SIEMENS

SIMATIC NET

Industrial Ethernet / PROFIBUS IE/PB LINK PN IO

Operating Instructions

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04/2019

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Legal information

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Preface

Validity of this manual

This document contains information on the following product:

IE/PB LINK PN IO
Article number 6GK1 411-5AB10
Hardware product version 1
Firmware version V3.1

Link between Industrial Ethernet and PROFIBUS with PROFINET IO functionality



IE/PB LINK PN IO without bus adapter



IE/PB LINK PN IO with bus adapter

On the front of the housing, you will see the firmware version and the hardware product version printed as a placeholder "X". If the printed text is, for example, "X12 / 3Y4", X is the placeholder for hardware product version 1.

Product names and abbreviations

- LINK

  In this document, the name "LINK" is used in place of the full product name "IE/PB LINK PN IO".

- STEP 7

  The short form of the configuration tool is used for the following products:

  – STEP 7 V5.x

  – STEP 7 Professional

  The short form "STEP 7" is used only when the product is self explanatory in the context.

- PST

  Primary Setup Tool

  As an alternative to STEP 7, you can use the PST to configure the address and PROFINET parameters.

Purpose of the manual

This manual describes the properties of this module and supports you when installing and commissioning it.

The required configuration steps are described as an overview and there are explanations of the relationship between firmware functions and configuration.

You will also find information about the diagnostics options of the device.

Cross references

In this manual there are often cross references to other sections.

To be able to return to the initial page after jumping to a cross reference, some PDF readers support the command <Alt>+<Left arrow>.

New in this release

- New firmware version
- New ATEX/IECEx approval
- Expansion of BusAdapter accessories
- Support of the DP/PA LINK behind the IE/PB LINK PN IO
- Support of the DP/FF LINK behind the IE/PB LINK PN IO

Replaced edition

Edition 11/2017

Current manual release on the Internet

You will also find the current version of this manual on the following Internet page of Siemens Industry Online Support:

Link: (https://support.industry.siemens.com/cs/ww/en/ps/15406/man)

Requirements for use of the module

You will find the requirements for using the module in the section Requirements for use (Page 19).

Innovations and compatibility with the previous version (6GK1 411-5AB00)

You will find the functions of the module in the section Communication services and other properties (Page 15).

Note

Make sure that you read the information relating to enhanced functions and restrictions in the section Replacing a module (Page 75).

Required experience

To install, commission and operate the LINK, you require experience in the following areas:

- Automation engineering
- STEP 7 V5.x / STEP 7 Professional

Sources of information and other documentation

You will find an overview of further reading and references in the Appendix Documentation references (Page 93).

License conditions

Note

Open source software

The product contains open source software. Read the license conditions for open source software carefully before using the product.

You will find license conditions in the following document on the supplied data medium:

- OSS_IEPB-LINK_86.pdf

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

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Link: (http://www.siemens.com/industrialsecurity)

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
Link: (http://www.siemens.com/industrialsecurity)

Firmware

The firmware is signed and encrypted. This ensures that only firmware created by Siemens can be downloaded to the device.

SIMATIC NET glossary

Explanations of many of the specialist terms used in this documentation can be found in the SIMATIC NET glossary.

You will find the SIMATIC NET glossary on the Internet at the following address:

Link: (https://support.industry.siemens.com/cs/ww/en/view/50305045)

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Application and properties

1

1.1 Application, modes and operating modes

Basic function

The LINK is a gateway that connects the two network types Industrial Ethernet and PROFIBUS.

The LINK allows access to all PROFIBUS nodes connected to the underlying PROFIBUS network.

The LINK has the design of the SIMATIC ET 200SP device family.

Modes

You can use the LINK in the following modes:

- **PROFINET IO proxy**
- **Standard mode (gateway)**

You specify the mode in the configuration. For the "PROFINET IO proxy" mode, you need to configure the LINK as a PROFINET IO device. This procedure is described in the section Configuration and operation (Page 47).

Note

Changing the mode with Clear/Reset

If you want to change the configured mode of the LINK, you need to clear/reset the LINK.

Note that this deletes the configuration data, see also the section Clearing and for resetting to factory settings (Page 72).

Gateway as PROFINET IO proxy

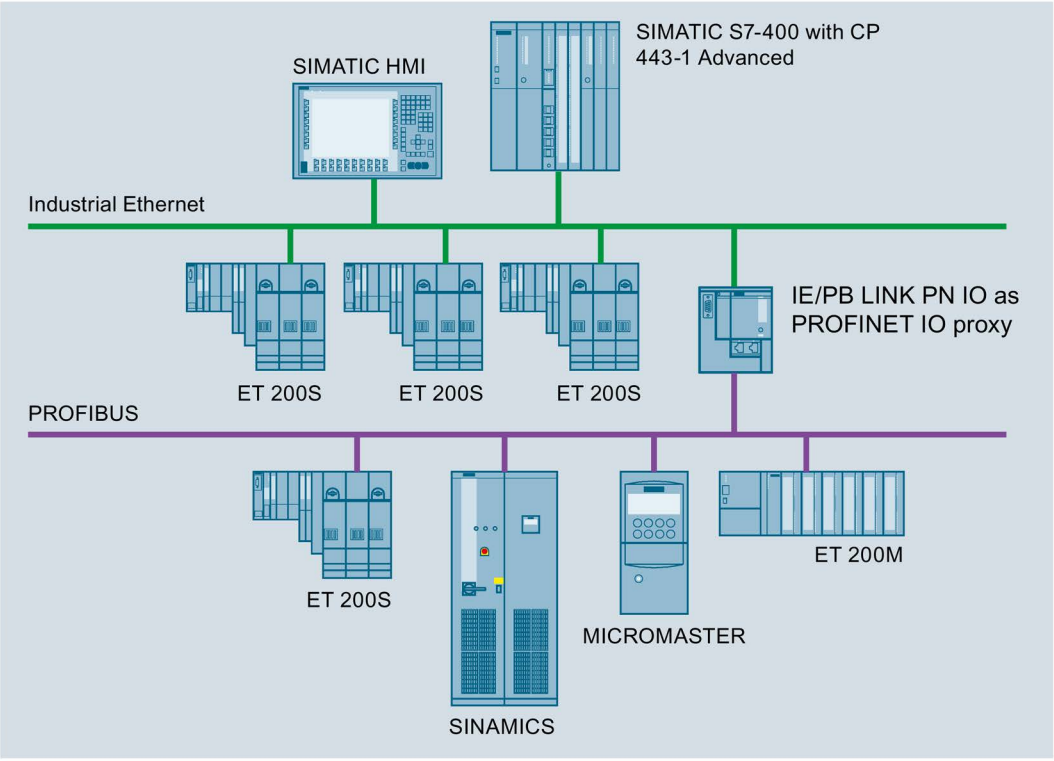


Figure 1-1 IE/PB LINK PN IO as PROFINET IO proxy

The LINK provides the connection between a PROFINET IO controller on Industrial Ethernet and PROFIBUS slaves visible as PROFINET IO devices via the LINK.

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

The LINK adopts the role of a proxy for the DP slaves connected to PROFIBUS.

As a PROFINET IO proxy, the LINK supports among other things the following functions:

- PG/OP communication, e.g. for loading programs and configuration data.
- Data record routing, among other things, for configuring field devices, for example with SIMATIC PDM.
- Gateway to a DP master system
- S7 routing

Gateway in standard operation

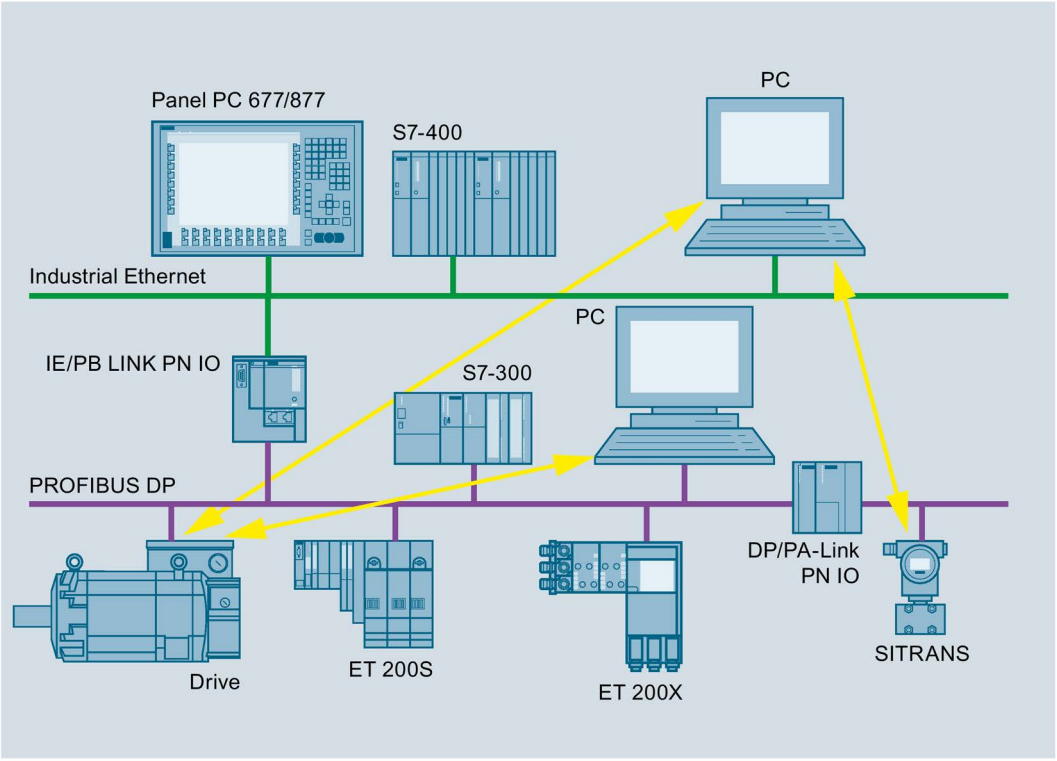


Figure 1-2 IE/PB LINK PN IO as gateway in standard operation

In standard operation, the LINK supports the following functions:

- PG/OP communication, e.g. for loading programs and configuration data.
- Data record routing, among other things, for configuring field devices, for example with SIMATIC PDM.
- Gateway to a DP master system
- S7 routing

You will find further details about the functions in the below.

Operating modes

The LINK has two operating modes:

- **Normal mode**

  This is the mode that the LINK adopts during normal operation both in PROFINET IO proxy and in standard mode.

- **Maintenance mode**

  Functions that can only be executed in maintenance mode:

  – Firmware download

  – Restart

  – Resetting to factory settings

Maintenance mode

Access to the three functions of the maintenance mode depends on how the LINK is set to the maintenance mode.

- **Maintenance mode after startup**

  After startup the LINK is in maintenance mode for 10 seconds and then changes automatically to normal mode. In this status only the following function can be executed:

  – Loading firmware

- **Maintenance mode by pressing the button**

  After pressing the button the LINK is in maintenance mode for 5 minutes. The following functions are possible:

  – Restart

  – Resetting to factory settings

  To change from normal mode to maintenance mode using the button, refer to the section Maintenance mode (Page 30).

1.2 Communication services and other properties

Communication services

Industrial Ethernet

- **PROFINET IO**

  The LINK can be configured as an IO device.

- **IP configuration - IPv4**

  The essential features of IP configuration for the LINK:

  – The LINK supports IP addresses according to IPv4.

  – Address assignment:

    The IP address, the subnet mask and the address of a gateway can be set manually in the configuration.

    As an alternative, the IP address can be obtained from a DHCP server or by other means outside the configuration.

- **Media redundancy (MRP)**

  Within an Ethernet network with a ring topology, the LINK supports the media redundancy protocol MRP. You can assign the role of "Client" to the LINK.

- **SNMP**

  As an SNMP agent, the LINK supports data queries using SNMP (Simple Network Management Protocol).

  For more detailed information, refer to section SNMP (Page 77).

- **LLDP**

  The LINK supports the Link Layer Discovery Protocol.

PROFIBUS

- **Supported slaves:**

  – Slaves according to DP V0

  – Slaves according to DP V1

  – DP/PA LINK behind the IE/PB LINK PN IO

  – DP/FF LINK behind the IE/PB LINK PN IO

- **Direct data exchange**

  The LINK supports direct data exchange in its own DP Master system and in multimaster systems.

- **PROFISAFE**

  The LINK supports applications with PROFISAFE.

- **Gateway to a DP master system**

  The LINK serves as a gateway between Ethernet and PROFIBUS. The LINK is operated as an active node on a PROFIBUS network.

- **Data record gateway**

  Field device parameter assignment (data record routing)

  You can use the LINK as a router for data records intended for PROFIBUS nodes.

  Devices that are not directly attached to PROFIBUS and that therefore do not have direct access to the PROFIBUS nodes can transfer data records to the field devices via the LINK, e.g. via SIMATIC PDM (Process Device Manager).

Other services and properties

- **MPI networking (only in standard operation)**

  The LINK can be selected as a gateway in standard operation between an MPI subnet and an Ethernet subnet.

  To do this, you need to network the PROFIBUS interface of the LINK with the MPI subnet.

- **PG/OP communication**
  - Loading programs and configuration data
  - Running test and diagnostics functions
  - Operator control and monitoring (HMI systems) of a system.

- **S7 routing**

  Cross-subnet S7 connections, for example for HMI operation.

  The LINK forwards communication via S7 connections. This service is used, for example, by HMI applications (PC stations).

- **Time synchronization**

  The LINK supports time synchronization using the following methods:
  - SIMATIC mode
  - NTP

  The LINK uses the synchronized time-of-day, for example for forwarding and time stamping diagnostics buffer entries.

- **Firmware update**

  The LINK supports firmware updates using the firmware loader. A firmware file can be loaded from a PC/PG via PROFIBUS, see section Loading firmware (Page 73).

- **C-PLUG as exchangeable storage medium for configuration data**

  The LINK supports storage of configuration data on the optional exchangeable storage medium C-PLUG. This simplifies replacement of a defective module by simply inserting the C-PLUG in the new module.

- **Independent of media**

  The LINK supports the connection of bus adapter modules of the ET 200SP device family, for example for connecting to optical networks.

- **Redundant power supply**

  The LINK can be connected to a redundant power supply.

