SIEMENS

SIMATIC NET

S7-CPs for Industrial Ethernet

Manual Part BL1

Network Gateway IE/PB Link PN IO

6GK1 411-5AB00 Version 1 or higher (Firmware Version V 1.0)



LED displays

Mode selector

IE/PB Link



C-PLUG



Attachment to PROFIBUS:

9-pin D-sub female connector

Attachment to Industrial Ethernet

8-pin RJ-45 jack

Notes on the Product

Product Names:

This description contains information on the product

- IE/PB Link PN IO order no.: 6GK1 411-5AB00

Product Information Accompanying the Product

Note

All the notices in the **Product Information Bulletin** shipped with this device are valid and must be adhered to.

1 Properties and Services

Application

The IE/PB Link PN IO is a gateway that links Industrial Ethernet (management level) and PROFIBUS (cell level / field level).

The IE/PB Link PN IO allows access to all PROFIBUS DP slaves on the subordinate PROFIBUS; DP slaves complying with PROFIBUS DP-V0 are supported and, as of firmware version V2.0, also DP slaves complying with the DP-V1 standard and Siemens DP slaves.

The design of the IE/PB Link PN IO matches the components of the SIMATIC S7-300 range of devices.

You can use the IE/PB Link PN IO in the following modes:

- Gateway as PROFINET IO proxy
- Gateway in standard operation

Services

In these modes, the following communication services are supported:

- Gateway as PROFINET IO proxy

  The IE/PB Link PN IO is an important component for the operation of PROFINET IO. It connects the PROFINET IO controllers to Industrial Ethernet and the PROFINET IO devices (DP slaves to PROFIBUS).

  From the perspective of the PROFINET IO controller on Industrial Ethernet, there is no difference between accessing PROFINET IO devices connected to Industrial Ethernet and PROFIBUS DP slaves connected to PROFIBUS DP.

  The IE/PB Link PN IO takes on the role of a proxy for the DP slaves connected to PROFIBUS DP.

