

NetLink (V1.11)

Driver for the **NetLink** communication adapter for operation with Simatic® STEP®7

Content:

- 1.0 [Introduction](#)
- 1.1 [System requirements](#)
- 1.2 [Installation:](#)
- 2.0 [Manner of operation](#)
- 2.1 [Operation via local network \(LAN\)](#)
- 2.2 [Operation via internet \(WAN\)](#)
- 3.0 [Configuring connected controls](#)
- 4.0 [Definition of access names to identify controls](#)
- 5.0 [Settings within STEP®7](#)
- 6.0 [Troubleshooting](#)
- 7.0 [Revision history](#)
- 8.0 [Technical data](#)

1.0 Introduction

With the **NetLink** driver for the **NetLink**, you can easily program controls via a network using TCP/IP. Status operation is also possible via the **NetLink** driver.

The **NetLink** driver can be used in conjunction with Simatic® STEP®7. The **NetLink** driver also permits direct access through variables through WinCC®.

Access via the **NetLink** driver can be performed on the following controls:

- Any controls of the Simatic® S7-300® or S7-400® series that are connected via a local area network or the Internet. To link a Simatic® S7-300® or S7-400® control via the Ethernet network, you require the **NetLink** communication adapter.

1.1 System requirements

To operate the **NetLink** driver on the programming device side you require a PC with a 32-bit Windows operating system and an installed version of Simatic® STEP®7, Version **5.1** and higher. On the programming device side, the operating systems Windows98® (Internet Explorer 5.5 and higher), Windows ME® (Internet Explorer 5.5 and higher), Windows NT4® (Service Pack 6 and Internet Explorer 5.5 and higher), and Windows 2000® (Internet Explorer 5.5 and higher) or Windows XP® can be used. Please pay attention to the requirements of your STEP®7 package.

Connect the **NetLink** directly to the MPI or the Profibus interface of the Simatic® S7-300® or S7-400® controller if possible. If this is not possible in special cases, it may be necessary to provide a separate power supply to the **NetLink** communication adapter.

A functioning network link using TCP/IP must be set up in the PC that is used. IP addresses of the PC must be known. You can use normal commercial type network cards. In the local area network, 100 Mbit network cards and switches are used to obtain the best possible performance. Of course, you can also use 10 Mbit network cards and hubs but that would slow down status operation.

1.2 Installation

Please note that you have to log on as an administrator for installation under the 32-bit Windows operating systems Windows NT4®, Windows 2000® and Windows XP® because the setup program has to make entries in the Windows registry.

For start installation, launch the Setup.exe program on the CD supplied and follow the instructions that appear on the screen.

If necessary you are able to download the newest NetLink driver from our homepage (www.helmholz.de).

Please pay attention that your installation of STEP®7 software needs an installed driver for the PC adapter because the **NetLink** driver uses some basic functions out of it.

After the first installation, reboot your computer to make sure that changed settings are applied.

After installation, the start menu of your PC will contain the program *NetLink settings*. The program can be used to assign and organize the IP addresses of the connected **NetLink**. The user interface of the **NetLink** driver is also visible inside STEP®7 under the menu item *Set PG/PC interface*.

2.0 Manner of operation

The **NetLink** is usable at all TCP/IP conform networks. I.e. you can use it in local LANs as in worldwide WANs.

2.1 Operation via local network (LAN)

Before you can select the connected control in the driver settings of the programming devices, the IP address of the connected **NetLink** must be known.

To make sure that the control can be accessed by the programming device when setting up a new connection, first use a PING <IP address> to make sure that your network link is working.

The TCP port **1099** is currently used for communication.

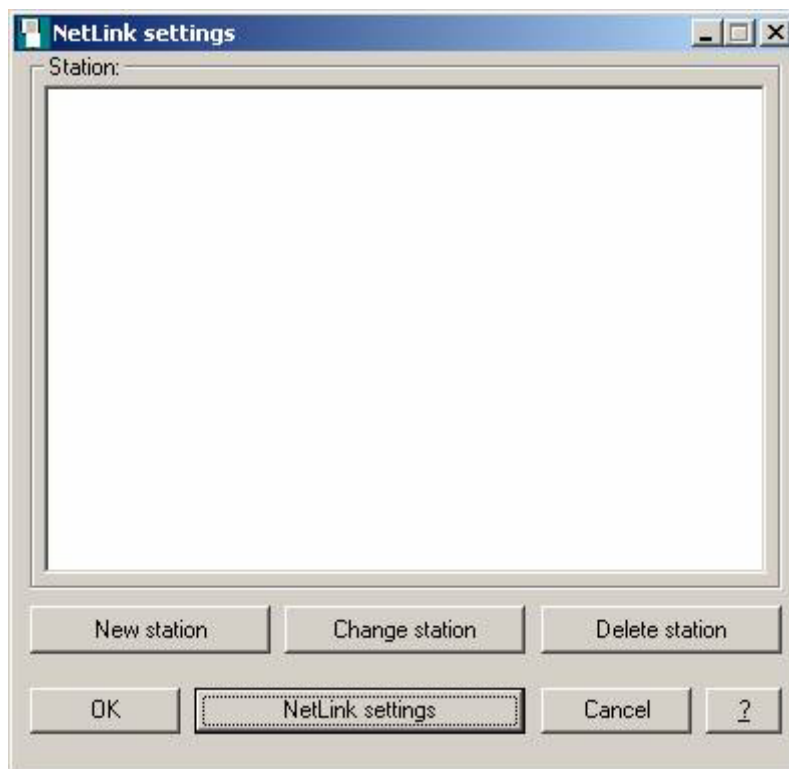
If the computers are behind a firewall, the port for communication must be enabled in the firewall software. Contact your network administrator or refer to the documentation of your firewall software.

