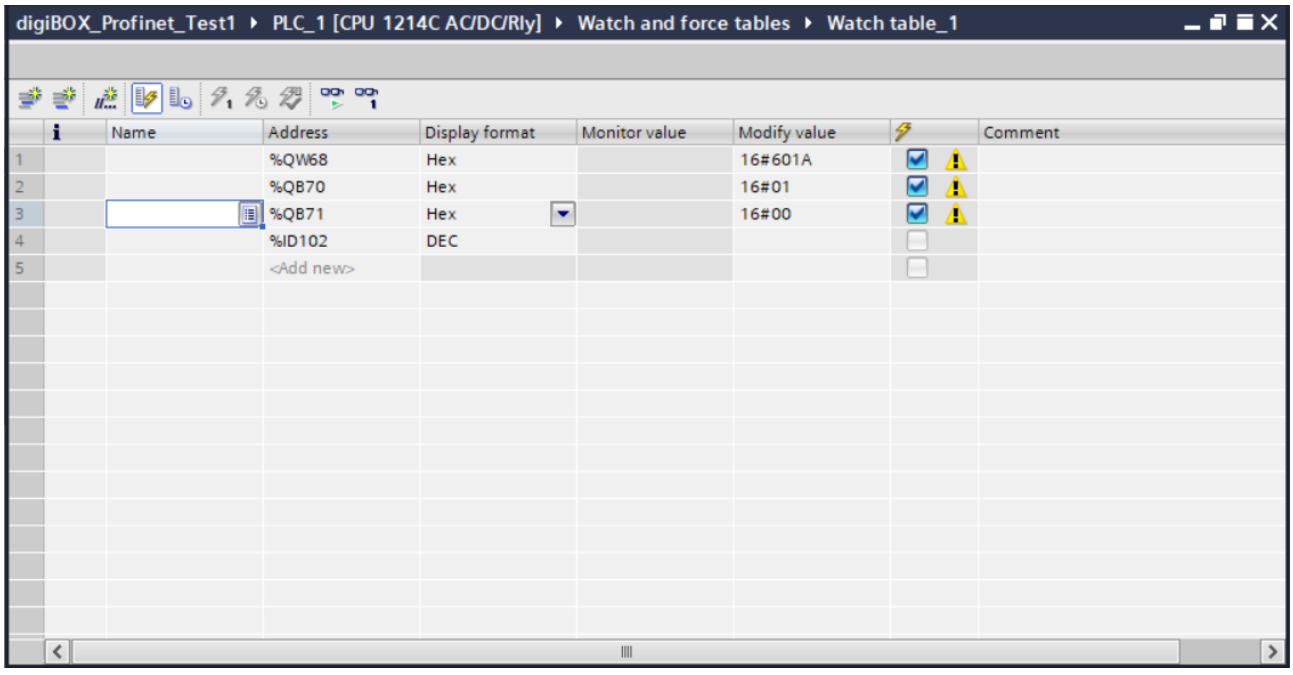
To access the targeted object, we need to input the address of the index, subindex and channel. The Q address will be used here (Q address means output address) as we can only make changes to the output. Take also the value here. Check the IO Tags. If there is none listed, use %ID or %QD depends on if it is an input or output.



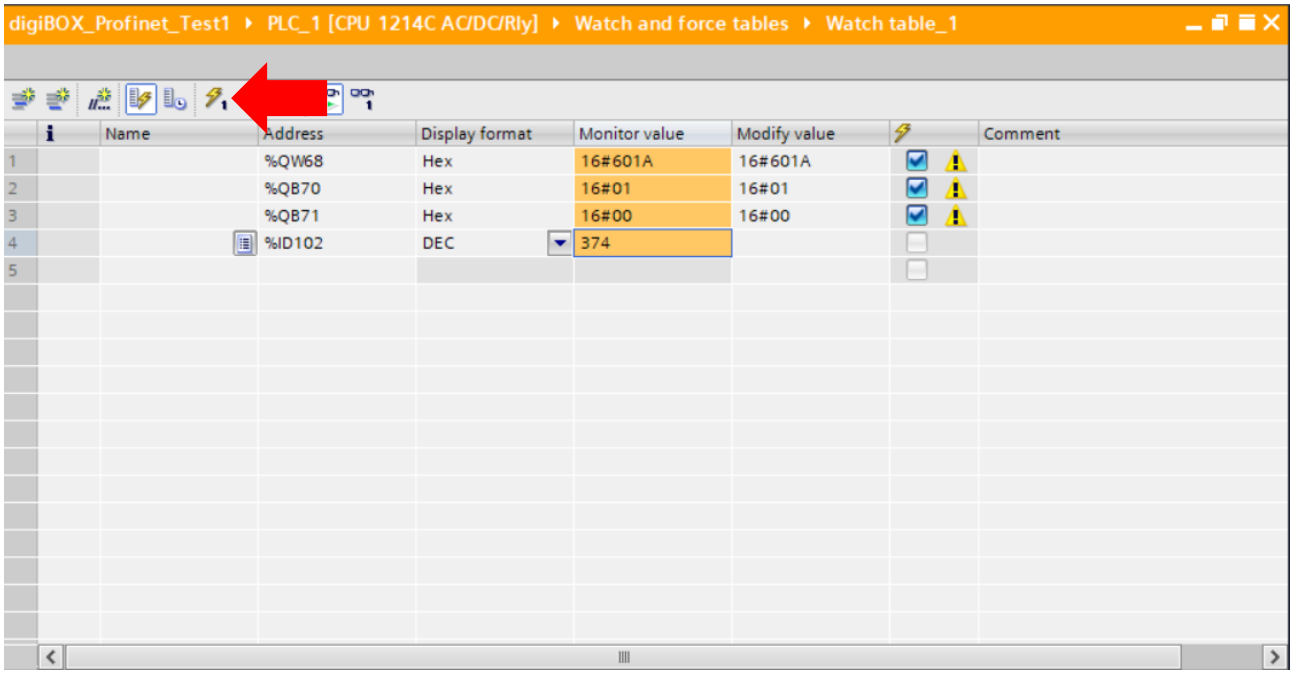
Type in the addresses of the variables in the watch table.



