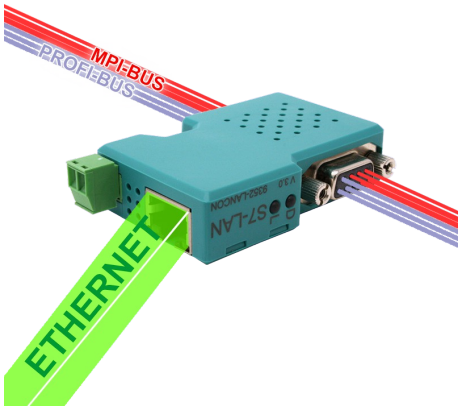
S7-LAN / S7-LAN++ / S7-GATE / MPI-LAN / S7-USB / MPI-USB / MPI-II

user manual
V2.14

English



Content

1 General

1.1 About the manual

This manual describes the devices S7-LAN, S7-LAN++, S7-GATE, MPI-LAN, S7-USB, MPI-USB and MPI-II. These devices are sometime also just called devices or LAN or USB devices within the manual.

In addition to the description of the devices itself, you will also find the documentation for the programs TIC and PLC-VCOM here. These are needed for the configuration of and communication with the devices.

This document, the two mentioned programs from above as well as example applications can be downloaded from the product page from our website within the “downloads” section.

The manual is aimed to the following user groups:

- planners
- operators
- commissioning staff
- service and maintenance staff

If not specified otherwise the manual refers to the following firmware and program versions:

- **S7-LAN:** V2.66 or newer
- **S7-LAN++:** V3.00 or newer
- **S7-GATE:** V1.02 or newer
- **MPI-LAN:** V2.91 or newer
- **S7-USB:** V1.37 or newer
- **MPI-USB / MPI-II:** V2.85 or newer
- **TIC:** V2.59 or newer
- **PLC-VCOM:** V2.83 or newer

The device S7-LAN++ supports all functions that the S7-LAN also provides, as well as some additional functions. However the S7-LAN++ is only mentioned explicitly within the manual if there are differences to the S7-LAN.

Before you use the device, you should read the manual.

If you have questions and / or problems you can contact the technical support from your dealer.

2 System requirements

2.1 Hardware

The hardware system requirements for connecting the module / cable with your PC / network differs depending on the device type:

- S7-LAN, S7-GATE and MPI-LAN
  - network connection 10/100MBit *(PC or Switch/Hub)*
  - 24V/DC power supply *(via the bus interface or externally via the Phoenix jack)*
- S7-USB and MPI-USB
  - PC with USB-1.1-A interface *(the 5V/DC on the USB lines are also used as power supply)*
- MPI-II
  - PC with USB-1.1-A interface *(used for communication via USB)*
  - PC with RS232 interface *(used for serial communication)*
  - 24V/DC power supply *(via the bus interface or externally via the Phoenix jack)*

Hint:
If the backward compatibility is given, you can also connect your device with a USB2.0 or higher as well as with a 1000MBit LAN interface.

Important:
The devices with an external 24V/DC power supply have an integrated reverse polarity diode. Therefore the device itself is protected against reverse polarity. Only if the module / cable with reverse polarity is connected to a PLC or other module this can be get damaged!

The 9 pin PPI/MPI/Profibus interface is used for connecting the device with a controller. The following controllers are supported:

- S7-200 *(older controllers with TIC from V2.53)*
- S7-300 *(baud rates up to 12M, if the controller supports it)*
- S7-400 *(baud rates up to 12M)*
- FM modules
- Sinamix *(TIC from V1.20 or PLC-VCOM from V2.71)*

- MicroMaster and other drives and converters *(TIC from V1.20 or PLC-VCOM from V2.71)*
- SEW-EURODRIVE converters
- Sinumerik *(PLC part only)*

Furthermore the routing on S7 controllers is supported.

2.2 Software

The following operating systems are supported from the drivers:

- Windows XP
- Windows Vista
- Windows 7
- Windows 8 / 8.1
- Windows 10
- Windows 11

If you want to use the device together with a programming software, like SIMATIC Step 7 Manager, TIA Portal or MicroWin, or with a visualization software, like Windows Control Center flexible (WinCC flexible) or ProTool, you have to use one of the following programs:

- Direct Driver / TIC *(configuration and communication directly from the PG/PC Interface)*
- PLC-VCOM *(communication via virtual COM port)*

Hint:
We are recommending the usage of the TIC driver. But in some special cases, like for example when the application have to communicate with a COM port, the PLC-VCOM is needed.
The TIC driver also contains an interface configuration tool (formerly S7-IFC), which is used for configuring and updating your device.

A video description for the installation and parameterization of the Direct Driver can be found on our support page.

The driver as well as the needed configuration depends on which software you are using for programming or visualizing. The following table gives you an overview which driver and configuration you should use for USB or LAN devices together with a given software:

program	**driver**	**configuration**
SIMATIC Manager	TIC	configuration directly via the PG/PC Interface “TIC ETH/USB“ for MPI or PROFIBUS
WinCC (flexible)	TIC	configuration directly via the PG/PC Interface “TIC ETH/USB“ for MPI or PROFIBUS
TIA Portal	TIC	configuration directly via the PG/PC Interface “TIC ETH/USB“ for MPI or PROFIBUS
STARTER	TIC	configuration directly via the PG/PC Interface “TIC ETH/USB“ for MPI or PROFIBUS
MicroWin	TIC	configuration directly via the PG/PC Interface “TIC ETH/USB“ for PPI
ProTool	TIC	configuration directly via the PG/PC Interface “TIC ETH/USB“ for MPI or PROFIBUS

If you want to use the serial interface you always have to use the PC-Adapter or PC-PPI driver from Siemens. This is needed because the TIC driver hasn't the possibility to communicate via the serial interface with a PLC or other module.

Siemens doesn't offer the serial communication for the drivers PC-Adapter and PC-PPI on 64-bit operating systems anymore.

Devices with an integrated LAN interface can also be accessed directly via the TCP/IP protocol. Siemens offers some TCP/IP drivers within the PG/PC Interface, which can be used therefore.

If you want to configure or check the state of your LAN device, you can also access it via the integrated web server. For this access you only need a web browser (e. g. Microsoft Internet Explorer, Mozilla Firefox or Google Chrome) on your PC. The access is independent of the used operating system and browser of your computer.

Hint:
Please make sure that JavaScript isn't disabled in your browser. Otherwise the web pages may not work correctly.

2.2.1 Ports for LAN devices

LAN devices are communicating via network with the help of different TCP/IP protocols. Therefore the following ports are used:

port	type	description
133	TCP	access to watchdog information
291	UDP	search and configuration (emergency loader)
292	UDP	search and configuration
40501	UDP	search and configuration
64738	UDP	communication
80	TCP	access to web server
102	TCP	access via RFC1006 / CP mode
64738	TCP	communication

If you have problems by accessing your device, please make sure that the ports from the table above aren't blocked from your firewall. This is especially a typical problem for VPN connections.

The ports for the watchdog information as well as for the web server can be omitted, if you don't need this type of access.

2.2.2 Communication-connections of the S7-300/400-PLCs

The S7-300/400-PLC distinguishes between the following communication-connections in the hardware-configuration :

- PG-communication
- OP-communication
- S7-standard-communication
- other communication

Only the PG-, OP- and S7-standard-communication can be defined in terms of number. The other-communication result from the difference between these communication and the maximum number.

This example is intended to illustrate this :

Maximum number:	12
PG-communication:	2
OP-communication:	3
S7-standard-communication:	4
this results in other-communication:	3

(12 - 2 - 3 - 4 = 3)

The S7-LAN++-module uses one or more of these communication in the S7- PLC depending on the number of connections to the module itself.

When connecting via the TIC-driver with Simatic-Manager and TIA-Portal, a PG-communication is used. For WinCC, an OP-communication.

The connection-channel used is determined by the software-package used. This cannot be determined by the user .

For S7-TCPIP RFC1006-connections to the module, the connection cable depends on the TSAP used for this connection . The TSAP defines the communication channel, rack and slot address .

The communication-channel is :

1: PG-communication

2: OP-communication

>=3: other-communicaton

Here is an example of a possible TSAP :

0102 ==> PG-communication to a participant with rack address 0
and slot address 2

This must not be neglected when designing the system and planning the use of the module.

A controller with insufficient free communication connections creates problems when using the S7-LAN++-module .

3 Commissioning

If you have met all mentioned requirements you can start do use your device. In this chapter the commissioning of the hardware, this means the correct way to connect your device to your PC or network, and the needed configuration of your software is described. Thereby the complete process for applications like Step 7, WinCC or TIA Portal is demonstrated here.

3.1 Hardware

Before you can use the device together with a software you have to connect it to your PC or network first. The connection options are partly different from device to device and are explained in more detail within this section of the current chapter.

3.1.1 Connecting the device S7-LAN / S7-GATE / MPI-LAN

In the first step you should put your LAN device on the PPI/MPI/Profibus interface of your PLC. If a bus cable is already connected to the interface of your PLC you can simply connect your device on top of the cable if a diagnostic jack is available. You can also put your device directly on a slave module (e. g. a panel) if you don't want to work on a bus with a controller.

Most controllers output a voltage of 24V/DC on the 9 pin bus connector. This voltage can then be used from the S7-LAN, S7-GATE or MPI-LAN as a power supply. If your controller doesn't output this 24V/DC or if you are connected to a slave module you have to supply power to the device externally via the Phoenix jack on the device.

After that you have to connect your device with your PC or network through a network cable. When you only want to use the device for programming or monitoring and controlling of variables it is usually sufficient to connect the device with the network jack of your PC or laptop directly. Therefore you should use a crossover LAN cable (a LAN cable with crossed occupancy). If your computer supports the automatically swapping of the two data pairs (also known as auto negotiation) you can also use a “normal” LAN cable (with 1:1 occupancy). If your device should be reachable from different PCs or installed within a plant, it is generally better to connect the device with a switch or hub of your network. There you have to use a normal network cable then. If you want to use a crossover cable you have to connect it with the up-link port of your switch/hub. If your switch supports the automatically swapping of the data pairs the cable type doesn't matter.

Hint:
The MPI-LAN devices are already have an installed crossover cable. Please pay attention to the above mentioned connection options about this cable type.

3.1.2 Connecting the device S7-USB / MPI-USB

In the first step you should put your USB device on the PPI/MPI/Profibus interface of your PLC. If a bus cable is already connected to the interface of your PLC you can simply connect your device on top of the cable if a diagnostic jack is available. You can also put your device directly on a slave module (e. g. a panel) if you don't want to work on a bus with a controller.

Now you have to connect your device via a USB cable to your PC. The cable can be connected directly to a free USB port of your computer or of course to a port on a USB hub too.

The devices S7-USB and MPI-USB are powered via the USB interface. A second cable for the power supply isn't needed thereby.

Hint:
The MPI-USB devices already have an installed USB cable which can be connected to your PC or hub directly. If you are using a S7-USB device you need a USB cable with the connectors USB-A to Mini-USB-B.

Important:
Please make sure that the USB interface of your PC or hub can deliver enough power. Otherwise your USB port may get overloaded.
Furthermore you should use USB cables with good quality only. This is especially very important for longer USB cables.

3.1.3 Connecting the device MPI-II

In the first step you have to connect the short cable side of your MPI-II device with the PPI/MPI/Profibus interface of your PLC. If a bus cable is already connected to the interface of your PLC you can simply connect your device on top of that cable if a diagnostic jack is available. You can also connect your device directly with a slave module (e. g. a panel) if you don't want to work on a bus with a controller.

Most controllers output a voltage of 24V/DC on the 9 pin bus connector. This voltage can then be used from the MPI-II cable as a power supply. If your controller doesn't output this 24V/DC or if you are connected to a slave module you have to supply power to the device externally via the Phoenix jack on the device.

When you want to communicate via the serial interface, you have to connect the long cable side of the MPI-II device with the COM port of your PC or laptop. If needed this cable side can also be extended via a 1:1 occupied connection cable. When the 9 pin COM port is already in use but you have a 25 pin COM port also, you can connect the cable on this port too by using an adapter.

If you want to communicate with your device via USB (this is the recommended option for most applications), you have to use a USB-A to USB-A cable to connect the device together with your PC. The cable can be connected directly to a free USB port of your computer or of course to a port on a USB hub too.

3.1.3.1 Usage as HMI adapter

The MPI-II cable can be used as a HMI adapter too. The function of the HMI adapter allows you to connect an operating terminal which hasn't a MPI/Profibus interface but rather a RS232 interface with the support for the HMI protocol with a S7-300/400 controller.

Therefore you have to connect the short cable side of the MPI-II device with the MPI/Profibus of your controller. Thereby you should also make sure that the device is powered. The other side of the cable then have to be connected to the RS232 interface of the operating terminal.

Important:
Some operating terminals are tuned to the HMI adapter from Siemens, where some pins on the RS232 interface are crossed. Please pay attention to the occupancy of the operating terminal and use a corresponding adapter if needed.

3.1.3.2 Usage as TS adapter

Furthermore you can also use the MPI-II cable as a TS adapter (TS is the shortcut for TeleService). With this function you can connect a modem to the device. With a second modem on the PC side you can then access your S7-300/400 controller for a remote maintenance.

In the first step you have to enable the TS function on the device. This can be done within the TIC interface configuration tool.

Afterwards you have to connect the long cable side of the MPI-II and thus the RS232 interface of the device via the separately available TS adapter (article no. *9350-TS)* to a modem.

On the PC side you then have to use the original TeleService software from Siemens to access the MPI-II cable as well as the on the device connected controller and bus.

3.1.4 Connection of external power supply 24V DC

The interface products "S7-LAN/S7-GATE/S7-LAN++, MPI-LAN, MPI-II" are supplied with 24V DC by the S7 controller via the bus connection as standard. This voltage is not provided for passive controllers or controllers from the manufacturer VIPA (Yaskawa).

The external supply of +24V DC is done via the integrated Phoenix socket. The external supply voltage must not fall below or exceed the value of +24V DC ± 20%.

The pin assignment of the connector is as follows, it is also located on the plastic housing:

3.2 Software

After you have connected your device correctly you can start the configuration of your device and usage of your application. Within the next pages some general topics about all devices or some specific device types as well as examples for the usage of different applications together with your device are described.

3.2.1 USB driver installation

If you want to communicate with a S7-USB, MPI-USB or MPI-II device via USB, you have to install the USB driver if not done already before you can use the device.

Before you can start the installation you have to download the ZIP archive with the drivers from the product page of the device and then unpack the archive.

3.2.1.1 Installation on Windows XP

In the first step you have to connect the device with an USB-1.1 compatible port of your PC as described in this chapter. If you are using

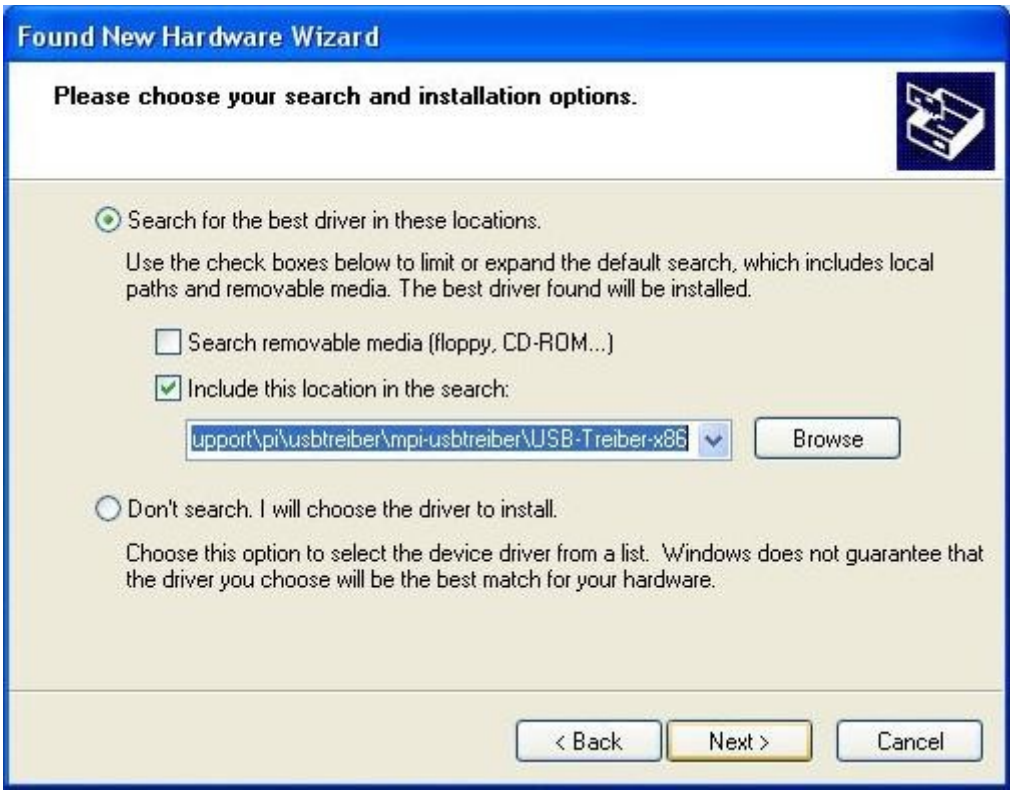
a MPI-II cable please make also sure that the device is powered with 24V/DC via the bus connector or the Phoenix jack.

After the device is connected the hardware wizard from Window should appear. There you have to answer the question for Windows Updates with “No, not this time”:

If you have clicked on the “Next” button you have to select “Install from a list or specific location” on the next dialog:

In the next step you then have to choose “Search for the best driver in these locations” and navigate to the folder “USB-Treiber-x86” which can be found within the unpacked ZIP archive with the drivers.

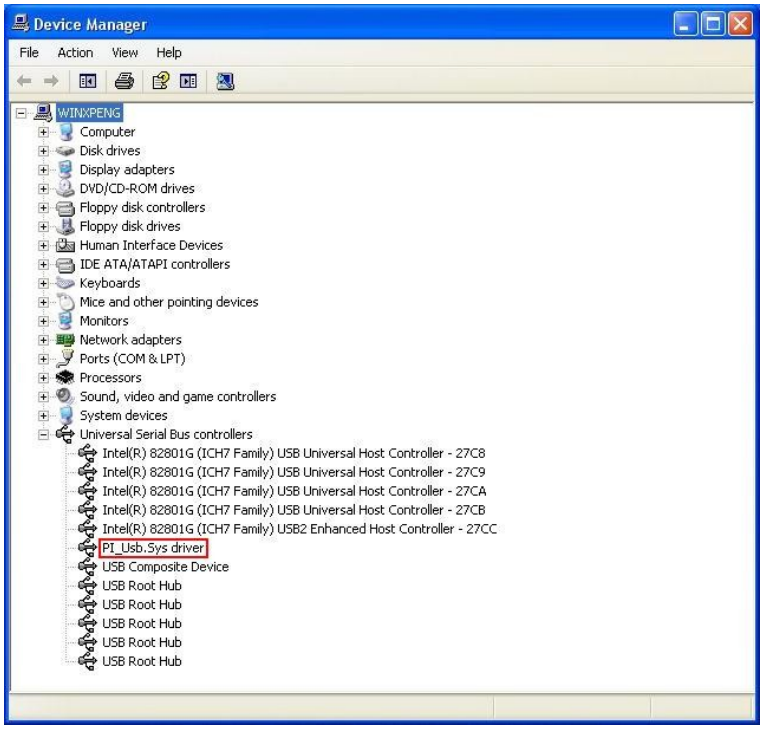
Afterwards you can click on the “Next” button:



Next you should see a warning message because of the Windows Logo test. This window have to be confirmed with “Continue Anyway”:

Thereby the copy process of the drivers should be started. If the process has completed the following dialog will appear:

If you want to make sure that the installation of the driver was successful, you can now open the Device Manager and search for the entry “PI_Usb.Sys driver” within the group “Universal Serial Bus controllers”.



If this entry isn't available or marked with a yellow exclamation mark, please try to install the USB driver again.

If you want to update an already installed driver, execute a double click on the corresponding entry and click on “Update Driver ...” within the tab “Driver”.

If you want to remove the driver completely you can use the button “Uninstall” within the same dialog.

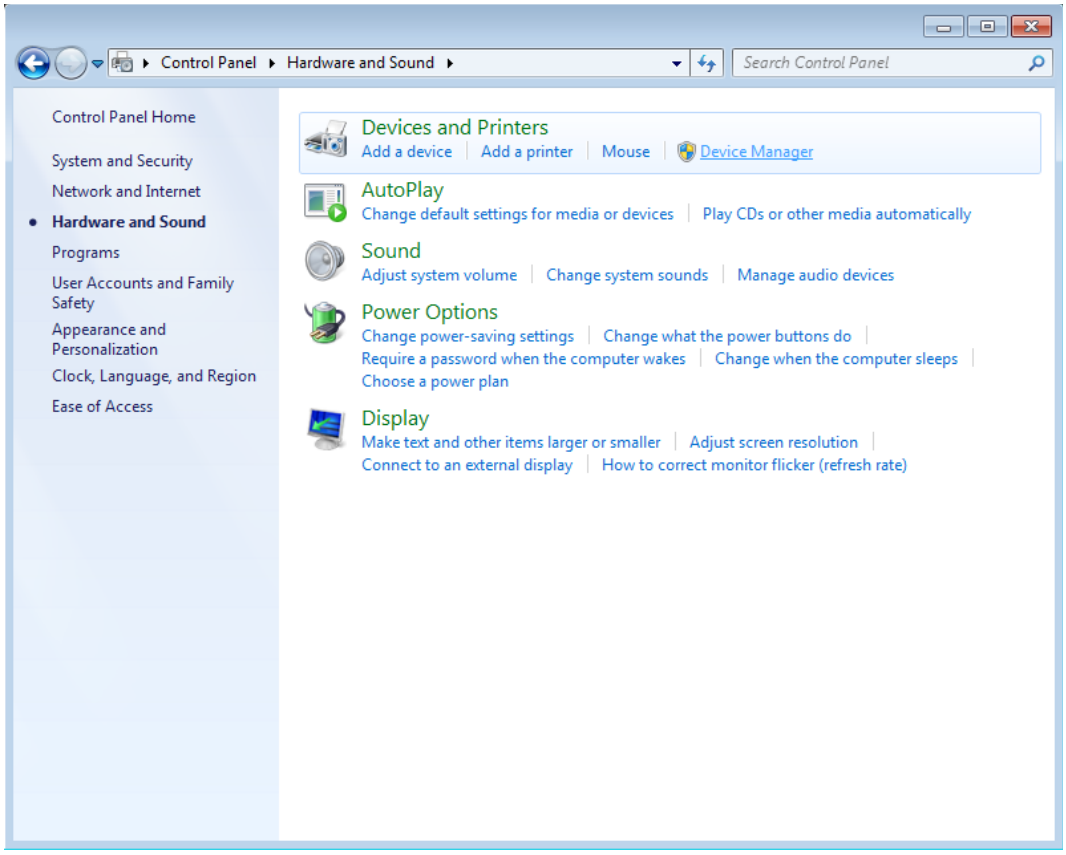
If you install an older version of the PLC-VCOM, Step7 Direct Driver or S7-IFC, the USB driver may get overwritten by an older version, because the USB driver was included in the setup programs until 01.11.2012!

3.2.1.2 Installation on Windows Vista and newer

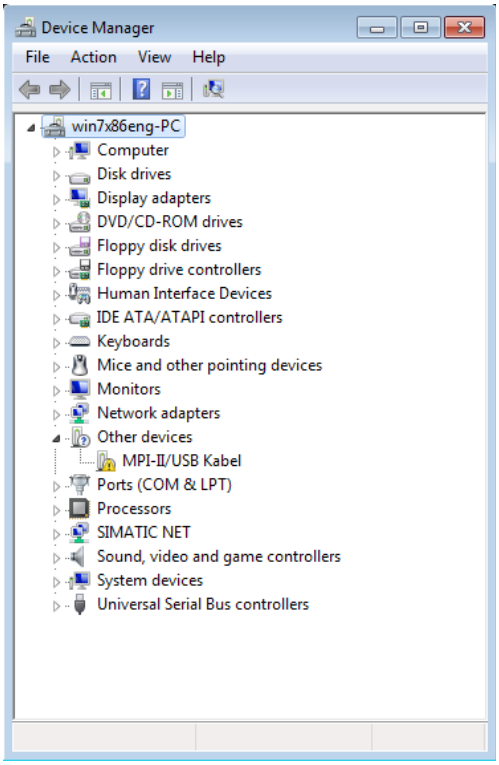
In the first step you have to connect the device with an USB-1.1 compatible port of your PC as described in this chapter. If you are using a MPI-II cable please make also sure that the device is powered with 24V/DC via the bus connector or the Phoenix jack.

The PC should now report “Installing device driver software” and tries to search for a suitable driver. After a few moments the message “Device driver software was not successfully installed” will be shown, because no driver could be found by Windows automatically.

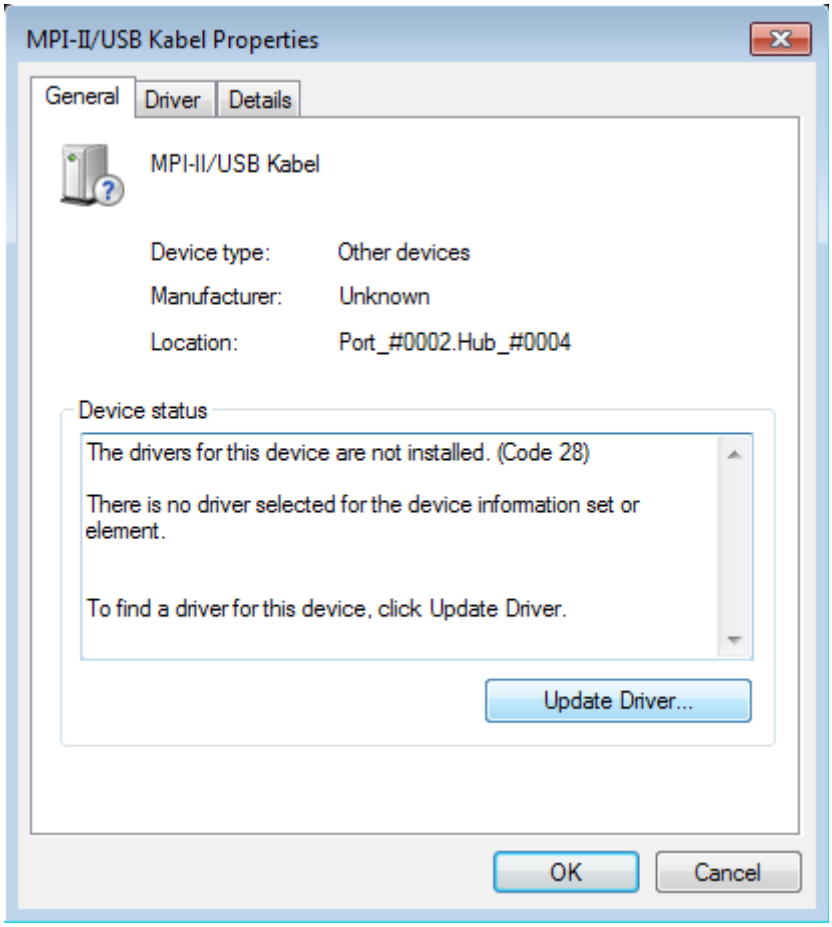
Now you can start with the manual installation of the driver. Therefore you have to open the Control Panel and then the Device Manager:



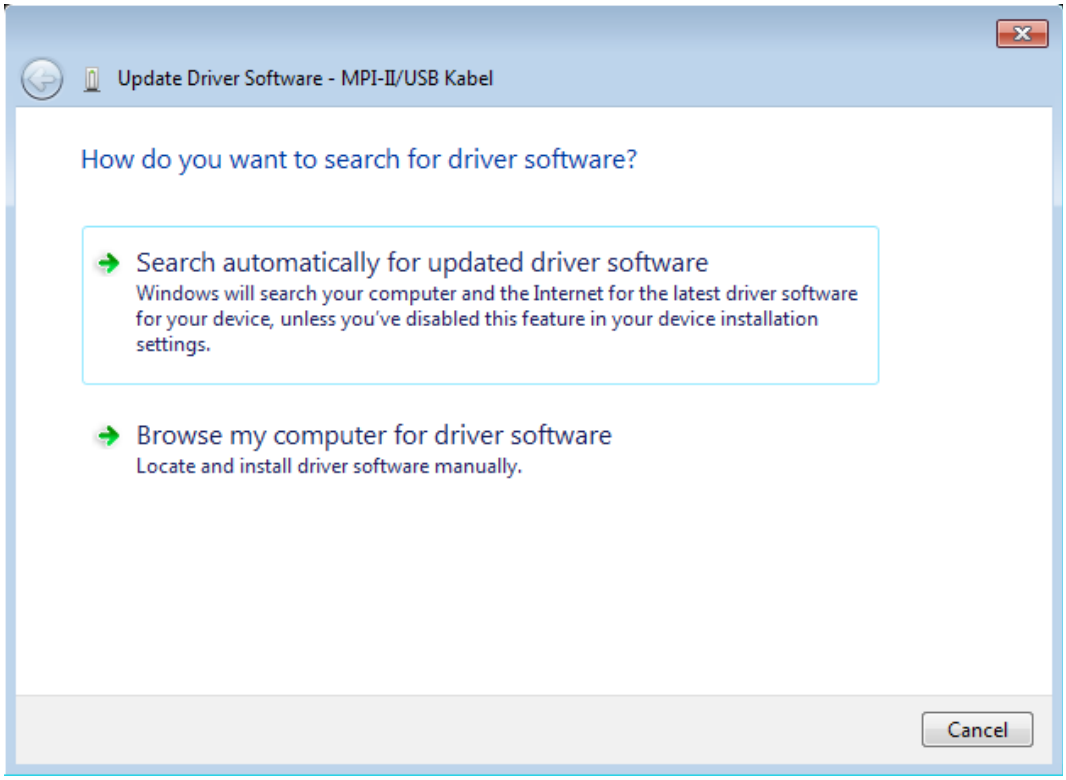
Within the Device Manager you should now see an entry with a yellow exclamation mark within the group “Other devices”:



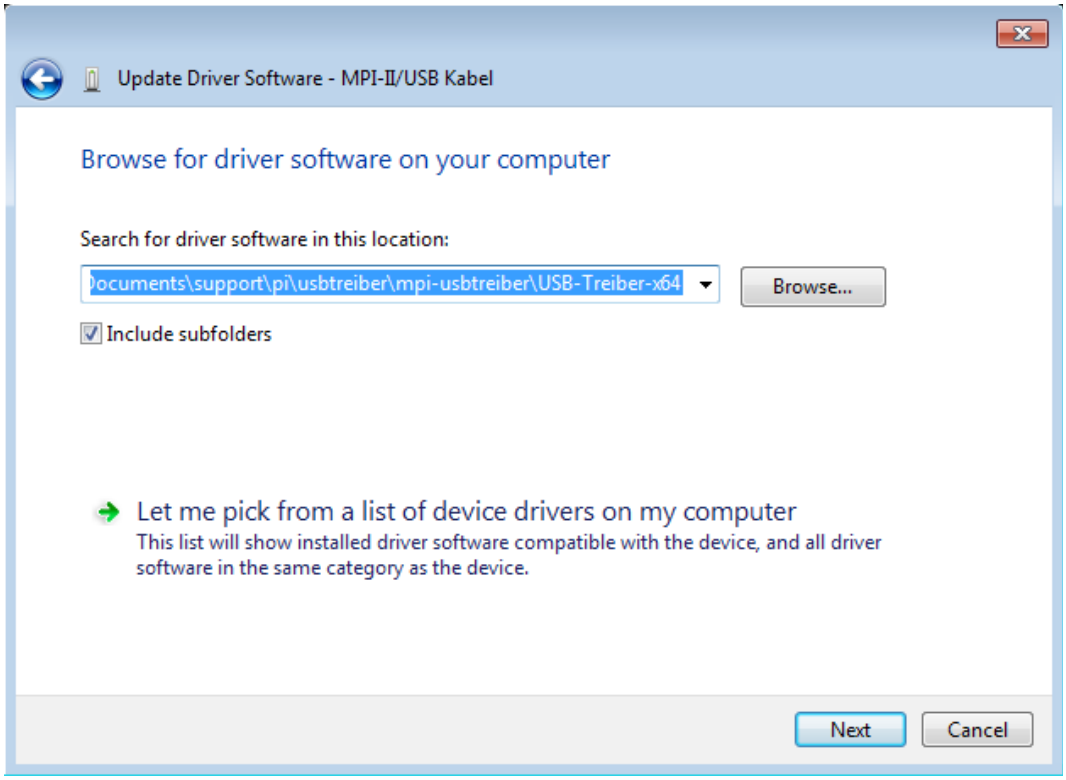
Now you have to execute a double click on this entry:



