



# **4B IE-NODE Siemens PLC Software**

This is a first draft of the document and the software and although it has been tested as far as possible, it may contain errors not yet identified.

Author	AM
Document Reference	-
Revision	1
Date	06/02/2019

[illegible]

# Table of Contents

1.	INSTALL GSDML FILE .....	5
2.	CHANGE IP ADDRESS OF A PLC DEVICE.....	6
3.	CHANGE IE-NODE IP SETTINGS .....	8
4.	MONITOR VALUES .....	10
5.	ADD A NEW PLC DEVICE .....	12
6.	ADD AN IE-NODE .....	15
7.	IE-NODE DATA STRUCTURE.....	19
8.	CONCLUSION .....	21

<b>Page Number:</b> 2	<b>Reference:</b> -
<b>Revision:</b> 1	<b>Date:</b> 06/02/2019

## **Information**

The software supplied includes the following:

- 1) The complete PLC Software and system file – **IE-NODE Application.ap13**.
- 2) The GSDML file for the Siemens PLC device configuration.

This document is divided into two main parts:

- First part deals with establishing communication with up to two IE-NODEs by using the **IE-NODE Application.ap13** project (Follow Section 1 to 4).
- The second part deals with adding a new device into the project (Follow Section 5 to 6).

<b>Page Number:</b> 3	<b>Reference:</b> -
<b>Revision:</b> 1	<b>Date:</b> 06/02/2019

## **Introduction**

This application note has been created to assist the user in connecting the IE-NODE to the Siemens PLC via ProfiNet. The application note has been written for the following combination of tools:

- 1. PLC:** SIMATIC S7-1200 series (Siemens order code: 6ES7 212-1BE31-0XB0)
- 2. Siemens IDE:** TIA Portal Basic Version 13 (SP1)

Due to the large number of different tools and packages available, 4B are not able to provide application notes for each combination. This application note should be thorough enough to be used as guidance for connecting the IE-NODE via ProfiNet to the end user's system of choice.

The application note should be used alongside with an example project provided within the Zip file. The application project contains all the necessary information to successfully connect and use the IE-NODE with a Siemens PLC.

**This document is NOT comprehensive and assumes that the reader does have a familiarity with the Siemens PLC SIMATIC S7 series if not the exact model in use.**

<b>Page Number:</b> 4	<b>Reference:</b> -
<b>Revision:</b> 1	<b>Date:</b> 06/02/2019

# Part 1

This part describes the steps required to establish communication with up to two IE-NODEs by using the “IE-NODE Application.ap13” example project.

## 1. Install GSDML file

- 1.1. Please open the “IE-NODE Application.ap13” project file and select “Option → Install general station description file (GSD)” from the menu.

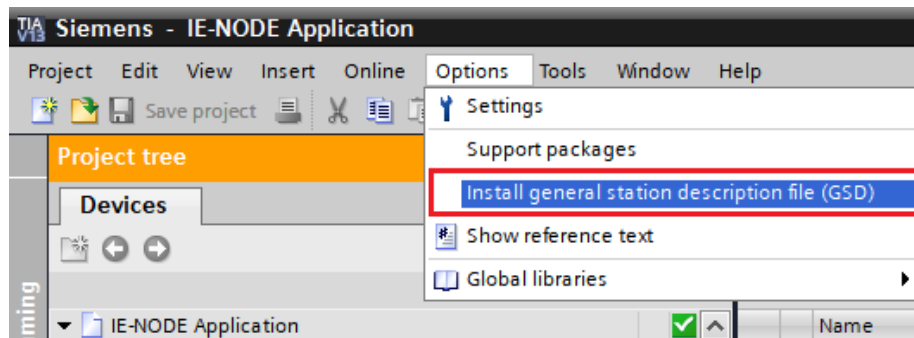


Figure 1 – Select Install GSDML file from menu

- 1.2. If the GSDML file doesn't appear automatically then please browse for the GSDML file within the GSD sub-folder of this application note to install.
- 1.3. Select the GSDML file and press “**Install**” to install it for the IE-NODE.
- 1.4. Follow the process through to add the file into the PLC for the product. Press “**Close**” after the installation process.