2.2 Operation via internet (WAN)

Basically the same rules are to use as in section [2.1](#) described. The routing of IP telegrams from a local computer to a point far away (e.g. for remote control) needs mostly a network administrator with established knowledge about the technical environment between the communication partners.

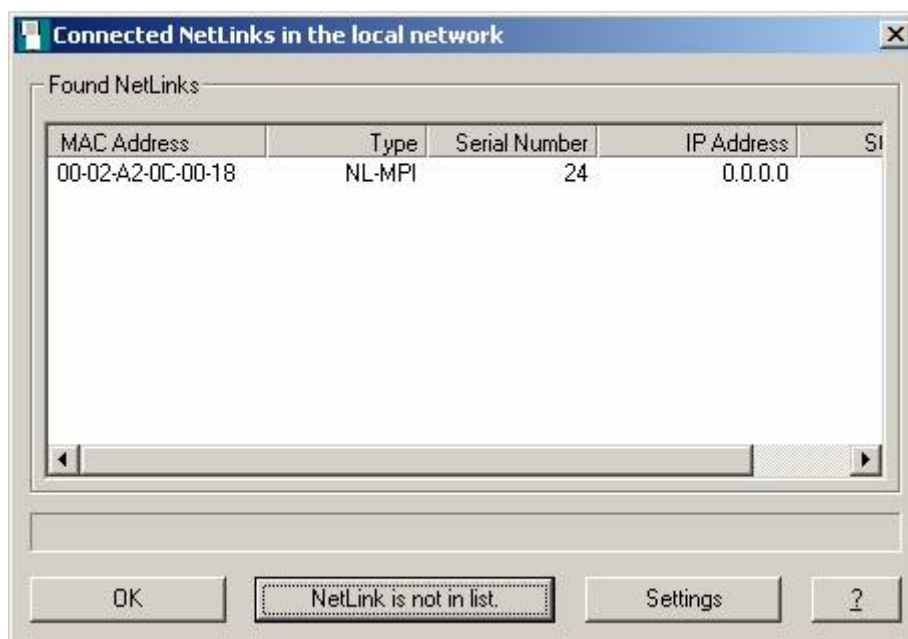
3.0 Configuring connected controls

Start the program *NetLink settings* from the start menu. The following window will then open:



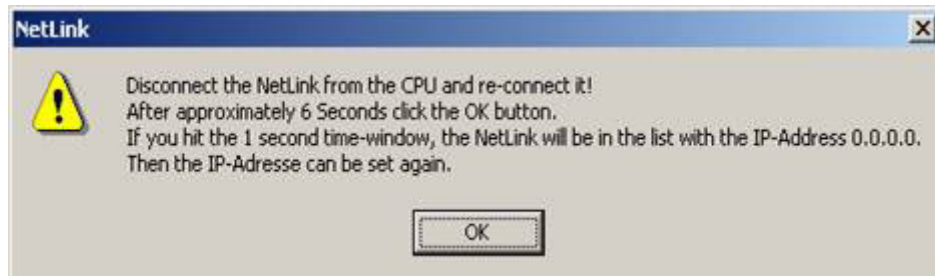
Because after initial start-up no access names have been defined for the controls, an empty list appears. As explained in the next section, before we can assign access names for the controls, the connected **NetLinks** must first be assigned IP addresses.

First click on the button *NetLink settings*



The list shows all the **NetLinks** found in the available net. If no IP address has been assigned yet, the address 0.0.0.0. will appear.

If the desired **NetLink** does not appear in the list, the **NetLink** is not in the same Net (e.g. behind a router) or it is not in configuration mode. In that case, click on the button *NetLink is not in list*. The following message then appears:



Do what the message says and disconnect the **NetLink** from the power supply and then reconnect it. Only when you have done that, confirm with the OK button.

After that, the list is refreshed and the **NetLink** will appear in the list.

Select the **NetLink** to configure and click on the *Settings* button.

Assign the IP address for the **NetLink** in the following dialog box.