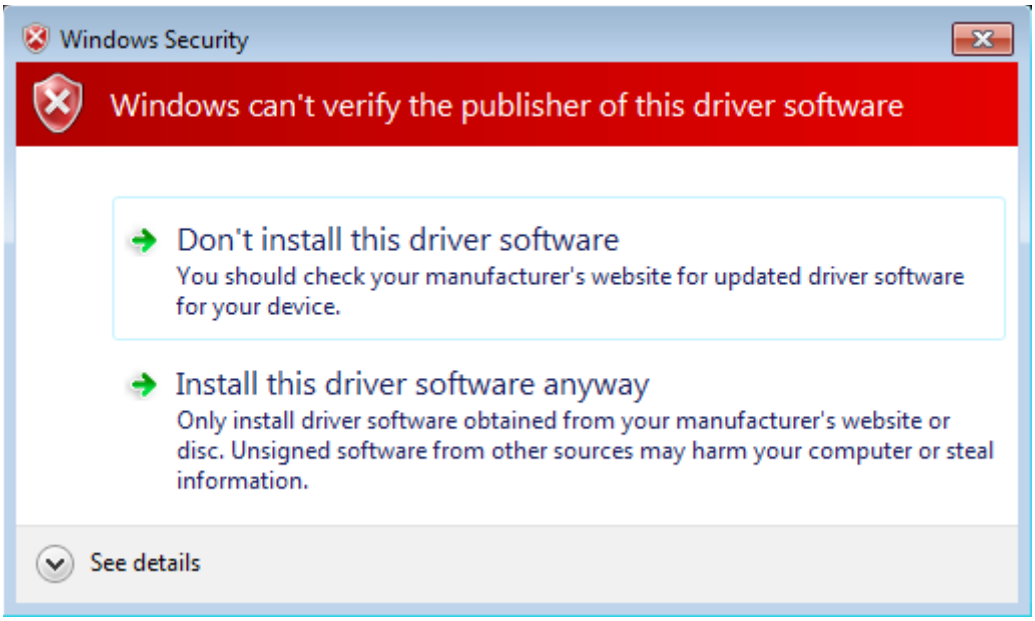
In this dialog you can now click on the button “Update Driver”. Thereby another window will get opened:



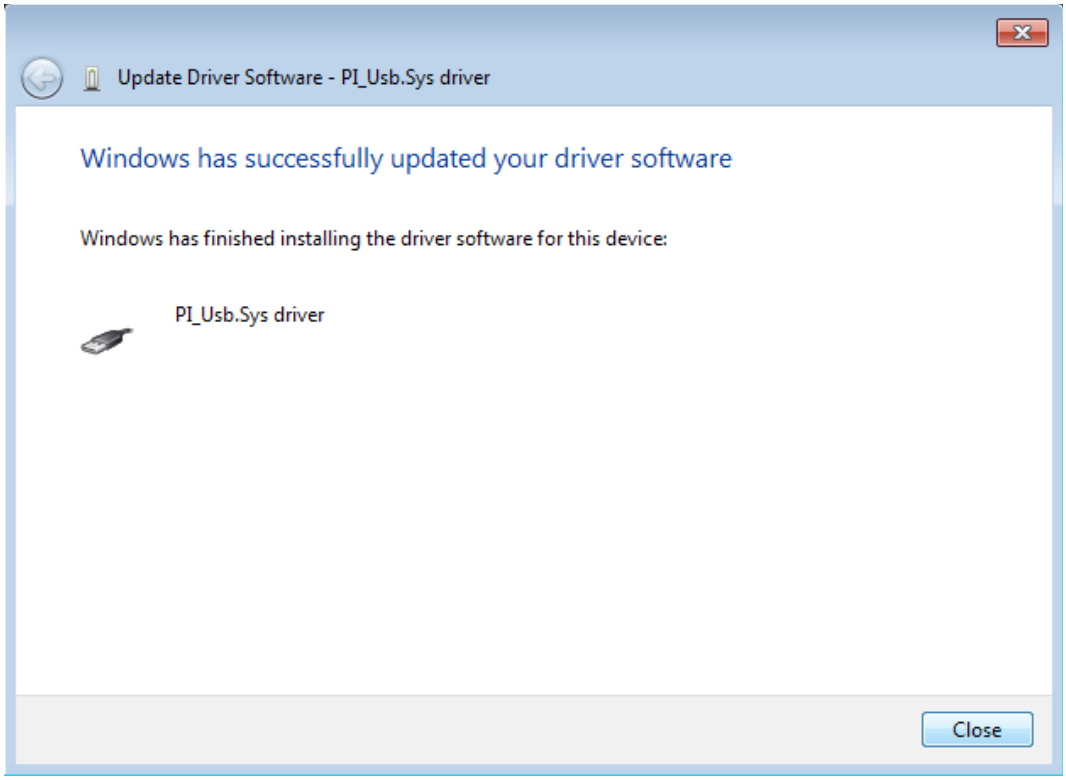
Here you have to select “Browse my computer for driver software” and then navigate to the folder “USB-Treiber-x86” or “USB-Treiber-x64” from the unpacked ZIP archive depending on your operating system version:



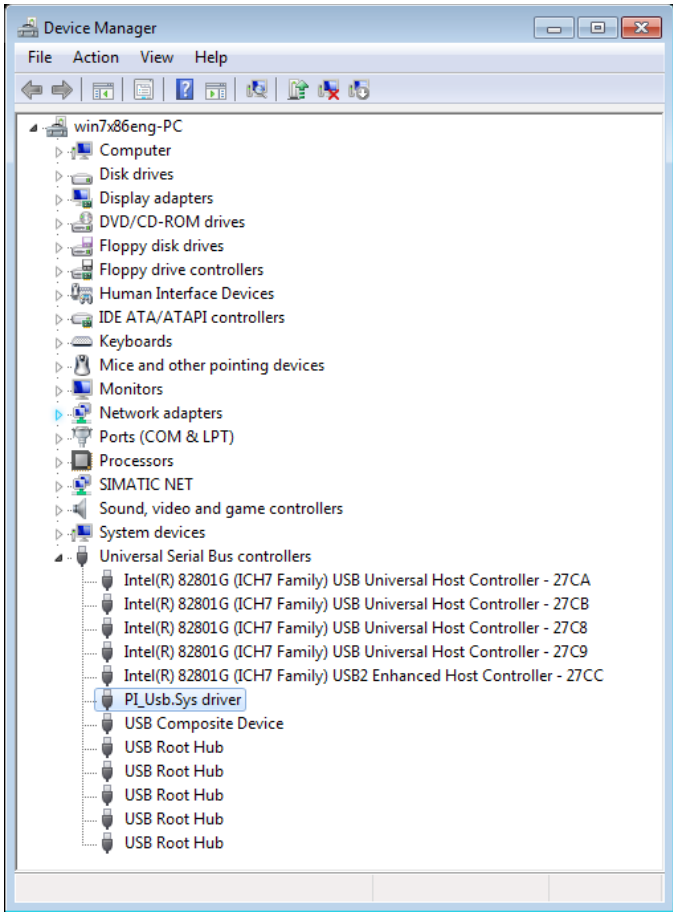
If you have clicked on the “Next” button a security prompt will be shown. This message have to be acknowledged with a click on the field “Install this driver software anyway”:



Now the driver gets copied to your operating system. When the process has finished a success message should be shown:



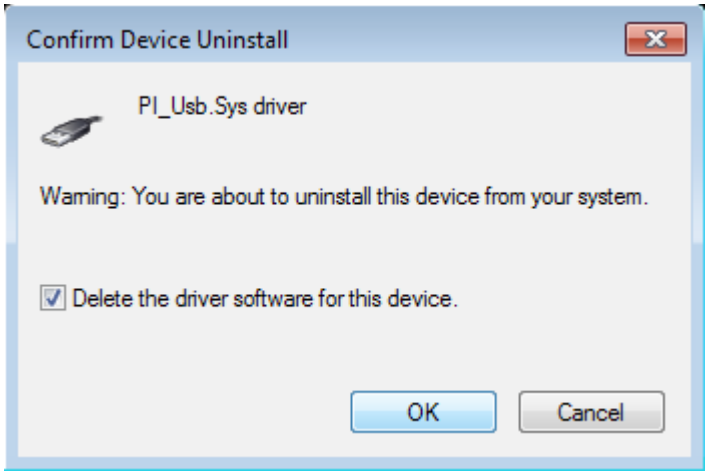
Now you can go back to the main window of the Device Manager and check if the entry “PI_Usb.Sys driver” within the section “Universal Serial Bus controllers” was created. This entry shouldn't have an exclamation mark anymore.



If the entry isn't available or still has a yellow exclamation mark, please try the installation of the driver again.

If you would click to update an already installed driver, you have to execute a double click on the entry and then click on the button “Update Driver ...” within the tab “Driver”.

With the button “Uninstall” on the same dialog the driver can be removed from your system. If you want to remove the driver completely you have to enable the option “Delete the driver software for this device.”:



If you install an older version of the PLC-VCOM, Step7 Direct Driver or S7-IFC, the USB driver may get overwritten by an older version, because the USB driver was included in the setup programs until 01.11.2012!

Issue on Windows 10 with HVCI:

With Windows 10 Version 1803 the kernel isolation, called HVCI (Hypervisor-Protected Code Integrity), was introduced. When installing the USB driver with enabled HVCI this can lead to issues. Thereby the following error message is shown:

The device driver for this hardware cannot be loaded.
The driver may be damaged or missing. (Code 39)

The only solution is to deactivate HVCI. Therefore you have to open the registry editor as "Run as administrator" and navigate to the following path:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\
DeviceGuard\Scenarios\HypervisorEnforcedCodeIntegrity

There you have to set the DWORD value "Enabled" to 0.

Afterwards Windows 10 have to be restarted. Then HVCI should be deactivated and the installation of the USB driver should work without any problems as described above.

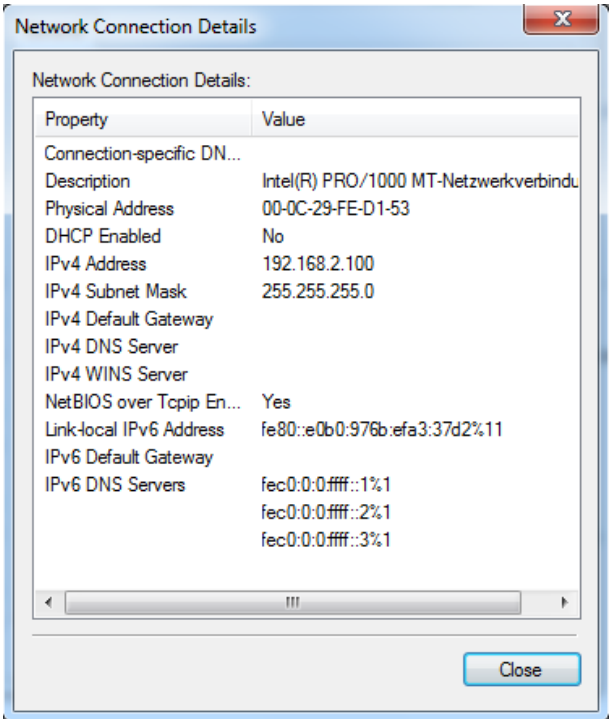
More information to this topic can also be found on the website from Microsoft.

3.2.2 IP address configuration

If you are using your LAN device for the first time, you may have to check and maybe change the IP settings of your device or PC, so they can communicate with each other. The default IP address of all LAN devices are 192.168.1.56.

If you don't know about the correct IP settings, you may want to ask your network administrator for the correct parameters.

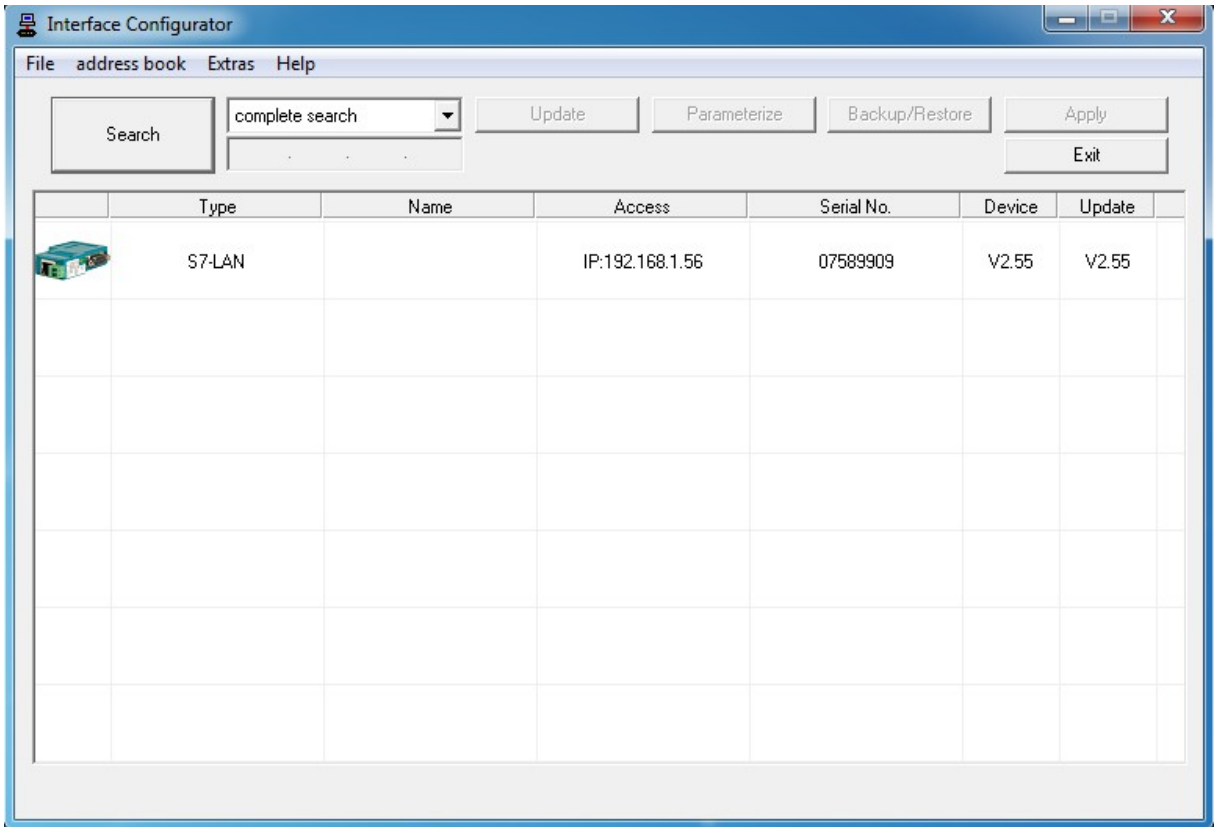
In the first step you should check the IP address of your PC. Therefore you should open the status dialog of your network card and navigate to the tab “Support” (for Windows XP) or click on the button “Details” (for Windows Vista or newer).



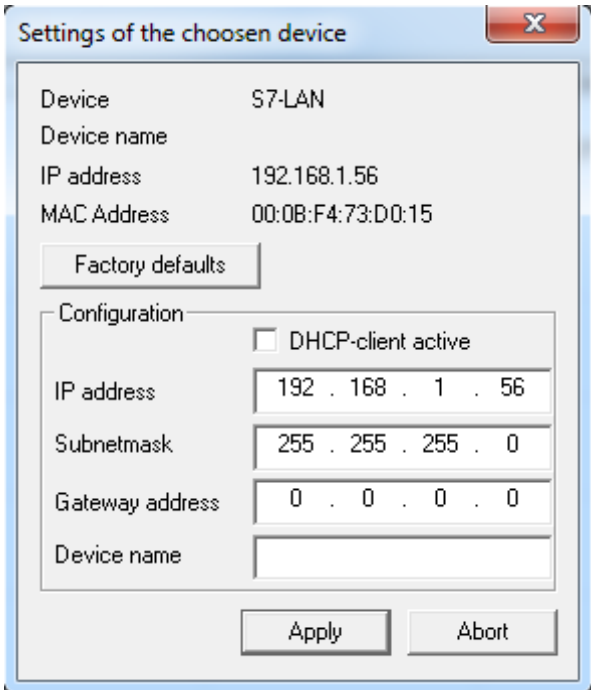
If your PC is already within the same address space as the device, you don't have to change anything.

When your PC is configured to DHCP but you didn't get an IP address (e. g. because you are connected to the device directly) you have to set an IP address for the PC manually. Therefore you have to click on the button “Properties” within the tab “General”. Then you have to change the IP settings within the entry “Internet Protocol (TCP/IP)” or “Internet Protocol Version 4 (TCP/IPv4)”.

If you want to or have to change the IP address of your LAN device you should open the TIC driver. By default the automatically search begins and searches for all available devices. If the search process has completed all found devices should be shown.



When your device was found you can execute a double click on the cell with the IP address of the corresponding device entry. Now a dialog with the network settings of the device should appear:



On this dialog you can configure another fixed IP address for the device or enable the DHCP option (this needs a DHCP server on your network) as well as setting a name for the device. The name of the device is used for easier identification only.

Hint:
If you are using a MPI-LAN cable you can configure the IP address as well as the other parameters via the integrated display and keyboard also. Because in general you need to search for the device via the TIC driver anyway to assign it for the communication, the way via the TIC is a bit easier.

3.2.3 Configure the device

The devices are configured by the factory defaults so they can simply be used for the communication on most bus systems without doing any configuration (except the IP settings). This is possible because the device detects the bus type as well as the baud rate automatically.

In some special cases a few settings have to be configured manually, because they can't be detected automatically. These special cases and the needed parameters are explained within the following table:

usage case	**configuration**
access to a bus without cyclic bus parameters	The “configuration” have to be set to the type “fixed” first. After that the operation mode as well as the bus parameters have to be set. As an alternative you can also set the “configuration” to the mode “from PG” and set the parameters within the driver dialog.
access to a slave module without any controller on the bus	The “configuration” have to be set to the type “fixed” first. After that the operation mode as well as the bus parameters have to be set. Now the setting “PG/PC is the only master“ have to be enabled as well. As an alternative you can also set the “configuration” to the mode “from PG” and set the parameters within the driver dialog.
access to a S7-200 controller	The “configuration” have to be set to the type “fixed” first. After that the operation mode as well as the bus parameters have to be set. As an alternative you can also set the “configuration” to the mode “from PG” and set the parameters within the driver dialog.

If you want to use your device within one of the above mentioned usage cases you have to open the TIC, search for the device and open the settings dialog. There you can then change the listed settings. When you are using a LAN device you can do that configuration via the integrated web server too.

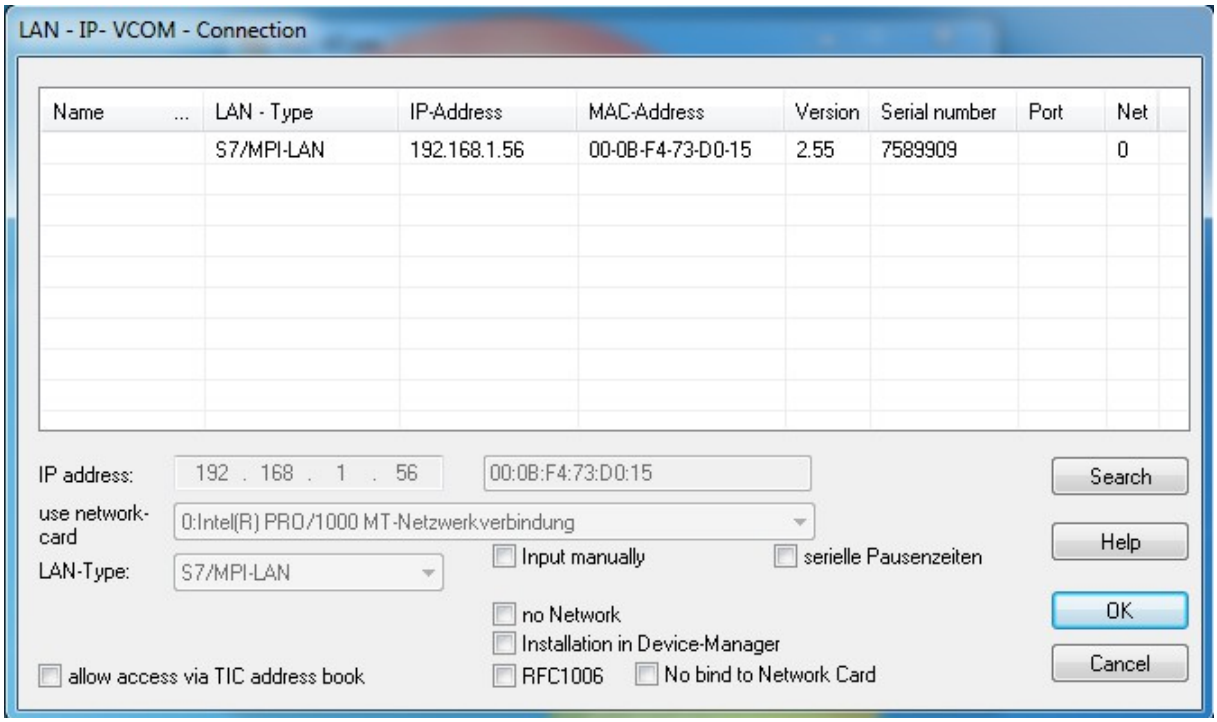
Hint:
If the device is connected to a slave module you can also assign the module an address.

When you want to load an operating terminal with this device you may have to bring the terminal into the transfer mode. Furthermore some older terminals are requiring a previously executed communication via the serial port before the PPI/MPI/Profibus interface can be used for the communication.

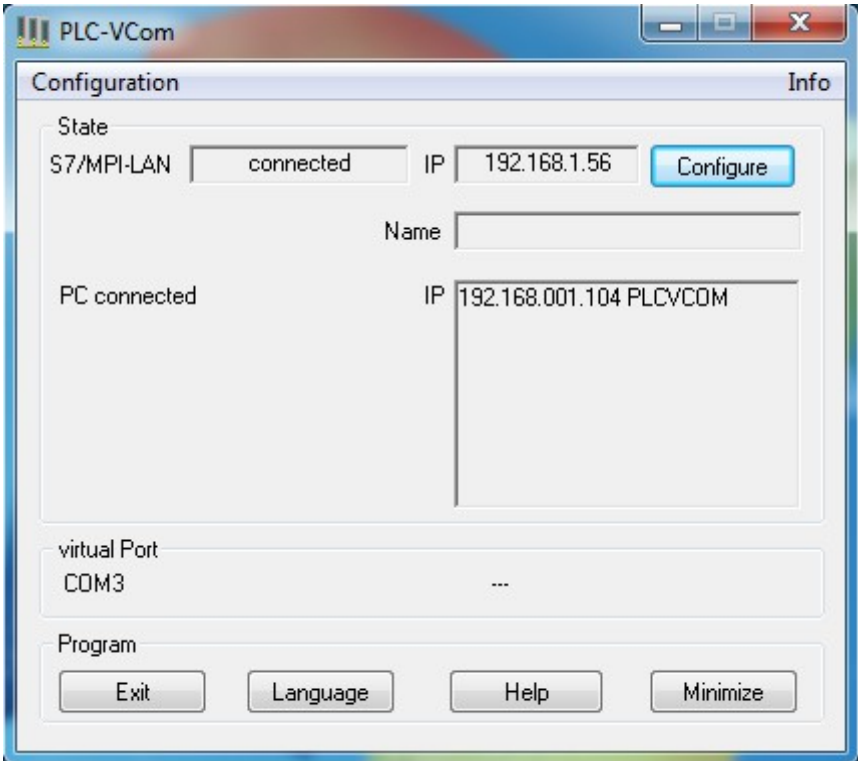
Important:
The settings within the driver dialog are used only when the “configuration” is set to “from PG”. If you have selected the mode “automatic” and the bus parameters couldn't be detected automatically, the settings from the driver dialog are used too. In the other modes this settings aren't used.

3.2.4 Setting up the PLC-VCOM

If you want or have to use the PLC-VCOM for the communication (e. g. because you need a virtual COM port), you have to start the application first. Depending on the configuration which you have done during the installation, the program may start together with your Windows operating system. If the PLC-VCOM is already running you simply have to reopen it with a double click on the icon in the info area of the taskbar. When the PLC-VCOM dialog is opened you should click on the button “Configure”. Thereby the program searches for all available devices and shows them within a new window:



There you should now select your device, which you want to use for the communication and confirm the dialog with a click on “OK”. Now you should see the overview window again with the selected device as well as the connection state:



Hint:
The PLC-VCOM is needed for the communication via USB or LAN only. If you have connected a MPI-II cable directly to the serial interface of your PC the PLC-VCOM isn't needed.

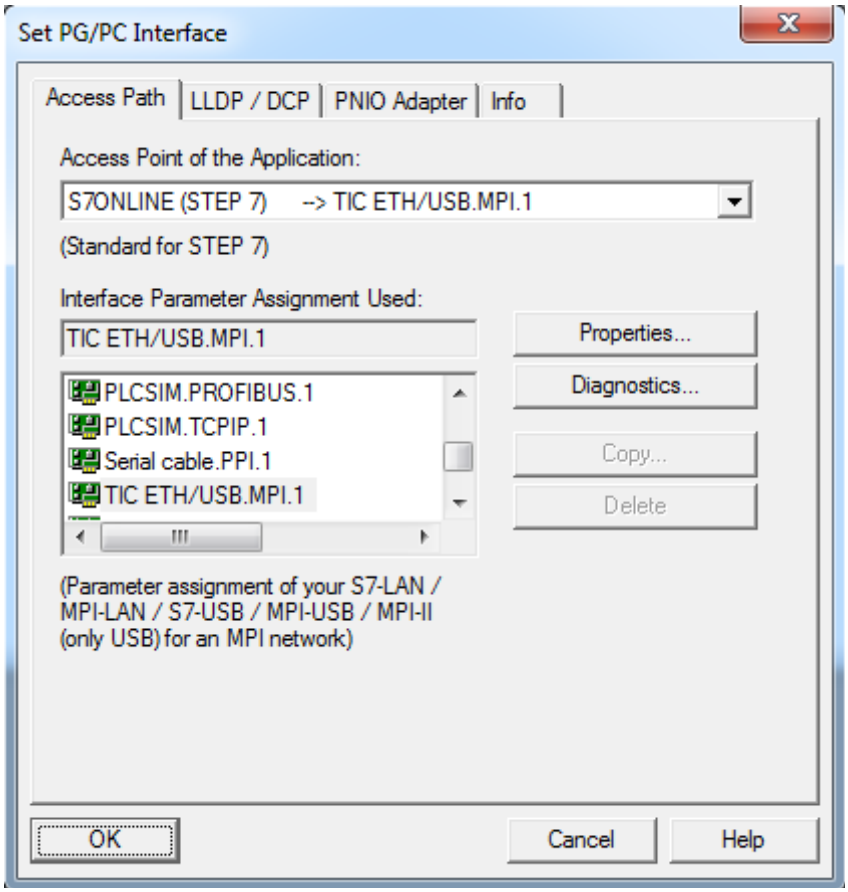
3.2.5 Setting up the PG/PC Interface

The dialog “Set PG/PC Interface” is a small program from Siemens, which is used for the configuration of access points and interfaces. The dialog can be opened from some Siemens applications (e. g. the SIMATIC Manager) directly or via the corresponding entry within the Control Panel from Windows.

An access point thereby describes an access path for one or multiple programs. For every access point then there are multiple interfaces available. An interface is the path to access a device. But only one interface can be selected at the same for one access point. Within the interface list you can find drivers from Siemens for the communication via

TCP/IP or with the PC Adapter (via USB or serial) as well as our TIC driver. For some of the interfaces further configurations and diagnostics can be executed.

If you want to configure an access path you have to select the access point from the list on the top of the window if possible first. Afterwards you can select the suitable interface for your purpose within the list on the left side. Thereby the buttons “Properties” and “Diagnostics” gets enabled depending on your selected interface. If you have to or like to, you can click on them to configure some parameters or execute a diagnostic. In the last step you have to click on the button “OK” to submit the configured access path.



3.2.5.1 Access points

Depending on the used software you will have to use another access point. If you open the settings dialog via the corresponding program the access point will be selected automatically sometimes. When opening the dialog via the Control Panel of Windows you always have to select

the correct access point from the selection list manually. The following list gives you a short overview about the most important access points:

access point	programs
S7ONLINE (STEP 7)	SIMATIC Step 7 Manager Windows Control Center flexible STARTER ProTool
Micro/WIN	MicroWin
DEVICE	STARTER *(alternate access)*

3.2.5.2 Interfaces

Depending on the device and interface or driver you want to use you have to select and configure another interface. The following list gives you a short overview about the most important interfaces:

interface	description
PC Adapter(Auto)	communication via USB or serial with the PC Adapter from Siemens or MPI-II (serial only); the bus protocol gets detected automatically
PC Adapter(MPI)	communication via USB or serial with the PC Adapter from Siemens or MPI-II (serial only); the bus protocol is MPI
PC Adapter(PPI)	communication via USB with the PC Adapter from Siemens; the bus protocol is PPI
PC Adapter(PROFIBUS)	communication via USB or serial with the PC Adapter from Siemens or MPI-II (serial only); the bus protocol is PROFIBUS
PC/PPI cable(PPI)	communication via USB or serial with the PC/PPI cable from Siemens or MPI-II (serial only); the bus protocol is PPI

TCP/IP -> xxx	communication via LAN (“xxx” is the name of your network card) with a device that supports the RFC1006 protocol and CP mode
TCP/IP(Auto) -> xxx	communication via LAN (“xxx” is the name of your network card) with a device that supports the RFC1006 protocol and CP mode; the IP address of your PC is set depending on your project
TIC ETH/USB(MPI)	communication via LAN or USB with the device S7-LAN, S7-GATE, MPI-LAN, S7-USB, MPI-USB or MPI-II (USB only); the bus protocol is MPI
TIC ETH/USB(PPI)	communication via LAN or USB with the device S7-LAN, S7-GATE, MPI-LAN, S7-USB, MPI-USB or MPI-II (USB only); the bus protocol is PPI
TIC ETH/USB(PROFIBUS)	communication via LAN or USB with the device S7-LAN, S7-GATE, MPI-LAN, S7-USB, MPI-USB or MPI-II (USB only); the bus protocol is PROFIBUS
TS Adapter	communication serial with the TS Adapter from Siemens or MPI-II (serial and with enabled TS function only)

Hint:
The name of the interfaces differ between 32 and 64 bit operating systems. For example the interface “TIC ETH/USB(MPI)” can be found on 64 bit systems as “TIC ETH/USB.MPI.1”. Furthermore the name of network interfaces on 64 bit systems aren't “TCP/IP -> xxx” anymore but like “xxx.TCP/IP.1”. All interface names from the list above belong to a 32 bit operating system.

Important:
The settings of an interface are stored globally and therefore affects all access points. Only the assignment of an interface to an access point can be set individually.

If you want to use the PLC-VCOM you have to use the PC Adapter or PC/PPI driver and then set up the virtual COM port from the PLC-VCOM.

