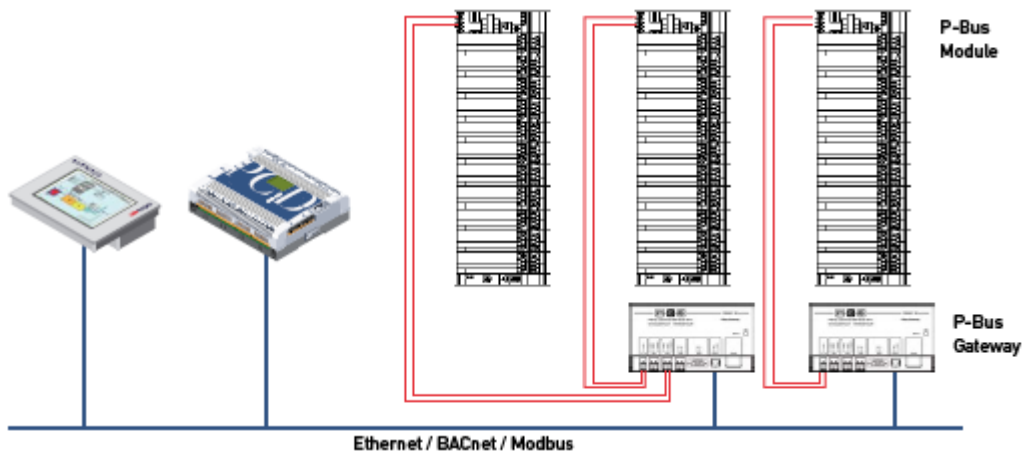


P-Bus Quick Start



Revision History:

Version	Primary Authors	Description of Version	Date Approved
V1.0	A. K.	Initial version	09.02.2010

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1 Introduction

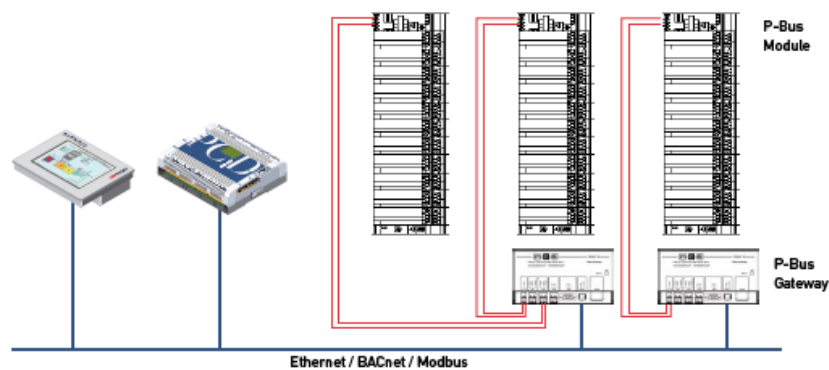
1.1 Purpose of this document

The intention of this document is to give some help to the customer who wants to work with the P-Bus sample project.

1.2 What is the P-Bus gateway

With the P-Bus FBox Library and the P-Bus Gateway you can use Siemens P-Bus I/O modules (PTM) together with Saia NT-OS based Controllers.

1.3 How the data exchange is working



The data exchange can be separate into two parts. The first data exchange is working on the P-Bus line. This communication is driven by the P-Bus / Modbus Gateway itself. The P-Bus / Modbus Gateway automatically recognize the connected P-Bus modules and write to and read back the information from the module-reserved registers.

The second data exchange is working between the P-Bus / Modbus Gateway and the PCD. This communication is Modbus communication where the physical layer can be serial RS-485 or Ethernet. The P-Bus FBoxes are handling the data exchange between the module-reserved registers of the P-Bus / Modbus Gateway and the flags and registers inside of the PCD.

For this communication the firmware of the used PCD must support Modbus communication and it is needed to use the SAIA Modbus library.

So the PCD does not access directly to the P-Bus module but, it does access of the module-reserved Modbus registers in the P-Bus / Modbus Gateway.

2 Technical Informations

2.1 Capabilities of the P-Bus Gateway

- Two P-Bus lines with up to 64 PTM modules per each line (maximum possible modules: 127 !)
- Easy parameterization with a web interface
- Possible communication interfaces to the PCD are Modbus/Ethernet, Modbus/RS485 or Modbus/RS232

More information about the gateway you can find on: <http://www.persy.nl/en/products.htm>

2.2 Capabilities of the P-Bus FBoxes

- One FBox for every supported Siemens module type
- Easy configuration (P-Bus line and module address)
- All supported information's from the modules are transmitted

2.3 Minimum Hardware requirements

- Saia PCD3.Mxxxx / PCD2.M5xxx:
The used PCD and its firmware must support Modbus communication.
- Persy P-Bus ↔ Modbus Gateway with the latest firmware. (www.persy.nl)
- Siemens PTX1.01 P-Bus bus coupler plus backplane
- At least one P-Bus module with terminal block supported by the gateway
- 24 VAC min 50VA power supply
- 24 VDC power supply for PCD3
- if you would like to use Modbus TCP you need cross Ethernet cable for direct connection or straight cables and hub/switch to connect PCD3, Persy gateway and PC into a small network
- cabling for power supplies, and twisted wires for P-Bus and twisted wires RS-485/RS232 null modem cable for connecting Persy gateway to PCD3 in serial line.

2.4 Minimum Software requirements

- PCD3 firmware which supports Modbus
- Saia Modbus library with licence (other Modbus libraries are not supported)
- Saia P-Bus library with licence
- Saia Hevac library

2.5 Supported PTM Modules

- PTM1.2C
- PTM1.2D20
- PTM1.2I25
- PTM1.2I420
- PTM1.2P100
- PTM1.2P1K
- PTM1.2Q250
- PTM1.2Q250-M
- PTM1.2QD
- PTM1.2R1K
- PTM1.2U10
- PTM1.2Y10(S)
- PTM1.2Y10-(S)-M
- PTM1.2Y250T-M
- PTM1.3Q-M3
- PTM1.4D20
- PTM1.4D20R
- PTM1.4Q250-P
- PTM1.4R1K
- PTM1.4Y10S
- PTM1.8D20E
- PTM1.2QD
- PTM1.2QDM
- PTM1.4QD
- PTM1.4QDM
- PTM1.2Y420
- Diagnostic of the P-Bus / Modbus gateway

Other modules can be implemented by demand (only if the Gateway itself supports them).

2.6 PTM Modules which are supported by the P-Bus / Modbus Gateway but currently not supported by FBox:

PTM1.2D42, PTM1.2D20S, PTM1.2Q250-B, PTM1.2D250, PTM1.4Q250-P3,
PTM1.4Q250A-P

FBox support of these modules is possible on request.

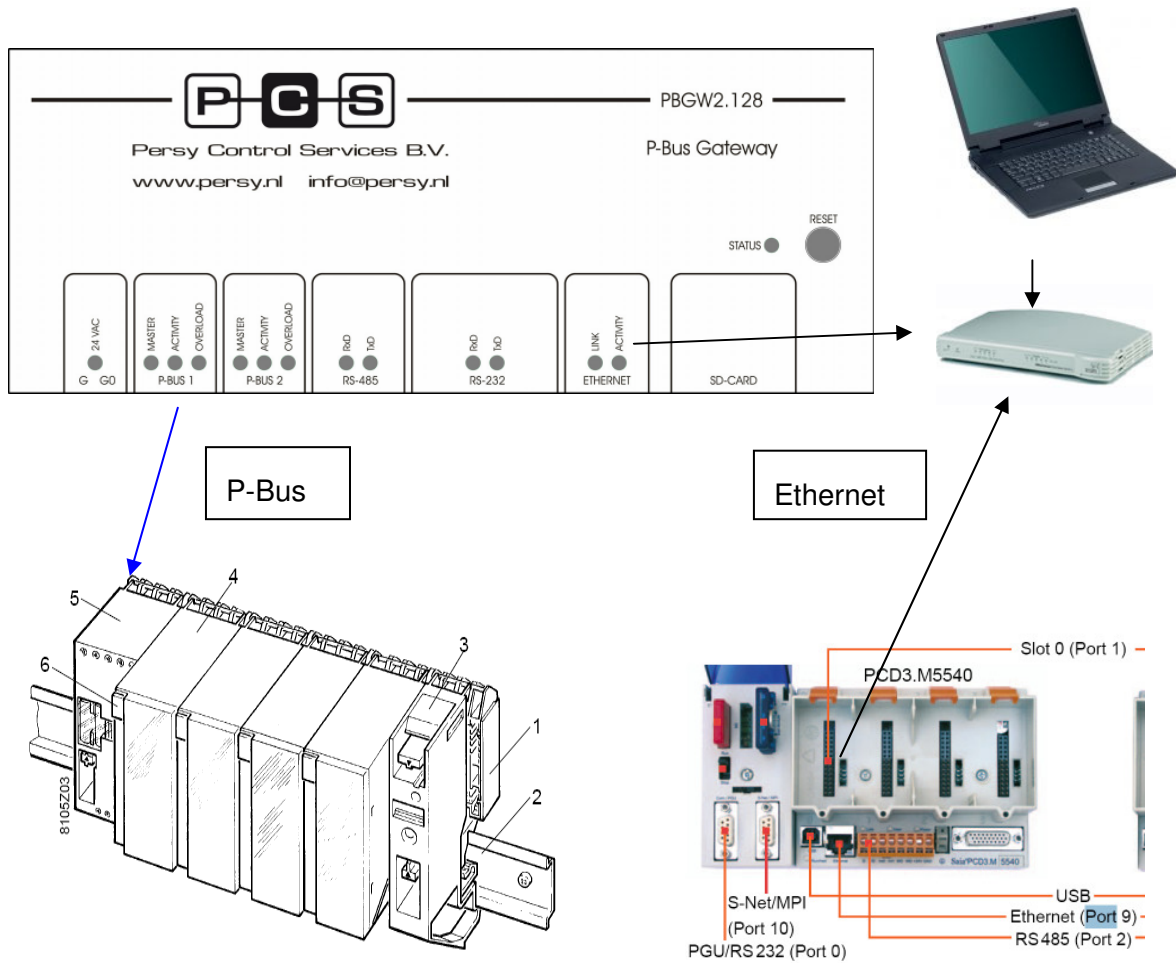
3 Using the gateway with Modbus TCP Connection

3.1 Hardware Installation

Important !