Now, you need to know the index and subindex of the object that you want to access. You can get this from the object dictionary library downloaded from the web interface of digiBOX as an excel file. For example, I want to get the output weight from channel 1. The index of this object is 16#601A and the subindex is 16#01. The channel array starts from the index 0, meaning channel 1 is at 0, channel 2 is at 1, etc. Type all of these under “Modify value”.



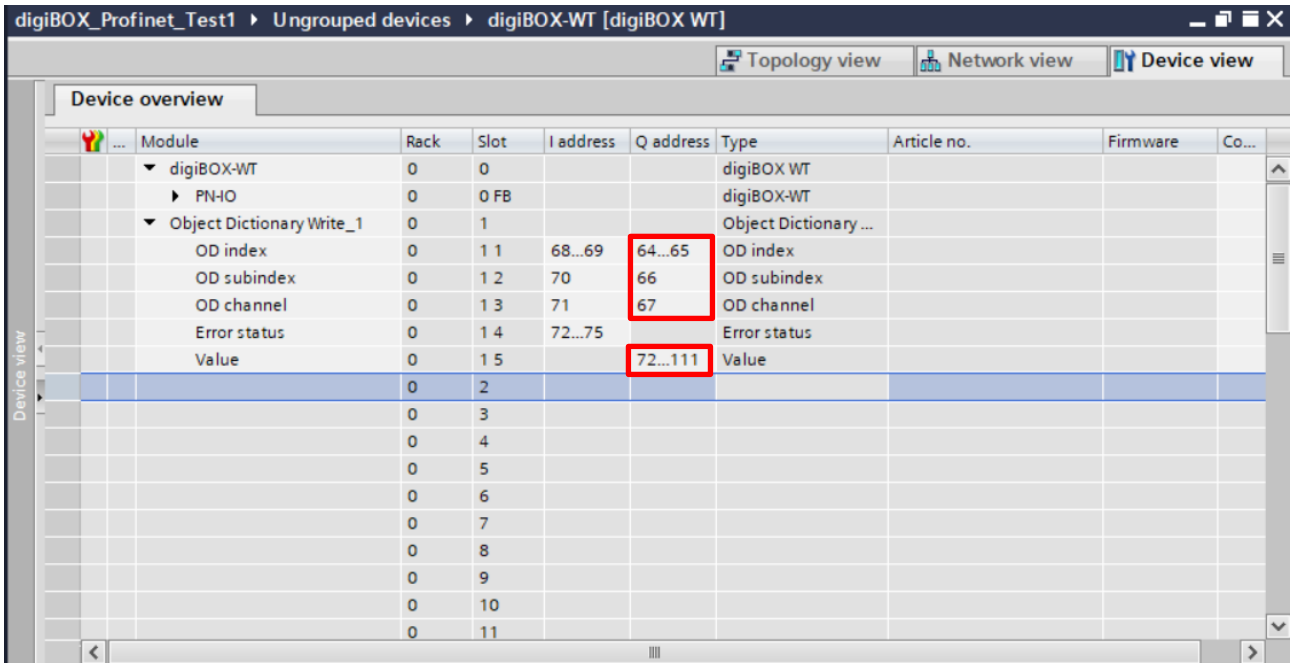
Now, go online and monitor all. Then, click on “Modify all selected values once and now”.