1.3 Performance data

1.3.1 Characteristics of S7 communication

Table 1- 1 Number of connections for S7 communication

Characteristic	Explanation / values
Maximum number of S7 connections / HMI connections	32 For the S7 communication both configured and unconfigured S7 connections are used.

1.3.2 Characteristics of data record routing

Field device parameter assignment (data record routing)

You can use the LINK as a router for data records intended for field devices (PROFIBUS nodes):
Devices that are not connected directly to PROFIBUS and therefore have no direct access to the field devices can send data records to the field devices for example via the LINK using the SIMATIC PDM (Process Device Manager).

The function is enabled as default.

Characteristic	Explanation / values
Maximum number of connections to the PROFIBUS nodes	32
Maximum data record size for parameters sent to PROFIBUS nodes via a connection	244 bytes

1.3.3 Total number of connections

Characteristic	Explanation / values
Maximum number of: • S7 connections • HMI connections • Data record routing connections	In total 48 in any combination

Note

Note that for every S7 connection used a TCP/IP connection is occupied on industrial Ethernet.

1.3.4 Characteristic data for PROFINET IO

Table 1- 2 Number of connections for PROFINET IO

Characteristic	Explanation / values
Maximum number of DP slaves assigned to the LINK (DP Master). (PROFINET IO devices)	64
Maximum number of DP inputs	2048 bytes
Maximum number of DP outputs	2048 bytes

1.3.5 Characteristic data of the C-PLUG

Usable C-PLUGs

The LINK can be operated with the following C-PLUGs:

- **C-PLUG 32**

  Memory:

  – Total capacity: 32 MB

  – Free capacity available: 30 MB

- **C-PLUG 256**

  Memory:

  – Total capacity: 256 MB

  – Free capacity available: 126 MB

Recommendation: Avoid writing data cyclically. The flash area allows a limited number of write cycles.

You will find details in the section C-PLUGs (Page 92).

1.3.6 Update time for parallel operation of PROFINET IO with other services

Dependent on the number of PROFINET IO devices operated in the same Ethernet subnet:

STEP 7 automatically sets the lowest possible value for the update time for the IO devices.

When necessary configure the update time for the IO devices via the properties of the PROFINET interface in STEP 7:

- STEP 7 V5.x

  "IO Cycle"

- STEP 7 Basic / Professional

  "Advanced options" > "Real time settings"

Configuring a higher update time

In the following cases, configure a higher update time:

- Alongside the cyclic communication via PROFINET IO, you use non-cyclic communications services, e.g. S7 connections, data record routing, HMI connections.
- Diagnostics or alarm frames occur often in the DP Master system.

Note

Do not set the shortest possible update time

In parallel operation do not set the shortest possible update time but select the next higher value proposed by STEP 7.

1.4 Requirements for use

Configuration and downloading

You can configure the LINK for all modes via Industrial Ethernet. If you use the device as a gateway in standard operation, it is also possible to download the configuration data via PROFIBUS.

STEP 7 versions

Below you will find the STEP 7 products required to configure the LINK. If both STEP 7 V5.x as well as STEP 7 Basic / Professional are named, one of the two products can be used as an alternative.

STEP 7 versions	Function
STEP 7 V5.3 SP1	LINK with article number 6GK1 411-5AB00 The functionality of firmware version V1.0 can be used.
• STEP 7 V5.3 + SP2 + Hotfix 1 + HSP 1007 • STEP 7 Basic / Professional V11	LINK with article number 6GK1 411-5AB00 The functionality of firmware version V2.x can be used.
• STEP 7 V5.5 + SP4 + Hotfix 11 + HSP 1101 • STEP 7 Basic / Professional V14 + Update 1 + Support package 0192	LINK with article number 6GK1 411-5AB10 The functionality of firmware version V3.0 can be used.
• STEP 7 V5.6 + SP1 + HSP 1107 • STEP 7 Basic / Professional V15.1	LINK with article number 6GK1 411-5AB10 The functionality of firmware version V3.1 can be used.

Downloading the support package / HSP from the Internet

You will find the HSP or support package on the following Internet pages of Siemens Industry Support.

- STEP 7 V5.x

  Link: (https://support.industry.siemens.com/cs/ww/en/view/23183356)

- STEP 7 Basic / Professional

  Link: (https://support.industry.siemens.com/cs/ww/en/ps/14667/dl)

Installation of Hardware Support Packages

- STEP 7 V5.x

  Install the HSP in STEP 7 / HW Config with the "Options" > "Install Hardware Updates" menu command.

  You will find information in the online help: Keyword "HSP" or "Hardware update").

  After installing an HSP, you need to close and restart STEP 7.

- STEP 7 Basic / Professional

  Install the support package in STEP 7 from the file system of the engineering station using the menu command "Options" > "Support packages".

  The information system of STEP 7 will provide you with information: Keyword "Support packages".

Primary Setup Tool (PST)

Version V4.2.1 is required for configuration with the PST.

You can download the current version from the pages of Siemens Industry Support:

Link: (https://support.industry.siemens.com/cs/ww/en/view/19440762)

LEDs, connectors, buttons

2

2.1 LED displays of the LINK

LEDs of the module

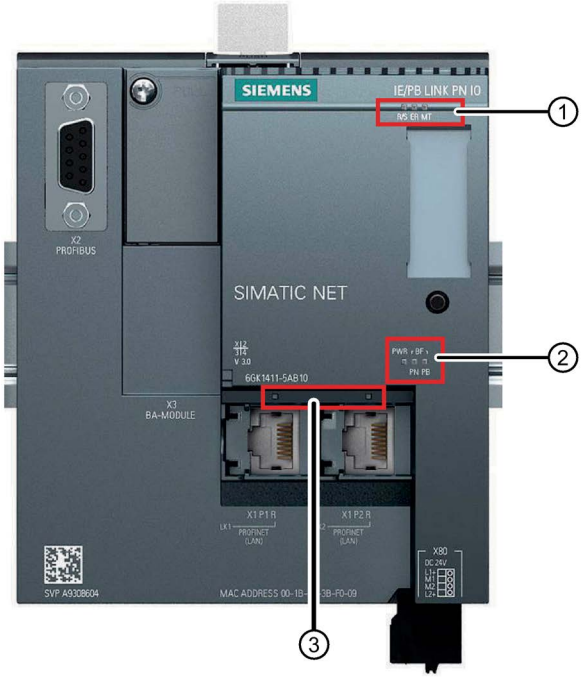


Figure 2-1 LEDs of the IE/PB LINK PN IO

The module has the following LED groups for displaying the status:

No.	LED	Meaning
①	Top LED strip	The LEDs show the basic statuses, see table below,
②	Lower LED strip	
③	Connection status LEDs (LK1 / LK2)	Status of the connection to Ethernet / PROFINET The LEDs of the Ethernet ports are lit only when no bus adapter is plugged in.

Table 2- 1 Top LED strip ① - basic statuses

LEDs / colors	Name	Meaning
	R/S	Operating status of the LINK (RUN/STOP)
	ER	Error
	MT	Maintenance

Table 2- 2 LED strip ② - basic statuses

LEDs / colors	Name	Meaning
	PWR	Power supply
	BF PN	PROFINET bus error
	BF PB	PROFIBUS bus error

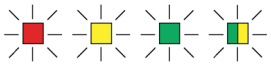
Table 2- 3 LEDs of the Ethernet ports ③

LED / color	Name	Meaning
	LK1 / LK2	Status of the connection to Ethernet/PROFINET (When using a TS a us adapter "LK1 / LK2" are disabled.)

Display of the operating and communications statuses

The LED symbols in the following tables have the following significance:

Table 2- 4 Meaning of the LED symbols

Symbol				-
LED status	OFF	ON (steady light)	Flashing	LED status not relevant

The LEDs indicate the operating and communications status of the module according to the following scheme:

Table 2- 5 Display schemes for detailed module statuses

R/S (yellow / green)	**ER** (red)	**MT** (yellow)	**PWR** (green)	**BF PN** (red)	**BF PB** (red)	**LK1/LK2 *** (green)	**Meaning**
Startup, operating statuses, errors							
■	■	■	■	■	■	-	Turn on (lamp test)
✳	-	-	■	-	-	-	Starting up (STOP → RUN)
-	-	■	■	-	-	✳	Finding modules on Ethernet (LK1/LK2 flashes slowly, only during startup)
■	■	-	■	□	□	-	• Distribution of the PROFINET configuration data during startup • Bus adapter configured but not plugged in. • Bus adapter plugged in but not configured.
■	■	-	■	■	■	-	• Reset to factory settings • Status following a memory reset • Device new and started up
■	□	-	■	□	□	-	Running (RUN) without error
✳	-	-	■	-	-	-	Stopping (RUN → STOP)
■	□	-	■	□	□	-	Stopped (STOP)
■	■	-	■	-	-	-	Stopped (STOP) with error
✳	✳	✳	■	✳	✳	-	Module fault / system error
Operating statuses, error (PROFIBUS and Ethernet)							
■	□	-	■	□	□	■	Running (RUN), Ethernet connection at port, no data traffic
■	■	-	■	□	□	-	Running (RUN), problem with a module (DP slave)
■	■	-	■	□	✳	-	Running (RUN), module missing on PROFIBUS or is incorrectly configured (does not apply to PROFINET IO).

R/S (yellow / green)	**ER** (red)	**MT** (yellow)	**PWR** (green)	**BF PN** (red)	**BF PB** (red)	**LK1/LK2 *** (green)	**Meaning**
■	■	-	■	✳	✳	-	Running (RUN) with error: • Error on PROFIBUS that also affects PROFINET IO (e.g. IO device). • Error on PROFINET IO that also affects PROFIBUS (e.g. proxy not put into operation).
■	■	-	■	■	-	-	Running (RUN) with error. • Error on PROFINET IO No logical or physical connection to the PROFINET IO controller.
■	■	-	■	✳	-	-	Running (RUN) • No module on PROFIBUS.
■	■	-	■	-	■	-	Running (RUN) • Problems on PROFIBUS • No PROFIBUS configuration to match system
Maintenance mode Firmware download , Reset							
✳	□	□	■	□	□	□	Maintenance mode (after startup) Ready to load a firmware file via PROFIBUS. See section Loading firmware (Page 73).
✳	■	■	■	□	□	□	Error loading firmware Status after failed firmware update
✳	□	□	■	□	□	□	When downloading firmware via PROFIBUS: Firmware is loaded after the restart.
✳	□	□	■	□	□	□	Loaded firmware not activated.
-	-	✳	■	-	-	-	Maintenance mode (after pressing the button)

R/S (yellow / green)	ER (red)	MT (yellow)	PWR (green)	BF PN (red)	BF PB (red)	LK1/LK2 * (green)	Meaning
-	-	☐	■	-	-	-	Maintenance demanded: • Problem with redundant power supply • C-PLUG not detected or incorrectly formatted • Program is adopted after restart, (Note: After plugging in a C-PLUG after a memory reset a second restart is necessary.) • Duplicate database (internal memory and C-PLUG)

***** The LEDs LK1/LK2 flash very quickly when there is data traffic. When there is a high load. It may not be possible to distinguish the flashing from steady light.
The LEDs LK1/LK2 are also used for the node flash test.

Note

LEDs LK1/LK2 turned off when bus adapters are connected

If bus adapters are connected to the LINK for the Ethernet connection, the LEDs LK1/LK2 of the LINK are turned off.

In this case, the LEDs of the bus adapter need to be evaluated, see section LED displays of the bus adapter (Page 27).

2.2 LED displays of the bus adapter

Table 2- 6 Display scheme of the bus adapter "BA 2xRJ45"

LK1	LK2	Meaning
■	-	Ethernet connection at port 1, no data traffic
✳	-	Data traffic at port 1
☐	-	No Ethernet connection at port 1
-	■	Ethernet connection at port 2, no data traffic
-	✳	Data traffic at port 2
-	☐	No Ethernet connection at port 2

Table 2- 7 Display scheme of the optical bus adapter "BA 2xSCRJ"

LK1	LK2	MT1	MT2	Meaning
■	-	-	-	Ethernet connection at port 1, no data traffic
✳	-	-	-	Data traffic at port 1
□	-	-	-	No Ethernet connection at port 1
-	■	-	-	Ethernet connection at port 2, no data traffic
-	✳	-	-	Data traffic at port 2
-	□	-	-	No Ethernet connection at port 2
-	-	■	-	Maintenance demanded port 1
-	-	□	-	Port 1 without maintenance demand
-	-	-	■	Maintenance demanded port 2
-	-	-	□	Port 2 without maintenance demand

2.3 Interfaces, bus adapters, buttons

Interfaces X1 and X2

You will find the technical specifications and assignment of the Ethernet interface X1 and the PROFIBUS interface X2 in the section Technical data (Page 79).

Interface X3 for for bus adapter

At the top right beside the PROFIBUS interface, there is the interface X3 for bus adapters of the ET 200SP device family.

As an alternative, you can use this interface for connection to Ethernet if, for example, you require an optical connection to the LINK.

The interface is constructed in the ET 200SP design and pin assignment.

You will find further information in the catalog, in Siemens Industry Mall and in the system manual of the ET 200SP, see /4/ (Page 94) and in the appendix BusAdapter (Page 89).

For information on configuring the bus adapters in STEP 7 V5 refer to the section Configuring bus adapters (Page 58).

For information on configuring the bus adapters in STEP 7 Professional refer to the section Configuring bus adapters (Page 61).

Note

Deactivated Ethernet interface

When you plug in a bus adapter, the ports X1P1R / X1P2R of the integrated Ethernet interface of the LINK are deactivated.

Button

WARNING

EXPLOSION HAZARD

Do not press the button if there is a potentially explosive atmosphere.

The button serves the following purposes:

- Changeover to maintenance mode
- Restart

  After the restart a new firmware file can be loaded, see section Loading firmware (Page 73).
- Resetting to factory settings

For information on using the button and changing to the maintenance mode see the section Maintenance mode (Page 30).

2.4 X80: External power supply

External power supply

The connector X80 (socket) for the external 24 VDC power supply is located on the bottom of the LINK. The external power supply is redundant (optional use).

The power supply is connected to the LINK with the supplied 4-pin plug-in terminal block. The plug-in terminal block is designed so that it can only be inserted in one position in the X80 socket of the LINK.

The connector X80 has electronic reverse polarity protection.