Before you start the hardware installation you should be familiar with the hardware manual of the used modules, Gateway, PCD3.Mxxxx, Ethernet switch, Power supplies in order to know the wiring, necessary power supply and pin layout of the used hardware.

Hardware elements overview:



- 1 I/O bar PTX1...
- 2 Standard mounting rail
- 3 Phase supply block PTX1.00
- 4 I/O module PTM1...
- 5 Module supply block PTX1.01
- 6 Address plug PTG1...

Steps of building the hardware together:

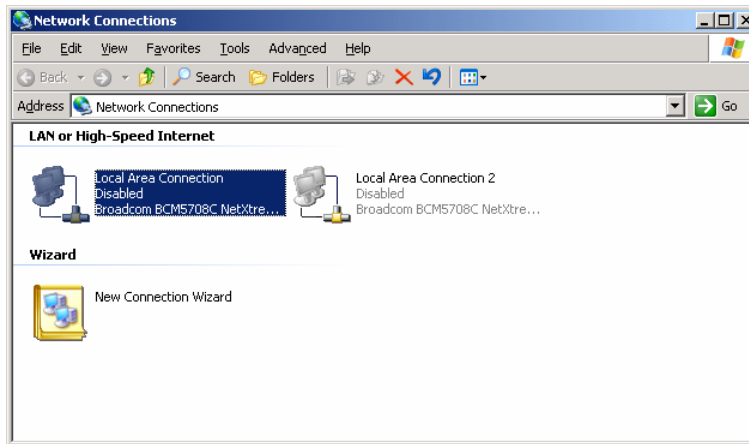
- Connect the Persy gateway P bus1 (PC, PU, PD) pins to PTX1.01 module (PC, PU, PD) pins. 3-core round cable (unshielded).
- Connect 24 VAC to Persy gateway (G, G0) pins and PTX1.01 module (G, G0) pins.
- Connect 24 VDC to PCD3.Mxxxx
- Connect power for the Ethernet switch (patch cable)
- Connect Persy Gateway Ethernet connector into the switch (patch cable)
- Connect PC Ethernet connector to the switch
- Install the terminal block of the P-Bus function module onto the backplane
- Install the P-Bus function module
- Put the address plug into the module
- Check the wiring and switch on the power ☺
- After power on the 24VAC LED should be green on Persy gateway. And If you have chosen P-Bus port 1 to communicate with the P-Bus module the Master LED should be green and activity LED must be flashing yellow above this terminal (of course the port must be enabled in the settings. It is described later).
- After power on the 24VAC LED should be green on Persy gateway. And If you have chosen P-Bus port 2 to communicate with the P-Bus module the Master LED should be green and activity LED must be flashing yellow above this terminal (of course the port must be enabled in the settings. It is described later).
- If you are connected to Persy Gateway via Ethernet the Link and Activity LED's must be green and yellow to show you that there is online connection

3.2 Software settings of the gateway

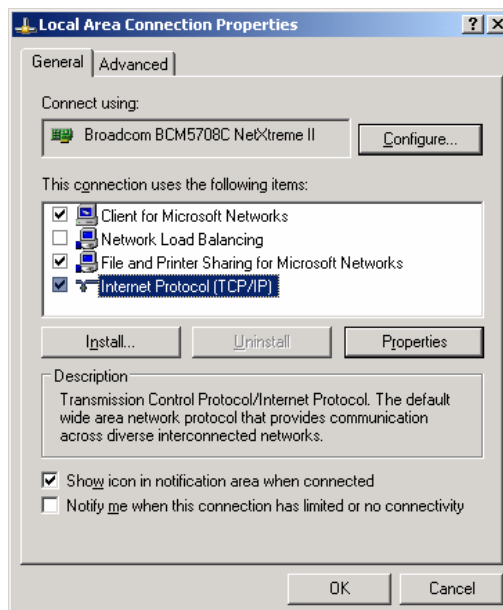
First you have to modify your PC LAN settings in order to connect to the Persy P-Bus/Modbus gateway. The gateway can be configured via your web browser (Internet Explorer or Mozilla or Opera e.t.c)

The necessary steps are the following:

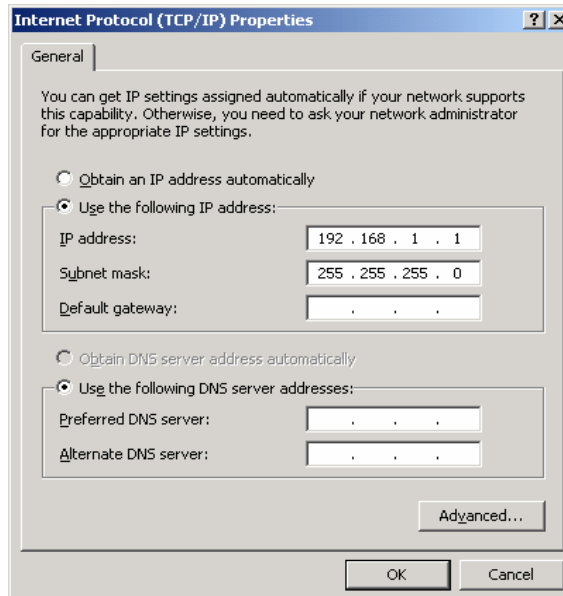
1. Open the network connection of your computer



2. Right mouse click on Local Area Connection which will be used for communicating with the gateway (if you have several Ethernet card installed into your PC you must choose one which are connected to the Gateway) and choose Internet Protocol TCP/IP and click on the properties button of the popup window.



3. In the next popup window you must write down your original network settings on a piece of paper to remember. And modify your network settings as you can see on the picture below.



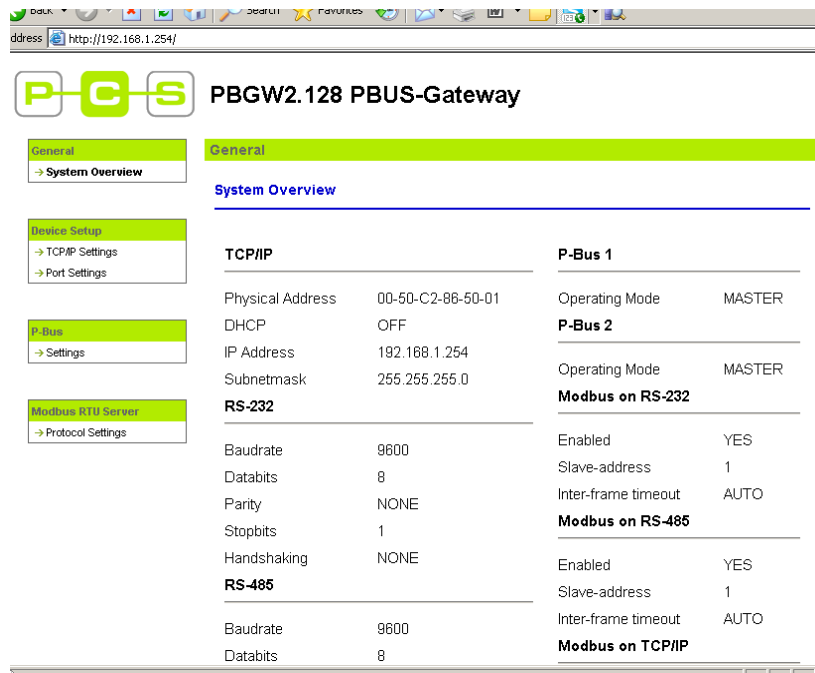
The standard IP settings (factory default) of the gateway are:

IP address **192.168.1.254**, Subnet mask **255.255.255.0**

So you must set an IP address of your computer which is in the same range as the Gateway plus you must set the subnet mask also the same.

