GW PN/ASCII... and TIA Portal V14

Configuring the GW PN/ASCII... to communicate with the Siemens TIA Portal V14

Application note
4007_en_A

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1 Description

This document provides step-by-step instructions for configuring the GW PN/ASCII... gateway with a Siemens® PROFINET controller TIA Portal®.

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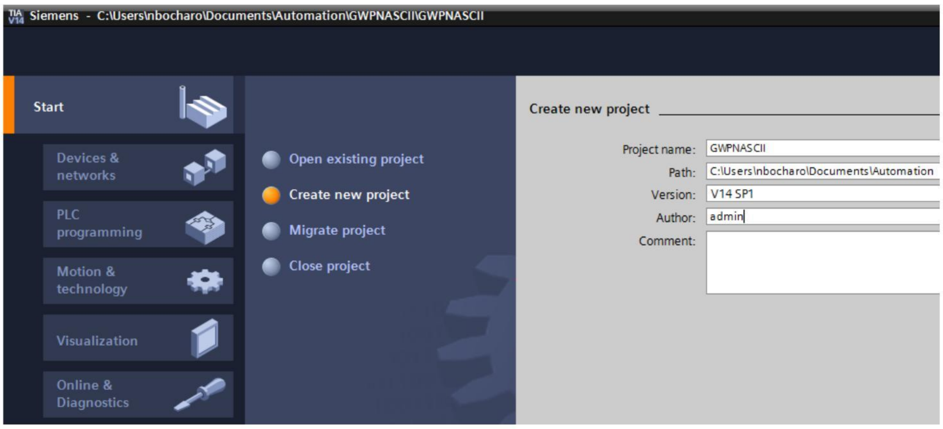
Make sure you always use the latest documentation.
It can be downloaded at phoenixcontact.net/products.

RSPSupply - 1-888-532-2706 - https://www.RSPSupply.com
See the product details here

2 Procedure

2.1 Configuration of the network

1. Download the latest general station description markup language (GSDML) files and save it to an accessible folder for future use. The GSDML file for the GW PN/ASCII... products are available at phoenixcontact.net/products.
2. Open the TIA Portal software and click the “Create new project” button.

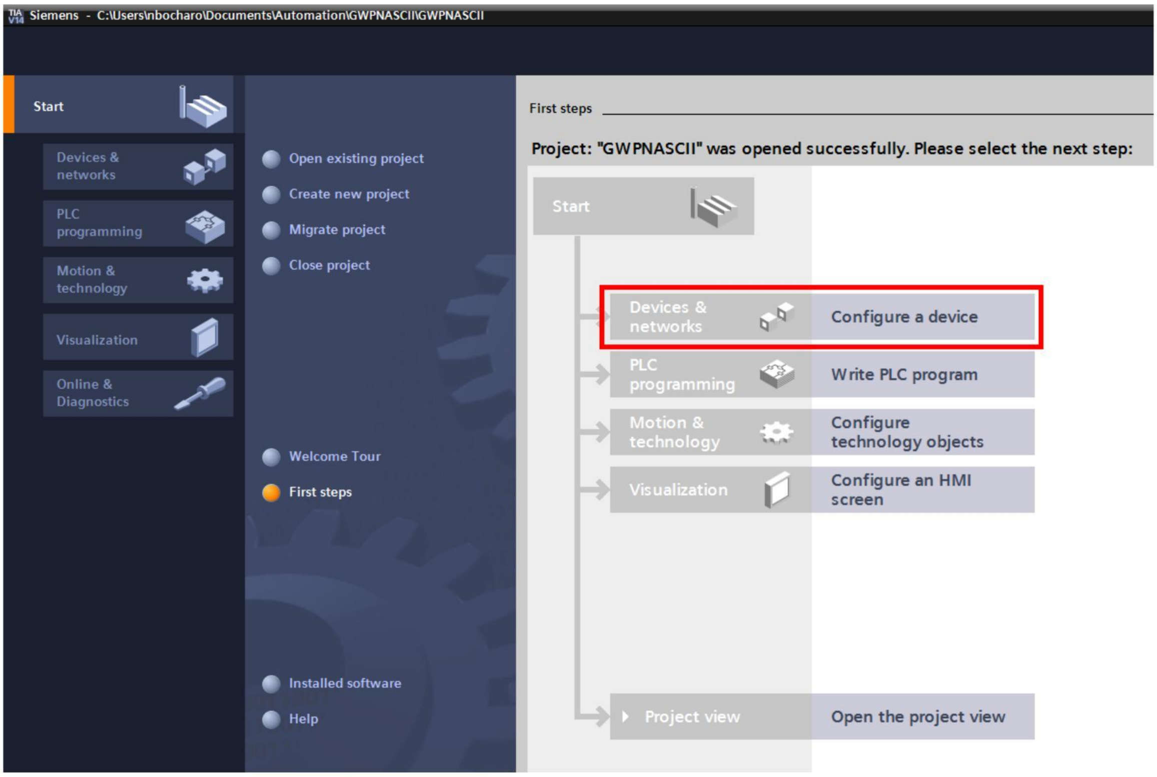

Siemens - C:\Users\nbocharo\Documents\Automation\GWPNASCII\GWPNASCII

Create new project

Project name: GWPNASCII
Path: C:\Users\nbocharo\Documents\Automation
Version: V14 SP1
Author: admin
Comment:

Figure 1 Create a new project

3. Click the “Configure a device” button”.


Siemens - C:\Users\nbocharo\Documents\Automation\GWPNASCII\GWPNASCII

First steps

Project: "GWPNASCII" was opened successfully. Please select the next step:

Figure 2 Configure a device

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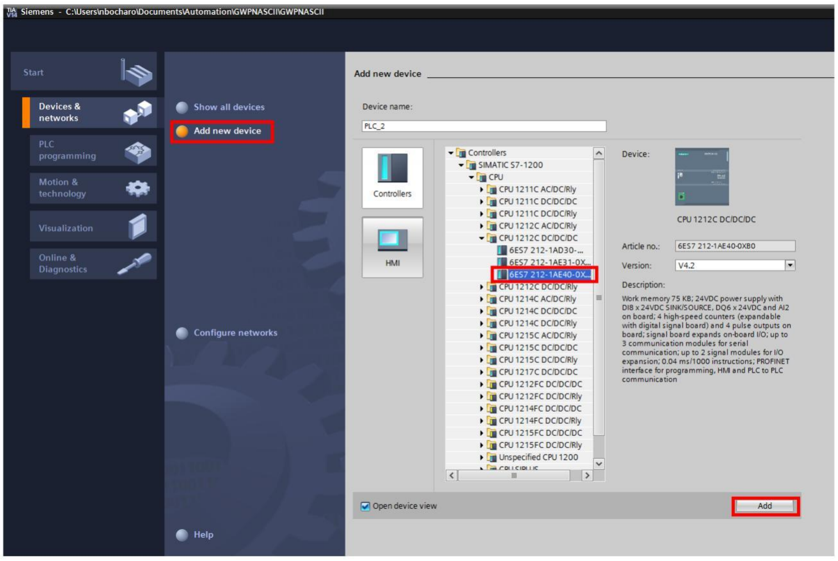
4. Click the “Add New Device” button, and then find the desired controller in the list of devices. Click on the controller name to highlight it, and then click the “Add” button.



Device name: PLC_2

Device: CPU 1212C DC/DC/DC

Article no.: 6ES7 212-1AE40-0XB0

Version: V4.2

Description:
Work memory 75 KB; 24VDC power supply with DI8 x 24VDC SINK/SOURCE, DQ6 x 24VDC and AI2 on board; 4 high-speed counters (expandable with digital signal board) and 4 pulse outputs on board; signal board expands on-board I/O; up to 3 communication modules for serial communication; up to 2 signal modules for I/O expansion; 0.04 ms/1000 instructions; PROFINET interface for programming, HMI and PLC to PLC communication

☑ Open device view

Figure 3 List of controllers in the “Add new device” list

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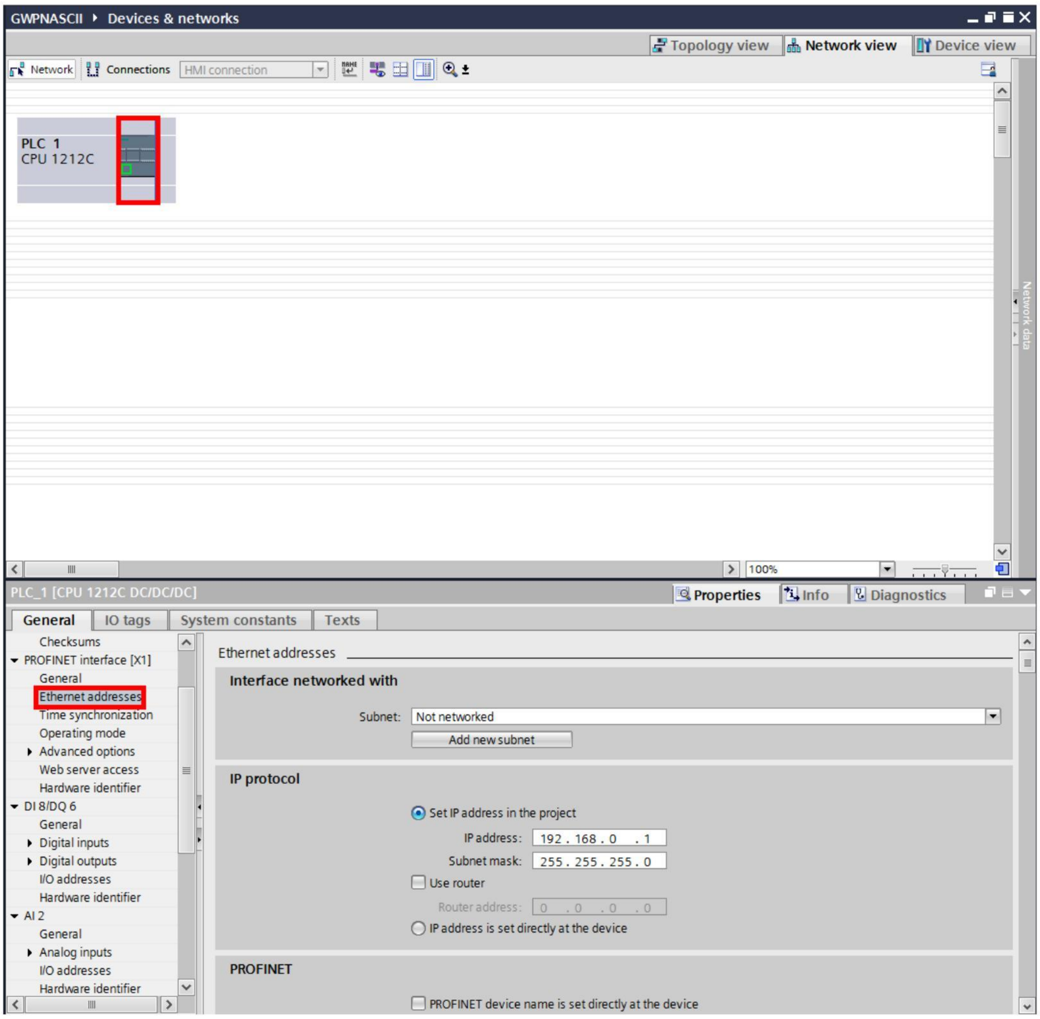
5. Click the controller name to open the “Properties” window for the controller. Click the “Ethernet addresses” menu to display the “Ethernet addresses” window for the selected controller.



PLC_1 [CPU 1212C DC/DC/DC]

Ethernet addresses

Interface networked with

Subnet: Not networked

IP protocol

● Set IP address in the project

IP address: 192 . 168 . 0 . 1

Subnet mask: 255 . 255 . 255 . 0

□ Use router

Router address: 0 . 0 . 0 . 0

○ IP address is set directly at the device

PROFINET

□ PROFINET device name is set directly at the device

Figure 4 New devices

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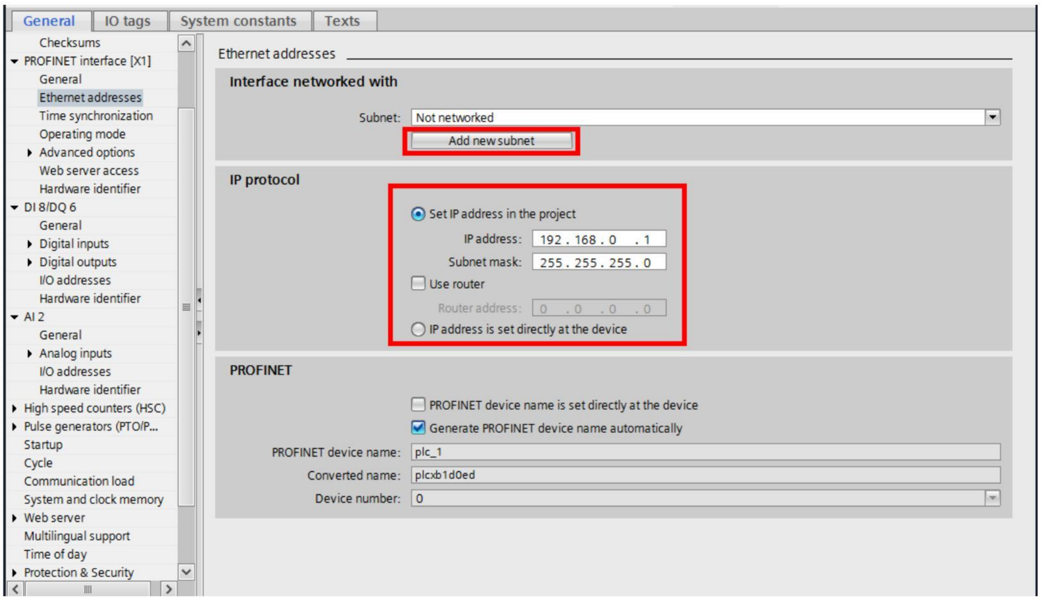
6. Click the “Add new subnet” button to create a new PROFINET network. Enter the desired IP address for the subnet connection in the appropriate fields. The default PROFINET device name is acceptable.