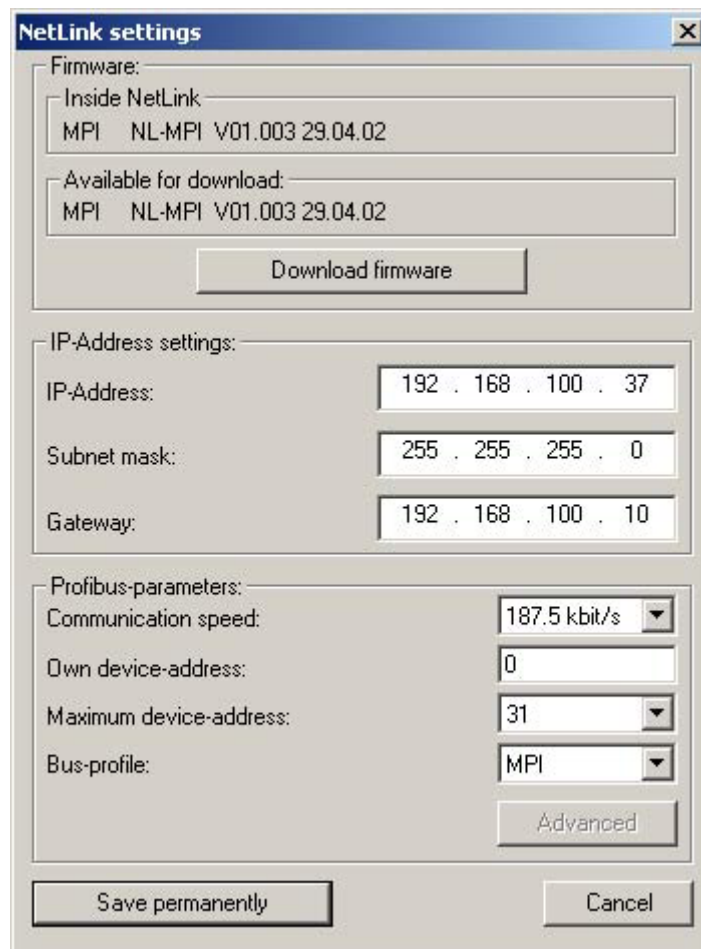
In the next dialog box assign, the subnet mask in which the NetLink is operated and the address of a gateway. If there is one. If there is not gateway, just leave those fields empty.

If the NetLink already have an IP address for an other subnet the *Set IP-Address* window will appear for reconfiguring it for the actual subnet. In this case you need to reconfigure the **NetLink** within one minute after power cycle.

Select the transmission rate of the MPI or Profibus network. On transmission via MPI, you should select 187.5 kbps. If you operated the **NetLink** on the Profibus, you must set it to the baudrate that is configured on the CPU for the Profibus. For example, on a CPU315-2DP the default setting of the CPU is 1.5 Mbps. Always select the data transmission rate set on the CPU.

Because the **NetLink** is a node in an MPI or Profibus network, it must have its own address in the network. The default is address 0. On delivery, the programming devices have address 0, operator panels address 1, and CPUs address 2. On starting up **NetLink** make sure the addresses you use do not conflict.

Set the highest node address and the bus profile (MPI/Profibus) correctly.



NetLink settings

Firmware:

Inside NetLink:
MPI NL-MPI V01.003 29.04.02

Available for download:
MPI NL-MPI V01.003 29.04.02

Download firmware

IP-Address settings:

IP-Address: 192 . 168 . 100 . 37

Subnet mask: 255 . 255 . 255 . 0

Gateway: 192 . 168 . 100 . 10

Profibus-parameters:

Communication speed: 187.5 kbit/s

Own device-address: 0

Maximum device-address: 31

Bus-profile: MPI

Advanced

Save permanently Cancel

After you have made the settings, click the *Apply permanently* button.

The firmware version of the connected adapter is also displayed in the dialog box. Clicking on the *Load firmware* button updates the NetLink to the latest firmware version.

Caution: If you want to use the **NetLink** on a Profibus system, you must state this in the bus profile selection. Please then also set the **Profibus parameters** to match the hardware configuration. Otherwise faults may occur on the bus. You will find the Profibus parameters dialog behind the *Advanced* button.

Please use the Profibus parameters out of your actual STEP®7 project.

Follow the instructions to apply the configuration permanently.



NetLink

The configuration has been downloaded to the NetLink. Select 'Yes' to restart the adaptor. If 'No' is selected, the NetLink needs to be disconnected and re-connected to save the settings permanently !

Ja Nein

Configuration of the IP address and the interface speed is then complete. The **NetLink** can now be used.

4.0 Definition of access names to identify controls

The next step is to configure a meaningful name to make accessing a control easier. Using meaningful names for controls makes it unnecessary to note down the IP addresses of all controls.