Hint:
For the communication with older S7-200 controllers the PC Adapter driver can't be used. In this case you have to use the PC/PPI driver for serial communication or the TIC driver for PPI for communication via USB or LAN. Within the driver settings then the option “Advanced PPI” have to be disabled.

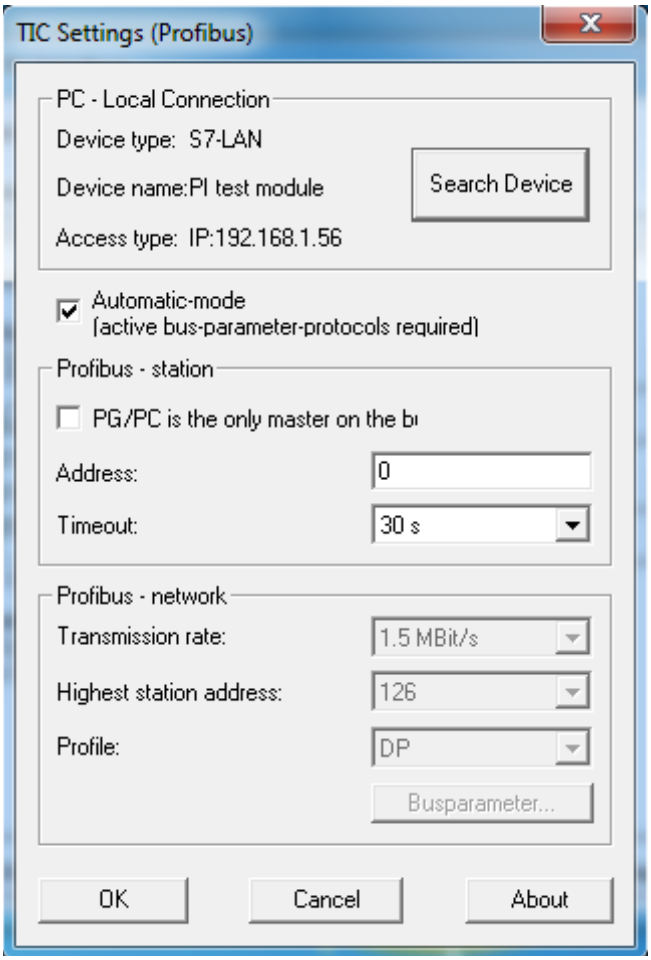
Important:
Siemens has discontinued the support for serial communication on 64 bit operating systems. The usage of the PC Adapter or PC/PPI driver together with the MPI-II or PLC-VCOM isn't possible here anymore.

3.2.5.3 TIC driver

In most cases you have to select one of the entries for the TIC driver within the PG/PC Interface dialog. The TIC driver allows you to use and select a S7-LAN, S7-GATE, MPI-LAN, S7-USB, MPI-USB or MPI-II (for access via USB only) for the communication.

The variants MPI, PPI and PROFIBUS have to be selected manually depending on the bus system, where the device is connected to.

The configuration of the interface can be done directly via the PG/PC Interface dialog. Therefore you have to click on the “Properties” button after you have selected the TIC driver variant you want to use. Now a window, which looks a bit different depending on the selected driver variant, gets opened where you can change different parameters:



Within the section “Local Connection” you can see which device is currently selected for the communication with this interface. If you want to use another device you have to click on the button “Search Device”. Thereby the interface configuration tool of the TIC gets opened where you can search for devices and then select the device you want to use. Finally you have to click on the “Apply” button. Afterwards you will be redirected back to this properties dialog.

Within the section “station“ you can find parameters for the station of the programming device:

field	description
PG/PC is the only master on the bus	Indicates if there isn't any other active bus participant as the PG and thereby have to take the master function of the bus. *(not for PPI)*
Address	The bus address which should be used by the PG.
Timeout	The timeout in seconds for the connection.

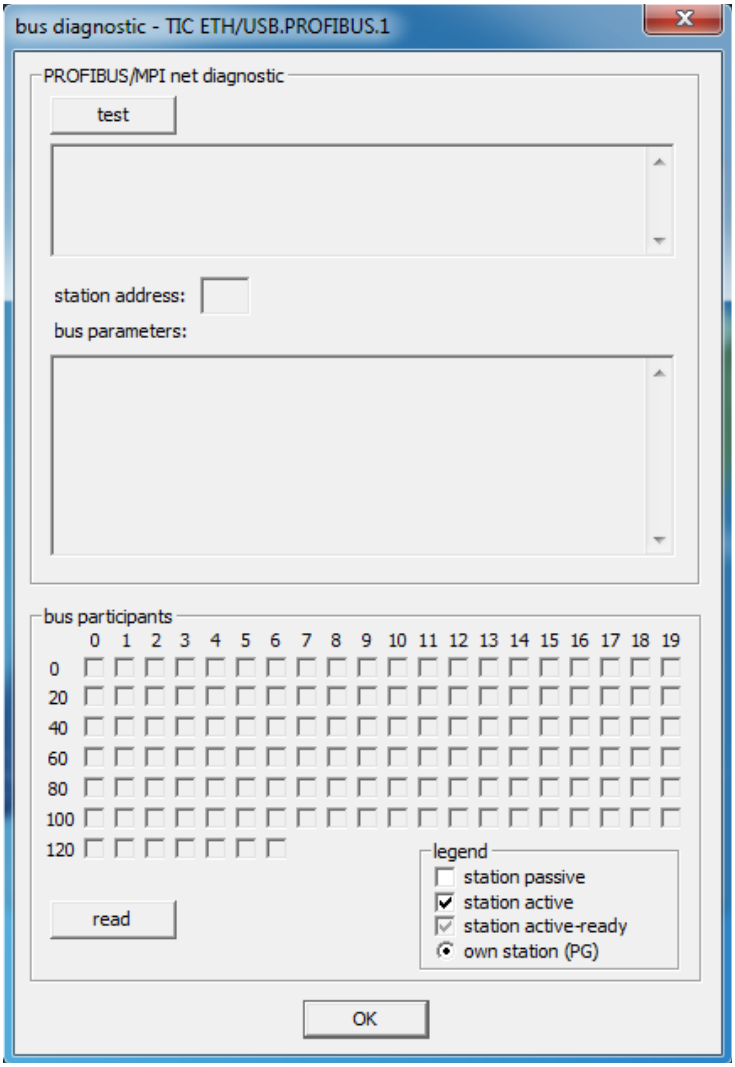
Within the section “network” you can find general parameters about the bus system:

field	description
Advanced PPI	Indicates if the advanced, MPI compatible, PPI protocol should be used. This protocol isn't supported by older S7-200 controllers. *(for PPI only)*
Transmission rate	The baud rate which is used on the bus.
Highest station address	The highest station address (HSA) which can occur on the bus.
Profile	The profile which is used on the bus. *(for PROFIBUS only)* A click on the button “Busparameter” allows you to view or if the type “User” was selected to configure the parameters for the bus.

When you have selected the MPI or PROFIBUS variant of the driver you can enable the option “Automatic-mode”. Thereby all parameters within the block “network” are disabled and getting detected automatically. But this function requires that the PLC is sending the bus parameters on the bus cyclically. The parameters on the block “station” can be configured independent of this option.

If you have selected your device and are done with the configuration you can click on the “OK” button. Thereby the parameters are stored for this interface.

If you have problems when communicating with your device or module or like to test if your parameters are working correctly you can use the diagnostic function of the driver. If you have clicked on the button “Diagnostics” a new window will be opened:



In the first step you should make sure that the connection to the device and bus is working correctly. Therefore you have to click on the button “Test”. After a few seconds the state will be displayed on the first text area. If the connection was successful the station address as well as the bus parameters will be shown within the two text fields below too.

If the connection to the device and bus is OK, you may also want to click on the button “Read”. Thereby the list of all available participants on the bus are retrieved from the device and shown via the control fields within the dialog. If you click on one of the control fields the diagnostic buffer of the corresponding participant will be shown.

3.2.5.4 TCP/IP driver

If you want to communicate with a network participant (e. g. a network PLC or a S7-CP) you will have to use the TCP/IP driver. Here you have to select the interface that is suitable to your network card.

The difference between the “normal” TCP/IP driver and the TCP/IP auto driver is that on the TCP/IP auto driver it is checked automatically if the destination device is within the same IP network as your PC. If this isn't the case the driver adds a further IP address to your network card so you can communicate with the device.

Within the properties you can configure a connection timeout if needed. As a general rule you don't have to change this value. If you want to use the TCP/IP auto driver you will get a list with all project specific IP addresses within the same dialog too. There you can also clear the list with IP addresses.

The diagnostic of the driver just tests if the protocol SEND/RECEIVE is working and shows some status information.

Hint:
If you want to access you LAN device you should use the TIC driver normally. The TCP/IP drivers can be used only if the access path for LAN is configured and projected.

Important:
You should use the TCP/IP auto driver only when the network participant where you want to connect to is within the same physical network but in a different subnet as your PC and if it's OK for you when the driver changes the IP parameters from your network card.

3.2.5.5 PC Adapter driver

If you want to use the MPI-II cable for communication with your controller or slave module via the serial interface you have to select the PC Adapter driver from Siemens within the PG/PC Interface dialog. This is needed because the TIC driver doesn't support the serial communication to the MPI-II cable expect the configuration of the device itself.

If you are using the PLC-VCOM the PC Adapter driver have to be used as well. The PLC-VCOM thereby interacts as linking tool between the driver and the device.

Of course you have to use this driver too, when you want to communicate with the original PC Adapter (via USB or serial) from Siemens.

The driver is available in the variants Auto, MPI, PPI and PROFIBUS. The selection should be done depending on your bus system. The variant “Auto” can be used to detect the bus system (for MPI and PROFIBUS only) including all bus parameters automatically. But keep in mind that this function is available only if the option for sending bus parameter protocols cyclically is enabled on your PLC.

The bus settings for the PC Adapter driver are mainly the same as for the TIC driver. This means settings like the station address of the PG as well as the baud rate and other parameters of your bus can be configured here too. The option “Automatic-mode” isn't available within the PC Adapter driver, because Siemens uses the driver variant “Auto” therefore. On the settings dialog of the PC Adapter driver variant “Auto” you can then click on the button “Start Network Detection” to start the network detection and afterwards display the bus parameters on the dialog.

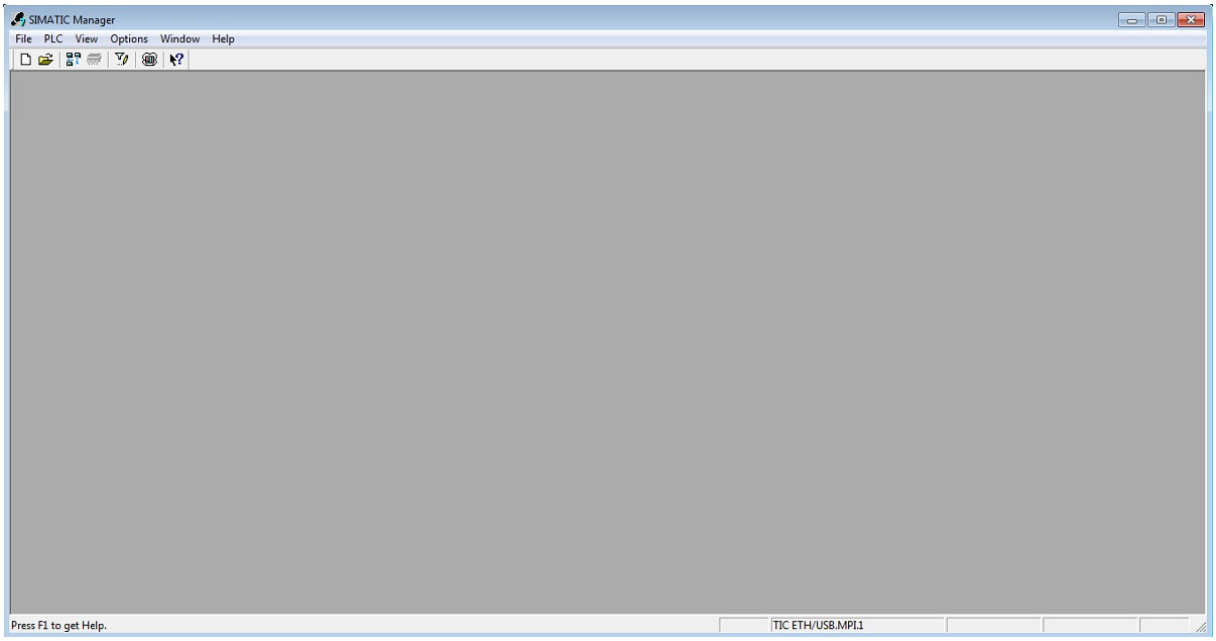
In addition to the bus settings you can also find the tab “Local interface” within the settings window. There you can then configure the COM port as well as the baud rate between the device and the PC.

A diagnostic function isn't available on this driver.

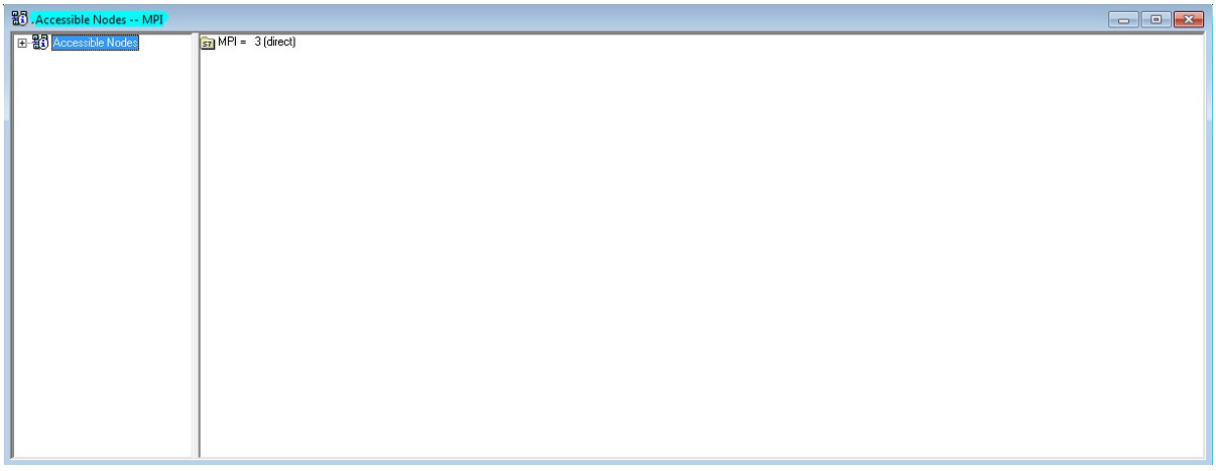
Important:
The selection of the interface “USB” is reserved for the communication with the PC Adapter from Siemens. The communication with this driver can only be used for serial communication with the MPI-II device or with the virtual COM port from the PLC-VCOM as linking tool.

3.2.6 SIMATIC Step 7 Manager

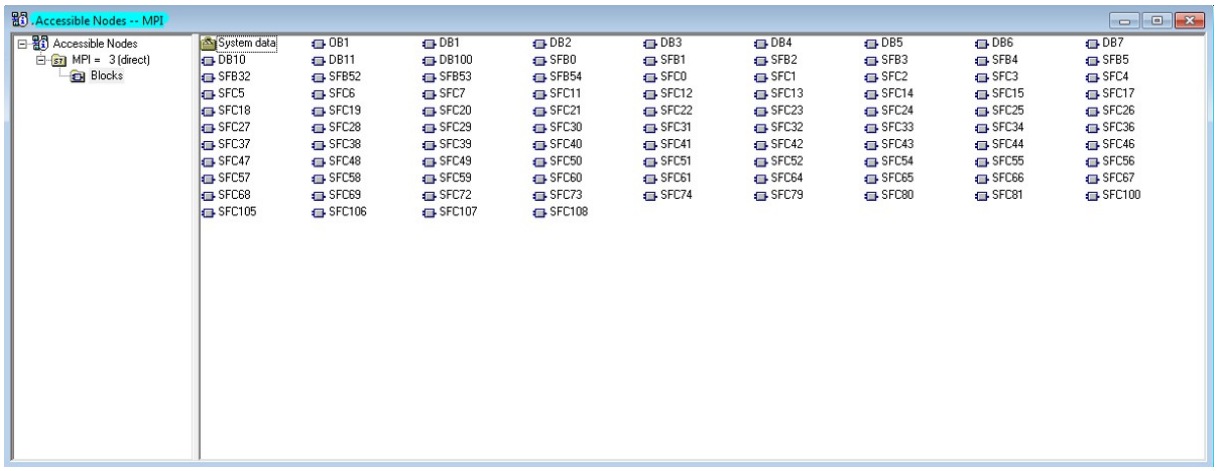
First you have to open the SIMATIC Manager. If you haven't done the configuration of the PG/PC Interface already, you can do this now. Therefore you have to click on the entry “Set PG/PC Interface” within the menu “Options” and then configure the driver, you want to use, as described within this chapter.



If the configuration is done you can click on the menu “PLC” and then on the entry “Display Accessible Nodes”. After a few seconds a new window should be opened where you can see all participants on the bus. Thereby you can also see which participants are active, passive or directly connected to the programming device.



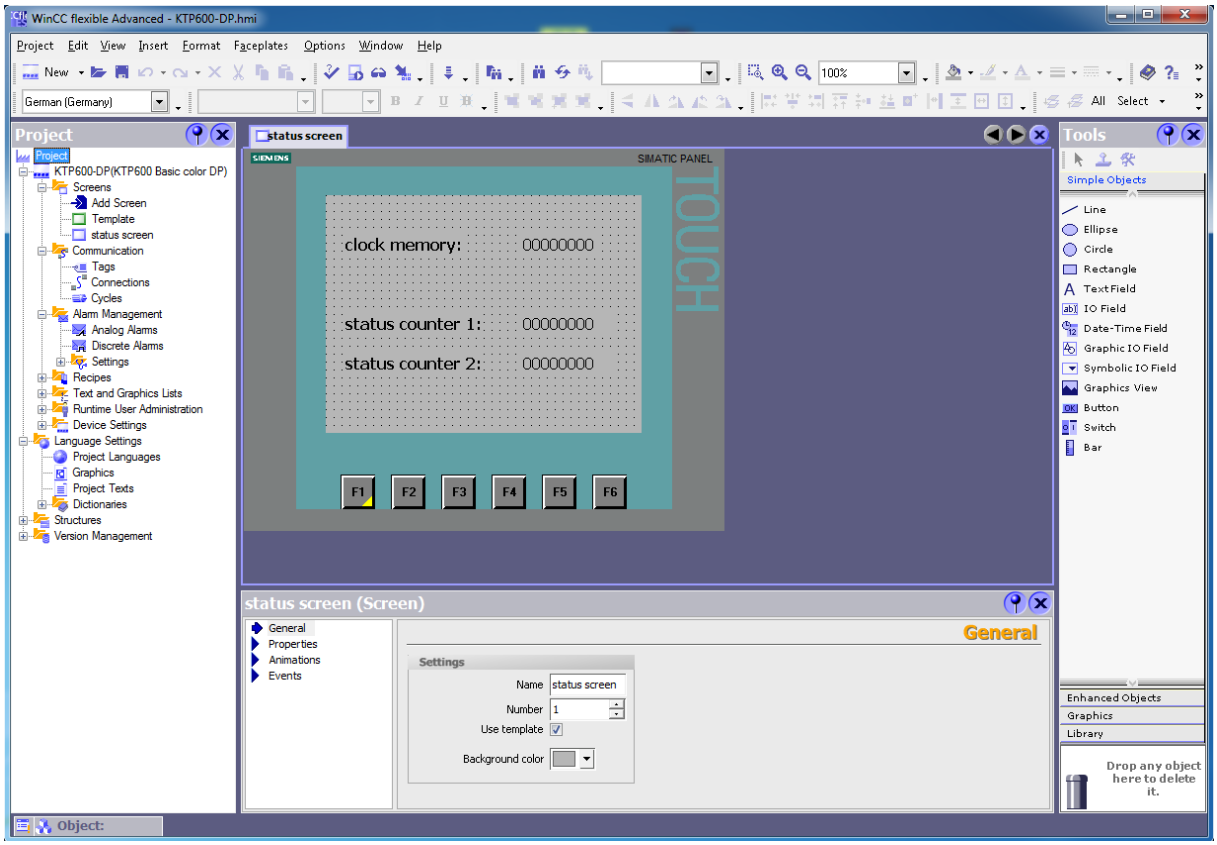
Now you can select one of the participants with a double click and then navigate to the blocks. There you then can view and watch as well as edit and delete blocks.



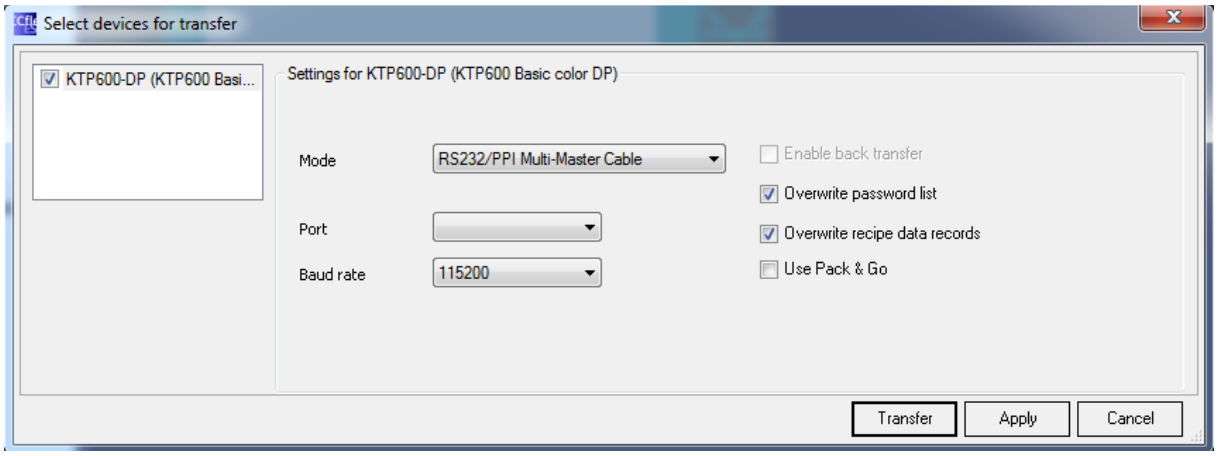
Hint:
If you already have a Step7 project you can also just toggle the view to “Online” or use the download command to load changes into your PLC.

3.2.7 Windows Control Center flexible (WinCC flexible)

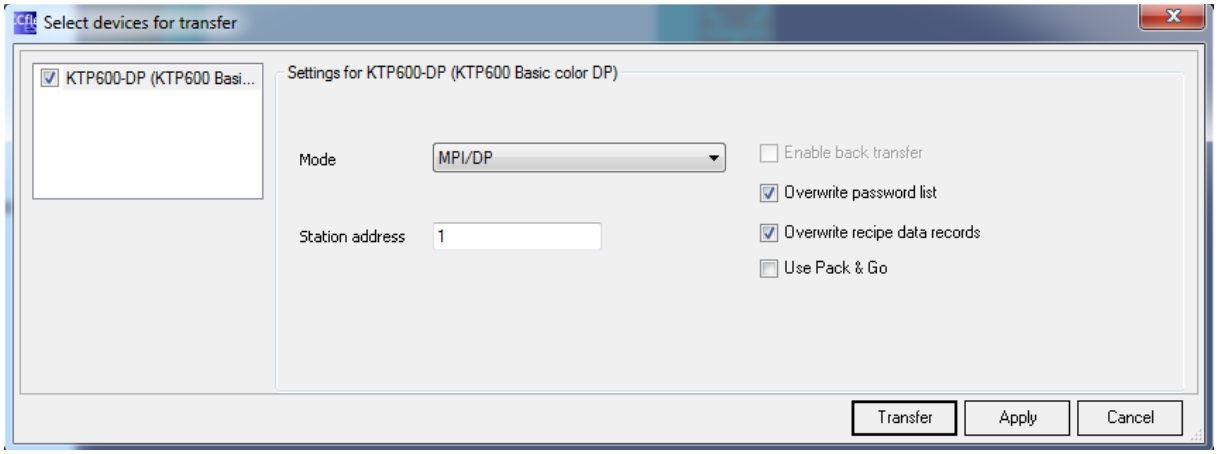
If you have done the configuration within the PG/PC Interface, you can start the program WinCC flexible and open your project as well.



Now you have to navigate to the menu item “Project” → “Transfer” → “Transfer”. Thereby a new window will be opened:

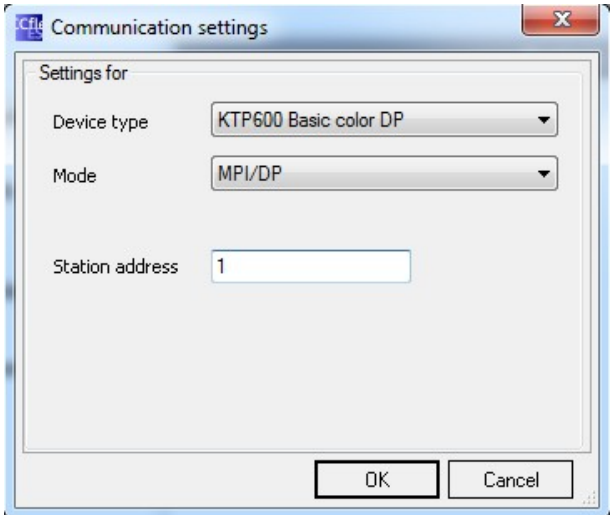


There you then have to make sure that your operating terminal is checked and selected on the left side. Afterwards you have to set up the mode “MPI/DP” on the right side as well as the station address from the operating terminal.



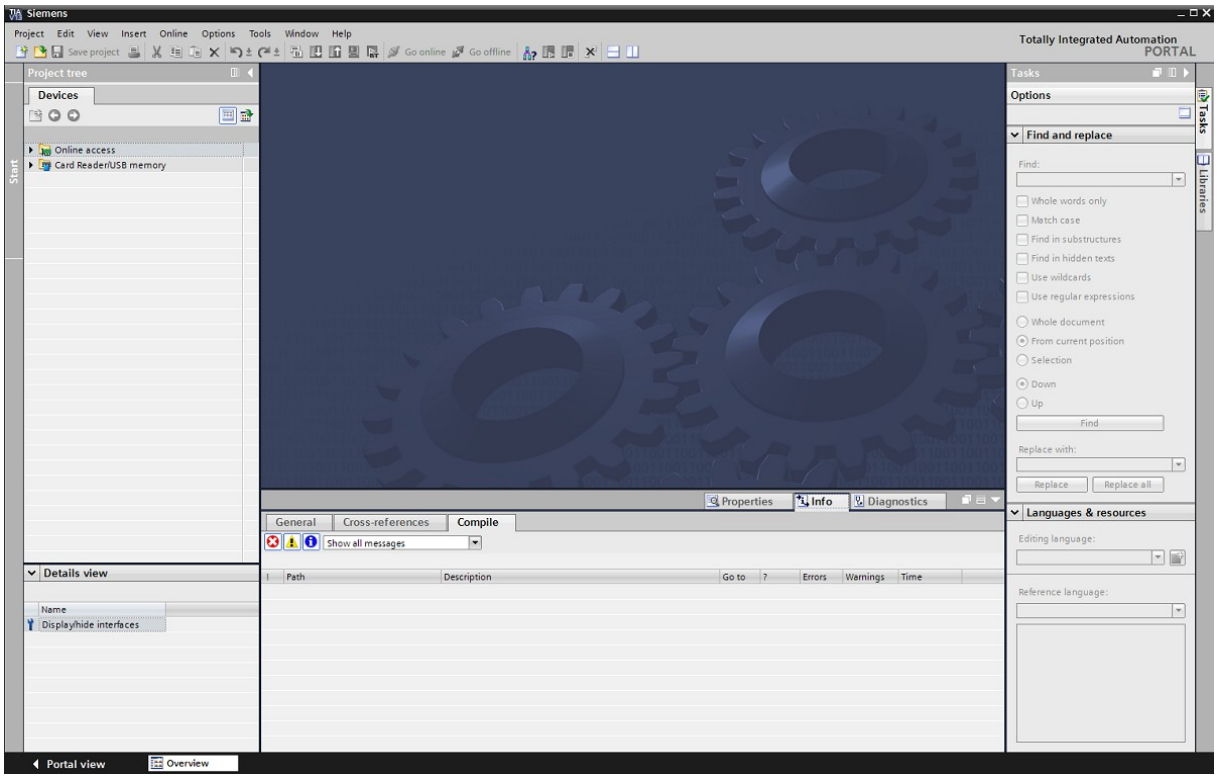
If all settings are correct you can click on the button “Transfer” do transfer the project into the operating terminal. The button “Apply” can be used to save the settings without executing a transfer to the terminal. This for example may be needed if you want to update the operating system from your operating terminal without transferring your project first.

When you want to update the operating system from your operating terminal you have to click on the menu entry “Project” → “Transfer” → “OS Update”. If you want to do this without a project, this requires that the device type and access path is already configured on the dialog “Communication settings” which can be found within the same menu.

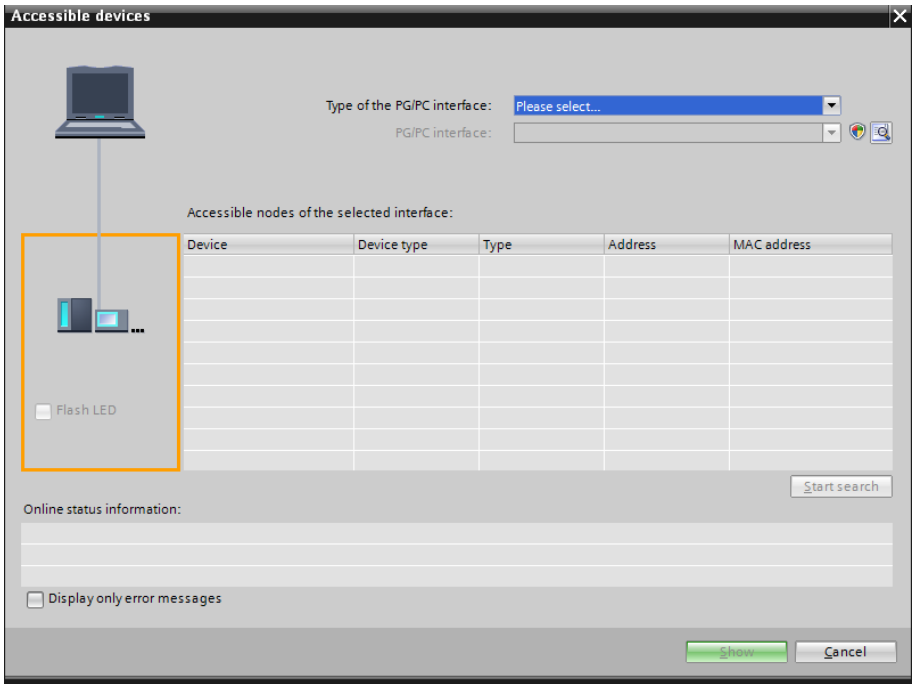


3.2.8 TIA Portal

At the first step you have to open the TIA Portal and switch to the project view. The selection and configuration of your device within the PG/PC Interface have to be done already via the Control Panel.