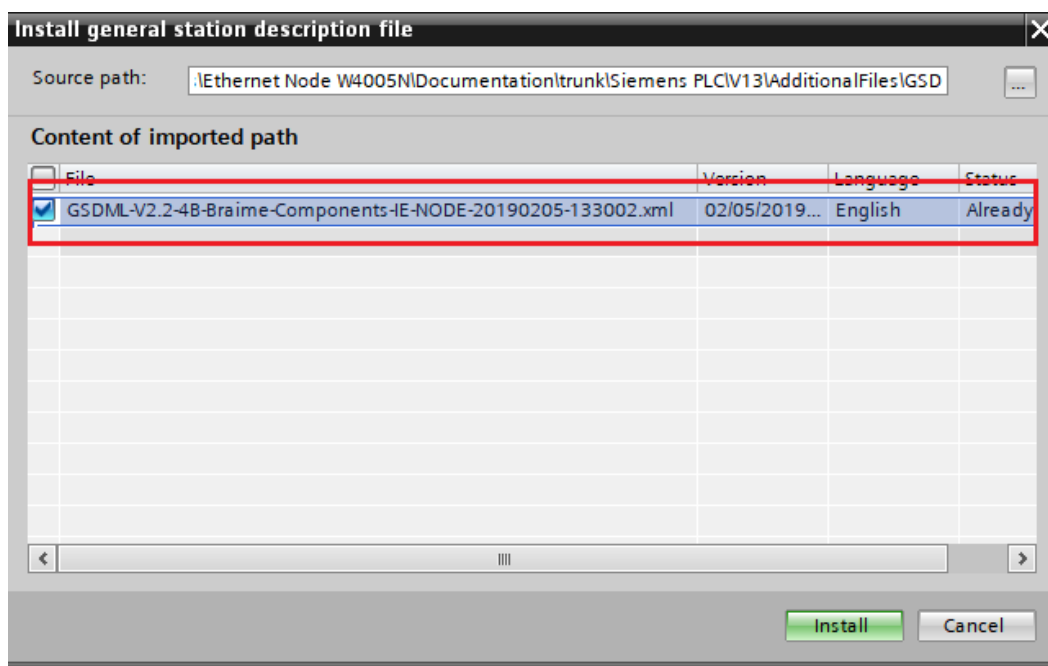


Figure 2 - GSDML File selection

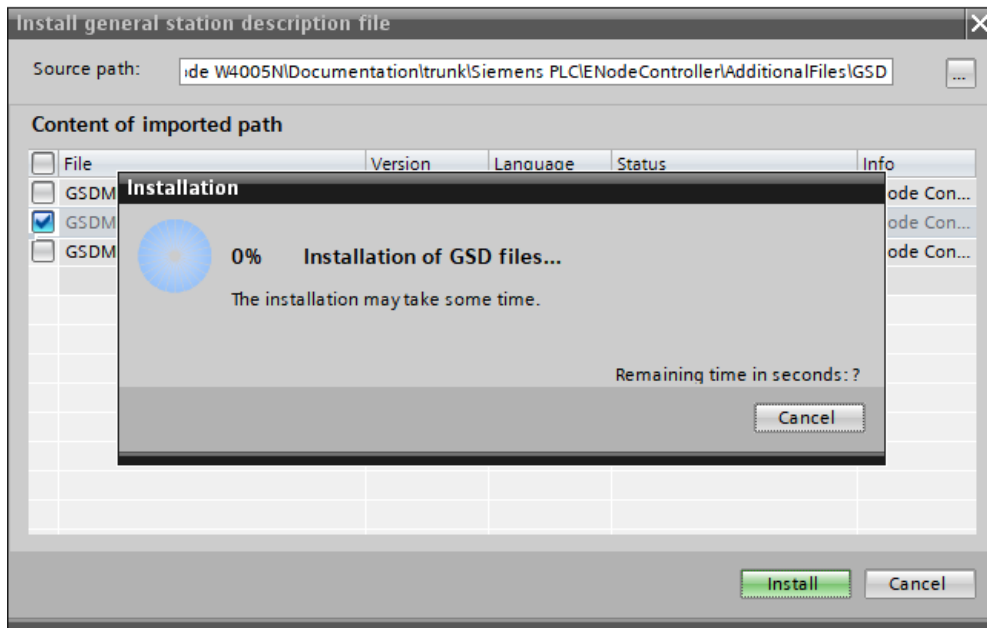


Figure 3 - GSDML file Installation Process

## 2. Change IP address of a PLC device

**Note:** Please make sure the IE-NODEs have static IP address setup. Refer to [Ethernet Node Setup Procedure.pdf](#) document to change the network settings of the Modules.

- 2.1. From the “**Project Tree**” navigation menu open “**Devices & networks**”. After opening the “**Devices & networks**” window the user will see the PLCs and IE-NODEs configured in this example project.

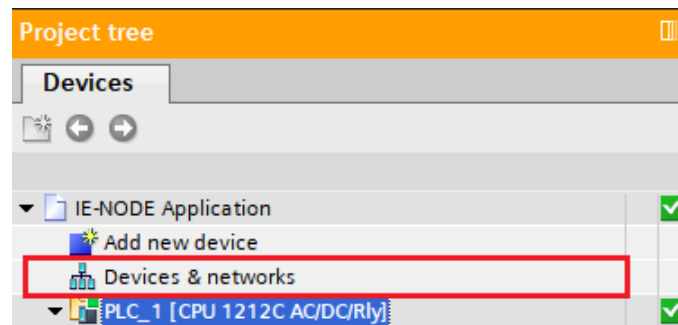


Figure 4 - PLC device IP Address

- 2.2. Select the “**PLC\_1 CPU 1212C**” device and click on the small “**Green box**” as shown in the image below (PTO):

<b>Page Number:</b> 6	<b>Reference:</b> -
<b>Revision:</b> 1	<b>Date:</b> 06/02/2019

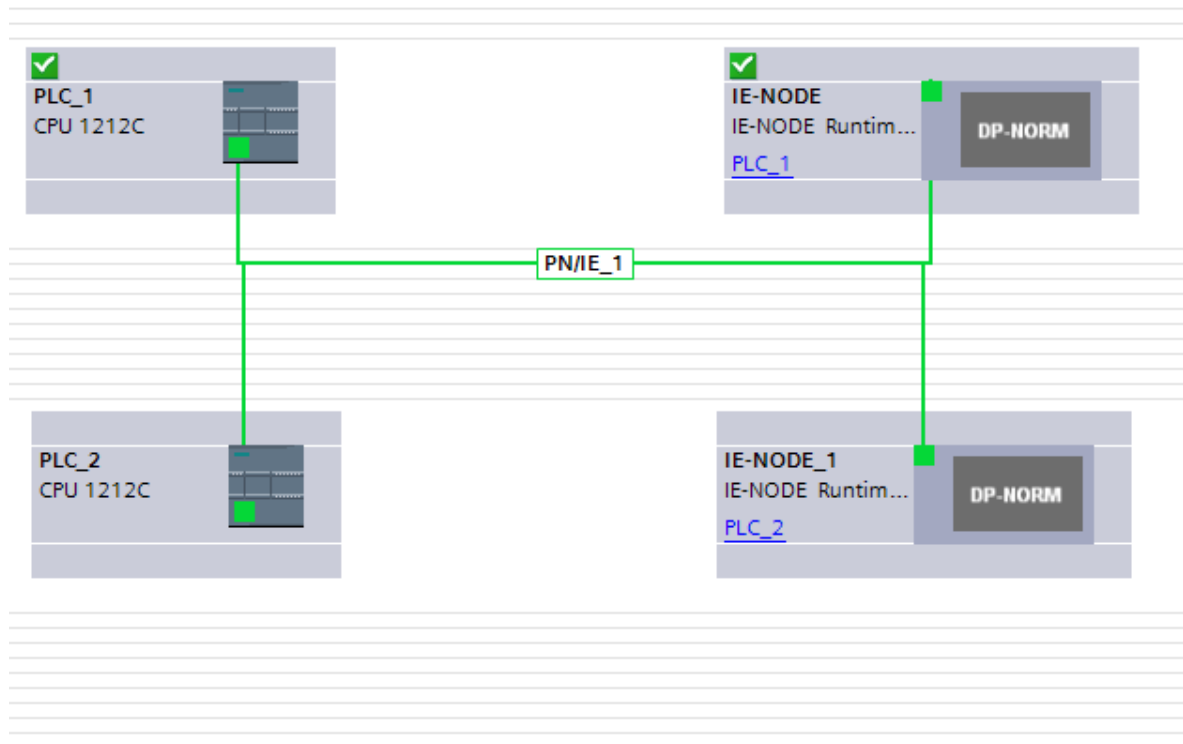


Figure 5 - Devices configured in the project

2.3. Assign the IP address to the PLC Module from the **“Properties”** window.

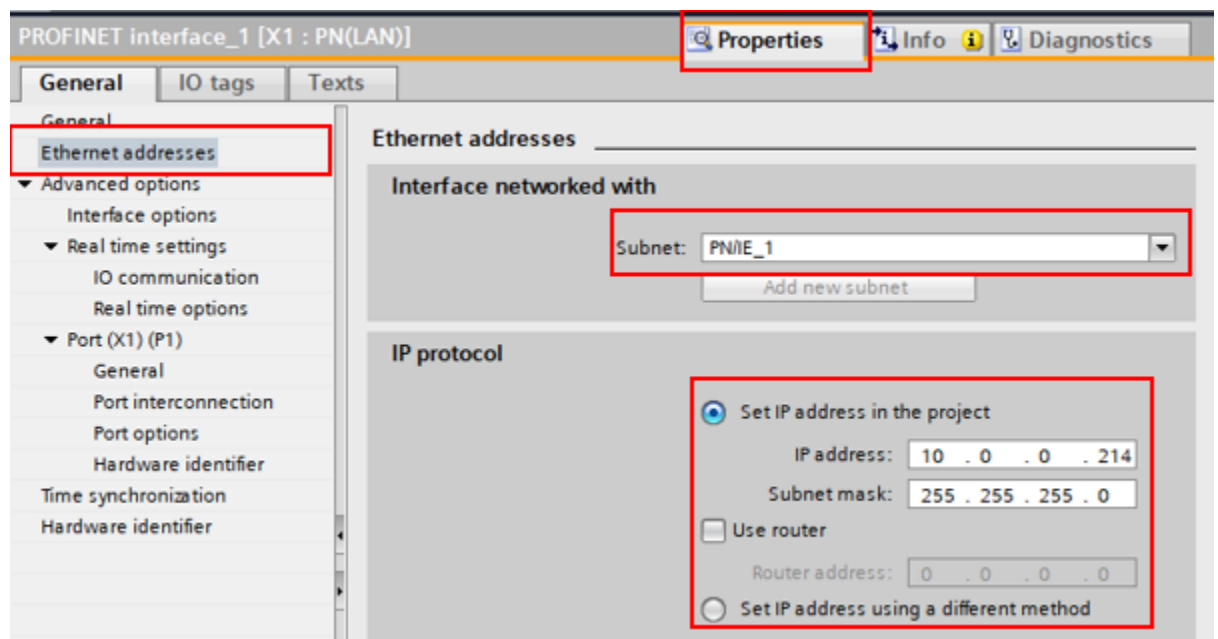


Figure 6 - PLC network settings

2.4. After assigning the IP settings, click on the **“PLC\_1[CPU 1212C AC/DC/Rly]”** and save settings then please click on the **“Download to device”** button to compile and download the settings into the PLC as shown in the image below (PTO):

