compatible with you

NETLink PRO

Ethernet Gateway for MPI/PROFIBUS

700-881-MPI11/700-881-MPI12

User Manual

Edition 8 / 16.04.09

HW 1-1a-1 and FW 1. 54 and higher

Order number of manual: 900-881-MPI11/en

Systeme Helmholz **GmbH** ● Hannberger Weg 2 ● 91091 Großenseebach ● Germany

Phone: +49 9135 7380-0 ● Fax: +49 9135 7380-110 ● E-Mail: info@helmholz.de ● Internet: www.helmholz.de

All rights are reserved, including those of translation, reprinting, and reproduction of this manual, or parts thereof. No part of this manual may be reproduced, processed, copied, or transmitted in any way whatsoever (photocopy, microfilm, or other method) without the express written permission of Systeme Helmholz GmbH, not even for use as training material, or using electronic systems. All rights reserved in the case of a patent grant or registration of a utility model or design.

Copyright © 2009 by

Systeme Helmholz GmbH

Hannberger Weg 2, 91091 Grossenseebach, Germany

Note:

We have checked the content of this manual for conformity with the hardware and software described. Nevertheless, because deviations cannot be ruled out, we cannot accept any liability for complete conformity. The information in this manual is regularly updated. When using purchased products, please heed the latest version of the manual, which can be viewed in the Internet at www.helmholz.de, from where it can also be downloaded.

Our customers are important to us. We are always glad to receive suggestions for improvement and ideas.

STEP ,Protool, Starter, Micromaster, and SIMATIC are registered trademarks of SIEMENS AG
MS-DOS and Windows are registered trademarks of Microsoft Corporation.

Revision history of this document:

Edition	Date	Revision
7	10.04.2008	New functions in the Web interface, troubleshooting expanded
8	16.04.2009	User name edit function implemented, layout revised

Contents

1	**Safety Information**	**8**
1.1	General	8
1.2	Restriction of access	9
1.3	Information for the user	9
1.4	Use as intended	9
1.5	Avoiding use not as intended!	9
2	**Installation and Mounting**	**10**
2.1	Mounting orientation	10
2.2	Minimum clearance	10
2.3	Installing the module	11
3	**System Overview**	**12**
3.1	Application and function description	12
3.2	Connections	13
3.3	LED displays	13
3.4	Items supplied	14
3.5	Accessories	15
3.5.1	Manuals	15
3.5.2	Software	15
4	**Installation of the driver software**	**16**
4.1	Introduction	16
4.2	System requirements	16
4.3	Running the installation setup	16
4.3.1	Adding the interface to the PG/PC interface	17
4.3.2	Selecting the required interface parameterization	19
5	**Configuration via the NETLink-S7-NET driver**	**20**
5.1	Properties	21
5.1.1	Local connection (TCP parameterization)	21
5.1.1.1	Creating a station	22
5.1.1.2	Setting TCP parameters	25
5.1.1.2.1	Static TCP configuration	26
5.1.1.2.2	Using DHCP	26
5.1.1.2.3	Additional features	27

5.1.1.3 Using the NETLink PRO for teleservice 27
5.1.2 Bus settings 28
5.1.2.1 MPI configuration 29
5.1.2.2 PROFIBUS configuration 30
5.1.2.3 PPI configuration 33
5.1.3 Options of the driver 34
5.1.3.1 Language setting of the display elements 34
5.1.3.2 Version information 34

5.2 Diagnostics 34
5.2.1 Bus members 35
5.2.2 Bus parameters 36

6 Parameterization via the parameterization tool '*NETLink PRO configuration*' 37

7 Possibilities of the web interface 38

7.1 Home page 38

7.2 Status page 39

7.3 Configuration page 41

7.4 Security page 44

7.5 Observing variables 47

8 Using the RFC1006 option (S7-TCP/IP) 49

8.1 Configuration of the RFC1006 interface 50
8.1.1 Autobaud ON/OFF 50
8.1.2 Own (local) station address 50
8.1.3 Storage of specified bus parameters 50
8.1.4 Addressing (rack/slot mode ON/OFF) 52
8.1.4.1 Addressed mode 52
8.1.4.2 Rack/slot mode 53

8.2 Example of configuration for WinCC V6.0/7.0 53
8.2.1 Using addressed mode 54
8.2.2 Use of rack/slot mode 56

9 Troubleshooting 60

10 Appendix 68

10.1 Technical Data 68

10.2 Pin assignments 68
10.2.1 MPI/PROFIBUS interface pin assignments 68
10.2.2 Assignment of the Ethernet interface (host interface) 69
10.2.3 Power supply socket 69

10.3 Further Documentation 70
10.3.1 Address conversion table 70
10.3.2 Information in the internet 71

1 Safety Information

For your own safety and for the safety of others, always heed the safety information given here. The safety information indicates possible hazards and provides information about how you can avoid hazardous situations.

The following symbols are used in this manual.

Caution, indicates hazards and sources of error

Gives information

Hazard, general or specific

*Danger of **electric shock***

1.1 General

The NETLink PRO is only used as part of a complete system.

The operator of a machine system is responsible for observing all safety and accident prevention regulations applicable to the application in question.

During configuration, safety and accident prevention rules specific to the application must be observed.

Emergency OFF facilities according to EN 60204 / IEC 204 must remain active in all modes of the machine system. The system must not enter an undefined restart.

Faults occurring in the machine system that can cause damage to property or injury to persons must be prevented by additional external equipment. Such equipment must also ensure entry into a safe state in the event of a fault. Such equipment includes electromechanical safety buttons, mechanical interlocks, etc. (see EN 954-1, risk estimation).

Never execute or initiate safety-related functions using an operator terminal.

1.2 Restriction of access

Only authorized persons must have access to the modules!

The modules are open equipment and must only be installed in electrical equipment rooms, cabinets, or housings. Access to the electrical equipment rooms, barriers, or housings must only be possible using a tool or key and only permitted to personnel having received instruction or authorization.

1.3 Information for the user

During configuration, safety and accident prevention rules specific to the application must be observed.

This manual is addressed to anyone wishing to configure, use, or install the NETLink PRO.

The manual tells the user how to operate the NETLink PRO and explains the signaling functions. It provides the installing technician with all the necessary data.

The NETLink PRO is exclusively for use with a S7-200 and S7-300/S7-400 programmable controller from Siemens.

The NETLink PRO is for use within a complete system only. For that reason, the configuring engineer, user, and installing technician must observe the standards, safety and accident prevention rules applicable in the particular application. The operator of the automation system is responsible for observing these rules.

1.4 Use as intended

The NETLink PRO must only be used as a communication and signaling system as described in the manual.

1.5 Avoiding use not as intended!

Make sure in the software that uncontrolled restarts cannot occur.

Safety-related functions must not be controlled via the NETLink PRO alone. Make sure in the software that uncontrolled restarts cannot occur.

2 Installation and Mounting

Before you start installation work, all system components must be disconnected from their power source.

Installation and mounting must be effected in compliance with VDE 0100 / IEC 364. Because it is an IP30 module, you must install it in a cabinet.

A maximum ambient temperature of 60 ºC must be ensured for reliable operation.

2.1 Mounting orientation

The NETLink PRO can be installed in any orientation.

2.2 Minimum clearance

Minimum clearances must be observed because

- then it is possible to insert and remove the NETLink PRO without having to remove other system components.
- there is enough space to connect existing interfaces and other contacts using standard commercial type accessories.
- there is room for any necessary cable routing.

For the NetLink PRO, a minimum clearance of 60 mm must be left above and below and 10 mm at the sides.

2.3 Installing the module

A wall/DIN rail bracket is available as an accessory for mounting on flat surfaces or on DIN rails.

The available accessories are listed in Section 3.5 with the corresponding order numbers.

3 System Overview

3.1 Application and function description

The NETLink PRO is a gateway between a TCP network and a PPI, MPI, or PROFIBUS network.

Two protocols are available at the TCP end for exchange of useful data with the automation system (multi-protocol operation):

- One is a proprietary protocol that is used to connect to the proprietary NETLink-S7-NET driver
- The other is the S7-TCP/IP protocol often used by visualization system manufacturers which is known as *'RFC1006'* or *'ISO on top of TCP'*.

Up to seven (6+1, see below) TCP connections (10 Mbps or 100 Mbps) and up to twelve PPI/MPI/PROFIBUS connections (9.6 kbps to 12 Mbps) can be used simultaneously.

Please note that up six TCP links per TCP protocol but no more than seven TCP links in total can be opened in multi-protocol operation.
This means that at least one spare link always remains that can be used by the other protocol.

On both the TCP and the field bus sides, the baudrate used can be determined automatically (autonegotiation or autobaud)

The NETLink PRO can draw the necessary power supply either from the bus interface of the programmable controller or via an external power supply.

The connecting cable used to link the NETLink PRO with the programmable controller is 1.2 meters long and active. Because it is active, no spur lines are required which could interfere with the bus.

The use of the NETLink-S7-NET driver makes it possible to use the NETLink PRO as the following at the PC end

- Programming adapter,
- Teleservice unit, or
- Operator control and monitoring unit

The RFC1006 interface also enables you to use third-party software that supports this protocol to communicate with S7-300/S7-400 systems.

The NetLink PRO is connected to the PC via a switch or hub in both cases.

If the NETLink PRO is connected directly to a PC, a crossover adapter must be interposed between the PC and the NETLink PRO (for accessories, see Section 3.5)

3.2 Connections

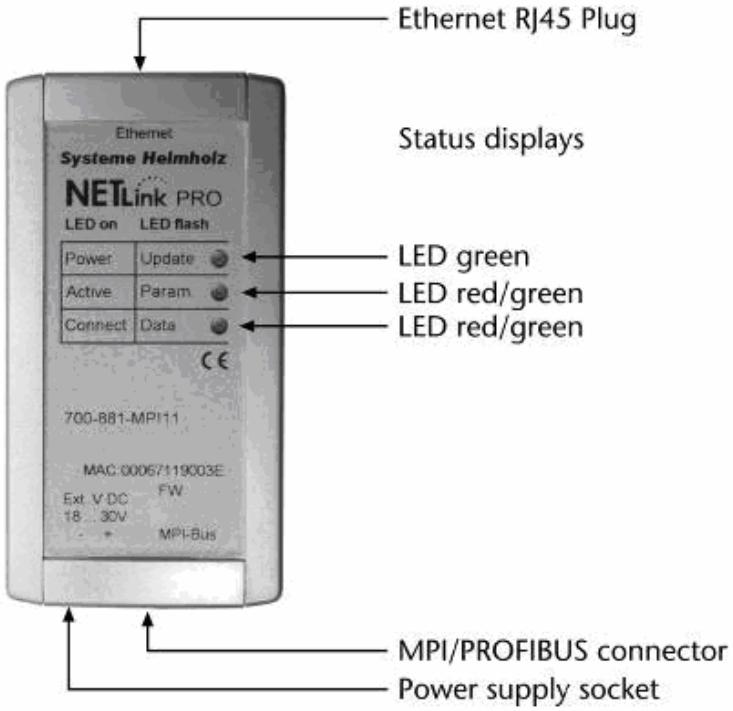
The NETLink PRO has the following connections:

The NETLink has the IP address 192.168.4.49 on delivery from the factory.

- RJ45 socket for connecting the unit to a commercial type switch or hub using a standard CAT5 TCP cable (straight).
  If the NETLink PRO is to be operated directly on a PC, a cross adapter (for accessories, see Section 3.5) or a CAT5 TCP cable (cross) must be used in most cases.
- Power supply socket for 24 V DC power supply.
  This power supply option can be used, if the programmable controller used does not provide any or only insufficient power on the bus connector.
- Bus connector with programming unit socket, switchable terminating resistor, and 1.2 m connecting cable.
  The programming unit socket of the bus connector allows further bus nodes to be plugged in.
  The terminating resistor must be connected (ON) if the NETLink PRO is at the beginning or end of a bus segment. If this is not the case, the switch position must be OFF.
  The 1.2 m connecting cable is an 'active cable'. This means there is no spur line, which avoids interference on the bus at high baud rates.

3.3 LED displays

The NETLink PRO has five LEDs, including two two-color LEDs, to indicate its operating status.



The two LEDs located on the RJ45 socket indicate by their status, the state in which the TCP network is:

LINK LED (green)		ACTIVE LED (yellow)	
Status	**Description**	**Status**	**Description**
OFF	Not connected	**OFF**	No activity on the network
ON	Connected	**ON**	Activity on the network
BLINK		**BLINK**	Activity on the network

The three LEDs (two two-color LEDs) on the top of the NETLink PRO indicate the operating status of the device itself:

LED status for operating status	Power LED (green)	Active LED (green)	Active LED (red)	Connect LED (green)	Connect LED (red)
Search for TCP configuration	BLINK				
Ready for operation	ON				
Try to log on to the PPI/MPI/PROFIBUS	ON	BLINK			
Actively logged on to the PPI/MPI/PROFIBUS	ON	ON			
Active connection with a programmable controller	ON	ON		ON	
Data exchange with a programmable controller	ON	ON		BLINK	
Transferring firmware update	BLINK		BLINK		BLINK
Storing firmware update	ON		ON		ON
Exception at bus end	ON				BLINK
Exception at PC end	ON		BLINK		

3.4 Items supplied

The NETLink has the IP address 192.168.4.49 on delivery from the factory.

The scope of supply of the NETLink PRO includes:

- NETLink PRO ready to run
- CAT5 TCP cable (straight) with a length of 3 meters
- CD with NETLink-S7-NET driver, additional infos
- Manual (German/English)

3.5 Accessories

3.5.1 Manuals

Manual, German	900-881-MPI11/de
Manual, English	900-881-MPI11/en

3.5.2 Software

S7/S5 OPC server with software license	800-880-OPC10
S7/S5 OPC server with USB dongle	800-880-OPC20

Other accessories

DIN mounting rail bracket 700-751-HSH01

The DIN rail bracket is for mounting the NETLink PRO on a DIN standard mounting rails.

The DIN rail bracket and NETLink PRO can be separated without the use of tools.

The DIN rail bracket can also be used as a wall bracket for mounting on flat surfaces.

Power supply adapter with plug 700-751-SNT01

Input: 100-240 V AC / 47-63 Hz / 400 mA

Output: 24 V DC / 625 mA

4 Installation of the driver software

With installation of the NETLink-S7-NET driver for the NETLink PRO, it is easy to access controllers with an PPI, MPI, or PROFIBUS interface from the PC via TCP/IP.

4.1 Introduction

The NETLink-S7-NET driver is inserted in the PG/PC interface of an existing Simatic application and can then be used from most Simatic engineering tools (STEP7, ProTool, WinCC, etc.).

Access is possible to any controllers of the Simatic S7-200, S7-300, or S7-400 series. The NETLink PRO communication adapter is required to connect a Simatic S7-200, S7-300, or S7-400 controller with the Ethernet network.

4.2 System requirements

A PC with a 32-bit Windows operating system is required to operate the NETLink-S7-NET driver at the PU end. The Windows 2000 and Windows XP operating systems can be used.

A further requirement is the existence of a Simatic engineering tools, such as STEP7, Version 5.1 and higher or STEP7-Micro/Win Version 4.0 and higher, which ensures that the PG/PC interface is installed on the computer.

Installation under Windows 98/ME/NT is possible but is not supported by the technical support team of Systeme Helmholz GmbH. Please pay attention to the requirements of the Simatic package used.

A functioning network link using TCP/IP must have been set up on the PCs that are used. The network configuration of the PC must be known. You can use normal commercial type network cards.

To maximize performance, 100 Mbps network cards and switches should be used in the local area network. Of course, you can also use 10 Mbps network cards and hubs but that would slow down status operation.

4.3 Running the installation setup

After you have inserted the installation CD, user guidance starts automatically, allowing the user to start the setup routine of the NETLink-S7-NET driver.

If the user guidance does not start automatically, the setup file can be launched manually in directory '*CD drive:\Driver*'.

If necessary, you can download the latest NETLink-S7-NET driver from our homepage (http://www.helmholz.de).

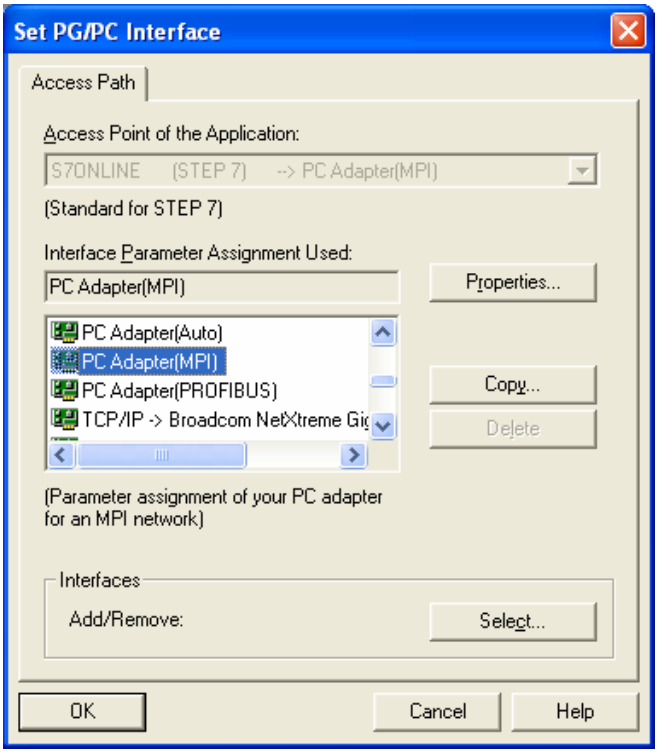
Administration rights are required for installation.

Please note that for installation you have to log on as an administrator under the 32-bit Windows operating systems Windows 2000® and Windows XP® because the setup program has to make entries in the Windows registry.