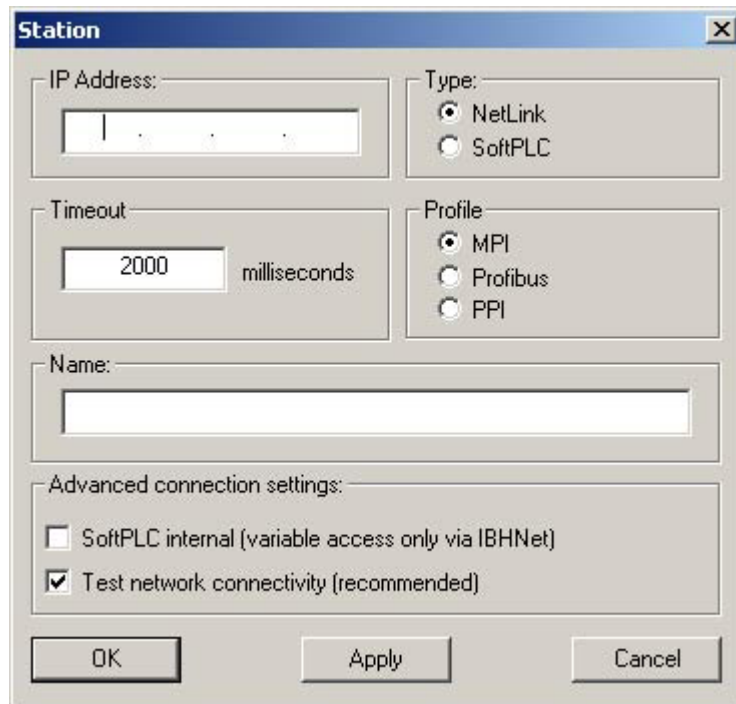
Start the NetLink program from the start menu. The following window appears:



In the Station selection field, you can select existing stations, which you can alter if you click on the *Change station* button.

The *NetLink settings* button takes you back to the NetLink configuration described in Section [3.0](#).

We are assuming that no station has been created and that you have to create a new station now. Click on the *New station* button. The following dialog box opens:



The 'Station' dialog box is used for configuring network settings. It contains the following fields and options:

- IP Address:** A text field for entering the IP address.
- Type:** Radio buttons for 'NetLink' (selected) and 'SoftPLC'.
- Timeout:** A text field with '2000' and a label 'milliseconds'.
- Profile:** Radio buttons for 'MPI' (selected), 'Profibus', and 'PPI'.
- Name:** A text field for entering a unique name.
- Advanced connection settings:**
 - ☐ SoftPLC internal (variable access only via IBHNet)
 - ☒ Test network connectivity (recommended)
- Buttons:** 'OK', 'Apply', and 'Cancel'.

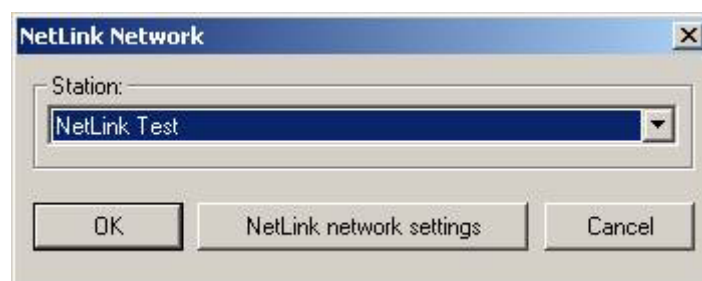
Enter the IP address of the **NetLink** that you want to access by a certain name. Select *NetLink* for the *Type*. Assign a unique name by which the control can be accessed.

Now choose the bus profile which you want to use to communicate with your environment and click on the *Apply* button, then confirm by clicking on the *OK* button.

Under Windows98® it can be useful to deselect *Test network connectivity* for performance reasons.

The bus profile *PPI* for communicating with S7-200® controls is not full supported yet.

After you have configured all accessible controls, you can select them by their name. The name you set stands for the IP address. In the dialog box shown, control from STEP®7 is selected.