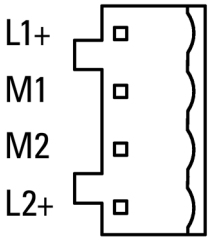


Figure 2-2 Redundant power supply

Table 2- 8 Pin assignment of the socket for the power supply

Labeling	Function
L1+	24 V DC
M1	Reference ground
M2	Reference ground
L2+	24 VDC

For information on the connector, refer to the section "Installing and connecting up the LINK (Page 38)".

You will find further data on the power supply in section Technical data (Page 79).

2.5 Maintenance mode

Changing to the maintenance mode using the button

The functions of the maintenance mode are obtained as follows:

Table 2- 9 Functions of the maintenance mode

Operating mode before pressing the button	Pressing the button	Effect
Normal mode	Press the button for 3 seconds	The LINK changes to maintenance mode You can use the following functions: • Restart • Resetting to factory settings Without any further actions, the LINK returns to the normal mode after 5 minutes.
Maintenance mode	Press the button for 1 second	The maintenance mode is extended by 5 minutes.

Operating mode before pressing the button	Pressing the button	Effect
Maintenance mode	Press the button twice briefly within 5 seconds	The LINK restarts. Following this the LINK remains ready for new firmware for 10 seconds, see also section Loading firmware (Page 73).
Maintenance mode	Press the button for at least 10 seconds	The LINK is reset to the factory settings. Note that configuration data is deleted when you reset, refer to the section Clearing and for resetting to factory settings (Page 72).

Installation, connecting up, commissioning 3

3.1 Important notes on using the device

Safety notices on the use of the device

Note the following safety notices when setting up and operating the device and during all associated work such as installation, connecting up or replacing the device.

Overvoltage protection

NOTICE
Protection of the external power supply If power is supplied to the module or station over longer power cables or networks, the coupling in of strong electromagnetic pulses onto the power supply cables is possible. This can be caused, for example by lightning strikes or switching of higher loads. The connector of the external power supply is not protected from strong electromagnetic pulses. To protect it, an external overvoltage protection module is necessary. The requirements of EN61000-4-5, surge immunity tests on power supply lines, are met only when a suitable protective element is used. A suitable device is, for example, the Dehn Blitzductor BVT AVD 24, article number 918 422 or a comparable protective element. Manufacturer: DEHN+SOEHNE GmbH+Co.KG Hans Dehn Str.1 Postfach 1640 D-92306 Neumarkt, Germany

3.1.1 Notices on use in hazardous areas

⚠ WARNING
The device may only be operated in an environment with pollution degree 1 or 2 (see IEC 60664-1).

⚠ WARNING
EXPLOSION HAZARD Do not press the button if there is a potentially explosive atmosphere.

WARNING

EXPLOSION HAZARD

DO NOT OPEN WHEN ENERGIZED.

WARNING

The equipment is designed for operation with Safety Extra-Low Voltage (SELV) by a Limited Power Source (LPS).

This means that only SELV / LPS complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 must be connected to the power supply terminals. The power supply unit for the equipment power supply must comply with NEC Class 2, as described by the National Electrical Code (r) (ANSI / NFPA 70).

If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.

WARNING

EXPLOSION HAZARD

DO NOT CONNECT OR DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

WARNING

EXPLOSION HAZARD

SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2 OR ZONE 2.

WARNING

When used in hazardous environments corresponding to Class I, Division 2 or Class I, Zone 2, the device must be installed in a cabinet or a suitable enclosure.

3.1.2 Notes on use in hazardous areas according to ATEX (IECEx)

WARNING

Requirements for the cabinet/enclosure

To comply with EU Directive 94/9 (ATEX95), the enclosure or cabinet must meet the requirements of at least IP54 in compliance with EN 60529.

WARNING

Cable

If the cable or conduit entry point exceeds 70 °C or the branching point of conductors exceeds 80 °C, special precautions must be taken. If the equipment is operated in an air ambient in excess of 50 °C, only use cables with admitted maximum operating temperature of at least 80 °C.

WARNING

Take measures to prevent transient voltage surges of more than 40% of the rated voltage. This is the case if you only operate devices with SELV (safety extra-low voltage).

3.1.3 Notices regarding use in hazardous areas according to UL HazLoc

WARNING

EXPLOSION HAZARD

DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.

This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.

This equipment is suitable for use in Class I, Zone 2, Group IIC or non-hazardous locations only.

3.1.4 Notes on use in hazardous areas according to FM

⚠ WARNING

EXPLOSION HAZARD

You may only connect or disconnect cables carrying electricity when the power supply is switched off or when the device is in an area without inflammable gas concentrations.

This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.

This equipment is suitable for use in Class I, Zone 2, Group IIC or non-hazardous locations only.

⚠ WARNING

EXPLOSION HAZARD

For operation the device is intended to be installed within an enclosure/control cabinet. The inner temperature of the enclosure/control cabinet corresponds to the ambient temperature of the device. Use installation wiring connections with admitted maximum operating temperature of at least 30 °C higher than maximum ambient temperature.

3.2 Overview: Installation, configuration, commissioning

Follow the steps as shown below. Installation and configuration can be performed independently of each other.

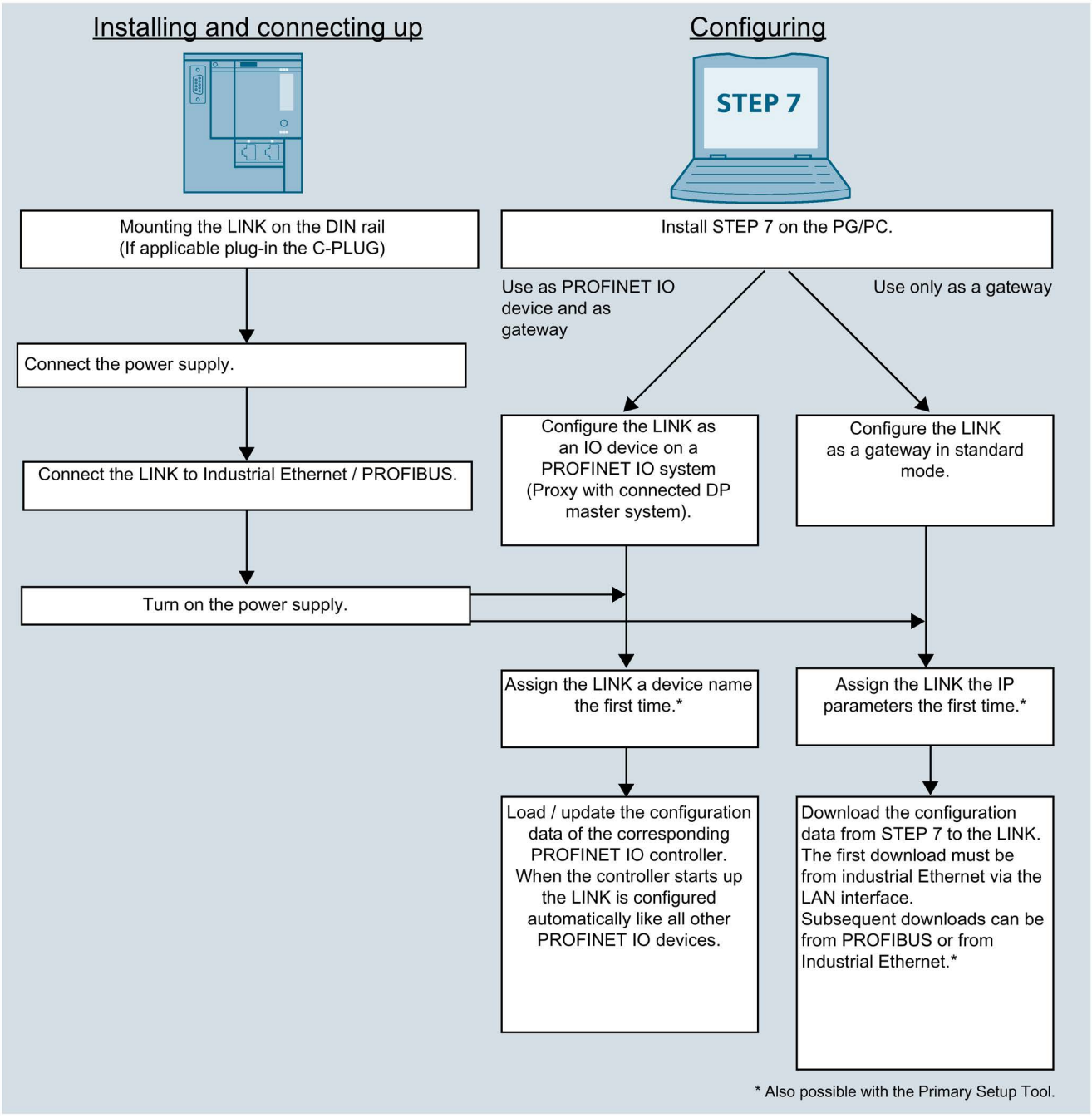
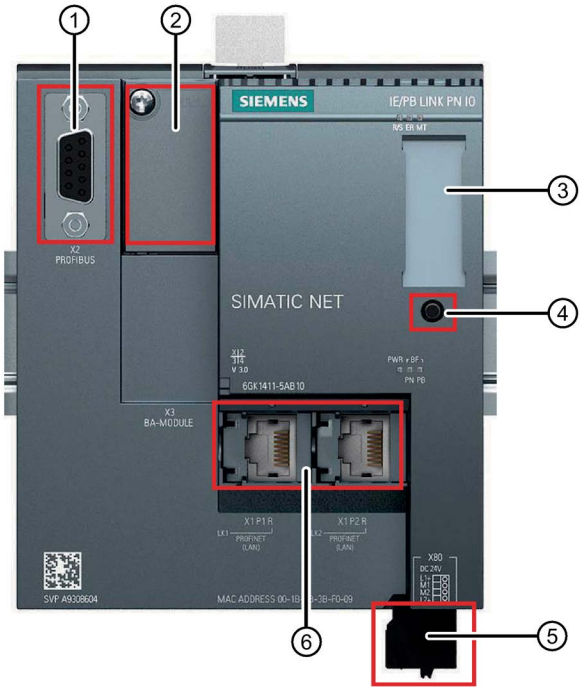


Figure 3-1 Installing, connecting up and configuring the LINK

3.3 Installing and connecting up the LINK



① X2: PROFIBUS interface: 1 x 9-pin D-sub female connector
② X3: Interface for ET 200SP bus adapter (behind the labeling plate)
③ X50: Receptacle for C-PLUG (behind the labeling plate);
④ Button. For information on the functions, refer to the section Interfaces, bus adapters, buttons (Page 28).
⑤ X80: Connector for the redundant power supply
⑥ X1: PROFINET interface, 2 x RJ-45 jacks with ring ports X1P1R / X1P2R

Figure 3-2 Connectors of the LINK

Installing and connecting up the LINK

Note

Only wire up the LINK with the power switched off.

Mount the LINK as follows:

1. Mount the LINK on the 35 mm DIN rail.
2. Connect the turned off power supply to the LINK. See section X80: External power supply (Page 29).
3. Connect the LINK to Industrial Ethernet via one of the RJ-45 jacks (X1).

   As an alternative you can use bus adapters at X3, that must be plugged in with the power turned off. When using bus adapters, the Ethernet interface X1 is inactive.

4. When necessary, connect another component to the remaining free RJ-45 jack.
5. Connect the LINK CM to PROFIBUS.
6. Initially leave the power supply turned off.

Note

Using bus adapters

If you use bus adapters instead of the Ethernet interface of the LINK, do not initially plug in the bus adapters. The procedure is described with the commissioning.

For information on further commissioning, refer to section Commissioning and startup of the LINK (Page 44).

3.4 PG/PC connector

To download the STEP 7 configuration data, you can connect the PG or the engineering station as follows:

- Via Ethernet (recommended)
  - To load the LINK in standard mode, you must first supply the LINK with an IP address, refer to the section Configuring the IP address (Page 49).
  - To download the configuration data of the LINK as a PROFINET IO proxy, you must first assign the LINK its PROFINET device name.
- Via PROFIBUS

  To download via PROFIBUS, you must first supply the LINK with the PROFIBUS address.

For information on downloading see section Commissioning and startup of the LINK (Page 44).

3.5 C-PLUG

Exchangeable storage medium C-PLUG

For configuration data, the LINK has an internal memory. As an option, the device can be operated with a C-PLUG (Configuration Plug). You will find the memory capacity in the section Characteristic data of the C-PLUG (Page 18).

Area of application

The C-PLUG is an exchangeable medium for storage of the configuration data of the LINK. This means that the configuration data data remains available if the device is replaced. It is possible to replace the module without a PG/PC.

The retentive parameters include the entire configuration data and the relevant mode:

How it works

Power is supplied by the LINK. The CPLUG retains all data permanently when the power is turned off.

Flash components are used in the C-PLUG. Note the limited number of times you can write to the C-PLUG, see section Characteristic data of the C-PLUG (Page 18).

Inserting and removing the C-PLUG

Note

Insert and remove only when power is off

The C-PLUG must be inserted or removed only when the power is off!



Figure 3-3 Left: IE/PB-LINK PN IO without C-PLUG / right LINK with C-PLUG

The slot for the C-PLUG is located on the front: Insert the C-PLUG in the intended receptacle.

Remove the C-PLUG only if there is a fault on the basic device. Remove the C-PLUG from the receptacle using a screwdriver.