Ethernet addresses

Interface networked with

Subnet: Not networked

IP protocol

● Set IP address in the project

IP address: 192 . 168 . 0 . 1

Subnet mask: 255 . 255 . 255 . 0

□ Use router

Router address: 0 . 0 . 0 . 0

○ IP address is set directly at the device

PROFINET

□ PROFINET device name is set directly at the device

☑ Generate PROFINET device name automatically

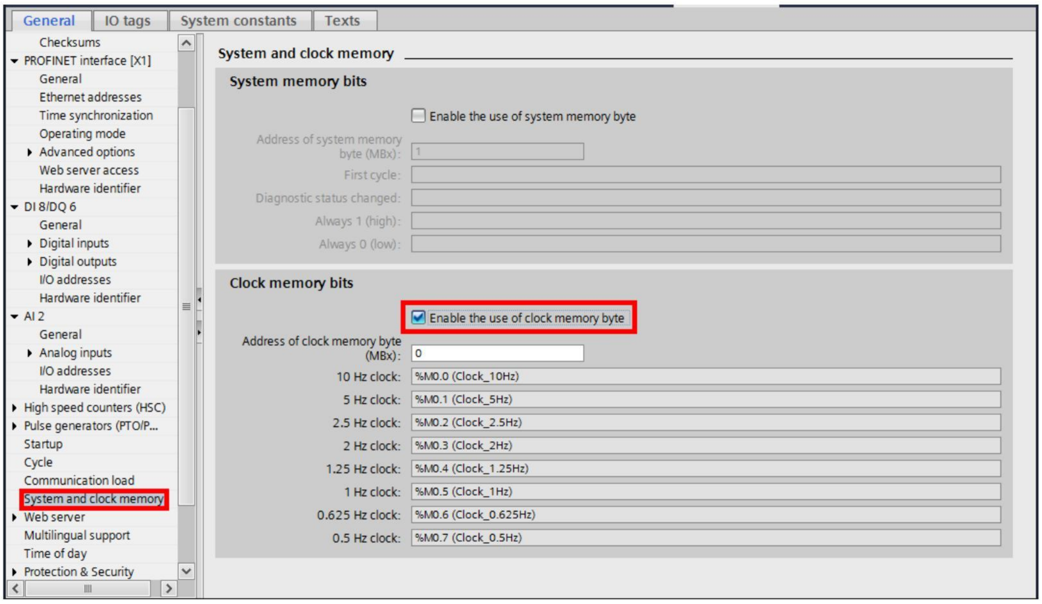
PROFINET device name: plc_1

Converted name: plcxb1d0ed

Device number: 0

Figure 5 Configuring a new PROFINET network

7. Click the “System and clock memory” menu to display the “System and clock memory” properties window. Click the “Enable the use of clock memory byte” box to allow use of the PLC clock to generate a pulse.



System and clock memory

System memory bits

□ Enable the use of system memory byte

Address of system memory byte (MBx): 1

First cycle:

Diagnostic status changed:

Always 1 (high):

Always 0 (low):

Clock memory bits

☑ Enable the use of clock memory byte

Address of clock memory byte (MBx): 0

10 Hz clock: %M0.0 (Clock_10Hz)

5 Hz clock: %M0.1 (Clock_5Hz)

2.5 Hz clock: %M0.2 (Clock_2.5Hz)

2 Hz clock: %M0.3 (Clock_2Hz)

1.25 Hz clock: %M0.4 (Clock_1.25Hz)

1 Hz clock: %M0.5 (Clock_1Hz)

0.625 Hz clock: %M0.6 (Clock_0.625Hz)

0.5 Hz clock: %M0.7 (Clock_0.5Hz)

Figure 6 System clock and memory

The controller is now configured with a PROFINET network.

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2.2 Installation of GSDs for the GW PN/ASCII....

1. Click the “Options/Manage general station description files (GSD)” menu.

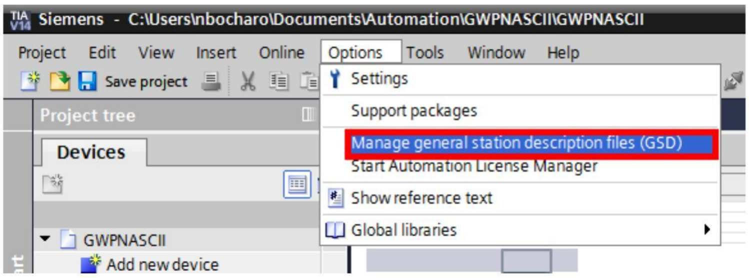
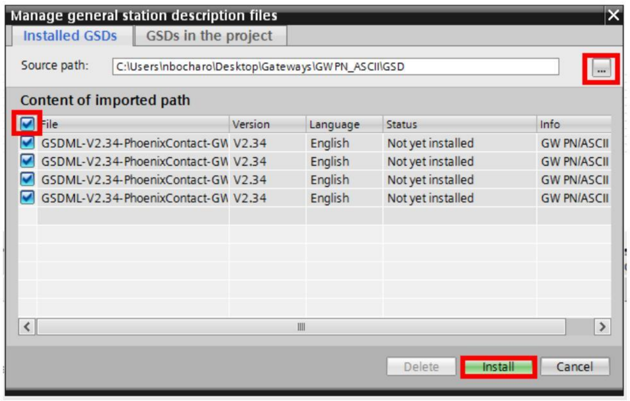


Figure 7 Manage general station description files (GSD)

2. Navigate to the folder containing the saved GSDML files, select the files by checking the boxes, and then click the “Install” button.



Source path: C:\Users\nbocharo\Desktop\Gateways\GW PN_ASCII\GSD

Content of imported path

☑ File	Version	Language	Status	Info
☑ GSDML-V2.34-PhoenixContact-GW	V2.34	English	Not yet installed	GW PN/ASCII
☑ GSDML-V2.34-PhoenixContact-GW	V2.34	English	Not yet installed	GW PN/ASCII
☑ GSDML-V2.34-PhoenixContact-GW	V2.34	English	Not yet installed	GW PN/ASCII
☑ GSDML-V2.34-PhoenixContact-GW	V2.34	English	Not yet installed	GW PN/ASCII

Figure 8 Installing the GSD files

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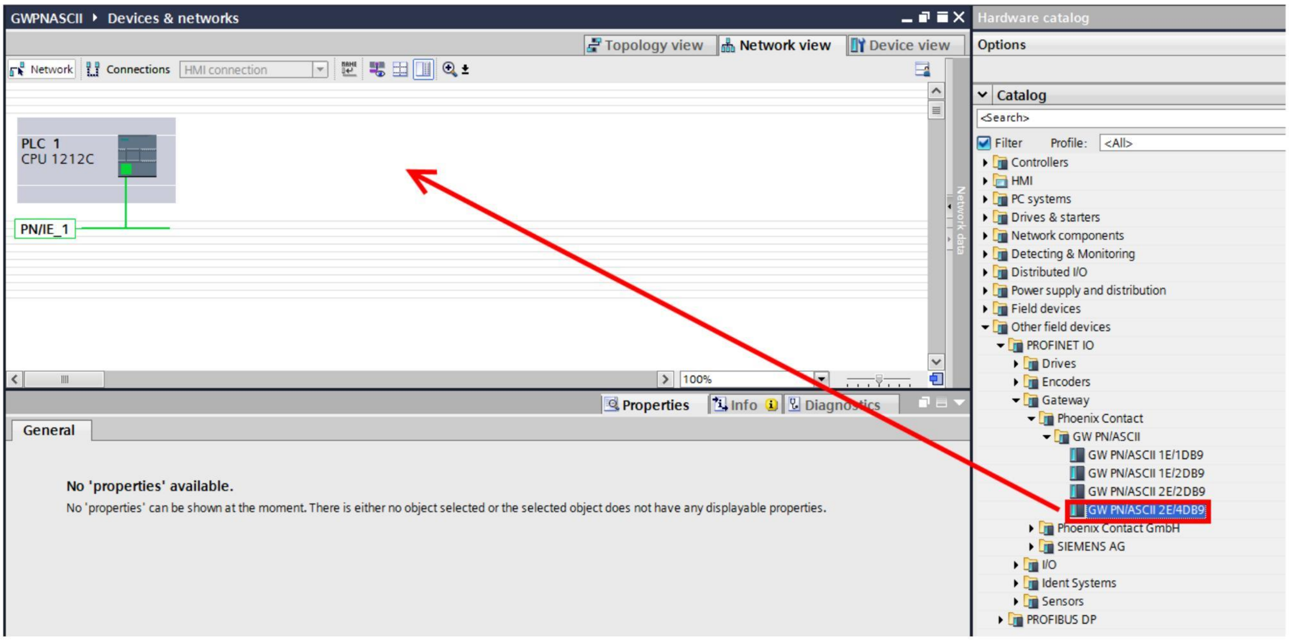
3. Once the GSDML files are installed and the catalog is updated, navigate to the “Network View” of TIA Portal. From the “Hardware catalog” pane, click “Other field devices/PROFINET IO/Gateway/Phoenix Contact/GW PN/ASCII” to display the available gateways. Click the device and drag it into the “Network view” window. For example, Figure 9 shows the selection of a gateway with one Ethernet port and two D-SUB 9 serial ports (GW PN/ASCII 2E/4DB9).



No 'properties' available.

No 'properties' can be shown at the moment. There is either no object selected or the selected object does not have any displayable properties.

Figure 9 Gateway selection

4. Click and hold the green box of the gateway icon and drag it to the PN/IE_1 network (see Figure 5) to establish a connection between the gateway and PLC.

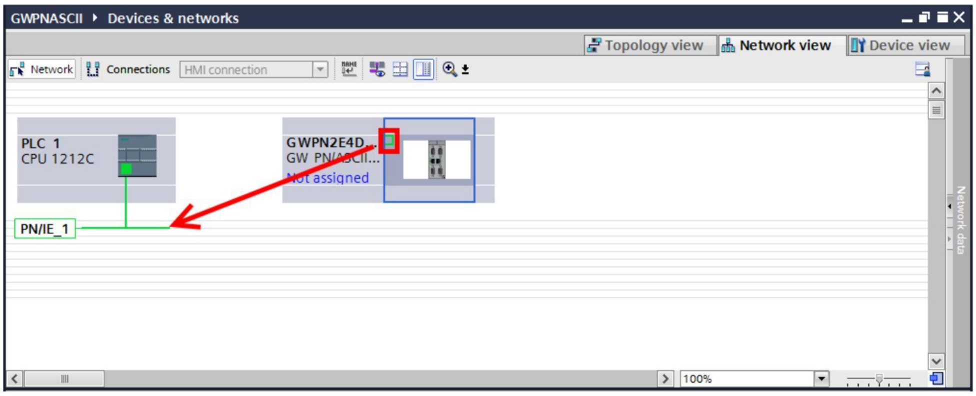


Figure 10 Connecting the gateway to the controller

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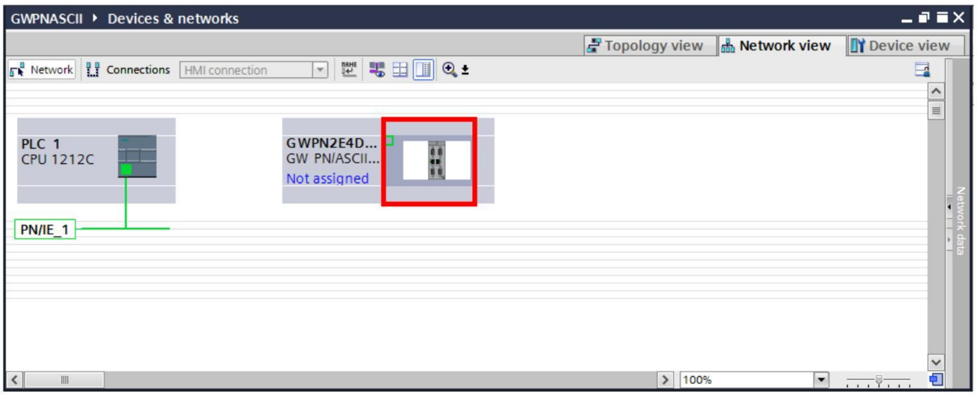
5. Click the “Gateway” icon to display the settings.



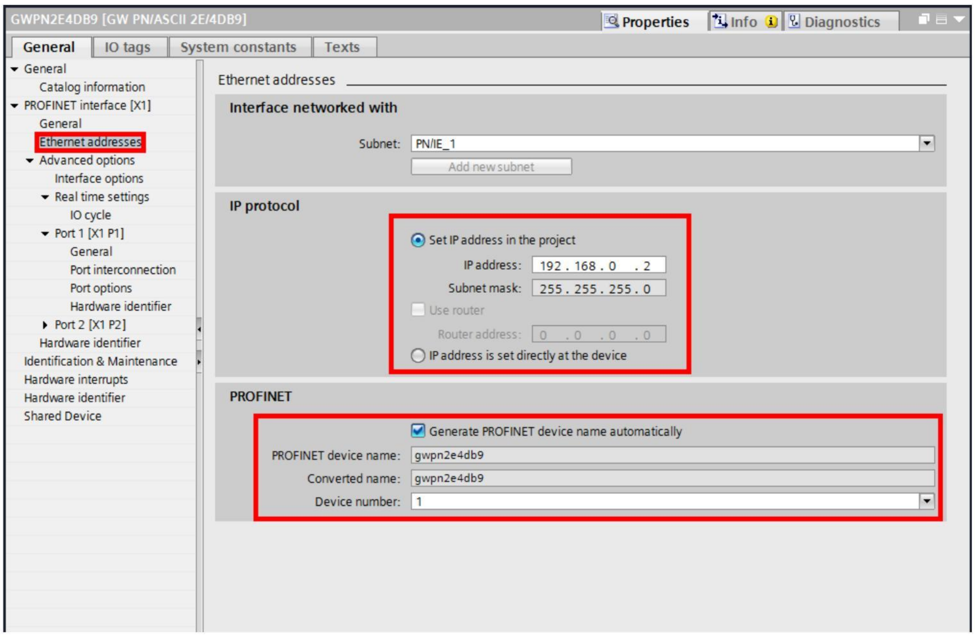
PLC_1
CPU 1212C

GWPN2E4D...
GW PN/ASCII...
Not assigned

PN/IE_1

Figure 11 Gateway icon

6. Select **PN/IE_1** for the subnet. Set the IP address of the gateway. You can either pick your own device name or TIA Portal will generate one automatically.