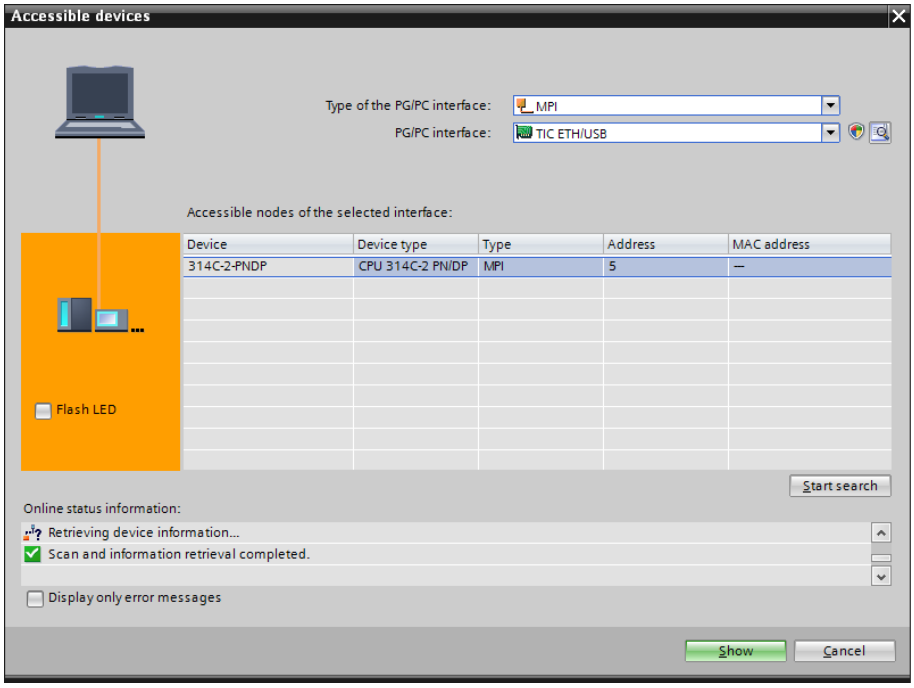


Now you can click on the menu “Online” and then on the entry “Accessible devices “. Thereby you should get the following window:

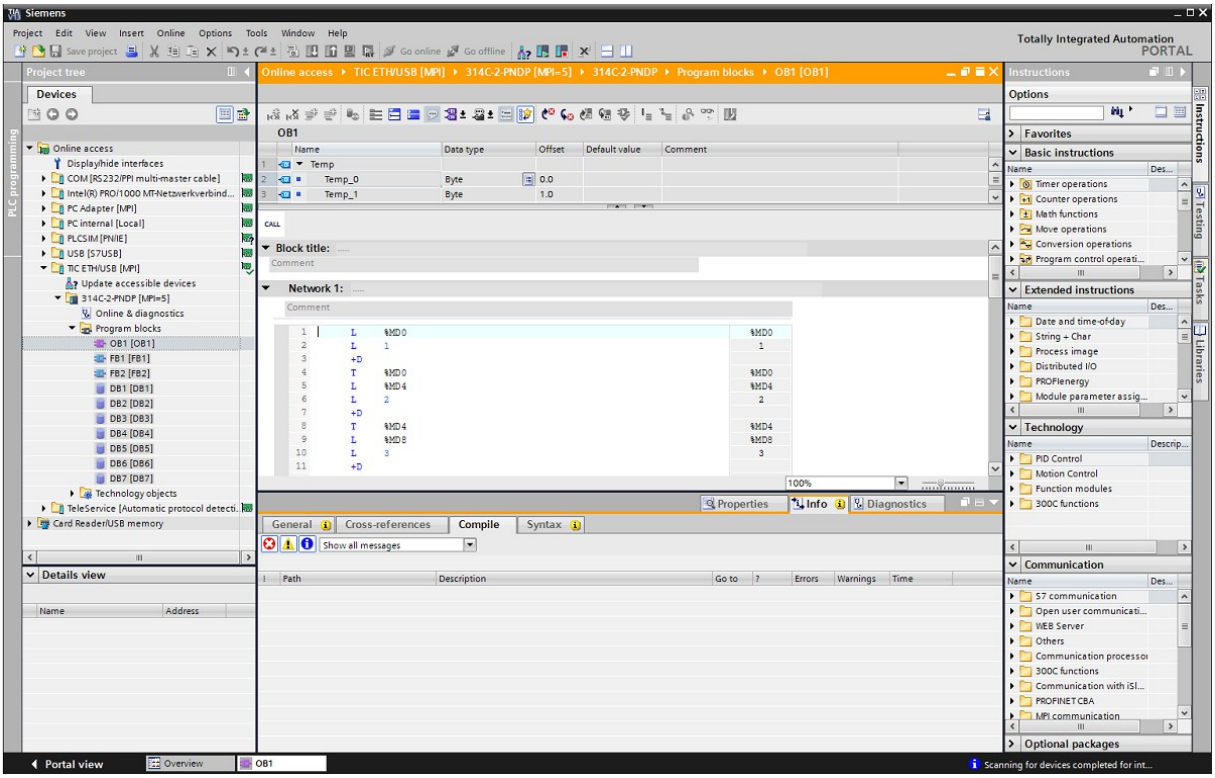


Within this dialog you then have to choose the type of the PG/PC Interface as well as the driver or interface which should be used. The selection here is a bit different from the classical PG/PC Interface dialog. When you have finished your selection you can click on the button “Start

search”. After a few moments the list of all accessible participants should be shown:



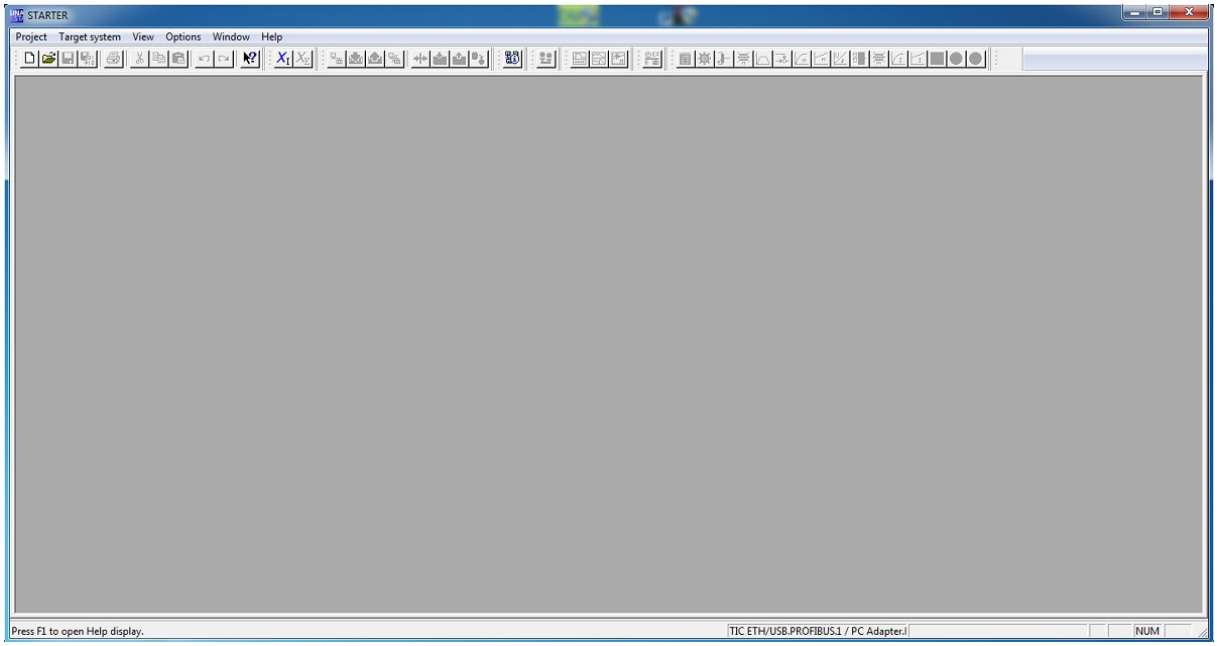
In the next step you can select one of the participants from the list and then click on the button “Show”. Thereby the tree of the participant on the project navigation gets opened. There you can then choose and open the entry “Program blocks”, where you can open and manage your blocks within your controller.



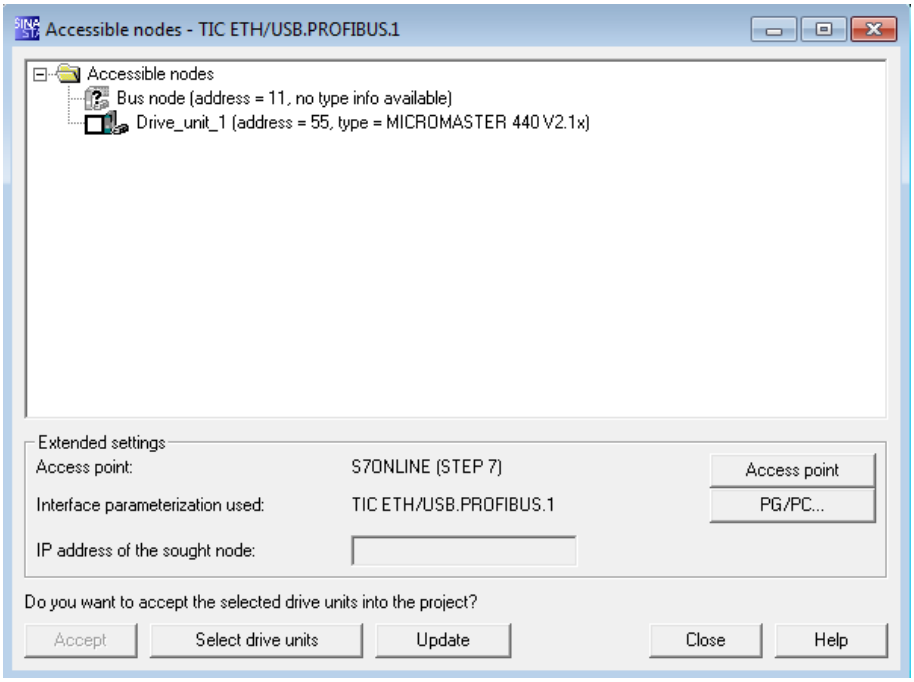
Hint:
If you already have a TIA project, you can also directly “Go online” or use the load command to transmit changes into your PLC.

3.2.9 STARTER

First you have to open the STARTER software. If you haven't configured your access point you can do this now. Therefore you have to click on the entry “Set PG/PC Interface” within the menu “Options”. The access point which have to be configured for the STARTER software is either “S7ONLINE” or “DEVICE” (alternate access). If you have done this configuration you can open your Step7 project or create a new one. The STARTER software thereby can also be used to create a new project.

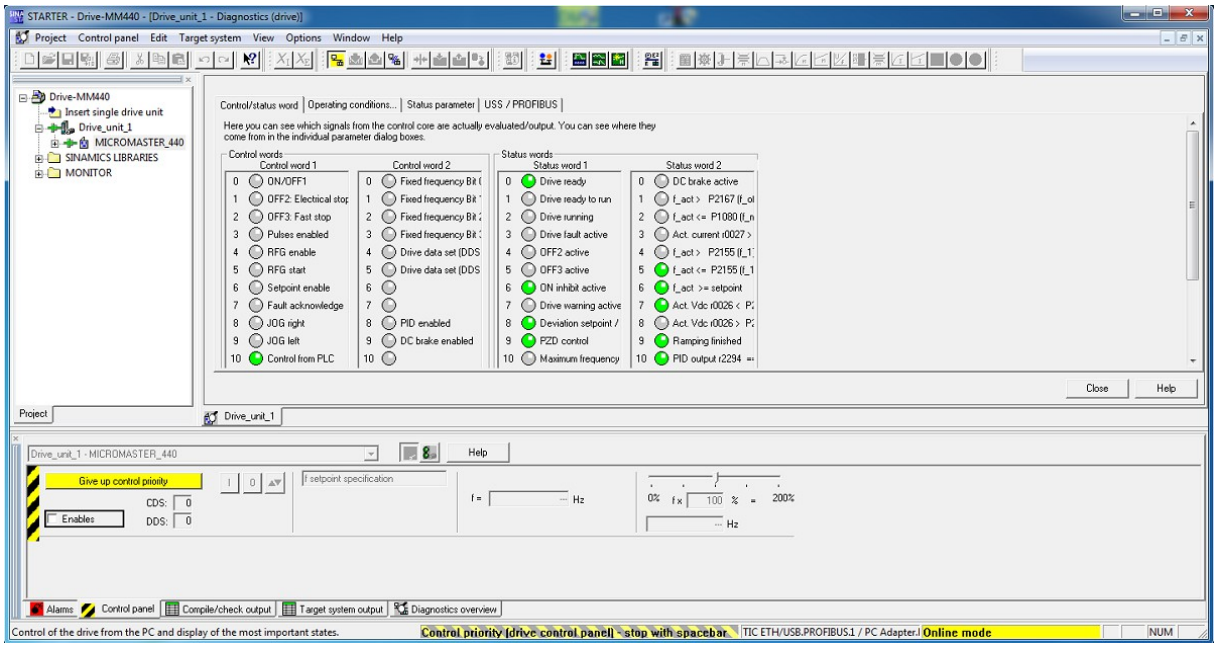


If you have opened your project or created a new one you can click on the entry “Accessible nodes” within the menu “Project”. The software then searches for accessible nodes automatically and shows them within the newly opened dialog:



If you haven't accepted your drive within your project you can set the check in front of the node entry and then click on the “Submit” button. Thereby the drive device gets accepted into your project. Otherwise you can simply close the dialog again.

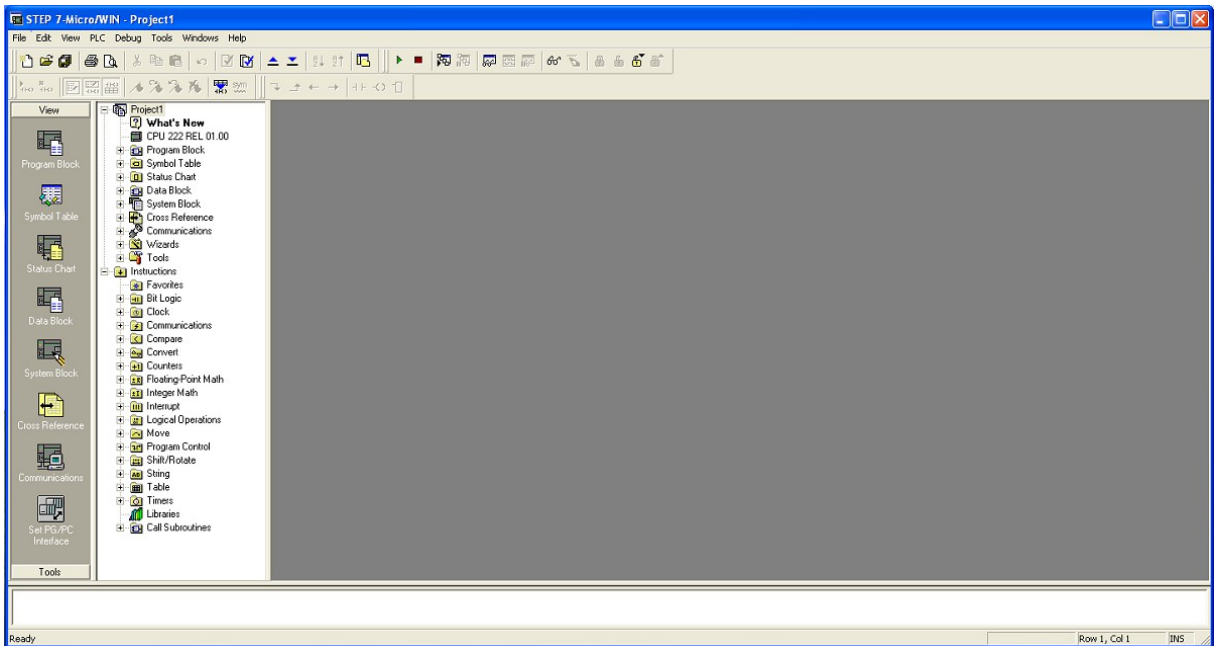
Now when the drive is accepted into your project you can use all functions of the program like loading, diagnostic and many more.



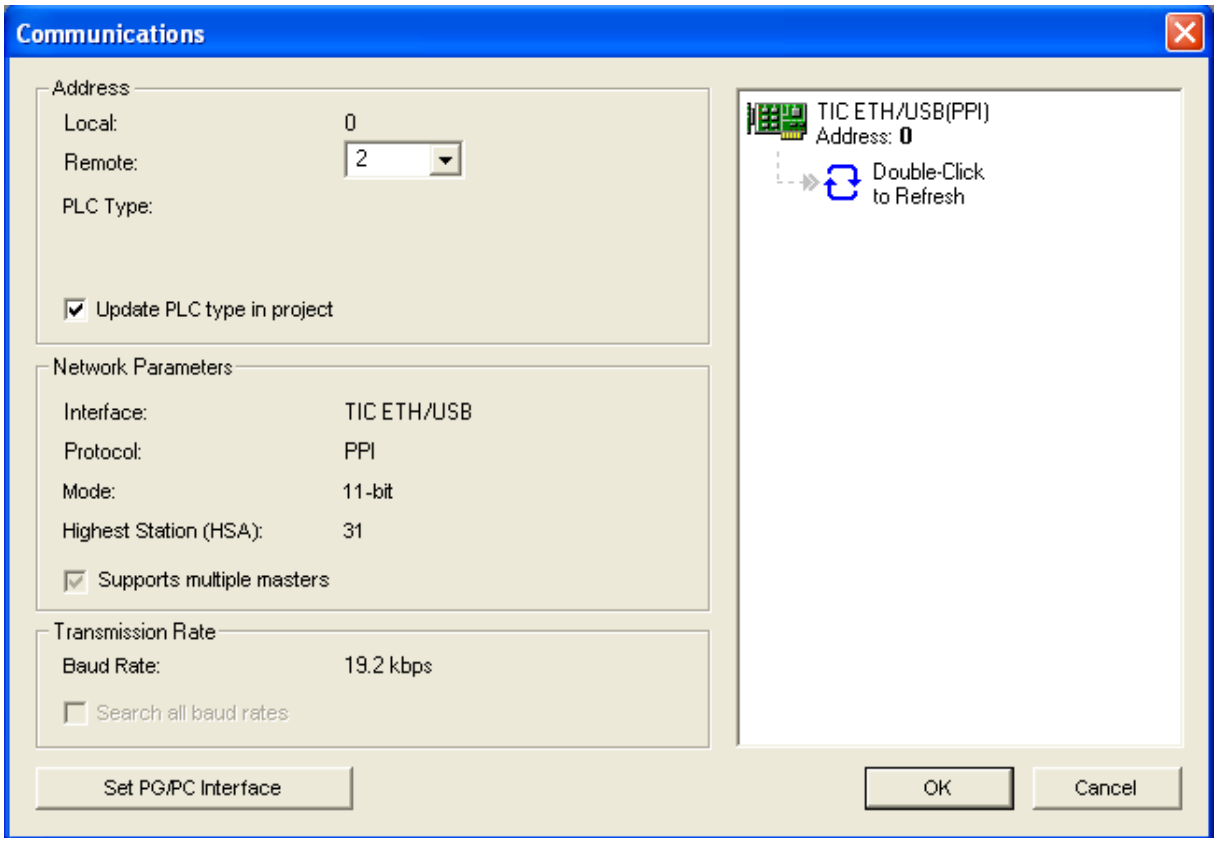
Hint:
When you only want to check if the node is accessible you don't need a project. But when you want to do further communication with your drive you will need a project.

3.2.10 MicroWin

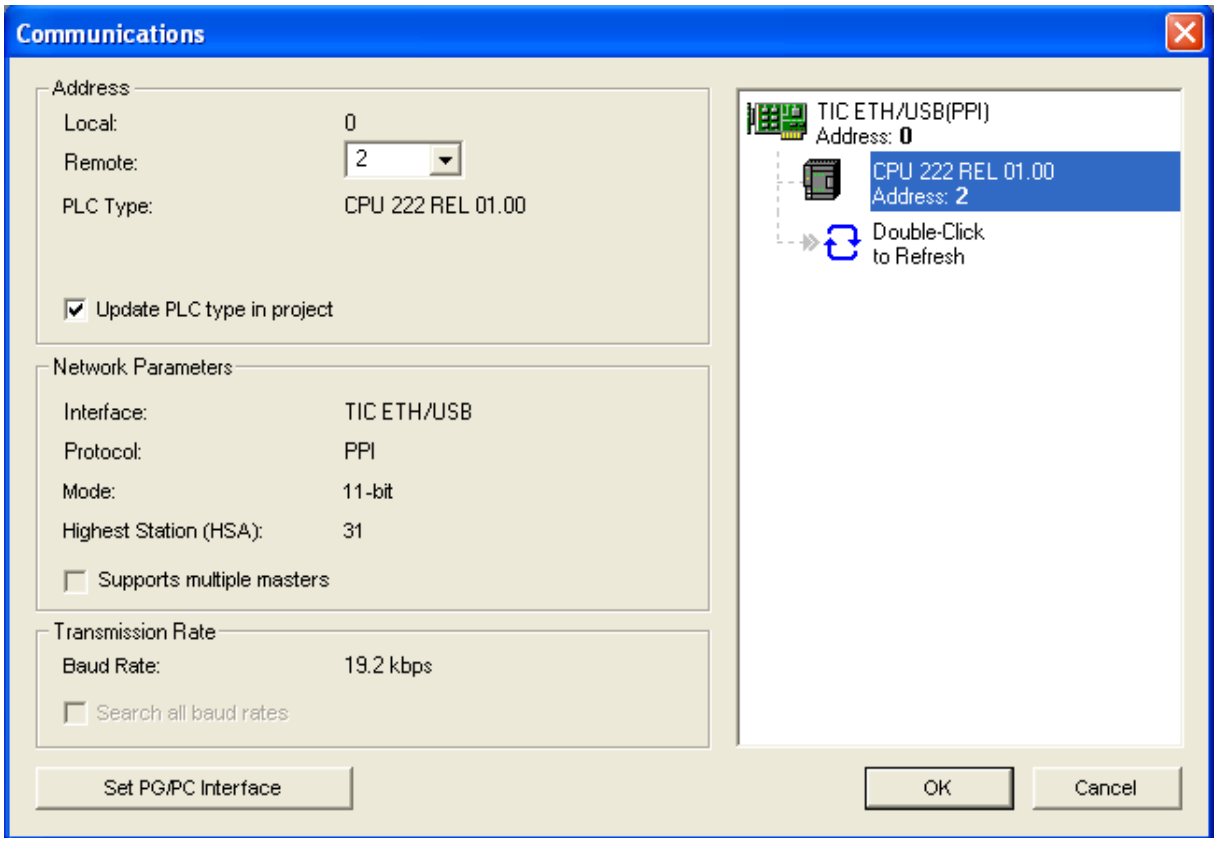
First you have to start the program MicroWin. If you already have a project for your PLC you can now open that. Otherwise you can create a new empty project. Such a project is normally generated when starting the application automatically. If you haven't done the configuration on the PG/PC Interface you should to do that now. Therefore you can click on “Set PG/PC Interface” within the area “View” on the navigation bar. There you then can choose the interface and maybe configure your device.



If the interface is configured you will have to set up the communication to the controller. Therefore you have to click on “Communications”. This item can also be found within the block “View” on the navigation bar on the left side of the program. After you have clicked on the item you should get the following dialog:



Within the dialog you should then see the current parameters as well as the selected driver. Now you will have to search for participants. This can be done by clicking on the refresh icon on the right side of the window. When the search has completed your PLC should be shown there:

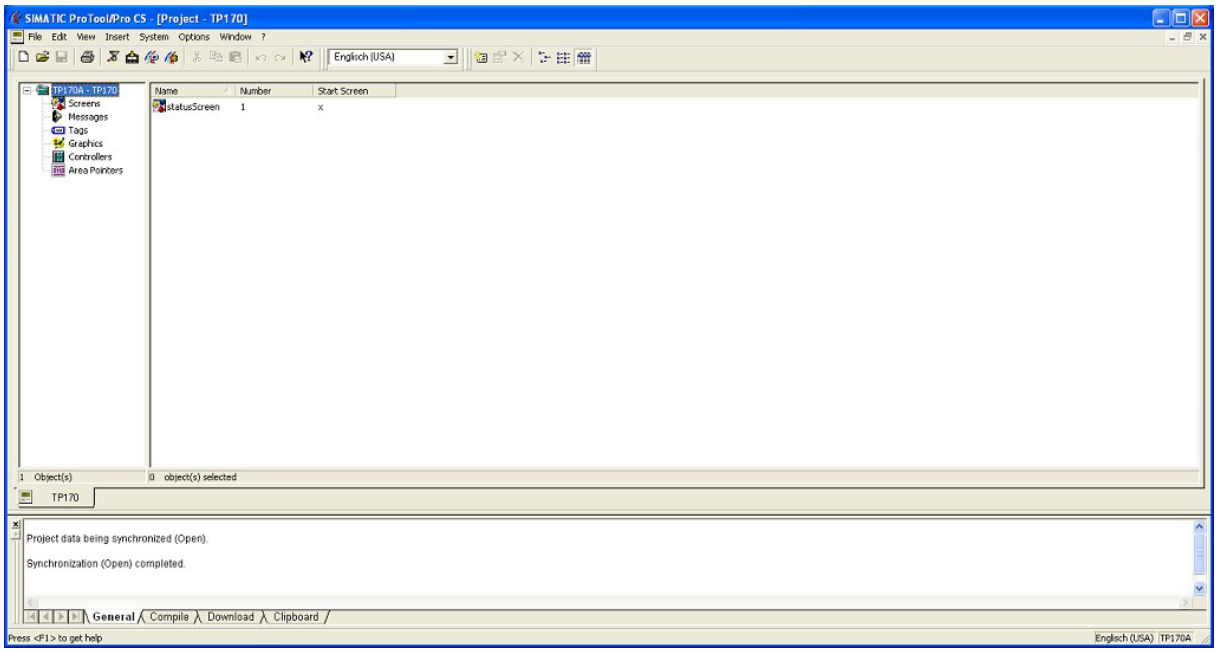


To submit the PLC for the communication you will have to select it on the right side and then click on the button “OK”. Afterwards you can use your MicroWin application normally for the communication with your PLC (e. g. loading a program or viewing and controlling variables).

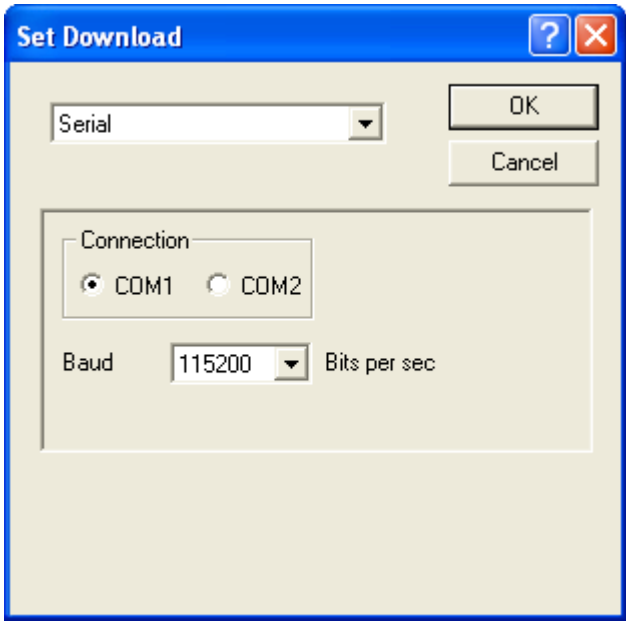
Important:
If you have an older S7-200 controller you have to make sure that the setting “Advanced PPI” within the PPI driver is disabled. Otherwise a connection to this controllers isn't possible. Newer S7-200 controllers are supporting both protocols.

3.2.11 ProTool

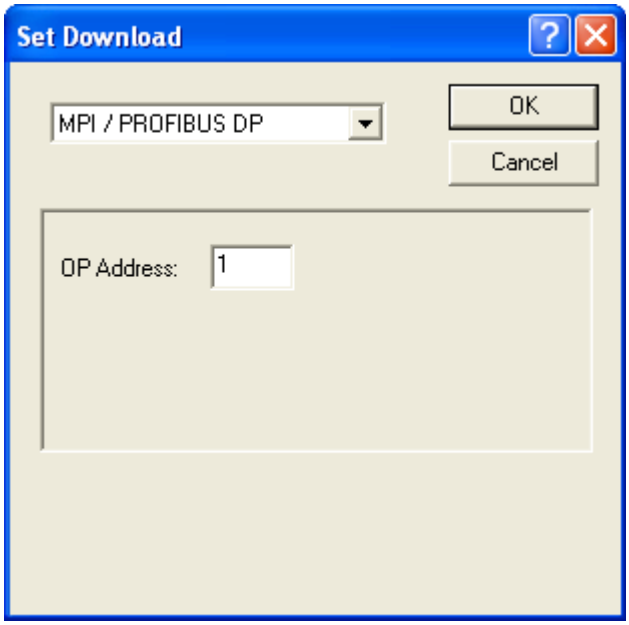
When you have done the selection and configuration within the PG/PC Interface you should start the program ProTool and open your project. The project thereby can either be a Step7 or a stand alone project.



In the next step you have to set up the transfer settings. Therefore you have to navigate to the menu item “File” → “Download” → “Preferences”. After you have clicked on that item the following window will appear:



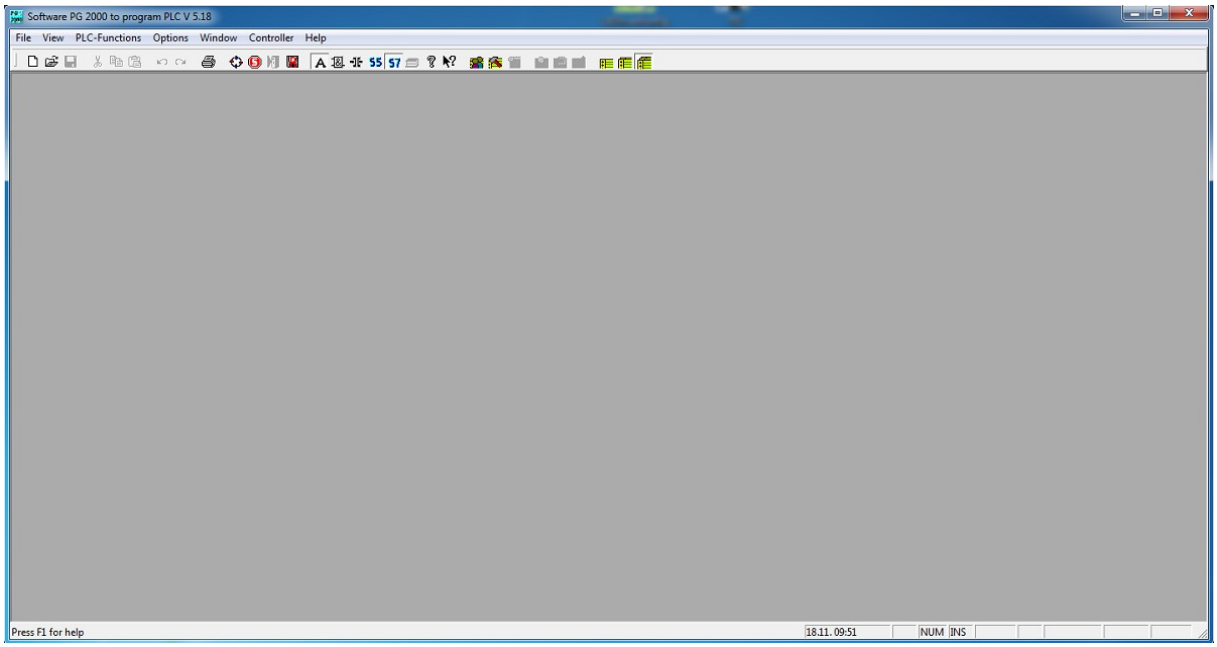
Within the selection list you then have to select “MPI / PROFIBUS DP” and afterwards enter the station address from your operating terminal.