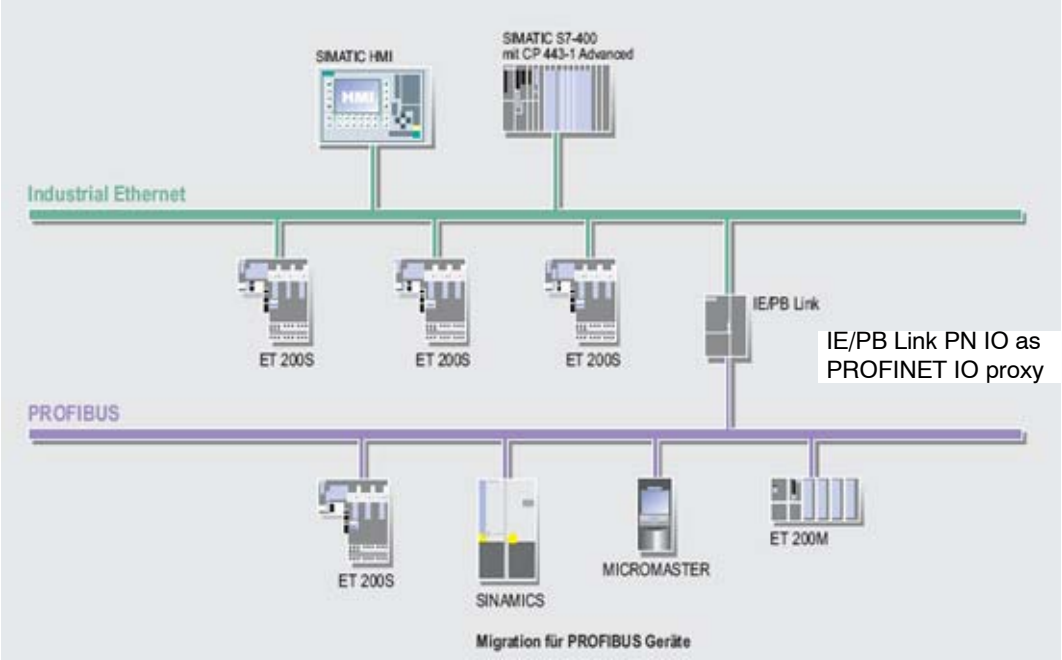


Figure 1-1 Example of Using the IE/PB Link PN IO PROFINET IO Proxy

- Gateway in standard operation
  - PG/OP communication

    PG/OP communication is used to download programs and configuration data, run test and diagnostic functions, and monitor the plant (HMI systems).
  - Assigning parameters to field devices (data record routing)

    You can use the IE/PB Link PN IO as a router for data records intended for field devices (DP slaves). This means that devices that are not directly linked to PROFIBUS and therefore do not have direct access to the field devices (DP slaves), can transfer data to the field devices via the IE/PB Link PN IO.

    The SIMATIC PDM (Process Device Manager) is an example of a tool that creates data records for assigning parameters to field devices.
  - Gateway to a DP master system with constant scan time mode

    The IE/PB Link PN IO serves as a gateway between Ethernet and the field devices of a DP master system. The IE/PB Link PN IO is then operated as an active node along with a DP master on PROFIBUS operating in the constant scan time mode.
  - Cross-subnet S7 connections for HMI operation

    The IE/PB Link PN IO forwards communication over S7 connections. This service is, for example, used with HMI applications (PC stations).

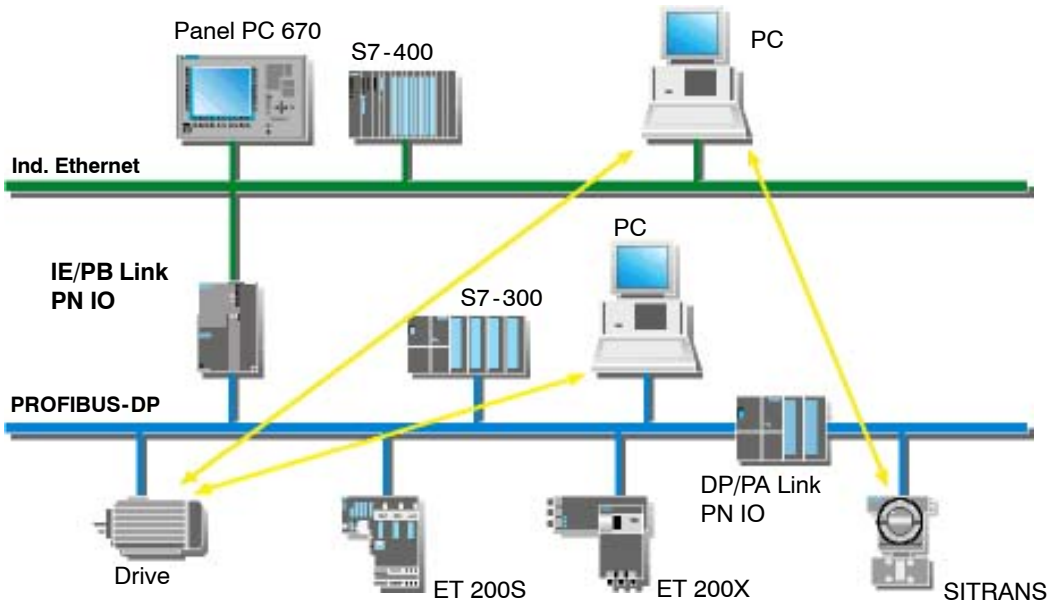


Figure 1-2 Example of Using the IE/PB Link PN IO in the Standard Mode

Further Properties

- Fast Ethernet

  The IE/PB Link PN IO has a 10/100 Mbps half/full duplex port with “Autonegotiation” for automatic switchover.

- Time-of-day synchronization

  If a time master exists on Industrial Ethernet, the IE/PB Link PN IO uses the time frames for time stamping the diagnostic buffer entries and process signals.