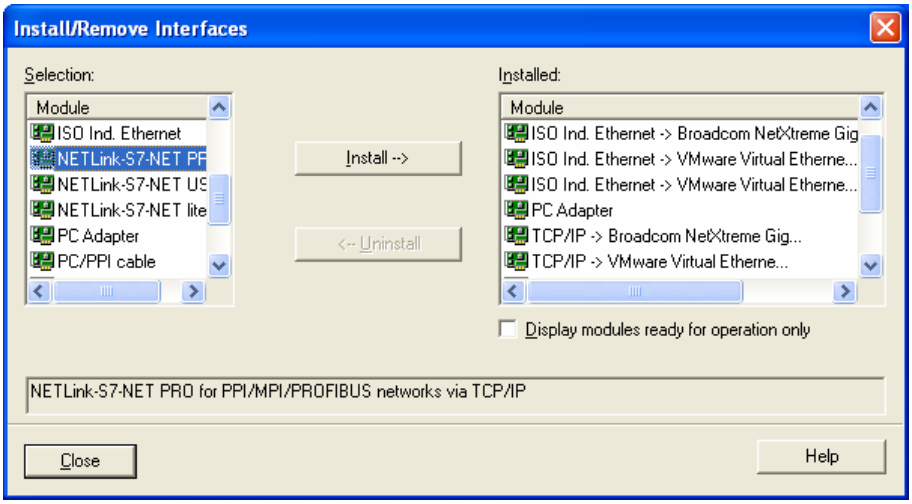
4.3.1 Adding the interface to the PG/PC interface

After initial installation, the new interface parameter set '*NETLink-S7-NET*' has to be set up. Administrator rights are necessary for this.

After you have started '*Set PG/PC Interface*' in the Control Panel, click the '*Select…*' button there.

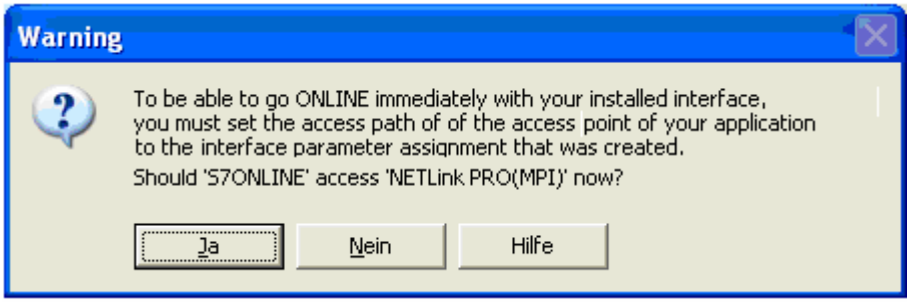


This opens the '*Install/uninstall interface*' dialog box.



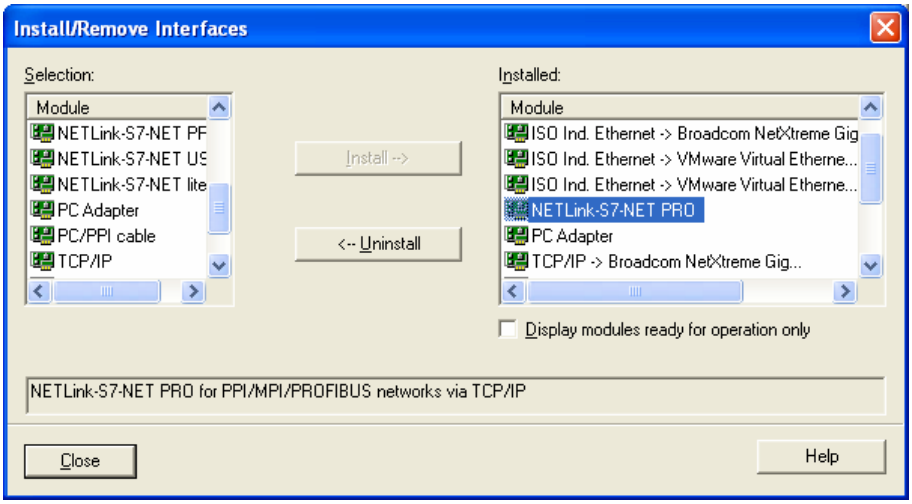
After you have selected the entry '*NETLink-S7-NET PRO*' from the left-hand list, click the '*Instal-->l*' button.

The following query then appears.



If you answer *"Yes"* to this query, the NETLink PRO is set as the current access path. If you respond *"No"*, the previous access path remains set and the NETLink PRO is put in the selection list where you can select it later.

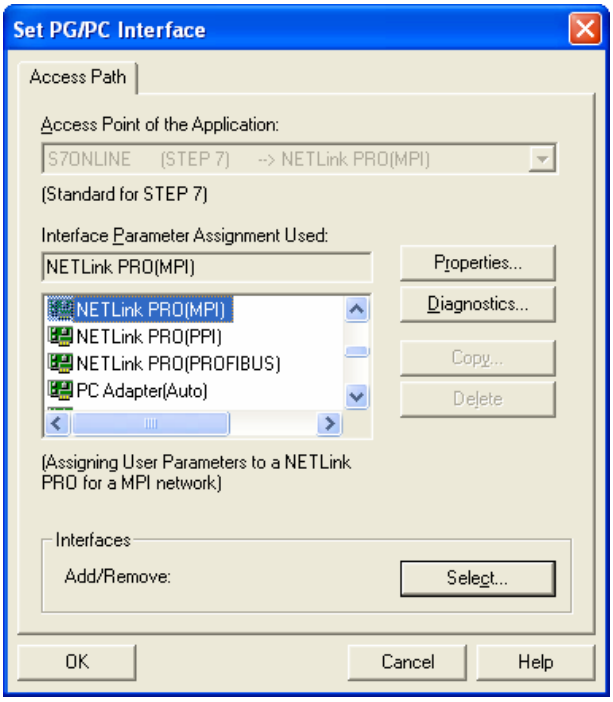
Now you have answered the query, *'NETLink-S7-NET PRO'* will appear in the right-hand list with the interfaces already installed.



The access path in the *'Set PG/PC Interface'* dialog box is set when this window is closed.

4.3.2 Selecting the required interface parameterization

The selection list for the interface parameter sets now contains an additional three items for the NETLink PRO.



All relevant settings of a NETLink-S7-NET driver can be made via the "*Properties*" access field. With the button '*Diagnostics...*' it is possible to show the nodes connected to the bus and the parameters the bus is working with. These fields are explained in Section 5.

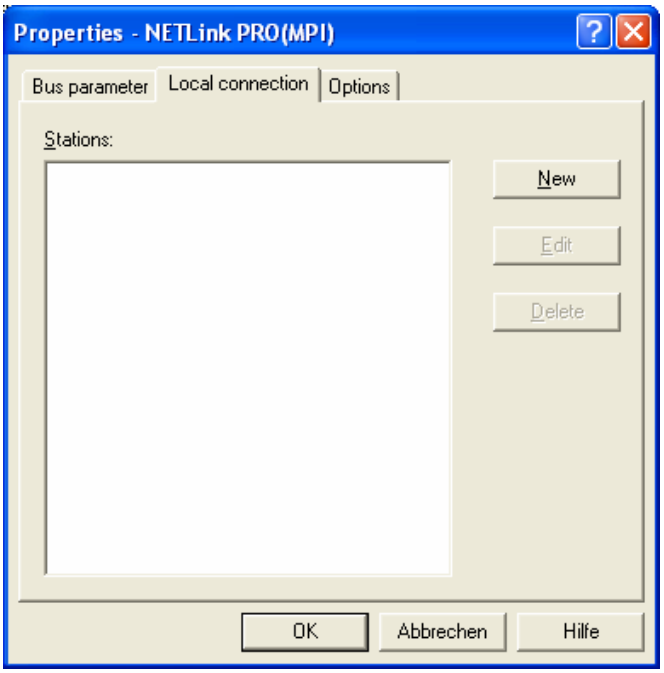
5 Configuration via the NETLink-S7-NET driver

Once a NETLink PRO has been selected in the '*Set PG/PC Interface*' window, it is possible to specify this access path more precisely with the '*Properties…*' button.

With the functionality behind the button '*Diagnostics...*', it is possible to read the bus configuration and scan connected nodes.

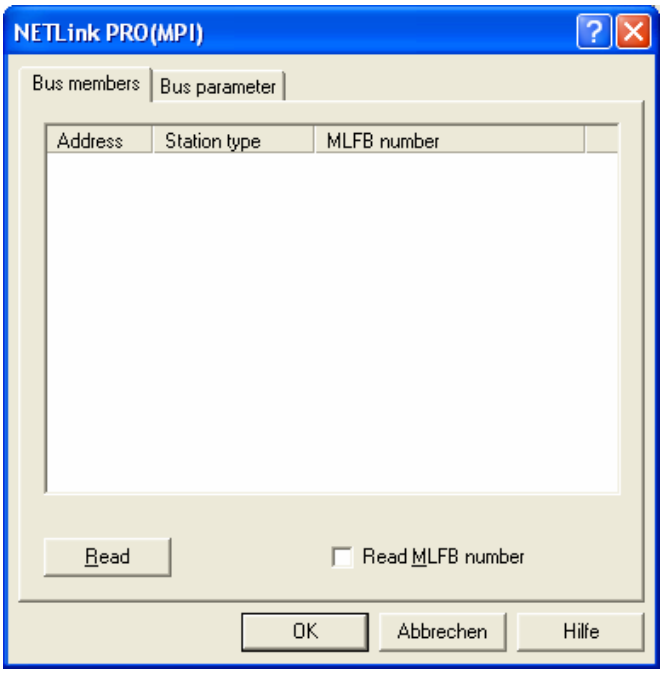
The properties of the access path NETLink PRO(xyz) are divided into three subareas as follows:

- Local connection (TCP configuration)
  Here, you set the IP address via which the required connection with the programmable controller will be established.
  The NETLink PRO hardware can also be parameterized in this window.
- Bus settings
  Here it is possible to state the bus configuration (e.g. station address) with which the NETLink PRO will enter the bus system.
- Options
  Here it is possible to change the language of the NETLink-S7-NET driver and to read out the version information of the driver.



Two functionalities are implemented for diagnostics at the connected bus:

- Bus members
  A list of all active and passive nodes connected to the bus will be displayed. By request the order numbers (MLFBs) will be displayed also if this functionality is available by the nodes.
- Bus parameters
  If possible, a list of all available bus parameters will be displayed.



5.1 Properties

5.1.1 Local connection (TCP parameterization)

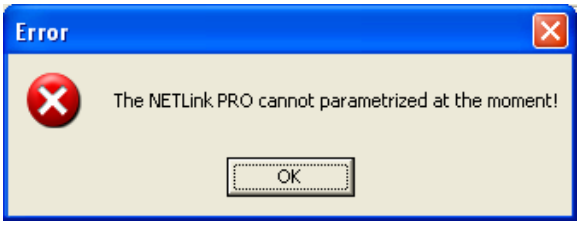
There are three basic ways of parameterizing NETLink PRO at the TCP end:

- Parameterization via 'Set *PG/PC interface*
  Existing stations can be reparameterized using the '*Change*' button
- Parameterization via the parameterization tool, *NETLink PRO configuration*' (see Section 6).
- Parameterization via the web interface of the NETLink PRO (see Section 7.3).

If the NETLink PRO is configured via the NETLink-S7-NET driver, the following points must be considered:

- If the NETLink PRO is active on the bus when reparameterization is required (e.g. a variable table or block is being viewed), reparameterization is not performed.

The ensuing reset would interrupt the NETLink PRO link



- The NETLink PRO can be protected against unauthorized reparameterization via a password (default password: “admin”).
  If an attempt is made to save a parameter set with an incorrect password, the following messages is displayed:

The password query must be answered correctly and confirmed with OK.

- If the password is correct during parameterization, the new parameter set will be saved and the following message displayed:

The default password is ‘admin’.

NETLink PRO is now restarted. This can take up to 15 seconds.

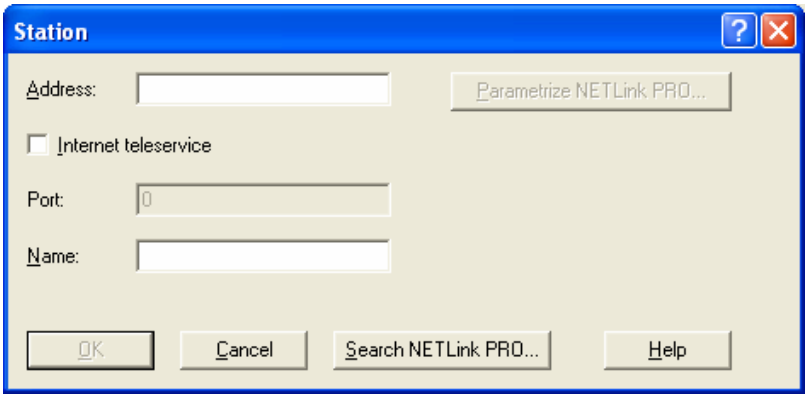
Rebooting can take up to 15 seconds.

5.1.1.1 Creating a station

To able to access a NETLink PRO with the NETLink-S7-NET driver, a station must be set up first. This station is virtual and is not stored in the NETLink PRO – it permits easier differentiation if two or more NETLink PROs are used.

The '*New*' button takes you to an input dialog box in which you can store the known IP address of an existing NETLink PRO and any name for easier assignment.

The NETLink has the IP address 192.168.4.49 on delivery from the factory.



If NAT/PAT is used, a port can be defined if 'Internet teleservice' is selected.

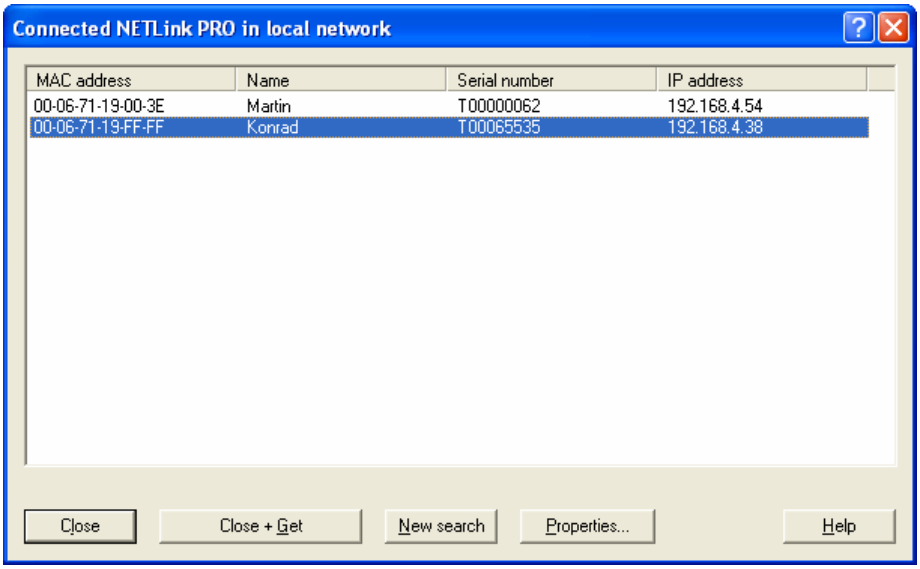
Is the desired NETLink PRO behind a router (e.g. internet teleservice), the network administrator is able to configure the router via NAT/PAT. So all frames going to a specific port of the router going to a specific NETLink PRO behind the router.

Using this functionality makes it possible to communicate to more as one NETLink PRO behind a router, if each station gets a specific port configuration.

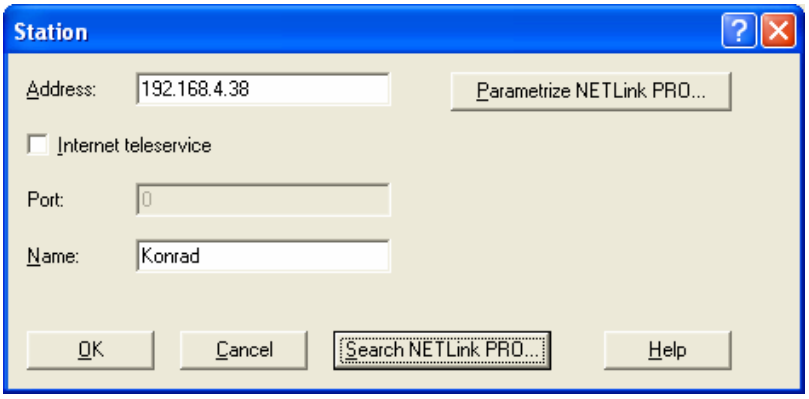
Is the NETLink PRO connected to the local network, the 'Internet teleservice' option must be deselected.

'*OK*' stores this station, which can now be used.

It is easier to search for an existing NETLink PRO in the local area network. Just click the '*Search NETLink PRO…*' button.

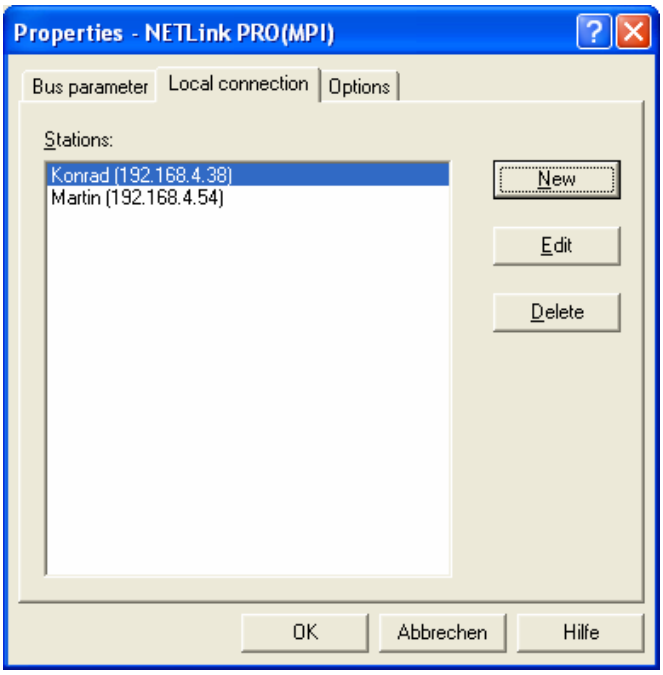


If you now select the required NETLink PRO and click the '*Close + Get*' button, the following dialog box will appear again:



This station can also be saved with '*OK*' and is then available.