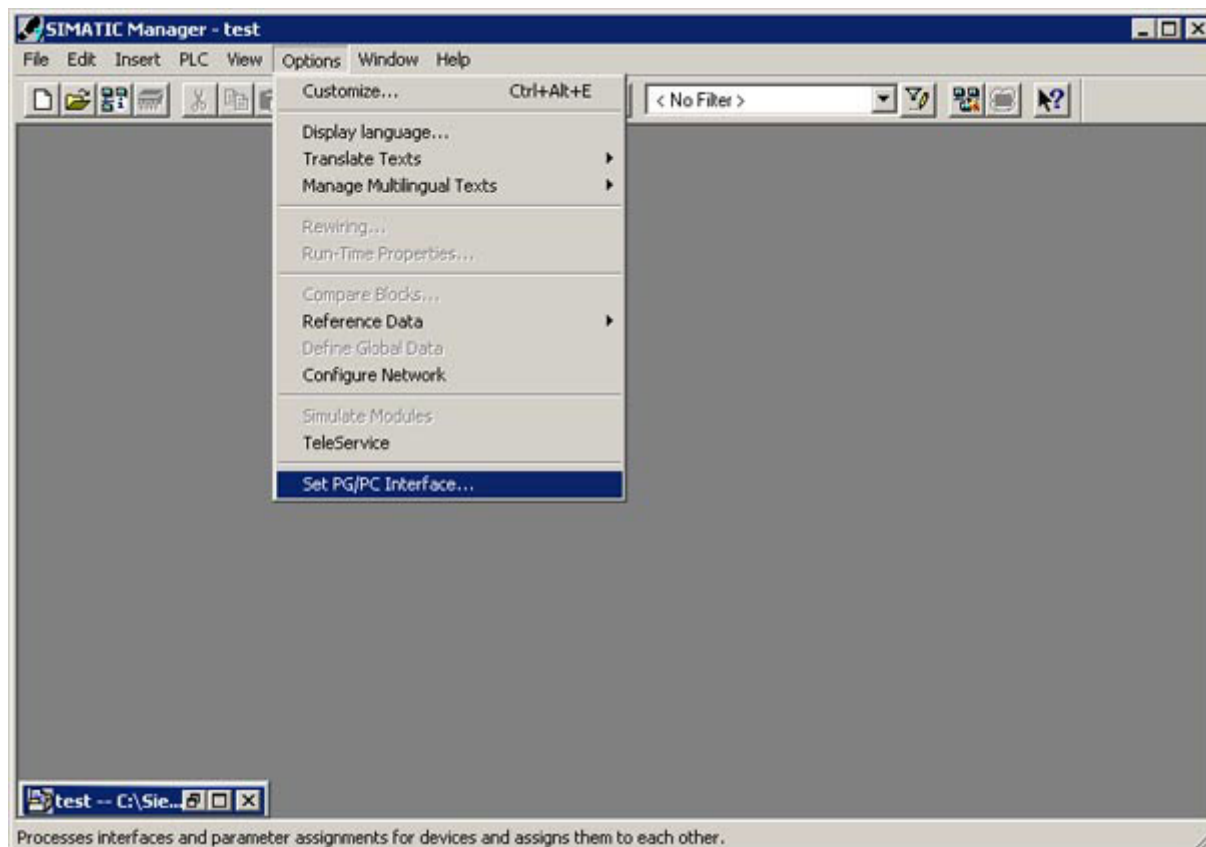


The 'NetLink Network' dialog box is used for selecting a station. It contains the following elements:

- Station:** A dropdown menu showing 'NetLink Test'.
- Buttons:** 'OK', 'NetLink network settings', and 'Cancel'.

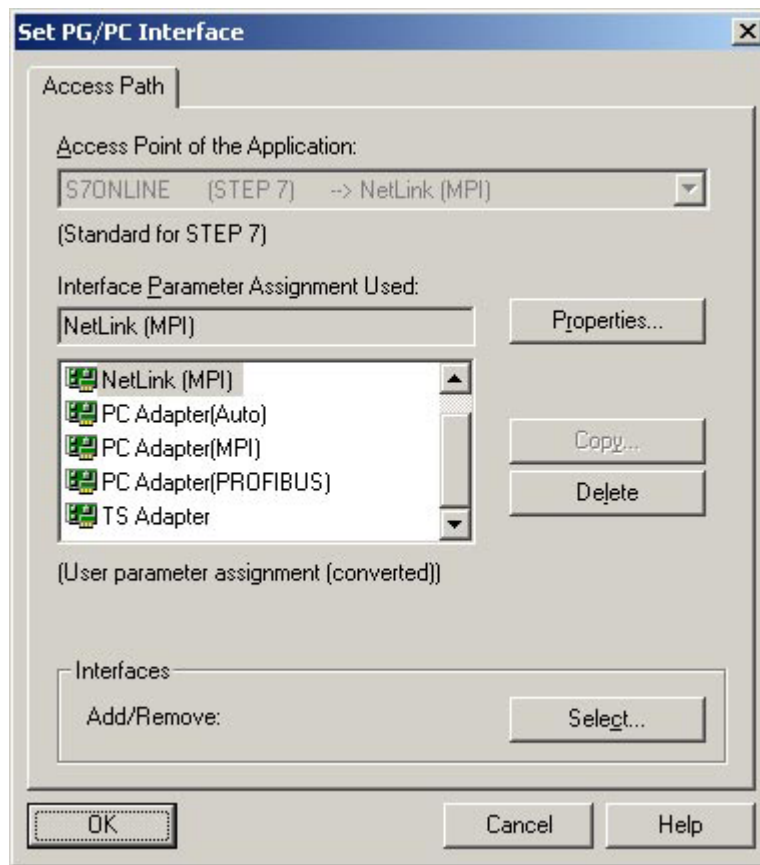
5.0 Settings within STEP®7

After successful installation and configuration of the **NetLink** driver, start your version of STEP®7. For configuration, select the menu item *Options - Set PG/PC interface*. As an alternative, you can use the menu item *Set PG/PC interface* in the Windows control panel.