  Forwarding time-of-day frames

  The IE/PB Link PN IO can forward the time-of-day frames received from a time transmitter as follows:

  - from Ethernet to PROFIBUS
  - From PROFIBUS to Ethernet

- Downloading firmware

  The IE/PB Link PN IO supports the updating of firmware (FW) with the Firmware Loader.

  A firmware update can be downloaded at any time from the PC/PG via the Ethernet port.

- Option: C-PLUG as exchangeable medium for the project engineering data

  The IE/PB Link PN IO supports storage of the project engineering data on a C-PLUG. This allows simple replacement of a defect module by inserting the C-PLUG in the new module.

- Direct Data Exchange

  The IE/PB LINK PN IO supports direct data exchange between DP slaves in assigned DP master systems. This means that applications with PROFISAFE are also possible.

Configuration

You can configure the IE/PB Link PN IO over Industrial Ethernet or PROFIBUS.

You can perform the project engineering for the IE/PB Link PN IO for all modes over Industrial Ethernet. If you use the device as a standard gateway, it is also possible to change / download the project engineering data over PROFIBUS.

You require the STEP 7 configuration software with a version as shown below:

Table 1-1

Version STEP 7/NCM S7 *)	Functionality of the IE/PB Link PN IO (see also Chapter 8)
V5.3 SP1	The full functionality of the V1.0 firmware can be used.
V5.3 SP2 Hotfix 1 with HSP 1007	The full functionality of a module with firmware version V2.0 can be used.

*) As of V5.3, NCM is automatically part of the basic installation, as of this version no distinction between Ethernet and PROFIBUS is made.

2 Construction

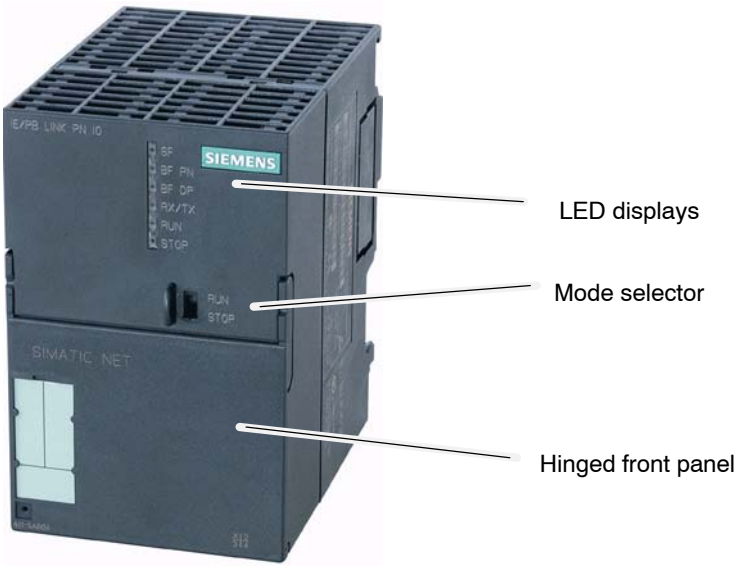


Figure 2-1

The module has been designed to match the components of the S7-300 programmable logic controller and has the following features:

- Double-width module for simple installation in the S7-300 rack
- The control and display elements are all on the front panel; some of the LEDs are behind the hinged front panel.
- No fan necessary

Behind the front panel, you will find:

- 8-pin RJ-45 jack to connect the IE/PB Link to Ind. Ethernet;
- 9-pin D-sub female connector for attaching the IE/PB Link to PROFIBUS
- Further LED displays;
- Slider for setting the chassis ground connection

On the back of the device, there is a slot for an external memory module (C-PLUG); the slot is accessible only after removing the device from the rack.