If you do not want the name that is stored in the NETLink PRO to be the same as the station name, you can overwrite the station name (e.g. replacing the name '*Konrad*' with the name '*Michael*' in the example below).

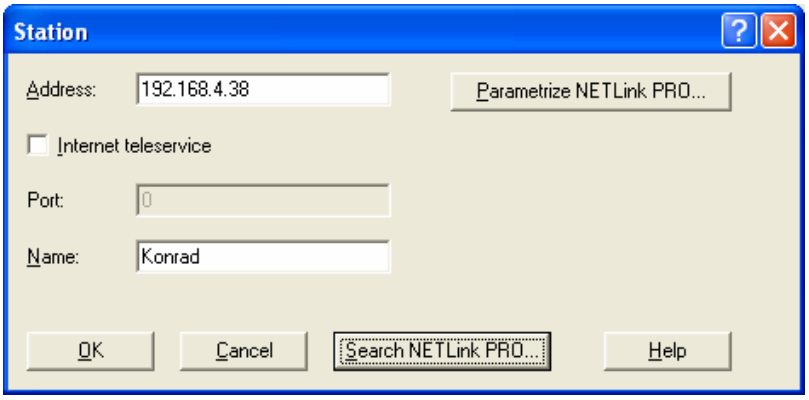


This completes parameterization of the driver.

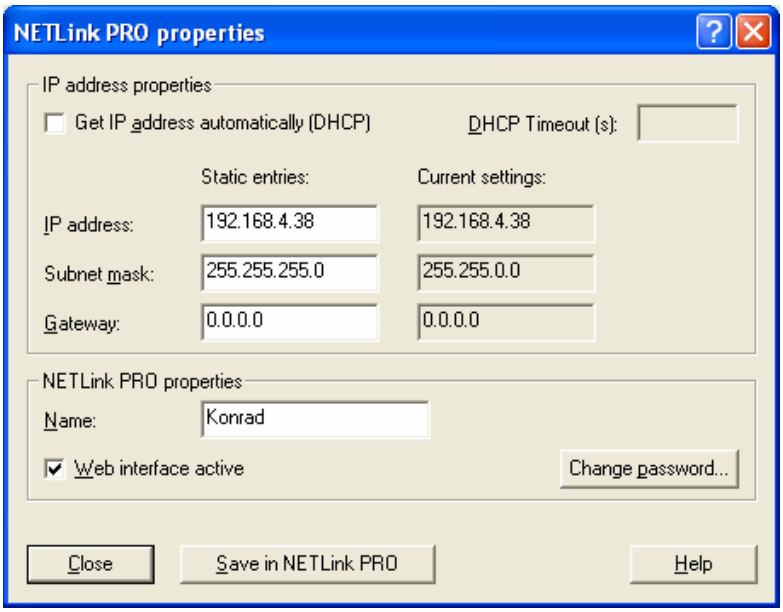
It may now be necessary to adapt the NETLink PRO to the situation in the existing TCP/IP network.

5.1.1.2 Setting TCP parameters

To change the TCP parameters, select the station in question and open the following dialog box with the '*Change*' button.



The '*Parametrize NETLink PRO…*' button takes you to a new input form that already contains the current parameters of the NETLink PRO:



If no NETLink PRO can be accessed via the stated IP address, the following message will appear:

This message can have two causes:

- There is no NETLink PRO with the stated IP address (e.g. the device has not yet been switched on or is still booting).
- The IP configuration of the computer used does not match the IP configuration of the stated NETLink PRO (e.g. different subnet mask settings).

From the parameterization form shown, it can be seen that not only static IP address allocation but also IP parameter assignment via DHCP (Dynamic Host Configuration Protocol) is possible.

Both these options are now explained in more detail.

The further configuration options are described in Section 5.1.1.2.3.

5.1.1.2.1 Static TCP configuration

If NETLink PRO is used in a network without a DHCP server (or you want the NETLink PRO to work with the same IP address on the network despite the presence of a DHCP server) the required IP parameters are stored in the input forms for '*Static parameters*'.

In this case, the checkmark is not set in the field '*Get IP address automatically (DHCP)*'.

Clicking the '*Save in NETLink PRO'* button saves the parameters in the NETLink PRO.

5.1.1.2.2 Using DHCP

To have the NETLink PRO receive its IP parameters automatically via DHCP, set a checkmark in the field '*Get IP address automatically (DHCP)*'.

This then enables the '*DHCP Timeout (s)*' input field. Enter the maximum waiting time here. If the NETLink PRO does not receive any parameters from the DHCP server within this time, it will use the stored static parameters to ensure that the device is accessible in the network and can be reparameterized if necessary.

Times shorter than 30 seconds are replaced by the default value (30 seconds) because most DHCP servers require 12 to 20 seconds to assign valid parameter sets.

Clicking the '*Save in NETLink PRO'* button saves the parameters in the NETLink PRO.

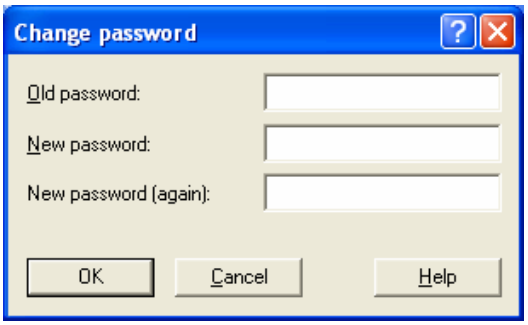
DHCP has the drawback that a NETLink PRO parameterized by this method could theoretically be assigned a different IP address from the DHCP every time it is switched on.

The system administrator responsible for the DHCOP server can counter this informing the DHCP server of the MAC address of the NETLink PRO. However, this is additional work for the system administrator.

5.1.1.2.3 Additional features

The '*NETLink PRO properties*' input form contains a '*NetLink PRO properties*' group box with further options that are explained here:

- Name:
  Here a name can be given to the NETLink PRO that identifies it better when it is shown in the search window. The name is stored in the device.
  The name may designate the location (e.g. conveyor HG1), the user (e.g. Mr. Example), or anything else (e.g. Not long till Friday).



The default password is 'admin'.

- Changing the password:
  Here you can change the actual password.
  It is only possible to change the configuration of the NETLink PRO with the password. This applies to parameterization both via the driver and via the web interface.

- Web interface active:
  If there is a checkmark in this checkbox, the parameterization of the NETLink PRO can be viewed and changed, if necessary, in any standard Browser (e.g. IE, Firefox, Opera …) as long as the password (if one has been set) is known.
  Section 7 provides more detailed information about what you can do with the web interface.

Here too, clicking the '*Save in NETLink PRO*' button saves the parameters in the NETLink PRO.

5.1.1.3 Using the NETLink PRO for teleservice

If you want to use the NETLink PRO for teleservice, you should consult the network administrators of both the locations involved.

There are various ways of implementing teleservice via a WAN (wide area network). Here are some suggestions:

Assignment of a separate, unique IP address with direct access to the network (WAN).

Advantage: Quick to implement
No intervention by the administrator required

Disadvantage: Few globally available addresses exist,
A separate network with direct WAN access is required, Security

- Use behind a router by means of NAT/PAT
  Advantage: Can be integrated into existing infrastructures.
  Administrator can ensure that it is not visible/usable from outside.
  Disadvantage: Network administrators must parameterize routers and firewalls between the communicating nodes.

- Use of a dial-up router (e.g. NETlink Router)
  Advantage: relatively simple to implement if a phone connection is available.
  Disadvantage: Loss of performance, additional costs due to phone charges, IP address can only be queried remotely via DynDNS services.

5.1.2 Bus settings

The NETLink PRO can be operated on three different bus systems: PPI, MPI, and PROFIBUS

From the NETLink PRO user's viewpoint, the three bus systems only differentiates by the transmission rates that can be selected and the additional options which are explained here.

The bus configuration is passed to the NETLink PRO during the runtime of the NETLink-S7-NET driver and is not stored in the device (exception: enabling the RFC1006 functionality, see Section 8).

It is possible to use the NETLink PRO without specifying bus-related information. The NETLink PRO then automatically ascertains the bus parameters and can be operated on different programmable controllers, possible, with different transmission rates without switching over the NETLink-S7-NET driver.

This autobaud function is supported if the '*Cyclic distribution of the bus parameters*' function is activated in the participating programmable controller. Usually this functionality is not available at S7-200 systems.

CPUs still exist, usually older types, that do not support cyclic distribution of bus parameters. The autobaud functionality cannot be used on these CPUs.

5.1.2.1 MPI configuration

The MPI configuration contains station and network-related settings.

The most important setting concerning bus configuration is assignment of the station address. This refers to the address the NETLink PRO will have on the bus when it goes online.

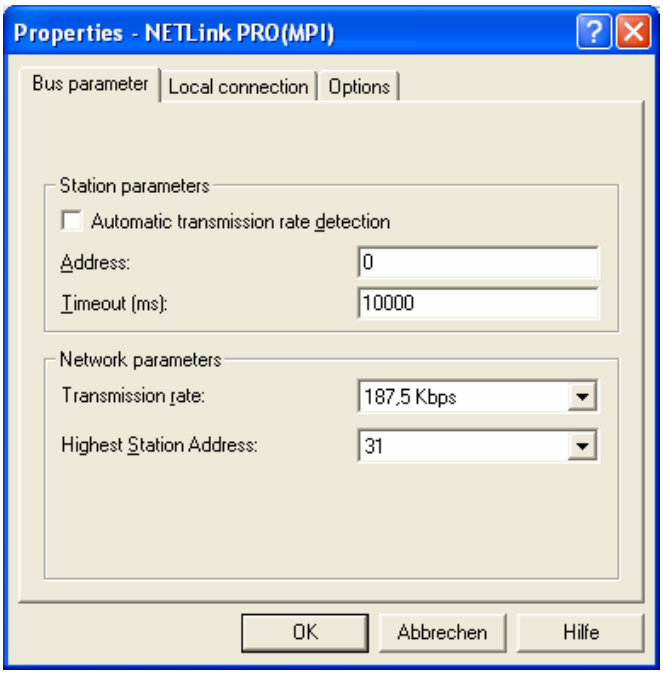
The station address can have any value from '*0*' and '*126*' if the selected address is lower than or equal to the highest station address (HSA).

Example: HSA = 31

> Any value between '*0*' and '*31*' can be specified for the station address if this address does not yet exist on the bus.

The local timeout of the NETLink-S7-NET driver can be parameterized in the station-related settings. If the driver does not receive a response to a request within the set timeout, a communication error is signaled to the Simatic application.

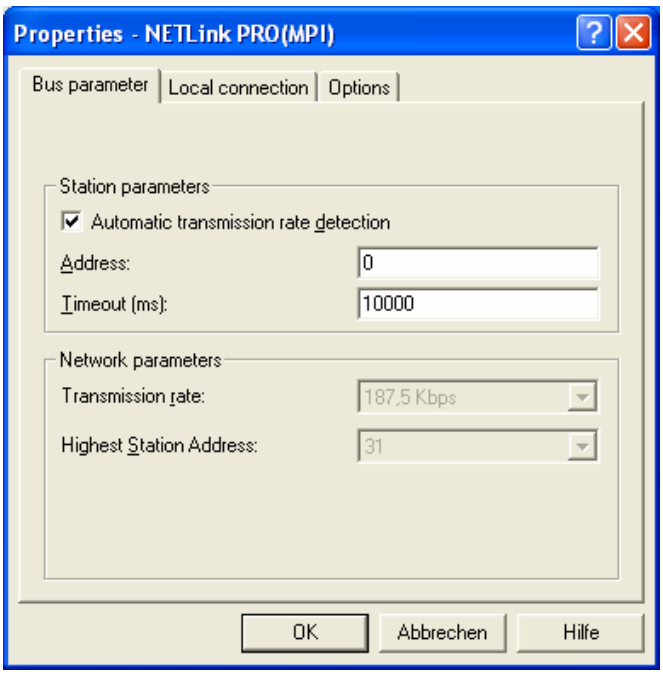
In the network-related settings, the transmission rate must be selected, as must the HAS of the programmable controller to be addressed.



To simplify configuration, the '*No baudrate detection*' function can be selected in the station-related settings.

This causes the NETLink PRO with the preset station address to ascertain the baudrate and associated bus parameters itself.

If this function is required, no manual setting of the network-related parameters is possible.



Use of the autobaud function does not impair the functionality, but initialization of a connection takes longer because the online parameters have to be ascertained.

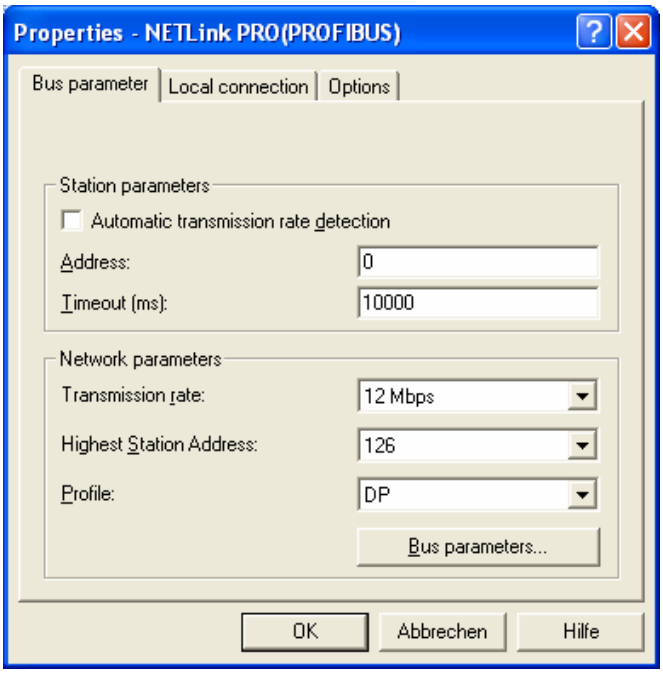
Some older Siemens CPUs do not support the autobaud function on the MPI. Also PPI systems are usually not able to support autobaud functionality.

It is also possible that the autobaud function may not function reliably at transmission rates slower than or equal to 19.2 Kbps or with increased use of communication via global data exchange, because the relevant telegram is transmitted more irregularly by the CPUs. In these cases, it is better to avoid automatic detection of the bus parameters.

5.1.2.2 PROFIBUS configuration

Basically, the same applies to PROFIBUS configuration as to MPI configuration. However, the network-related parameters are more extensive.

In addition to the parameters transmission rate and highest station address mentioned in Section 5.1.2.1, PROFIBUS also has parameter field for selecting the bus profile and bus parameters:

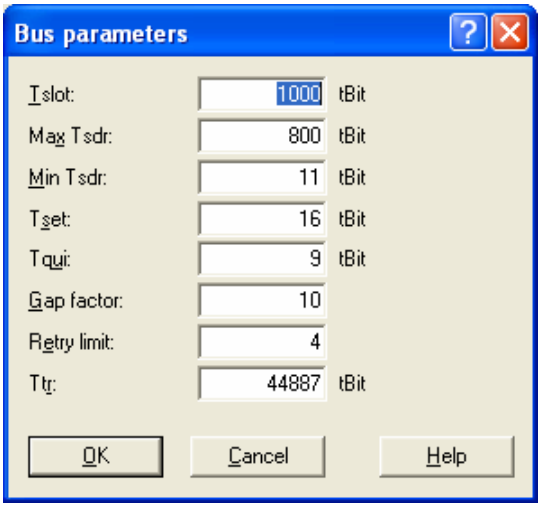


Profile:

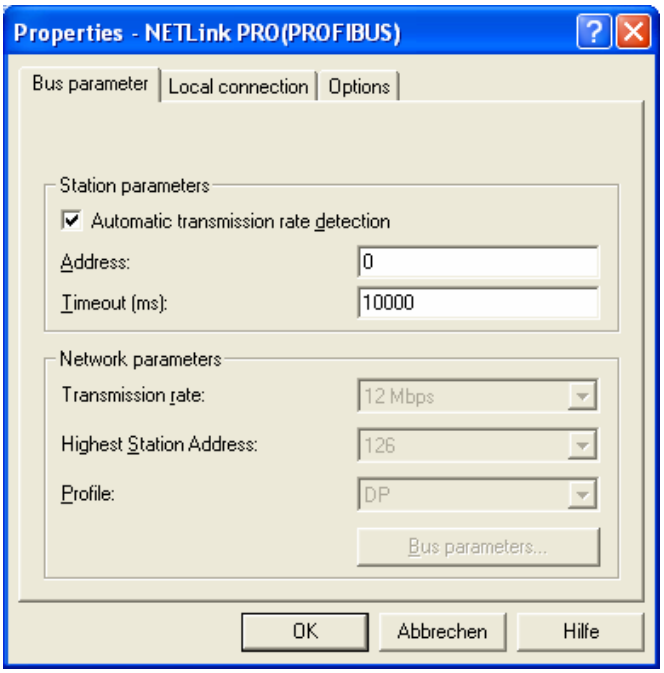
- Under PROFIBUS, there are usually the profiles *DP*, *Standard* und *User defined*.
- The profile must be selected that is already used in the programmable controller.

Bus parameters:

- Unlike the MPI bus profile, the bus parameters for PROFIBUS are not constant and change with the type and number of PROFIBUS stations used.
- The PROFIBUS parameters should always be set that are set in the currently used programmable controller (see current STEP7 project).