Ethernet addresses

Interface networked with

Subnet: PN/IE_1

IP protocol

● Set IP address in the project

IP address: 192 . 168 . 0 . 2

Subnet mask: 255 . 255 . 255 . 0

□ Use router

Router address: 0 . 0 . 0 . 0

○ IP address is set directly at the device

PROFINET

☑ Generate PROFINET device name automatically

PROFINET device name: gwpn2e4db9

Converted name: gwpn2e4db9

Device number: 1

Figure 12 Ethernet addresses

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7. Click the device icon, and then click the “NAME” button to assign the IP address and Device name to the device, Clicking the “Name” button opens the “Assign PROFINET device name” dialog box (see Figure 14)

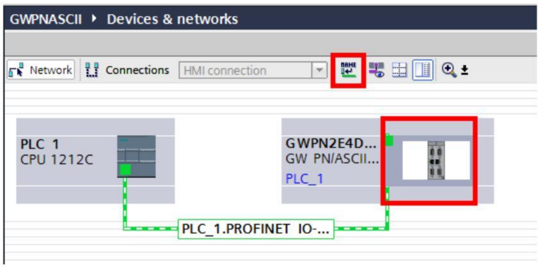
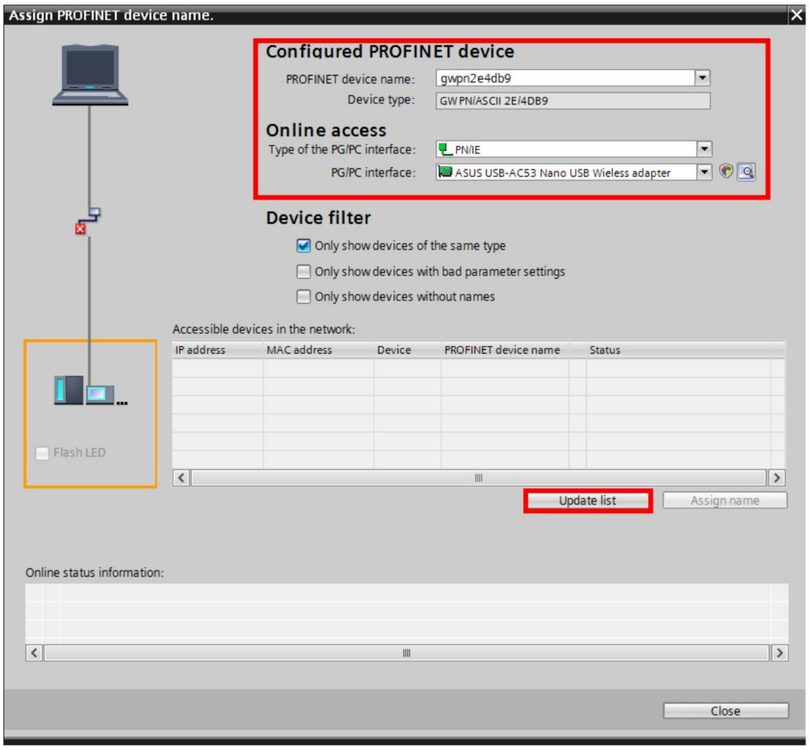


Figure 13 Connection name

8. From the “PROFINET device name” drop-down menu, select the device name for the gateway. From the “Type of the PG/PC interface” drop-down menu, select the interface used to communicate over the PROFINET network. Then click the “Update list” button.


Assign PROFINET device name.

Configured PROFINET device

PROFINET device name: gwpn2e4db9

Device type: GW PN/ASCII 2E/4DB9

Online access

Type of the PG/PC interface: PN/IE

PG/PC interface: ASUS USB-AC53 Nano USB Wieless adapter

Device filter

☑ Only show devices of the same type

□ Only show devices with bad parameter settings

□ Only show devices without names

Accessible devices in the network:

IP address	MAC address	Device	PROFINET device name	Status

Online status information:

Figure 14 “Assign PROFINET device name” dialog box

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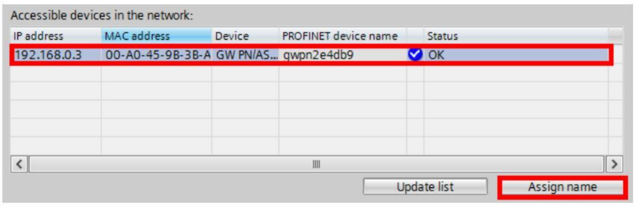
9. After the list is updated, highlight the gateway on the list and click the “Assign name” button. This assigns the name and IP address specified in the project to the gateway.



Accessible devices in the network:

IP address	MAC address	Device	PROFINET device name	Status
192.168.0.3	00-A0-45-9B-3B-A	GW PN/AS...	gwpn2e4db9	✓ OK

Figure 15 :Accessible devices in the network” table

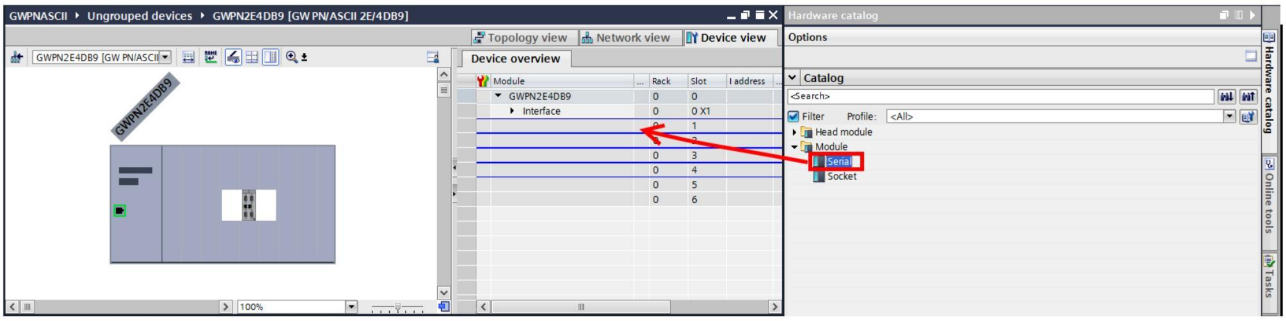
The gateway is now configured to communicate with the controller.

2.3 IO configuration example

In the “Device catalog/Device View” window is the “Module” folder. Located in the folder are the modules for the serial ports and the socket ports. You only need to add the modules if you are going to be using them.

In this example, only Port 1 on the gateway is used, so you only need to insert one serial module into Slot 1. If using Port 4, only insert a serial module into Slot 4.

1. Drag a “Serial” module from the Hardware catalog to the “Device overview” window.



GWPNASCII ▸ Ungrouped devices ▸ GWPN2E4DB9 [GW PN/ASCII 2E/4DB9]

Device overview

Module	...	Rack	Slot	I address
▾ GWPN2E4DB9		0	0	
▸ Interface		0	0 X1	
		0	1	
		0	2	
		0	3	
		0	4	
		0	5	
		0	6	

Hardware catalog

Catalog

☑ Filter Profile: <All>

- ▸ Head module
- ▾ Module
  - Serial
  - Socket

Figure 16 Assigning ports to the gateway

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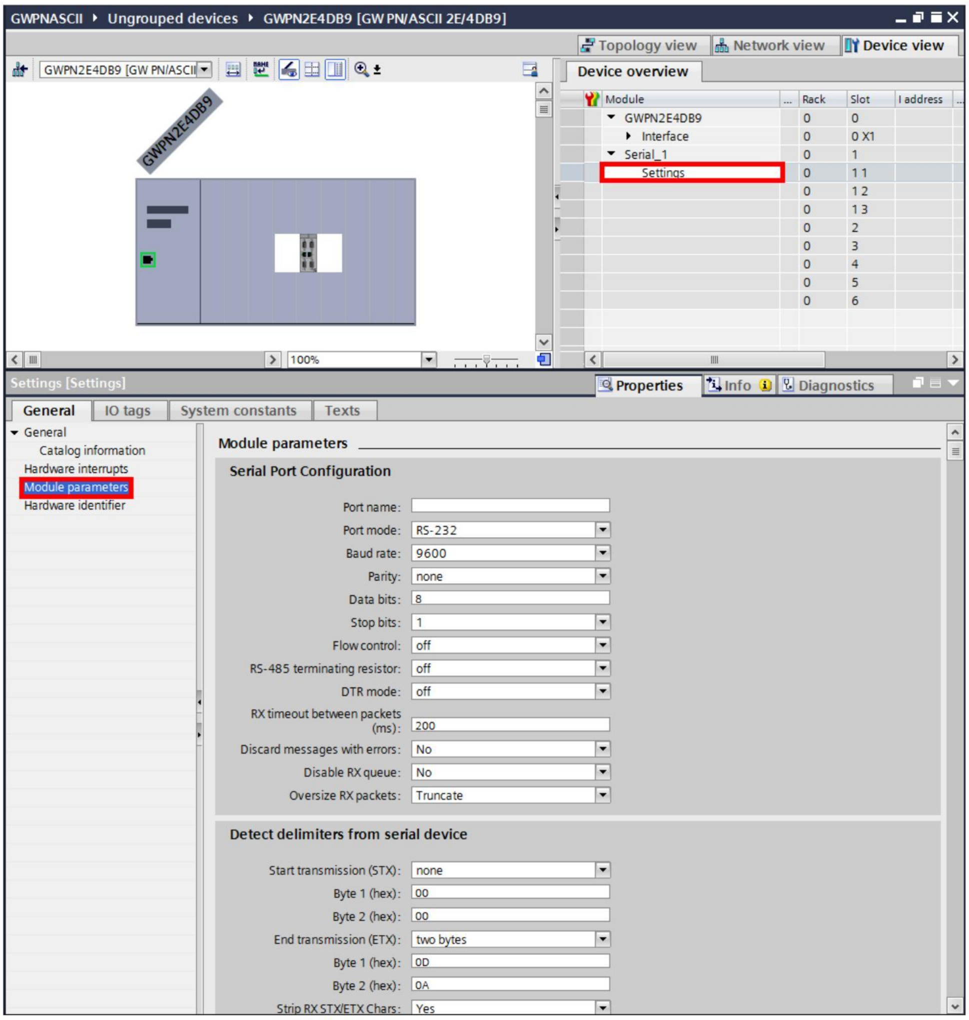
2. Click the “Settings” line to open the “Properties” window. Highlight “General/Module parameters” on the left menu to configure the communication settings of the serial port.



GWPNASCII ▸ Ungrouped devices ▸ GWPN2E4DB9 [GW PN/ASCII 2E/4DB9]

Device overview

Module	...	Rack	Slot	I address
GWPN2E4DB9		0	0	
Interface		0	0 X1	
Serial_1		0	1	
Settings		0	1 1	
		0	1 2	
		0	1 3	
		0	2	
		0	3	
		0	4	
		0	5	
		0	6	

- General
  - Catalog information
  - Hardware interrupts
  - Module parameters
  - Hardware identifier

Module parameters

Serial Port Configuration

Port name:
Port mode: RS-232
Baud rate: 9600
Parity: none
Data bits: 8
Stop bits: 1
Flow control: off
RS-485 terminating resistor: off
DTR mode: off
RX timeout between packets (ms): 200
Discard messages with errors: No
Disable RX queue: No
Oversize RX packets: Truncate

Detect delimiters from serial device

Start transmission (STX): none
Byte 1 (hex): 00
Byte 2 (hex): 00
End transmission (ETX): two bytes
Byte 1 (hex): 0D
Byte 2 (hex): 0A
Strip RX STX/ETX Chars: Yes

Figure 17 Serial port configuration

3. Each submodule may be placed in one of the two available sub-slots of an IO module. Sub-slot 1 is reserved for an input submodule; Sub-slot 2 is for an output submodule.

Here are some tips when configuring IO modules and submodules:

– A serial or Ethernet module must be inserted to configure a submodule.

– If there isn’t an exactly matching IO size, select the next size up. For instance, select the “Input 128 Bytes” submodule for a device that has 80 bytes input data.

– The input data size and output data size are independent. You can configure a serial module to have 64 bytes input data and 32 bytes output data.

– For input only devices, leave the Sub-slot 2 open. For output only devices, leave the Sub-Slot 1 open.

– If a serial port or an Ethernet device is not in use, simply leave the corresponding slot open.

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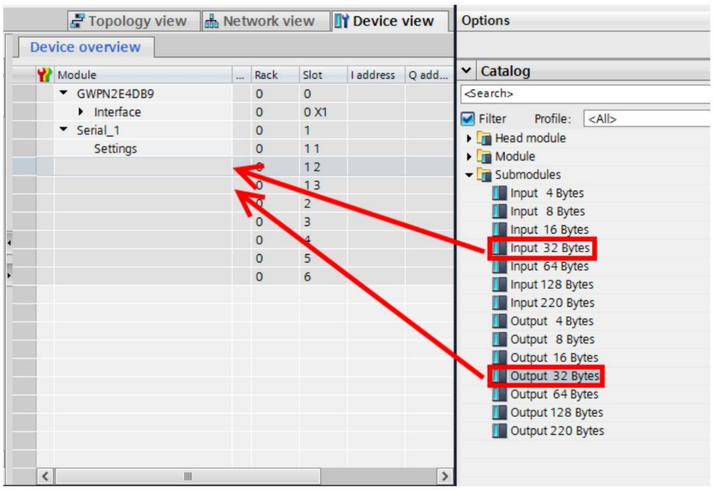
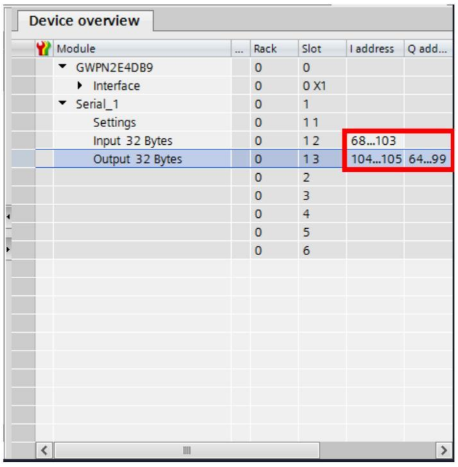
4. In this example, only one serial port is in use and it is an input and output device, so only one serial module (**Serial_1**) with one 32 byte input and one 32 byte output submodule is necessary.