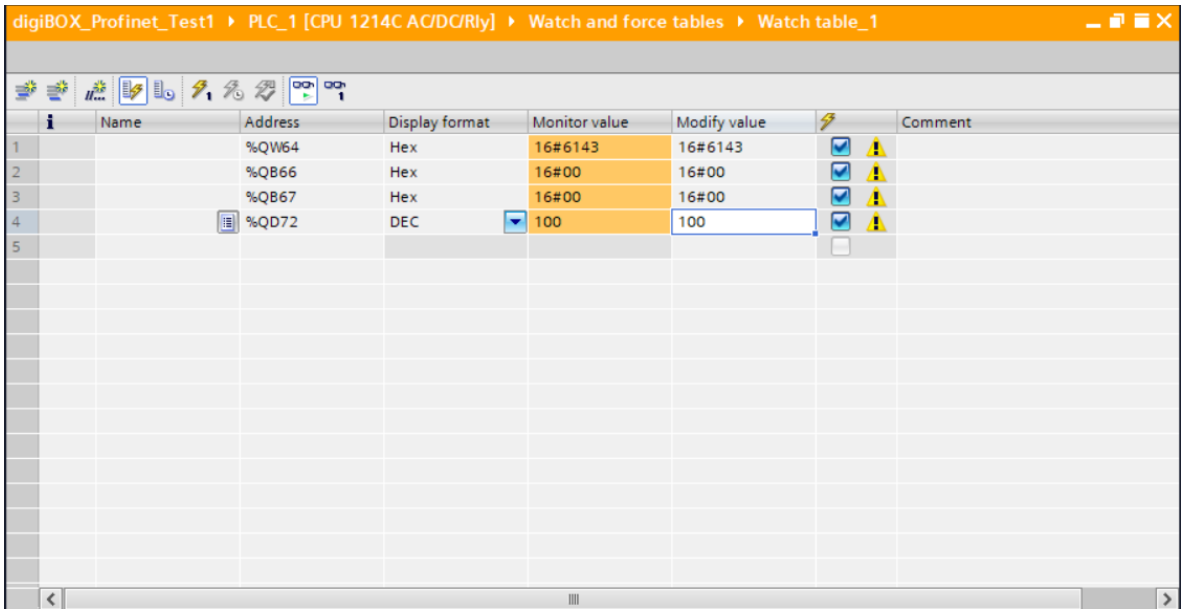
You can see the value of the object you accessed. If you need to read a different object, you can still change the index, subindex, or channel even while you are online. After adjusting these fields, click “Modify all selected values once and now” again to retrieve the updated value. Just note that the value displayed here is a one-time readout and does not update in real time.

b. OD Write

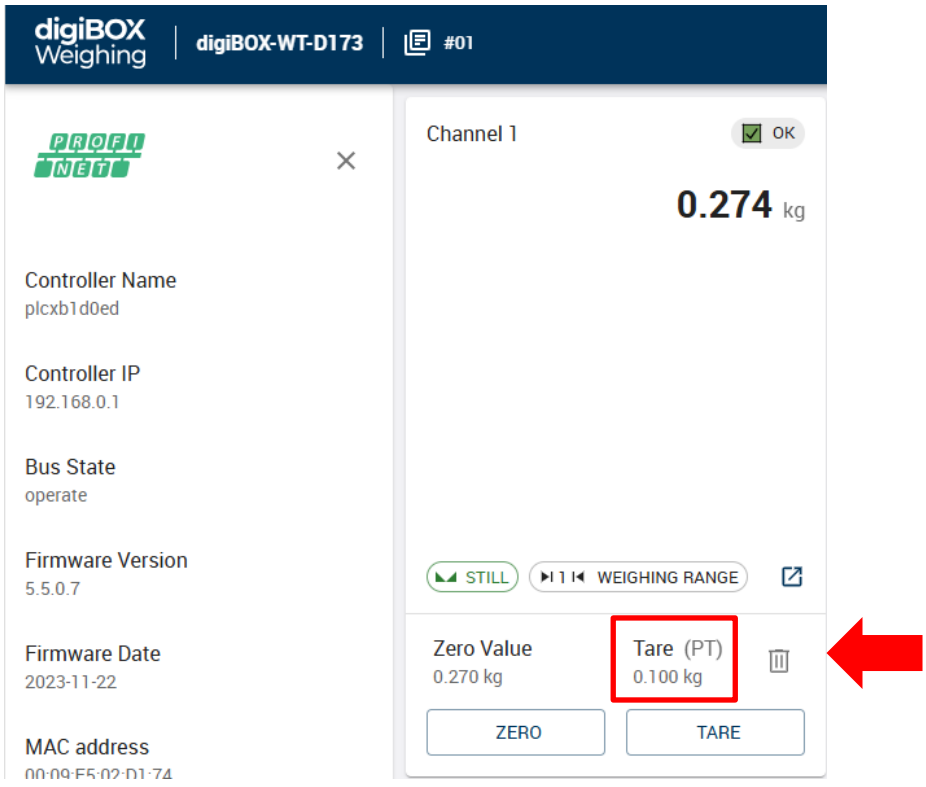
For OD Write, the procedure is the same as with OD Read. However, instead of retrieving a value, you must specify the payload that you want to send to the target address. Since you are writing data, the value field is now an output, meaning you must enter the value that should be transmitted.



For this example, we are going to overwrite the tare value in channel 1. It is located at index 16#6143 and subindex 16#00.



You can see the changes on the web interface of the digiBOX.



Disclaimer

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