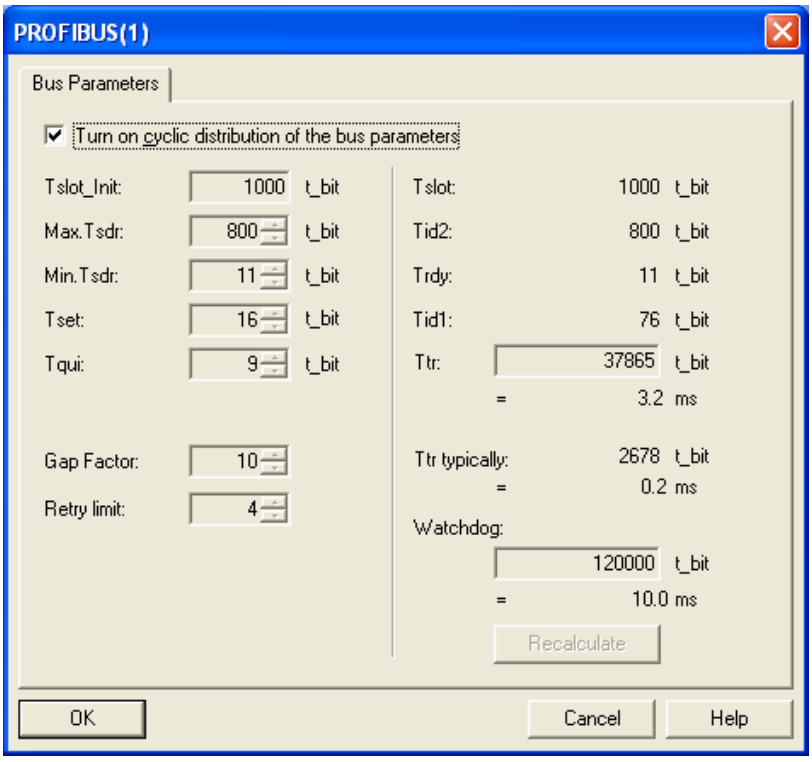


To avoid these, in some cases, complicated steps, it is especially useful in the case of PROFIBUS to use the autobaud function because it then automatically ascertains the bus parameters.



Under PROFIBUS, please note that the autobaud function can only be used if the '*Cyclic distribution of the bus parameters*' function is activated in the programmable controller used.

The following screenshot of a the hardware configuration of a randomly chosen PROFIBUS CPU shows where to find the switch for cyclic distribution of the bus parameters.



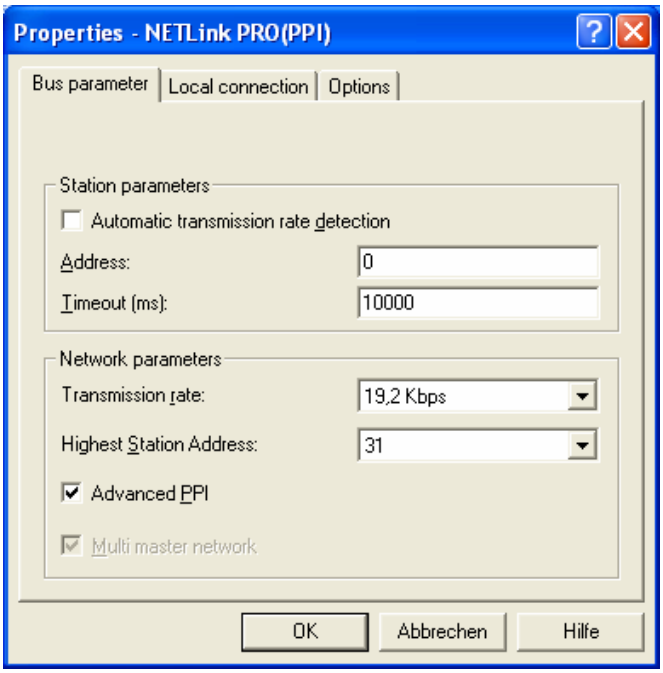
5.1.2.3 PPI configuration

Basically, the same applies to PPI configuration as to MPI configuration. However, the network-related parameters are more extensive.

In addition to the parameters transmission rate and highest station address mentioned in Section 5.1.2.1, PROFIBUS also has a parameter field for selecting the bus profile and bus parameters:

!

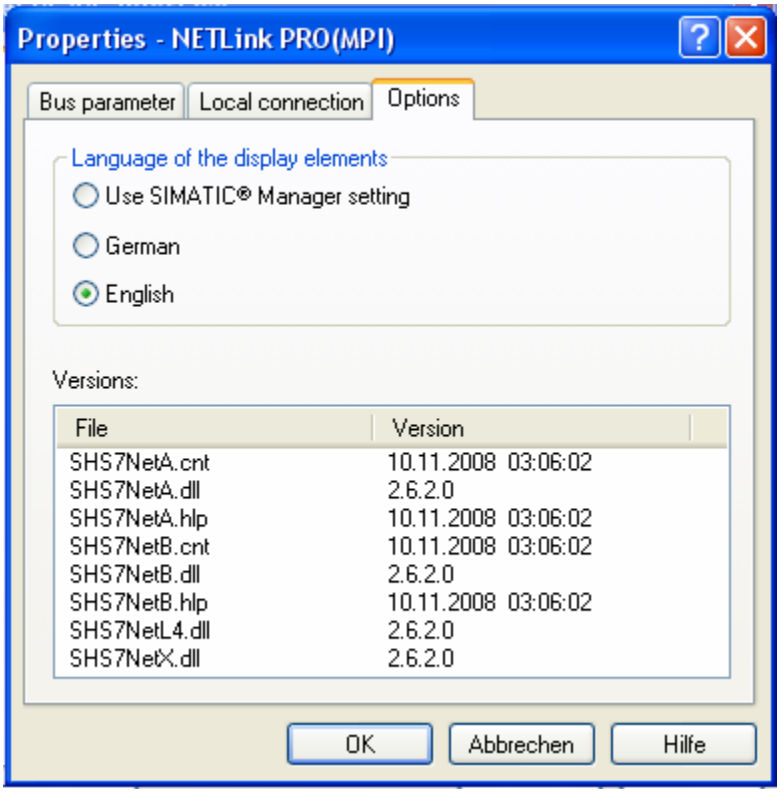
Normally the baudrate can not be detected automatically at PPI systems.



As actually known all S7-200 cpus of the product line 22x should be able to communicate with '*Advanced PPI*'. It is recommended to use '*Advanced PPI*' if possible.

5.1.3 Options of the driver

Under the options of the NETLink-S7-NET driver, it is possible to set the language of the output and help texts of the driver and read the version numbers of the driver files used.



5.1.3.1 Language setting of the display elements

The languages German and English are currently available.

After switching over the language, the setting window must be opened again to apply the changes.

5.1.3.2 Version information

The names and version number of all driver files are listed here.

If support is needed, this data is used to obtain information about the components used quickly and effectively.

5.2 Diagnostics

For rudimentary diagnostics of the connected bus two subfunctions are available:

- Display bus nodes
- Display bus parameters

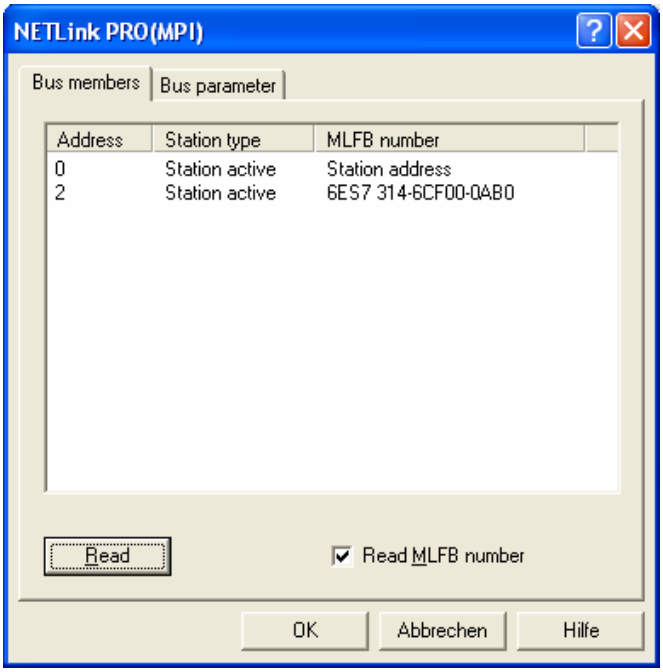
Before the diagnostics functionality is used, a valid station must be created and a plausible bus configuration set.

5.2.1 Bus members

A list of all available nodes at the bus will be generated by clicking the button '*Read*'.

With activating the option '*Read MLFB number*' the order numbers of all devices supporting this function will be displayed too.

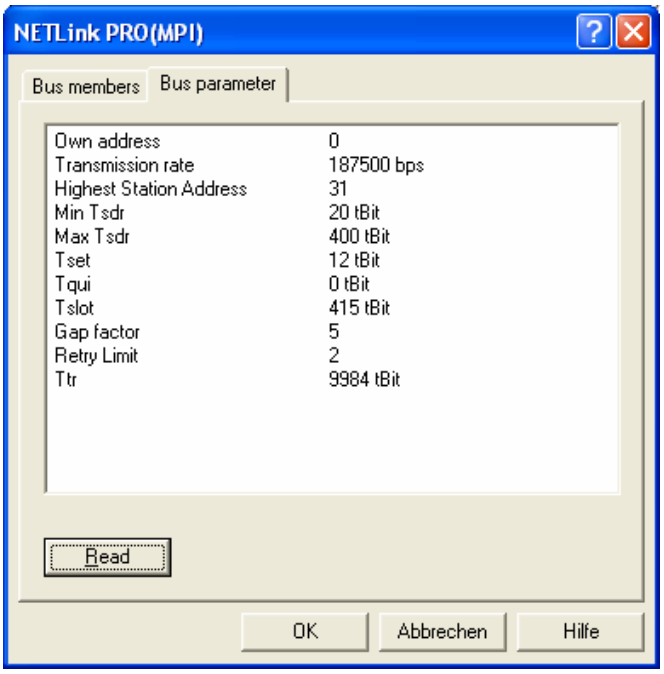
The possibility to detect all connected nodes depends on the parameterization of the PG/PC Interface. It is recommended to enable autobaud functionality at MPI and PROFIBUS.



5.2.2 Bus parameters

If it is possible a list of all bus parameters will be displayed by clicking the button '*Read*'.

The possibility to detect the bus parameters depends on the parameterization of the PG/PC Interface. It is recommended to enable autobaud functionality at MPI and PROFIBUS.



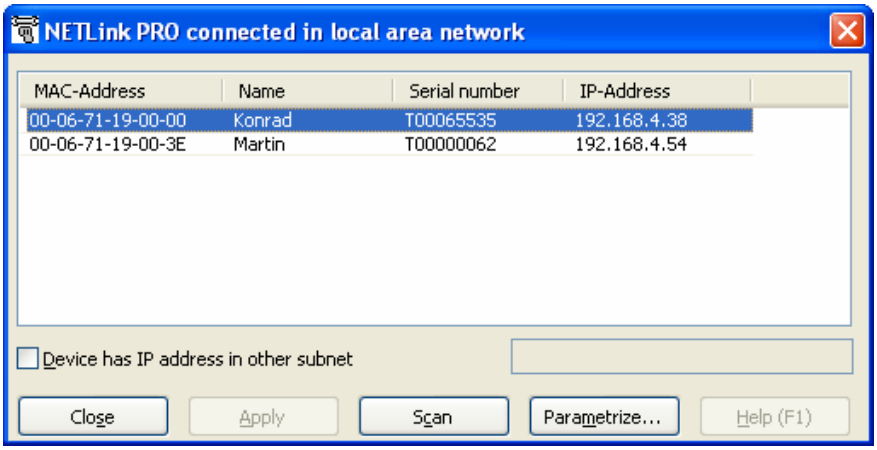
6 Parameterization via the parameterization tool '*NETLink PRO configuration*'

Is no Simatic engineering tool available, which installs the PG/PC Interface at the pc used for parameterization, it is possible to configure the NETLink PRO via the integrated web interface (s. 7.3) or via the configuration tool.

The tool is reachable under '*Start/Programs/Systeme Helmholz/NETLink-S7-NET/NETLink PRO Configuration*' after the NETLink-S7-NET driver is installed.

After a call of this program the net will be explored for connected NETLink PRO. The result shows of at the following screen:

The NETLink has the IP address 192.168.4.49 on delivery from the factory.



After choosing a NETLink PRO out of the provided list it is possible to configure the device after clicking '*Parametrize…*' as described in Section 5.1.1.2.

7 Possibilities of the web interface

If it has not been deactivated by the user, the web interface of the NETLink PRO can be opened with any standard browser (e.g. Internet Explorer, Firefox, Opera, etc.)

The web interface is intended to support the user intuitively with information and configuration tasks.

The NETLink has the IP address 192.168.4.49 on delivery from the factory.

7.1 Home page11

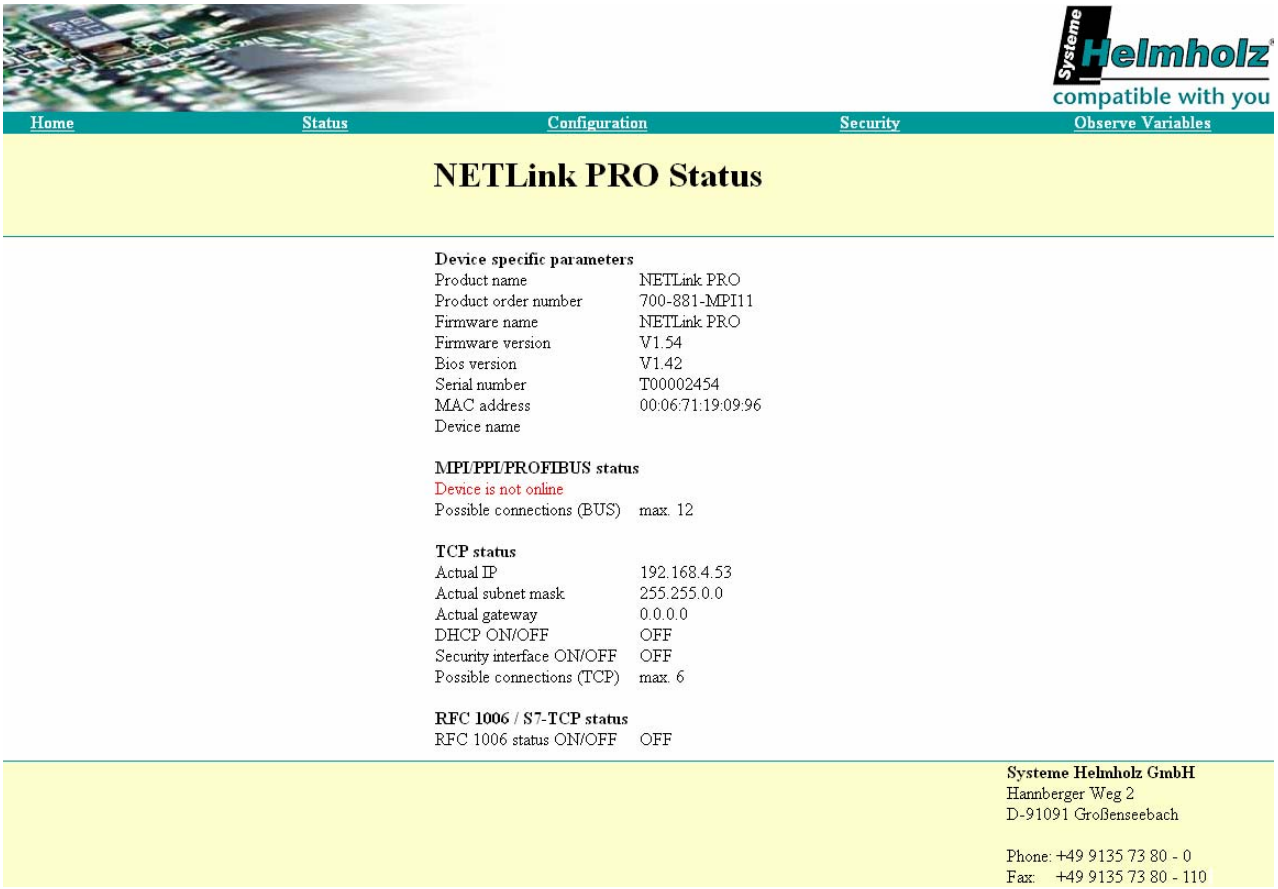
The home page, which is located at '*http://<ip-address>*', is a basic address and navigation starting point for the user.

From this page you can go to the status page, to the configuration page, to the security page and, if the computer is connected to the Internet, to the web site of Systeme Helmholz GmbH.

The page also shows the contact data, such as postal address, phone and fax number, e-mail and web address.

7.2 Status page

The status page, accessible via a link on the home page, provides the user with information without allowing unauthorized reconfiguration of the NETLink PRO.



The page provides general information (e.g. firmware version, number of possible connections, etc.), and specific information (baud rate, active stations, DHCP status, etc.) that could be useful when troubleshooting.

All displayed elements are shown below in the form of a table.

Depending on the configuration, on the relevant contents are displayed. For example, it does not make sense to indicate the RFC1006 options, if the RFC functionality is deactivated.

Device-specific parameters:

Product name	NETLink PRO
Product order number	700-881-MPI11/700-881-MPI12
Firmware name	NETLink PRO
Firmware version	z.B. V1.50
BIOS version	z.B. V1.42
Serial number	e.g. T00000062
MAC address	e.g. 00:06:71:19:00:3E
Device name	This shows the freely selectable name of the NETLink PRO, if a name has been assigned.