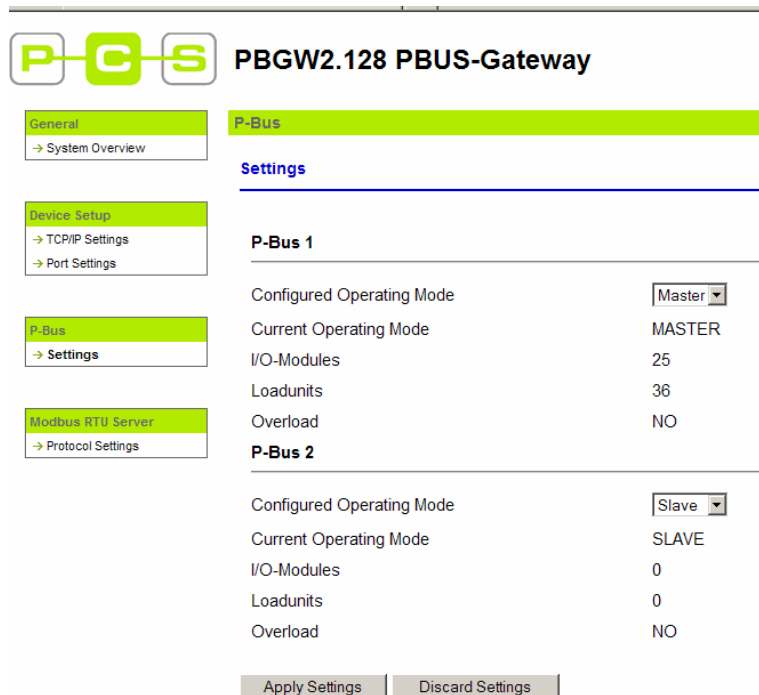
Apply the changes and now you will be able to connect to the gateway via your browser.

- Now open your web browser and type in the URL field **192.168.1.254** and press enter.



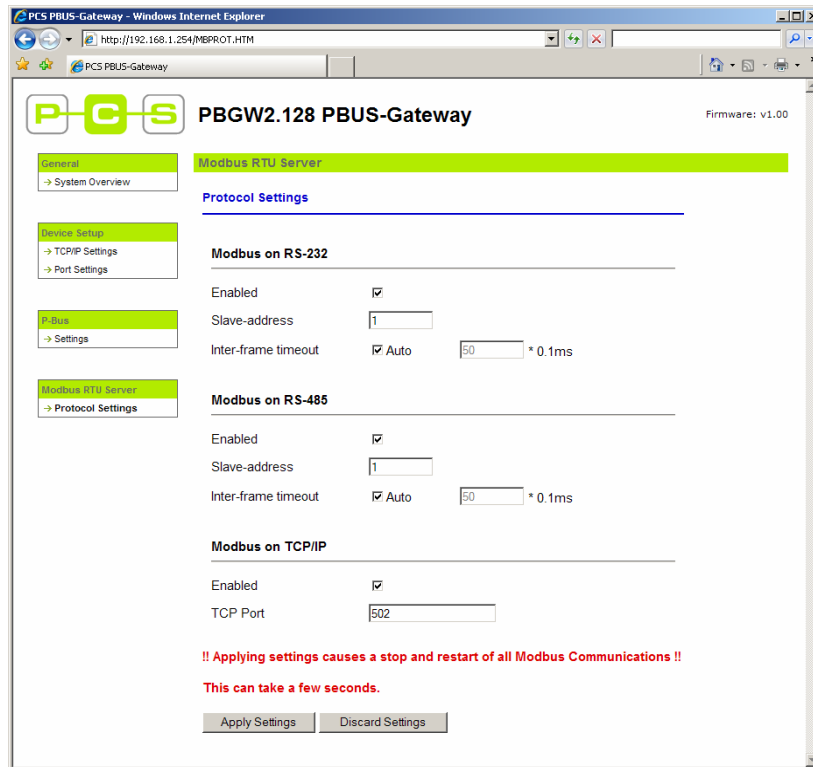
This is an overview window you can see the settings of your Gateway. You have to modify only two settings to enable the communication.

- You have to modify the P-Bus settings with left mouse click on P-Bus ->settings tab



Modify P-Bus1 Configured Operating Mode to Master. And Apply the Settings with pressing the button down.

6. And you have to enable the Ethernet port for Modbus TCP/IP communication. Check the ModbusTCP/IP Enabled checkbox and press Apply Settings button.

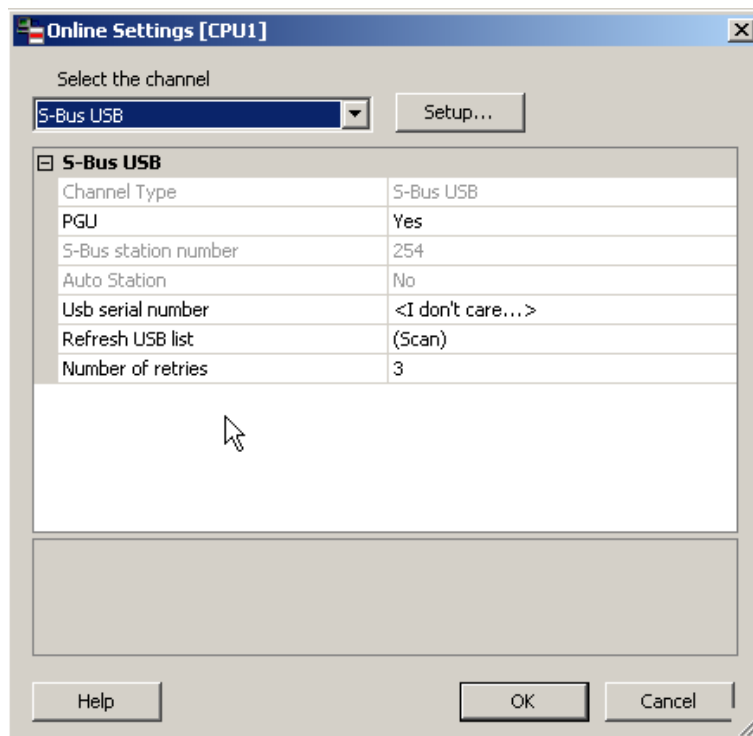


Now the gateway settings are done. You can switch off your browser. Later if your small P-Bus installation is working you can modify other settings to adapt your network to the real installation of yours.

3.3 Settings of the PCD

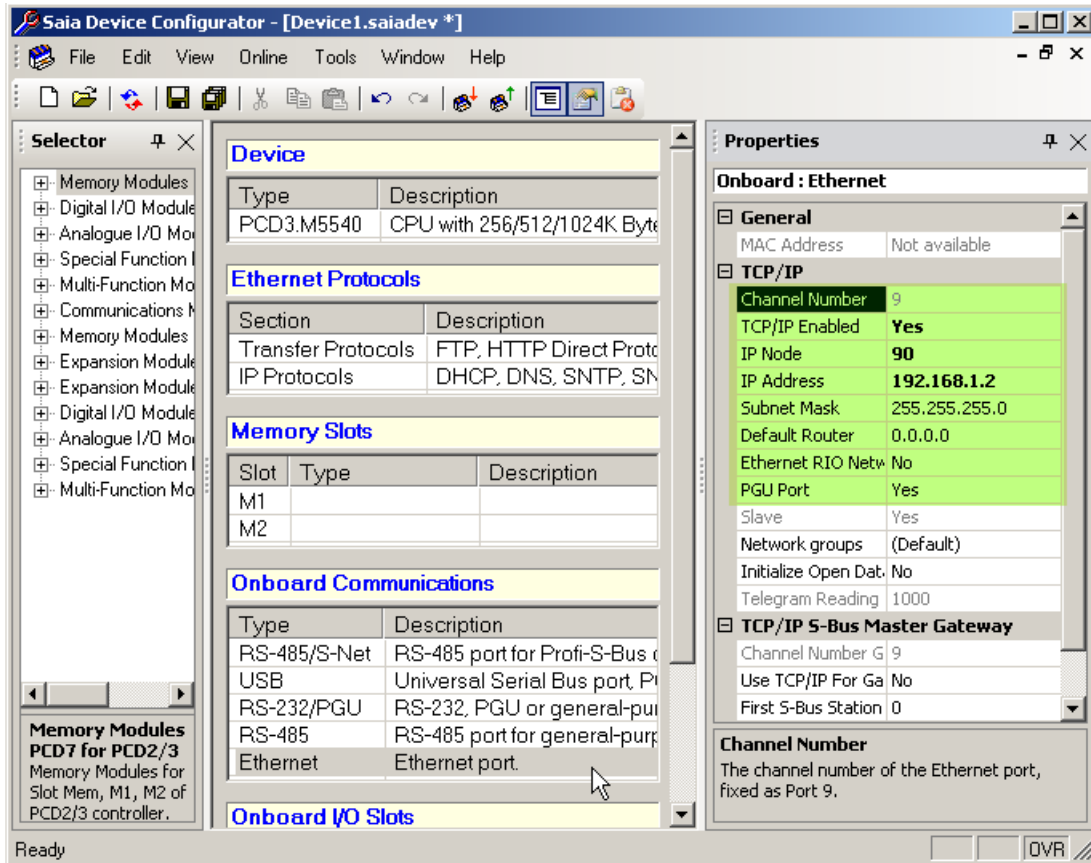
The necessary steps for setting up your PCD3:


1. Check that your PCD is capable of working with P-Bus FBoxes. (You need PCD3.Mxxxx / PCD2.M5xxx: series of PCD with Modbus capable firmware V1.10.16, installed and licensed Saia Modbus library and installed P-Bus library.)
2. Restore the project: P-Bus_Quick_Start_projectxxxx.zip using PG5 Project Manager "Project → Restore menu.
3. Go to the project tree and first check the online settings. The settings should be S-Bus USB with PGU = Yes. If you have other type of connection, like serial PGU, please apply the necessary settings, which are needed for program downloading.