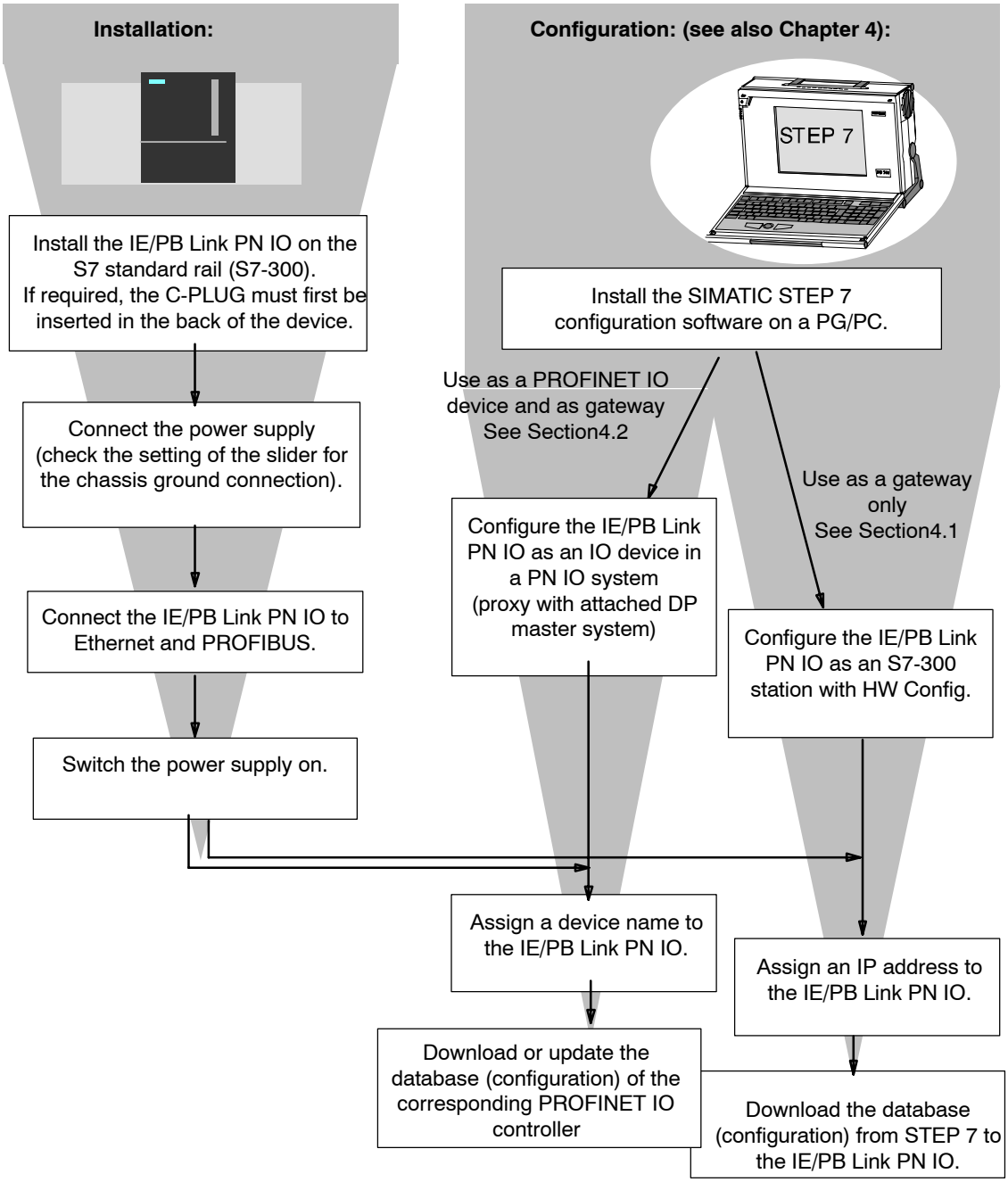
Notice

If you replace the C-PLUG, make sure that the power supply is off!

3 Installation and Commissioning

3.1 How to...

Follow the steps as shown in the graphic below; please make sure that you read the supplementary notes in this section. Installation and configuration can initially be considered as independent procedures.