Bus-specific parameters:

Station address	If the NETLink PRO is active on the bus, this is the device's own station address.
Bus parameters	If the NETLink PRO is active on the bus, this is the explanation of the bus parameter set, this is transmitted by a CPU.
List of active stations	If the NETLink PRO is active on the bus, this is the list of the stations that are currently active. The device's own address is shown in red.
Possible connections (BUS)	Maximum number of possible simultaneous bus connections.
Sum of used bus connections	If the NETLink PRO has opened at least one bus connection, the exact count of open connections will be displayed.

TCP-specific parameters:

IP address	The currently used IP address of the NETLink PRO is shown (e.g. 192.168.4.54).
Subnet mask	The currently used subnet mask of the NETLink PRO is shown (e.g. 255.255.255.0).
Gateway	The currently used standard gateway of the NETLink PRO is shown (e.g. 192.168.4.33).
DHCP ON/OFF	Shows whether the DHCP is activated or not (ON or OFF).
- DHCP Timeout	The time (in seconds) for which a DHCP configuration waits.
- Configured via DHCP	If DHCP is ON, thise states whether DHCP was successful or whether the currently parameterized default IP address is being used.
Possible connections (TCP)	Maximum number of possible simultaneous IP connections (currently 4).
Sum of used TCP connections	If the NETLink PRO has opened at least one TCP or RFC1006, the exact count of open TCP connections will be displayed.

RFC1006-specific parameters:

RFC 1006 status	Shows whether the RFC1006 is activated or not (ON or OFF). If RFC1006 was enabled (ON), further parameters are visible.
- Bus autobaud ON/OFF	Shows whether the bus parameters of the bus system are to be determined automatically (ON) or whether to go online with the stored parameters (OFF).
- Own station address	Indicates the local station address. This is the address with which the NETLink PRO will participate in the bus cycle.
- Stored bus parameters	This indicates the stored bus parameters with which the NETLink PRO attempts to go online if RFC1006 is enabled when autobaud is OFF.
- Rack/slot mode	Indicates whether R/S mode (ON) or addressed mode (OFF) is used (for details, see Section 8.1.4).
- Fixed destination address for R/S mode	If R/S mode is activated, all incoming RFC1006 requests are routed to the bus address parameterized here.
- Max. possible IP links (RFC)	Maximum number of possible simultaneous IP connections for RFC1006 communication.
Sum of used RFC connections	If the NETLink PRO has opened at least one TCP or RFC1006, the exact count of open RFC1006 connections will be displayed.

7.3 Configuration page

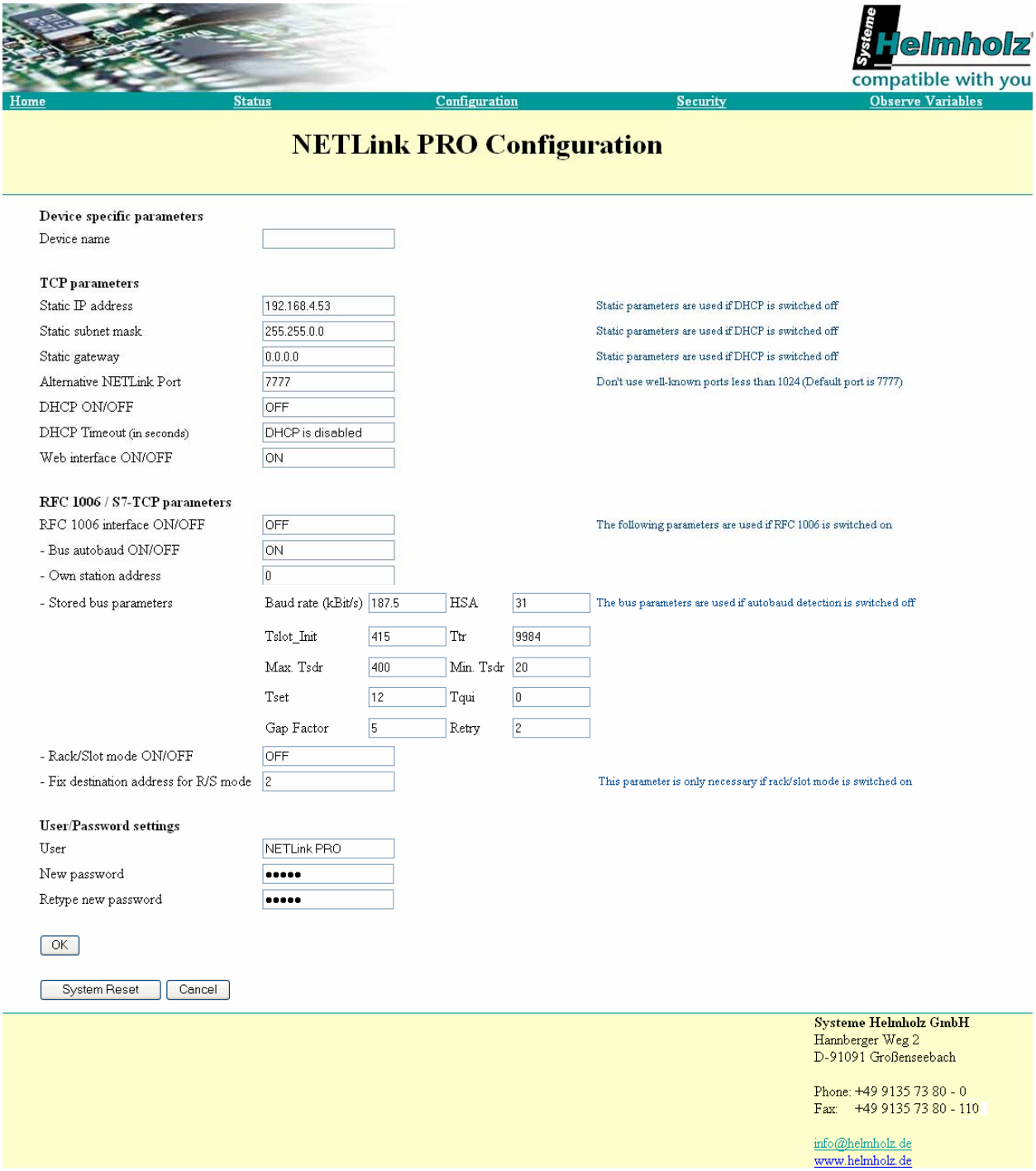
The configuration page, accessible via a link on the home page, is a configuration interface for the user.

The default password is 'admin'.

Before this page opens, it is necessary to enter the device name (*NETLink PRO*) and the password (*admin* if no user specified password is stored).

Using firmware 1.54 or higher, it is possible to edit the user name for the NETLink PRO in the "Configuration" window on the webinterface.

The entry for the security query is case-sensitive, that is, upper and lower case must be correct.



After the security query has been correctly answered, you have write-access to all parameters that can be configured via the driver interface of the NETLink-S7-NET driver.

The RFC1006 functionality can also be enabled and parameterized here.

For details of RFC1006 parameterization, see Section 8.

Device-specific parameters:

Device name	Name consisting of max. 20 alphanumeric characters

TCP parameters:

Static IP address	IP address that is used if DHCP is deactivated or the DHCP timeout elapses.
Static subnet mask	Subnet mask that is used if DHCP is deactivated or the DHCP timeout elapses.
Static gateway	Gateway that is used if DHCP is deactivated or the DHCP timeout elapses.
Alternative NETLink Port	In addition to the standard port, a further freely selectable port can be stored here in the NETLink (on FW 1.50 and higher).
DHCP ON/OFF	ON or OFF
DHCP Timeout (in seconds)	30 to 65535 seconds At 65535, the timeout is deactivated. In this case, there is no fallback mechanism, i.e. it is essential that a DHCP server is accessible!
Web interface ON/OFF	Web interface is ON or OFF

RFC1006 parameters:

RFC1006 interface	ON or OFF The following parameters only have a meaning if the RFC1006 interface is switched on (ON).
- Bus autobaud	Determine bus parameters of the bus system automatically (ON) or go online with the stored parameters (OFF).
- Own station address	This is the address with which the NETLink PRO will participate in the bus cycle.
- Stored bus parameters	If autobaud is OFF, the bus parameters stated here are used to go online.
- Rack/slot mode	Indicates whether R/S mode (ON) or addressed mode (OFF) is used (for details, see Section 8.1.4).
- Fixed destination address for R/S mode	If R/S mode is activated, all incoming RFC1006 requests are routed to the bus address parameterized here.

User password settings:

New user password	Password with up to 19 characters
Retype new password	The password with up to eight characters must be entered a second time

After you have entered changes, clicking the '*Cancel*' button will discard your changes again.

If you click the '*OK*' button, the inputs are checked for plausibility. You may then be shown which inputs are incorrect and what correct input would look like at this point.

If all entries are consistent, the changes are displayed again as they will now be stored in the NETLink PRO when you click the '*OK*' button again.

Rebooting can take up to 15 seconds.

After the changed parameterization data have been stored, the NETLink PRO is restarted to activate the desired configuration.

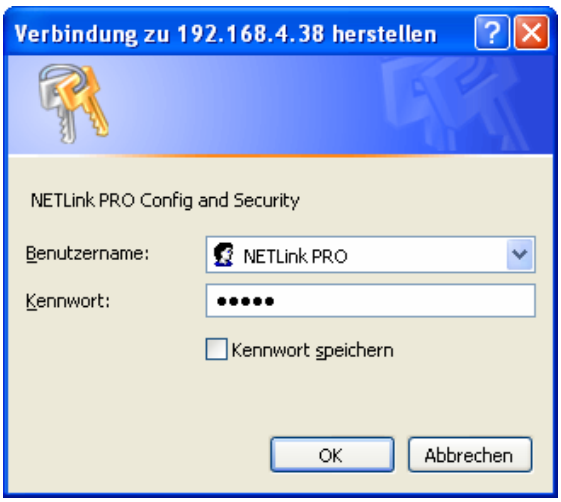
It is also possible to reboot the NETLink PRO remotely via the configuration interface, if required. This is done by clicking the '*System Reset*' button.

7.4 Security page

The security page, accessible via a link on the home page, is a configuration interface for all security specific settings.

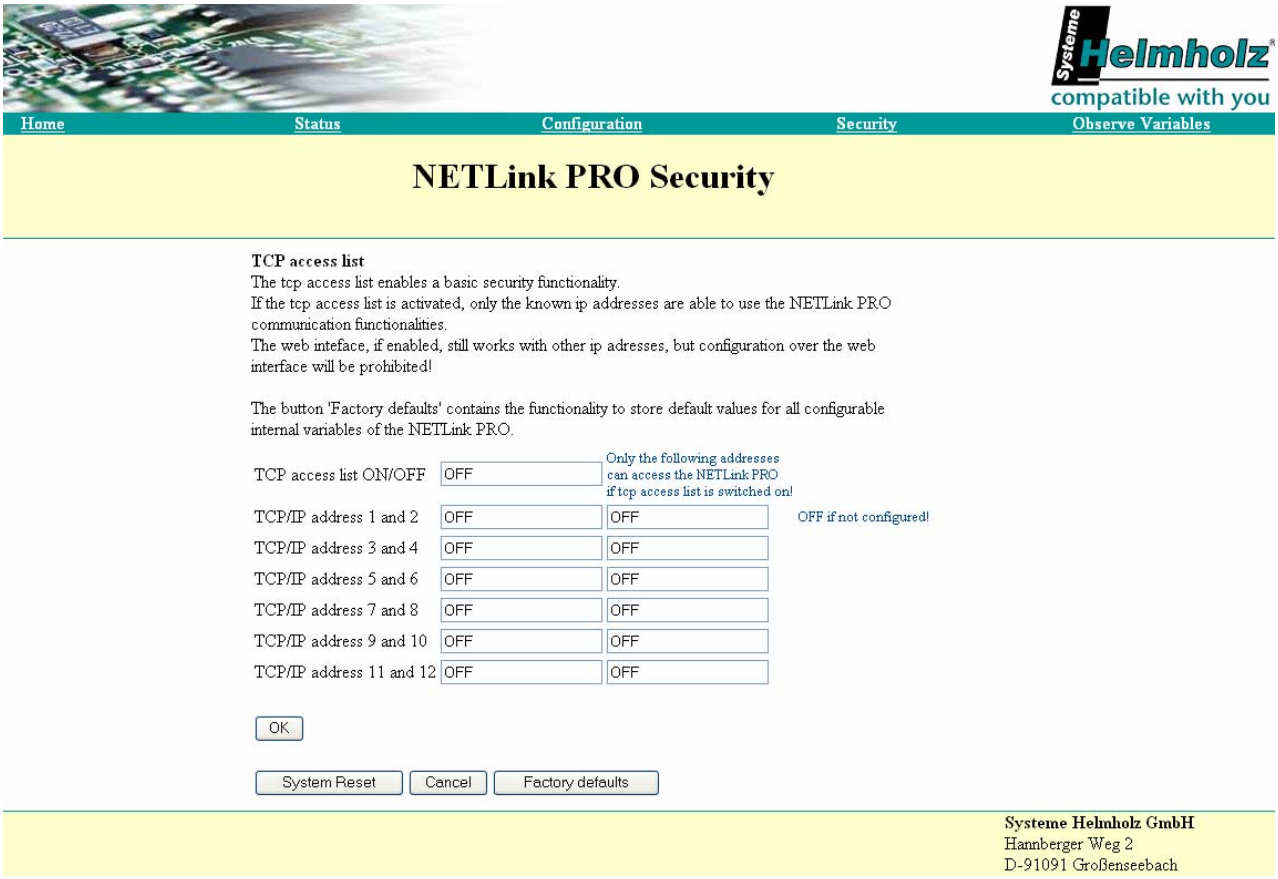
The default password is 'admin'.

Before this page opens, it is necessary to enter the device name (*NETLink PRO*) and the password (*admin* if no user specified password is stored).



The entry for the security query is case-sensitive, that is, upper and lower case must be correct.

After the security query has been correctly answered, you have write-access to all parameters that are implemented for TCP security.



Is the TCP access list switched on by typing 'ON' to the field '*TCP access list ON/OFF*', only TCP connections with addresses configured in the table entries '*TCP address 1*' to '*TCP address 12*' are able to communicate to the NETLink PRO without restrictions (white list).

The pattern for a legal ip address is something like '*192.168.4.36*'. To delete an ip address the pattern '*OFF*' is necessary.

IP addresses without access rights are only allowed to read some information at the web interface. Using PPI, MPI or PROFIBUS functionalities are not possible. Also the configuration tool is not working.

Parameters of the TCP access list:

TCP access list ON/OFF	Switch ON/OFF the functionality of the TCP access list.
TCP/IP address 1 and 2	First and second allowed IP address.
TCP/IP address 3 and 4	Third and fourth allowed IP address.
TCP/IP address 5 and 6	Fifth and sixth allowed IP address.
TCP/IP address 7 and 8	Seventh and eighth allowed IP address.
TCP/IP address 9 and 10	Ninth and tenth allowed IP address.
TCP/IP address 11 and 12	Eleventh and twelfth allowed IP address.

Notice deviation by usage of proxy servers.

Attention: If proxy servers are reachable at the specific network, these proxy servers should not be included to the access list. If so, a safety usage of the NETLink PRO is not guaranteed at this network.

After you have entered changes, clicking the '*Cancel*' button will discard your changes again.

If you click the '*OK*' button, the inputs are checked for plausibility. You may then be shown which inputs are incorrect and what correct input would look like at this point.

If all entries are consistent, the changes are displayed again as they will now be stored in the NETLink PRO when you click the '*OK*' button again.

Rebooting can take up to 15 seconds.

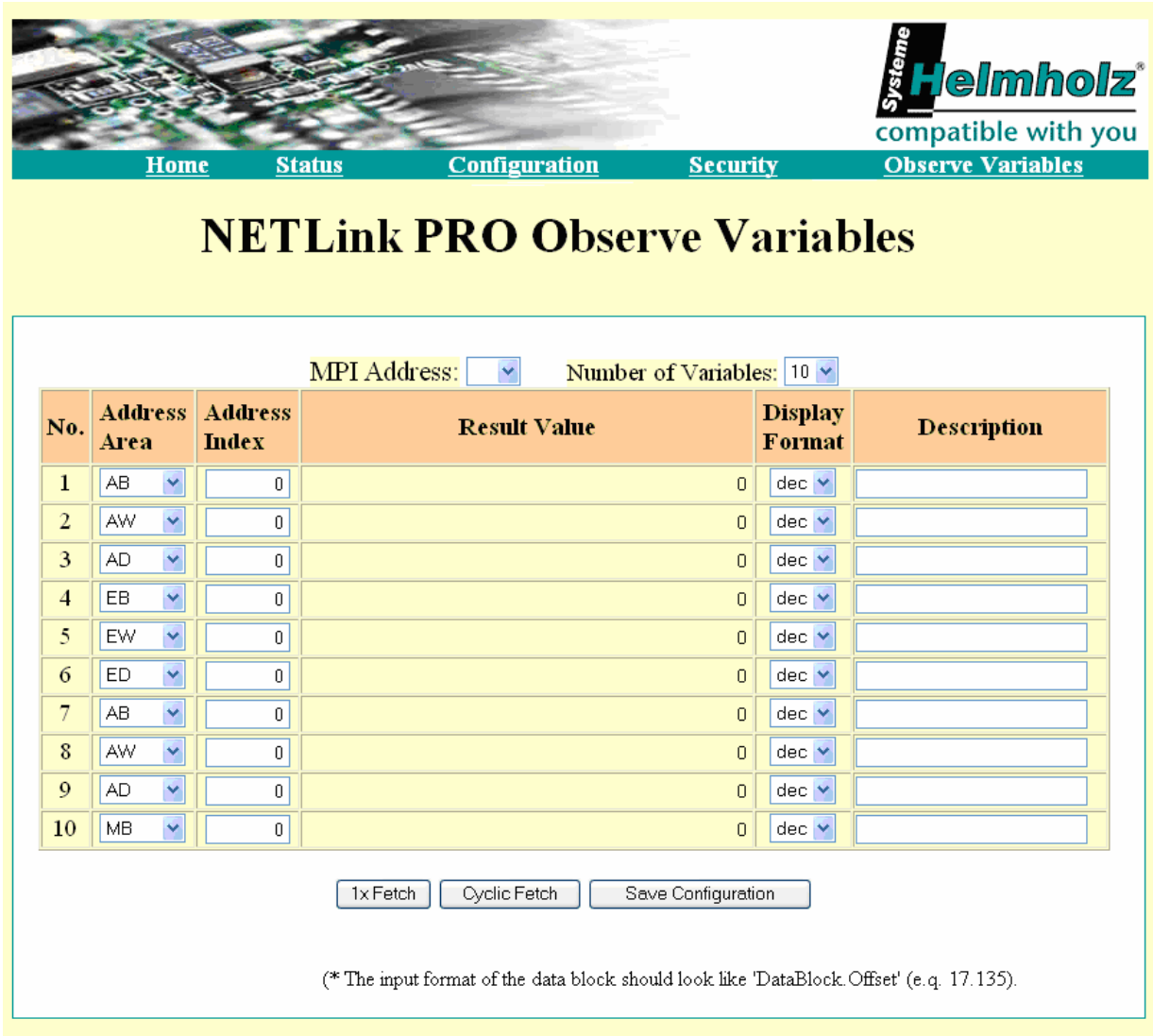
After the new parameterization data have been stored, the NETLink PRO is restarted to activate the new configuration.