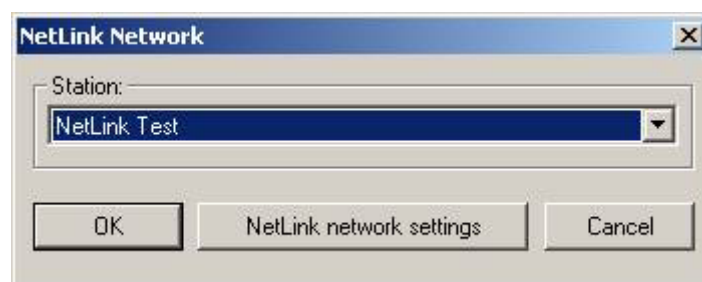


If the STEP®7 software is used under the operating systems Windows NT4®, Windows 2000®, and Windows XP®, install the interface driver for the *PC adapter(MPI)* in addition before installing the **NetLink** network driver.

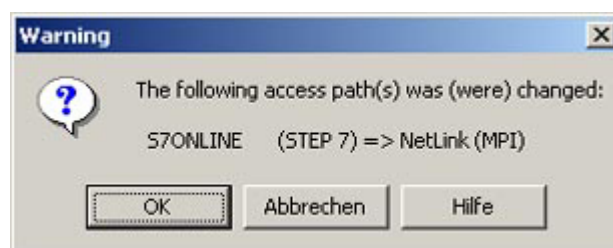
Now select driver **NetLink** as the access path.



Click the *Properties...* button to select the control already configured or create a new control with *Network setting* as described at section [4.0](#).



Confirm the settings by clicking on the *OK* button. When you close the *Set PG/PC interface* dialog box, a message is displayed indicating that you have changed the communication path.



If you have connected a **NetLink**, you have already successfully change the access path.

6.0 Troubleshooting

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

A: Make sure you have set the IP address correctly in the driver configuration. Please also enter the command PING <IP address> at the prompt to check whether the **NetLink** can also be accessed via the network.

Q: I connected the NetLink direct 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 cable adaptor (Order no: 700-880-ZuBeh) or a hub/switch for connecting two TCP/IP end devices together.

Q: The **NetLink** driver does not appear in the "Set PG/PC interface" setting dialog box of the STEP7[®] software.

A: Install the driver for the serial adapter "PC adapter (MPI)" because it provides basic functionality. Then the **NetLink** will appear in the list.

F: The modify dialogues are not appearing in the Simatic[®] Manager:

A: Be sure, you had administrator rights during the installation. Restart the pc after installation.

You need at least version 5.1 of the Simatic[®] Managers.

F: During transmitting with ProTool[®] I'm getting a message like *Server is busy* and it looks like ProTool[®] is hanging.

A: The configured timeout for the **NetLink** is too big in this case. Please make it smaller as 4 seconds.

Q: In the setting dialog box of the STEP[®]7 software I can't open any properties for the **NetLink** driver.

A: Pathnames were used during installation that do contain blanks or special characters. Please install it again without using blanks or special characters.

F: By connecting the **NetLink** to Profibus, there is no communication possible.

A: Please read the timing parameters for Profibus out of your actual STEP[®]7 project. Configure your **NetLink** (behind the *advanced* button, see section [3.0](#)) with these parameters and try it again.

If still no communication is possible, increase *Ttr* (Target Rotation Time) in the **NetLink** and in the CPU.

Q: With some older versions of Windows 95[®], some files can not be correctly registered during installation.

A: Your Windows95 lacks the Update for „Windows Sockets 2“. This can be downloaded from www.microsoft.com free of charge. The filename is: W95ws2setup.exe.

More help on this operating system is not available because it is not longer supported from us.

7.0 Changes in the versions

Changes in the version V1.11

- The firmware supports now a Hilscher and an STEP[®]7 connection simultaneously.
- After power cycling the PLC, WinCC did not reconnect the communication.
- Speed by PLC communication via STEP[®]7 V5.2 increased.
- Different problems with ProTool[®] runtime eliminated.
- Problems with some bigger S7-300[®] CPUs eliminated.

Changes in the version V1.10

- Firmware and driver are supporting two tcp/ip connections at the time now.
- Transfer of projects to a TP170 is possible now.
- Transfer of projects to an OP25/OP27 is possible now.
- Speed of PLC connections increased.
- Standard bus parameter for Profibus modified.
- Problem with access right eliminated.
- Dropping if STEP[®]7 is not used for a longer time is eliminated.
- Support of S7-200[®] devices are cancelled for technical reasons.
- Documentation of high language interface deleted (already existing projects are still working with the **NetLink** driver).