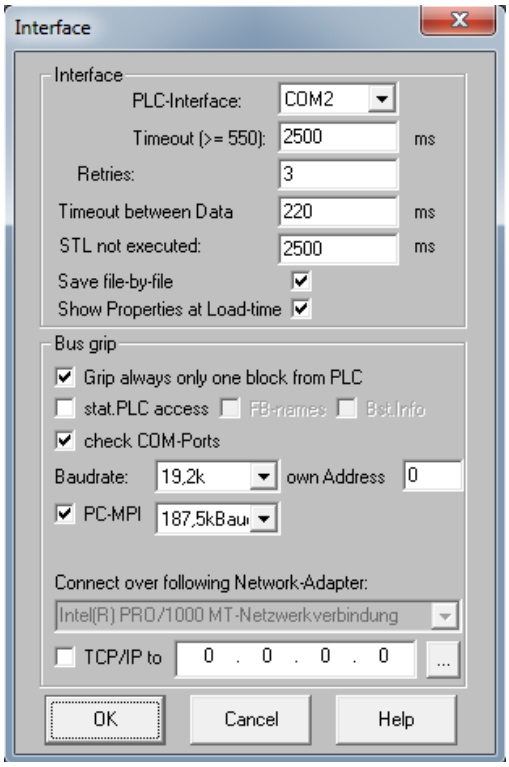
If this setting is done you can click on the button “OK” to submit the settings and close the dialog. Now you can transfer your project with the menu item “File” → “Download” → “Start Project Download”. When you want to do an update of the operating system from your operating terminal you can click on the menu entry “OS Update” within the same menu.

3.2.12 PG-2000

First you should start the program PG-2000 and make sure that S7-300/400 is selected as mode of the application. This setting can be simply changed by clicking on the S7 icon within the toolbar or with the menu entry “View” → “S7 300 / 400”.

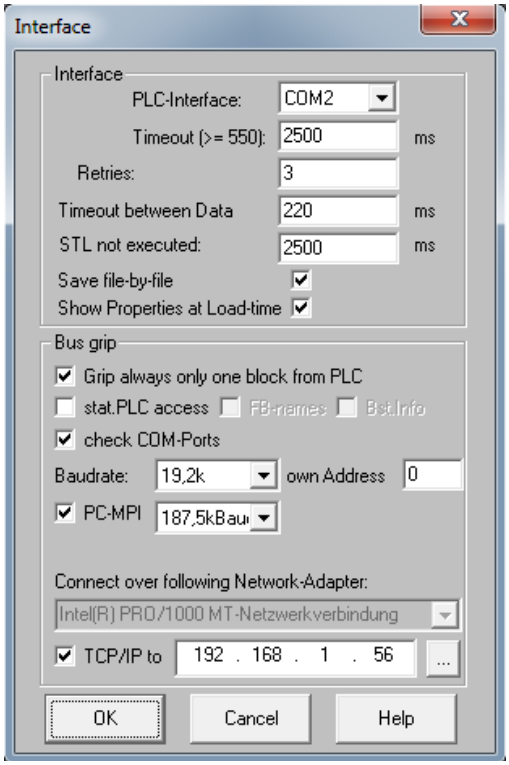


Next you have to open the interface configuration dialog. This can be done via the menu “Option” → “Interfaces”.

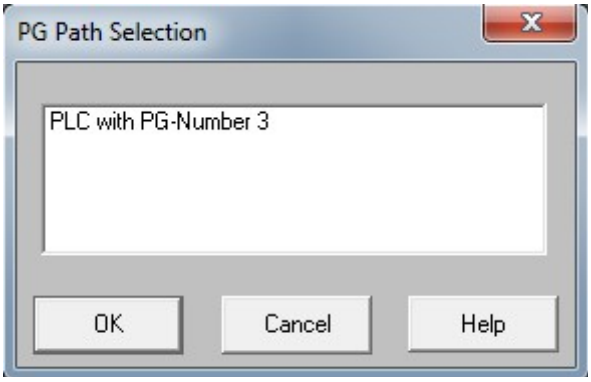


On the selection “PLC-Interface” on the top of the window you can then select your COM port which should be used for the communication. This COM port can either by a physical COM port for the communication with a MPI-II cable or a virtual COM port from the PLC-VCOM application for the communication with any of the USB or LAN devices. When you want to communicate with a LAN device you can also do this without any further driver or software. Therefore you have to enable the option

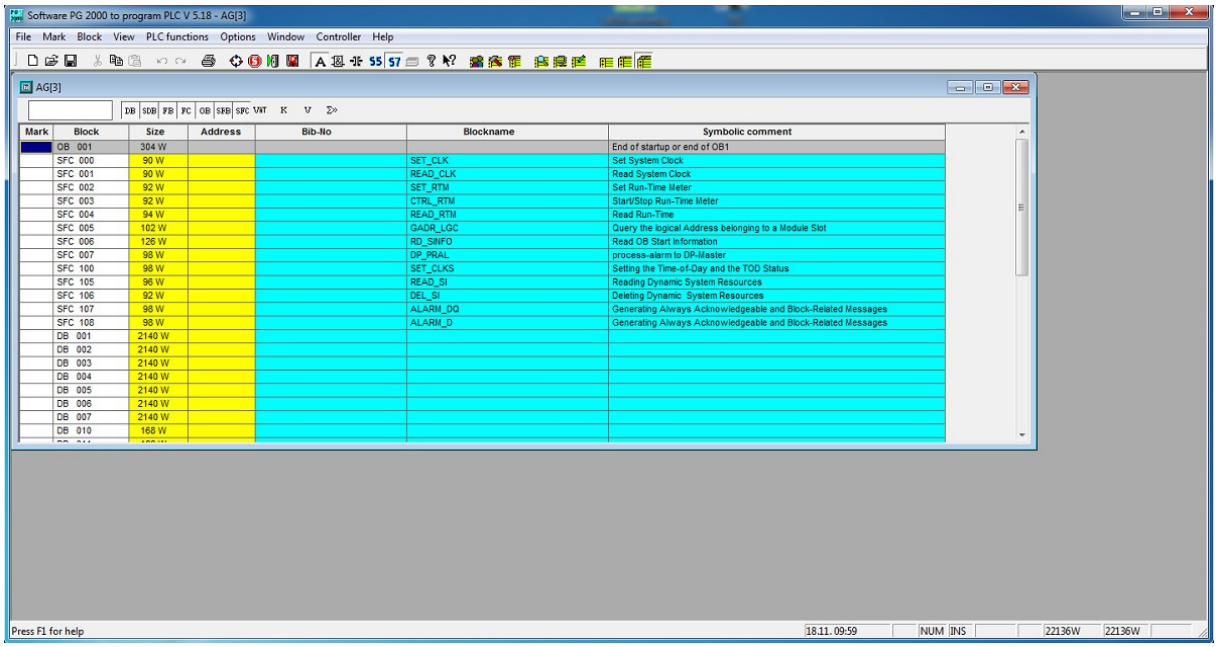
“TCP/IP to” and then enter the IP address of your device. With the button behind the input field you can also execute a search for available devices within your network. When you have configured the access path you should make sure that the local address as well as both baud rates (for TCP/IP the MPI baud rate only) is configured correctly. All other parameters can be leaved unchanged in the most cases. For more information about this settings you should read the manual of the program.



If all settings are set up you can submit the parameters with a click on the “OK” button. Now you can click on the menu entry “File” → “Open” → “PLC” to read in the list of blocks within your PLC. In some cases a small window will appear where you have to select to which destination CPU you want to connect to:



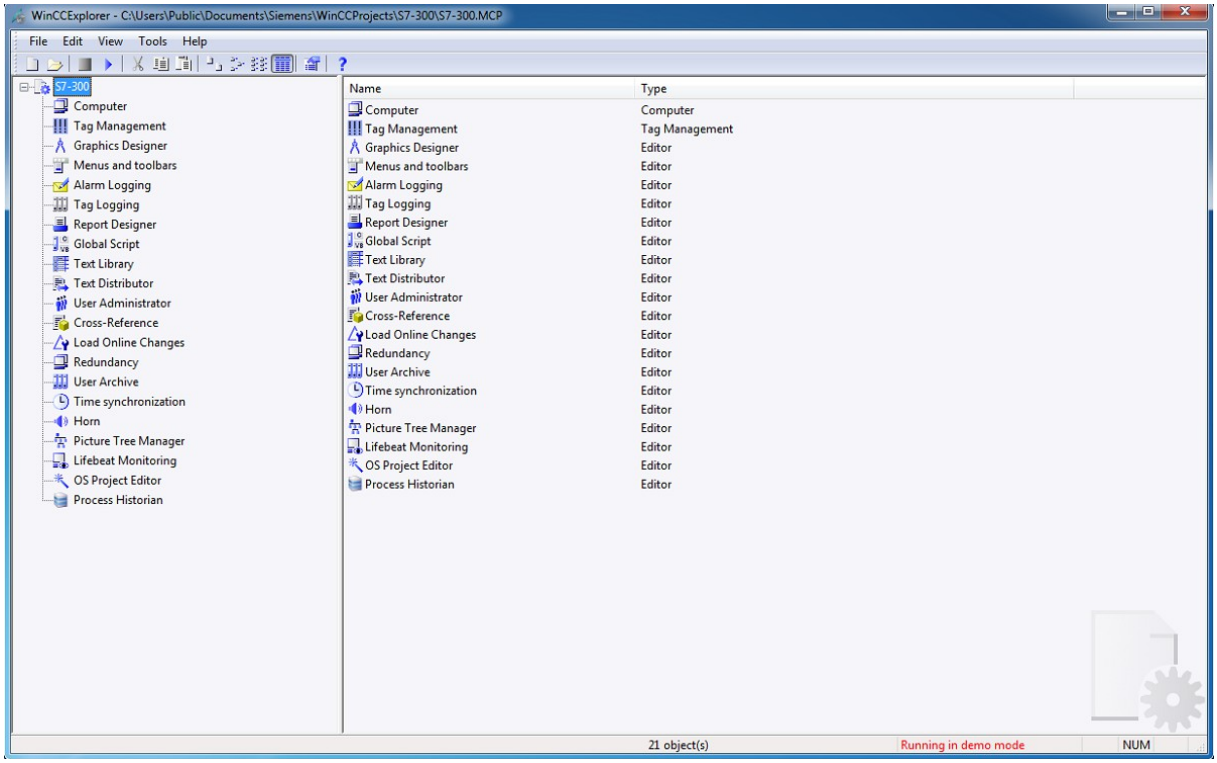
If this dialog is shown you just have to select your controller an then click on the “OK” button. At the least you should get the list of blocks in your controller:



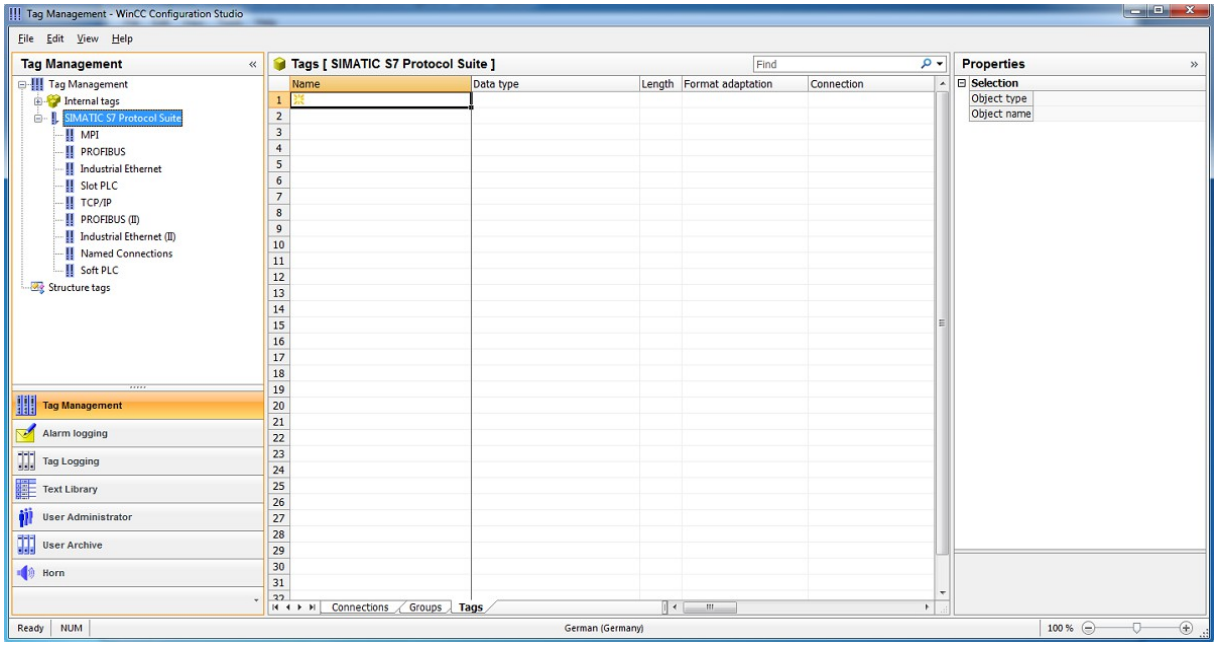
Hint:
The address of the selected destination CPU gets stored. This means the dialog will only appear if the previously selected address isn't reachable anymore. The setting about the access path of the destination CPU can be viewed and configured within the menu “Options” → “PG path” at any time.

3.2.13 Windows Control Center (WinCC)

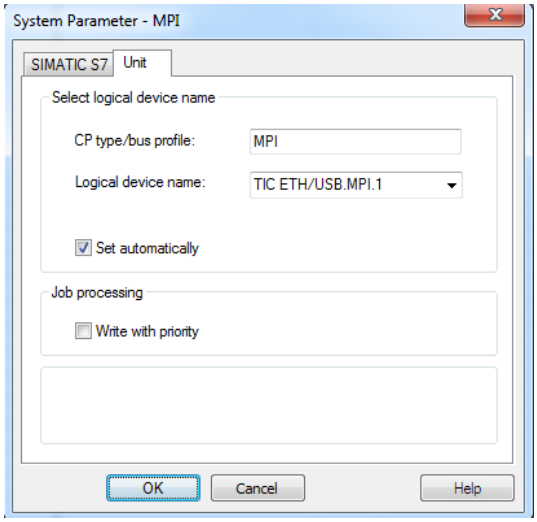
The first step is to open the program WinCC as well as your project. If you haven't created a project yet, you have to create a new one now.

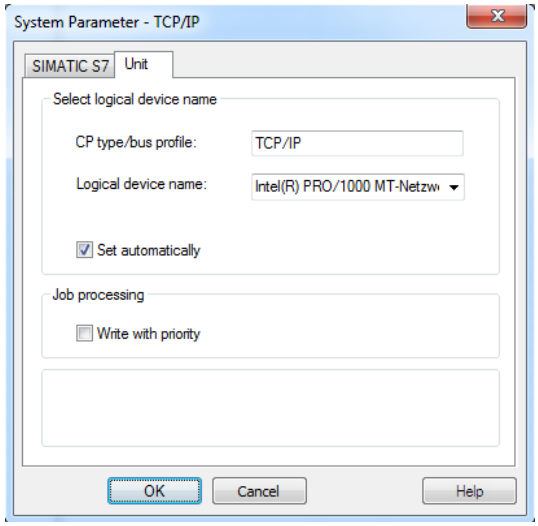


When WinCC is opened you can execute a double click on the entry “Tag management” within the navigation bar to open the management tool for tags. There you then have to add the protocol suite for SIMATIC S7 first if not done already. The suite can be added with a right click on “Tag Management” and then navigating to “Add new driver” → “SIMATIC S7 Protocol Suite”.



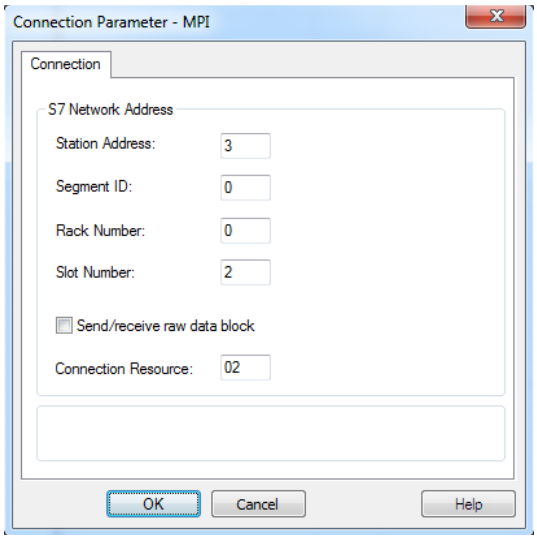
If the driver is added you should verify and maybe adjust the system parameters for the protocol (MPI, PROFIBUS or TCP/IP) you want to use. To open these system parameters you have to execute a right click on the corresponding entry and then click on the context menu item “System parameters”. Now you should get a new window where you have to navigate to the tab “Unit”. The important setting which have to be checked is “Logical device name”. Within the selection list the driver which should be used for the communication with your device should be selected. If you don't communicate via the TCP/IP driver you further have to choose and configure your device via the regular PG/PC Interface dialog too.

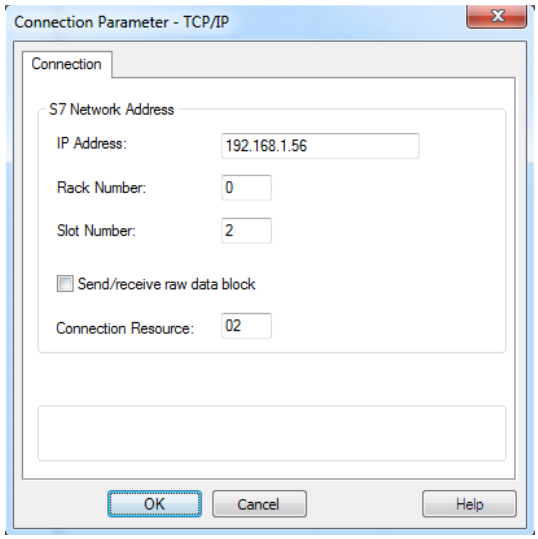




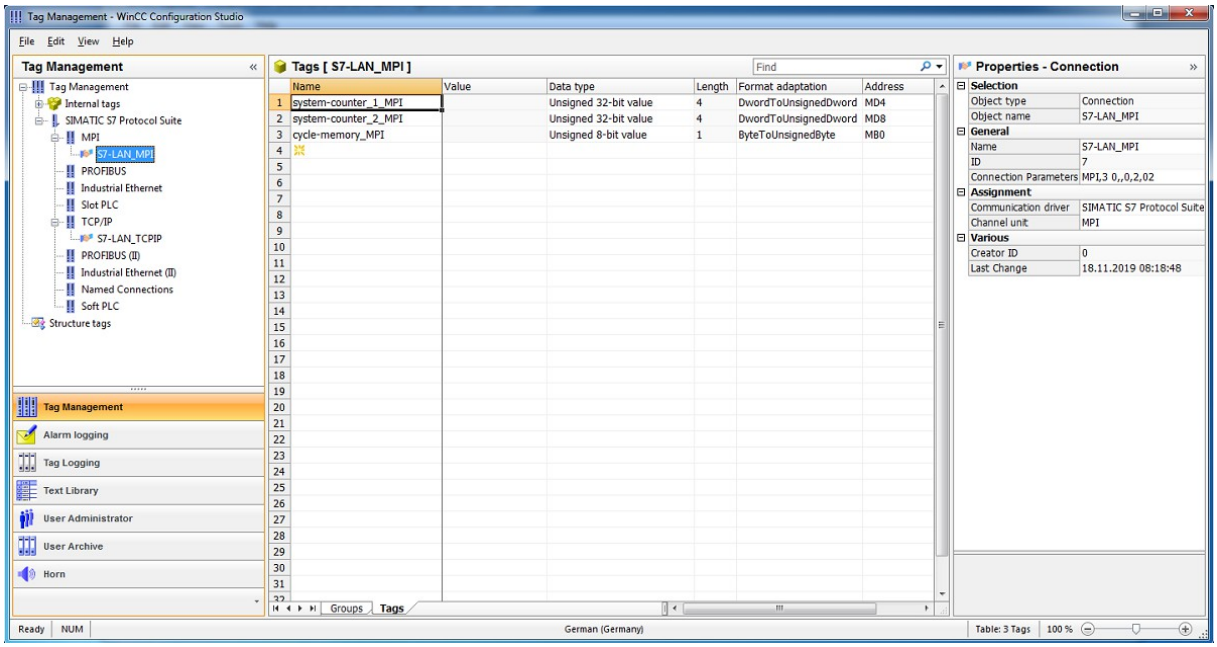
When these settings are checked and the dialog is closed again you can add a new connection. Therefore you have to execute a right click on the corresponding entry within the protocol suite again and then choose “New connection”. After that an entry on the navigation bar on the left side is created automatically and you will have to enter a name for that connection.

If the connection was created you have to change the settings of the connection. Therefore you have to click with the right cursor on the entry and then select “Connection Parameters”. Within the newly opened dialog you can then configure the MPI or IP address (depending on your access path) as well as some other parameters.





When this data is configured too, you can close the dialog by a click on the button “OK”. In the next step you can then create and configure variables within the list view.

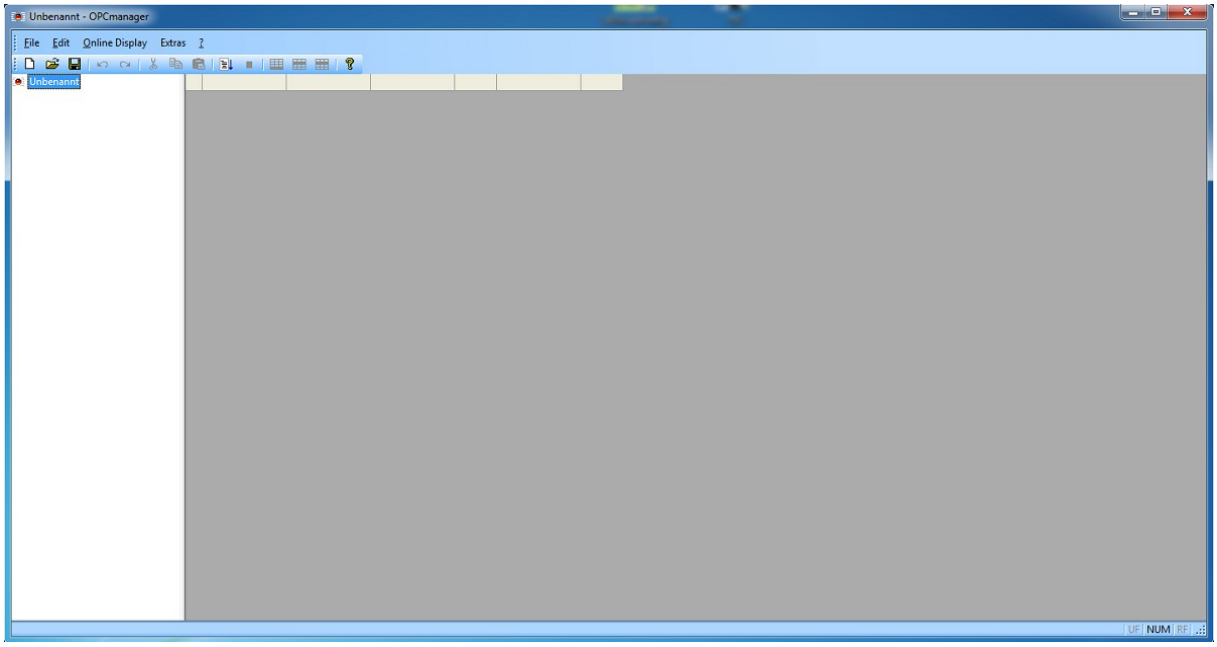


Afterwards you can use your variables from you project as usual (e. g. viewing on a screen or triggering an action). The management for the connection as well as the querying of variables thereby is taken by the WinCC application. If you have problems while communicating you may want to use the tool “Channel Diagnosis” to get more information about the error.

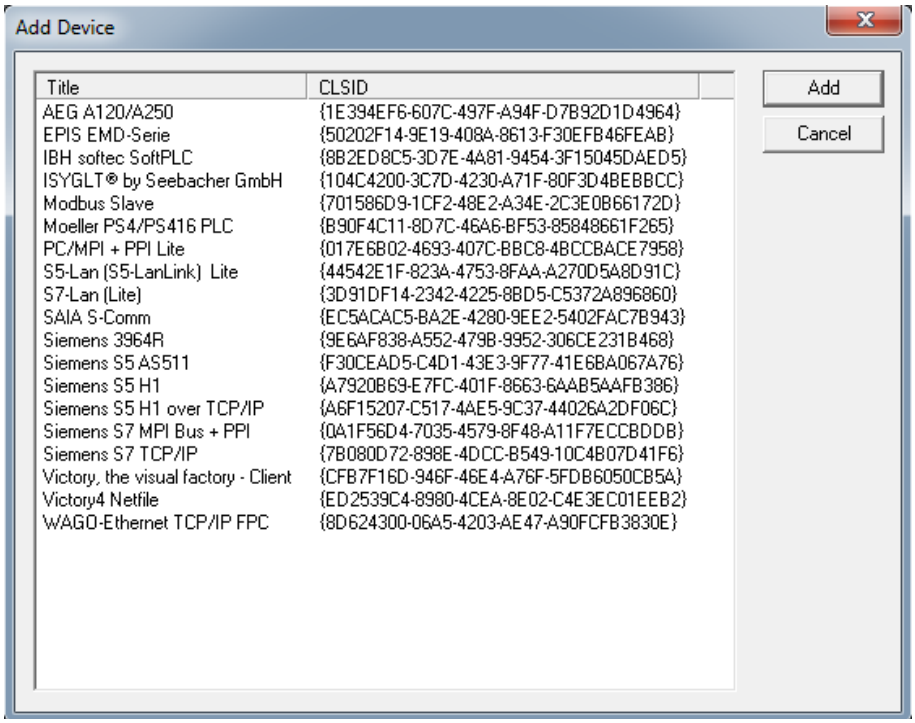
3.2.14 OPC-Manager

In the first step you should open the program OPC-Manager. Afterwards you can open your project if you have created one already. Otherwise

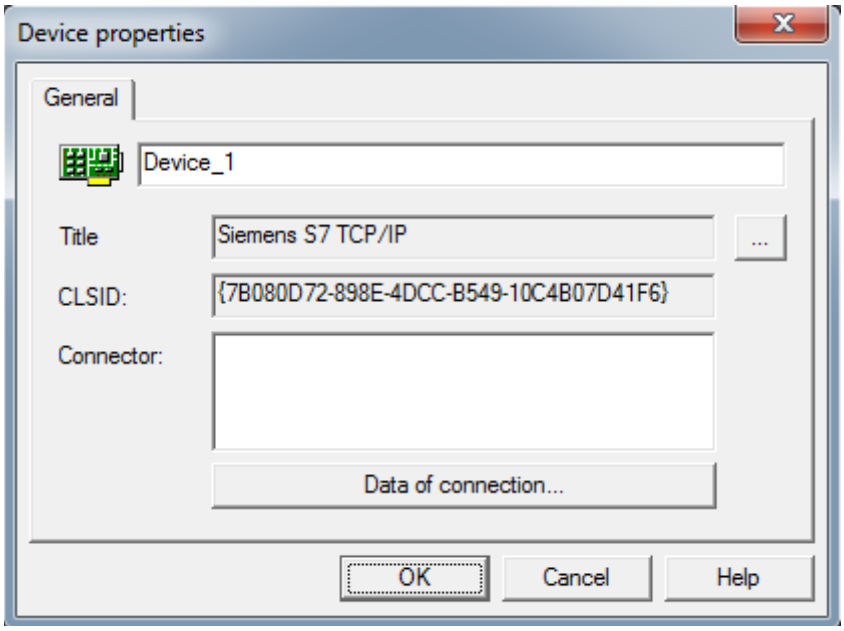
you can also use the empty project which is created when starting the program automatically.



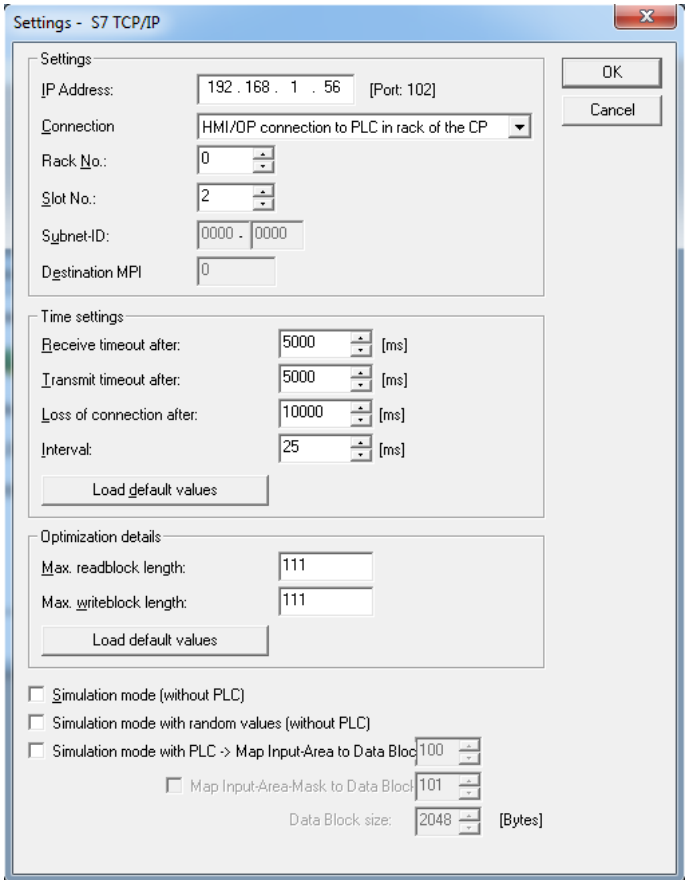
Before you can configure your variables you have to create a device. This can be done by clicking on the entry “Add device” within the “Edit” menu. Thus a window gets opened where you can choose between multiple controller and access types:

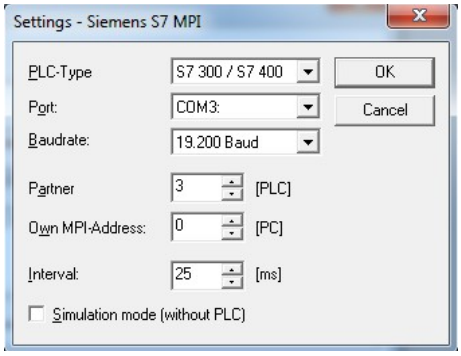


In this dialog you then have to select “Siemens S7 TCP/IP” when you want to access your LAN device directly via network or “Siemens S7 MPI Bus + PPI” when using serial access (with the MPI-II or a virtual COM port from the PLC-VCOM application). Then you can click on the “OK” button. Afterwards the dialog with the device properties gets shown:

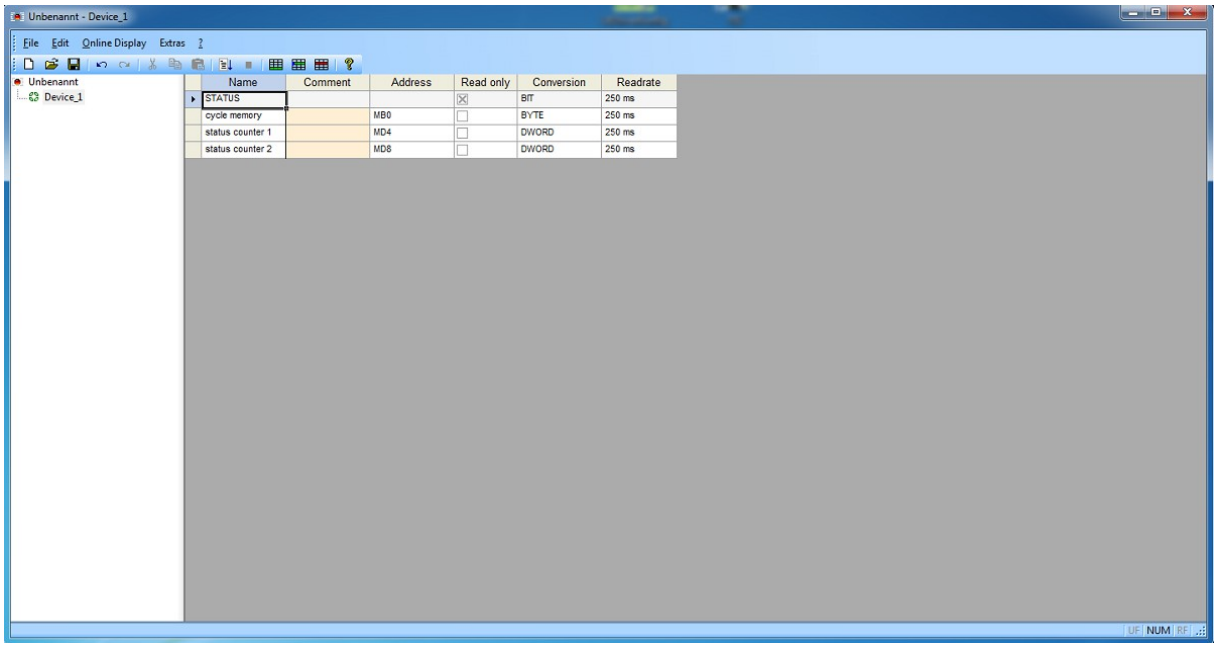


To specify further settings for the connection you have to click on the button “Data of connection”. There you then can configure the IP address or COM port as well as some more settings depending on the used access type.