<b>Page Number:</b> 7	<b>Reference:</b> -
<b>Revision:</b> 1	<b>Date:</b> 06/02/2019



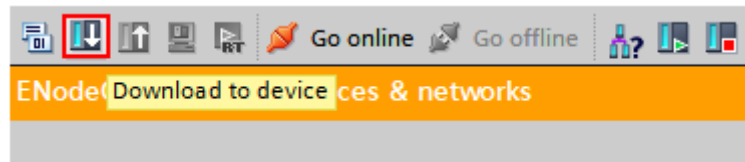


Figure 7 - Compile and download to PLC device

2.5. Press **“Load”** on the confirmation windows and let the process complete. Press **“Finish”** after the successful completion of this process.

### 3. Change IE-NODE IP Settings

Please follow the steps below to change the network settings of the IE-NODE:

3.1. From the **“Project Tree”** navigation menu please select the **“PLC\_1 [CPU 1212C AC/DC/Rly]→Distributed I/O→PROFINET IO-System (100): PN/IE\_1→IE-NODE”** and open **“Online and diagnostics”**.

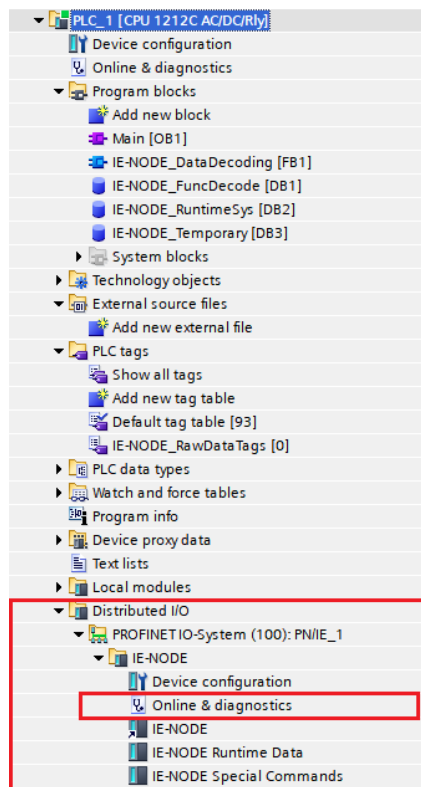


Figure 8 - IE-NODE IP Settings

3.2. From the **“Functions”** menu please open the **“Assign name”** window and select the IE-NODE from the Accessible devices list and press **“Assign name”**.

Note: Before assigning the name / IP address please make sure to select the correct PG/PC interface (PN/IE\_1) to find the IE-NODE on the network. Select the network adapter that should be used to communicate with the PLC. Please try not to use Wi-Fi connection for this.

<b>Page Number:</b> 8	<b>Reference:</b> -
<b>Revision:</b> 1	<b>Date:</b> 06/02/2019



Figure 9 - Accessible devices in the network

3.3. To assign the IP Address please open the “Assign IP Address” from the same window and press the “Accessible devices” button.

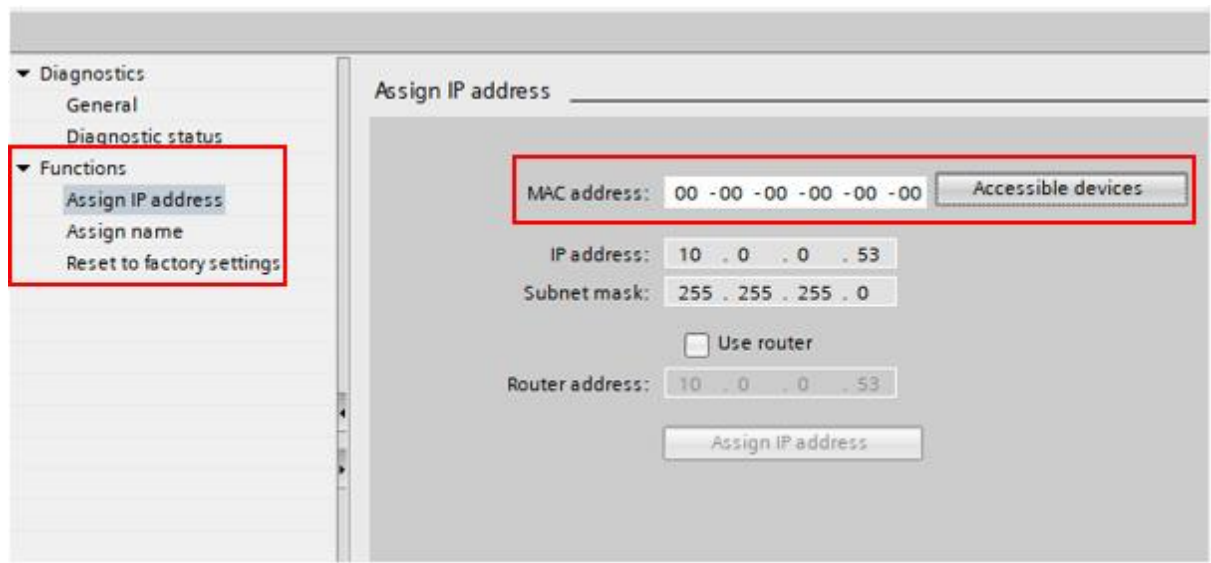


Figure 10 - Open Accessible devices window

3.4. Select the IE-NODE from the “Select device” window and press “Apply” and then press “Assign IP address”.

Note: Before assigning the name / IP address please make sure to select the correct PG/PC interface to find the IE-NODE on the network. Select the network adapter that should be used to communicate with the PLC. Please try not to use Wi-Fi connection for this.