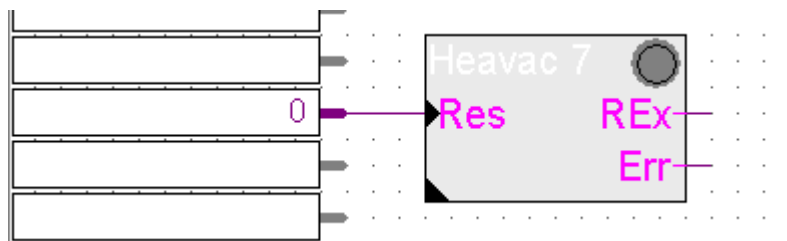
4. Open the Device configurator and check the important settings like PLC type and PCD memory settings

- Go to the onboard communication tab and check the Ethernet port settings. If you need other network settings please apply the new settings and be ensured that the P-Bus / Modbus Gateway and the PCD are connected to the same network with different IP address (If you have notebook in the network it must have different IP also).



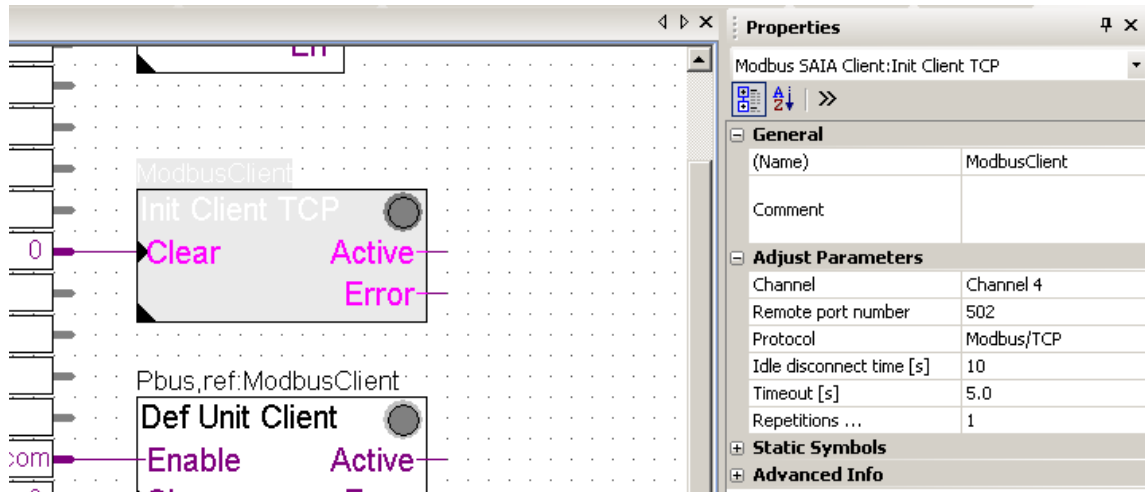
- Download the hardware settings into the PCD with pressing the  button.
- Double Click on to the Build Options tab in the Project Tree and press the “Set Defaults” button of the bottom of the popup window.
- Go to the Fupla program called “**pbus_test_ethernet.fup**” and check the pages.
- On the first page there are the FBoxes for setting up the Modbus TCP communication.
- The FBoxes and their settings:

Heavac Init FBox:



No special settings are needed. The Heavac Init FBox is placed because of some internal functions is used by the P-Bus FBoxes.

Init Client TCP FBox:



Channel - Logical channel. If several Client FBoxes are used, each one must use a different channel

Remote port number is the port number (502), which is set in the Persy Gateway.

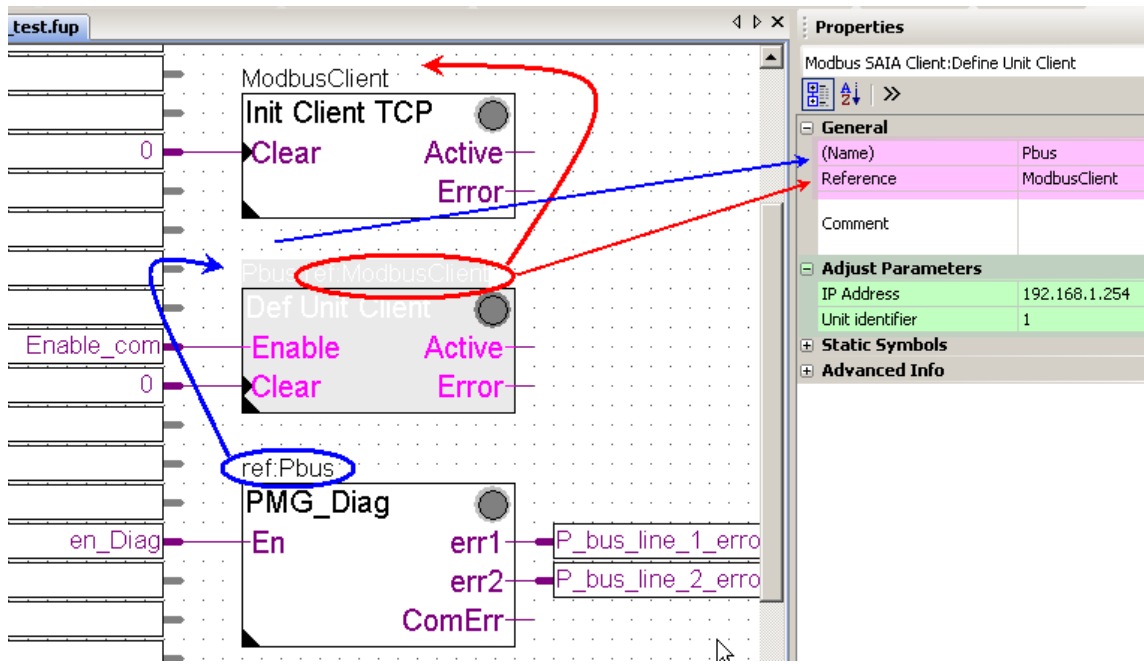
Protocol is Modbus/TCP which is used by Persy Gateway.

Timings, Repetitions can be left as default.

If you have large network it is possible that you need different timing. For the right settings please refer to the Modbus user manual.(SFC_Modbus_Classic_V1.5.pdf)

If you are online you can delete the error counter by pressing the clear button in the adjust window.

Def Unit Client FBox:



Reference connection is needed between the Init Client TCP FBox and the Def Unit Client FBox.

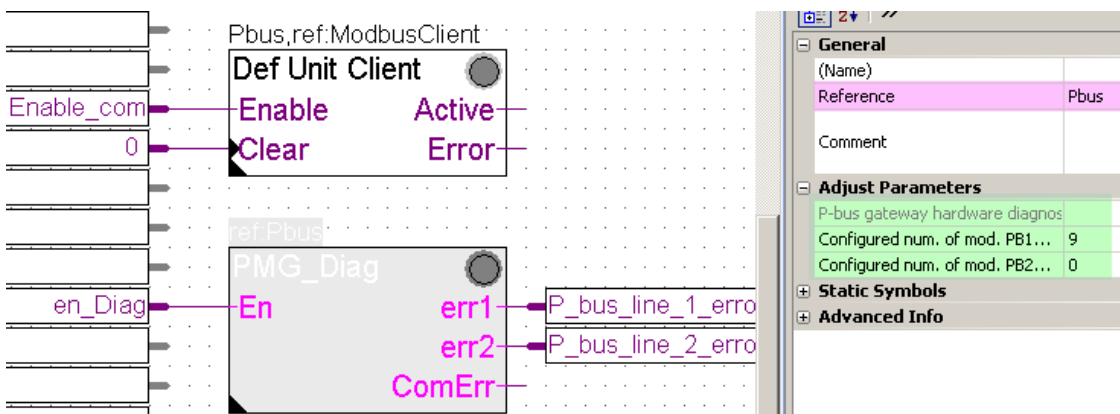
Reference connection is needed between the Def Unit Client FBox and the following P-Bus FBoxes.

You can change the name of the FBoxes but the reference connection must be kept, if not you will get error message during the build.

IP address (192.168.1.254) is the IP address of the Persy Modbus/P-Bus Gateway.

Unit identifier (1) – is used to determine the Modbus address of the Gateway (address of the Modbus slave) if you are using RS485 line for the communication with the P-Bus gateway. Use the “1” in both side (PCD and the P-Bus gateway) if you are using Modbus TCP for communication.