Module	...	Rack	Slot	I address	Q add...
GWPN2E4DB9		0	0		
Interface		0	0 X1		
Serial_1		0	1		
Settings		0	1 1		
		0	1 2		
		0	1 3		
		0	2		
		0	3		
		0	4		
		0	5		
		0	6		

Figure 18 Adding submodules

5. The “Device Overview” window shows the input register address for the serial input. The 32-byte input provides an array of 36 bytes: 2 bytes for sequence number, 2 bytes for length, and 32 bytes of data.



Module	...	Rack	Slot	I address	Q add...
GWPN2E4DB9		0	0		
Interface		0	0 X1		
Serial_1		0	1		
Settings		0	1 1		
Input 32 Bytes		0	1 2	68...103	
Output 32 Bytes		0	1 3	104...105	64...99
		0	2		
		0	3		
		0	4		
		0	5		
		0	6		

Figure 19 Device overview showing additional submodules

6. In order to see the data, use a data block, or access the IO address directly through the watch table.

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2.4 Using data block to read/write data

1. In the “Project tree” window, click the “Add new block” menu to add the “Data_block_1” block.

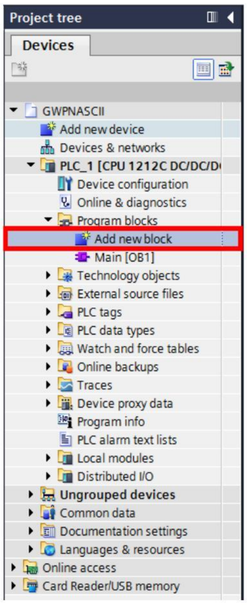
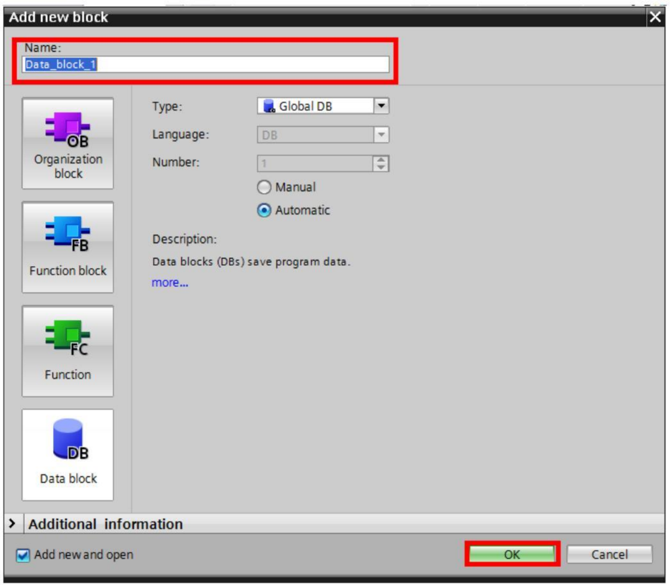


Figure 20 Adding a new block

2. Enter the desired name in the “Name” field.


Add new block

Name: Data_block_1

Type: Global DB

Language: DB

Number: 1

○ Manual

● Automatic

Description:

Data blocks (DBs) save program data.

more...

☑ Add new and open

Figure 21 Configuring a new block

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3. Right click the data block and select “Properties” from the menu.

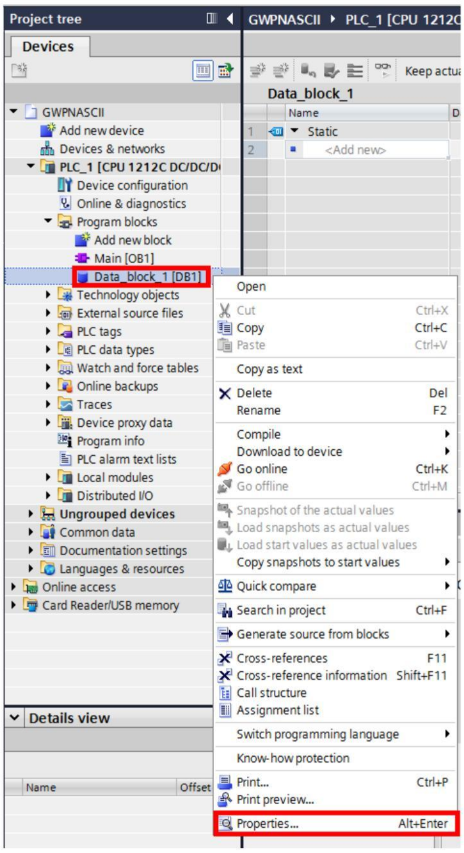
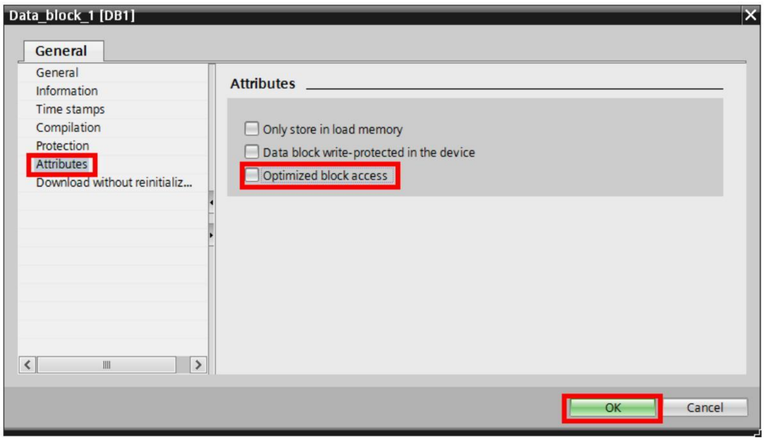


Figure 22 Open “Data_block_1 (DB1) properties” dialog box

4. Uncheck the “Optimized block access” attribute.



Attributes

☐ Only store in load memory
☐ Data block write-protected in the device
☐ Optimized block access

Figure 23 “Data_block_1 (DB1) attributes” dialog box

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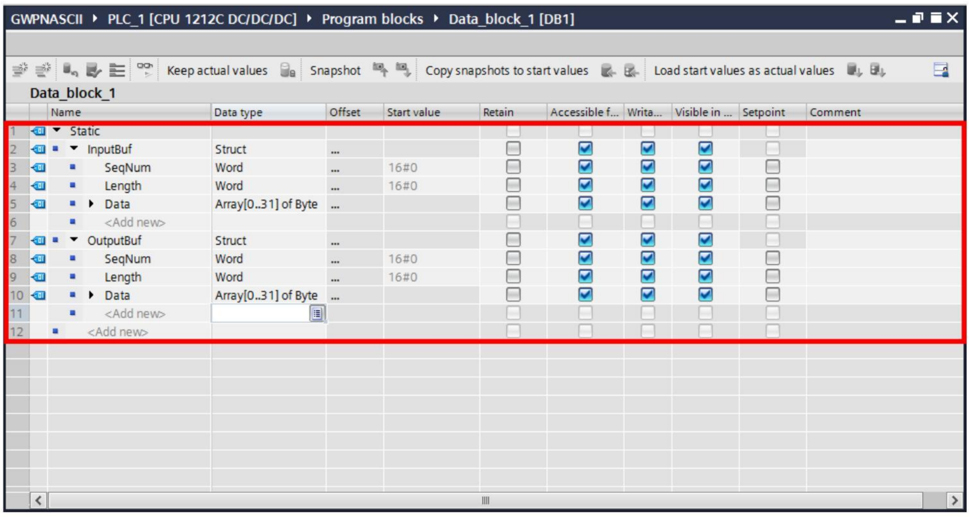
5. In the “Data Block” configuration window, create an input buffer structure called **InputBuf** that has the same format as the input data, and an **OutputBuf** structure that has the same format as the output data.



GWPNASCII ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ Program blocks ▸ Data_block_1 [DB1]

Keep actual values
Snapshot
Copy snapshots to start values
Load start values as actual values

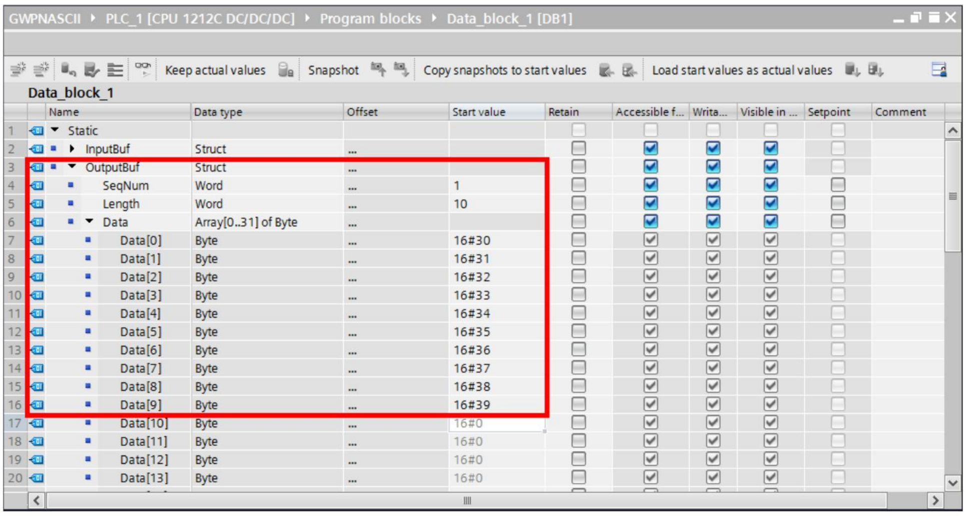
Data_block_1

	Name	Data type	Offset	Start value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint	Comment
1	▼ Static				□	□	□	□	□	
2	▼ InputBuf	Struct	...		□	☑	☑	☑	□	
3	SeqNum	Word	...	16#0	□	☑	☑	☑	□	
4	Length	Word	...	16#0	□	☑	☑	☑	□	
5	▸ Data	Array[0..31] of Byte	...		□	☑	☑	☑	□	
6	<Add new>				□	□	□	□	□	
7	▼ OutputBuf	Struct	...		□	☑	☑	☑	□	
8	SeqNum	Word	...	16#0	□	☑	☑	☑	□	
9	Length	Word	...	16#0	□	☑	☑	☑	□	
10	▸ Data	Array[0..31] of Byte	...		□	☑	☑	☑	□	
11	<Add new>				□	□	□	□	□	
12	<Add new>				□	□	□	□	□	

Figure 24 “Data_block_1 (DB1)” dialog box

6. In the “SeqNum” section of the OutputBuf, the “Start value” field should be **0**. The “Length start value” field will be however long the message is. In this example, ten digits (0-9) are being sent, so the “Length” field is **10**, and the first ten values of the data array are filled as such. Since this is an GW PN/ASCII... gateway, the values in the data array must be entered as hex representations of their ASCII values.

> Hex to ASCII conversions can be found on the internet.



GWPNASCII ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ Program blocks ▸ Data_block_1 [DB1]

Keep actual values
Snapshot
Copy snapshots to start values
Load start values as actual values

Data_block_1

	Name	Data type	Offset	Start value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint	Comment
1	▼ Static				□	□	□	□	□	
2	▸ InputBuf	Struct	...		□	☑	☑	☑	□	
3	▼ OutputBuf	Struct	...		□	☑	☑	☑	□	
4	SeqNum	Word	...	1	□	☑	☑	☑	□	
5	Length	Word	...	10	□	☑	☑	☑	□	
6	▼ Data	Array[0..31] of Byte	...		□	☑	☑	☑	□	
7	Data[0]	Byte	...	16#30	□	☑	☑	☑	□	
8	Data[1]	Byte	...	16#31	□	☑	☑	☑	□	
9	Data[2]	Byte	...	16#32	□	☑	☑	☑	□	
10	Data[3]	Byte	...	16#33	□	☑	☑	☑	□	
11	Data[4]	Byte	...	16#34	□	☑	☑	☑	□	
12	Data[5]	Byte	...	16#35	□	☑	☑	☑	□	
13	Data[6]	Byte	...	16#36	□	☑	☑	☑	□	
14	Data[7]	Byte	...	16#37	□	☑	☑	☑	□	
15	Data[8]	Byte	...	16#38	□	☑	☑	☑	□	
16	Data[9]	Byte	...	16#39	□	☑	☑	☑	□	
17	Data[10]	Byte	...	16#0	□	☑	☑	☑	□	
18	Data[11]	Byte	...	16#0	□	☑	☑	☑	□	
19	Data[12]	Byte	...	16#0	□	☑	☑	☑	□	
20	Data[13]	Byte	...	16#0	□	☑	☑	☑	□	

Figure 25 OutputBuf data block

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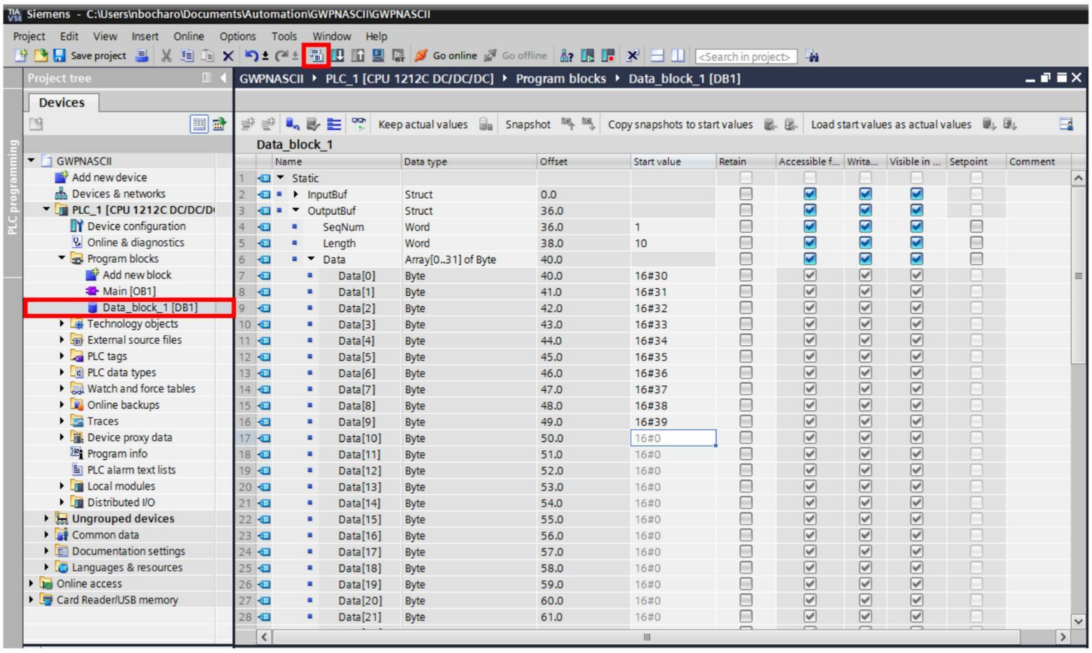
7. Click the “Compile” button and compile the data block.