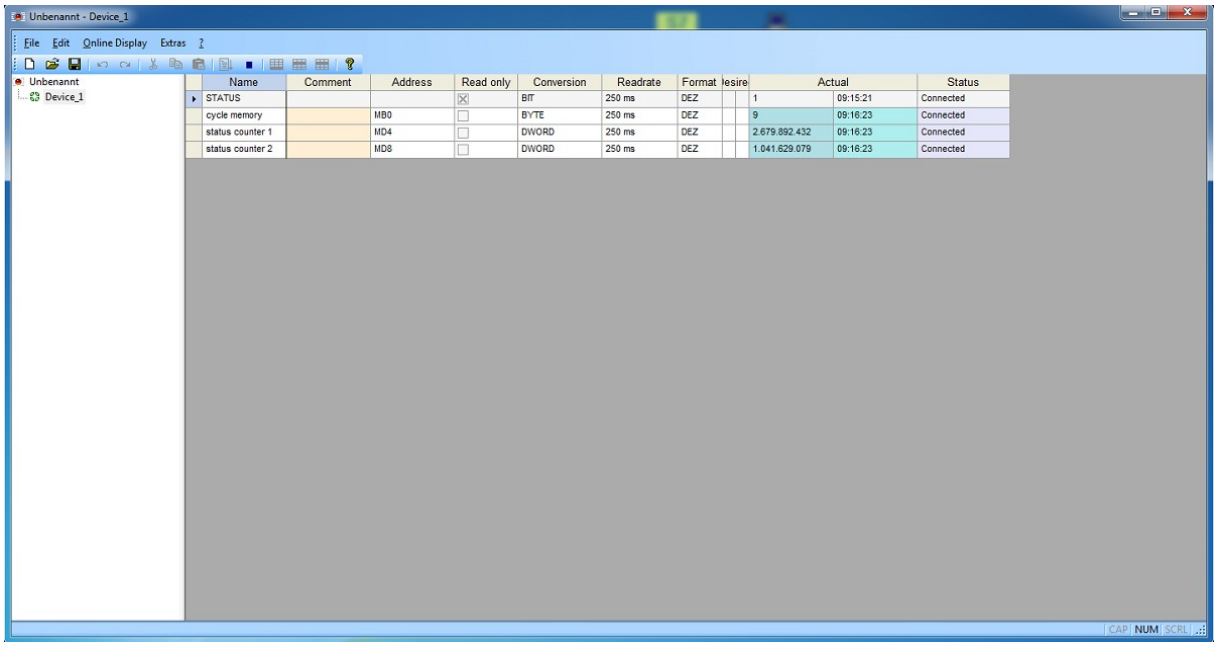




When you have configured all settings you can close both windows with a click on the “OK” button. Afterwards you can create your variables (in this application also called “Items”) for the connection.



With a click on the menu entry “Online Display” → “Start Online Display” you can then finally switch to the online view. Thereby the configured items gets retrieved from the device within the configured cycle and shown on the main window:



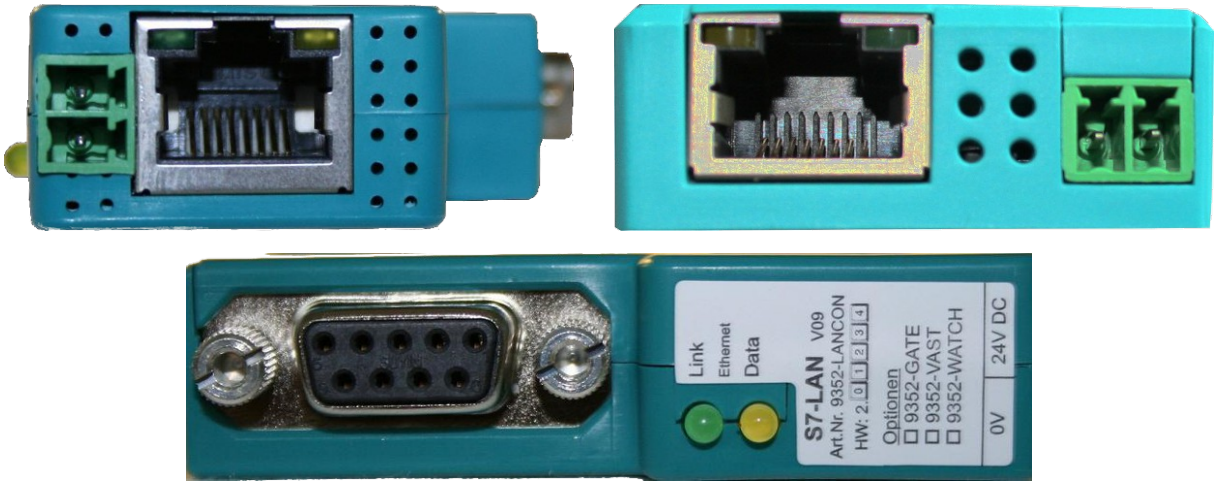
4 Control elements

The devices are having different control elements. This control elements can then be used for diagnostic or configuration purpose.

Please note, that the diagnostic and configuration function from the drivers TIC and PLC-VCOM aren't explained here. These are described within the chapters “Commissioning”, “TIC” and “PLC-VCOM”.

4.1 Status LED's

If you want to do a quick diagnostic of your device without the need for a PC, the status LED's may help you. Status LED's are available on the devices S7-LAN, S7-GATE and S7-USB only.



The S7-LAN and S7-GATE module has LED's on the Ethernet jack and on the front side. These LED's are having the same function and have the following meanings:

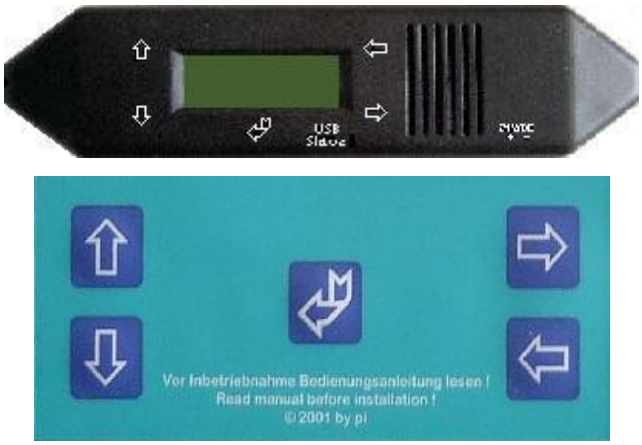
LED	mode	description
green	off	no link state / no connection to the network
	on	link state available / connection to the network available
yellow	off	no communication running
	flashes	communication with network running
	on	device is booting

On the S7-USB the LED's on the front side have the following meanings:

LED	mode	description
green	off	device isn't powered
	flashes	bus communication running
	on	device is powered
yellow	off	no errors while communicating
	flashes	1 x module can't go into the bus 2 x participant with same address detected 3 x MPI baud rate is wrong 4 x parity errors on bus detected 5 x buffer overflow within the module

4.2 Keyboard and LCD display

The cables MPI-LAN, MPI-USB and MPI-II have a LCD display with two lines as well as a keyboard on the bottom side of the device. With those two elements you can determine the current state of your device and bus and directly parameterize your cable without the need of a PC.



The keys are having the following functions:

key	name	description
	ENTER	menu call / confirmation of an input
	LEFT	navigating a menu level back / abortion of an input / moving input cursor to the left side

	RIGHT	calling a sub menu / moving input cursor to the right side
	UP	choosing a menu item / increasing value by one
	DOWN	choosing a menu item / decreasing value by one

The different menus are described within the following pages. After the device has booted the cable shows the menu “Message” automatically.

The devices S7-LAN, S7-GATE and MPI-LAN are (also) having a virtual display, which can be shown and controlled via the web browser from your PC.

4.2.1 Message

The menu “Message“ is the default menu of the device and is shown after the boot process or when navigating completely out of the menu.

The menu hasn't any sub menu items and shows status information about the cable and about the connected bus.

	amount of active stations	PG baud rate *(see below)*	address of the programming device (PG)	data transfer ■ to cable ▄ to PC
#	02	Pg	00	■
!	03	Ag	03	
addresses of active participants (! means directly connected, otherwise ?; ¡/¿ for passive participants)		PG protocol *(see below)*	address of the partner / controller	

In the example from above 2 active stations (the PG and a PLC) are available. The programming device has the address 0 and is directly connected to the controller with the address 3. These two participants are also communicating with each other.

The field “PG baud rate“ determines, which baud rate is used between the PG and the PC:

- **P?:** baud rate detection or no communication yet
- **PU:** communication via USB
- **PD:** baud rate 115k2 or baud rate detection
- **PG:** baud rate 38k4
- **Pg:** baud rate 19k2
- **pG:** baud rate 57k6
- **pg:** baud rate 2k4, 4k8 or 9k6
- **TD:** baud rate 115k2 or baud rate detection (configured as TS adapter)
- **TS:** baud rate 38k4 (configured as TS adapter)
- **Ts:** baud rate 19k2 (configured as TS adapter)
- **tS:** baud rate 57k6 (configured as TS adapter)
- **ts:** baud rate 2k4, 4k8 or 9k6 (configured as TS-Adapter)
- **PM:** PPI multi master

With the field “PG protocol“ you can see which protocol is used between the PG and the PC:

- **AG:** before V5 protocols or no communication yet
- **Ag:** V5.1 protocol or PPI multi master with baud rate 19k2
- **ag:** V5.0 protocol or PPI multi master with baud rate 9k6

Hint:
If you have more then one active participant on the bus, those are viewed successively within a ¾ second rhythm.
The addresses of the PG and of the communication partner is only shown when a communication is running currently. On LAN devices this information is only shown when communicating via the PLC-VCOM.

In some special cases where the cable acts as a simple converter the message view is completely different from the basic view as described above:

mode	**1. line**	**2. line**
PPI 9K6 *(PPI 9k6 via RS232)*	PPISER96	AKTIV
PPI 19K2 *(PPI 19k2 via RS232)*	PPISER19	AKTIV
SPEC SER *(manual via RS232)*	SNDSER	*e. g. 19K2 N81*
PPIUSB96 *(PPI 9k6 via USB)*	PPIUSB96	AKTIV
PPIUSB19 *(PPI 19k2 via USB)*	PPIUSB19	AKTIV
SPEC USB *(manual via USB)*	SNDUSB	*e. g. 19K2 N81*
PPILAN96 *(PPI 9k6 via LAN)*	PPILAN96	AKTIV
PPILAN19 *(PPI 19k2 via LAN)*	PPILAN19	AKTIV
SPEC LAN *(manual via LAN)*	SNDLAN	*e. g. 19K2 N81*

4.2.2 Config

The menu “Config“ allows you to change different settings of your cable:

- **Data:** selection of the origin for the bus configuration

selection	**description**
auto	configuration gets detected automatically from the bus; if this information is not available the configuration from the PG/PC is used
Bus	configuration gets detected automatically from the bus

PG	configuration from the PG/PC is used
fixed	configuration from the device is used

- **Mode:** selection of the mode, to specify the function of the cable

selection	**description**
PPI	PPI communication for all S7-200 controllers
PPI Adv	PPI communication with the advanced, MPI compatible, PPI protocol for newer S7-200 controllers
MPI SER	MPI communication via RS232 *(MPI-II only)*
DP SER	Profibus communication profile DP via RS232 *(MPI-II only)*
Std SER	Profibus communication profile Standard via RS232 *(MPI-II only)*
Uni SER	Profibus communication profile Universal via RS232 *(MPI-II only)*
MPI USB	MPI communication via USB *(USB devices only)*
DP USB	Profibus communication profile PG via USB *(USB devices only)*
Std USB	Profibus communication profile Standard via USB *(USB devices only)*
Uni USB	Profibus communication profile Universal via USB *(USB devices only)*
MPI LAN	MPI communication via LAN *(LAN devices only)*
DP LAN	Profibus communication profile DP via LAN *(LAN devices only)*
Std LAN	Profibus communication profile Standard via LAN *(LAN devices only)*
Uni LAN	Profibus communication profile Universal via LAN *(LAN devices only)*
PPISER9K6	PPI converter with 9600 baud via RS232 *(MPI-II only)*

PPISER19K2	PPI converter with 19200 baud via RS232 *(MPI-II only)*
PPIUSB96	PPI converter with 9600 baud via USB *(USB devices with PLC-VCOM only)*
PPIUSB19	PPI converter with 19200 baud via USB *(USB devices with PLC-VCOM only)*
PPILAN96	PPI converter with 9600 baud via LAN *(LAN devices with PLC-VCOM only)*
PPILAN19	PPI converter with 19200 baud via LAN *(LAN devices with PLC-VCOM only)*
PPIMulti	PPI multi master mode with 9600-187500 baud via RS232 *(with physical COM port)* or USB or LAN *(with PLC-VCOM)*
SPEC SER	RS232-RS485 converter via RS232 *(MPI-II only)*; interface have to be configured manually
SPEC USB	RS232-RS485 converter via USB *(USB devices with PLC-VCOM only)*; interface have to be configured manually
SPEC LAN	RS232-RS485 converter via LAN *(LAN devices with PLC-VCOM only)*; interface have to be configured manually

- **PG/PC:** configuration parameters for the communication between PG and PC
  - **Baudrate:** selection of the speed
    - when using “from PC“ the cable tries to determine the baud rate from the PC automatically and uses that
    - alternatively you can select one of the fixed baud rates 2400, 4800, 9.6k, 19.2k, 38.4k, 57.6k or 115.2k Baud
  - **Databits:** selection of the amount of data bits
  - **Stopbits:** selection of the amount of stop bits
  - **Parity:** selection of the parity
- **Protocol:** selection of the protocol between the cable and PC

selection	**description**
Auto	cable tries to determine the protocol from the PC

	automatically and uses that
V5.0 Old	Usage of the older but more stable V5.0 protocol
V 5.1	usage of the V5.1 protocol

→ **Hint:** If you have problems while communicating, try to change this setting to “V5.0 Old”!

- **MPI/PPI:** configuration for the connection to the MPI/PPI bus
  - **Baudrate:** selection of the speed
  - **HSA:** selection of the highest station address
    → **Hint:** The higher the HSA is the less the performance.
  - **local Nr:** configuration of the local / own station address
  - **Master:** selection of the master mode
    - “MultiMaster“ is the default setting and means there are or can be multiple active participants on the bus
    - choose “PGPC is signMast“ (PG/PC is single Master), if the device is connected to a passive participant directly and there isn't any other active station (e. g. a PLC) on the bus
  - **AlwayBus:** configuration of the setting always-in-bus
  - **CP-Mode:** settings for the CP mode (RFC1006)
    - **StatNumb:** configuration of the station address from the controller which should be used for RFC1006
- **DHCP:** activation of the DHCP option *(LAN devices only)*
- **IP adr:** configuration of the IP address *(LAN devices only)*
- **SNetMask:** configuration of the subnet mask *(LAN devices only)*
- **Gateway:** configuration of the IP gateway *(LAN devices only)*
- **USBCurnt:** selection of the maximum USB current *(USB devices only)*
  - “000mA“ or “360mA“ (standard); this value gets transmitted from the cable to the PC during the USB initialization process, so the PC can ensure that enough current on the port where the device is plugged in is available
    → **Important:** The MPI-USB cable always needs the current of 360mA, because the device is powered via the USB interface!
    This value should only be changed on the MPI-II cable, if you have problems with the USB connection.

Non-observance can lead to an overload and corruption of your port on the PC.

- **Language:** toggles the menu language
- **Set Def.:** sets the cable back to factory defaults
- **Reset:** executes a restart of the cable

Hint:
Some parameters will be automatically hidden, if they aren't used on the configuration of the device.

4.2.3 Bus

The menu “Bus“ only has the sub entry “Address“. If you have selected this entry the 1. line shows the word “Address” and the 2. line a letter shortcut as well as the address of the first bus participant (e. g. DA 004). With the help of the arrow up and down keys you can go through the complete list with available participants.

The following letters can occur in the shortcut, which is shown before the real address, whereby the letter “D” can be combined with the other letters:

- **D:** cable is directly connected to the participant
- **A:** participant is active
- **P:** participant is passive

4.2.4 Info

The menu “Info“ has the two sub menu entries “Version” and “Message”.

On the sub menu “Version“ you can show you the current firmware version of the device. This version is also shown for a short moment when the device boots up.

The sub menu “Message” can show you different errors if applicable. Otherwise “No Error” is shown there. Furthermore you can look up some more status information when scrolling up and down with the corresponding cursor keys.

4.3 Web server

The LAN devices are having an integrated web server. This allows you to access your device easily to get status information or configure your device with just a web browser and no need of any further software.

If you want to access the web server of your device, you have to open your web browser (e. g. Microsoft Internet Explorer, Mozilla Firefox or Google Chrome) firstly. After that you can enter the IP address of your device (default is 192.168.1.56) within the address line of your web browser.

When you have confirmed your input the page “Home” of the device should get loaded.

If you don't know the IP address of your device, you can consider to use the TIC interface configuration tool to search for available devices within your network.

All pages are having a header, a menu tree, a content area and a footer. The content area (and the menu tree partly) is the only part which differs from page to page. All other parts are equal on all pages.

Within the header (from left to right) the device type, the firmware version, the name and the current IP address of the device is shown.

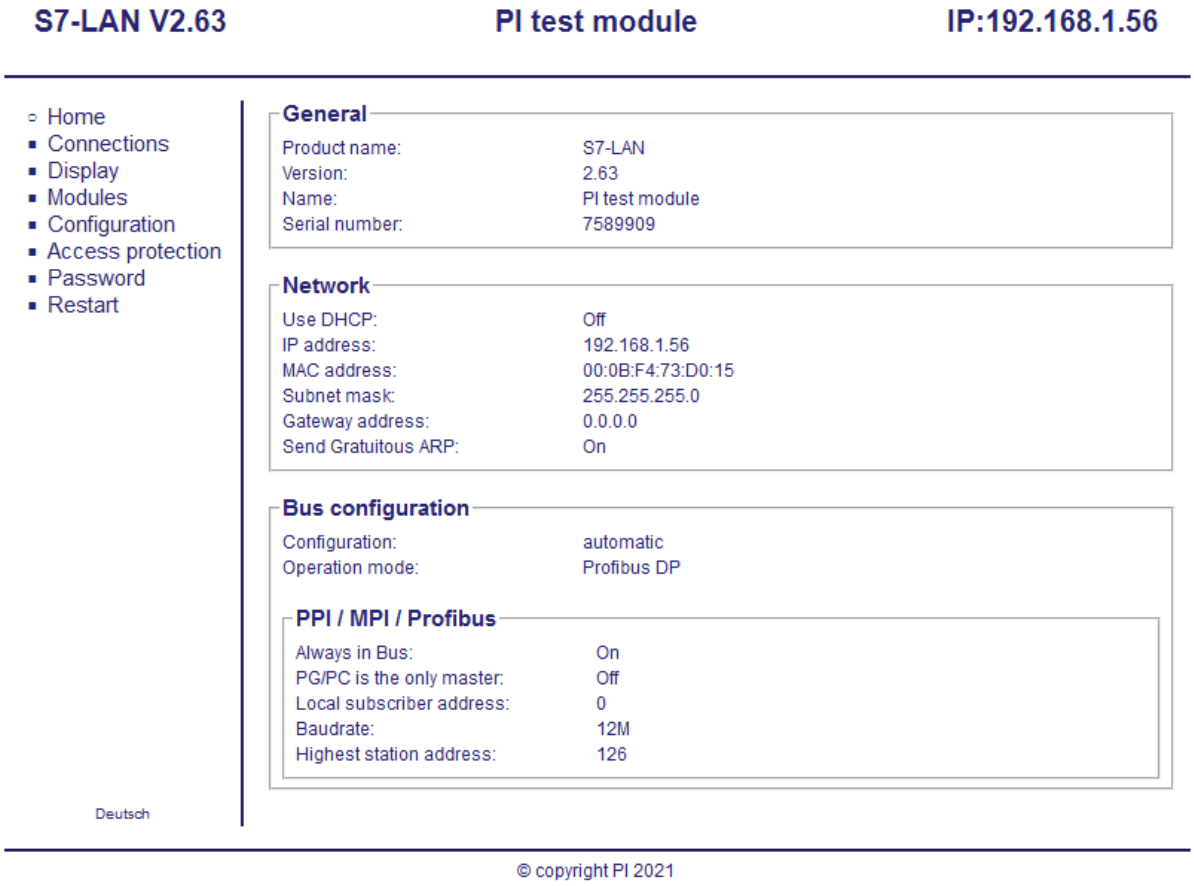
The menu tree, which is located on the left side, allows you to navigate through the different pages of the web side. Some menu items can have sub menu items. But these items are only shown, if you are within such a menu. Furthermore you can find a small link with the labeling “English” or “Deutsch” on the bottom of the menu. This link can be used to switch the language from German to English or English to German.

The footer is the last consistent area of all web pages. Within the footer you can find a copyright note which shows the current year of the version release.

The content area of the page “Home” and of all other pages are explained in more detail within the next pages.

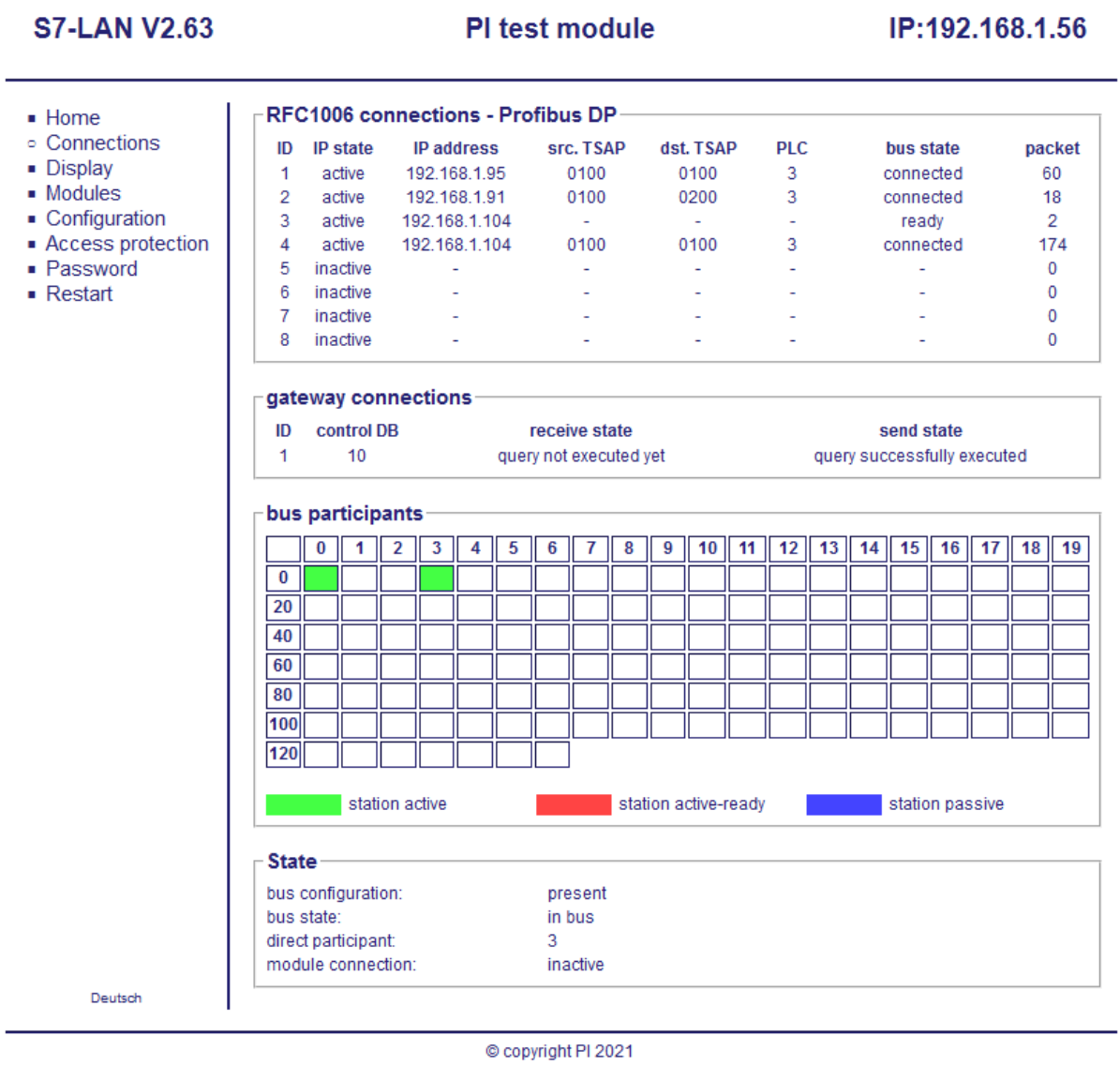
4.3.1 Home

The page “Home” shows some general, network and bus information about your device. The fields thereby are similar to them on the configuration page. But a configuration of these settings can't be done on this page.



4.3.2 Connections

On the page “Connections“ you can find two connection tables, an overview of the bus participants as well as a general status view. If you have a S7-LAN++ or S7-GATE module you can also open the diagnostic for a single bus participant via this page.



The table “RFC1006 connections” shows all connections to or from the device which uses the RFC1006 protocol (TCP port 102; sometimes called CP mode, shortcut for Communication Processor). Thereby also unused or previously used connections are shown. Every line within the table represents one connection.

column	description
ID	An ongoing number for the connection.
IP state	Indicates if an IP connection is established.
IP address	The IP address of the partner device (e. g. from the PC or from a network PLC).

src. TSAP	The connection TSAP of the source side.
dst. TSAP	The connection TSAP of the destination side.
PLC	The participant address of the local partner (PLC or other module) on the bus.
bus state	If a connection to a participant on the bus exists, the text “connected” is shown. If a connection only exists to the bus “ready” is shown. When an error has occurred this will be shown here.
packet	An overflow counter for the network packets to recognize active connections.

The second table on this page is “gateway connections”. On this table the current state of configured couplings (S7-Gateway or IPDeviceToS7) are shown. In contrast to the first table, the second table shows only information if a coupling is actively used.

column	**description**
ID	The matching number on the connection list.
control DB	The number of the control data block.
receive state	The state of the last receive job.
send state	The state of the last send job.

Hint:
The number of RFC1006 connections for the S7-LAN and MPI-LAN is limited to 8. The devices S7-LAN++ and S7-GATE support up to 32 connections. Please note, that a configured coupling also counts as a RFC1006 connection.

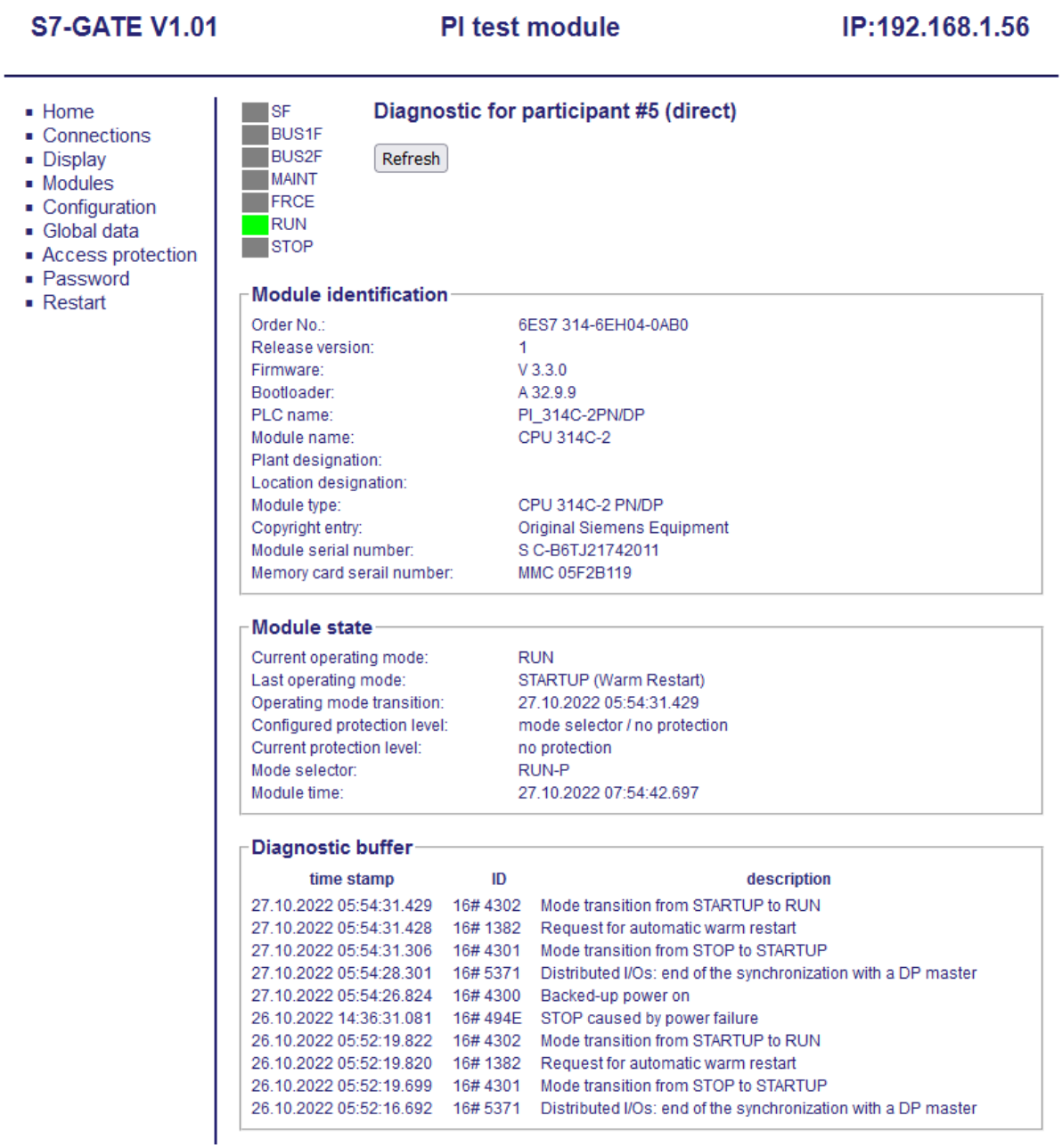
In the overview of the bus participants you can see which addresses on the bus are in use. This view differs between multiple participant types, which are viewed in different color on the web page:

- **station active:** A participant (e. g. a S7-300/400 controller) which acts as a master. This participants can communicate with other active or passive participants.
- **station active-ready:** An active participant which is currently not included in the token ring, but who would like to be.
- **station passive:** A participant (e. g. a S7-200 controller, drive or IO system) which acts as a slave only. This participants have t be addressed by an active participant for communication.

Within the view “state” you can find the following state information:

- **bus configuration:** Shows if the device is aware of the parameters of the bus or which information is missing.
- **bus state:** Determines if the device is currently in the bus.
- **direct participant:** The address of the bus participant, where the device is connected to *(if known)*.
- **module connection:** Determines if the internal connection for the modules Variable control or NTP-Server is currently in use.