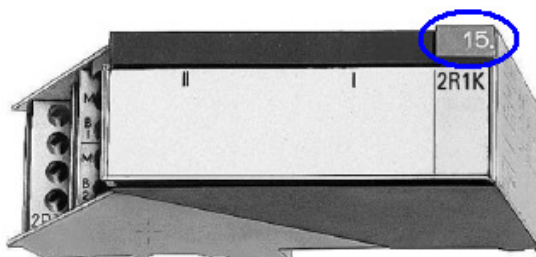
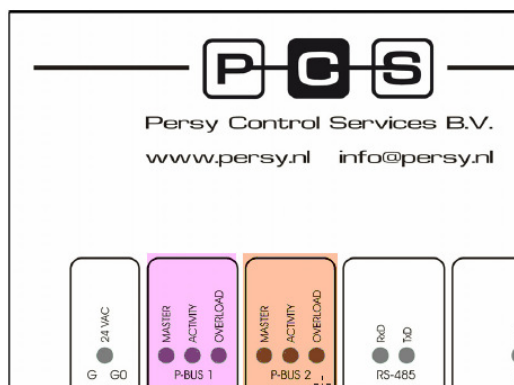
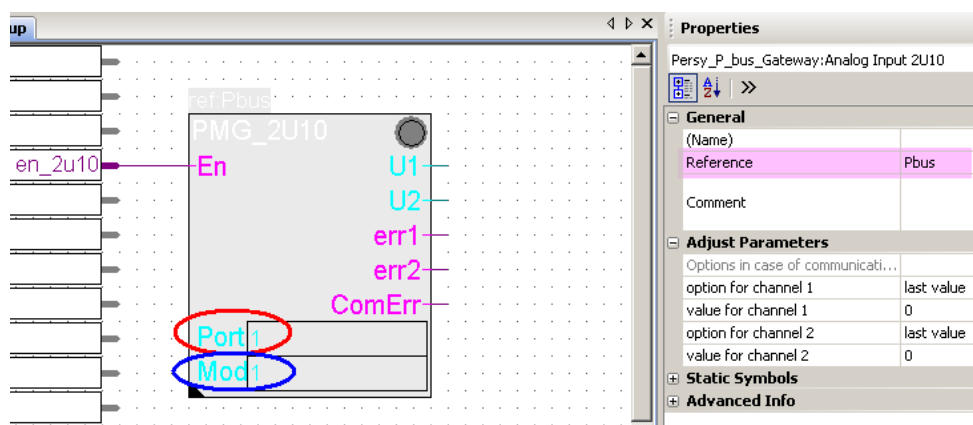
PMG_Diag FBox:



In the FBox it is possible to set up how many P-Bus modules are installed per each P-Bus line.

If the “Configured number of modules” does not match the number of modules recognized by the P-Bus / Modbus gateway the user gets error. If the “Configured number of modules” is set to “0” the error generation is switched off.

11. On the following Fupla pages there can be many different P-Bus FBoxes found. You can use them according to your project. If you need more than one from one kind of P-Bus FBoxes you can place them on, but strictly after the first Fupla page and set up the reference connection. If you place a P-Bus FBox before the second page you will get error message during build because of the faulty reference connection. If you do not need all of the placed P-Bus FBox you can delete the unnecessary ones.
12. It is necessary to set up on the face of every each P-Bus FBoxes the **Port** number and **Module** number. The port number represents the identification number of P-Bus line (1 or 2) of the P-Bus / Modbus Gateway is used to connect the physical P-Bus module to the gateway. The Module number is the address number of the physical P-Bus module. It is possible to read out this number from the address stick plugged into the P-Bus module.



13. After setting up the Port and the Module number of the used P-Bus FBoxes the project is ready to build and download.
14. After the project download the user can go online in the Fupla and can enable the used FBoxes step by step. If every communication parameter and other settings were correct the communication must start between the P-Bus / Modbus gateway and the PCD. If the P-Bus line is correctly installed to the physical P-Bus modules and the modules are correctly installed and put under power the Gateway can read out the information from the physical P-Bus modules and can transfer the data to the PCD and back.

4 Using the Gateway with Modbus RTU on RS485 serial line

4.1 Hardware Installation

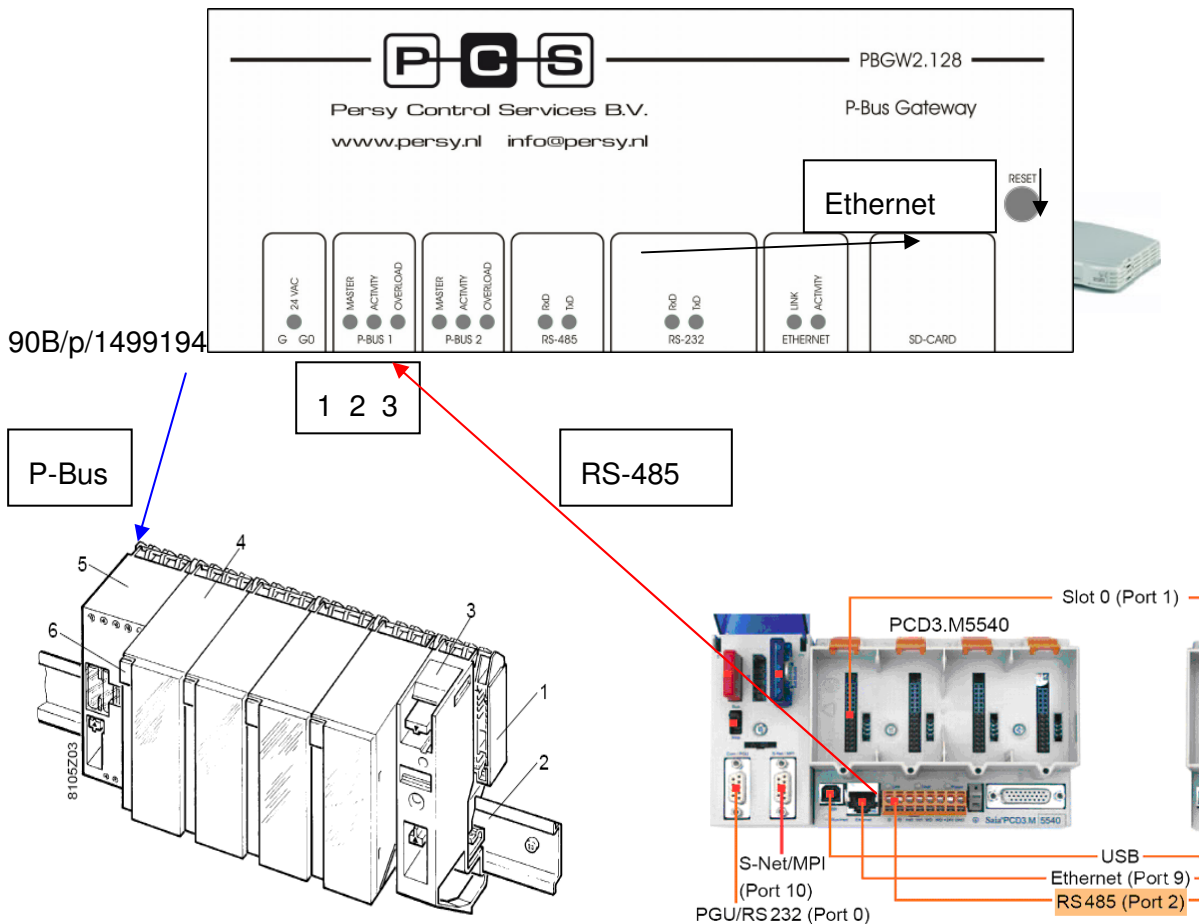
Important !

Before you start the hardware installation you should be familiar with the hardware manual of the used modules, Gateway, PCD3.Mxxxx, Ethernet switch, Power supplies in order to know the wiring, necessary power supply and pin layout of the used hardware.

Hardware elements overview:



http://www.notebooksarok.hu/product_images/8cdbababf84045eaddfad7134142f6ba.jpg
http://www.superwarehouse.com/3Com_OfficeConnect_Dual_Speed_5_Port_Switch/3C167



- 1 I/O bar PTX1....,
- 2 Standard mounting rail

- 3 Phase supply block PTX1.00
- 4 I/O module PTM1...
- 5 Module supply block PTX1.01
- 6 Address plug PTG1...

Steps of building the hardware together:

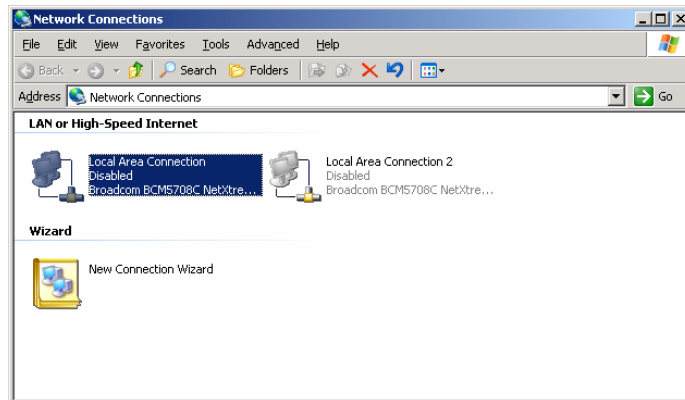
- Connect the Persy gateway P bus1 (PC, PU, PD) pins to PTX1.01 module (PC, PU, PD) pins. 3-core round cable (unshielded).
 - Connect 24 VAC to Persy gateway (G, G0) pins and PTX1.01 module (G, G0) pins.
 - Connect 24 VDC to PCD3.Mxxxx
 - Connect Persy Gateway RS-485 port to PCD3.Mxxxx RS-485 port.
 - pin 1 means Data A must be connected to PCD3.Mxxxx /D pin
 - pin 2 means Data B must be connected to PCD3.Mxxxx D pin
 - pin 3 means shield must be connected if you have long wires
- in case of long wiring do not forget to install termination resistor of the communication lines according to PCD3.Mxxxx manual
- Connect power for the Ethernet switch (patch cable)
 - Connect PC Ethernet connector to the switch
 - Install the terminal block of the P-Bus function module onto the backplane
 - Install the P-Bus function module
 - Put the address plug into the module
 - Check the wiring and switch on the power ☺
 - After power on the 24VAC LED should be green on Persy gateway. And if you have chosen P-Bus port 1 to communicate with the P-Bus module the Master LED should be green and activity LED must be flashing yellow above this terminal (of course the port must be enabled in the settings, it is described later).
 - After power on the 24VAC LED should be green on Persy gateway. And If you have chosen P-Bus port 2 to communicate with the P-Bus module the Master LED should be green and activity LED must be flashing yellow above this terminal (of course the port must be enabled in the settings, it is described later).
 - If you are connected to Persy Gateway via Ethernet the Link and Activity LED's must be green and yellow to show you that there is online connection
 - LED's on the RS-485 would be yellow if the communication is enabled inside of the Fupla program. (if you don't have Fupla program with enabled communication and the LED's are yellow the wires are changed and the LED's shows this error.