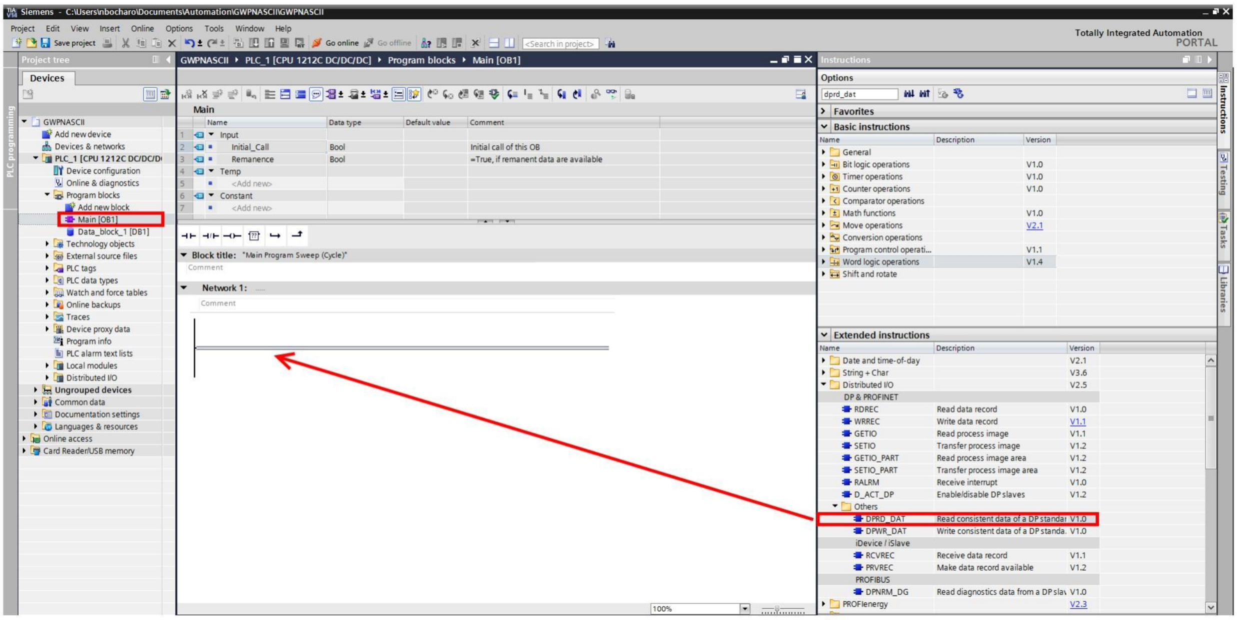
GWPNASCII ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ Program blocks ▸ Data_block_1 [DB1]

Data_block_1

	Name	Data type	Offset	Start value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint	Comment
1	▾ Static									
2	▸ InputBuf	Struct	0.0		□	☑	☑	☑	□	
3	▾ OutputBuf	Struct	36.0		□	☑	☑	☑	□	
4	SeqNum	Word	36.0	1	□	☑	☑	☑	□	
5	Length	Word	38.0	10	□	☑	☑	☑	□	
6	▾ Data	Array[0..31] of Byte	40.0		□	☑	☑	☑	□	
7	Data[0]	Byte	40.0	16#30	□	☑	☑	☑	□	
8	Data[1]	Byte	41.0	16#31	□	☑	☑	☑	□	
9	Data[2]	Byte	42.0	16#32	□	☑	☑	☑	□	
10	Data[3]	Byte	43.0	16#33	□	☑	☑	☑	□	
11	Data[4]	Byte	44.0	16#34	□	☑	☑	☑	□	
12	Data[5]	Byte	45.0	16#35	□	☑	☑	☑	□	
13	Data[6]	Byte	46.0	16#36	□	☑	☑	☑	□	
14	Data[7]	Byte	47.0	16#37	□	☑	☑	☑	□	
15	Data[8]	Byte	48.0	16#38	□	☑	☑	☑	□	
16	Data[9]	Byte	49.0	16#39	□	☑	☑	☑	□	
17	Data[10]	Byte	50.0	16#0	□	☑	☑	☑	□	
18	Data[11]	Byte	51.0	16#0	□	☑	☑	☑	□	
19	Data[12]	Byte	52.0	16#0	□	☑	☑	☑	□	
20	Data[13]	Byte	53.0	16#0	□	☑	☑	☑	□	
21	Data[14]	Byte	54.0	16#0	□	☑	☑	☑	□	
22	Data[15]	Byte	55.0	16#0	□	☑	☑	☑	□	
23	Data[16]	Byte	56.0	16#0	□	☑	☑	☑	□	
24	Data[17]	Byte	57.0	16#0	□	☑	☑	☑	□	
25	Data[18]	Byte	58.0	16#0	□	☑	☑	☑	□	
26	Data[19]	Byte	59.0	16#0	□	☑	☑	☑	□	
27	Data[20]	Byte	60.0	16#0	□	☑	☑	☑	□	
28	Data[21]	Byte	61.0	16#0	□	☑	☑	☑	□	

Figure 26 “Compile” button

8. Drag the DPRD_DAT block onto the ladder rung.



GWPNASCII ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ Program blocks ▸ Main [OB1]

Main

	Name	Data type	Default value	Comment
1	▾ Input			
2	Initial_Call	Bool		Initial call of this OB
3	Remanence	Bool		=True, if remanent data are available
4	▾ Temp			
5	<Add new>			
6	▾ Constant			
7	<Add new>			

Block title: "Main Program Sweep (Cycle)"

Network 1:

Instructions – Options: dprd_dat

Basic instructions

Name	Description	Version
▸ General		
▸ Bit logic operations		V1.0
▸ Timer operations		V1.0
▸ Counter operations		V1.0
▸ Comparator operations		
▸ Math functions		V1.0
▸ Move operations		V2.1
▸ Conversion operations		
▸ Program control operati...		V1.1
▸ Word logic operations		V1.4
▸ Shift and rotate		

Extended instructions

Name	Description	Version
▸ Date and time-of-day		V2.1
▸ String + Char		V3.6
▾ Distributed I/O		V2.5
DP & PROFINET		
RDREC	Read data record	V1.0
WRREC	Write data record	V1.1
GETIO	Read process image	V1.1
SETIO	Transfer process image	V1.2
GETIO_PART	Read process image area	V1.2
SETIO_PART	Transfer process image area	V1.2
RALRM	Receive interrupt	V1.0
D_ACT_DP	Enable/disable DP slaves	V1.2
▾ Others		
DPRD_DAT	Read consistent data of a DP standar	V1.0
DPWR_DAT	Write consistent data of a DP standa.	V1.0
iDevice / iSlave		
RCVREC	Receive data record	V1.1
PRVREC	Make data record available	V1.2
PROFIBUS		
DPNRM_DG	Read diagnostics data from a DP slav	V1.0
▸ PROFIenergy		V2.3

Figure 27 DPRD_DAT instruction block

9. Add a DPRD_DAT instruction to the main block. Assign the **InputBuf** structure made previously to the “RECORD” field (return can be a word).

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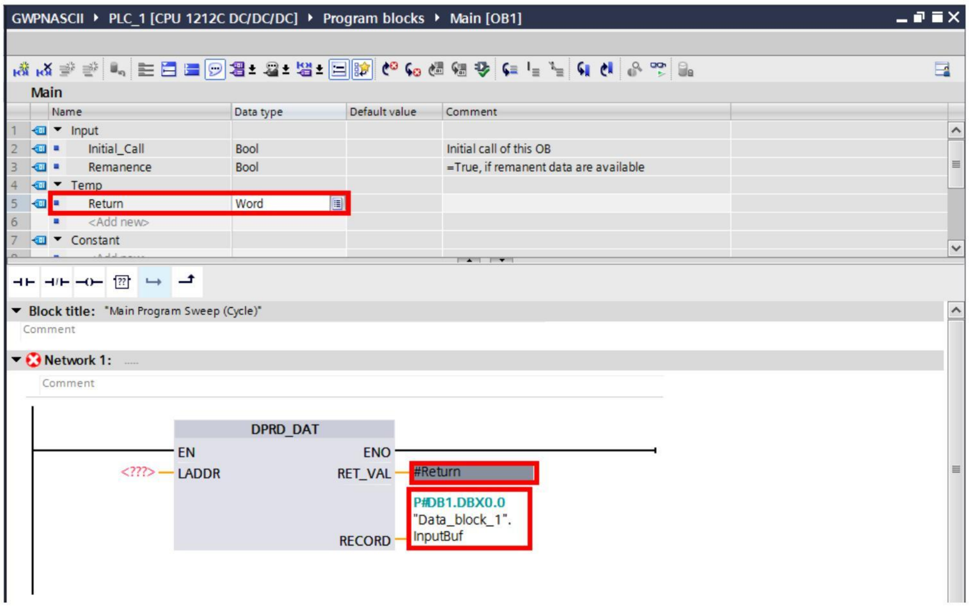


GWPNASCII ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ Program blocks ▸ Main [OB1]

Main

	Name	Data type	Default value	Comment
1	▼ Input			
2	Initial_Call	Bool		Initial call of this OB
3	Remanence	Bool		=True, if remanent data are available
4	▼ Temp			
5	Return	Word		
6	<Add new>			
7	▼ Constant			

Block title: "Main Program Sweep (Cycle)"

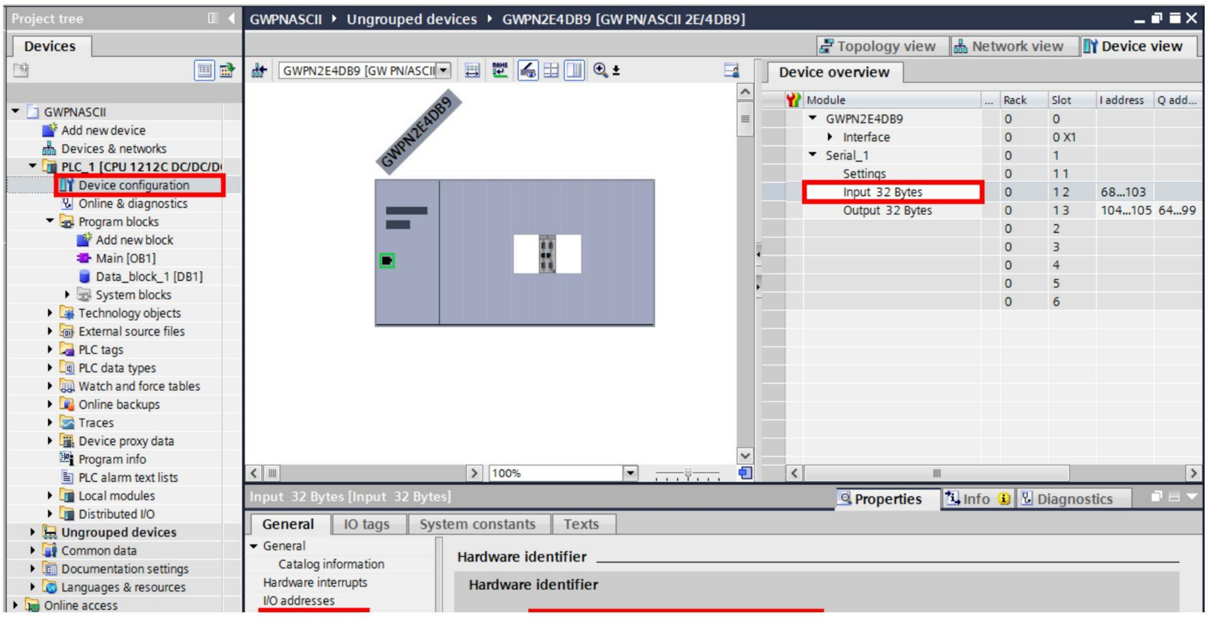
Comment

Network 1: .....

Comment

Figure 28 DPRD_DAT Block variable assignment

The “LADDR” field is the hardware address of the module. Click the “Input 32 Bytes” module in Device view to open it.