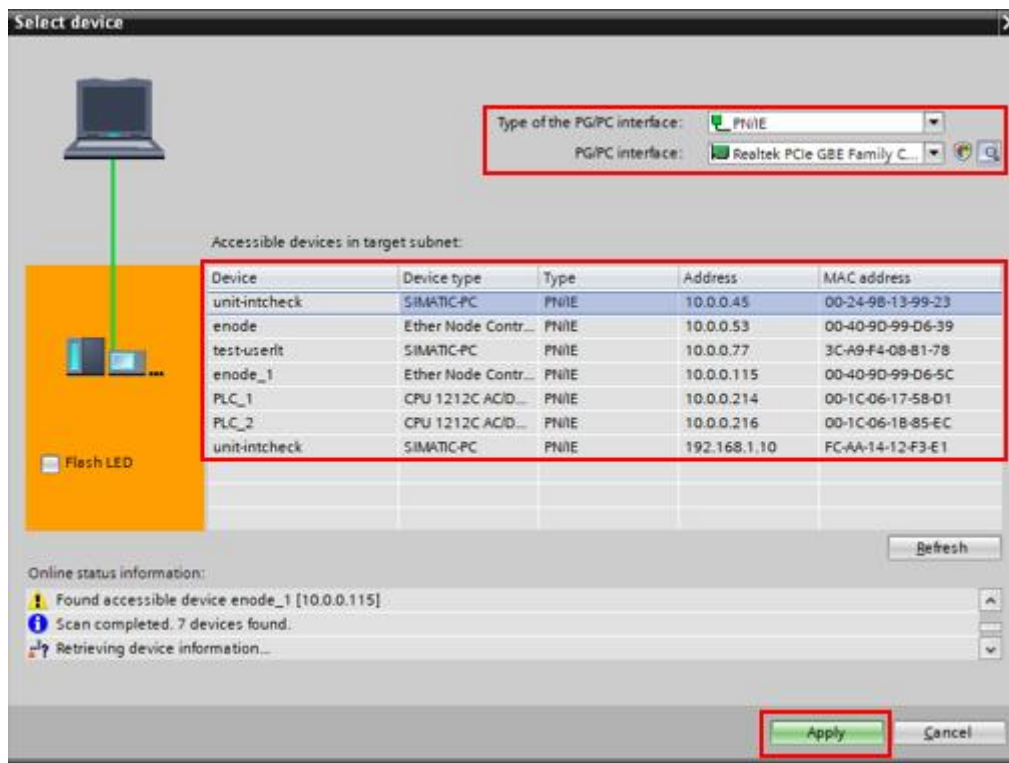


Figure 11 - Accessible devices window to assign IP address

3.5. After assigning the IP address to the I/O device please download the settings into the PLC by pressing the **“Download to device”** button as described in [“Section 2 - Change IP address of a PLC device”](#).

Note: Repeat section 2 & 3 to setup PLC 2 if the user wants to configure two IE-NODEs with two PLCs.

## 4. Monitor Values

To monitor data of the IE-NODE, a user must change the PLC status to **“Online”** and change the mode to **“Run”**. Please follow the steps below to monitor the values:

4.1. After downloading the IP settings for both the IE-NODE and the PLC into the S7-1200 Module, select the PLC from the **“Project Tree menu”** (e.g. **PLC\_1 [CPU] 1212C AC/DC/Rly**).

4.2. Select **“Go online”** from the menu to change the status and **“Start CPU”** to change the mode.



Figure 12 - Change PLC status to Online & Run

4.3. Please open the “**IE-NODE\_RuntimeSys [DB2]**” from the Program blocks and press “**Monitor values**” to see the IE-NODE data.

Name	Data type	Start value	Monitor value
50 DNS Server 2[0]	Dint	0	0
51 DNS Server 2[1]	Dint	0	0
52 DNS Server 2[2]	Dint	0	0
53 DNS Server 2[3]	Dint	0	0
54 DNS Server 2_String	String	"	' 0. 0. 0. 0'
55 MAC Address	Array [0..3] of Word		
56 MAC Address[0]	Word	16#0	16#0000
57 MAC Address[1]	Word	16#0	16#0000
58 MAC Address[2]	Word	16#0	16#0000
59 MAC Address[3]	Word	16#0	16#0000
60 HazardMon UDF ID	Word	16#0	16#0000
61 HazardMon Port	UInt	0	0
62 HazardMon Status	UInt	0	0
63 Temperature Unit	"Temperature Unit"		
64 Fahrenheit °F	Bool	false	FALSE
65 Celsius °C	Bool	false	TRUE
66 Switches	"IE-NODE Switch Settings"		
67 Rotary Switch	UInt	0	0
68 DIP Switch	UInt	0	0
69 DIPSwitch_Profinet	Bool	false	TRUE
70 DIPSwitch_EthernetIP	Bool	false	FALSE
71 Bootloader Selection	Bool	false	TRUE
72 HazardMon Enabled	Bool	false	TRUE
73 Node ID (Internal)	Bool	false	FALSE

Figure 13 - IE-NODE Data

Name	Data type	Start value	Monitor value
Static			
ENode System DB	"IE-NODE_Data"		
System	"IE-NODE Settings Section"		
Device Name	String	'Test System'	'Test System'
Device	UInt	0	0
Device Type	String	"	'UNKNOWN NODE'
ETH-NODE 1	Bool	false	FALSE
ETH-NODE 2	Bool	false	FALSE
Node ID	Dint	0	0
Protocol Version	UInt	0	0
Serial Number	String	"	' 0 0'
PIC Hardware Version	Word	16#0	16#0000
PIC Software Version	Word	16#0	16#0000
DIGI Hardware Version	Word	16#0	16#0000
DIGI Software Version	Word	16#0	16#0000
EXP Hardware Version	Word	16#0	16#0000
EXP Software Version	Word	16#0	16#0000
# Modbus Connections	Dint	0	0
PIC Heartbeat Counter	UInt	0	0
DIGI Heartbeat Counter	UInt	0	0
HazardMon Heartbeat Counter	UInt	0	0
Internal Ambient Temperature	Real	0.0	0.0
Network	"IE-NODE Network Section"		
DHCP Status	UInt	0	0
IP Address	Array [0..3] of Dint		
IP Address[0]	Dint	0	0
IP Address[1]	Dint	0	0
IP Address[2]	Dint	0	0
IP Address[3]	Dint	0	0
IP Address_String	String	"	' 0. 0. 0. 0'
Subnet Mask	Array [0..3] of Dint		
Subnet Mask[0]	Dint	0	0
Subnet Mask[1]	Dint	0	0
Subnet Mask[2]	Dint	0	0
Subnet Mask[3]	Dint	0	0
Subnet Mask_String	String	"	' 0. 0. 0. 0'
Gateway	Array [0..3] of Dint		
Gateway[0]	Dint	0	0
Gateway[1]	Dint	0	0
Gateway[2]	Dint	0	0
Gateway[3]	Dint	0	0