4.2 Software settings of P-Bus gateway

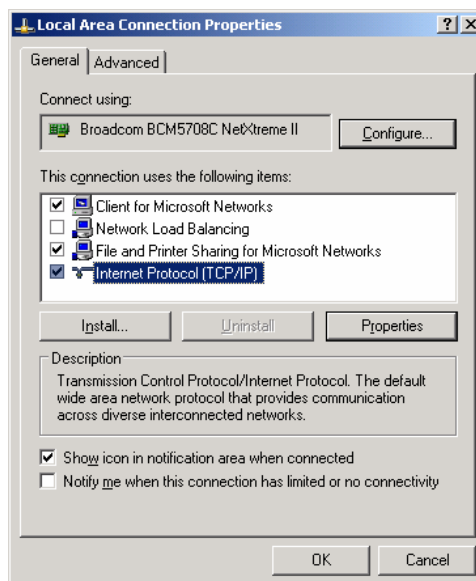
First you have to modify your PC LAN settings in order to connect to the Persy P-Bus/Modbus gateway. The gateway can be configured via your web browser (Internet Explorer or Mozilla or Opera e.t.c)

The necessary steps are the following:

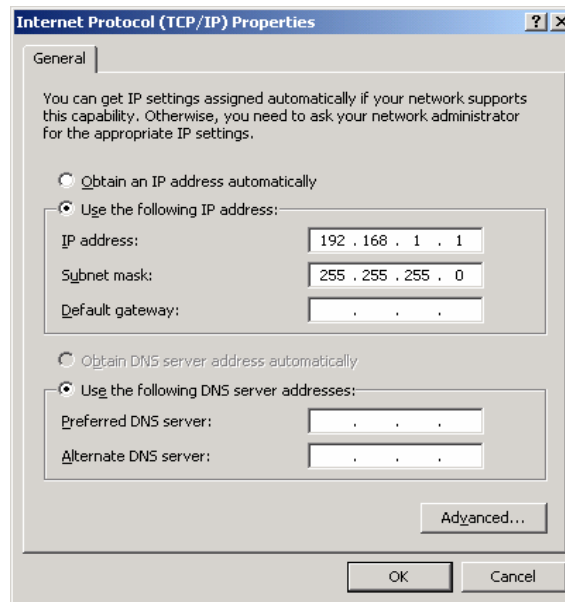
1. Open the network connection of your computer



2. Right mouse click on Local Area Connection which will be used for communicating with the gateway (if you have several Ethernet card installed into your PC you must choose one which are connected to the Gateway) and chose Internet protocol TCP/IP and click on the properties button of the popup window.



3. In the next popup window you must write down your original network settings on a peace of paper to remember. And modify your network settings as you can see on the picture below.



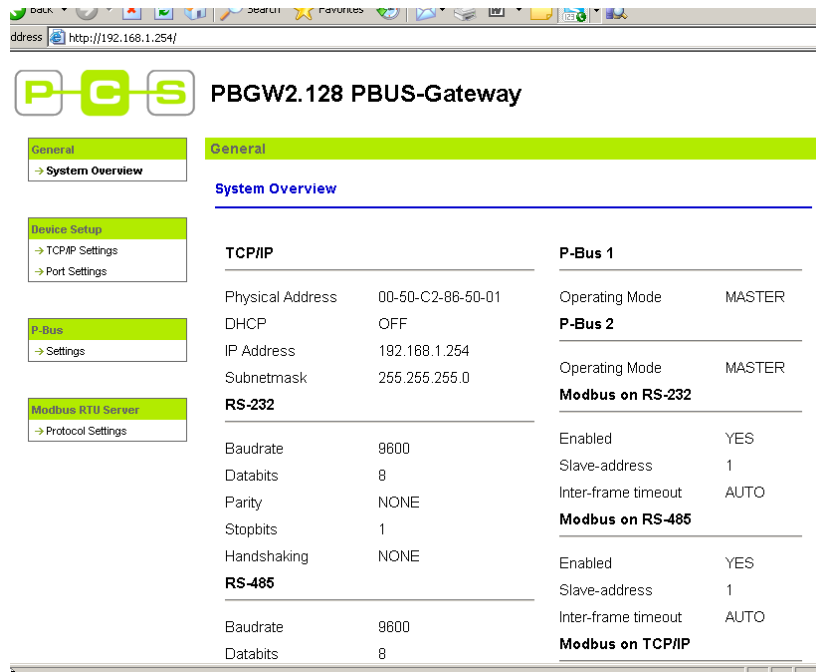
The standard IP settings (factory default) of the gateway are:

IP address **192.168.1.254**, Subnet mask **255.255.255.0**

So you must set an IP address of your computer which is in the same range as the Gateway plus you must set the subnet mask also the same.

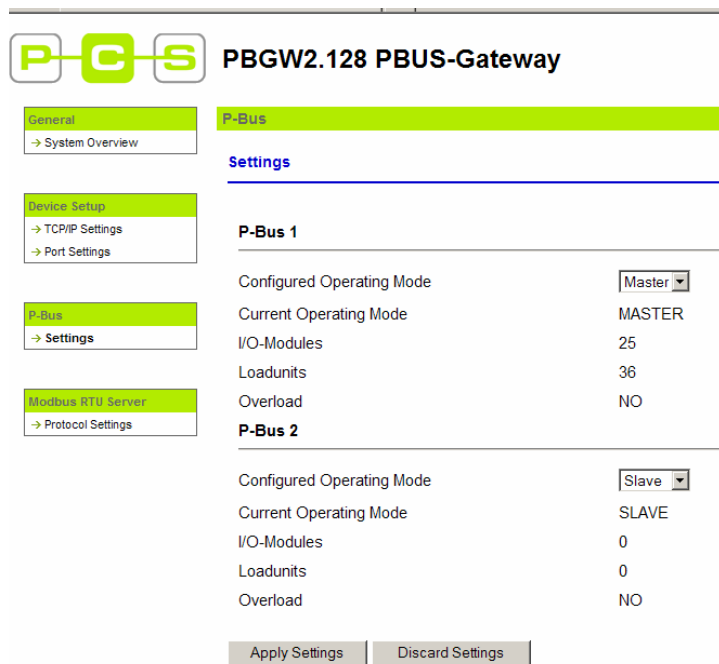
Apply the changes and now you will be able to connect to the gateway via your browser.

- Now open your web browser and type in the URL field **192.168.1.254** and press enter.



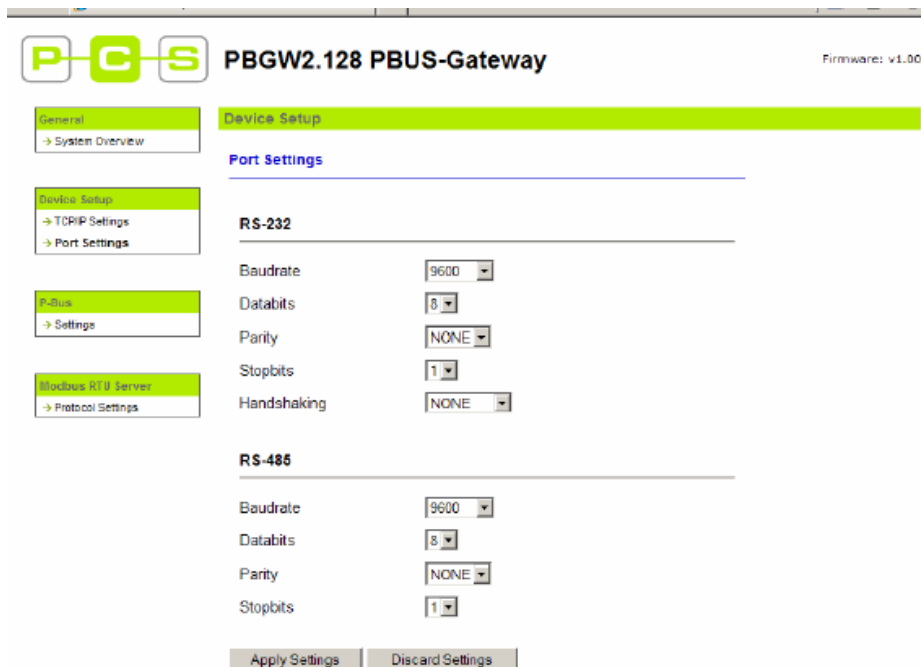
This is an overview window you can see the settings of your Gateway.

- You have to modify the P-Bus settings with left mouse click on P-Bus ->settings tab



Modify P-Bus1 Configured Operating Mode to Master. And Apply the Settings with pressing the button down.

- You have to modify the Port settings with left mouse click on Port settings in Device Setup tab



You can see the necessary values on the picture. Of course you can modify or adapt these values, but you have to set the same into the Modbus communication FBox in the Fupla.

7. And you have to enable the Modbus on RS-485 and set the slave address to 1. Press Apply Settings button to accept the changes.