GWPNASCII ▸ Ungrouped devices ▸ GWPN2E4DB9 [GW PN/ASCII 2E/4DB9]

Device overview

Module	...	Rack	Slot	I address	Q add...
▼ GWPN2E4DB9		0	0		
▸ Interface		0	0 X1		
▼ Serial_1		0	1		
Settings		0	1 1		
Input 32 Bytes		0	1 2	68...103	
Output 32 Bytes		0	1 3	104...105	64...99
		0	2		
		0	3		
		0	4		
		0	5		
		0	6		

Input 32 Bytes [Input 32 Bytes]

General | IO tags | System constants | Texts

▼ General
Catalog information
Hardware interrupts
I/O addresses

Hardware identifier

Hardware identifier

Figure 29 Hardware identifier

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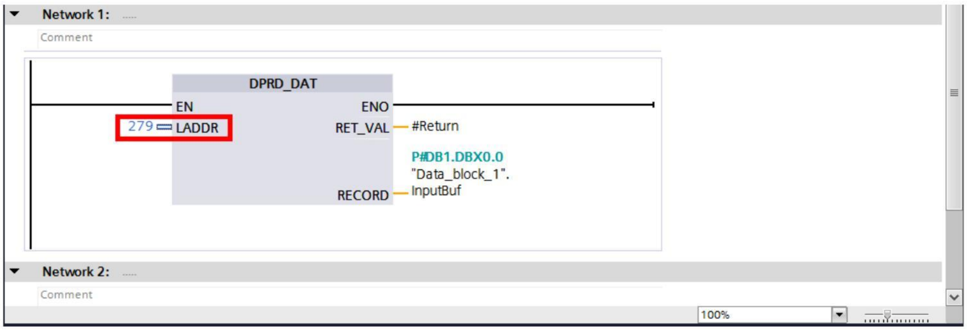
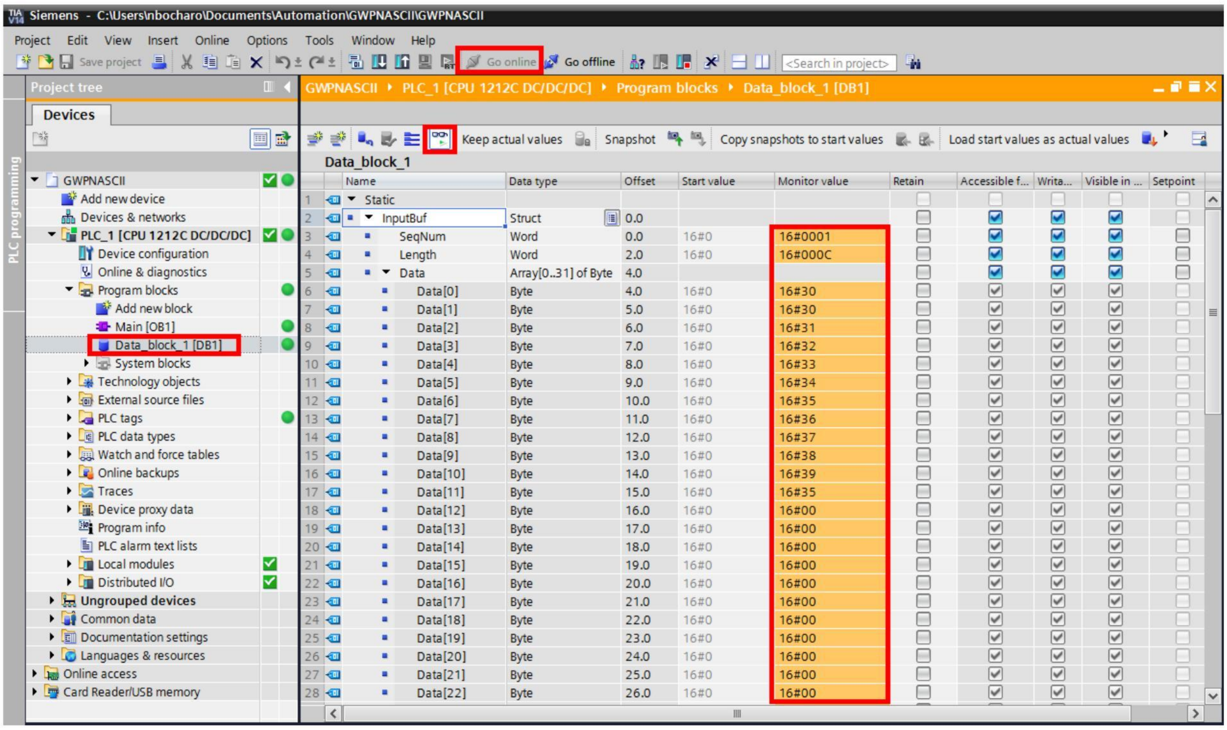


Figure 30 DPRD_DAT final configuration

10. Compile, download the project, and then click the “Run” button.
11. Click the “Go online” button to see the ASCII values that the GW PN/ASCII... receives through the serial port. In this example, a bar code scanner is used to read a bar code. The “SeqNum” field increased to 1 after a scan, the “Length” field is $0C_{hex}$ which is 12, and the data array is populated with the values from the barcode.



Data_block_1

	Name	Data type	Offset	Start value	Monitor value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint
1	Static					☐	☐	☐	☐	☐
2	InputBuf	Struct	0.0			☐	☑	☑	☑	☐
3	SeqNum	Word	0.0	16#0	16#0001	☐	☑	☑	☑	☐
4	Length	Word	2.0	16#0	16#000C	☐	☑	☑	☑	☐
5	Data	Array[0..31] of Byte	4.0			☐	☑	☑	☑	☐
6	Data[0]	Byte	4.0	16#0	16#30	☐	☑	☑	☑	☐
7	Data[1]	Byte	5.0	16#0	16#30	☐	☑	☑	☑	☐
8	Data[2]	Byte	6.0	16#0	16#31	☐	☑	☑	☑	☐
9	Data[3]	Byte	7.0	16#0	16#32	☐	☑	☑	☑	☐
10	Data[4]	Byte	8.0	16#0	16#33	☐	☑	☑	☑	☐
11	Data[5]	Byte	9.0	16#0	16#34	☐	☑	☑	☑	☐
12	Data[6]	Byte	10.0	16#0	16#35	☐	☑	☑	☑	☐
13	Data[7]	Byte	11.0	16#0	16#36	☐	☑	☑	☑	☐
14	Data[8]	Byte	12.0	16#0	16#37	☐	☑	☑	☑	☐
15	Data[9]	Byte	13.0	16#0	16#38	☐	☑	☑	☑	☐
16	Data[10]	Byte	14.0	16#0	16#39	☐	☑	☑	☑	☐
17	Data[11]	Byte	15.0	16#0	16#35	☐	☑	☑	☑	☐
18	Data[12]	Byte	16.0	16#0	16#00	☐	☑	☑	☑	☐
19	Data[13]	Byte	17.0	16#0	16#00	☐	☑	☑	☑	☐
20	Data[14]	Byte	18.0	16#0	16#00	☐	☑	☑	☑	☐
21	Data[15]	Byte	19.0	16#0	16#00	☐	☑	☑	☑	☐
22	Data[16]	Byte	20.0	16#0	16#00	☐	☑	☑	☑	☐
23	Data[17]	Byte	21.0	16#0	16#00	☐	☑	☑	☑	☐
24	Data[18]	Byte	22.0	16#0	16#00	☐	☑	☑	☑	☐
25	Data[19]	Byte	23.0	16#0	16#00	☐	☑	☑	☑	☐
26	Data[20]	Byte	24.0	16#0	16#00	☐	☑	☑	☑	☐
27	Data[21]	Byte	25.0	16#0	16#00	☐	☑	☑	☑	☐
28	Data[22]	Byte	26.0	16#0	16#00	☐	☑	☑	☑	☐

Figure 31 Data block monitoring data

Writing serial data

The GW PN/ASCII... only writes data when the TxSeqNum is incremented. The following steps demonstrate writing a LAD program that increments the TxSeqNum once every two seconds.

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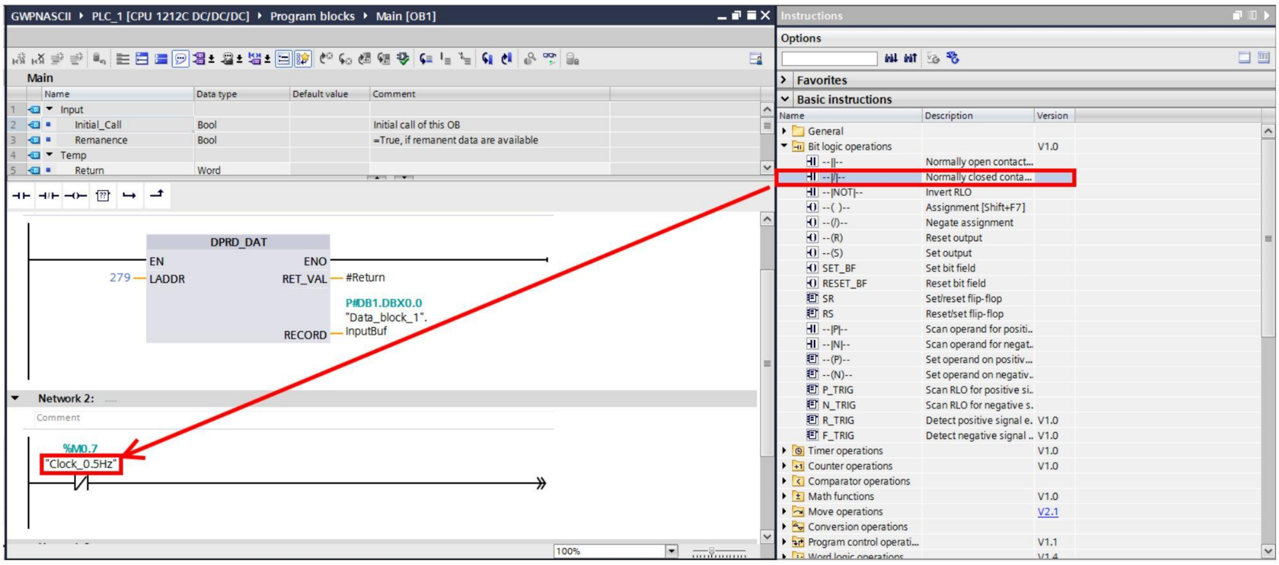
Go back to the Main program block and insert a normally closed contact into Network 2, and assign it to the 0.5 Hz clock.

NOTE:
If the clock settings are not available, ensure the “Enable clock memory byte” box is unchecked (see Figure 6).



GWPNASCII ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ Program blocks ▸ Main [OB1]

Main

	Name	Data type	Default value	Comment
1	▼ Input			
2	Initial_Call	Bool		Initial call of this OB
3	Remanence	Bool		=True, if remanent data are available
4	▼ Temp			
5	Return	Word		

Instructions

Options

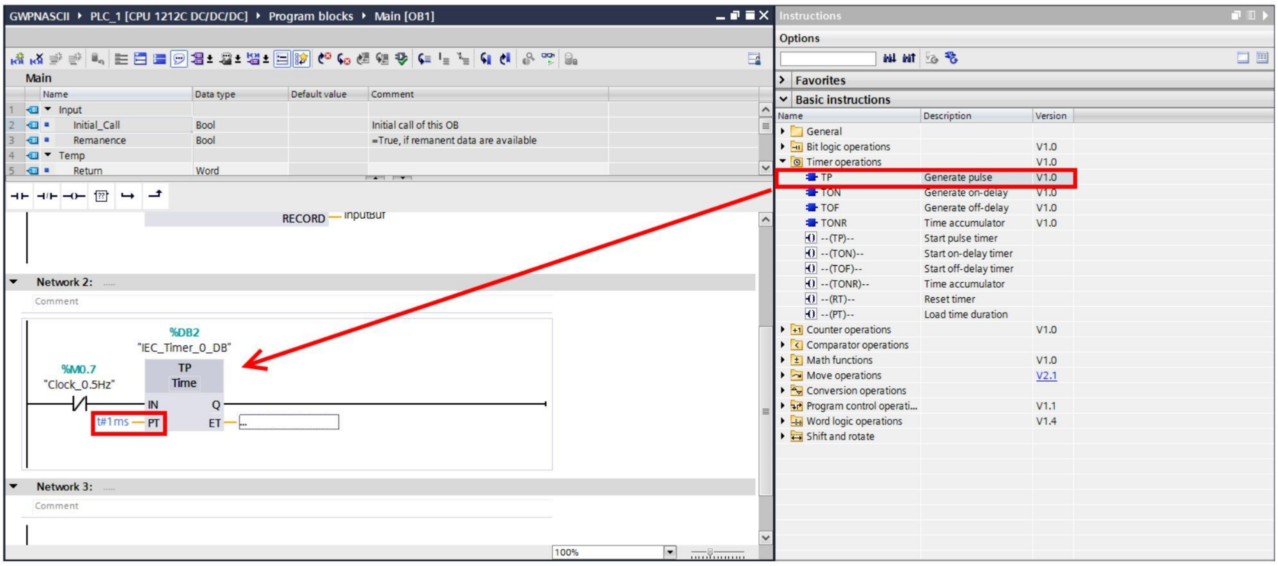
Favorites

Basic instructions

Name	Description	Version
General		
Bit logic operations		V1.0
--| |--	Normally open contact...	
--|/|--	Normally closed conta...	
--|NOT|--	Invert RLO	
--( )--	Assignment [Shift+F7]	
--(/)--	Negate assignment	
--(R)	Reset output	
--(S)	Set output	
SET_BF	Set bit field	
RESET_BF	Reset bit field	
SR	Set/reset flip-flop	
RS	Reset/set flip-flop	
--|P|--	Scan operand for positi...	
--|N|--	Scan operand for negat...	
--(P)--	Set operand on positiv...	
--(N)--	Set operand on negativ...	
P_TRIG	Scan RLO for positive si...	
N_TRIG	Scan RLO for negative s...	
R_TRIG	Detect positive signal e...	V1.0
F_TRIG	Detect negative signal ...	V1.0
Timer operations		V1.0
Counter operations		V1.0
Comparator operations		
Math functions		V1.0
Move operations		V2.1
Conversion operations		
Program control operati...		V1.1
Word logic operations		V1.4

Figure 32 Clock assignment

12. Insert a TP function, and set the PT value to “T#1ms”. The combination of the normally closed contact assigned to the 0.5 Hz clock with the TP function will generate a 1 ms pulse every two seconds, and it is within that pulse that the output is written.