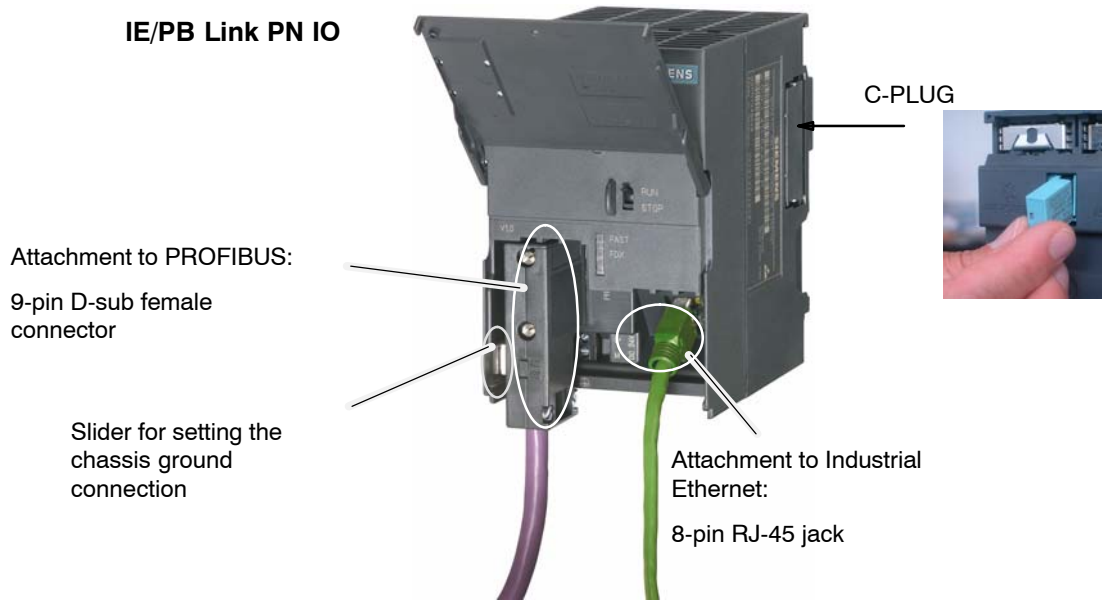


Figure 3-1

Notice

Important notes on installation and operation:

- The module must be installed so that its upper and lower ventilation slits are not covered, allowing adequate ventilation.
- When you fit the device onto the standard S7 rail, make sure it is not inserted in an S7-300 bus connection element.
- The hinged front panel must be kept closed during operation.

Note

You can connect to Ethernet and PROFIBUS even with the power switched on.

Ground/Chassis Ground Concept

Notice

Please keep to the instructions on the grounding and chassis concept in the installation instructions for SIMATIC S7-300/S7-400 LEERER MERKER.

Behind the hinged panel on the left of the device, you will see a slider with which you can connect or disconnect the chassis ground of the 24 V power supply with reference ground.

- Slider pushed in: chassis and reference ground connected (note: the slider must be felt to lock in place).
- Slider pulled out: No connection between chassis and reference ground

When shipped: Slider pushed in

Use a screwdriver to set the slider.

PG/PC Connection

You can connect the PG when configuring the CP as follows:

- via PROFIBUS

  You can only configure the IE/PB Link PN IO via PROFIBUS after it has been assigned its PROFIBUS address. Please follow the instructions for addressing in Chapter 4.

- via Industrial Ethernet

  You can only configure the IE/PB Link PN IO via Industrial Ethernet after it has been assigned its IP address. Please follow the instructions for addressing in Chapter 4.

Module Accessories

The accessories required to connect the IE/PB Link PN IO to an Industrial Ethernet and PROFIBUS LAN (S7 standard rail, power supply) must be ordered extra.

The optional C-PLUG can also be ordered separately.

For more detailed information and ordering data, refer to the Catalog IK PI.

3.2 C-PLUG (Configuration Plug)

C-Plug Removable Memory Medium As an Alternative to Flash Memory

The IE/PB Link PN IO has an internal flash memory for storage of the project engineering data. As an option, the device can be operated with a C-PLUG (configuration plug) removable memory medium.