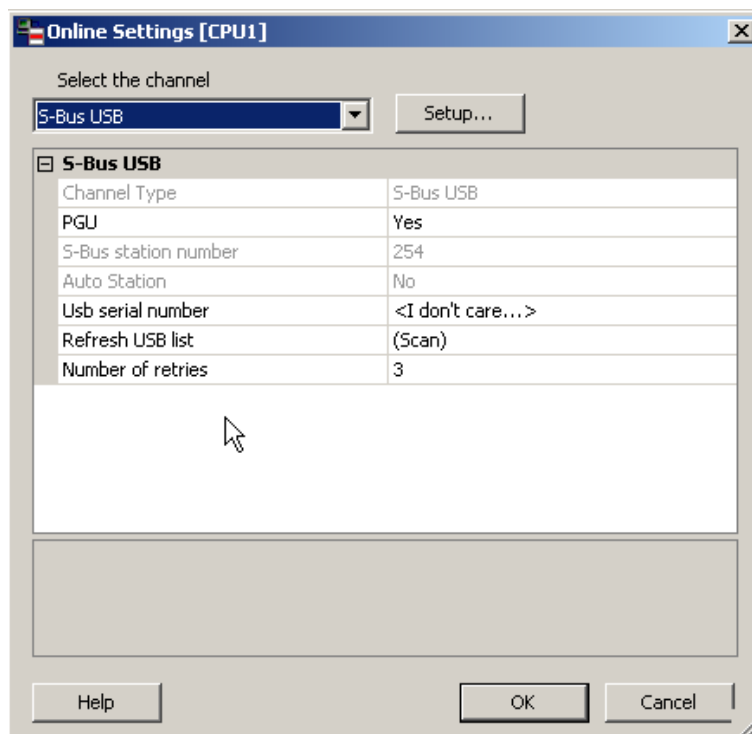


Now the gateway settings are done. You can switch off your browser. Later if your small P-Bus installation is working you can modify other settings to adapt your network to the real installation of yours.

4.3 Settings of PCD3.Mxxxx

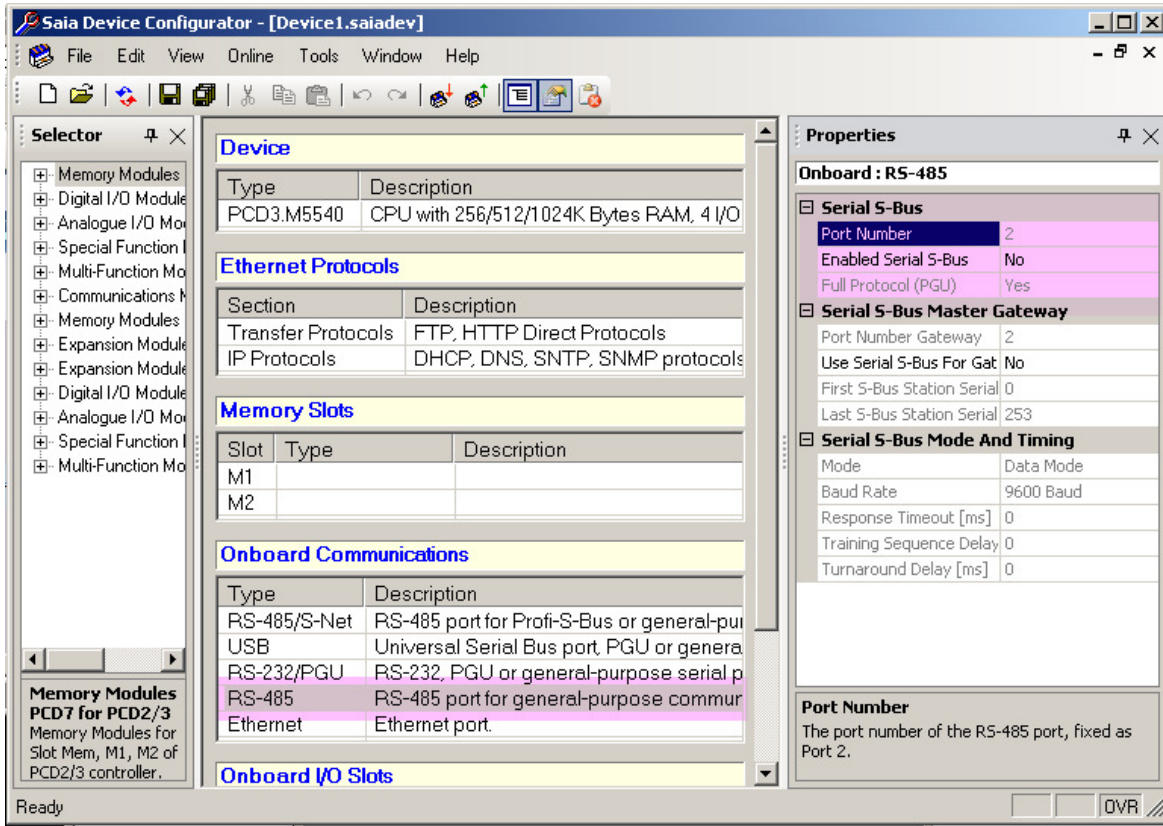
The necessary steps for setting up your PCD3:


1. Check that your PCD is capable of working with P-Bus FBoxes. (You need PCD3.Mxxxx / PCD2.M5xxx: series of PCD with Modbus capable firmware V1.10.16, installed and licensed Saia Modbus library and installed P-Bus library.)
2. Restore the project: P-Bus_Quick_Start_projectxxxx.zip using PG5 Project Manager "Project → Restore menu.
3. Go to the project tree and first check the online settings. The settings should be S-Bus USB with PGU = Yes. If you have other type of connection, like serial PGU, please apply the necessary settings, which are needed for program downloading.



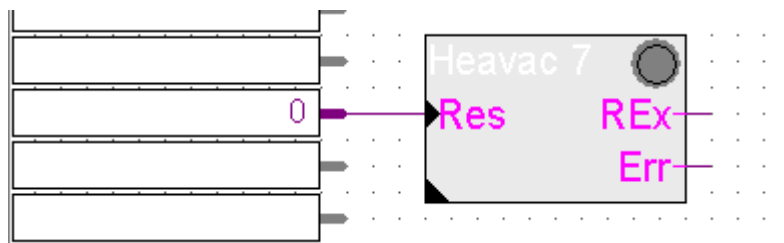
4. Open the Device Configurator and check the important settings like PLC type and PCD memory settings

- Go to the onboard communication tab and check the “RS-485 port for general purpose” settings. Please disable the serial S-Bus support for this port.

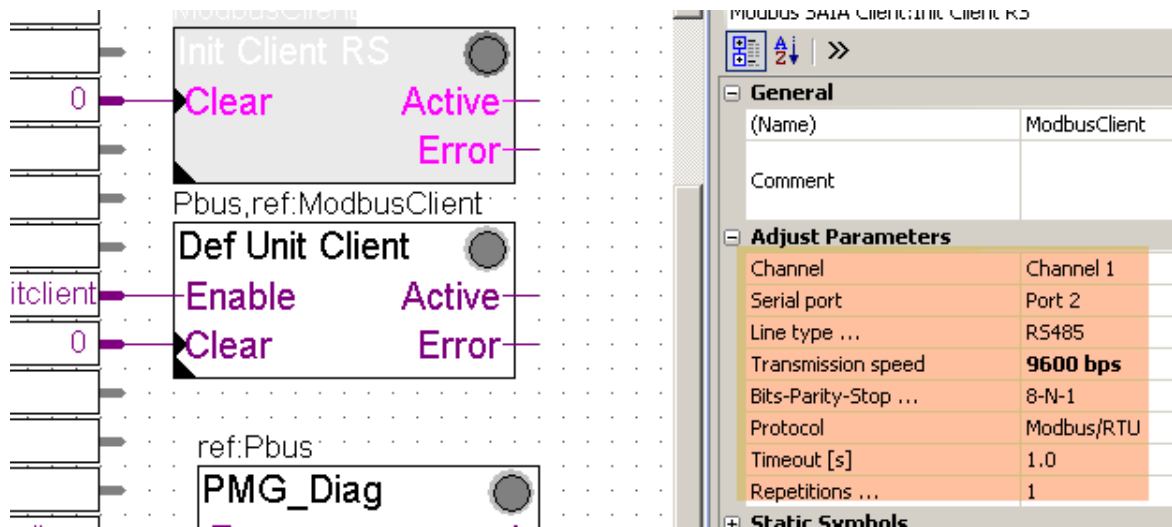


- Download the hardware settings into the PCD with pressing the  button.
- Double Click on to the Build Options tab in the Project Tree and press the “Set Defaults” button of the bottom of the popup window.
- Go to the Fupla program called “**pbus_test_RS485.fup**” and check the pages
- On the first page there are the FBoxes for setting up the serial Modbus communication.
- The FBoxes and their settings:

Heavac Init FBox:



No special settings are needed. The Heavac Init FBox is placed because of some internal functions is used by the P-Bus FBoxes.

Init Client RS FBox:

Channel: Logical channel. If several Client FBoxes are used, each one must use a different channel

Serial Port: is the RS-485 port number of PCD3.Mxxxx. (take care and check which serial port is supported by this Modbus implementation)

Line type: must be RS485

Transmission speed: 9600 bps must be the same settings like in the Persy Gateway

Bits-Parity-Stop: must be 8-N-1 same settings like Persy gateway.