It is also possible to reboot the NETLink PRO remotely via the security interface, if required. This is done by clicking the '*System Reset*' button.

With the button '*Factory defaults*' it is possible to restore all parameters to the delivery state of the NETLink PRO. All user defined configurations will be deleted by this function.

7.5 Observing variables

As from firmware version 1.50, the “observe variables” function is provided in the NETLink PRO:



The operating menu can be accessed via the ‘*Observe Variables*’ link.

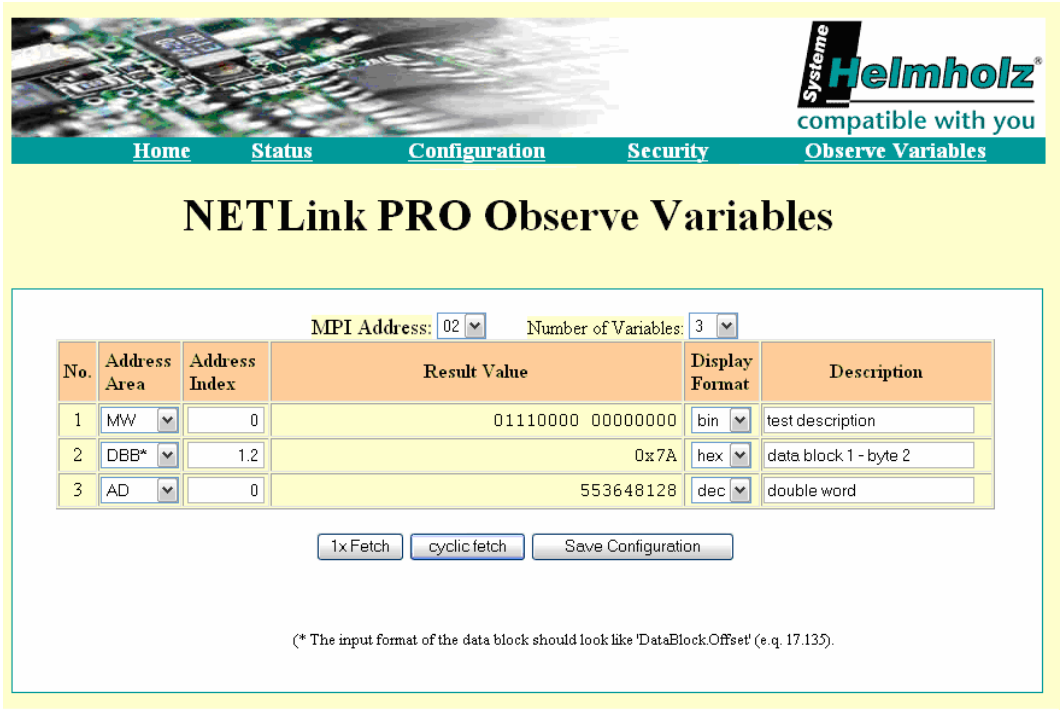
These functions are supported in RFC 1006 mode. Section 8.1 describes how to activate this.

Setting parameters of the observe variables function:

MPI Address	An active MPI/PB address is selected using the drop-down menu.
Number of Variables	The number of variables to be observed can be selected from 1 to 10 for a clearer view.
No.	Consecutive numbering.
Address Area	The following viewable items are supported: OB, OW, OD, IB, IW, ID, MB, MW, MD, DBB, DBW, DBD, counter, and timer.
Address Index*	Address of the bytes to be displayed. * On the case of data blocks with the nomenclature “Datablock.Offset”
Result Value	If one of the buttons is pressed, the output value will be displayed here
Display Format	The possible display formats are: decimal, hexadecimal, or binary
Description	Freely selectable description (max. 32 chars)

To display the desired values, you can use the ‘*1x fetch*’ button for a single value update or ‘*cyclic fetch*’ for a permanent online query.

With ‘*Save Configuration*’, it is possible to store the screen form you have created with all the variables and their descriptions in the NETlink PRO.



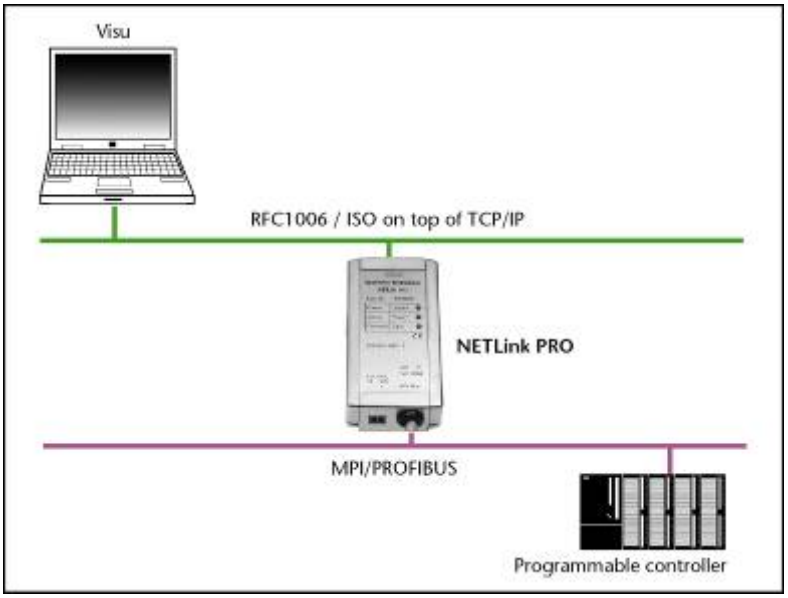
An example of display of various variables:

The value update is currently permanently set to 0.5 seconds. Even if multiple stations access this function from the TCP/IP end, only one connection resource is ever assigned in the NETLink PRO. Moreover, data exchange via MPI/PB and/or RFC 1006, the ‘*Observe Variables*’ action has the lowest priority. The update time in the Web interface therefore depends on the concurrent bus load.

8 Using the RFC1006 option (S7-TCP/IP)

As an additional option, the NETLink PRO can implement the RFC1006 protocol (also known as S7-TCP/IP or as ISO on top of TCP). This functionality can be enabled and parameterized via the Web interface of the NETLink PRO.

Because many visualization system manufacturers have implemented this protocol to ensure a connection to Simatic controllers via TCP-CPs from Siemens (e.g. CP343 or CP443), NETLink PRO with RFC1006 is a lower-cost alternative to communication with these visualization systems.



!

The usage of RFC1006 at S7-200 systems is not possible.

Please notice the RFC1006 functionality is not accessible with S7-200 systems connected to the NETLink PRO.

The following software packages with RFC1006 support have so far been tested in conjunction with the NETLink PRO:

- WinCC V7.0 (Siemens AG)
- WinCC flexible 2005/2008 (Siemens AG)
- ZenOn V6.2 (COPA-DATA)
- PROCON-Win V3.2 (GTI Control)
- S7-OPC Server, V3.1 and higher (Systeme Helmholz GmbH)
- AGLink V4.0 (DELTALOGIC Automatisierungstechnik GmbH)
- INAT-OPC-Server (INAT GmbH)
- WinCE 5.0 Terminal TP21AS (Sütron Electronic GmbH)
- KEPserverEx V4.0 (KEPware Inc.)
- InTouch V9.5 (Wonderware GmbH)

8.1 Configuration of the RFC1006 interface

The configuration page of the Web interface, accessible via a link on the home page, is a configuration interface for the user (see Section 7.3).

The option *'RFC 1006 interface ON/OFF'* activates or deactivates the RFC1006 interface.

The possible options are:

- ON: The RFC1006 functionality is enabled and can be used, taking further configuration into account.
- OFF: The RFC1006 functionality is deactivated.

If the RFC1006 functionality is activated, the options described below must be taken into account and parameterized as required and desired.

If RFC1006 functionality is deactivated, the following parameters will have no influence on the functioning of the NETLink PRO. However, if an attempt is made to communicate with the NETLink PRO via RFC1006, the service will be denied.

Rebooting can take up to 15 seconds.

After the configuration has been saved and the NETLink PRO has been rebooted, the current settings will be shown clearly and easily on the status page of the Web interface.

8.1.1 Autobaud ON/OFF

With the option *'Bus autobaud ON/OFF'*, you preset whether after a power cycle the NETLink PRO will search for the bus parameters with which it will then go online or whether the stored bus parameters will be used (see Section 8.1.3).

The possible options are:

- ON: The NETLink PRO attempts to determine the correct bus parameters and goes onto the bus with them.
- OFF: The NETLink PRO goes onto the bus with the parameters that are stated under *'Stored bus parameters'*.

8.1.2 Own (local) station address

The *'Own station address'* option indicates the bus address with which the NETLink PRO will log on to the bus.

The value for the station address must not have any value in the range 0 through 126. The only precondition for this is that the selected address is not larger than the HAS (highest station address) and is not already being used for another device on the bus.

8.1.3 Storage of specified bus parameters

If the *'Bus autobaud ON/OFF'* option has been deactivated (OFF), the parameter fields of the subitem *'Stored bus parameters'* must be configured carefully.

When parameterizing, please note that all parameters for PROFIBUS are interdependent. That is, if a parameter, e.g. the baudrate, is changed, all the other parameters usually also change.

For MPI, on the other hand, all parameters besides the baudrate are fixed. That is, if an MPI connection of increased from, say, from 187.5 Kbps to 12000 Kbps, all other parameters can/must remain unchanged.

The following parameters must be taken into account:

- Baudrate: The required baudrate is entered in Kbps. That is, for example, '*187.5'* or *'12000'*.
  The possible values are:
  9.6; 19.2; 45.45; 93.75; 187.5; 500; 1500; 3000; 6000, and 12,000.
- HSA The highest station address is entered here. For MPI generally *'31'* and for PROFIBUS *'126'*. However, anyvalues can be used that are not equal to the default values.
- TSlot_Init This value is always '415' for MPI – whatever the baudrate. For PROFIBUS the appropriate value should be read from the PROFIBUS project.
- Ttr This value is always '9984' for MPI – whatever the baudrate. For PROFIBUS the appropriate value should be read from the PROFIBUS project.
- Max. Tsdr This value is always '400' for MPI – whatever the baudrate. For PROFIBUS the appropriate value should be read from the PROFIBUS project.
- Min. Tsdr This value is always '20' for MPI – whatever the baudrate. For PROFIBUS the appropriate value should be read from the PROFIBUS project.
- Tset This value is always '12' for MPI – whatever the baudrate. For PROFIBUS the appropriate value should be read from the PROFIBUS project.
- Tqui This value is always '0' for MPI – whatever the baudrate. For PROFIBUS the appropriate value should be read from the PROFIBUS project.
- Gap This value is always '5' for MPI – whatever the baudrate. For PROFIBUS the appropriate value should be read from the PROFIBUS project.

- Retry — This value is always '2' for MPI – whatever the baudrate. For PROFIBUS the appropriate value should be read from the PROFIBUS project.

Incorrect bus parameters can interfere with the bus considerably!

Please note that under unfavorable circumstances an incorrectly parameterized NETLink PRO can interfere with the bus to the extent that regular bus operation is no longer possible.

For this reason, autobaud functionality is provided to ensure the correct parameters are used, provided that the CPU supports this functionality.

8.1.4 Addressing (rack/slot mode ON/OFF)

RFC1006 connections are virtual point-to-point links, that is, links from the PC to the programmable controller (possible branching within the programmable controller is handled by the CPU => Routing).

Because NETLink PRO is a point-to-multipoint communication adapter ('PC to NETLink PRO' on the one hand and 'NETLink PRO to many bus stations' on the other hand), it was necessary to implement different addressing methods to permit all communication variations.

The addressing methods are *'Addressed Mode'* (see Section 8.1.4.1) and *'Rack/Slot Mode'* (see Section 8.1.4.2).

These two addressing methods, which are mutually exclusive, permit most types of communication that are also possible via the NETLink-S7-NET.

8.1.4.1 Addressed mode

If different CPUs are to be accessed on the same MPI/PROFIBUS via RFC1006, addressed mode is suitable.

If this mode is used, the following setting must be parameterized on the configuration page of the Web interface.

- *‚Rack/slot mode'* must be deactivated (OFF)
  ⇨ Addressed Mode is active

The destination address now has to be entered in the RFC1006 driver of the Windows application (e.g. WinCC, see Section 8.2.1) instead of the rack and slot.

Please note that the rack and slot together fill only one byte which is divided as follows:

- Rack fills the upper three bits (11100000_{bin} for Rack 7, Slot 0)
- Slot fills the lower five bits (00011111_{bin} for Rack 0, Slot 31)

If you now want to communicate with destination address 2, the following has to be entered:

Rack 0, Slot 2.

If you want to communicate with destination address 49, on the other hand, the following has to be set:

Rack 1, Slot 17.

Section 10.3.1 contains a table were you can read off already converted values for the rack and slot.

There are also parameterization tools that do not provide fields with names like rack and slot. These tools normally have a parameterization field with a name such as Remote TSAP that is usually two bytes long and in hex format. This field, in which only the lower byte is of interest, is parameterized as follows:

If you want to communicate with destination address 2, the following has to be entered:

Remote TSAP 0202_{hex}.

If you want to communicate with destination address 49, on the other hand, the following has to be set:

Remote TSAP 0231_{hex}.

Section 10.3.1 contains a table were you can read off already converted values for the Remote TSAP.

The formula *Rack * 32 + Slot = Address* can be used for simplicity.

8.1.4.2 Rack/slot mode

In rack/slot mode, it is possible to access specific modules of the automation system.

This is achieved by only communicating directly with one, preparameterized station. This station routes the data packets not intended for it to the required rack/slot and routes the response back to the NETLink PRO.

This makes it possible, for example, to communicate in S7-400 systems with more than one CPU on a rack (⇨Multicomputing) without having to attach further CPUs to the bus.

To use this functionality, it is necessary to parameterize the following on the configuration page of the Web interface:

- *‚Rack/slot mode'* must be enabled (ON)
- For *'Fix destination address for R/S mode'*, the address of the required communication partner must be entered.

No special aspects have to be observed in the visualization system. The settings for the rack and slot or remote TSAP must be made as the described for the specific visualization system.

Section 8.2.2 explains addressed mode using WinCC as an example.

8.2 Example of configuration for WinCC V6.0/7.0

The basic parameterization of RFC1006 connections in visualization systems is explained here using the example of the WinCC V6.0 tool from Siemens AG.

It is assumed you are familiar with the development environment of WinCC, so that only points relating specifically to the connection need to be mentioned.

Because it is the Windows RFC1006 driver that is parameterized, all elements you will see in the WinCC example can also be found in similar form on other visualization systems/OPC servers that support RFC1006.

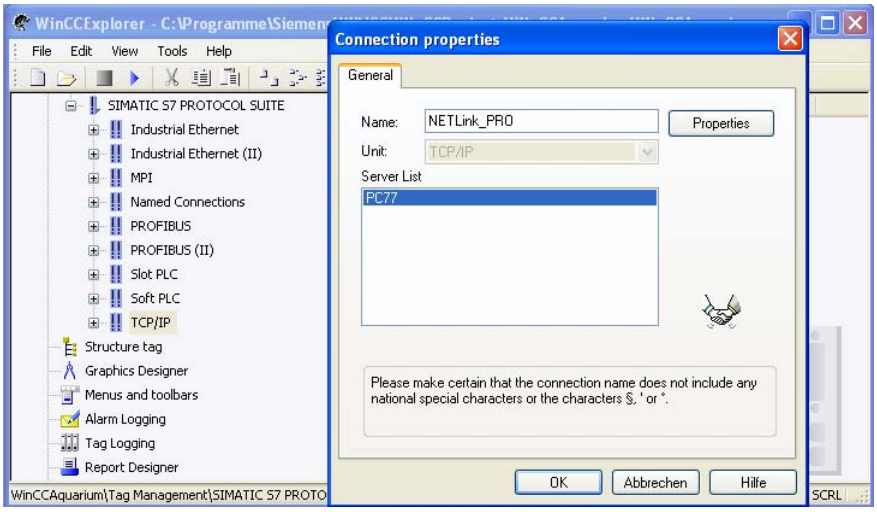
To explain the special aspects of communication with the NETLink PRO, the same connection is explained once for addressed mode (see Section 8.2.1) and again in rack/slot mode (see Section 8.2.2).