Operating response with the C-PLUG inserted

Status / procedure	Response when adopting data / actions	Result after startup
Operation without C-PLUG		
• Internal memory empty • No C-PLUG inserted	Configuration data is adopted from the STEP 7 project, Method of adoption dependent on the mode: • Use as a gateway: Configuration data is transferred using the download function of STEP 7. • Use as PROFINET IO device: Configuration data is transferred from the PROFINET IO controller.	The LINK runs with the configuration data transferred to the internal memory. [1)]
Operation with C-PLUG		
• Internal memory empty • Empty C-PLUG is plugged in	Configuration data is adopted from the STEP 7 project, Method of adoption dependent on the mode: • Use as a gateway: Configuration data is transferred using the download function of STEP 7. • Use as PROFINET IO device: Configuration data is transferred from the PROFINET IO controller.	The LINK runs with the configuration data transferred to the C-PLUG. [1)]
• Internal memory empty • C-PLUG with valid configuration data is plugged in. [2)]	Result after startup; The LINK runs with the configuration data stored on the C-PLUG.	The LINK runs with the configuration data existing on the C-PLUG. [1)]
LINK has a C-PLUG inserted after operating without a C-PLUG		
• Internal memory with configuration data • C-PLUG with different but valid configuration data is plugged in. [2)] • LINK is to run with data from the C-PLUG instead of with the internal data.	The power for the LINK must be turned off and on again. The LINK starts up with the configuration data on the C-PLUG. The configuration data in the internal memory is deleted.	The LINK runs with the configuration data adopted from the C-PLUG. [1)]

Status / procedure	Response when adopting data / actions	Result after startup
• Internal memory with configuration data • C-PLUG is plugged in. • Configuration data is to be adopted on the C-PLUG from internal memory.	The following situations are possible: • The C-PLUG has data written to it: Format the C-PLUG using special diagnostics. The data on the C-PLUG is deleted. The LINK then restarts. • The C-PLUG is brand new (without device ID): Turn the power supply for the LINK off and on again. When the LINK starts up, the configuration data is loaded on the C-PLUG from the internal memory. The configuration data in the internal memory is deleted.	The LINK runs with the configuration data transferred to the C-PLUG from the internal memory. [1]
• Internal memory with configuration data • C-PLUG with valid but incorrect configuration data is plugged in accidentally. • Both sets of configuration data (internal memory and C-PLUG) should be retained, LINK should continue to run with internal configuration data.	Back up the configuration data of the internal memory with STEP 7 STEP 7 (with "Upload from device"). [3] Turn off the power to the LINK and remove the incorrectly inserted C-PLUG. Turn on the power to the LINK and download the configuration data backed up in STEP 7 to the LINK.	The LINK continues to run with the internal configuration data.
• Internal memory with configuration data • C-PLUG with valid but incorrect configuration data is plugged in accidentally. • Both sets of configuration data (internal memory and C-PLUG) should be retained, LINK should continue to run with internal configuration data.	The power to the LINK must be switched off. Remove the incorrectly inserted C-PLUG. Insert a C-PLUG without a device ID (e.g. brand new). Switch on the power of the LINK. The data previously stored in the internal memory is transferred to the new C-PLUG.	The LINK continues to run with the original internal configuration data, which is now located on the new C-PLUG. The incorrectly inserted C-PLUG still has its original data.

[1] When used as a PROFINET IO device: Only the PROFINET device name and the I&M data are stored retentively on the C-PLUG. Configuration data is transferred from the PROFINET IO controller at each new startup and entered in the temporary memory.

[2] If the C-PLUG for the LINK does not contain valid configuration data, the device does not start up. In this case, use the diagnostics of STEP 7 for further clarification and possibly to format the C-PLUG.

[3] Only possible when using as "Gateway in standard mode".

Backing up configuration data of the LINK

If the C-PLUG has not been written to (factory status), when the device starts up all configuration data of the LINK is automatically backed up.

Changes to the configuration during operation are also backed up on the C-PLUG.

A basic device with an inserted C-PLUG uses the configuration data of the inserted C-PLUG when it starts up unless the internal memory is full. This is, however, only possible when the data from a compatible device type was written to the C-PLUG.

Replacing a device

Saving the configuration data on the C-PLUG makes it simple to replace the LINK. If a LINK needs to be replaced, the C-PLUG is simply taken from the replaced LINK and inserted in the replacement device. After it starts up the first time, the replacement automatically has the same configuration data as the replaced device.

C-PLUG formatting

Note

Using the C-PLUG of a LINK with firmware version < V3.0

If you use a C-PLUG that has already been used in a LINK with firmware version < V3.0, the C-PLUG can only be read. To have configuration data transferred to it, this C-PLUG must be reformatted.

Use only a C-PLUG that is formatted for the IE/PB LINK PN IO.

A C-PLUG that has already been used in a different device type and that was formatted for this device type must first be formatted for the LINK. After formatting, all data areas are deleted on the C-PLUG and the LINK restarts.

The configuration data is adopted only after reloading or after turning on the power supply again.

To format use STEP 7 special diagnostics > Operating mode > C-PLUG. For more detailed information, refer to the online help in the topic "General Diagnostics Functions - C-PLUG Diagnostics Object".

Diagnostics

Malfunctions are signaled using diagnostics mechanisms of the device (LEDs "ER" and "MT"):

- Inserting a C-PLUG that contains the configuration data of an incompatible device type.
- General malfunctions of the C-PLUG
- Duplicate database

3.6 Commissioning and startup of the LINK

Requirements for commissioning

Prior to commissioning the LINK, make sure that the following conditions are met:

- The system is completely installed.
- The communications partners are reachable.
- The STEP 7 configuration data is complete.
- When using a C-PLUG: The C-PLUG is plugged in.
- The PG or engineering station with the STEP 7 configuration data is connected to the LINK.

  See section PG/PC connector (Page 39) for information on this.

Startup behavior of the LINK

Commission the LINK by first turning on the power supply. During startup the LINK behaves as follows:

- When starting up the first time (brand new) the LINK searches for the configuration data in the internal memory.

  The LINK changes to STOP and shows the LED pattern "Reset to factory settings", see also section LED displays of the LINK (Page 23)
- When starting up after a phase of operation the LINK searches for the configuration data either on the C-PLUG (if plugged in) or in the internal memory.

  For information on the startup with C-PLUG refer to the section C-PLUG (Page 39).

After startup the subsequent procedure depends on the required mode.

Commissioning the LINK

After startup - depending on the mode of the LINK - follow the steps below:

LINK in standard mode

You have the following options:

- Optional: Assign or change the IP address
- Download the configuration data

LINK al PROFINET IO proxy

In this mode. the following first step is necessary:

- Assign the LINK the PROFINET device name

Following this you can take the following steps:

- Optional: Assign or change the IP address
- Download the configuration data

Information on commissioning

Depending on the configuration tool you are using, you will find information on commissioning in the following sections:

- STEP 7 V5
  - LINK as PROFINET IO device

    See section Commissioning the LINK as a PROFINET IO device (Page 55).
  - LINK as gateway in standard mode

    See section Commissioning the LINK as a gateway (Page 57).
- STEP 7 Professional
  - LINK as PROFINET IO device

    See section Commissioning the LINK as a PROFINET IO device (Page 62).
  - LINK as gateway in standard mode

    See section Commissioning the LINK in standard mode (Page 63).

For information on saving the configuration data when turning off the power supply and when changing from RUN to STOP, see section Changing from RUN to STOP (Page 45).

Commissioning when using bus adapters

If you use bus adapters instead of the Ethernet interface, follow the steps below during commissioning:

1. First download the configuration data.
2. Then turn off the power.
3. Now plug in the bus adapter connected to the network.
4. Turn on the power.

   Only now is the interface X3 of the bus adapter active and the ports X1P1R / X1P2R of the integrated Ethernet interface are deactivated.

3.7 Changing from RUN to STOP

In the standard mode of the LINK you can change the operating mode of the LINK between RUN and STOP with STEP 7.

STOP → RUN

The LINK loads configured and/or downloaded data into the work memory and then changes to RUN mode.

RUN → STOP

With a transition phase (LED pattern "Stopping (RUN → STOP)", the LINK changes to STOP mode.

- Established routed S7 connections are not terminated.
- The following functions are disabled:
  - PROFINET IO
  - Time-of-day synchronization
- The following functions remain enabled:
  - Downloading the configuration data and diagnostics of the LINK

    System connections for configuration, diagnostics and PG channel routing still exist.
  - Routing function

Power ON → OFF → ON

Note

Configuration data when turning off the power

- **LINK as PROFINET IO device**

  Configuration data loaded during startup is not stored retentively.

  The configuration data downloaded from the PROFINET IO controller is not stored retentively by the LINK. After cycling power on the LINK, all the configuration data except for the device name is deleted.

  During startup the configuration data is once again downloaded from the PROFINET IO controller.
- **LINK in standard mode**

  All stored data is retained after turning off the power and when the power is turned on the LINK starts up as configured.

Configuration and operation

4

4.1 Security recommendations

Keep to the following security recommendations to prevent unauthorized access to the system.

General

- You should make regular checks to make sure that the device meets these recommendations and other internal security guidelines if applicable.
- Evaluate your plant as a whole in terms of security. Use a cell protection concept with suitable products.
- Do not connect the device directly to the Internet. Operate the device within a protected network area.
- Keep the firmware up to date. Check regularly for security updates of the firmware and use them.
- Check regularly for new features on the Siemens Internet pages.
  - Here you will find information on network security:

    Link: (http://www.siemens.com/industrialsecurity)
  - Here you will find information on Industrial Ethernet security:

    Link: (http://w3.siemens.com/mcms/industrial-communication/en/ie/industrial-ethernet-security/Seiten/industrial-security.aspx)
  - You will find an introduction to the topic of industrial security in the following publication:

    Link: (http://w3app.siemens.com/mcms/infocenter/dokumentencenter/sc/ic/InfocenterLanguagePacks/Netzwerksicherheit/6ZB5530-1AP01-0BA4_BR_Netzwerksicherheit_en_112015.pdf)

Physical access

Restrict physical access to the device to qualified personnel.

Network attachment

Do not connect the LINK directly to the Internet. If a connection from the LINK to the Internet is required, arrange for suitable protection before the LINK, for example a SCALANCE S with firewall.

Protocols

Secure and non-secure protocols

- Only activate protocols that you require to use the system.
- Use secure protocols when access to the device is not prevented by physical protection measures.

List of available protocols

The following is a list of all available protocols and their ports through which the LINK can be accessed.

Table 4- 1 List of available protocols

Service/ Protocol	Protocol/ port number	Configurable port	Default port status	Authentication	Encryption
DHCP-Client	UDP/68	✓	Open	No	No
NTP-Client	UDP/123	✓	Closed	No	No
S7 communication	TCP/102	-	Open	No	No
SNMP	UDP/161	✓	Open	No	No
PROFINET CM	UDP/34964	✓	Open	No	No
PROFINET RPC	UDP/50793 UDP/54549 UDP/61009	✓	Open	No	No

Explanation for table:

Service/Protocol

Protocols that the device supports.

Protocol/port number

Port number assigned to the protocol.

Default port status

- Open

  The port is open at the start of the configuration.
- Closed

  The port is closed at the start of the configuration.

Configurable port

- ✓

  The port status can be changed.
- --

  The port status cannot be changed.

Authentication

Specifies whether the communication partner is authenticated.

Encryption

Specifies whether the transfer is encrypted.

4.2 IP configuration

4.2.1 Configuring the IP address

Alternative ways of assigning the address parameters

You can decide the route and the method with which the IP address of the local interface is obtained and assigned.

- Set IP address in the project

  This is the default setting. You specify the IP address when the device is networked. The IP address CP is therefore fixed. With this option, you need to configure the communication connections.

  The configuration can be achieved in the following ways:

  – PST, see section Assign the address and network parameters with the Primary Setup Tool (PST) (Page 50).

    As an alternative to STEP 7, you can use the PST to assign the address and PROFINET parameters.

  – STEP 7 V5, see section Configuration with STEP 7 V5.5 (Page 53).

  – STEP 7 Basic / Professional, see section Configuration with STEP 7 Basic / Professional (Page 58).

- Obtain IP address from a DHCP server

  This is an alternative method if the LINK is operated in standard mode as a gateway.

  With this, you specify that the IP address is obtained from a DHCP server when the device starts up. To do this, the MAC address of the interface or the client ID that can be entered in the configuration or the PROFINET device name is transferred to the DHCP server.

You will find further information in the configuration manual for S7 CPs /3/ (Page 94).

4.2.2 Restart after detection of a duplicate IP address in the network

Behavior when the LINK starts up

To save you time-consuming troubleshooting in the network, during startup the LINK detects double addressing in the network.

If the LINK recognizes double addressing during startup, it changes to the RUN status and can no longer be reached via the IP parameters. The LEDs "ER" and "R/S" are lit and the LED "BF PN" flashes.

4.2.3 Remove retentive storage of the IP address if there are duplicate addresses

The IP address and the PROFINET device name of the LINK remain stored retentively:

If, for example during startup, the LINK detects a duplicate address in another network, the LINK is not connected to the network. The LEDs "ER" and "R/S" are lit and the LED "BF PN" flashes. The LINK is not reachable via the IP parameters.

To connect the LINK to the network, remove the retentively stored IP address as follows:

Using DCP with the Primary Setup Tool (PST), set the IP address of the LINK to 0.0.0.0 without configuration or set a new address.

This removes the retentively stored IP address of the LINK. The LINK can be connected into the network.

4.3 Assign the address and network parameters with the Primary Setup Tool (PST)

With PST you assign the IP parameters and the PROFIBUS parameters to the LINK for the first time.

You then download the configuration data to the LINK.

Note the required version of the PST, see section Requirements for use (Page 19).

Starting PST and setting the PC access

1. Connect the PC to the LINK.
2. Start the PST using the start menu:

   Siemens Automation > SIMATIC > Primary Setup Tool > Primary Setup Tool
3. First set the access point of the PC with:

   "Settings" > "Set PG/PC Interface"
4. Select the interface to be used and confirm the dialog.

Configuring and loading the LINK

1. Search the network for the LINK: "Network" > "Browse"
2. In the left-hand window, double-click on the displayed LINK.

   The PROFIBUS and Ethernet interface of the LINK are displayed.

3. Select the Ethernet interface..

   In the right-hand part of the dialog, the properties of the Ethernet interface are displayed.