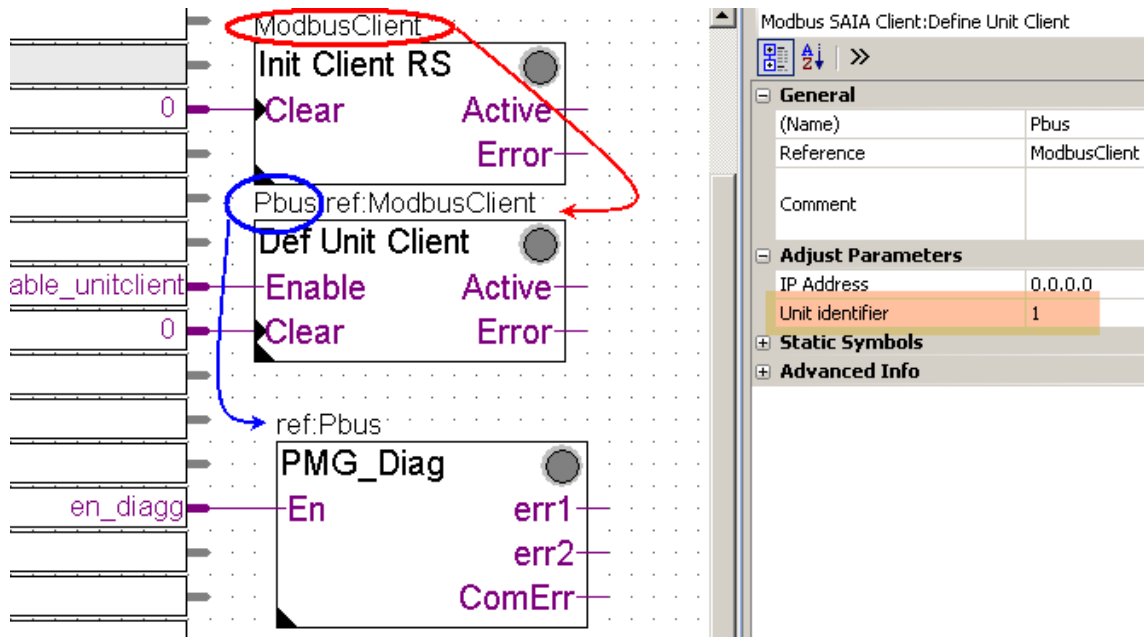
Protocol: Modbus/RTU (Persy Gateway supports Modbus RTU over RS-232, RS485, and TCP/IP)

Timings (Timeout, Repetitions): can be left as default.

If you have large network it is possible that you need different timing. For the right settings please refer to the Modbus user manual. (SFC_Modbus_Classic_V1.5.pdf)

If you are online you can delete the error counter by pressing the clear button in the adjust window.

Def Unit Client FBox:



Reference connection is needed between the Init Client RS FBox and the Def Unit Client FBox.

Reference connection is needed between the Def Unit Client FBox and the following P-Bus FBoxes.

You can change the name of the FBoxes but the reference connection must be kept if not you will get error message during the build.

IP address (192.168.1.254) is not important because we use serial communication.

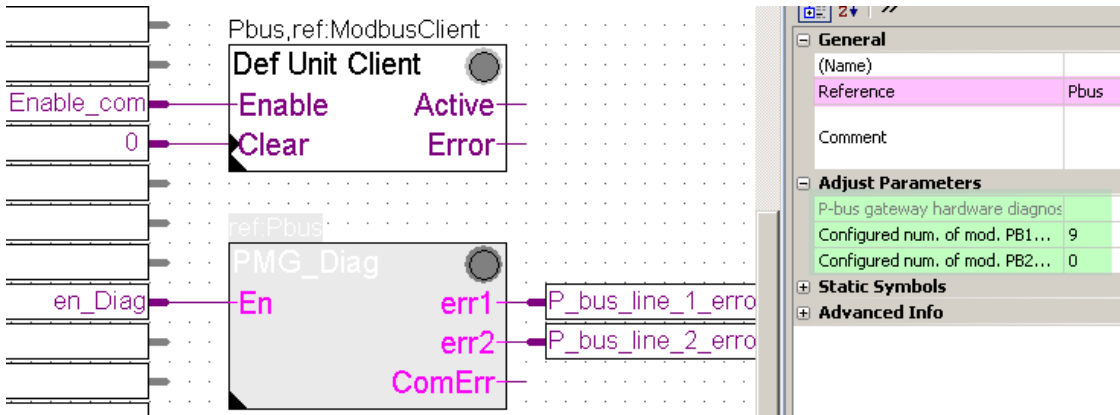
Unit identifier (1) – is used to set the Modbus address of the Gateway (address of the Modbus slave) if you are using RS485 line for the communication with the P-Bus gateway.

If you have several other Modbus slaves on the serial network it is necessary to give different Unit identifier (slave address) to them.

(You must check the firmware revision inside of Persy P-Bus gateway and download firmware 1.01 at least. The older firmware only supports Modbus slave address 1.)

If you are online you can delete the error counter and request counter by pressing the clear buttons in the adjust window.

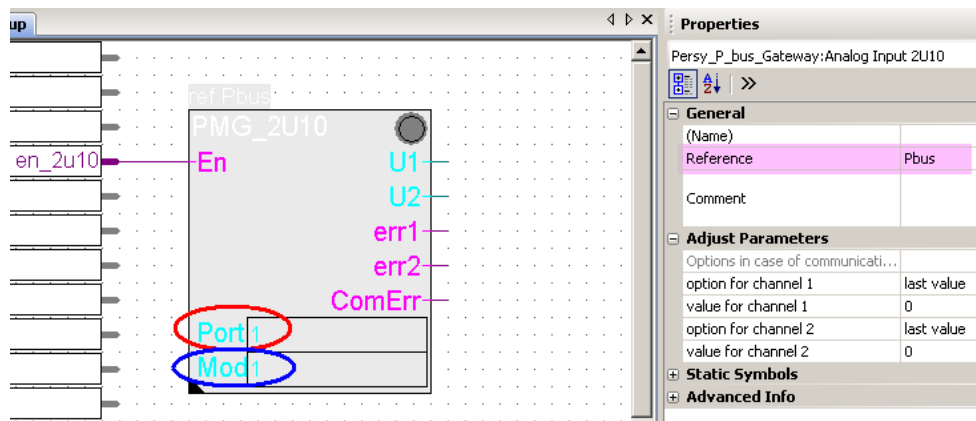
PMG Diag FBox:

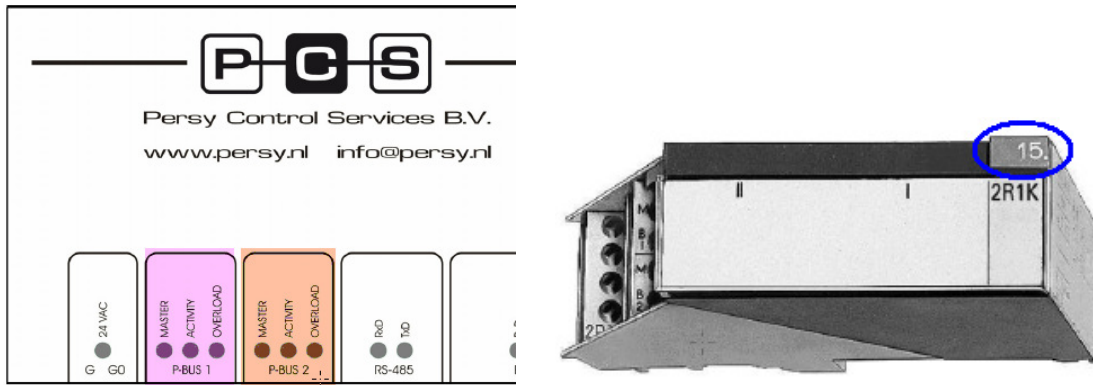


In the FBox it is possible to set up how many P-Bus modules are installed per each P-Bus line.

If the “Configured number of modules” does not match the number of modules recognized by the P-Bus / Modbus gateway the user gets error. If the “Configured number of modules” is set to “0” the error generation is switched off.

11. On the following Fupla pages there can be many different P-Bus FBoxes found. You can use them according to your project. If you need more than one from one kind of P-Bus FBoxes you can place them on, but strictly after the first Fupla page and set up the reference connection. If you place a P-Bus FBox before the first page you will get error message during build because of the faulty reference connection. If you do not need all of the placed P-Bus FBox you can delete the unnecessary ones.
12. It is necessary to set up the **Port** number and **Module** number on the face of every each P-Bus FBoxes. The port number represents the identification number of P-Bus line (1 or 2) of the P-Bus / Modbus Gateway is used to connect the physical P-Bus module to the gateway. The Module number is the address number of the physical P-Bus module. It is possible to read out this number from the address stick plugged into the P-Bus module.





13. After setting up the Port and the Module number of the used P-Bus FBoxes the project is ready to build and download.
14. After the project download the user can go online in the Fupla and can enable the used FBoxes step by step. If every communication parameter and other settings were correct the communication must start between the P-Bus / Modbus gateway and the PCD. If the P-Bus line is correctly installed to the physical P-Bus modules and the modules are correctly installed and put under power the Gateway can read out the information from the physical P-Bus modules and can transfer the data to the PCD and back.

(More information of the Modbus and P-Bus FBoxes you can find in the help.)