Figure 14 - IE-NODE Data – 2

## Part 2

**Note:** The steps below are only necessary if the user wants to add a new device into the project.

### **5. Add a new PLC Device**

5.1. Please open the “Add new device” window from the “Project Tree → IE-NODE Application” menu.

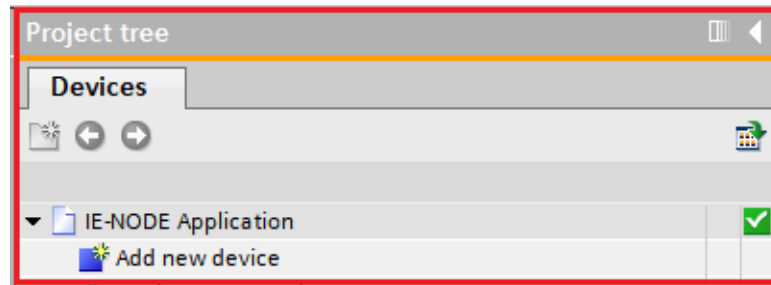


Figure 15 - Add a new PLC device

5.2. Select the PLC device from the list and select OK.

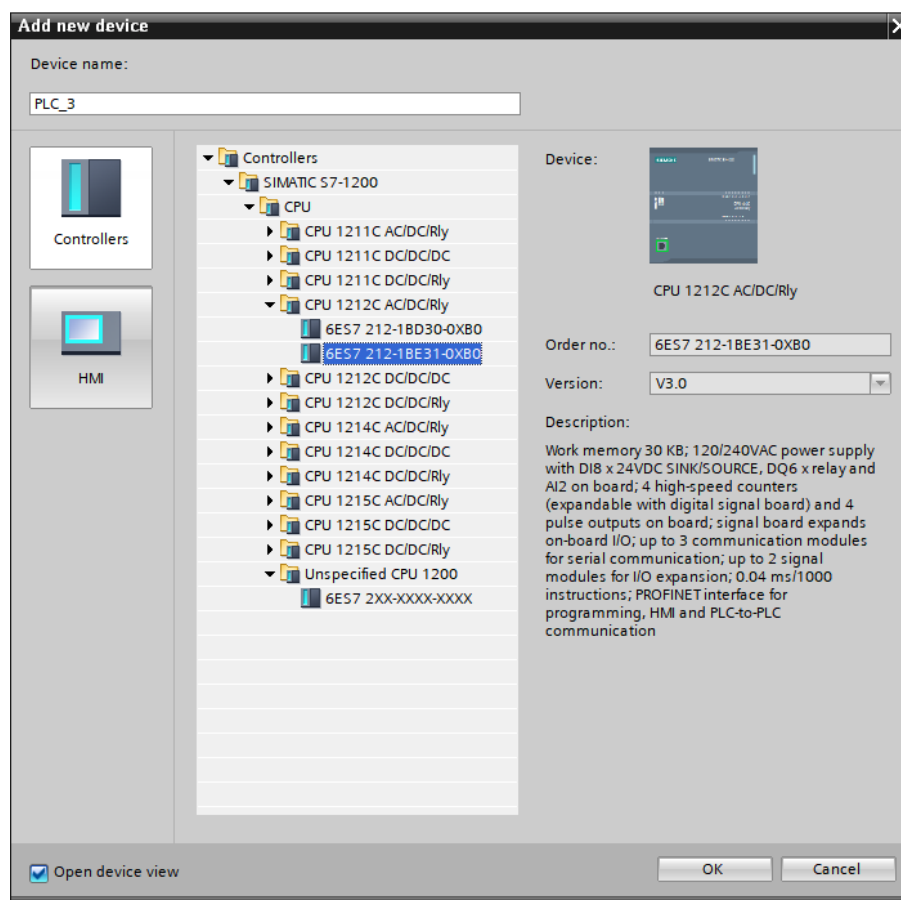


Figure 16 - List of PLC devices

- 5.3. From the “**Devices and network**” window please click on “**small green box**” of the newly added PLC and from the properties windows click on the “**Ethernet Address**” and assign a new IP address to the PLC.

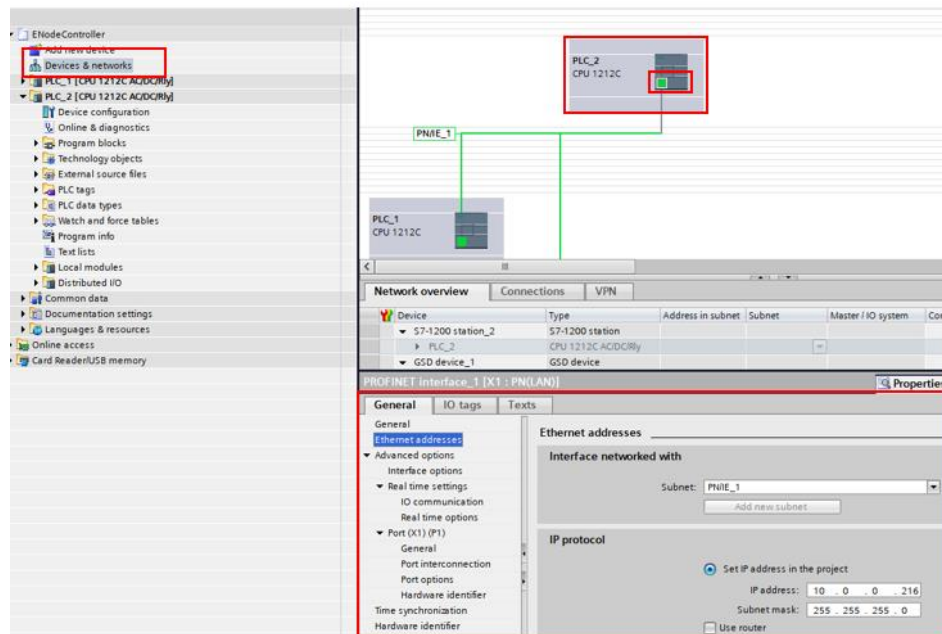


Figure 17 - save new IP address for the PLC

- 5.4. After assigning the IP address and interface network (PN/IE\_1), please save the settings and download them into the PLC device as described in “[Section 2 - Change IP address of a PLC device](#)”.
- 5.5. Open the “**Online and diagnostics**” of the device from the “**Project Tree → Online access**” and select the Ethernet Card connected to the PC and update the accessible devices. In the given image below “**Realtek PCIe GBE Family Controller**” is the Ethernet Card and “**PLC\_2**” or “**Accessible device**” is the new PLC:

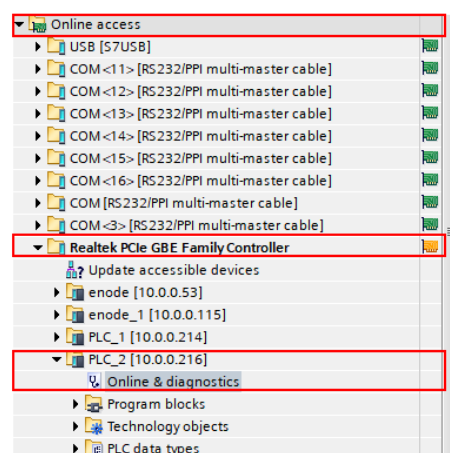


Figure 18 - PLC device network settings

5.6. Please assign static IP address to the PLC controller. Open the **“Functions”** menu and if necessary delete the current IP address of the PLC from the **“Reset to factory settings”**. Go into the **“Assign IP address”** window to assign a new IP address to the PLC device.

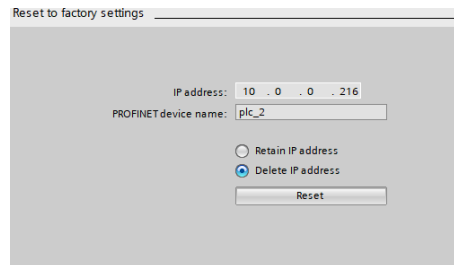


Figure 19 - Reset PLC IP address

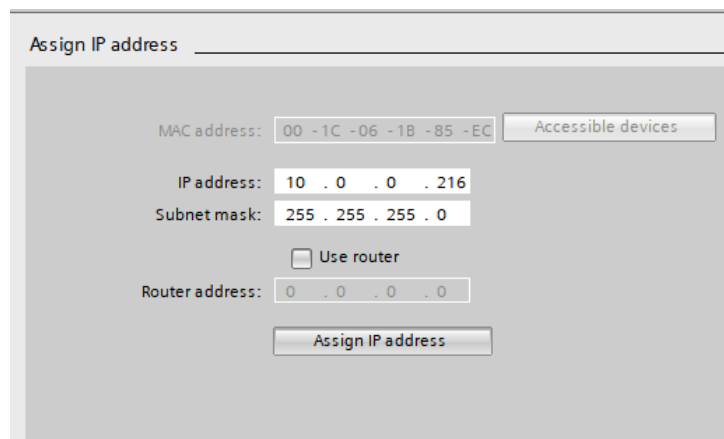


Figure 20 - Change IP Settings of the PLC

5.7. To Assign a name to a PLC module, please open the **“Assign name”** window and give a new name to the PLC device. The name of the added device and the accessible device should match.