8.2.1 Using addressed mode

For the basics of addressed mode at the NETLink PRO end, see Section 8.1.4.1.

To parameterize a RFC1006 link in a WinCC project, a new TCP/IP link must first be created in the *'SIMATIC S7 PROTOCOL SUITE'*.

Here, this connection is called *'NETLink_PRO'*.

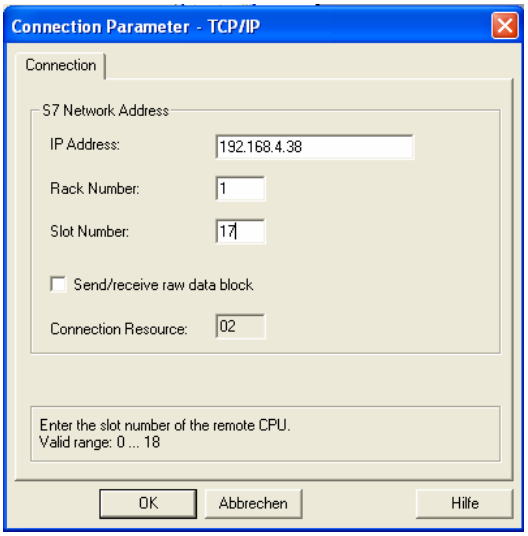


A click on '*Properties*' takes us to a setting form in which the IP address of the NETLink PRO and the rack/slot combination of the destination have to be entered.

The NETLink has the IP address 192.168.4.49 on delivery from the factory.

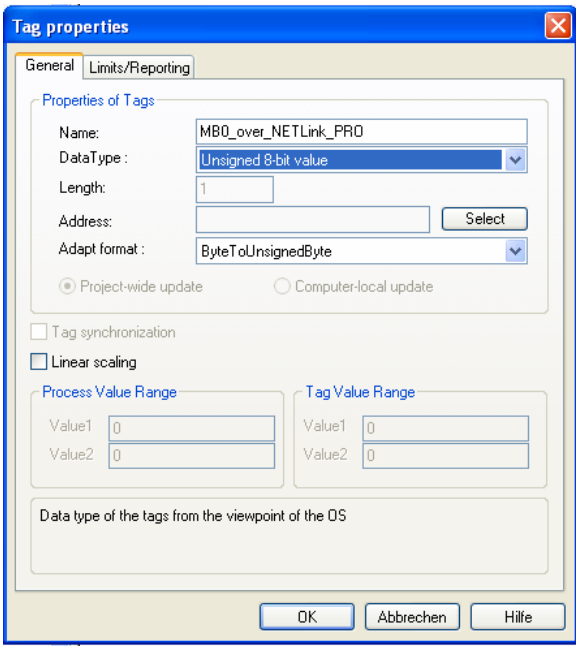
In this case, the NETLink PRO has the IP address 192.168.4.38.

The destination CPU with which we want to communicate has the PROFIBUS address 49. Because addressed mode is to be used, we can read off the correct value for the rack and slot from the table in Section 10.3.1.



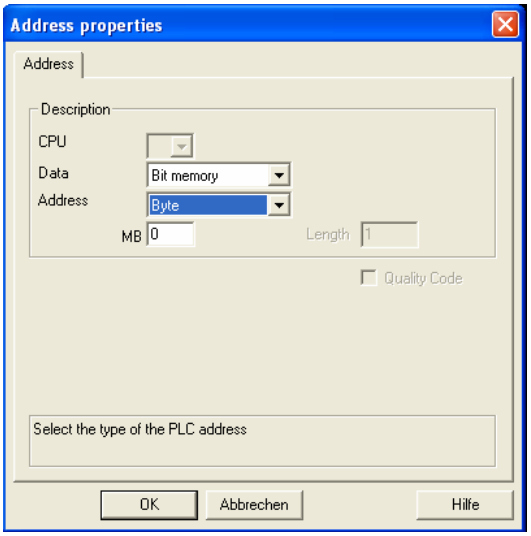
Under this connection we have just configured, we now have to create a variable.

This is done by right-clicking to open the context menu of the new connection and selecting *'New variable...'*.

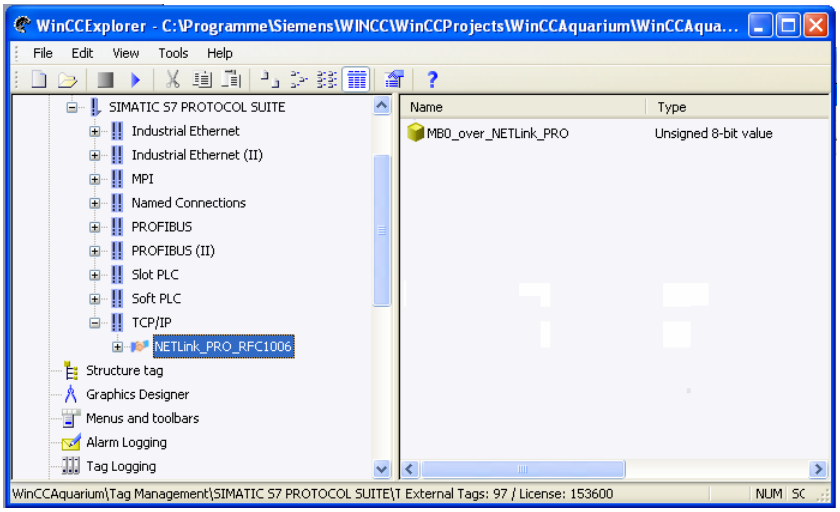


In the properties window of the variable, which was named *'MB0_over_NETLink_PRO'* in this case, we can now select the type of variable by clicking the *'Select'* button.

Marker byte 0 is configured here.



The following screenshot shows that a variable named *'MB0_over_NETLink_PRO'* now exists under the *'NETLink_PRO'* connection.



If this variable is now included in the initial screen of the WinCC project, for example, a connection will be established to the CPU with address 49 via the NETLink PRO to read or write marker byte 0 from this address.

Further variables of different types can, of course, be created and used according to the same scheme.

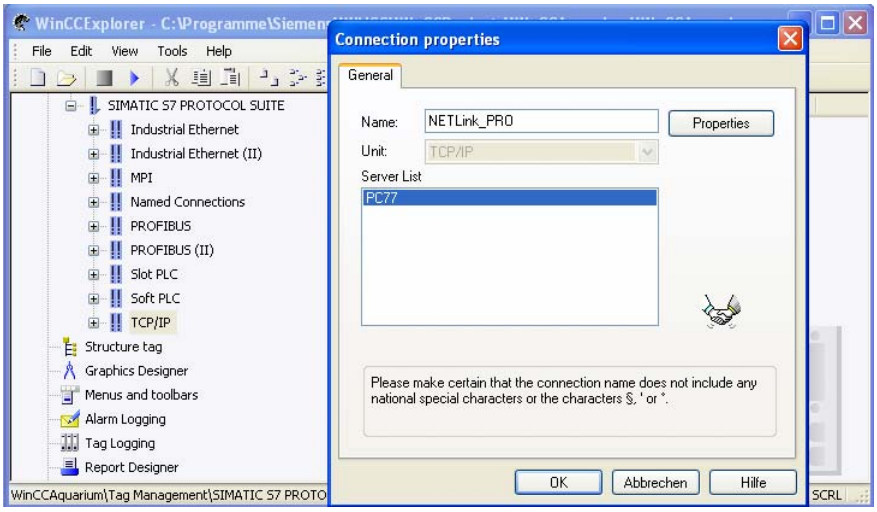
It is also possible to create additional TCP/IP connections in order to communicate not only with the CPU with bus address 49 but also with other CPUs.

8.2.2 Use of rack/slot mode

For the basics of rack/slot mode at the NETLink PRO end, see Section 8.1.4.2.

To parameterize a RFC1006 link in WinCC, a new TCP/IP link must first be created in the *'SIMATIC S7 PROTOCOL SUITE'*.

Here, this connection is called *'NETLink_PRO'*.



A click on '*Properties*' takes us to a setting form in which the IP address of the NETLink PRO and the rack/slot combination of the destination have to be entered.

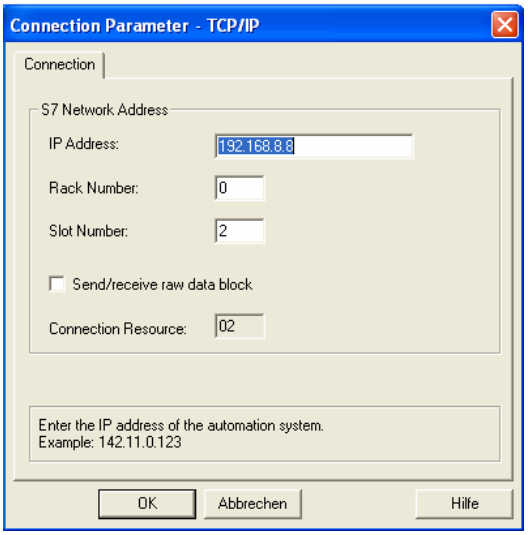
In this case, the NETLink PRO has the IP address 192.168.4.38.

The destination CPU with which we want to communicate is in Rack 0 on Slot. Because rack/slot mode we are going to use, WinCC does not have to announce the CPU address. Instead, the real values for rack and slot are specified, in this case rack 0 and slot 2.

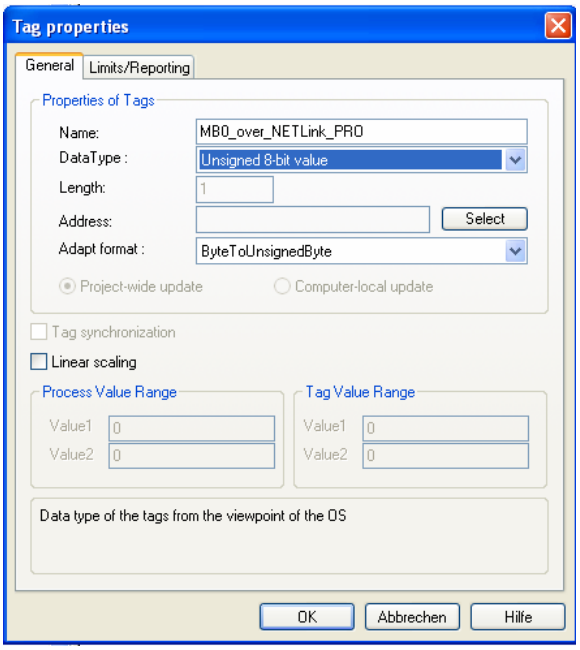
Please note that the destination address, 49 in this case, must now be announced to the NETLink PRO via the Web interface.

The NETLink has the IP address 192.168.4.49 on delivery from the factory.

Remember to parameterize the NETLink PRO.

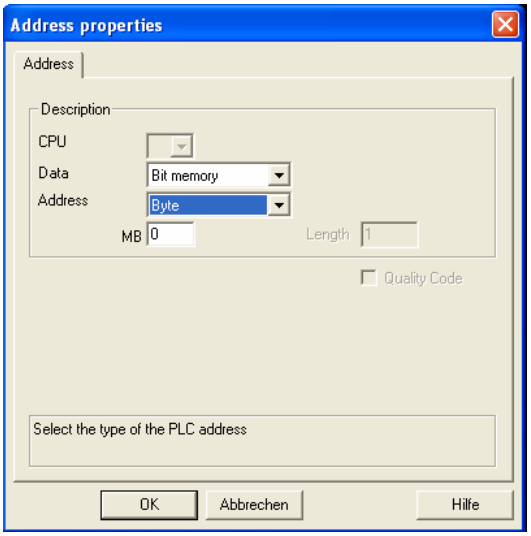


Under this connection we have just configured, we now have to create a variable. This is done by right-clicking to open the context menu of the new connection and selecting *'New variable…'*.

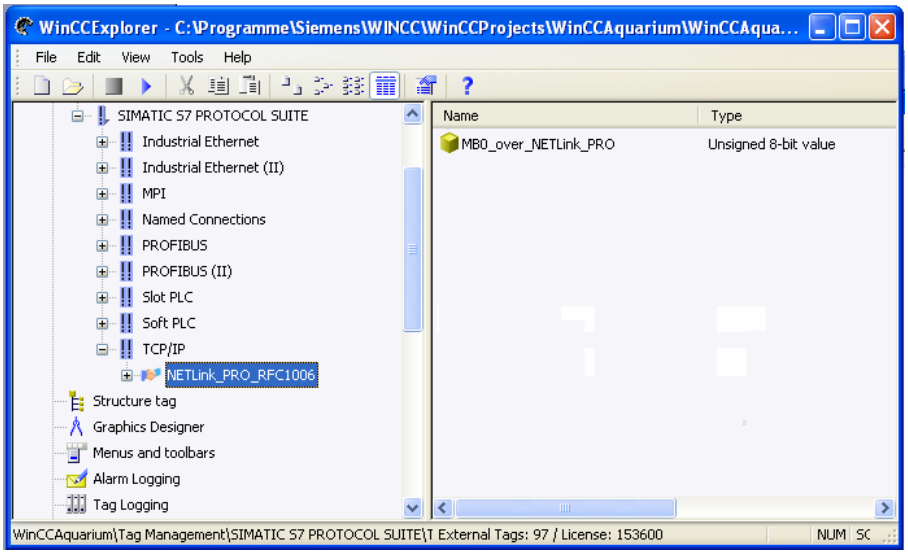


In the properties window of the variable, which was named *'MB0_over_NETLink_PRO'* in this case, we can now select the type of variable by clicking the *'Select'* button.

Marker byte 0 is configured here.



The following screenshot shows that a variable named *'MB0_over_NETLink_PRO'* now exists under the *'NETLink_PRO'* connection.



If this variable is now included in the initial screen of the WinCC project, for example, a connection will be established to the CPU with address 49 via the NETLink PRO to read or write marker byte 0 from this rack 0, slot 2.

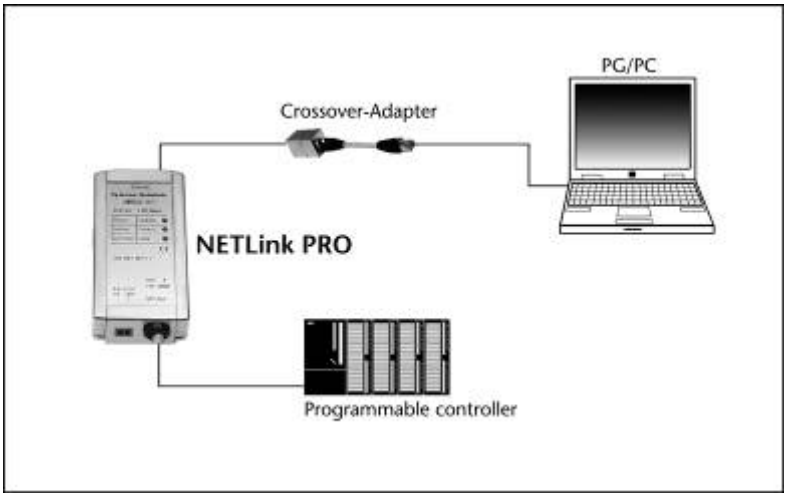
Further variables of different types can, of course, be created and used according to the same scheme.

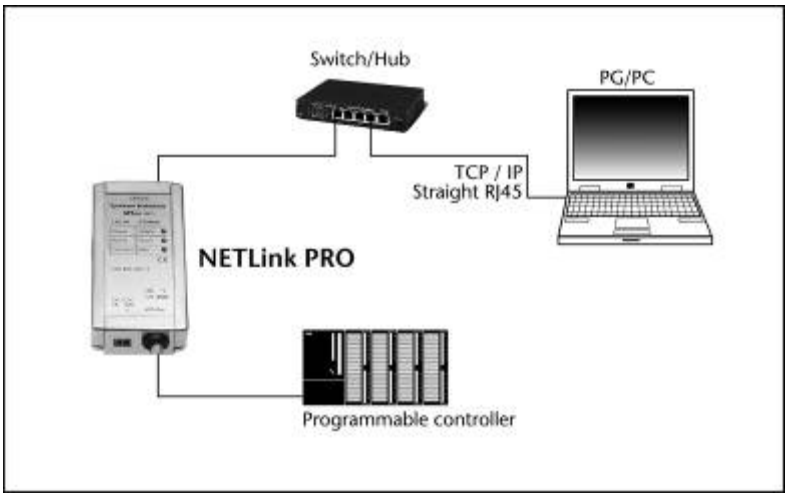
It is also possible to create additional TCP/IP connections in order to communicate not only with rack 0 / slot 2, for example, but also with rack 0 / slot3. However, all the communication must go via bus address 49.

9 Troubleshooting

Q: I connected the NETLink PRO directly to my PC/notebook but it doesn't work.

A: A direct connection between two NIC (network interface card) interfaces is not possible. You need a cross-over adaptor (Order no: 700-880-CROSS) or a switch/hub for connecting two Ethernet terminal devices together.

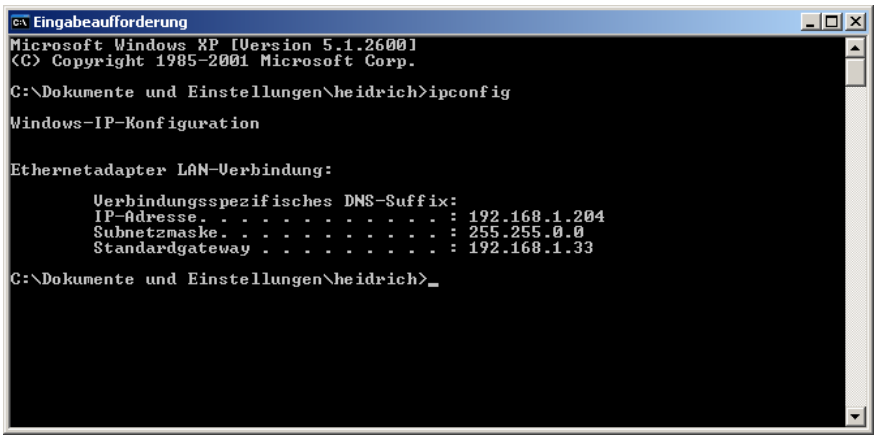




Instead of a crossover adapter you can also purchase a crossover CAT5 cable in specialist stores.