The IE/PB Link PN IO can be operated with or without a C-PLUG. The existing flash memory is then only used when no C-PLUG is inserted.

If a C-PLUG is inserted, the project engineering data is always stored on it. This simplifies replacement of modules. By simply exchanging the C-PLUG, all the data can be transferred to the replacement module.

Notice

- If a C-PLUG is inserted, that does not contain valid formatting or no valid data for the IE/PB Link PN IO, the IE/PB Link PN IO will not start up! Device status: “STOP with error”.

  In this case, you must reformat the C-PLUG (with NCM diagnostics) or replace it with a C-PLUG containing valid data.
- The C-PLUG may only be inserted for removed when the power is turned off!



Figure 3-2 Fitting a C-PLUG in the IE/PB Link PN IO and Removing a C-PLUG from the IE/PB Link PN IO using a Screwdriver

Working with and without a C-PLUG

The following table provides you an overview of how data is transferred to the C-PLUG. The following situations must be distinguished:

- As shipped - operation without C-PLUG
- A C-PLUG is inserted in a module in the status as shipped
- A C-PLUG is inserted in an already installed module

Table 3-1 Working with and without a C-PLUG

Procedure / Status	Data Transfer	Result after Startup
As shipped - operation without C-PLUG		
• Flash memory empty • No C-PLUG inserted.	Project engineering data is received from the STEP 7 project. The following situations must be distinguished: • Use as Gateway only: Project engineering data transferred by the download function of STEP 7. • Use as PROFINET IO device: Project engineering data transferred from PROFINET IO controller.	The IE/PB Link PN IO starts up with the project engineering data that was transferred to the flash memory. 1)
A C-PLUG is inserted in a module in the status as shipped		
• Flash memory empty • Empty C-PLUG is inserted.	Project engineering data is received from the STEP 7 project. The following situations must be distinguished: • Use as PROFINET IO device: Project engineering data transferred from PROFINET IO controller. • Use as Gateway only: Project engineering data transferred by the download function of STEP 7.	The IE/PB Link PN IO starts up with the project engineering data that was transferred to the C-PLUG. 1)
• Flash memory empty • C-PLUG with project engineering data is inserted. Requirements: Project engineering data must be valid for the IE/PB Link PN IO 2)	Result after startup: The IE/PB Link PN IO starts up with the project engineering data stored on the C-PLUG.	The IE/PB Link PN IO starts up with the project engineering data on the C-PLUG. 1)

Table 3-1 Working with and without a C-PLUG, continued

Procedure / Status	Data Transfer	Result after Startup
C-PLUG is inserted in an already installed module		
• Flash memory with project engineering data • Empty C-PLUG is inserted.	When the IE/PB Link PN IO starts up, the project engineering data are loaded on the C-PLUG from flash memory The project engineering data in flash memory is deleted.	The IE/PB Link PN IO starts up with the project engineering data transferred to the C-PLUG from flash memory. 1)
• Flash memory with project engineering data • C-PLUG with project engineering data is inserted. Requirements: Project engineering data must be valid for the IE/PB Link PN IO 2)	As long as the C-PLUG contains value project engineering data for the IE/PB Link PN IO, this project engineering data is used; The data in flash memory is ignored. The next time the module starts up, internal flash memory is deleted.	Result: The IE/PB Link PN IO starts up with the project engineering data stored on the C-PLUG. 1)

1) Note on use as a PROFINET IO device: Only the device name is stored retentively on the C-PLUG; project engineering data is transferred by the PROFINET IO controller during each startup and stored in volatile memory.

2) Note: If the C-PLUG has no valid project engineering data for the IE/PB Link PN IO, the device will not start up! In this case, please use NCM diagnostics to clarify the situation and, if necessary, to format the C-PLUG.

4 Project Engineering with STEP 7

To connect (initial addressing) and configure the IE/PB Link PN IO, you require the STEP 7 configuration software (see Chapter 1).