4. Enter the values for the IP address and the subnet mask.

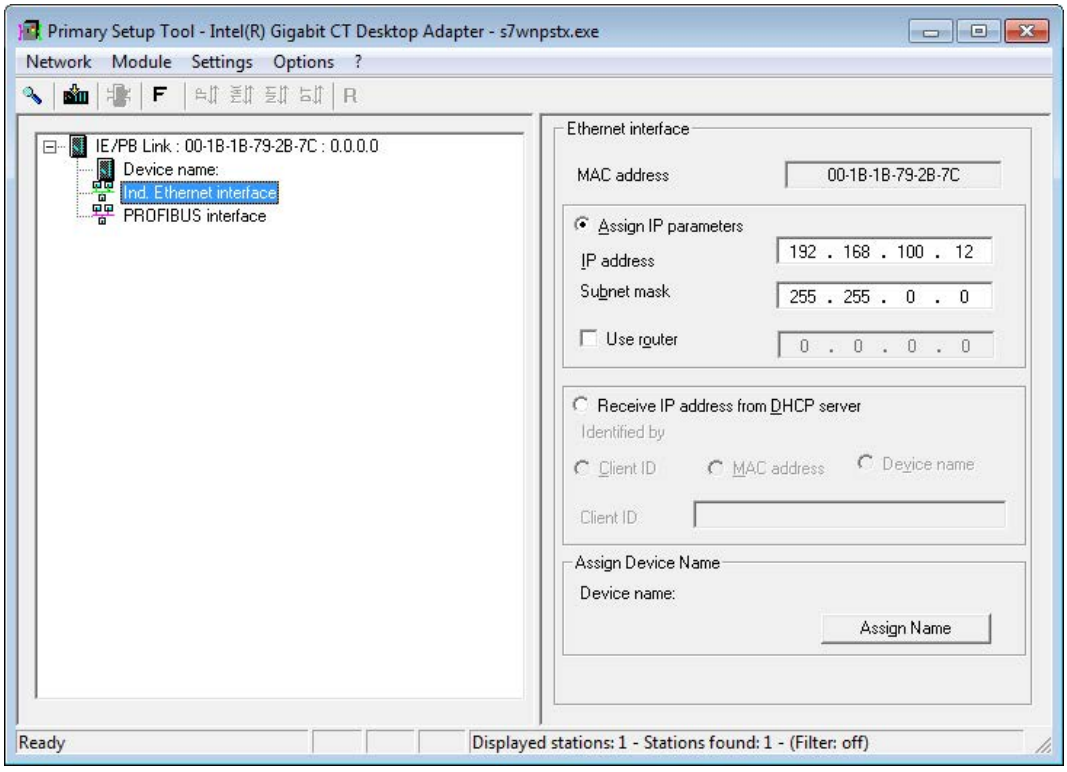


Figure 4-1 Ethernet interface: Entering the IP address and subnet mask

5. Select the PROFIBUS interface.

   In the right-hand part of the window, the network settings of the PROFIBUS interface are displayed.

6. From the drop-down lists, select the required values for the network settings.

   If you set a user-defined profile of the bus parameters:

   – Click the "Bus Parameters" button.
   – Enter the required bus parameters.
   – Apply the data by clicking the button.

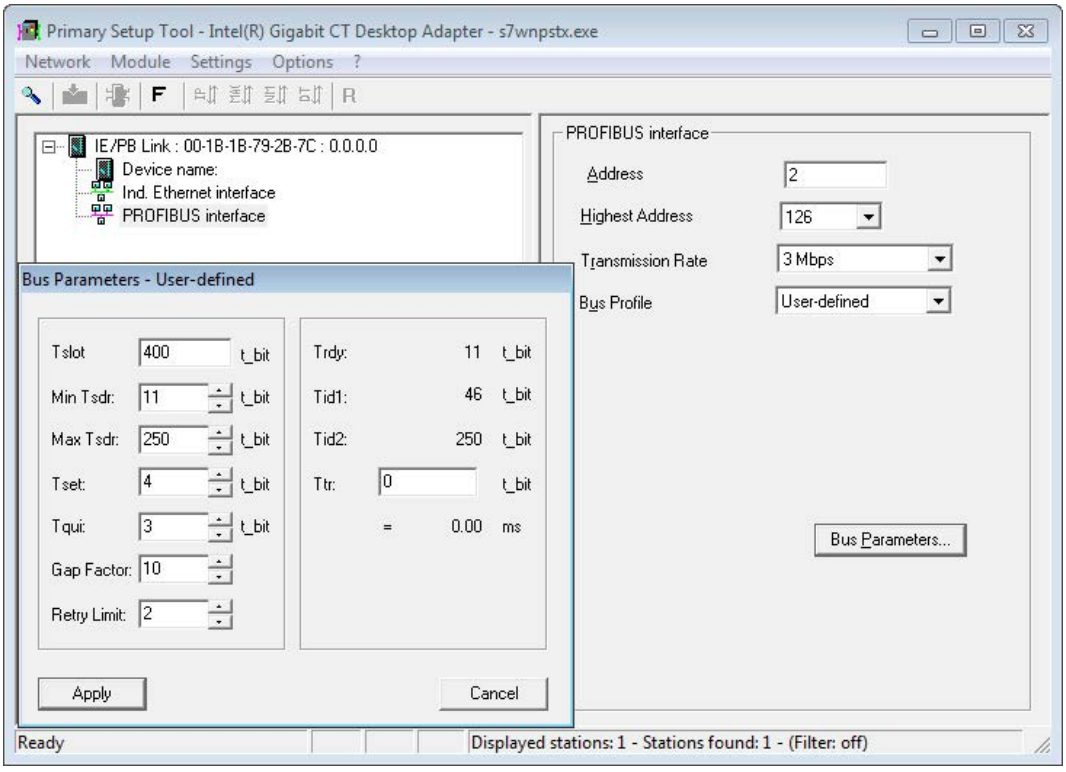


Figure 4-2 PROFIBUS interface: Selecting network settings and bus parameters

7. In the left-hand part of the window, select the displayed LINK.
8. Click the download icon:" ".

   The download of the Ethernet and PROFIBUS parameters to the LINK begins.

   During the download you receive to queries.
9. , Firm these queries with "Yes" if you want to transfer the configured parameters.

   Result: The parameters are downloaded to the LINK.

4.4 Configuration with STEP 7 V5.5

4.4.1 Configuring the LINK

Overview of configuration

Note the required version of the STEP 7 V5, see section Requirements for use (Page 19).

NCM S7 is integrated in STEP 7 V5. With NCM S7 you additionally obtain direct access to NCM diagnostics via the Start menu and the firmware loader, see section Loading firmware (Page 73).

Note

Operation as LINK with settings compatible with the previous version

You can operate the LINK with a setting compatible with the previous version (6GK1 411-5AB00).

For information on the previous version (6GK1 411-5AB00), refer to the manual /2/ (Page 94).

Depending on the area of application of the LINK, configuration involves the following steps:

- Use as PROFINET IO device and as gateway
  - Assign the LINK the PROFINET device name the first time.
  - Configure the LINK as a PROFINET IO device. During this, a DP Master system is assigned to the LINK.

    During startup the configuration data is automatically downloaded from the PROFINET IO controller.

  For information on further configuration, refer to section Use as PROFINET IO device and as gateway (Page 54).
- Use only as a gateway
  - Assign the IP parameters the first time.
  - Configure the LINK as an S7-300 station and download the configuration data to the LINK.

  For information on further configuration, refer to section Use only as a gateway in standard operation (Page 55).

Note

Support when configuring: Online help

You will find detailed information on the procedure in the online help of STEP 7 V5.x.

4.4.2 Use as PROFINET IO device and as gateway

Configuring the LINK as a PROFINET IO device.

1. Create a STEP 7 project with a PROFINET IO controller, e.g., an S7-300 station.
2. Open HW Config by double-clicking on the created station.
3. Create a PROFINET IO system by inserting and networking a PROFINET IO system using the shortcut menu (right mouse button) of the PROFINET interface of the controller.
4. From the hardware catalog (PROFINET IO > Gateway) insert the LINK as an IO device on the PROFINET IO system.

   An IP address is assigned automatically for the interface in the PROFINET IO system and the LINK is assigned a device number. The highest free device number in the current PROFINET IO system is selected.

   When you take the LINK from the hardware catalog, you will be requested to network the LINK on the PROFIBUS interface.
5. Network the LINK on the PROFIBUS interface.

   If you have not previously created a subnet, you can do this later by selecting the PROFIBUS interface of the LINK and inserting the DP Master system using the shortcut menu.

   Result: The LINK has been created in HW Config as a PROFINET IO device with a connected DP Master system.

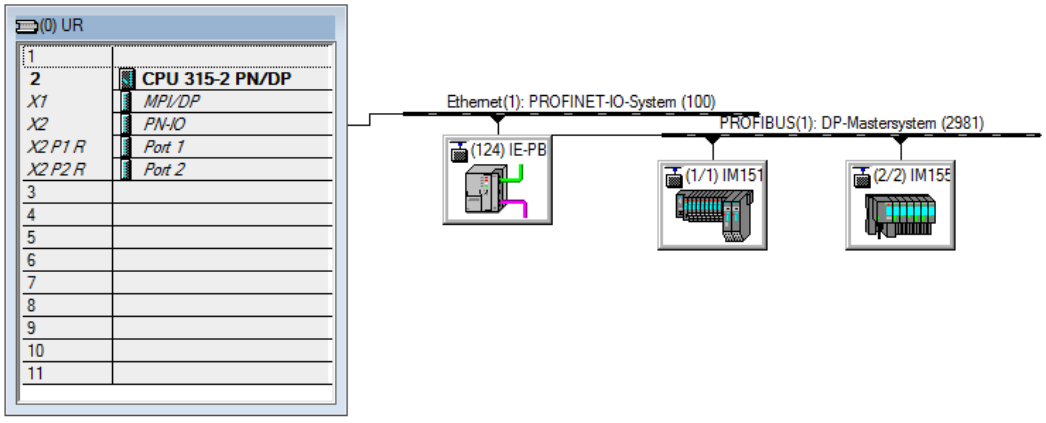


Figure 4-3 LINK as a PROFINET IO device with a DP Master system

Note

Creating a new DP master system

The DP Master system at the LINK is assigned to the PROFIBUS submodule. When you create a new DP Master system, you must therefore first select the PROFIBUS submodule.

6. As far as necessary, set further properties of the LINK.
7. Configure the DP master system with its PROFIBUS nodes:

4.4.3 Commissioning the LINK as a PROFINET IO device

1. Assign the LINK a device name the first time.

   The LINK ships with a fixed MAC address. Without further configuration, the device can only be reached via the Ethernet connection using this MAC address.

   During configuration, an IP address is assigned automatically. This IP address is later transferred to the LINK (IO device) when the IO controller starts up.

   To allow the IO controller to identify the IO device during this procedure, first assign the link a PROFINET device name - like every other IO device.

   See section Overview: Installation, configuration, commissioning (Page 37) for information on this.

   To do this in the SIMATIC Manager or in HW Config use the menu command "PLC" > "Ethernet" > "Edit Ethernet Node" > "Assign device name".

   As an alternative you can also use the PST to assign the PROFINET device name.

2. Download the configuration data to the PROFINET IO controller.

   With this action, the IO controller receives the configuration data of the LINK.

When the IO controller starts up the LINK is configured automatically like all other PROFINET IO devices.

Configuration data loaded during start-up is not stored retentively. See also section Changing from RUN to STOP (Page 45).

4.4.4 Use only as a gateway in standard operation

4.4.4.1 Creating a station and networking the LINK

Configuring the LINK as an S7-300 station and connecting it to Ethernet and PROFIBUS

1. Create a STEP 7 project with an S7-300 station.
2. Open the hardware configuration HW Config by double-clicking on the created station.
3. Insert the LINK from the hardware catalog in "SIMATIC 300" > "Gateway" > "IE/PB LINK PN IO".

   When you take the IE/PB LINK PN IO from the hardware catalog, you will be requested to network the LINK on the Ethernet and PROFIBUS interface.

4. Network the LINK on the Ethernet and PROFIBUS interface.

   If you have not previously created a suitable subnet, you can do this later by selecting the relevant interface using the shortcut menu.

   Result: The LINK has been created in HW Config within the S7 300 station with a basic module and the two submodules Ethernet and PROFIBUS.

   Note

   LINK as gateway between an MPI and Ethernet subnet

   The LINK can also be selected as a gateway between an MPI subnet and an Ethernet subnet. To do this, you need to network the PROFIBUS interface of the LINK with the MPI subnet.

5. Configure the other properties of the LINK, see sections Setting object properties on the LINK (Page 56) and Configuring the PROFIBUS interface (Page 57).

4.4.4.2 Setting object properties on the LINK

Configuring object properties

You can set the further properties of the LINK in HW Config or using the component view in NetPro.

Open the properties dialog of the LINK by double-clicking or using the shortcut menu.

You can make the following settings in the properties dialog:

- "General" tab

  Here, you can enter the PROFINET device name, the device number and a comment.

- "Time-of-Day Synchronization" tab

  Here, you can activate time-of-day synchronization, set the time forwarding by the LINK and the direction. As default, this time-of-day synchronization is disabled.

  You will find details in the section Time-of-day synchronization (Page 68).

- "Device Numbers" tab

  Here, you can change the device numbers of the connected DP slaves.

- "Diagnostics" tab

  With a connected LINK, you can call up NCM special diagnostics. The

- "Identification" tab

  Here you configure I&M data of the LINK.

4.4.4.3 Configuring the Ethernet interface

You can configure the properties of the Ethernet interface of the LINK in HW Config.

1. Open the properties dialog of the LINK by double-clicking or using the shortcut menu.
2. In the "General" tab ("Ethernet" button) open the properties dialog of the Ethernet interface.
   - In the "General" tab, the general properties of the network connection are displayed.
   - In the "Parameters" tab you configure IP parameters of the LINK.

4.4.4.4 Configuring the PROFIBUS interface

You can set the properties of the PROFIBUS interface of the LINK in HW Config.

1. Open the properties dialog of the PROFIBUS interface of the LINK by double clicking on the slot 2/X2 (PROFIBUS/DP).
   - In the "General" tab, the general properties of the interface are displayed.

     Here, you can change the name of the interface.
   - In the "Addresses" tab you can change the start address of the interface.
   - In the "Operating Mode" tab, you can set the DP delay time.
2. In the "General" tab, open the properties dialog of the PROFIBUS interface with the "Properties" button.
   - Here, you network the PROFIBUS interface.
   - You can change the PROFIBUS address of the LINK.

4.4.4.5 Commissioning the LINK as a gateway

Commissioning the LINK

1. Assign an IP address to the LINK.

   To do this, select the menu command "PLC" > "Ethernet" > "Edit Ethernet Node" in HW Config.
2. Download the configuration data to the LINK.

   The first download must be from industrial Ethernet via the Ethernet interface. Depending on the PG/PC connection subsequent downloads can be from PROFIBUS or from Industrial Ethernet via the Ethernet interface.

4.4.5 Configuring bus adapters

Configuring bus adapters

If you want to use the Ethernet interface of the LINK, configure the interface as described above.

If, instead of direct connection of the Ethernet interface you want to use a bus adapter, follow the steps below:

1. Find the required bus module in the catalog of HW Config:

   PROFINET IO > Gateway > IE/PB Link PN IO > 6GK1 411-5AB10 > V3.0 > "Bus adapter"

2. Insert the bus adapter.

If you have already configured a bus adapter but instead want to connect the Ethernet interface directly select the entry "onboard" from the catalog of the bus adapters.