Q: I don’t know the IP address of my computer.

A: Enter the command ‘ipconfig’ after the prompt to show the configuration of the Ethernet interfaces of your computer.



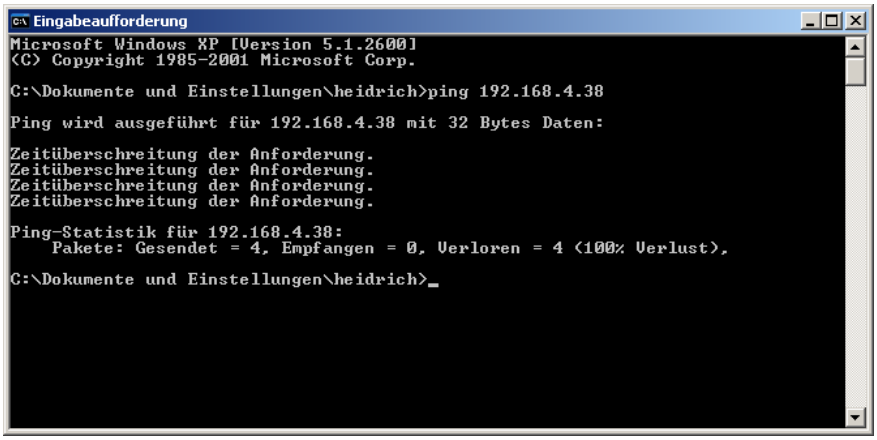
Q: My computer has a firewall. Which ports must I release.

A: The NETLink-S7-NET driver communicates with the NETLink PRO via TCP port 7777.
UDP ports 25342 and 25343 are also used to search for the NET-Link PRO devices.
Please release at least port 7777 so that the basic functionality of the driver is available.
If you use the RFC1006 functionality (also known as S7-TCP/IP), port 102 must also be released.
ATTENTION: If you want to use the driver option ‘*Internet teleservice*’ (see chapter 0) the specific ports configured there must be released also because this ports will be used instead port 7777.

Q: I get an error message when I access the controller.

The NETLink has the IP address 192.168.4.49 on delivery from the factory.

A: Check the error message.
The problem may be the setting of the PG/PC interface (e.g. PROFIBUS instead of MPI, address already allocated, etc.) or the NETLink PRO if it is not connected or not accessible at this IP address.
Make sure you have set the IP address correctly in the driver configuration. Please also enter the command *PING <IP address>* at the DOS prompt to check whether the NETLink PRO can also be accessed via the network.



Q: I am getting requested for a password if I try to configure the NETLink via configuration tool or web interface. But I never configured one.

The default password is 'admin'.

A: Since version 1.40 the NETLink PRO firmware always has a password. If no password is given by the user, the firmware sets the password to '*admin*'.

Q: The setting dialog boxes are not appearing in the Simatic Manager:

A: Please note that after initial installation the NETLink-S7-NET driver must be added to the PG/PC interfaces.
Make sure you had administrator rights during installation. Reboot your PC after installation if prompted to do so.
You need at least version 5.1 of the Simatic Manager.

Q: When the adapter is plugged onto the PROFIBUS, no online connection is possible.

A: If possible, use the autobaud functionality.
If this is not possible or not desired, check the timing parameters for the PROFIBUS in the STEP7 configuration. Enter the read values into the advanced bus parameter settings via the '*Bus parameters'* button. If on-line access is still not possible, set a higher 'Ttr' (target rotation time) both in the NETLink PRO and on the CPU.

Q: The Starter program has problems accessing a Micromaster drive.

A: When you request a *'control priority'* for the Micromaster drive, please increase the Failure monitoring from 20ms to 200ms and the Application monitoring from 2000ms to 5000ms, so that the Starter software remains operable.

Q: Every time I execute a certain function, it fails and the red Active LED flashes.

A: It is an exception in the communication between the PC and the NETLink PRO. Please contact support and describe how the error can be triggered. The support team will attempt to solve the problem as quickly as possible.

Q: Every time I execute a certain function, it fails and the red Connect LED flashes.

A: It is an exception in the communication between the programmable controller and the NETLink PRO. Please contact support and describe how the error can be triggered. The support team will attempt to solve the problem as quickly as possible.

Q: Although the NETLink PRO is plugged directly into my CPU and no further nodes are connected, MPI and PROFIBUS connections sometimes break down at high baudrates.

A: Make sure that the bus is correctly terminated.
Even if the NETLink PRO is the only device on the bus apart from the CPU, the terminating resistor must be connected. Otherwise problems may occur, especially at high baudrates.

Q: If I set the NETLink PRO to autobaud in the PG/PC interface and try to go online, the active LED lights up briefly before a message appears telling me that the bus parameters cannot be determined.

A: Either the CPU used does not support the cyclic transmission of bus parameters (disabled via parameterization or function does not exist), or the CPU is so busy with general communication tasks that the lower-priority bus parameter telegram is transmitted too infrequently and cannot be detected by the NETLink PRO. Please deactivate the autobaud functionality in the NETLink-S7-NET driver (PG/PC interface) and set the correct baudrate and the correct profile.

Q: In the Web interface, I enabled the RFC1006 functionality and would like the NETLink PRO to go onto the bus using autobaud. Unfortunately, the active LED just flashes but no communication is possible via my visualization system.

A: Either the CPU used does not support the cyclic transmission of bus parameters (disabled via parameterization or function does not exist), or the CPU is so busy with general communication tasks that the lower-priority bus parameter telegram is transmitted too infrequently and cannot be detected by the NETLink PRO. Please deactivate the autobaud functionality in the Web interface of the NETLink- PRO and set the correct baudrate with the corresponding bus parameters.

Q: I read that the NETLink PRO can communicate with up to seven PCs at the same time. But I can't manage to query a status of my automation system from more than six PCs at once.

A: A total of seven TCP links are available that can be used at the same time. However, please note that only up to six links can be used at once per type of connection (NETLink-S7-NET or RFC1006 connections are possible). The purpose of this is to keep one connection channel free for the other protocol.
6+1 or 5+2 or 4+3 or 3+4 or 2+5 or 1+6 links are available for the two types of protocols.

Q: I use the rack/slot mode of the RFC1006 interface (rack/slot mode = ON) and have specified address 2 for my existing CPU in the Web interface in ‘Fix destination address for R/S mode’. Although NETLink PRO online is active (active LED lights up), my visualization system tells me that no link can be established.

A: Make sure you have assigned the correct values to rack and slot in the parameterization. For example, to communicate with a CPU in a 300 rack, you must enter '0' for rack and '2' for slot. Many visualization system manufacturers have grouped together the two fields. In that case, there may be a field with the name 'Remote TSAP' containing a hex value such as '0102'. In this case, the hex value '02' stands for rack 0 and slot 2.

Q: I would like to use addressed mode of the RFC1006 interface (rack/slot mode = OFF) because that way I can access several CPUs on the same bus. Unfortunately I am not sure how to parameterize the fields rack and slot in the visualization used.

A: If addressed mode is used, a combination of rack and slot specifies the destination address of the automation system.
If the CPU is to be addressed with bus address 2, the value 0 for the rack and the value 2 for the slot must be entered.
Please note that the rack field consists of three bits and the slot field of five bits – i.e. together they comprise one byte and eight bits. That means, for example, the value 1 (00000001_{Bin}; 01_{Hex}) in the rack field must be entered for bus address 49 (00110001_{Bin}; 31_{Hex}) and the value 17 (00010001_{Bin}; 11_{Hex}) in slot field.
For parameterization tools that offer a field with a name like *‘Remote TSAP’* for parameterization instead of separately parameterizable rack and slot fields, the value of the bus address can be entered directly without being taken apart and converted.
For example, for bus address 2, the hex value *‘0102’* can be entered and for bus address 49 the hex value *‘0131’*.
An address conversion table is given in Section 10.3.1 to simplify this task.

Q: If I mix RFC1006 connections and connections via the STEP7 driver, the link sometimes breaks off or error messages appear saying that it is not possible to establish a link.

A: For communication with S7-300 modules it may be necessary to parameterize the communication resources.
The user can influence the allocation of existing *‘connection resources’* under object properties of the CPU in the hardware configuration.

Q: Once the configured PROFIBUS slaves have been added on my CPU, communication between NETLink PRO and STEP7 becomes markedly slower.

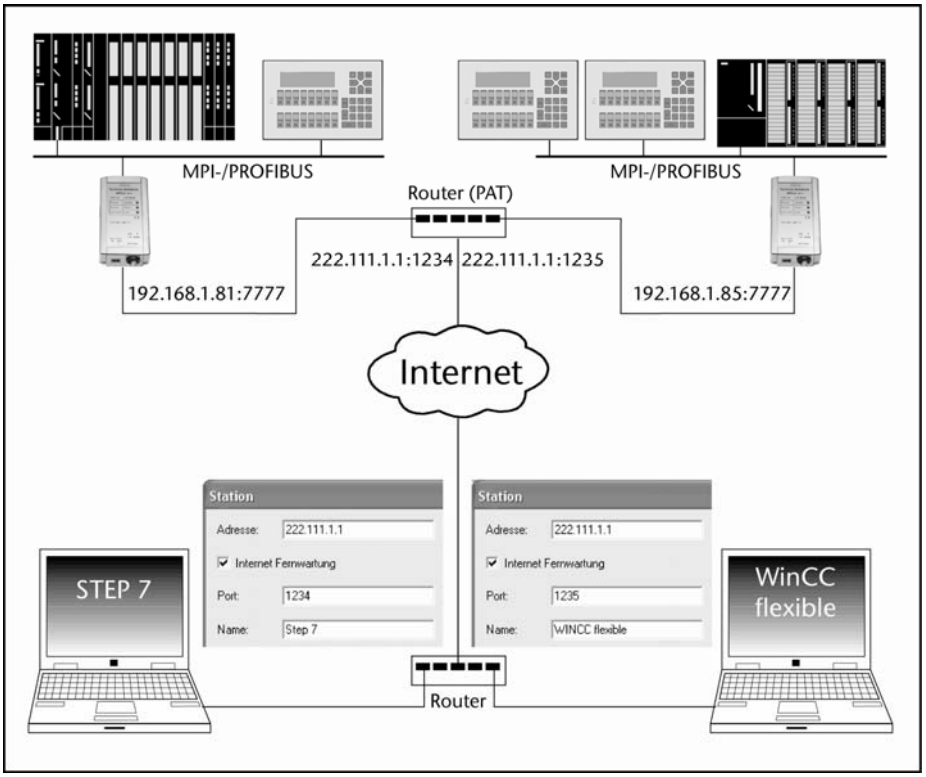
A: The user can influence the allocation of *'cycle load due to communication [%]'* under object properties of the CPU in the hardware configuration. The default value is 20 %.

Q: What should I look out for when implementing Internet teleservice via a router?

A: If the NETLink PRO devices are in a private network behind a router, they cannot be addressed by their private IP address on the fixed NETLink PRO port 7777 from the Internet.

To be able to address the devices from the Internet despite this, a 'public' port is configured in the router for each NETLink PRO.

After that, access is possible via the public IP address of the router and the configured port.



By default, the S7 network driver attempts to address the NETLink PRO via fixed port 7777, which would not work in the above scenario.

For that reason, as from driver version 2.5.0.0, the 'Internet Teleservice' option is installed, with which the port of a NETLink PRO configured in the router can be set.

This configuration can be made in the 'Station' dialog box.

There is a detailed description of the settings for a 'station' in Section 5.1.1.1.

For explanations, see the figure above:

Private addr. NETLink PRO		→	Public addr. NETLink PRO
NETLink 1:	192.168.1.81 Port 7777	→	222.111.1.1 Port 1234
NETLink 2:	192.168.1.82 Port 7777	→	222.111.1.1 Port 1235

10 Appendix

10.1 Technical Data

Dimensions in mm (LxWxH)	102 x 54 x 30
Weight	Approx. 180 g
Operating voltage	24 V DC ±25 %
Current consumption	150 mA
Ethernet interface	10 Base-T / 100 Base-TX
Ethernet connection	RJ45 socket
Ethernet transmission rate	10 Mbps and 100 Mbps
MPI/PROFIBUS interface	RS485, electrically isolated
MPI/PROFIBUS transmission rate	9.6 Kbps; 19.2 kbps 45.45 kbps 93.75 kbps 187.5 kbps 500 kbps 1.5 Mbps 3 Mbps 6 Mbps 12 Mbps
MPI/PROFIBUS connection	SUB-D connector, 9-way with programming unit interface and terminating resistor
MPI/PROFIBUS protocols	FDL protocol for MPI and PROFIBUS
Displays	3 LEDs, incl. 2 two-color, for general status information 2 LEDs on the Ethernet interface for Ethernet status
Degree of protection	IP 30
Operating temperature	0 °C ... 60 °C
Storage and transportation temperature	-20 °C to +90 °C
Relative humidity during operation	5 % to 85 % at 30 °C (no condensation)
Relative humidity during storage	5 % to 93 % at 40 °C (no condensation)

10.2 Pin assignments

10.2.1 MPI/PROFIBUS interface pin assignments

Connector	**Signal**	**Meaning**
1	-	unused
2	GND	Ground power supply (looped through)
3	RxD / TxD-P	receive / transmit data-P
4	-	unused
5	DGND	Ground for bus termination (looped through)
6	DVCC	5 V DC for bus termination (looped through)
7	VCC	24 V DC for power supply (looped through)
8	RxD / TxD-N	receive / transmit data-N
9	-	unused

10.2.2 Assignment of the Ethernet interface (host interface)

Connector	Signal	Meaning
1	TX+	transmit data
2	TX-	transmit data
3	RX+	receive data
4	-	unused
5	-	unused
6	RX-	receive data
7	-	unused
8	-	unused

The NETLink PRO comes with a shielded category 5 TCP cable with a length of three meters.

The maximum cable length between two TCP interfaces is 100 meters according to IEEE802.

If distances greater than 100 meters have to be covered, the use of switches or hubs is recommended.

10.2.3 Power supply socket

If an external power supply is used, please make sure the polarity is correct and all technical data are complied with.

10.3 Further Documentation

10.3.1 Address conversion table

The following table is a parameterization aid for fining the correct setting for rack/slot or for remote TSAP in addressed mode.

Bus add.	Rack	Slot	TSAP		Bus add.	Rack	Slot	TSAP		Bus add.	Rack	Slot	TSAP		Bus add.	Rack	Slot	TSAP
0	0	0	0200		32	1	0	0220		64	2	0	0240		96	3	0	0260
1	0	1	0201		33	1	1	0221		65	2	1	0241		97	3	1	0261
2	0	2	0202		34	1	2	0222		66	2	2	0242		98	3	2	0262
3	0	3	0203		35	1	3	0223		67	2	3	0243		99	3	3	0263
4	0	4	0204		36	1	4	0224		68	2	4	0244		100	3	4	0264
5	0	5	0205		37	1	5	0225		69	2	5	0245		101	3	5	0265
6	0	6	0206		38	1	6	0226		70	2	6	0246		102	3	6	0266
7	0	7	0207		39	1	7	0227		71	2	7	0247		103	3	7	0267
8	0	8	0208		40	1	8	0228		72	2	8	0248		104	3	8	0268
9	0	9	0209		41	1	9	0229		73	2	9	0249		105	3	9	0269
10	0	10	020A		42	1	10	022A		74	2	10	024A		106	3	10	026A
11	0	11	020B		43	1	11	022B		75	2	11	024B		107	3	11	026B
12	0	12	020C		44	1	12	022C		76	2	12	024C		108	3	12	026C
13	0	13	020D		45	1	13	022D		77	2	13	024D		109	3	13	026D
14	0	14	020E		46	1	14	022E		78	2	14	024E		110	3	14	026E
15	0	15	020F		47	1	15	022F		79	2	15	024F		111	3	15	026F
16	0	16	0210		48	1	16	0230		80	2	16	0250		112	3	16	0270
17	0	17	0211		49	1	17	0231		81	2	17	0251		113	3	17	0271
18	0	18	0212		50	1	18	0232		82	2	18	0252		114	3	18	0272
19	0	19	0213		51	1	19	0233		83	2	19	0253		115	3	19	0273
20	0	20	0214		52	1	20	0234		84	2	20	0254		116	3	20	0274
21	0	21	0215		53	1	21	0235		85	2	21	0255		117	3	21	0275
22	0	22	0216		54	1	22	0236		86	2	22	0256		118	3	22	0276
23	0	23	0217		55	1	23	0237		87	2	23	0257		119	3	23	0277
24	0	24	0218		56	1	24	0238		88	2	24	0258		120	3	24	0278
25	0	25	0219		57	1	25	0239		89	2	25	0259		121	3	25	0279
26	0	26	021A		58	1	26	023A		90	2	26	025A		122	3	26	027A
27	0	27	021B		59	1	27	023B		91	2	27	025B		123	3	27	027B
28	0	28	021C		60	1	28	023C		92	2	28	025C		124	3	28	027C
29	0	29	021E		61	1	29	023D		93	2	29	025D		125	3	29	027D
30	0	30	021F		62	1	30	023E		94	2	30	025E					
31	0	31	0220		63	1	31	023F		95	2	31	025F					

10.3.2 Information in the internet

http://www.helmholz.de

http://www.profibus.com

http://www.siemens.com

http://www.ietf.org/rfc

Notes