On a S7-LAN++ and S7-GATE device you are able to get some diagnostic information from the bus participants. For this you have to click on the corresponding participant within the table with bus participants. Then a new page gets opened where various information about the module and it's state will be shown. Furthermore the diagnostic buffer as well as a overview about the scan cycle times, memory areas and connections is shown. All this data lets you do some fast diagnostic without the need for a PC with a programming software.



The image only shows the upper part of the diagnostic! Below this further information are following.

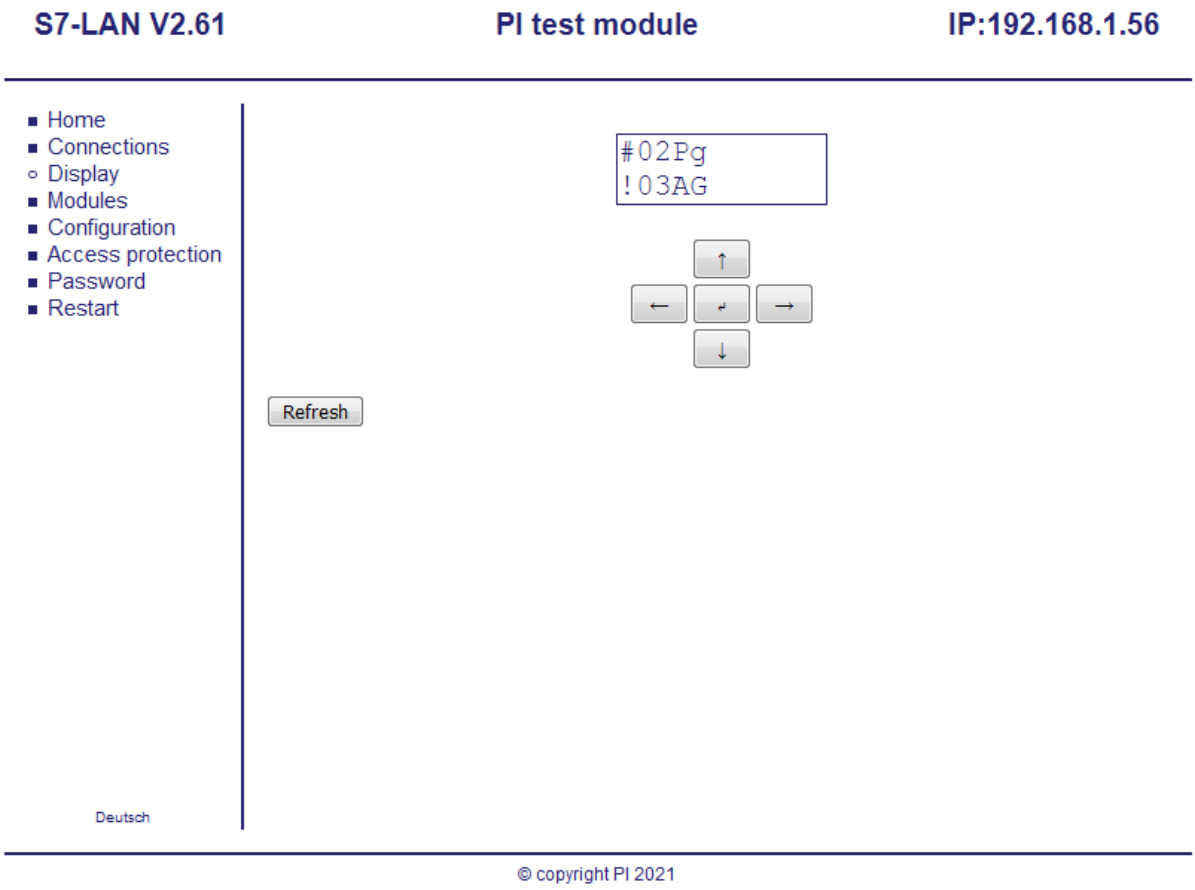
Hint:

Please note that above all old PLCs might not supply all information (like e. g. the LED state).

The view of the diagnostic buffer only shows the short description about the event. A detailed view can be shown with the TIC, SIMATIC Manager or TIA Portal.

4.3.3 Display

The page “Display“ allows the viewing and controlling of the display. For the S7-LAN and S7-GATE this display is virtual only. On MPI-LAN this page allows the remote access to the hardware installed display.

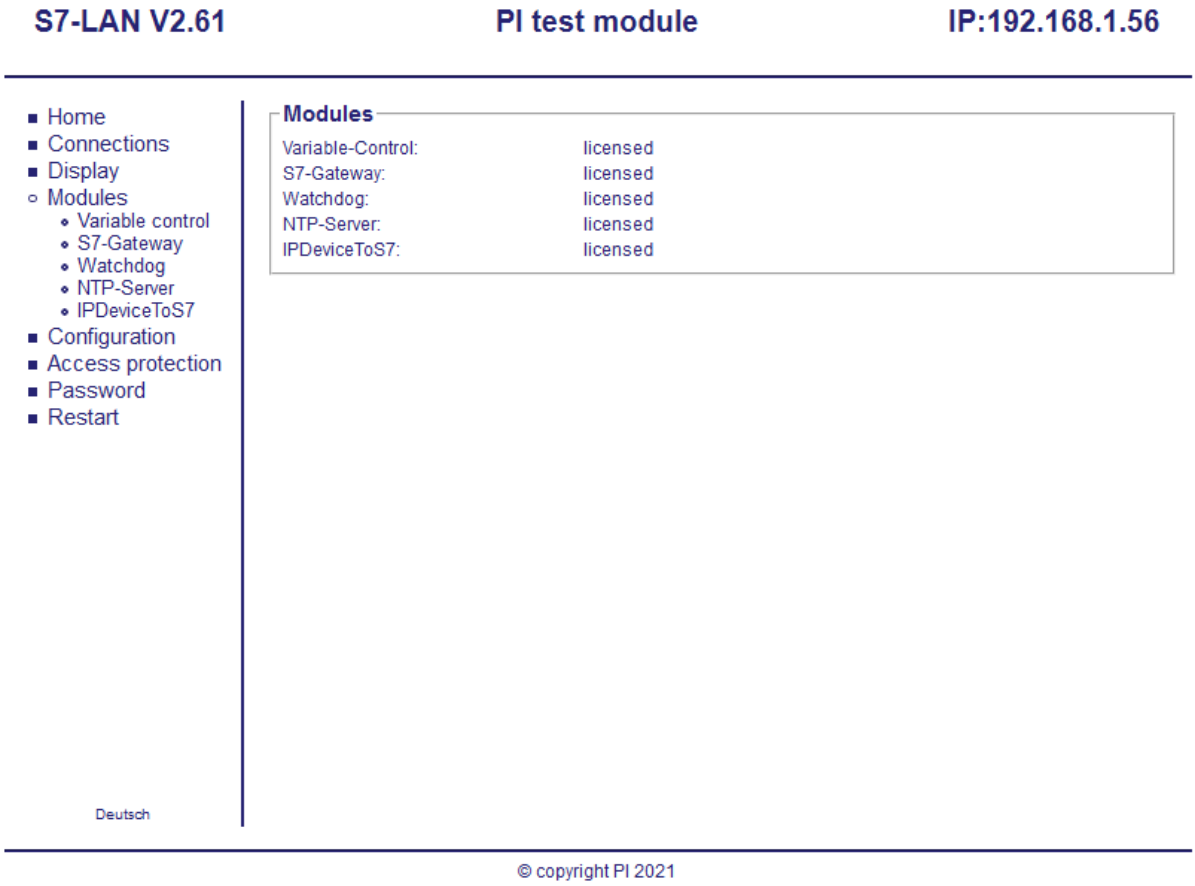


The display can be controlled with the five buttons below the viewed display. An explanation about the content of the display as well as of the operation can be found within the section “Keyboard and LCD display” in this chapter.

The button “Refresh” can be used to update the display view. This is needed in some cases, because the display doesn't get refreshed in the web browser automatically.

4.3.4 Modules

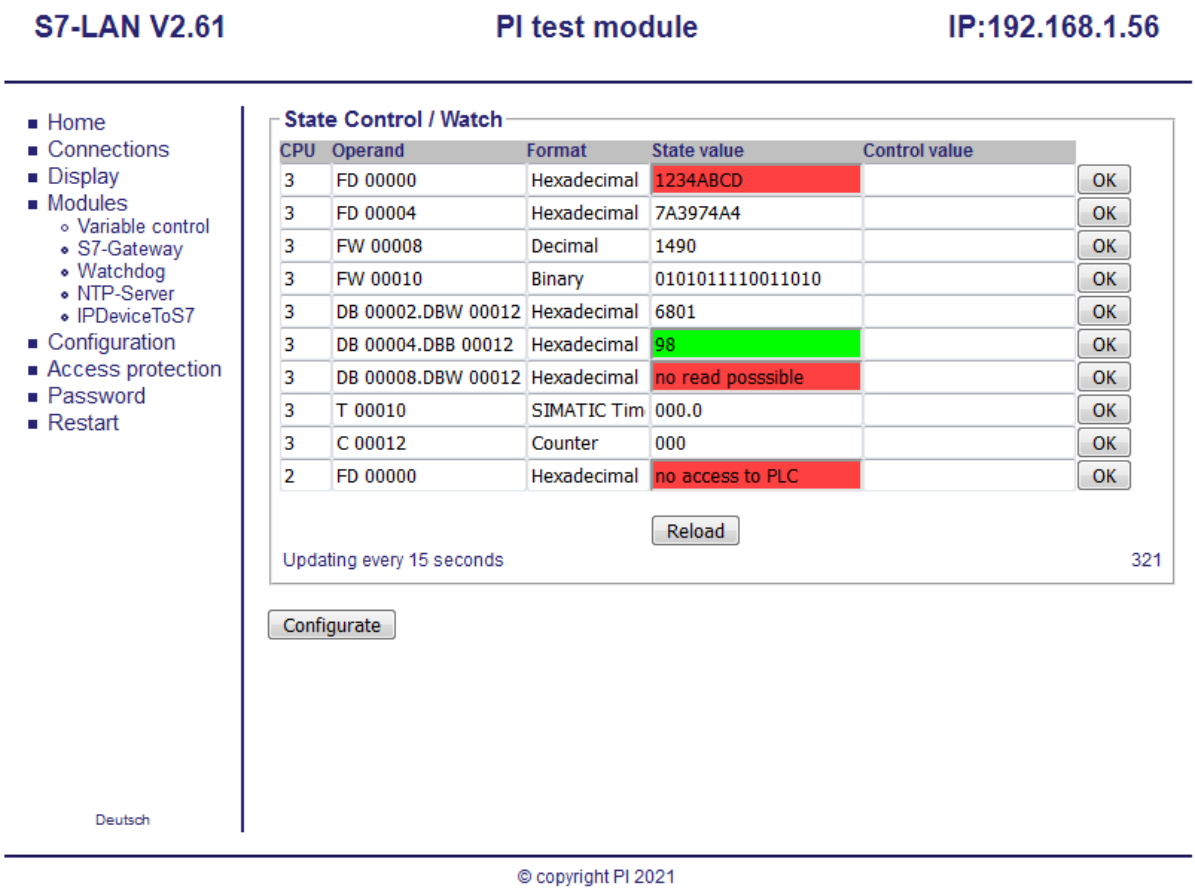
On the page “Modules“ you can see the license state of previously chargeable extensions. Since the S7-LAN version 2.54 and MPI-LAN version 2.79 as well as for all versions of the S7-GATE all extensions are licensed for free automatically.



This menu entry has some sub menu items, where each sub item represents another module. You can use these entries or the hyperlinks within the table in the content area to open the page for the module. All modules are explained in more detail on the next pages.

4.3.4.1 Variable control

The module “Variable control“ allows you to watch and control variables of bus participants easily via the web browser. If you have a S7-LAN or S7-GATE device you can additionally configure an automatically monitoring of variables with e-mail notification.

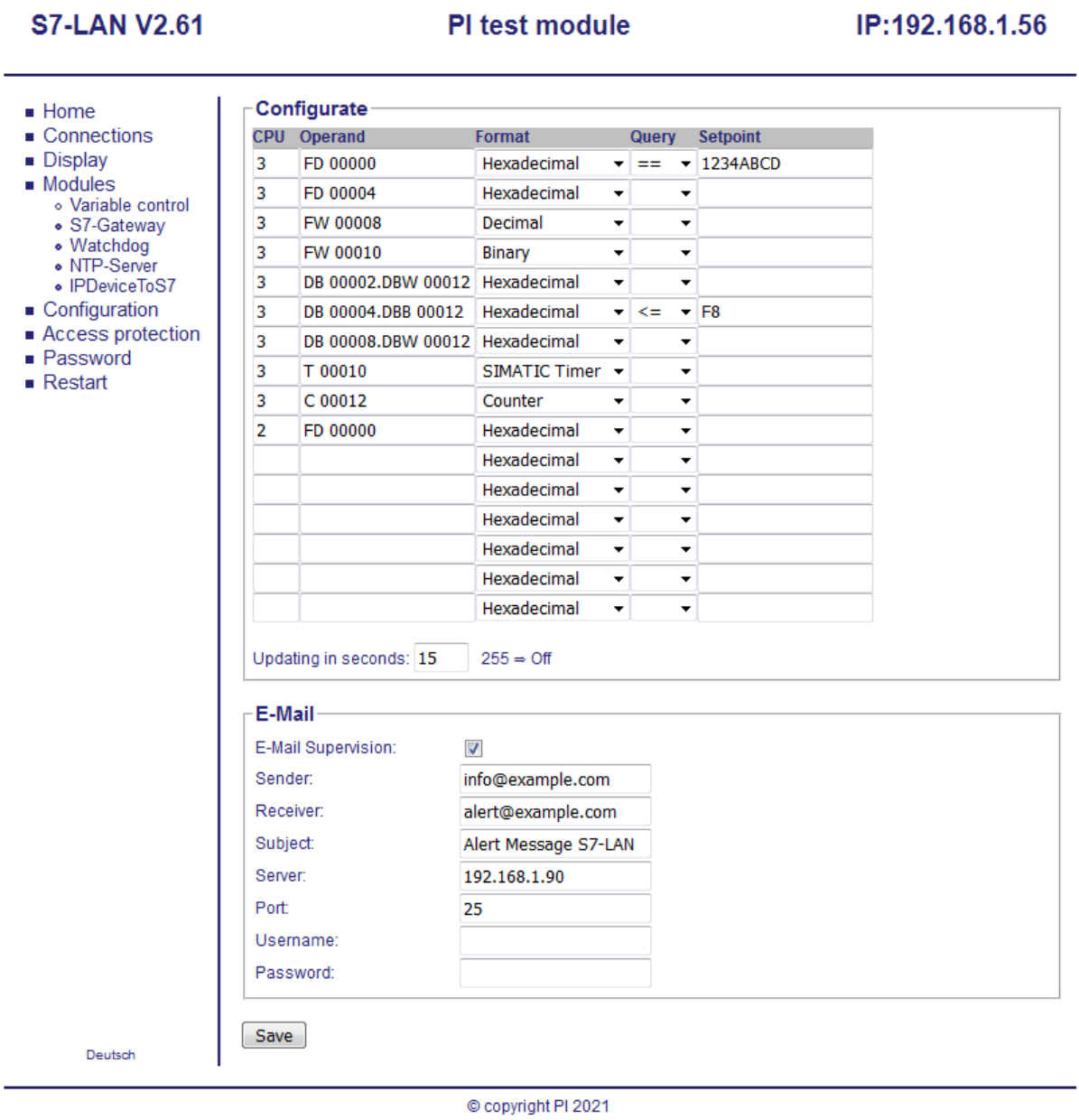


If you open the module you will see all configured variables with their current values or error messages (e. g. if an operand doesn't exist or the CPU isn't reachable). Depending on your configuration the variables get refreshed after a specified time. Otherwise you can execute a manual update by clicking on the button “Reload”.

If you want to control a variable, you have to enter the control value in the specified format in the text box of the corresponding variable and click on the button “OK” afterwards. Thereby this value if possible gets written into the PLC and all values are getting refreshed.

Hint:
Watching variables can always be done without a password. The passwords if configured are only needed for controlling variables or for the configuration of the module.

If you want to configure this module, you have to click on the button “Configurate”. Now a further page should be opened, where the configuration can be done:



Within the section “Configurate“ you can see a table where each line represents a variable.

column	description
CPU	The address of the local bus participant from where the variable should be queried.
Operand	The variable which should be queried or maybe set. The input should be done as S7 syntax.

Format	The format for the input and output of the variable value. For timer and counters you should use the formats “SIMATIC Timer” and “Counter”.
Query	The query type which should be performed to the status value. The selection of a query type leads to a coloring in the status view and affects the e-mail notification, if enabled.
Setpoint	The setpoint which belongs to the query. If no query is selected, this field can be leaved empty.

Below the table you can find the text field “Updating in seconds”. Here you can configure in which time span (specified in seconds) the variables for the web page (and for the automatically monitoring) should be refreshed. The value 255 disables the refreshing of variables.

If you want to watch and control the variable area of a S7-200 controller, you have to address it as data block 1 (e. g. VB24 as DB1.DBB24).

If you have a S7-LAN or S7-GATE device you will find the section “E-Mail” below the first block. There you can enable the e-mail notification for variables (only for variables where a query is configured) and configure the connection to the mail server. If you want to use this function you have to enable the option “E-Mail Supervision”. After that all input fields for the mail server aren't grayed out anymore and can be configured now. The following fields are available:

field	**description**
Sender	The e-mail address of the sender.
Receiver	The e-mail address of the receiver.
Subject	The subject which should be used for the e-mail. If this field remains empty, the subject is built from the device automatically by using the type, name and IP address of the device.

Server	The IP address of the SMTP server.
Port	The port of the SMTP server. When the value 65535 is entered, the default port 25 is used.
Username	The user name of the e-mail account used for the authorization on the SMTP server. *(optional)*
Password	The password of the e-mail account used for the authorization on the SMTP server. *(optional)*

Important:
The e-mail notification is available on S7-LAN and S7-GATE modules only. The MPI-LAN cable doesn't have this function.
A secured connection to the mail server isn't supported currently!

You can also use a SMTP server from the internet. Please note that therefore a IP gateway have to be configured in the device.

If you aren't sure, if your settings are correct, or if you want to test if the e-mail sending is working correctly, you can send a test e-mail. Therefore you have to click in the address line of your web browser and remove all characters from the back until the slash after the IP address. Then you have to enter the shortcut “sm” after this slash (e. g. 192.168.1.56/sm) and confirm your input. Now the device tries to sent an e-mail. If the e-mail reaches the configured receiver your settings are correct.

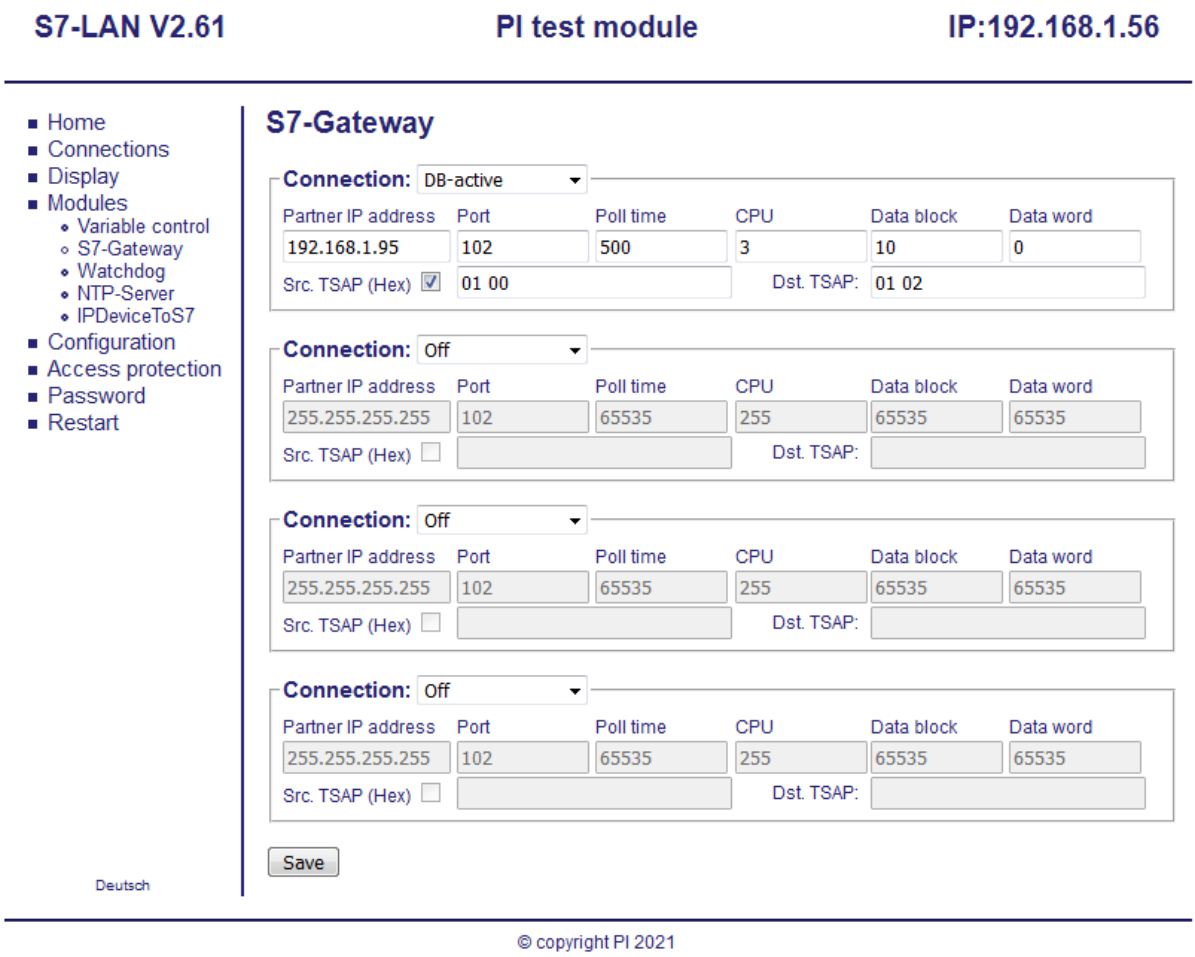
Hint:
The amount of variables which can be watched and controlled is limited to 16 variables.

4.3.4.2 S7-Gateway

The module “S7-Gateway“ allows you to specify and configure couplings to other controllers (e. g. via a S7-LAN, S7-GATE, MPI-LAN or S5-LAN++ or directly to a S7-CP) which supports the RFC1006 protocol (by Siemens also called “ISO-on-TCP”). For the coupling you can choose between SEND/RECV and PUT/GET.

The coupling via SEND/RECV sends the user data directly on top of the RFC1006 protocol. For the controlling of the communication a data block as well as the necessary function codes are used on both sides. Thus a change on both communication partners in necessary.

If you use PUT/GET for the coupling, the user data is packed within the S7 protocol which then gets sent via the RFC1006 protocol. The complete management of the connection as well as the decision which data is getting sent or received is done by the active communication partner. The coupling variant “PUT/GET active” also needs a data block and the function codes, but a change on the program is only needed on the PLC where the S7-LAN, S7-GATE or MPI-LAN is located. When using the variant “X_PUT/X_GET” in combination with a controller functions codes from Siemens can be used directly without the need of an additional data block. This allows you to replace a coupling between two controllers who are connected via MPI through a coupling between a controller with MPI interface and another controller with network interface. Another possibility for using the coupling variant “X_PUT/X_GET” is to connect a terminal with MPI or Profibus interface to a PLC with network interface. The LAN device thereby works in both cases as a gateway between MPI and network. A change on the PLC program with the LAN device is thereby only needed if no such coupling via the MPI interface was used before.



The image was shorten to 4 connections for a better legibility!

A detailed explanation about the configuration and programming of your controllers can be found in the section “Coupling between controllers” (for DB active, DB passive and PUT/GET active) and “Translation from MPI to network” (for X_PUT/X_GET) within the chapter “Project integration and couplings”. Furthermore you can download some example projects on the product page of the device. These are described in the chapter “Example applications”.

On the page “S7-Gateway” up to 8 couplings can be configured. The maximum number of data which can be sent or received is 512 bytes. First you have to choose how the connection or coupling should be used. Therefore you have to use the selection list “Connection”:

- **Off:** connection isn't used as coupling
- **DB-active:** device actively connects to the partner device and uses SEND/RECV for the coupling

- **DB-passive:** device waits for a connection from the partner device and uses SEND/RECV for the coupling
- **PUT/GET active:** Device actively connects to the partner device and uses PUT/GET for the coupling. The maximum number of data is then limited to 200 bytes for PUT and 222 bytes for GET.
- **X_PUT/X_GET:** Device actively connects to the partner device when the first job was received from the MPI bus and uses PUT/GET for the coupling. The maximum number of data is then limited to 76 bytes.

If you haven't chosen “Off” here you can continue the configuration of the coupling. Therefore some fields within the coupling section should be available now:

field	**description**
Partner IP address	The IP address of the partner device.
Port	The port of the partner device (fixed to 102; CP port).
Poll time	The interval (in 10ms units) for the retrieving of the data block from the controller for the job test.
CPU	Bus address of the S7 PLC controller that controls this connection. The controller must be on the same bus as the device.
Data block	The number of the data block, which is used for the management of the communication.
Data word	The data word offset within the data block.
Src. TSAP	The TSAP of the source side (max.16 bytes).
Dst. TSAP	The TSAP of the destination side (max. 16 bytes).

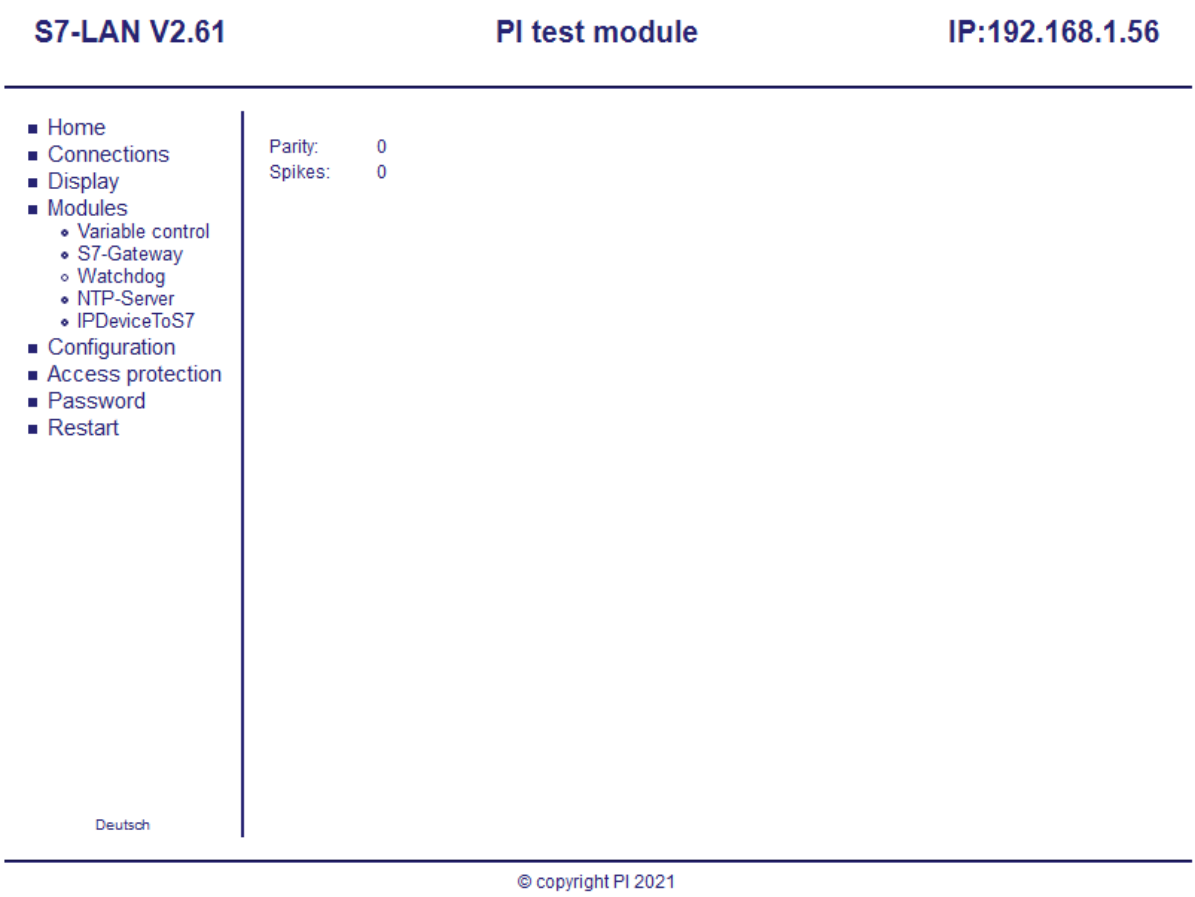
Hint:
For S7-200 controllers the data block 1 have to be used. This data block refers to the variable area of the PLC.
If the option “Hex” in front of the field “Src. TSAP” is enabled the configuration of both TSAP values have to be done in hex format. Otherwise the input is recognized as ASCII characters.

Important:
A too low chosen poll time can lead to a slowness of the device if the configuration is faulty. Maybe you should consider to chose a higher poll time first. If the connection is running successfully you can then decrease this value.

When using SEND/RECV as coupling the both TSAP values (shortcut for Transport Service Access Point), which are used for the identification and assignment of the connection, have to be crossed against each other on the devices. If you are using PUT/GET the TSAP values should be exactly 2 bytes long and represent the connection type and rack/slot value (e. g. 02 00).

4.3.4.3 Watchdog

The module “Watchdog“ can be used to monitor and view parity errors and spikes on your bus. Both parameters are shown as decimal value on this page and are automatically set back to zero after the page is loaded.

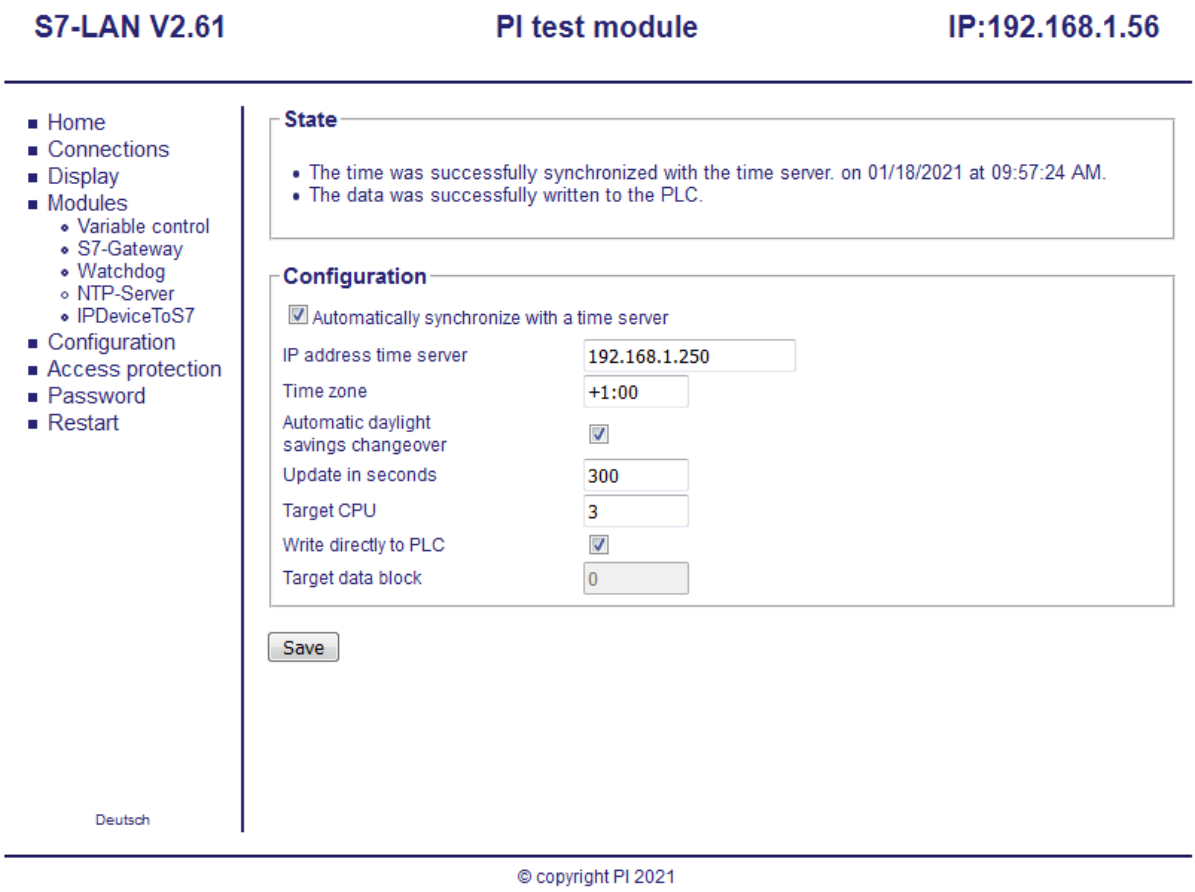


After one second the complete page gets reloaded. Thereby both values are refreshed.