NCM S7 is integrated in STEP 7; with NCM S7, you also have direct access to NCM diagnostics over the start menu and the firmware loader (see section 6.2).

Depending on the area of application of the IE/PB Link PN IO, project engineering involves the following steps:

- Use as a PROFINET IO device and as gateway
  - Assigning the device name for the first time
  - Configuring IE/PB Link PN IO a a PROFINet IO device with STEP 7/HW Config; here, a DP master system is assigned to the IE/PB Link PN IO. The configuration data is loaded automatically from the PROFINET IO controller.
- Use as a gateway only
  - Initial Address Assignment
  - Configuring the IE/PB Link PN IO as an S7-300 station with STEP 7/HW Config and downloading the configuration data to the IE/PB Link PN IO.

Notice

You must always “Reset to factory settings” if you want to change the mode of the IE/PB Link PN IO that is already set.

4.1 Use as a PROFINET IO Device and as Gateway

Configuring Properties and Addresses with STEP 7

To provide the IE/PB Link PN IO with address information and further parameters, you must create a loadable database (configuration) in STEP 7.

How to...

...**to configure the IE/PB Link PN IO as PROFINET IO device with STEP 7/HW Config:**

1. Start with an existing STEP 7 project in which you have already created a PROFINET IO controller, for example an S7-400 station with a CP 443-1 Advanced.
2. Double-click the station you have created to open the hardware configuration

tool HW Config.

3. Take the device type gateway IE/PB Link PN IO from the hardware catalog under PROFINET IO and insert this as an IO device in the PN IO system of the IO controller. For the interface in the PROFINET IO system, an IP address is assigned automatically. STEP 7 also assigns the IE/PB Link PN IO a device number. The highest free device number in the current PROFINET IO system is selected.

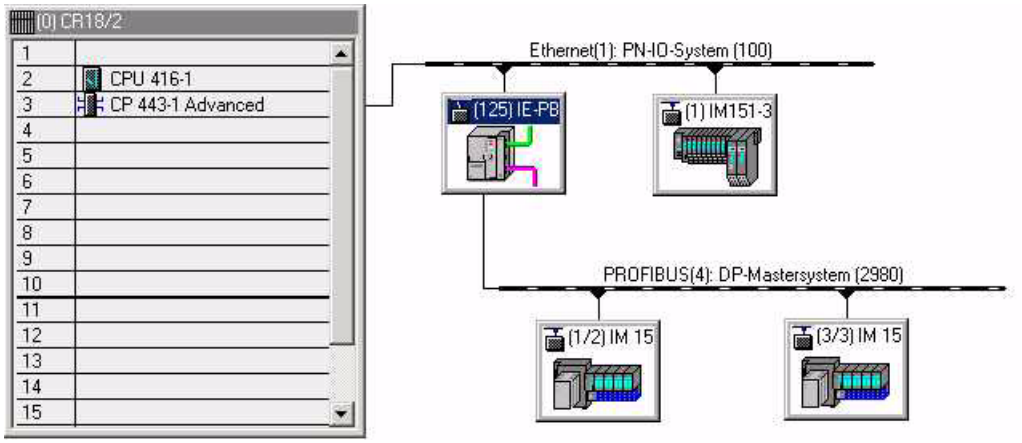
...to connect the PROFIBUS subnet in your STEP 7 project:

4. After taking the IE/PB Link PN IO from the hardware catalog, you will be prompted to network the IE/PB Link PN IO over the PROFIBUS interface.

   If you have not yet created the required subnets, you can do this now by selecting the relevant entry. This creates a DP master system.

Results:

- The IE/PB Link PN IO is created as a PROFINET IO device with a DP master system



5. Set any other properties of the IE/PB Link PN IO. For more detailed information, please refer to the online help in STEP 7.
6. Configure the DP master system with its DP slaves (for further information, refer to the online help).

   Note:
   With the IE/PB Link PN IO, the DP master system is assigned to the PROFIBUS submodule. If you want to create a new DP master system, you must therefore first select the PROFIBUS submodule.