GWPNASCII ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ Program blocks ▸ Main [OB1]

Main

	Name	Data type	Default value	Comment
1	▼ Input			
2	Initial_Call	Bool		Initial call of this OB
3	Remanence	Bool		=True, if remanent data are available
4	▼ Temp			
5	Return	Word		

Instructions

Options

Favorites

Basic instructions

Name	Description	Version
General		
Bit logic operations		V1.0
Timer operations		V1.0
TP	Generate pulse	V1.0
TON	Generate on-delay	V1.0
TOF	Generate off-delay	V1.0
TONR	Time accumulator	V1.0
--(TP)--	Start pulse timer	
--(TON)--	Start on-delay timer	
--(TOF)--	Start off-delay timer	
--(TONR)--	Time accumulator	
--(RT)--	Reset timer	
--(PT)--	Load time duration	
Counter operations		V1.0
Comparator operations		
Math functions		V1.0
Move operations		V2.1
Conversion operations		
Program control operati...		V1.1
Word logic operations		V1.4
Shift and rotate		

Figure 33 TP block configuration

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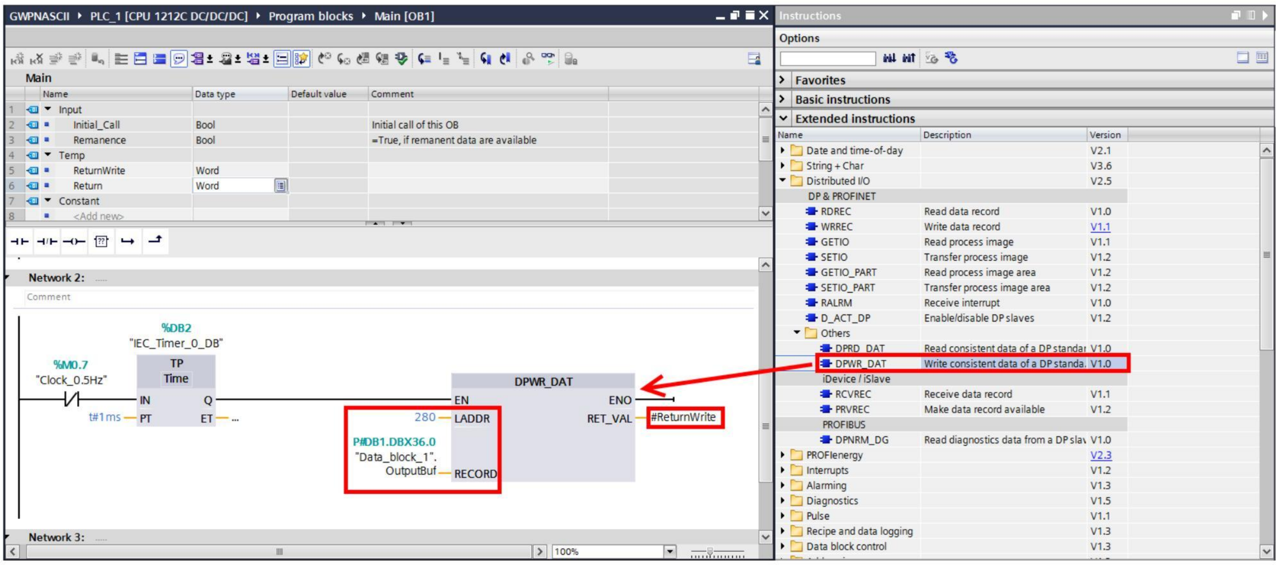
13. Add a DPWR_DAT instruction. The “LADDR” field is the hardware identifier of the Serial Output block, similar to the DPRD_DAT instruction (see Figure 29). The “RECORD” field is the entire output buffer from the data block.

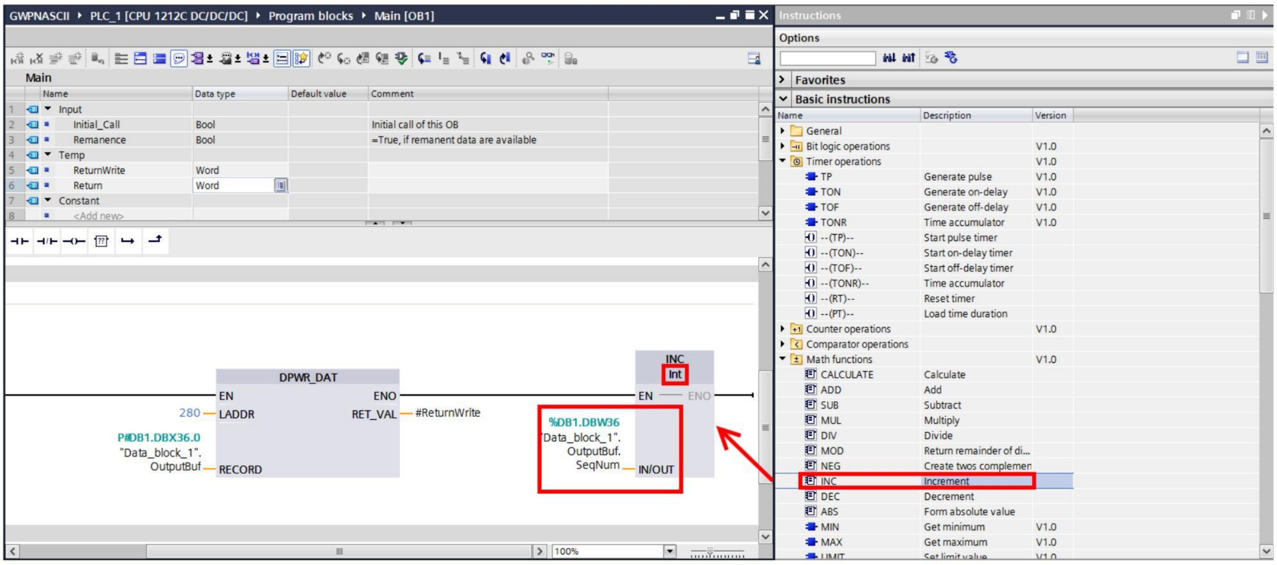


	Name	Data type	Default value	Comment
1	▾ Input			
2	Initial_Call	Bool		Initial call of this OB
3	Remanence	Bool		=True, if remanent data are available
4	▾ Temp			
5	ReturnWrite	Word		
6	Return	Word		
7	▾ Constant			
8	<Add new>			

Name	Description	Version
▸ Date and time-of-day		V2.1
▸ String + Char		V3.6
▾ Distributed I/O		V2.5
DP & PROFINET		
RDREC	Read data record	V1.0
WRREC	Write data record	V1.1
GETIO	Read process image	V1.1
SETIO	Transfer process image	V1.2
GETIO_PART	Read process image area	V1.2
SETIO_PART	Transfer process image area	V1.2
RALRM	Receive interrupt	V1.0
D_ACT_DP	Enable/disable DP slaves	V1.2
▾ Others		
DPRD_DAT	Read consistent data of a DP standar	V1.0
DPWR_DAT	Write consistent data of a DP standa.	V1.0
iDevice / iSlave		
RCVREC	Receive data record	V1.1
PRVREC	Make data record available	V1.2
PROFIBUS		
DPNRM_DG	Read diagnostics data from a DP slav	V1.0
▸ PROFIenergy		V2.3
▸ Interrupts		V1.2
▸ Alarming		V1.3
▸ Diagnostics		V1.5
▸ Pulse		V1.1
▸ Recipe and data logging		V1.3
▸ Data block control		V1.3

Figure 34 DPWR_DAT instruction

14. Add an “INC” function. Set the type to “Int” and select the “SeqNum” field of the OutputBuf struct as the “IN/OUT” field. This will increment the “SeqNum” field of the output buffer, which will cause the GW PN/ASCII... to send the output.



	Name	Data type	Default value	Comment
1	▾ Input			
2	Initial_Call	Bool		Initial call of this OB
3	Remanence	Bool		=True, if remanent data are available
4	▾ Temp			
5	ReturnWrite	Word		
6	Return	Word		
7	▾ Constant			
8	<Add new>			

Name	Description	Version
▸ General		
▸ Bit logic operations		V1.0
▾ Timer operations		V1.0
TP	Generate pulse	V1.0
TON	Generate on-delay	V1.0
TOF	Generate off-delay	V1.0
TONR	Time accumulator	V1.0
--(TP)--	Start pulse timer	
--(TON)--	Start on-delay timer	
--(TOF)--	Start off-delay timer	
--(TONR)--	Time accumulator	
--(RT)--	Reset timer	
--(PT)--	Load time duration	
▸ Counter operations		V1.0
▸ Comparator operations		
▾ Math functions		V1.0
CALCULATE	Calculate	
ADD	Add	
SUB	Subtract	
MUL	Multiply	
DIV	Divide	
MOD	Return remainder of di...	
NEG	Create twos complemen	
INC	Increment	
DEC	Decrement	
ABS	Form absolute value	
MIN	Get minimum	V1.0
MAX	Get maximum	V1.0
LIMIT	Set limit value	V1.0

Figure 35 INC function

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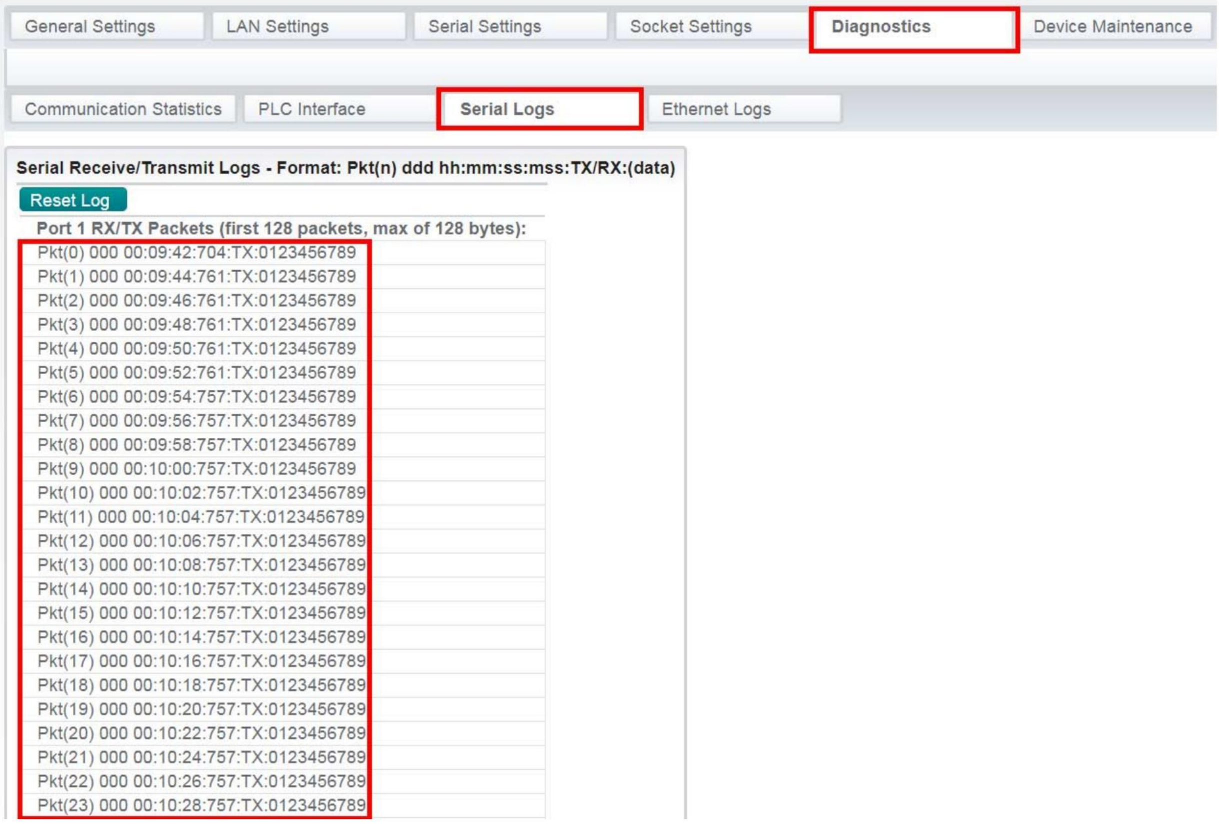
15. Compile the program and load it onto the PLC. The PLC program will now publish "0123456789" to the gateway, which transmits over the serial port. View the log in the "Diagnostics/Serial Logs" tab of the web manager.