Changes in the version V1.09

- Supports FM devices from the S7-300[®] product line now.
- Added support for OPs with MPI interface.
- Added support for S7-200[®] PLCs.
- No power cycle is needed anymore after a reconfiguration of the NetLink.
- Now it is possible to reconfigure the NetLink out of a different IP net.
- MPI with 19.2 kBit/s possible now.

Changes in the version V1.08

- Now different drivers for MPI and Profibus are displayed in the Simatic[®] Manager. Assigning the NetLink to MPI or Profibus networks is now possible.

- The timeouts can now be adjusted by the user.
- Undefined Problems fixed, when different Windows of the Simatic® Manager accessed the PLC.
- The Servicelab from Siemens also works now.
- Routing functions to MPI subnets are now possible.
- For CPU's with selectable MPI/DP interface, now the baudrates 1.5, 3 and 12 MBit can be selected.

Changes in the version V1.07

- The „Save permanently“ Button is not initially deactivated any more.
- The bus parameters are verified before saving now.
- In the preferences dialog of the Simatic Manager the list of PLCs is refreshed now.
- The driver now gives a warning, if the configuration is faulty.
- Blockwise variable access with the NetNet object now also works for blocks, that are longer than a MPI telegram.
- A “ping” can now be sent, before the driver tries to go online. If there is a faulty network connection, the driver cancels the online request in time.
- If an IP address is to be used with the **NetLink** that already exists, there is a warning now.
- Problems with CP343 fixed.
- Problems when erasing the complete CPU fixed.
- If “Profile Profibus” is selected, the NetLink now shows up as a Profibus interface in the Simatic Manager.

Changes in the version V1.05

- The Profibus parameters can now be installed.
- The **NetLink** object does not now open message boxes for variable access. The following error codes are now returned:

Error code	Error text
1	netpcomv.CreateInstance failed
2	netpcomv.MPI_open failed
3	netpcomv.MPI_ConnRequest failed
4	connection request to SoftPlc failed
5	netpcomv.MPI_close failed

An error on a write/read access still triggers an exception.

- A memory reset now no longer crashes the driver when waiting for the error message "No response to Step7 telegram" of the Simatic® Manager.

Changes in the version V1.04

- The Profibus parameters can now be installed.
- The orange LED of the **NetLink** now shows status(connected) of the network link instead of 10/100 Mbit.
- If you communicated with the Simatic® Manager via the **NetLink**, resetting to a PC adapter was only possible after rebooting the Simatic® Manager. It is now possible without rebooting.
- The system error on incorrect connection has been remedied. Only a relevant error message is displayed now.
- The behavior on using ProTool® has been improved.

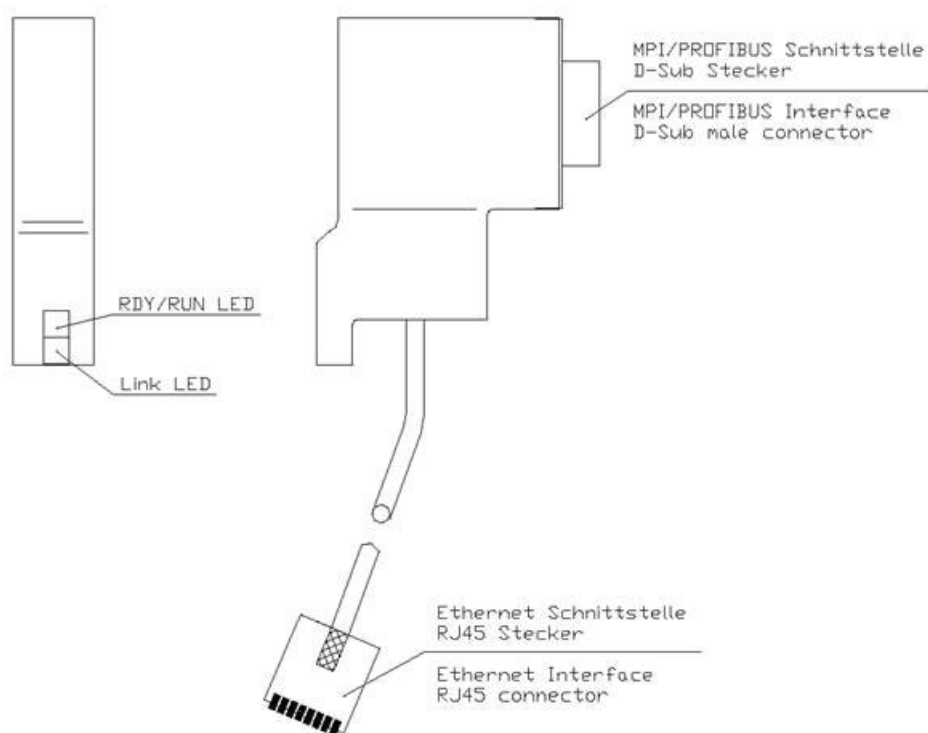
8.0 Technical data

The **NetLink** is an Ethernet Gateway. **NetLink** is housed in a sub D connector shell. It consists of a complete field bus master together with a 10/100 Mbps Ethernet interface and is therefore a complete gateway that automatically detects whether a 10 or 100 Mbit network is connected. Because it is housing in a sub D connector shell it can be directly connected to the field bus connector of an MPI-capable device and connects it with the next switch or hub via a 3 meter long Ethernet cable.