Replacing bus adapters

If you want to replace a bus adapter already being used in the LINK in your STEP 7 project, select the bus adapter being used and open the shortcut menu "Replace Object...". In the window that then opens you can replace the previous module with a new one.

As an alternative you can drag the required bus adapter from the hardware catalog to the slot for bus modules and confirm the replacement with "OK".

4.5 Configuration with STEP 7 Basic / Professional

4.5.1 Configuring the LINK

Creating the LINK and assigning the mode

For addressing the LINK the first time and configuring it you require STEP 7 Basic / STEP 7 Professional.

For the version and required support package, refer to the section Requirements for use (Page 19).

Note

Operation in compatibility mode

You can operate the LINK with a compatible setting to the previous version (6GK1 411-5AB00).

For operating the LINK in the compatibility mode, refer to the manual /2/ (Page 94) of the previous version 6GK1 411-5AB00.

For the configuration, follow the steps below:

1. Create a STEP 7 project.
2. Insert a LINK from the catalog:

   "Network components" > "Gateways" > IE/PB Link PN IO > 6GK1 411-5AB10

For the further configuration as a PROFINET I/O proxy, refer to the section Use as a PROFINET IO device (Page 59).

For the further configuration as a gateway, refer to the section Use only as a gateway in standard operation (Page 61).

Note

Support during configuration: Online help

The information system of STEP 7 will provide you with detailed information on the procedure.

4.5.2 Use as a PROFINET IO device

Configuring the LINK as a PROFINET IO device.

The following is required for further configuration: You have created a project with the LINK, see section Configuring the LINK (Page 58).

For further configuration follow the steps below:

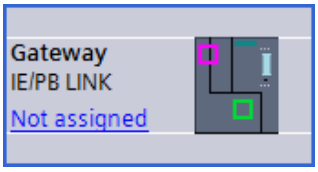
1. Specify the mode of the LINK in the "Gateway" parameter group:

   "Network gateway as PROFINET IO proxy"

2. Connect the PROFIBUS interface of the LINK to the PROFIBUS interface of the slave by dragging the PROFIBUS interface of the LINK onto the slave with the mouse pointer.

   The interface is connected and the slave assigned to the LINK.

   The LINK is assigned an automatically generated PROFIBUS address.



3. Connect the PROFINET interface of the LINK to the PROFINET interface of the IO controller by dragging the Ethernet / PROFINET interface of the LINK onto the PROFINET interface of the IO controller with the mouse.

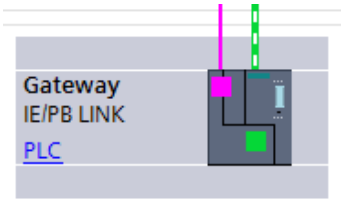
   The interface is connected and an automatically generated IP address is assigned to the LINK, however the LINK is not yet assigned to an IO controller.

4. If the LINK was not assigned to an IO controller, click on the text "Not assigned".

   A window with all IO controllers in the project is opened.

5. Click on the IO controller to which the LINK will be assigned.

   As soon as the LINK is assigned to an IO controller, the controller name is shown in the station icon of the LINK.



   The LINK is assigned an automatically generated PROFINET device next when it is assigned to an IO controller.

   During startup the configuration data is automatically downloaded from the PROFINET IO controller.

You configure the remaining parameters in the parameter groups of the LINK. Here, you can also change the PROFINET device name.

For information on downloading and further commissioning, refer to section Commissioning the LINK as a PROFINET IO device (Page 62).

4.5.3 Use only as a gateway in standard operation

Configuring the LINK

The following is required for further configuration: You have created a project with the LINK, see section Configuring the LINK (Page 58).

For further configuration follow the steps below:

1. Specify the mode of the LINK in the "Gateway" parameter group:

   "Gateway in standard mode"

2. Network the LINK on the Ethernet interface.

   The LINK is assigned an automatically generated IP address and a PROFINET device name..

3. Network the LINK on the PROFIBUS interface.

   The LINK is assigned an automatically generated PROFIBUS address.

   Note

   The LINK can also be selected as a gateway between an MPI subnet and an Ethernet subnet. To do this, you need to network the PROFIBUS interface of the LINK with the MPI subnet.

4. As far as necessary, set further properties of the LINK.

For information on downloading and further commissioning, refer to section Commissioning the LINK in standard mode (Page 63).

4.5.4 Configuring bus adapters

Configuring bus adapters

If, instead of using the Ethernet interface of the LINK you want to use a bus adapter, follow the steps below:

1. Select the LINK in the network view of STEP 7.
2. Disable the filter in the catalog.

   You will find the available bus adapters here: Network components > Netzübergänge > BusAdapter

3. Change to the device view.
4. Browse for the required bus adapter and drag it to a free slot for bus modules on the LINK.
5. Configure the port properties of the bus adapter.

Note the information on downloading and further commissioning in the following sections.

Note

Ethernet interface disabled

Note that after configuring a bus adapter, the Ethernet interface of the LINK and therefore also the LEDs "LK1 / LK2" are deactivated.

Replacement of a bus adapter

If you want to replace a bus adapter used in the LINK in your STEP 7 project, select the bus adapter being used in the device view of the LINK and select the shortcut menu command "Change device..." In the window that then opens you can replace the previous module with a new one.

As an alternative you can drag the required bus adapter from the catalog to the slot for bus modules. A replacement icon appears and the window for changing the device opens.

4.5.5 Commissioning the LINK as a PROFINET IO device

Commissioning the LINK as a PROFINET IO device

1. If necessary change the PROFINET device name before loading.

   The IP address is assigned by the controller.

   Via the shortcut menu of the LINK open the online and diagnostics view ("Online & Diagnostcs" > "Functions" > "Assign PROFINET device name").

   Make sure that the address data on the LINK and in the STEP 7 configuration are consistent.

2. Download the configuration data to the PROFINET IO controller.

   With this action, the IO controller receives the configuration data of the LINK. When the IO controller starts up the LINK is configured like all other PROFINET IO devices.

Note

Restart when using bus adapters

If you use a bus adapter, you need to restart the LINK after downloading so that the bus adapter is recognized. Follow the steps outlined below:

1. Download the configuration data as described above.
2. Turn off the power.
3. Plug in the bus adapter and connect it to the network.
4. Turn on the power.

The ports of interface X1 are then disabled.

4.5.6 Commissioning the LINK in standard mode

Commissioning the LINK in standard mode

1. If necessary change the IP address before loading.

   Via the shortcut menu of the LINK open the online and diagnostics view ("Online & Diagnostics" > "Functions" > "Assign IP address").

   Make sure that the address data on the LINK and in the STEP 7 configuration are consistent.

2. Download the configuration data to the LINK.

   When downloading the first time download via Ethernet. Depending on the PG/PC connection, later downloads can be via PROFIBUS or Ethernet.

Note

Restart when using bus adapters

If you use a bus adapter, you need to restart the LINK after downloading so that the bus adapter is recognized. Follow the steps outlined below:

1. Download the configuration data as described above.
2. Turn off the power.
3. Plug in the bus adapter and connect it to the network.
4. Turn on the power.

The ports of interface X1 are then disabled.

4.6 Identification and maintenance data

4.6.1 Reading out and entering I&M data

I&M data

Identification & Maintenance data (I&M data) is stored on the module.

- **Identification data (I&M0)**

  I data is manufacturers information about the module that you only have read access to. Some of it is printed on the housing, e.g., article number and serial number.

- **Maintenance data (I&M1, 2, 3)**

  M data is plant-dependent information, e.g. the plant designation and the location designation. Maintenance data is created during the configuration and written to the module.

  M data can be read and written.

All modules of the LINK support identification data (I&M0 to I&M3). The I&M identification data supports you in the following activities:

- Assignment of plant-related identification characteristics
- Checking the plant configuration
- Locating hardware changes in a plant
- Correcting errors in a plant

Modules can be clearly identified online using the I&M identification data.

With STEP 7 you can read out the I&M data. See the online help of STEP 7.

Configuring, reading and writing I&M data

You have the following options, for reading or writing I&M data:

- Configuring

  With STEP 7
- Reading / writing

  With read / write data record

  (only in the "PROFINET IO proxy" mode, e.g. via the user program)

Display of the I&M data in STEP 7 V5

You can display the I&M0 and I&M1 data as follows:

- Via the special diagnostics (properties dialog of the LINK > "Diagnostics" tab > Start special diagnostics)

  and
- In the "Gateway" mode using the STEP 7 function "Module Information"

You can load the I&M data in the "PROFINET IO-Proxy" mode as follows:

- Upload to PG

  With the "PLC" > "Upload Module Identification to PG" menu command
- Downloading to the module

  With the "PLC" > "Download Module Identification" menu command

Reading the I&M data using STEP 7 Professional

Gateway in standard operation

Requirement: There must be an online connection to the LINK.

1. Select the LINK in the project tree.
2. Select "Online & diagnostics" > "Identification & Maintenance".

Gateway as PROFINET IO proxy

Requirements: There must be an online connection to the relevant PROFINET IO controller.

1. Select the LINK in the project tree.
2. Select "Online & diagnostics" > "Identification & Maintenance".

Writing the I&M data using STEP 7

1. Select the LINK in the device view of the hardware and network editor.
2. Entered the required data in the properties in "General" > "Identification & Maintenance".

   You can enter the following data:

   – Plant designation (I&M1)
   – Location identifier (I&M1)
   – Installation date (I&M2)
   – Additional information (I&M3)

Gateway in standard operation

When loading the hardware configuration, the I&M data is adopted directly.

Gateway as PROFINET IO proxy

When loading the hardware configuration, the I&M data is not adopted directly. The values must be written to the device using suitable PROFINET mechanisms. STEP 7 provides suitable functions for this.

- **STEP 7 V5.x**
  – Select the LINK.
  – Select the menu command "PLC" > "Download Module Identification".
- **STEP 7 Professional**
  – Select the LINK in the project tree.
  – Select the menu command "Options > Hardware Configuration > Compile and Download > Download I&M Data".
  – Compile the configuration data (shortcut menu)
  – Download the configuration data (shortcut menu) "Download to device" > "Hardware configuration"
  – In the column "Data for Identification & Maintenance (I&M)" select the tab "Download data" or "Download selected".

Reading/writing I&M data with the user program

- To read I&M data in the user program, use the the block SFB52 "RDREC".
- To write I&M data in the user program, use the the block SFB53 "WRREC".

You will find the data records structure for distributed modules reachable via PROFINET IO / PROFIBUS DP below.

4.6.2 Data record structure for I&M data

Reading I&M data records

You can have read access to the identification data in the "PROFINET IO proxy" mode using the block "RDREC". You obtain the corresponding part of the identification data under the relevant data record index.

The data records are structured as follows:

Table 4- 2 Structure of the data records with identification data I&M

Content	Length (+ length header) [bytes]	Coding (hex)
Header information		
BlockType	2	I&M0: 0020_H I&M1: 0021_H I&M2: 0022_H I&M3: 0023_H
BlockLength	2	I&M0: 0038_H I&M1: 0038_H I&M2: 0012_H I&M3: 0038_H
BlockVersionHigh	1	01
BlockVersionLow	1	00
Identification data		
Identification data (see table below)	I&M0 / Index $AFF0_H$: 54 (+6) I&M1 / Index $AFF1_H$: 54 (+6) I&M2 / Index $AFF2_H$: 16 (+6) I&M3 / Index $AFF3_H$: 54 (+6)	

Table 4- 3 Data record structure for I&M identification data

Identification data	Access	Default	Explanation
Identification data 0: (data record index AFF0 hex)			
VendorIDHigh	Read (1 byte)	00_H	Name of the manufacturer ($2A_H$ = SIEMENS AG).
VendorIDLow	Read (1 byte)	$2A_H$	
Order_ID	Read (20 bytes)	6ES7155-6AU00-0BN0	Article number of the module (here: bus adapter)
IM_SERIAL_NUMBER	Read (16 bytes)	-	Serial number (device-specific)
IM_HARDWARE_REVISION	Read (2 bytes)	1	Hardware product version
IM_SOFTWARE_REVISION	Read	Firmware version	Firmware version of the module
• SWRevisionPrefix	(1 byte)	V	

Identification data	Access	Default	Explanation
• IM_SWRevision_Functional_ Enhancement	(1 byte)	00 - FF_H	
• IM_SWRevision_Bug_Fix	(1 byte)	00 - FF_H	
• IM_SWRevision_Internal_ Change	(1 byte)	00 - FF_H	
IM_REVISION_COUNTER	Read (2 bytes)	0000_H	Selected changes on the module (not used)
IM_PROFILE_ID	Read (2 bytes)	0000_H	Generic Device
IM_PROFILE_SPECIFIC_TYPE	Read (2 bytes)	0001_H	CPU
		0003_H	I/O module
		0005_H	Interface module / bus adapter
		0006_H	Active network infrastructure component
IM_VERSION	Read	0101_H	Version of the identification data (0101_H = Version 1.1)
• IM_Version_Major	(1 byte)		
• IM_Version_Minor	(1 byte)		
IM_SUPPORTED	Read (2 bytes)	$000E_H$	Existing identification data (I&M1 to I&M3)
Maintenance data 1: (data record index AFF1 hex)			
IM_TAG_FUNCTION	Read / write (32 bytes)	-	Plant-wide unique identification of the module
IM_TAG_LOCATION	Read / write (22 bytes)	-	Installation location of the module
Maintenance data 2: (data record index AFF2 hex)			
IM_DATE	Read / write (16 bytes)	YYYY-MM-DD HH:MM	Installation date of the module
Maintenance data 3: (data record index AFF3 hex)			
IM_DESCRIPTOR	Read / write (54 bytes)	-	Additional information

Reading I&M data records with data record 255 (distributed via PROFIBUS DP)

The modules support standardized access to identification data via DS 255 (index 65000 to 65003). You will find more information on the data structure of DS 255 in the specifications of Profile Guidelines Part 1: Identification & Maintenance Functions - Order No. 3.502, version 1.2 from October 2009.

4.7 Time-of-day synchronization

Synchronization method

The LINK supports time-of-day synchronization methods listed below.

Both in NTP and in the SIMATIC mode, the time-of-day is transferred as UTC (Universal Time Coordinated).

With the SIMATIC mode you require a time master in a network.