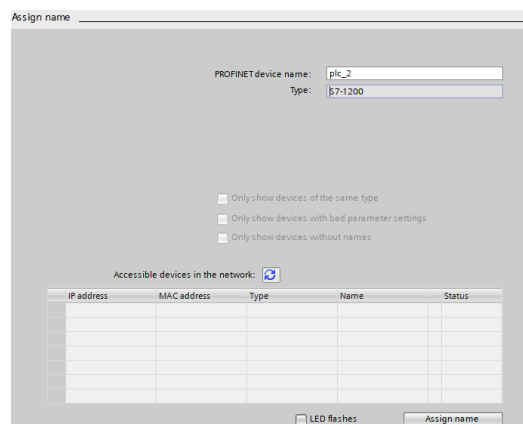


Figure 21 - Assign name to the PLC

5.8. After changing the settings please download them to the device by pressing the **“Download to device”** button.

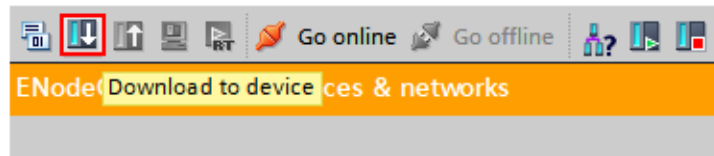


Figure 22 - Download settings to the PLC device

5.9. After downloading the settings to the device, open the **“Devices & network”** and select the PLC device and click on the **“Green box”** and make sure the **“Subnet”** settings are **“PN/IE\_1”**.

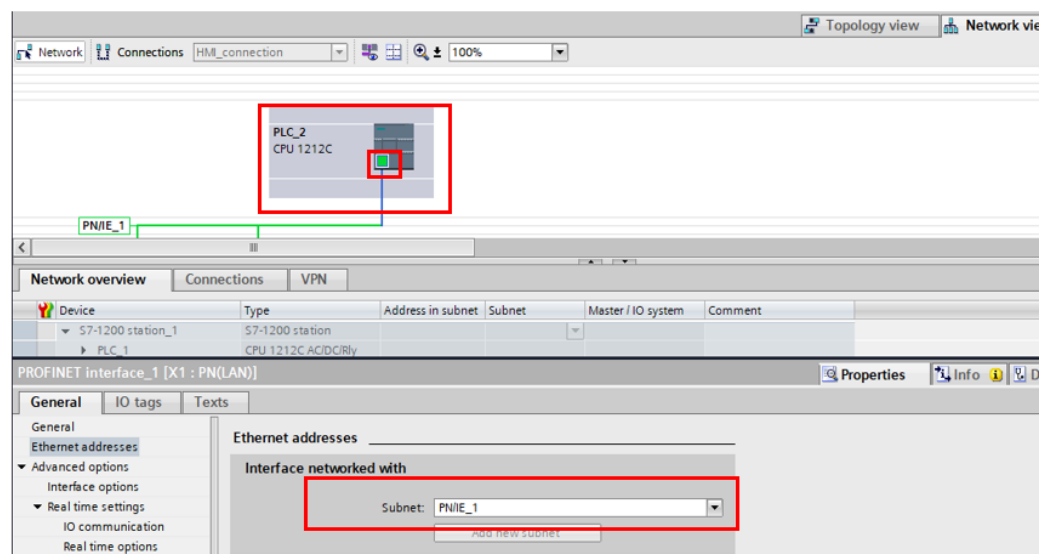


Figure 23 - Subnet network for the PLC

## 6. Add an IE-NODE

6.1. Right click on the new PLC device and select the Go to network view.

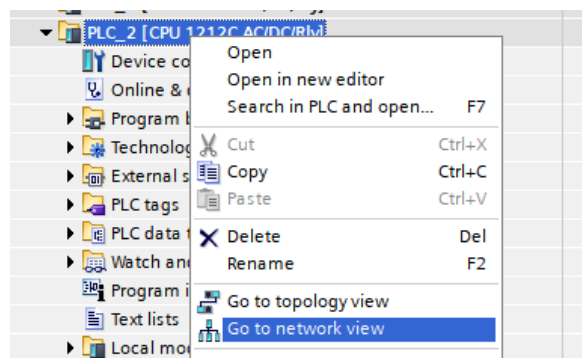


Figure 24 - Open the network view of the PLC to add IE-NODE



6.2. From the “**Hardware Catalog → Other field devices**” window drag the “**IE-NODE Runtime Data**” device and drop it into workplace of the PLC device and connect them together (see Figure 5).

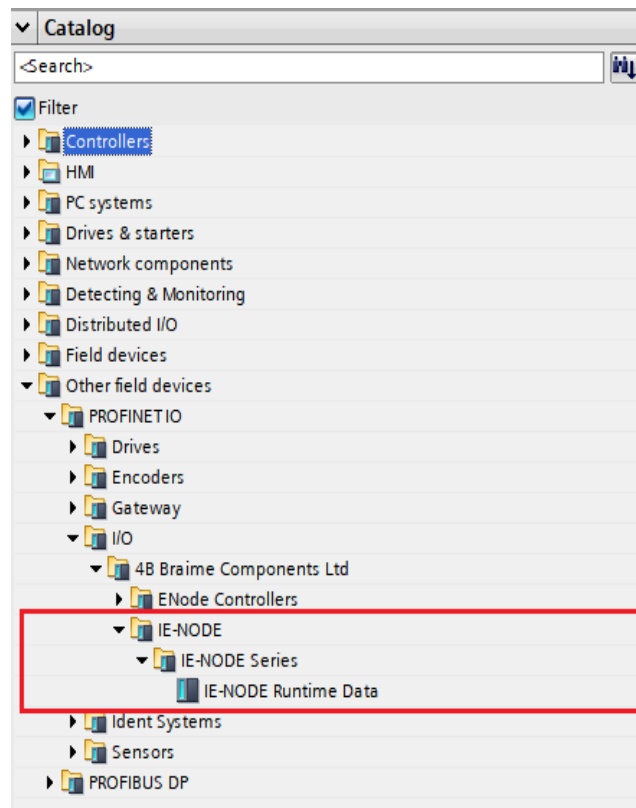


Figure 25 - Hardware Catalog

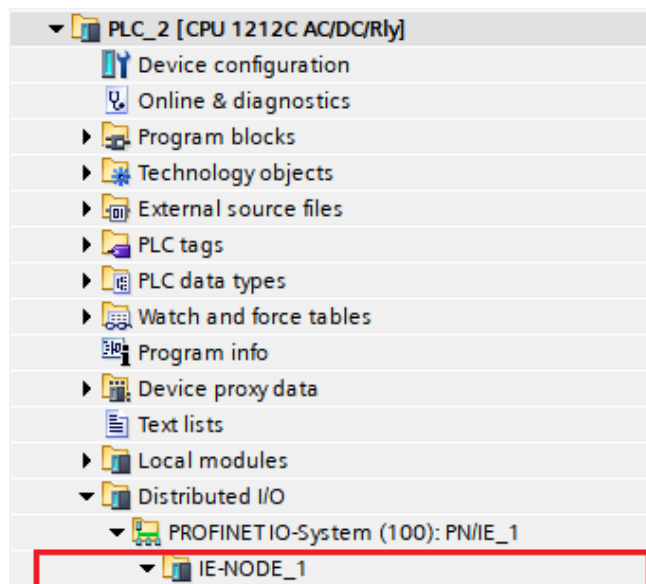


Figure 26 - IE-NODE added to the Distributed I/O modules

6.3. Double click on the “**IE-NODE\_1**” to open the IE-NODE Catalog and double click on the “**IE-NODE Runtime Data**” & “**IE-NODE Special Commands**” modules to add them into the “**IE-NODE\_1**” menu.