If you want to connect the *NetLink* directly to the network card of the PC, you must use a cross-over cable.

The power supply is connected directly via the MPI interface of the **NetLink**. The device is configured via the Ethernet. Please start the **NetLink** software running on a PC connected to the same Ethernet segment as the **NetLink**. A diagnostic channel with the **NetLink** is established via TCP/IP. It works via a permanently defined port parallel with useful data transmission. The configuration is stored in a FLASH in the **NetLink** and is therefore still available after a power failure.

Device drawing:



MPI Interface

Pin	Signal	Meaning
1	-	unused
2	DGND	data and supply voltage reference potential
3	RxD / TxD-P	receive / transmit data-P
4	-	unused
5	DGND	data and supply voltage reference potential
6	-	unused
7	VP	24 V power supply
8	RxD / TxD-N	receive / transmit data-N
9	-	unused Housing / shield

You do not require a connecting cable to connect the MPI interface of the **NetLink** to a Siemens S7 or another MPI capable device because the **NetLink** is directly connected to the device with the MPI interface.

No external power supply is required because the MPI interface provides a supply voltage.

Caution: The power supply of the **NetLink** does not have reverse polarity protection because of its compact dimensions!

Ethernet interface

For the Ethernet interface, an RJ45 connector and category 5 twisted pair cable is used.

The Ethernet cable consists of 4 twisted pair conductors in which there is a shield around the entire cable and each pair of conductors in the cable is shielded again separately. This is called an STP cable (shielded twisted pair).

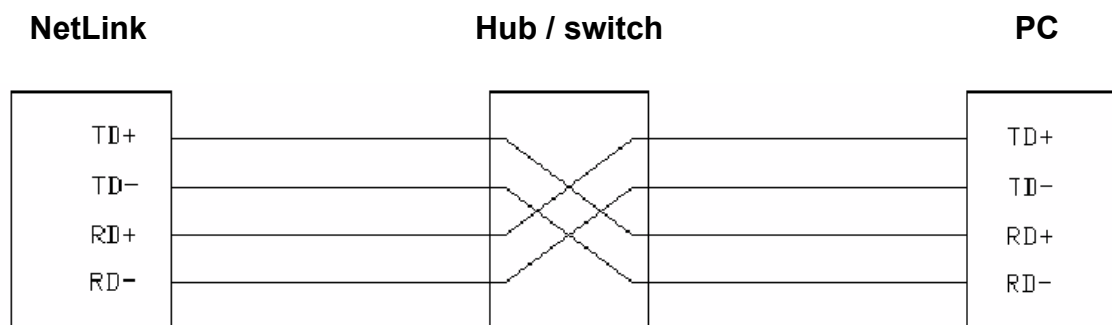
The transmission rate is 10 / 100 Mbaud.

Connection with RJ45 connector

Pin	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

Medium 4 x 2 twisted pair copper cable Cat 5 (10 / 100MBaud) / cable length up to the next hub, switch max. 3m
Transmission rate 10 / 100 Mbaud

Connection via hub/switch



Check of the LED displays

RDY / RUN	Flashing (1 Hz)	Boot loader active
Red	Flashing fast (10 Hz)	Booting, Firmware being initialized
RDY / RUN	On	Ready, IP address set
Green	Flashing non-cyclically	Still no IP address or double addresses Address in the network
	Flashing fast (10 Hz)	Firmware being updated
Link LED	On	There is a connection with the Ethernet
	Off	No connection with the Ethernet

Technical data

Ethernet interface

Transmission rate	10 / 100 Mbaud
Interface	10 / 100 Base-TX, isolated RJ45 connector

PROFIBUS interface

RS485, max. 12 Mbps, non-isolated

PROFIBUS interface

Operating voltage	acc. to EN 50170 +24 V / 50 mA
Operating temperature	0 °C - 50 °C
Degree of protection	IP 20
Dimensions (L x W x H)	65 x 48 x 16 mm
Weight	approx. 140 g with cable

Systeme Helmholz GmbH

Phone: +49 9135 7380-0

Gewerbegebiet Ost 36

Fax: +49 9135 7380-50

D-91085 Weisendorf

Germany

e-mail: support@helmholz.de www : <http://www.helmholz.de>

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