If time-of-day synchronization is enabled in the configuration, you can set whether the LINK simply adopts the time-of-day or adopts it and forwards it. The following options are available:

- **NTP**
  - Adopt the time of day
  - Adopt the time of day and forward it to PROFIBUS
- **SIMATIC mode**
  - Adopt the time of day from Ethernet (no forwarding to PROFIBUS)
  - Adopt the time of day from PROFIBUS (no forwarding to Ethernet)
  - Adopt the time of day from Ethernet and forward it to PROFIBUS
  - Adopt the time of day from PROFIBUS and forward it to Ethernet

NTP mode

With the NTP method, the LINK sends time-of-day queries at regular intervals to one to four NTP servers in the subnet (LAN).

- The update interval (synchronization cycle) specifies the interval between the time queries.
- "Accept time from non-synchronized NTP servers" option

  If the option is enabled, the LINK also accepts the time-of-day from non-synchronized NTP servers with stratum 16.

  If the option is disabled, the response is as follows: If the LINK receives a time-of-day frame from an unsynchronized NTP server with stratum 16, the time of day is not set according to the frame. In this case, none of the NTP servers is displayed as "NTP master" in the diagnostics; but rather only as being "reachable".

4.8 Overview: Access to the LINK as proxy

Overview of the options for accessing the LINK in the "PROFINET IO proxy" mode

If there is a connection established to the IO controller you have the following options for accessing the LINK.

Note: Stopping the IO controller CPU does not lead to connection termination with the LINK.

Access to LINK via	Access path	STOP ⇔ START	Memory reset	Resetting to factory settings		Initialization		Restart
				With C-PLUG from LINK V2	Without or with C-PLUG (formatted for LINK V3)	PROFINET device name	IP parameters	
Taster	-	- [1]	- [1]	+	+	- [1]	- [1]	+
PST / PRONETA	IE	- [1]	- [1]	- [4]	+	+	- [3]	- [1]
PST	PB	- [1]	- [1]	- [1]	- [1]	- [1]	- [1]	- [1]
Special diagnostics	IE	- [2]	- [2]	- [2]	- [2]	+	- [3]	- [1]
Special diagnostics	PB	- [2]	- [2]	- [2]	- [2]	- [1]	- [1]	- [1]
STEP 7	IE	- [2]	- [2]	+ [4]	+	+	- [3]	- [1]
STEP 7	PB	- [2]	- [2]	- [1]	- [1]	- [1]	- [1]	- [1]

[1]: Is not supported.

[2]: Is not allowed because an IP service is used here. Permitted with DCP-based services, since only possible locally.

[3]: According to IEC 61158-x-10 changing the IP parameters of an IO device when a connection is established is not premitted.

[4]: Not supported for reasons of compatiblity. Reformatting the C-PLUG for IE/PB LINK PN IO V3 is permitted.

There are restrictions in the following situations:

- The LINK in "Proxy" mode is in the STOP status.
- The LINK in "Proxy" mode has no connection to the IO controller.
- The LINK is in "Standard mode" and was configured only via PST (DCP).

Diagnostics and maintenance 5

5.1 Diagnostics options

The following diagnostics options are available:

LEDs of the module

For information on the LED displays, refer to the section LEDs, connectors, buttons (Page 23).

STEP 7 Professional: The "Diagnostics" tab in the Inspector window

If ou access the LINK via Ethernet, you obtain the following information on the selected module:

- Entries in the diagnostics buffer
- Information on the online status of the module

STEP 7 Professional: Diagnostics functions via the "Online > Online and diagnostics" menu

Using the online functions, you can read diagnostics information from the LINK from an engineering station on which the project with the LINK is stored. You obtain, for example; the following static information:

- General information on the module
- Information on the diagnostics status
- Diagnostics buffer entries
- Information on the PROFINET interface
- Information on the DP interface

You will find further information on the diagnostics functions of STEP 7 in the STEP 7 information system.

STEP 7 V5

Here, the known diagnostics tools are available to you.

SNMP

You will find detailed information about the supported functions in the section SNMP (Page 77).

Monitoring the C-PLUG and the redundant power supply

In the configuration you can activate monitoring of the C-PLUG and the redundant power supply. When the monitoring is activated, when certain errors occur a diagnostics entry is made in the diagnostics buffer. For details, refer to the STEP 7 online help .

5.2 Clearing and for resetting to factory settings

The CP has a two-level function available for resetting memory:

- **Memory reset**

  Following the memory reset, the LINK retains the retentive parameters. The LINK is therefore immediately ready for downloads using the IP address.

  The retentive parameters include:

  – IP address, subnet mask and, if applicable, router address, PROFIBUS device name

  – LAN settings

  – I&M data

- **Reset to factory settings**

Note

LINK no longer reachable after reset

After resetting to factory settings the LINK is no longer reachable with its previous IP parameters.

For information on the restrictions in the "PROFINET IO proxy" mode, refer to the section Overview: Access to the LINK as proxy (Page 69),

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After resetting, the LINK only contains the MAC address (as shipped). The content of the C-PLUG is completely deleted, the formatting is retained.

The LINK restarts.

How to use the function

- **Memory reset**
  - In STEP 7 V5 / special diagnostics with the "Operating Mode" > "Clear/Reset Module" menu command
  - In STEP 7 Basic/Professional via "Online & diagnostics" > "Go online" > "Online tools" > open input box > button "MRES"
- **Reset to factory settings**
  - In STEP 7 V5.x with the menu command "PLC" > "Ethernet" > "Edit Ethernet Node" > "Reset to Factory Settings"
  - In STEP 7 / special diagnostics with the menu command "Operating Mode" > "Reset to Factory Defaults"
  - In STEP 7 Professional with "Online" > "Online & Diagnostics" > "Functions" > "Reset to Factory Settings"
  - In PST with the menu command "Module" > "Reset".
  - By pressing the button

    Press the button initially for 3 seconds to change from normal mode to the maintenance mode.

    After this, press the button again for 10 seconds to reset the LINK.

    For information on changing to the maintenance mode using the button, see section Maintenance mode (Page 30).

5.3 Loading firmware

Requirements

Note

The new firmware can only be downloaded if the PROFIBUS interface parameter assignment. "FWL_FAST_LOAD" of the PG/PC CP is enabled.

The LINK supports the loading of new firmware files by the firmware loader of STEP 7.

If a new firmware version is available for the module, you will find this on the Internet pages of Siemens Industry Online Support:

Link: (https://support.industry.siemens.com/cs/ww/en/ps/15406/dl)

The PG/PC must be connected to the LINK via a direct point-to-point connection via PROFIBUS. There must be no other node on the bus.

Procedure

The firmware is downloaded from the PC/PG via PROFIBUS.

A new firmware file can only be loaded in maintenance mode after a restart. You effect a restart using the button (see below) or by turning the power supply off and on. After the restart you can start to load a new firmware file within the first 10 seconds.

To change to the maintenance mode using the button, follow he steps below:

1. Press the button initially for 3 seconds to change from normal mode to the maintenance mode.

   The LEDs signal the maintenance mode, see section LED displays of the LINK (Page 23).

2. Then press the button twice briefly within 5 seconds.

   The LINK restarts.

   After the restart the LINK remains ready for new firmware for 10 seconds.

   For information on switching over see also section Maintenance mode (Page 30).

3. On the PG/PC start the load procedure within the first 10 seconds after changing to maintenance mode.

The firmware update is completed when the LED pattern "Loaded firmware being activated" goes off, see also section LED displays of the LINK (Page 23).

You will find more information on loading the firmware in the online help of STEP 7 or in the online help of the firmware loader.

Loading firmware using the STEP 7 NCM firmware loader

The firmware loader is installed, along with STEP 7 V5.

Open the firmware loader from the Windows Start menu:
"Siemens Automation > SIMATIC > STEP 7 > NCM S7 > Firmware Loader"

You will find more information in the online help of the firmware loader.

Loading firmware in STEP 7 Basic / Professional

1. Select the LINK.
2. Open the "Online" > "Online & diagnostics" menu.
3. In the online view, open the parameter group. "Functions" > "Firmware-Update" and start the firmware update using the button "Start updating the firmware".

   The window. "SIMATIC NET Firmware - Loader" opens and guides you through the installation process.

Behavior after loading a firmware file

Once loading the firmware is completed, the LINK restarts and automatically returns to productive operation.

Check, for example with the special diagnostics of STEP 7 whether the new firmware is enabled after loading.

5.4 Upload tp PG/Upload from device

Uploading from the device (STEP 7)

If you want to upload the configuration data from the device to the PG or engineering station, in the selection dialog you need to set the rack to 0 and the slot to 0 or 2.

5.5 Replacing a module

5.5.1 Resetting address data

Note

Resetting address data if the use of the LINK is changed

If the LINK has already been operated in your plant and you want to use it at a different location in the plant, it starts up with the configured parameters.

If the LINK has been used previously in your plant or has been repaired, delete all stored data by resetting to the factory settings.

The MAC address is stored permanently on the LINK and is not deleted when you reset to the factory settings.

5.5.2 Replacing older modules

Replacing a module

The LINK (6GK1 411-5AB10) can be used as a replacement for the following predecessor products:

- 6GK1 411-5AB00

Replacement variants

When replacing a predecessor module (6GK1 411-5AB00) with the LINK (6GK1 411-5AB10) . The following variants can be distinguished:

- **Replacement with unchanged configuration (module replacement)**

  An existing module is replaced by a new module without changing the configuration.

  To load the unchanged configuration on the new module, two methods are possible:

  – Load the existing configuration data on the new module.

  – Insert the C-PLUG of the predecessor module in the new module.

  Note

  Older C-PLUG cannot be overridden with data of the new LINK

  A C-PLUG of the predecessor module cannot be overridden with data of the new LINK.

  If you want to load the configuration data of the link 6GK1 411-5AB00 on the C-PLUG of the predecessor module, you must first reformat the C-PLUG. See section C-PLUG (Page 39) for information on this.

- **Replacement with new configuration**

  An existing module is replaced by a new module with a new configuration.

  If adaptations are made to the configuration, the IE/PB LINK PN IO can be used instead of a module with firmware version V2.x or V1.0. The LINK used previously is replaced by the new LINK in the configuration:

  Load the new configuration on the new module.

Unless otherwise specified, in both cases, the range of functions of the previous module continues to be supported.

5.5.3 Replacing a module without PG/PC

An existing module can be replaced by a new module without changing the configuration.

To load the unchanged configuration on the new module, insert the C-PLUG of the removed module in the new module.

For information on replacing with previous modules, refer to the information in section Replacing older modules (Page 75).

Obtain IP address from a DHCP server

When configuring in STEP 7, you can specify the IP configuration for the LINK. One option here is that the LINK obtains the IP address from a DHCP server.

The DHCP server can assign the IP address based on the client ID, the MAC address or the host name.

If after a replacement, the LINK should always receive the same IP address from the DHCP server, always configure a client ID or a host name.

5.6 SNMP

SNMP (Simple Network Management Protocol)

SNMP is a protocol for diagnostics and managing networks and nodes in the network. To transmit data, SNMP uses the connectionless UDP protocol.

The information on the properties of SNMP-compliant devices is entered in MIB files (MIB = Management Information Base).

You will find detailed information on SNMP and the Siemens Automation MIB in the manual /5/ (Page 94).

For more detailed information on using MIB files, refer to the documentation of the SNMP client you are using (example of an SNMP client: SNMP OPC server from SIMATIC NET).

Range of performance of the LINK

The LINK supports data queries using SNMP in version V1 (standard). The LINK returns the content of certain MIB objects according to the MIB II standard and the part of the Siemens Automation MIB relevant for the LINK.

Traps are not supported.

Supported MIBs in SNMPv1

The LINK supports the following MIBs and groups of MIB objects:

- **MIB II (acc. to RFC1213)**
  - System
  - Interfaces
  - IP
  - ICMP
  - TCP
  - UDP
  - SNMP

  The following groups of the standard MIB II are not supported:
  - AT
  - EGP
  - Transmission
- **LLDP MIB**

- **MRP Monitoring**
- **Siemens Automation MIB**

  Note that write access is permitted only for the following MIB objects of the "System" group:

  – sysContact
  – sysLocation
  – sysName

    A set sysName is sent as the host name using DHCP option 12 to the DHCP server to register with a DNS server.

  For all other MIB objects and groups, only read access is possible for security reasons.

Access permissions using community name

The LINK uses the following community names to control the access rights in the SNMP agent:

Table 5- 1 Access rights in the SNMP agent

Type of access	Community name *)
Read access	public
Read and write access	private

*) Note the use of lowercase letters!

Technical data

6

6.1 Technical specifications of the LINK

Table 6- 1 Technical specifications

Technical specifications		
Attachment to Industrial Ethernet		
Amount	1 x PROFIBUS interface 1 x PROFINET interface with 2port switch	
Design of the PROFIBUS interface	Connector	9-pin D-sub female connector
	Transmission rate	9,6 / 19,2 / 45,45 / 93,75 / 187,5 / 500 Kbps 1,5 / 3 / 6 / 12 Mbps
Design of PROFINET interface (2port switch)	Connector	2 x RJ-45 jacks
	Transmission rate	10 / 100 Mbps
		When working with PROFINET IO and cyclic transfer, the transmission speed of 100 Mbps full duplex is mandatory.
	Aging time	5 minutes
	Special features of the ports X1 P1 R and X1 P2 R	Integration in ring topology / MRP possible
Electrical data		
External power supply, redundant setup	Power supply Permitted range	24 VDC +20.4 V to +28.8 V
Current consumption	From external power supply	• 200 mA typical (without connected bus adapter) • 300 mA maximum
Effective power loss	Typical	4.8 W
	Maximum	7.2 W
Permitted ambient conditions		
Ambient temperature	During operation with the rack installed horizontally	0 °C to +60 °C
	During operation with the rack installed vertically	0 °C to +40 °C
	During storage	-40 °C to +70 °C
	During transportation	-40 °C to +70 °C
Relative humidity	During operation	≤ 95 % at 25 °C, no condensation
Operating altitude	During operation	≤ 2000 m above sea level at max. 60 °C ambient temperature
Contaminant concentration	Acc. to ISA-S71.04 severity level G1, G2, G3	

Technical specifications	
Design, dimensions and weight	
Module format	Housing of the ET 200SP device family
Degree of protection	IP20
Weight	Approx. 600 g
Dimensions (W x H x D)	100 x 117 x 74 mm
Installation options	Installation on a rail: 35 mm DIN rail
Product functions *	

***** You will find further functions in the section Application and properties (Page 11).

Over and above this, all the information listed in the system manual "Distributed I/O System ET 200SP" applies to the LINK:

- Electromagnetic compatibility
- Transportation/storage conditions
- Mechanical and climatic environmental conditions
- Information on insulation checks, protection class and degree of protection

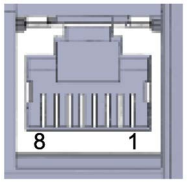
For the system manual see /4/ (Page 94).