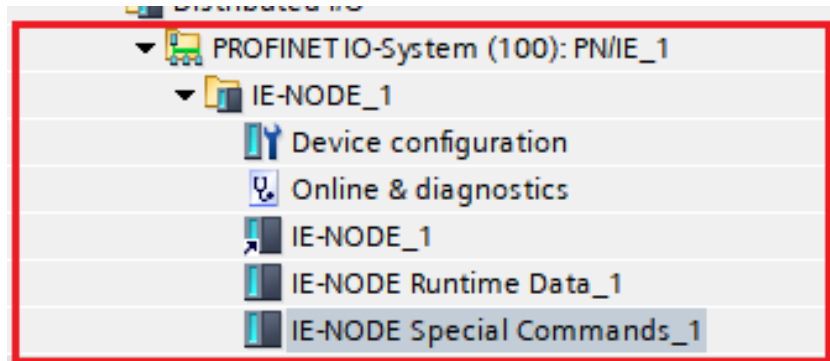


Figure 27 - IE-NODE Modules

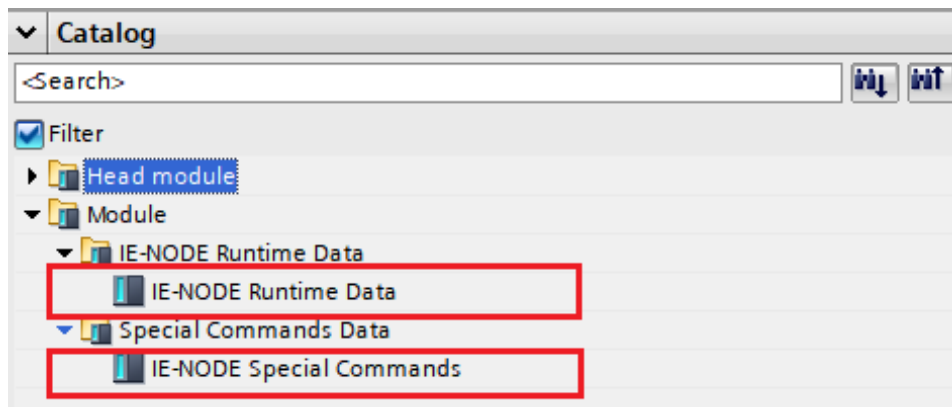


Figure 28 - IE-NODE Catalog

6.4. Please follow “[Section 3 - Change IE-NODE IP Settings](#)” to change the IP settings of the IE-NODE.

6.5. Download the IE-NODE to the device (see Section 2).

6.6. To monitor the module data please copy the “**Blocks**”, “**Tags**” and “**PLC data types**” given below and paste them into the newly added PLC device: (see Example Project)

- **Program block**
- **PLC tags** (First copy & paste the “**IE-NODE\_RawDataTags**” and then open the “**Default tag table**”, copy the seven tags and paste them into the newly added PLC’s “**Default tag table**”)
- **PLC data types** (Copy & paste PLC data types one at a time)

These images below explain how the new PLC device would look like for the new IE-NODE (PTO).

<b>Page Number:</b> 17	<b>Reference:</b> -
<b>Revision:</b> 1	<b>Date:</b> 06/02/2019

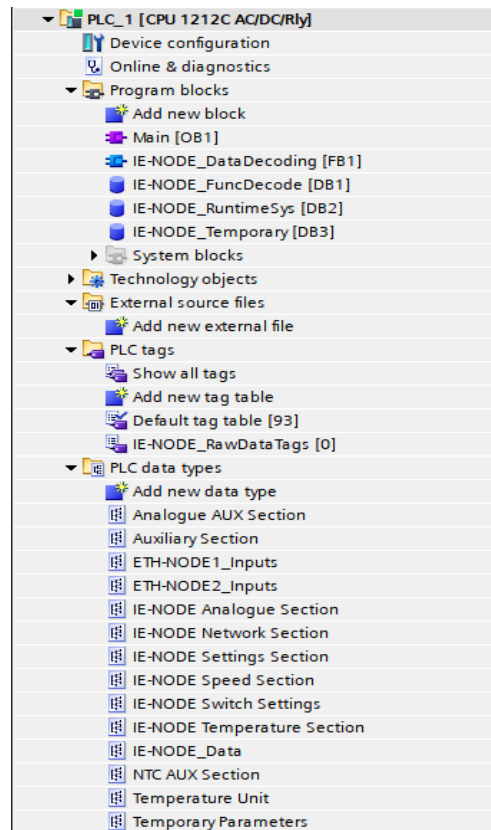


Figure 29 - PLC\_1 Data structure

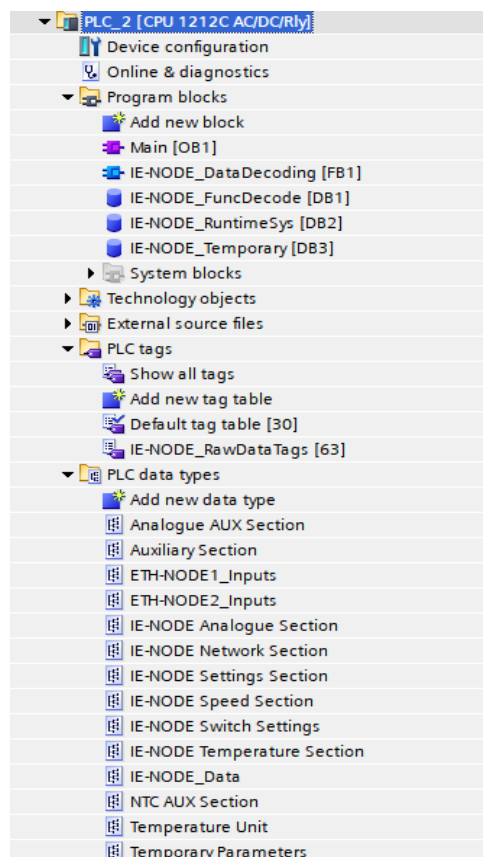


Figure 30 - PLC\_2 Data structure

6.7. Download the IE-NODE to the device (see Section 2).

6.8. To monitor data of the IE-NODE please refer to [“Section 4 - Monitor Values”](#).

6.9. After successfully compiling and loading the IE-NODEs to the PLC devices, change the status to **“Online”** and the mode to **“Run”**. It should look like the image given below:

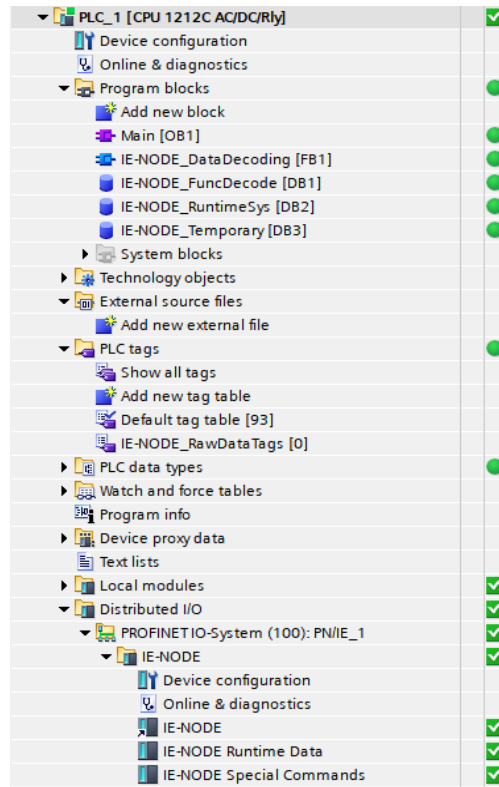


Figure 31 - Successfully running the PLC device

## 7. IE-NODE Data Structure

The images below are to describe the data structure for IE-NODE type (ETH-NODE X):

IE-NODE_RuntimeSys			
	Name	Data type	Start value
1	Static		
2	ENode System DB	"IE-NODE_Data"	
3	System	"IE-NODE Settings Section"	
4	Network	"IE-NODE Network Section"	
5	Temperature Unit	"Temperature Unit"	
6	Switches	"IE-NODE Switch Settings"	
7	ETH-NODE1	"ETH-NODE1_Inputs"	
8	ETH-NODE2	"ETH-NODE2_Inputs"	
9	Auxiliary Boards	"Auxiliary Section"	

Figure 32 – IE-NODE General Data Structure

IE-NODE_RuntimeSys			
	Name	Data type	Start value
1	▼ Static		
2	▼ ENode System DB	"IE-NODE_Data"	
3	▸ System	"IE-NODE Settings Section"	
4	▸ Network	"IE-NODE Network Section"	
5	▸ Temperature Unit	"Temperature Unit"	
6	▸ Switches	"IE-NODE Switch Settings"	
7	▼ ETH-NODE1	"ETH-NODE1_Inputs"	
8	▸ Temperature	Array[0..8] of "IE-NODE Temperature..."	
9	▸ Speed	Array[0..2] of "IE-NODE Speed Sectio..."	
10	▸ Analogue	Array[0..2] of "IE-NODE Analogue Se..."	
11	▸ ETH-NODE2	"ETH-NODE2_Inputs"	
12	▸ Auxiliary Boards	"Auxiliary Section"	

Figure 33 – ETH\_NODE1 Data Structure

7	▼ ETH-NODE1	"ETH-NODE1_Inputs"	
8	▼ Temperature	Array[0..8] of "IE-NODE Temperature..."	
9	▸ Temperature[0]	"IE-NODE Temperature Section"	
10	▸ Temperature[1]	"IE-NODE Temperature Section"	
11	▸ Temperature[2]	"IE-NODE Temperature Section"	
12	▸ Temperature[3]	"IE-NODE Temperature Section"	
13	▸ Temperature[4]	"IE-NODE Temperature Section"	
14	▸ Temperature[5]	"IE-NODE Temperature Section"	
15	▸ Temperature[6]	"IE-NODE Temperature Section"	
16	▸ Temperature[7]	"IE-NODE Temperature Section"	
17	▸ Temperature[8]	"IE-NODE Temperature Section"	
18	▼ Speed	Array[0..2] of "IE-NODE Speed Sectio..."	
19	▸ Speed[0]	"IE-NODE Speed Section"	
20	▸ Speed[1]	"IE-NODE Speed Section"	
21	▸ Speed[2]	"IE-NODE Speed Section"	
22	▼ Analogue	Array[0..2] of "IE-NODE Analogue Se..."	
23	▸ Analogue[0]	"IE-NODE Analogue Section"	
24	▸ Analogue[1]	"IE-NODE Analogue Section"	
25	▸ Analogue[2]	"IE-NODE Analogue Section"	

Figure 34 – ETH-NODE1 Inputs

9	▼ Analogue	Array[0..10] of "IE-NODE Anal..."	
10	▸ Analogue[0]	"IE-NODE Analogue Section"	
11	▸ Analogue[1]	"IE-NODE Analogue Section"	
12	▸ Analogue[2]	"IE-NODE Analogue Section"	
13	▸ Analogue[3]	"IE-NODE Analogue Section"	
14	▸ Analogue[4]	"IE-NODE Analogue Section"	
15	▸ Analogue[5]	"IE-NODE Analogue Section"	
16	▸ Analogue[6]	"IE-NODE Analogue Section"	
17	▸ Analogue[7]	"IE-NODE Analogue Section"	
18	▸ Analogue[8]	"IE-NODE Analogue Section"	
19	▸ Analogue[9]	"IE-NODE Analogue Section"	
20	▸ Analogue[10]	"IE-NODE Analogue Section"	

Figure 35 – ETH-NODE2 Inputs

<b>Page Number:</b> 20	<b>Reference:</b> -
<b>Revision:</b> 1	<b>Date:</b> 06/02/2019

21		■ ▼ Auxiliary Boards	"Auxiliary Section"	
22		■ Auxiliary Type	DInt	0
23		■ Analogue Enabled	Bool	false
24		■ NTC Enabled	Bool	false
25		■ ▶ Analogue Board	"Analogue AUX Section"	
26		■ ▶ NTC Board	"NTC AUX Section"	

Figure 36 – ETH-NODEX Auxiliary Type




















25		■ ▼ Analogue Board	"Analogue AUX Section"	
26		■ ▼ Analogue	Array[0..6] of "IE-NODE Analogue Se..."	
27		■ ▶ Analogue[0]	"IE-NODE Analogue Section"	
28		■ ▶ Analogue[1]	"IE-NODE Analogue Section"	
29		■ ▶ Analogue[2]	"IE-NODE Analogue Section"	
30		■ ▶ Analogue[3]	"IE-NODE Analogue Section"	
31		■ ▶ Analogue[4]	"IE-NODE Analogue Section"	
32		■ ▶ Analogue[5]	"IE-NODE Analogue Section"	
33		■ ▶ Analogue[6]	"IE-NODE Analogue Section"	
34		■ ▼ NTC Board	"NTC AUX Section"	
35		■ ▼ Temperature	Array[0..6] of "IE-NODE Temperature..."	
36		■ ▶ Temperature[0]	"IE-NODE Temperature Section"	
37		■ ▶ Temperature[1]	"IE-NODE Temperature Section"	
38		■ ▶ Temperature[2]	"IE-NODE Temperature Section"	
39		■ ▶ Temperature[3]	"IE-NODE Temperature Section"	
40		■ ▶ Temperature[4]	"IE-NODE Temperature Section"	
41		■ ▶ Temperature[5]	"IE-NODE Temperature Section"	
42		■ ▶ Temperature[6]	"IE-NODE Temperature Section"	

Figure 37 - Auxiliary Inputs (NTC &amp; Analogue)

## 8. Conclusion

This application note has shown how to integrate the IE-NODE into an existing Siemens S7-1200 series project or how to use the example project provided with this application note. The end user will have found all the information necessary to establish a ProfiNet connection and read the data in as well as basic data decoding example has been given.

In an event of any problems arising in connecting the IE-NODE to the PLC or for more information please contact your system provider or your 4B Group local sales support.