Serial Receive/Transmit Logs - Format: Pkt(n) ddd hh:mm:ss:mss:TX/RX:(data)

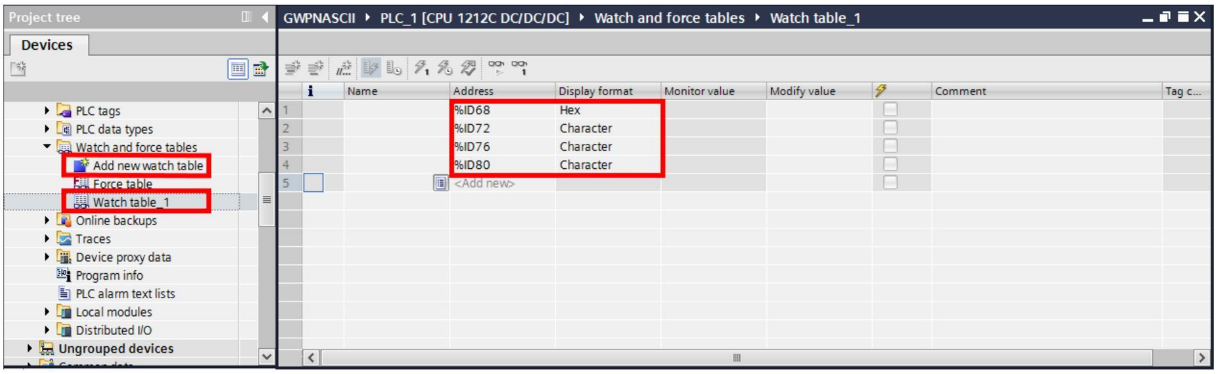
Port 1 RX/TX Packets (first 128 packets, max of 128 bytes):

```
Pkt(0) 000 00:09:42:704:TX:0123456789
Pkt(1) 000 00:09:44:761:TX:0123456789
Pkt(2) 000 00:09:46:761:TX:0123456789
Pkt(3) 000 00:09:48:761:TX:0123456789
Pkt(4) 000 00:09:50:761:TX:0123456789
Pkt(5) 000 00:09:52:761:TX:0123456789
Pkt(6) 000 00:09:54:757:TX:0123456789
Pkt(7) 000 00:09:56:757:TX:0123456789
Pkt(8) 000 00:09:58:757:TX:0123456789
Pkt(9) 000 00:10:00:757:TX:0123456789
Pkt(10) 000 00:10:02:757:TX:0123456789
Pkt(11) 000 00:10:04:757:TX:0123456789
Pkt(12) 000 00:10:06:757:TX:0123456789
Pkt(13) 000 00:10:08:757:TX:0123456789
Pkt(14) 000 00:10:10:757:TX:0123456789
Pkt(15) 000 00:10:12:757:TX:0123456789
Pkt(16) 000 00:10:14:757:TX:0123456789
Pkt(17) 000 00:10:16:757:TX:0123456789
Pkt(18) 000 00:10:18:757:TX:0123456789
Pkt(19) 000 00:10:20:757:TX:0123456789
Pkt(20) 000 00:10:22:757:TX:0123456789
Pkt(21) 000 00:10:24:757:TX:0123456789
Pkt(22) 000 00:10:26:757:TX:0123456789
Pkt(23) 000 00:10:28:757:TX:0123456789
```

Figure 36 Serial logs

2.5 Reading values using watch table

1. Add new watch table, and then add the IO addresses of the Input 32 Bytes submodule. Each IO address reads four bytes, so skip every fourth address to avoid overlap.



	i	Name	Address	Display format	Monitor value	Modify value	⚡	Comment	Tag c...
1			%ID68	Hex			□		
2			%ID72	Character			□		
3			%ID76	Character			□		
4			%ID80	Character			□		
5			<Add new>				□		

Figure 37 Watch table

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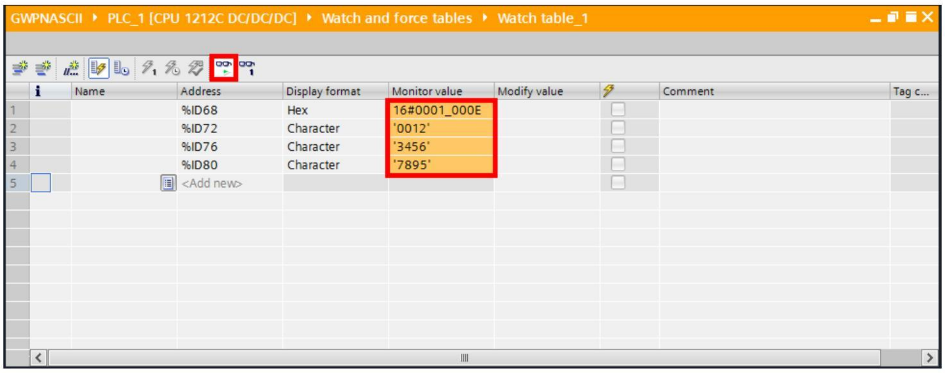
2. Click the “Glasses” icon to go online and monitor the values.



GWPNASCII ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ Watch and force tables ▸ Watch table_1

	i	Name	Address	Display format	Monitor value	Modify value	⚡	Comment	Tag c...
1			%ID68	Hex	16#0001_000E		□		
2			%ID72	Character	'0012'		□		
3			%ID76	Character	'3456'		□		
4			%ID80	Character	'7895'		□		
5			<Add new>				□		

Figure 38 Watch table

3. When using a barcode scanner as an example, the values of the IO addresses change as different barcodes are scanned and different data is entered. The barcode in Figure 39 was used in this example.

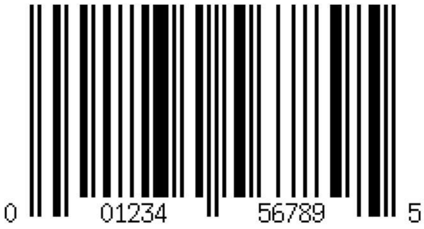
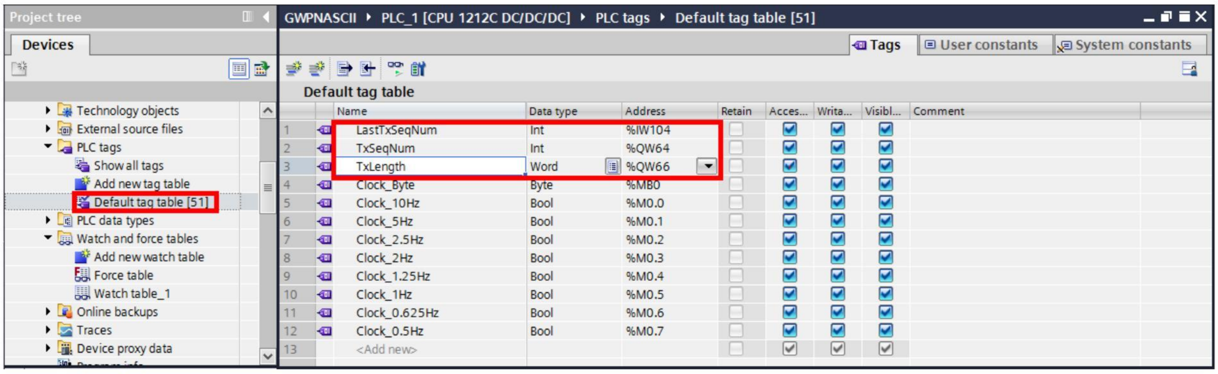


Figure 39 Example barcode

2.6 Forcing output using watch table

1. Add the tags shown in Figure 40 to organize the “Watch” table.



GWPNASCII ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ PLC tags ▸ Default tag table [51]

Default tag table

	Name	Data type	Address	Retain	Acces...	Writa...	Visibl...	Comment
1	LastTxSeqNum	Int	%IW104	□	☑	☑	☑	
2	TxSeqNum	Int	%QW64	□	☑	☑	☑	
3	TxLength	Word	%QW66	□	☑	☑	☑	
4	Clock_Byte	Byte	%MB0	□	☑	☑	☑	
5	Clock_10Hz	Bool	%M0.0	□	☑	☑	☑	
6	Clock_5Hz	Bool	%M0.1	□	☑	☑	☑	
7	Clock_2.5Hz	Bool	%M0.2	□	☑	☑	☑	
8	Clock_2Hz	Bool	%M0.3	□	☑	☑	☑	
9	Clock_1.25Hz	Bool	%M0.4	□	☑	☑	☑	
10	Clock_1Hz	Bool	%M0.5	□	☑	☑	☑	
11	Clock_0.625Hz	Bool	%M0.6	□	☑	☑	☑	
12	Clock_0.5Hz	Bool	%M0.7	□	☑	☑	☑	
13	<Add new>			□	☑	☑	☑	

Figure 40 PLC Tag table

The addresses for these tags are determined by the addresses given within the GSDML. In this case, we use the IW104 as the address for LastTxSeqNum because that is the one byte input in the Output submodule that gives you the LastTxSeqNum. Then TxSeqNum is the first two bytes of the Q address range, and TxLength is the next two bytes, with the body of the message following afterwards.

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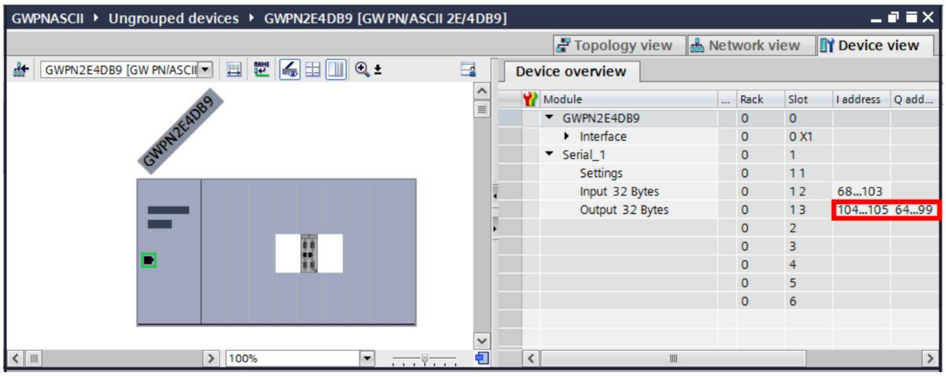
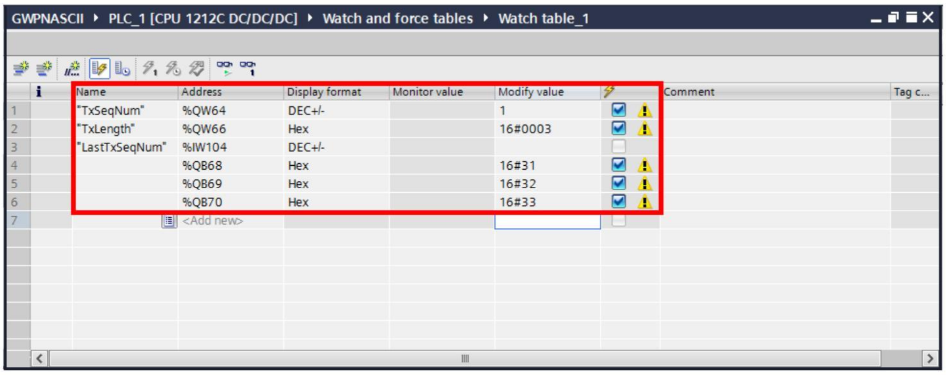


Device overview

Module	...	Rack	Slot	I address	Q add...
GWPN2E4DB9		0	0		
Interface		0	0 X1		
Serial_1		0	1		
Settings		0	1 1		
Input 32 Bytes		0	1 2	68...103	
Output 32 Bytes		0	1 3	104...105	64...99
		0	2		
		0	3		
		0	4		
		0	5		
		0	6		

Figure 41 Tag addresses

2. Go to the watch table and add the following addresses to watch. Modify the TxSeqNum field to be **1**, the “TxLength” field to be the number of characters being sent (in this case it’s **3**), and the hex values of the ASCII characters to send. In this case, sending ‘123’.
3. Compile and load, and then click the “Go online” button. Click the “Lightning bolt” icon to change the values of the “TxSeqNum” field. This will cause the “LastTxSeqNum” field to increase as well, meaning that a transaction was successfully sent through. Increase the TxSeqNum value to continue sending messages.


GWPNASCII ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ Watch and force tables ▸ Watch table_1

	i	Name	Address	Display format	Monitor value	Modify value	⚡		Comment	Tag c...
1		"TxSeqNum"	%QW64	DEC+/-		1	☑	⚠		
2		"TxLength"	%QW66	Hex		16#0003	☑	⚠		
3		"LastTxSeqNum"	%IW104	DEC+/-			□			
4			%QB68	Hex		16#31	☑	⚠		
5			%QB69	Hex		16#32	☑	⚠		
6			%QB70	Hex		16#33	☑	⚠		
7			<Add new>				□			

Figure 42 Watch table

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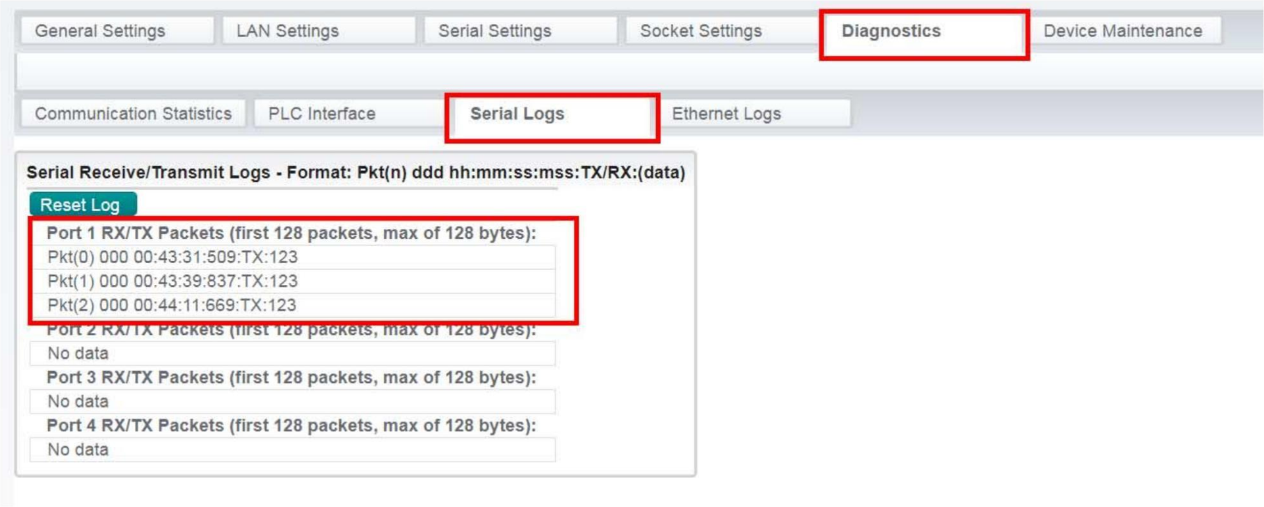
4. You can see these messages under Diagnostics -> Serial Logs in the web manager of the gateway.



Serial Receive/Transmit Logs - Format: Pkt(n) ddd hh:mm:ss:mss:TX/RX:(data)

Port 1 RX/TX Packets (first 128 packets, max of 128 bytes):

```
Pkt(0) 000 00:43:31:509:TX:123
Pkt(1) 000 00:43:39:837:TX:123
Pkt(2) 000 00:44:11:669:TX:123
```

Port 2 RX/TX Packets (first 128 packets, max of 128 bytes):

No data

Port 3 RX/TX Packets (first 128 packets, max of 128 bytes):

No data

Port 4 RX/TX Packets (first 128 packets, max of 128 bytes):

No data

Figure 43 Serial log

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