6.2 Pinout of the Ethernet interface

Pinout of the Ethernet interface

The table below shows the pin assignment of the Ethernet interface. The pin assignment corresponds to the Ethernet standard 802.3-2005, 100BASE-TX version.

Table 6- 2 Pin assignment of the Ethernet interface

View of the RJ-45 jack	Pin	Signal name	Assignment
	1	TD	Transmit Data +
	2	TD_N	Transmit Data -
	3	RD	Receive Data +
	4	GND	Ground
	5	GND	Ground
	6	RD_N	Receive Data -
	7	GND	Ground
	8	GND	Ground

6.3 Pin assignment of the PROFIBUS interface

PROFIBUS interface

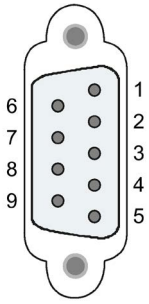


Table 6- 3 Pinout of the D-sub socket

Pin	Description	Pin	Description
1	- not used -	6	VP: Power supply +5 V only for bus terminating resistors; not for supplying external devices
2	- not used -	7	- not used -
3	RxD/TxD-P: Data line B	8	RxD/TxD-N: Data line A
4	CNTR-P: RTS	9	- not used -
5	DGND: Ground for data signals and VP	Housing	Ground connector

PROFIBUS cable and connector

NOTICE
Contacting the shield of the PROFIBUS cable The shield of the PROFIBUS cable must be contacted. To do this, strip the insulation from the end of the PROFIBUS cable and connect the shield to functional earth.

Approvals 7

Approvals issued

Note

Issued approvals on the type plate of the device

The specified approvals apply only when the corresponding mark is printed on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate.

EU declaration of conformity

CE

The product meets the requirements and safety objectives of the following EC directives and it complies with the harmonized European standards (EN) for programmable logic controllers which are published in the official documentation of the European Union:

- **2014/34/EU (ATEX explosion protection directive)**

  Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, pages. 309-356

- **2014/35/EU (Low Voltage Directive)**

  Directive of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits; official journal of the EU L96, 29/03/2014, p. 357-374.

- **2014/30/EU (EMC)**

  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, pages. 79-106

- **2011/65/EU (RoHS)**

  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EU L174, 1 July 2011, pages 88-110

The EU declaration of conformity is available to all responsible authorities at:

Siemens Aktiengesellschaft
Division Process Industries and Drives
Process Automation
DE-76181 Karlsruhe
Germany

You will find the EC Declaration of Conformity for this product on the Internet at the following address:

Link: (https://support.industry.siemens.com/cs/ww/en/ps/15406/cert)
→ "Entry list" tab
Filter settings: Entry type "Certificates", Certificate Type "Declaration of Conformity"

IECEx

The product meets the requirements of explosion protection according to IECEx.

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the ATEX certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA

  IECEx classification: Ex nA IIC T4 Gc

  Certificate no.: DEK 14.0025 X

  The products meet the requirements of the following standards:

  – IEC 60079-0 (Hazardous areas - Part 0: Equipment - General requirements)
  – IEC 60079-15 (Hazardous areas - Part 15: Equipment protection by type of protection "n")

- ec

  IECEx classification: Ex ec IIC T4 Gc

  Certificate no.: DEK 18.0019 X

  The products meet the requirements of the following standards:

  – IEC 60079-0 (Hazardous areas - Part 0: Equipment - General requirements)
  – IEC 60079-7 (Hazardous areas - Part 7: Equipment protection through increased safety "e")

You can see the current versions of the standards in the IECEx certificate that you can find on the Internet at the following address:

Link: (https://support.industry.siemens.com/cs/ww/en/ps/15406/cert)

The conditions must be met for the safe deployment of the product according to the section Notes on use in hazardous areas according to ATEX (IECEx) (Page 35).

You should also note the information in the document "Use of subassemblies/modules in a Zone 2 Hazardous Area" that you can find on the Internet at the following address:

Link: (https://support.industry.siemens.com/cs/ww/en/view/78381013)

ATEX



The product meets the requirements of the EU directive 2014/34/EU "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the ATEX certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA

  ATEX classification: II 3 G Ex nA IIC T4 Gc

  Certificate no.: KEMA 07ATEX0145 X

  The products meet the requirements of the following standards:

  – EN 60079-0 (Hazardous areas - Part 0: Equipment - General requirements)

  – EN 60079-15 (Hazardous areas - Part 15: Equipment protection by type of protection "n")

- ec

  ATEX classification: II 3 G Ex ec IIC T4 Gc

  Certificate no.: DEKRA 18ATEX0027 X

  The products meet the requirements of the following standards:

  – EN 60079-0 (Hazardous areas - Part 0: Equipment - General requirements)

  – EN 60079-7 (Hazardous areas - Part 7: Equipment protection through increased safety "e")

⚠ WARNING

Note the installation guidelines

The product meets the requirements if you keep to the following during installation and operation:

- The notes in the section Installation, connecting up, commissioning (Page 33)
- The installation instructions in the document /3/ (Page 94)

The current versions of the standards can be seen in the EU Declaration of Conformity, see above.

The conditions must be met for the safe deployment of the product according to the section Notes on use in hazardous areas according to ATEX (IECEx) (Page 35).

You should also note the information in the document "Use of subassemblies/modules in a Zone 2 Hazardous Area" that you can find on the Internet at the following address:

Link: (https://support.industry.siemens.com/cs/ww/en/view/78381013)

Electromagnetic compatibility (EMC directive)

The product meets the requirements of the EC Directive:2004/108/EEC "Electromagnetic Compatibility" according to the following standards:

- EN 61000-4

  Emission - industrial area

- EN 61000-2

  Immunity - industrial area

RoHS

The product meets the requirements of the EU directive 2011/65/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Applied standard:

- EN 50581:2012

cULus

Underwriters Laboratories Inc. meets

- Underwriters Laboratories, Inc.: UL 508 Listed (industrial control devices)
- Canadian Standards Association: CSA C22.2 No. 142 (process control equipment)

cULus HAZ.LOC.

Underwriters Laboratories Inc. meets

- UL 1604 (Hazardous Location)
- CSA C22.2 No. 213 (Hazardous Location)

APPROVED for Use in:

- Cl. 1, Div. 2, GP. A, B, C, D T4A; Ta = -20 °C...60 °C
- Cl. 1, Zone 2, GP. IIC T4; Ta = -20 °C...60 °C

FM

Factory Mutual Research (FM)
Approval Standard Class number 3600 and 3611
Approved for use in:
Class I, Division 2, Group A, B, C, D, Temperature Class T4A, Ta = 60 °C
Class I, Zone 2, Group IIC, Temperature Class T4, Ta = 60 °C

C-Tick



The product meets the requirements of the AS/NZS 2064 standards (Class A).

See also

Link: (https://support.industry.siemens.com/cs/ww/en/ps/15406/cert)

Important notes on using the device (Page 33)

Current approvals

SIMATIC NET products are regularly submitted to the relevant authorities and approval centers for approvals relating to specific markets and applications.

If you require a list of the current approvals for individual devices, consult your Siemens contact or check the Internet pages of Siemens Industry Online Support:

Link: (https://support.industry.siemens.com/cs/ww/en/ps/15406/cert)

Accessories

A

A.1 BusAdapter

BusAdapter ET200SP

As an alternative to the integrated Ethernet interface X1, the LINK supports connection to the Ethernet network bus adapter of the ET 200SP device family. A BusAdapter does not ship with the LINK.

The LINK supports the following bus adapters:

- BA 2×RJ45

  PROFINET bus adapter with the following connectors:

  – 2 x Ethernet jack RJ-45

  Article number: 6ES7193-6AR00-0AA0

- BA 2xFC

  PROFINET bus adapter with the following connectors:

  – 2 x direct connection of the bus cable (FastConnect)

  Article number: 6ES7193-6AF00-0AA0

- BA 2xSCRJ

  PROFINET bus adapter with the following connectors:

  – 2 x fiber-optic cable POF/PCF

  Article number: 6ES7193-6AP00-0AA0

- BA SCRJ/RJ45

  PROFINET bus adapter, media converter FO - copper with the following connectors:

  – 1 x fiber-optic cable POF/PCF

  – 1 x Ethernet jack RJ-45

  Article number: 6ES7193-6AP20-0AA0

- BA SCRJ/FC

  PROFINET bus adapter, media converter FO - copper with the following connectors:

  – 1 x fiber-optic cable POF/PCF

  – 1 x direct connection of the bus cable (FastConnect)

  Article number: 6ES7193-6AP40-0AA0

- BA 2xLC

  PROFINET BusAdapter with the following connectors:

  – 2 x fiber-optic cable glass fiber

  Article number: 6ES7193-6AG00-0AA0
- BA LC/RJ45

  PROFINET bus adapter, media converter FO - copper with the following connectors:

  – 1 x fiber-optic cable glass fiber

  – 1 x Ethernet jack RJ-45

  Article number: 6ES7193-6AG20-0AA0
- BA LC/FC

  PROFINET bus adapter, media converter FO - copper with the following connectors:

  – 1 x fiber-optic cable glass fiber

  – 1 x direct connection of the bus cable (FastConnect)

  Article number: 6ES7193-6AG40-0AA0
- BA 2xRJ45 VD HA

  Ethernet adapter for communication via 2-, 4- or 8-wire copper lines (Variable Distance)

  Article number: 6GK5991-2VA00-8AA2
- BA 2xRJ45 HA

  PROFINET BusAdapter with the following connectors:

  – 2 x Ethernet jack RJ45

  Article number: 6DL1193-6AR00-0AA0
- BA 2xFC HA

  PROFINET BusAdapter with the following connectors:

  – 2 x direct connection of the bus cable (FastConnect)

  Article number: 6DL1193-6AF00-0AA0
- BA 2xLC HA

  PROFINET BusAdapter with the following connectors:

  – 2 x fiber-optic cable glass fiber

  Article number: 6DL1193-6AG00-0AA0

SIPLUS ET 200SP

- BA 2xRJ45 SIPLUS

  PROFINET BusAdapter with the following connectors:

  – 2 x Ethernet jack RJ45

  Article number: 6AG1193-6AR00-7AA0 (based on 6ES7193-6AR00-0AA0)

- BA 2xFC SIPLUS

  PROFINET BusAdapter with the following connectors:

  – 2 x direct connection of the bus cable (FastConnect)

  Article number: 6AG1193-6AF00-7AA0 (based on 6ES7193-6AF00-0AA0)

- BA 2xSCRJ SIPLUS

  PROFINET BusAdapter with the following connectors:

  – 2 x FO fiber-optic cable

  Article number: 6AG1193-6AP00-2AA0 (based on 6ES7193-6AP00-0AA0)

- BA 2xLC SIPLUS

  PROFINET BusAdapter with the following connectors:

  – 2 x fiber-optic cable glass fiber

  Article number: 6AG1193-6AG00-2AA0 (based on 6ES7193-6AG00-0AA0)

You will find the pinout of the Ethernet interface of the bus adapter with RJ-45 connector in section Pinout of the Ethernet interface (Page 80).

You will find further details in the manual /4/ (Page 94) and in the Siemens Industry Mall. Link: (https://mall.industry.siemens.com)

A.2 C-PLUGs

Usable C-PLUGs

The LINK can be operated with a C-PLUG, a removable data storage medium of configuration data. A C-PLUG does not ship with the LINK.

The following C-PLUGs are available:

- **C-PLUG 32**

  Article number: 6GK1 900-0AB00

  Memory: 32 MB

- **C-PLUG 256**

  Article number: 6GK1 900-0AB01

  Memory: 256 MB

- **C-PLUG 256**

  Article number: 6GK1 900-0AB10

  Memory: 256 MB

Recommendation: Avoid writing data cyclically. The flash area allows a limited number of write cycles.

You will find further details in the Siemens Industry Mall.
Link: (https://mall.industry.siemens.com)

Documentation references

B

Where to find Siemens documentation

- Article numbers

  You will find the article numbers for the Siemens products of relevance here in the following catalogs:

  – SIMATIC NET - Industrial Communication / Industrial Identification, catalog IK PI

  – SIMATIC - Products for Totally Integrated Automation and Micro Automation, catalog ST 70

  You can request the catalogs and additional information from your Siemens representative. You will also find the product information in the Siemens Industry Mall at the following address:

  Link: (https://mall.industry.siemens.com)

- Manuals on the Internet

  You will find SIMATIC NET manuals on the Internet pages of Siemens Industry Online Support:

  Link: (https://support.industry.siemens.com/cs/ww/en/ps/15247/man)

  Go to the required product in the product tree and make the following settings:

  Entry type “Manuals”

- Manuals on the data medium

  You will find manuals of SIMATIC NET products on the data medium that ships with many of the SIMATIC NET products.

B.1 /1/

SIMATIC NET
IE/PB LINK PN IO
(6GK1 411-5AB10)
Operating Instructions
Siemens AG
Link: (https://support.industry.siemens.com/cs/ww/en/ps/15406/man)

B.2 /2/

SIMATIC NET
IE/PB LINK PN IO
(6GK1 411-5AB00)
Operating Instructions (2005)
Siemens AG
Link: (https://support.industry.siemens.com/cs/ww/en/view/19299692)

B.3 /3/

SIMATIC NET
S7 CPs for Industrial Ethernet
Configuring and Commissioning
Manual Part A - General Applications
Configuration Manual
Siemens AG
Link: (https://support.industry.siemens.com/cs/ww/en/view/30374198)

B.4 /4/

SIMATIC
Distributed I/O System ET 200
system manual
Siemens AG
Link: (https://support.industry.siemens.com/cs/ww/en/ps/14031/man)

B.5 /5/

SIMATIC NET
Diagnostics and configuration with SNMP
Diagnostics manual
Siemens AG
Link: (https://support.industry.siemens.com/cs/ww/en/ps/15392/man)

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