The two values can also be retrieved via a simple TCP connection (e. g. for monitoring purpose). Please read the chapter “Example applications” for more information.

4.3.4.4 NTP-Server

With the module “NTP-Server“ you can synchronize the time of your PLC with a time server or simply write the current time to a data block within the PLC.



The section “State“ show some status information (e. g. the last time of the synchronization or the last error) about the time synchronization.

Within the section “Configuration” you can configure this module and thus the parameters for the time synchronization. If you want to activate this function as well as the configuration fields you have to enable the option “Automatically synchronize with a time server” first.

field	**description**
IP address time server	The IP address of the time server from where the time should be retrieved.
Time zone	The time zone or time difference to the UTC/GMT time (e. g. +1:00 for Germany).
Automatic daylight savings changeover	Indicates if the time should be changed between the summer and winter time automatically. Otherwise the winter time is

	used always.
Update in seconds	The interval in seconds, in which the time should be retrieved from the server and written into the PLC.
Target CPU	The bus address of the controller, where the time should be stored.
Write directly to PLC	Indicates if the time should be set directly within the PLC. Otherwise the time is written to the specified data block.
Target data block	The data block within the PLC, where the time should be written to.

Hint:
For S7-200 controller the target data block 1 have to be used. This data block refers to the variable area of the PLC.
Please avoid too low update rates to reduce the network and bus load. For most applications one time update in one hour (3600 seconds) is sufficient.

Important:
The function for directly writing the time into the PLC isn't possible for S7-200 controllers.

You can also use a NTP server from the internet. Please note that therefore a IP gateway have to be configured in the device.

If the synchronization is enabled the device tries to retrieve the current time from the specified time server and writes it into the PLC.

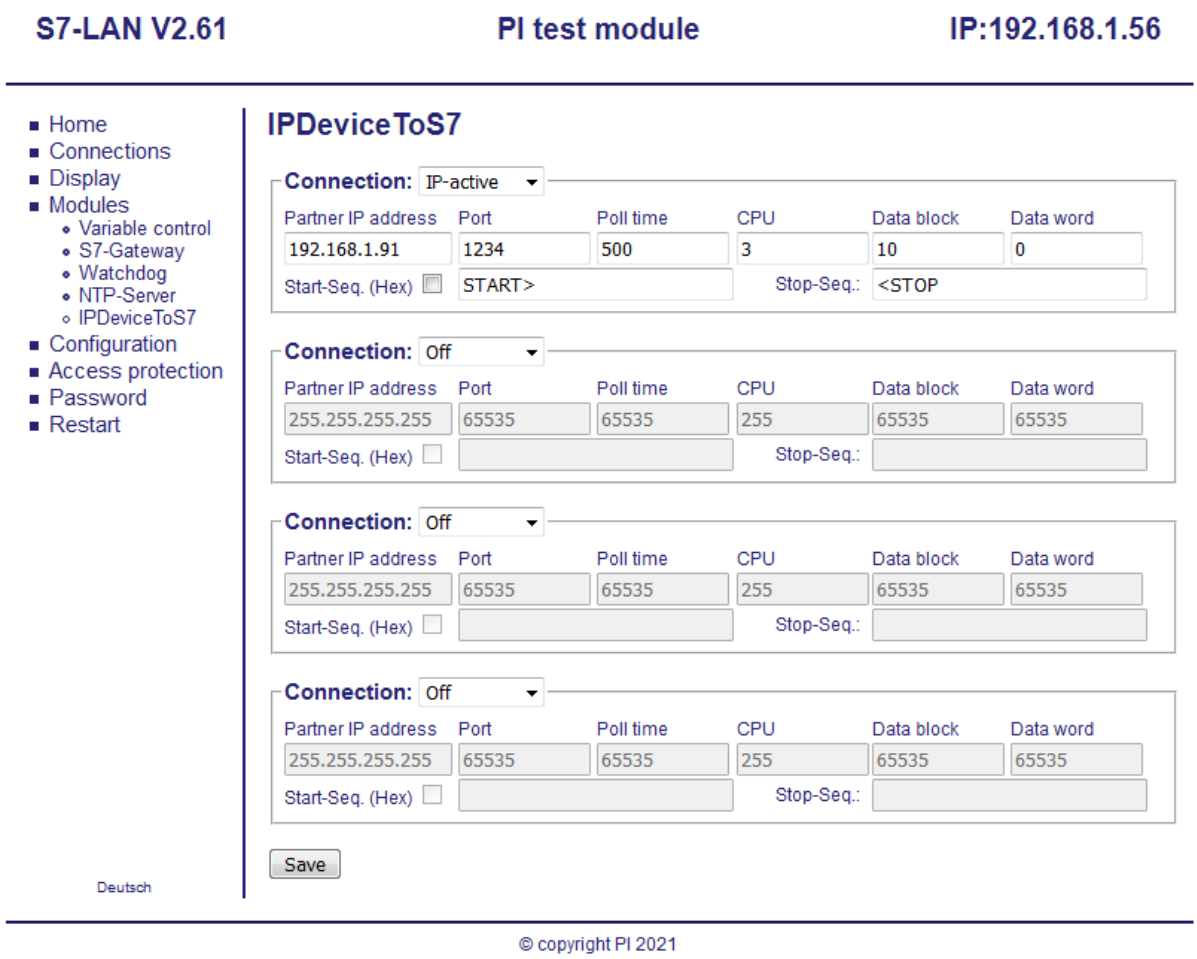
The time within the target data block is always written in ASCII format. The data block should have the following structure:

address	**description**	**example**
DW0	day (2 digits)	'2' '5'

DW2	month (2 digits)	'0' '9'
DD4	year (4 digits)	'2' '0' '1' '9'
DW8	hour (2 digits)	'1' '3'
DW10	minute (2 digits)	'4' '7'
DW12	Bit 8 = synchronization is OK	W#16#0100

4.3.4.5 IPDeviceToS7

Another module is “IPDeviceToS7”. There you can also configure couplings to other devices such as on the page “S7-Gateway”. But the usage of the module “IPDeviceToS7” isn't limited to controllers rather it can be used for a multitude of network devices. For the communication only a TCP connection is used. Via this connection the data then gets exchanged in plain text. If enabled an additionally start or stop sequence can be used. The management of the connection and jobs is done via a data block within the controller.



The image was shorten to 4 connections for a better legibility!

The complete description about the communication as well as the parameterization of your CPU is described within the section “Coupling between IP devices” in the chapter “Project integration and couplings”.

On the page “IPDeviceToS7” up to 8 couplings minus the amount of configured “S7-Gateway” couplings can be configured. The maximum number of data which can be sent or received is 512 bytes. First you have to choose how the connection or coupling should be used. Therefore you have to use the selection list “Connection”:

- **Off:** connection isn't used as coupling
- **IP-active:** device actively connects to the partner device
- **IP-passive:** device waits for a connection from the partner device

If you have chosen “IP-active” or “IP-passive” you can continue the configuration of the coupling. Therefore the following fields within the coupling section should be available now:

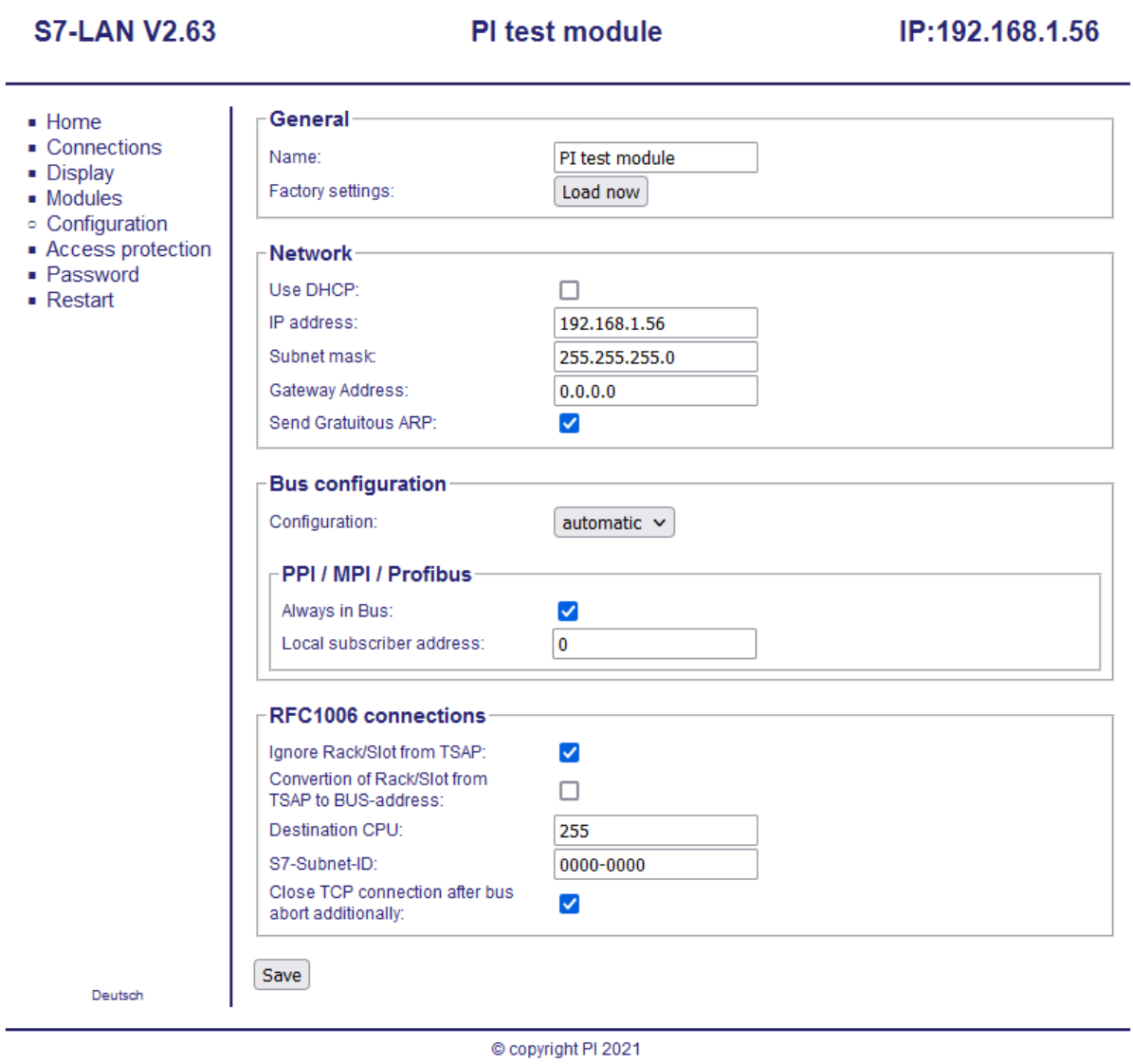
field	**description**
Partner IP address	The IP address of the partner device.
Port	The port of the partner device (freely adjustable).
Poll time	The interval (in 10ms units) for the retrieving of the data block from the controller for the job test.
CPU	Bus address of the S7 PLC controller that controls this connection. The controller must be on the same bus as the device.
Data block	The number of the data block, which is used for the management of the communication.
Data word	The data word offset within the data block.
Start-Seq.	The sequence which is sent in front of the payload (max.16 bytes).
Stop-Seq.	The sequence which is sent after the payload (max. 16 bytes).

Hint:
For S7-200 controllers the data block 1 have to be used. This data block refers to the variable area of the PLC.
If the option “Hex” in front of the field “Start-Seq.” is enabled the configuration of both sequences have to be done in hex format. Otherwise the input is recognized as ASCII characters.

Important:
A too low chosen poll time can lead to a slowness of the device if the configuration is faulty. Maybe you should consider to chose a higher poll time first. If the connection is running successfully you can then decrease this value.

4.3.5 Configuration

On the page “Configuration“ you can change the most important parameters of your device. All parameters are thereby grouped together in multiple sections. Some parameters as well as complete blocks are automatically shown or hidden depending on your configuration. Thus you will only see the configuration settings which have to be configured and are used from the device.



Within the section “General” you can specify a name (max. 16 chars) for your device. This name can be used for an easier identification.

Furthermore you can set your device back to the factory defaults, by clicking on the button “Load now” within the line “Factory settings”. After you have clicked on the button, a security query will be shown which have to be acknowledged.

When you restore to factory settings your device will have the default IP address 192.168.1.56 afterwards.

In the group “Network“ you can change the IP settings from your device:

fields	**description**

Use DHCP	Indicates if the device should obtain an IP address from a DHCP server. Otherwise the device will use the fixed configured IP address.
IP address	The IP address of the device, which should be used, so the device can communicate with your PC and maybe also other network participants.
Subnet mask	The subnet mask for the IP address. Both parameters determine the network area in which the device is located.
Gateway Address	The IP address of the gateway / router. This parameter is needed if the device have to communicate over a router junction.
Send Gratuitous ARP	Indicates if the device should sent it's IP address to all network participants via ARP cyclical.

Hint:
If you have enabled the DHCP option the device remains reachable via it's old (previously configured) IP address. The DHCP option will not take affect until a restart.
If the device boots up and DHCP is enabled the device queries for an IP address on all DCHP servers within your network. If the device can't obtain an IP address the device can be accessed with it's last configured fixed IP address.

If you aren't responsible for the administration of your network, you should ask your network administrator for the correct IP parameters.

The group “Bus configuration“ contains multiple parameters which are needed for the communication on the PPI/MPI/Profibus. Some parameters are grouped within sections again.

field	**description**
Configuration	Determines which bus configuration should be used from the device:

	• **automatic:** configuration gets detected automatically from the bus; if this information is not available the configuration from the PG/PC is used * • **from bus:** configuration gets detected automatically from the bus • **from PG:** configuration from the PG/PC is used • **fixed:** configuration from the device is used
Operation mode	Determines the operation mode of the device: • **PPI:** communication on the PPI bus for all S7-200 controllers • **PPI Advanced:** communication on the PPI bus with the advanced, MPI compatible, PPI protocol for newer S7-200 controllers • **MPI:** communication on the MPI bus • **Profibus DP:** communication on the Profibus with the profile DP • **Profibus Standard:** communication on the Profibus with the profile Standard • **Profibus Universal:** communication on the Profibus with the profile Universal • **PPI 9K6:** conversion to the PPI bus with 9600 Baud *(via COM port)* • **PPI 19K2:** conversion to the PPI bus with 19200 Baud *(via COM port)* • **PPI Multi-Master:** communication on the PPI bus with the multi master mode with 9600-187500 Baud *(via COM port)* • **RS232/485-Converter:** conversion from RS232 to RS485 *(via COM port)*
PPI / MPI / Profibus	
Always in Bus	Indicates if the device should stay within the bus after a communication. Otherwise the device leaves the bus after a communication.

PG/PC is the only master	Indicates if the device is the only master on the bus and have to act as bus master. Otherwise it's assumed that multiple masters are available on the bus.
Local subscriber address	The station address which should be used from the device. This address can't be used from any other participant and have to be smaller then the configured HSA.
Baudrate	The baud rate which should be used for the communication on the bus.
Highest station address	Determines the highest station address (HSA) which is used on the bus.
RS485 interface	
Baudrate	The baud rate for the RS485 bus. If you chose “Automatic” the device tries to detect the baud rate automatically.
Databit	The amount of data bits for the RS485 bus.
Parity	The parity for the RS485-Bus.
Stopbit	The amount of stop bits for the RS485 bus.

* The configuration “automatic” allows the correct function of the device in nearly all cases. By default the detection of the baudrate as well as the processing of the cyclical bus parameter protocol the correct configuration gets detected automatically. If this information is not available, the device alternatively uses the configuration which gets sent from the PG/PC.

The group “For RFC1006 connections“ shows some settings for network connections via the RFC1006 protocol:

field	**description**
Ignore Rack/Slot from TSAP	Indicates if the values for rack and slot, which are transmitted via the TSAP, should be ignored.
Convertion of	Indicates if the values for rack and slot within the

Rack/Slot from TSAP to BUS-address	TSAP should be interpreted as a bus address. This option allows you to communicate with multiple controllers when using different rack/slot values. An explanation and a table with the values can be found in the appendix.
Destination CPU	Determines the station address of the CPU which should be used for RFC1006 connections. The value 255 means that the directly connected CPU should be used as the destination.
S7-Subnet-ID	Determines the subnet ID of the MPI/Profibus which should be used for RFC1006 connections.
Close TCP connection after MPI abort additionally	Indicates if the TCP connection should be closed in addition to the sent error packet, when the connection on the MPI bus gets terminated.

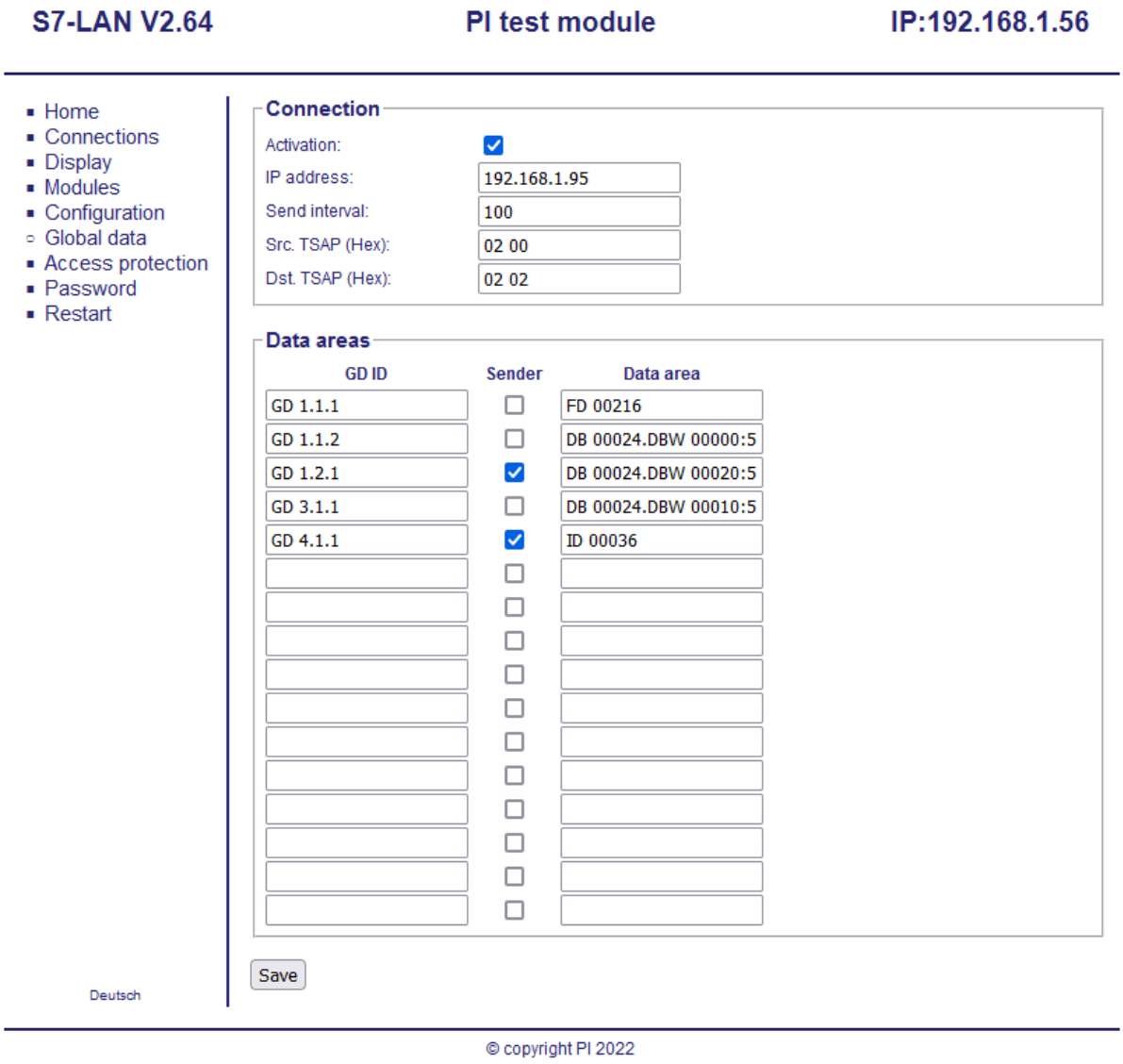
The last section on this page is “Others” which contains various advanced settings, who doesn't belong to any of the other groups. This group is only shown when the configuration mode “fixed” is selected. Normally you don't have to change any of these settings:

field	**description**
Protocol type	Determines which protocol should be used between the PC and the PG. By using the setting “Automatic” the device tries to detect the protocol automatically. *(for serial communication with PLC-VCOM only)*
Delay before sending	Determines a delay (in 0.1ms units) which should be used before sending a reply. *(for serial communication with PLC-VCOM only)* This setting may be needed for ProTool RT, because otherwise the communication may get interrupted. *(recommended 30ms)*
Send HMI-cable-version directly	Indicates if the version number of the HMI cable should be send as soon as possible. *(for serial communication with PLC-VCOM only)* This setting may be needed for some touch

	panels, because otherwise a connection can't be established.
Show errors on display	Indicates if errors should be shown on the display. *(MPI-LAN only)*

4.3.6 Global data

On the page “Global data” you have the possibility to configure the coupling used for the Global data communication. With this coupling you can extend the exchange of Global data between controllers on the MPI bus to another controller with network interface. The S7-LAN, S7-GATE and MPI-LAN thereby interacts as a gateway between MPI and network. A modification on the controller with network interface is not necessary.



A detailed description about the procedure of the communication as well as about the configuration of the controllers and Global data can be found in the section “Global data communication” within the chapter “Project integration and couplings”.

If you want to use the function for exchanging Global data you will have to enable the option “Activation” within the group “Connection” first. Afterwards you can specify the connection partner with the help of the following fields:

fields	**description**
IP address	The IP address of the network controller.
Send interval	The interval (in 10ms units) for requesting the data areas which needed to be send from the network controller and sending them as Global data on the MPI bus.
Src. TSAP (Hex)	The TSAP of the source side (the LAN device) in hex format.
Dst. TSAP (Hex)	The TSAP of the destination side (the network controller) in hex format.

The TSAP values are by default 2 bytes long and consists of the connection type and the rack/slot value. Normally you can simply use the value 02 00 here.

Hint:
The connection for the Global data communication internally uses one of the 8 configurable couplings which otherwise gets configured via the modules S7-Gateway or IPDeviceToS7.

Within the group “Data areas” you can now specify the assignments between the GD identifier and the corresponding data area within the controller with network interface. This information can be entered into the table with the following columns:

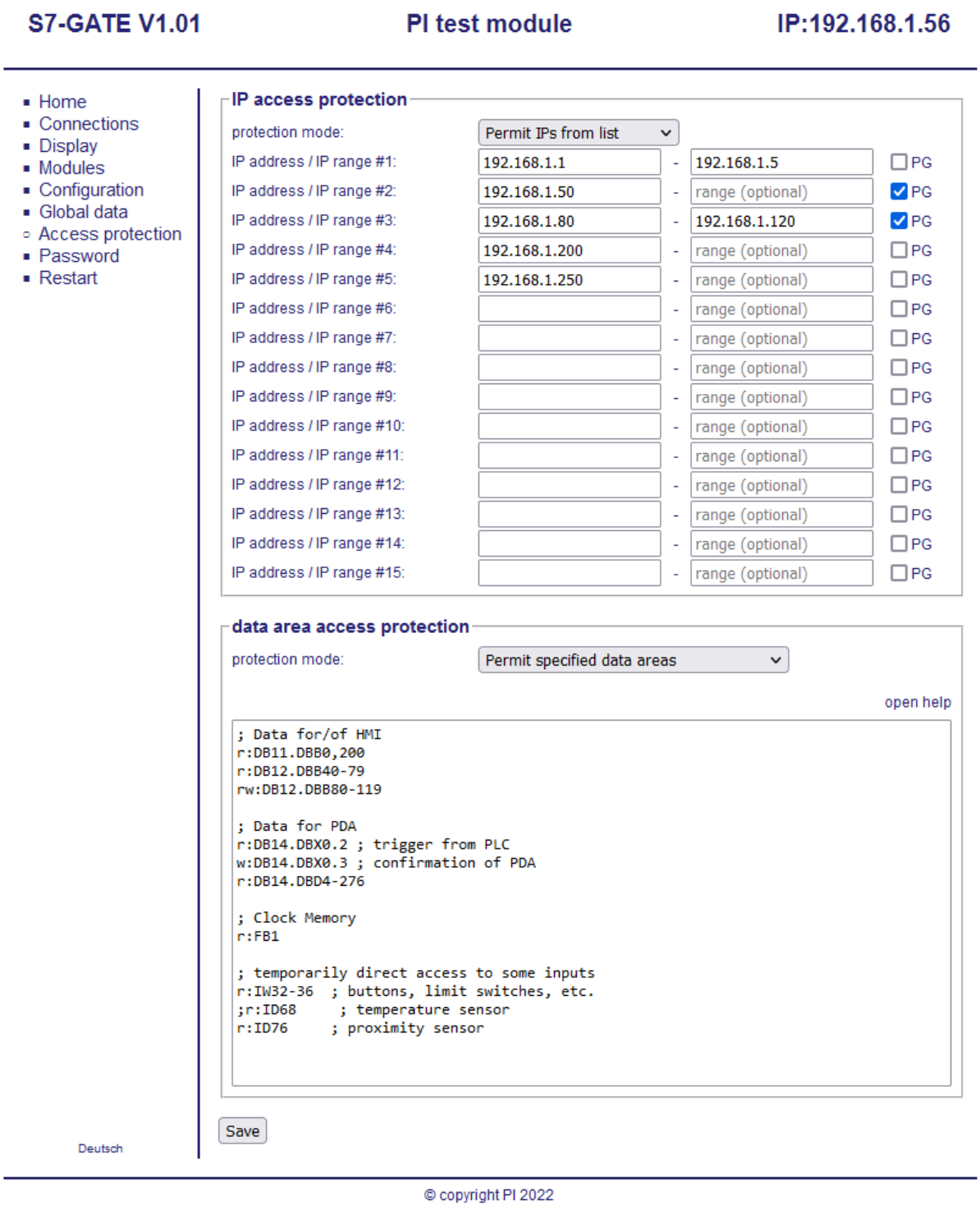
columns	description
GD ID	The identifier for the Global data entry. This gets automatically assigned by the SIMATIC Manager and have to be taken over.
Sender	Indicates if the network controller is the sender for this entry. Otherwise the network controller is the receiver.
Data area	The data area within the network controller where the data should be read from (sender) or should be written to (receiver). The syntax for this field is the same as used within the SIMATIC Manager.

Important:
Within the table you only specify the assignments for data areas for the network controller. Global data entries who aren't used by the controller may not be entered.

4.3.7 Access protection

On the page “Access protection” you have the possibility to control the access to the MPI or Profibus and their participants by allowing or blocking certain IP addresses or IP ranges. The connection attempt from a not allowed or blocked IP address will be rejected from the device.

If you have a S7-LAN++ or S7-GATE module you can also block or allow the PG access (e. g. loading blocks) completely or for single addresses. Furthermore you are able to configure to which variables an access (separated into read and write access) is allowed or forbidden.



Within the group “IP access protection” you can specify for which IP addresses or IP ranges an access should be allowed or forbidden. At first you should select in which mode the access protection should work. Therefore you can use the selection list “protection mode” to choose the desired mode:

- **Disabled:** The access protection is not used. Every IP address can establish a connection to the bus and its participants. This is the factory default.
- **Permit IPs from list:** Only the IP addresses who are listed within the address list can establish a connection to the bus and its participants.
- **Prohibit IPs from list:** Only the IP addresses who are not listed within the address list can establish a connection to the bus and its participants.

After the protection mode is selected you can enter IP addresses and IP ranges into the list. When you want to allow or block single IP addresses you have to fill in the first row only. If you instead want to allow or block a complete IP range you have to fill in both fields of the address line.

On S7-LAN++ and S7-GATE modules you are also able to limit the PG access. If you have selected “Permit IPs from list” you will see the option “PG” behind the address fields. If this option is selected then PG functions, like loading blocks, for this IP address or IP range is allowed. Otherwise only the reading and writing of variables is allowed. When you have selected the protection mode “Disabled” or “Prohibit IPs from list” then there will be the separated group “PG access protection” shown, where you can permit or prohibit the PG access globally for all connections.

Another function you will have with the S7-LAN++ and S7-GATE devices is to limit the access to single variables. This configuration can be done within the group “data area protection”. Before you start to specify the variables you have to select the mode in which mode the access protection should work. With the list “protection mode” you can select one of the following modes:

- **Disabled:** The access protection is not used. Every variable can be accessed for reading and writing. This is the factory default.
- **Permit specified data areas:** Only the specified variables can be accessed.
- **Prohibit specified data areas:** Only the variables who are not specified can be accessed.

After you have selected the protection mode you can start to specify the variables within the text field.

If you have multiple participants on the bus you should specify the address of the CPU. This can be done with the instruction `CPU x`, whereby the `x` have to be replaced with the address of the CPU. This instruction then applies to the next lines until a new instruction follows. If the instruction is missing then the address of the directly connected participant or the address 2 is used.

The variables have to be specified as operands in the S7 syntax:

Data area	**Data type**	**Example**
Input | Output | Flags	BOOL	`I1.0 | Q1.7 | F3.4`
Input | Output | Flags	BYTE	`IB1 | QB3 | FB40`
Input | Output | Flags	WORD	`IW2 | QW8 | FD42`
Input | Output | Flags	DWORD	`ID8 | QD12 | FD44`
Timer	TIMER	`T4`
Counter	COUNTER	`C5`
Data block	BOOL	`DB20.DBX1.6`
Data block	BYTE	`DB20.DBB7`
Data block	WORD	`DB20.DBW14`
Data block	DWORD	`DB20.DBD20`

You are also able to specify an operand area:

`FW42-FW48` Flag word 42 to 48 (inclusive, alternative `FW42-48`)

`FW42,4` 4 words from flag word 42

Before the operands you can also specify an access type if needed:

`r:` Read

`w:` Write

`rw:` Read and write (default, if not specified)

On the text field you can use comments. The text within the comments gets not processed. A comment starts with the characters `# ' //` or `--` and applies to the rest of the line.

Finally some examples:

`CPU 3`	Following operands are related to participant 3
`r:QB3`	Reading the output byte 3
`w:C5`	Writing the counter 5
`rw:DB20.DBX1.6`	Reading and writing the bit 6 in byte 1 of DB20
`DB20.DBB7`	Reading and writing the byte 7 of DB20
`w:DB20.DBW14-DBW20`	Writing the words 14 to 20 of DB20
`// HMI access`	Comment with any text

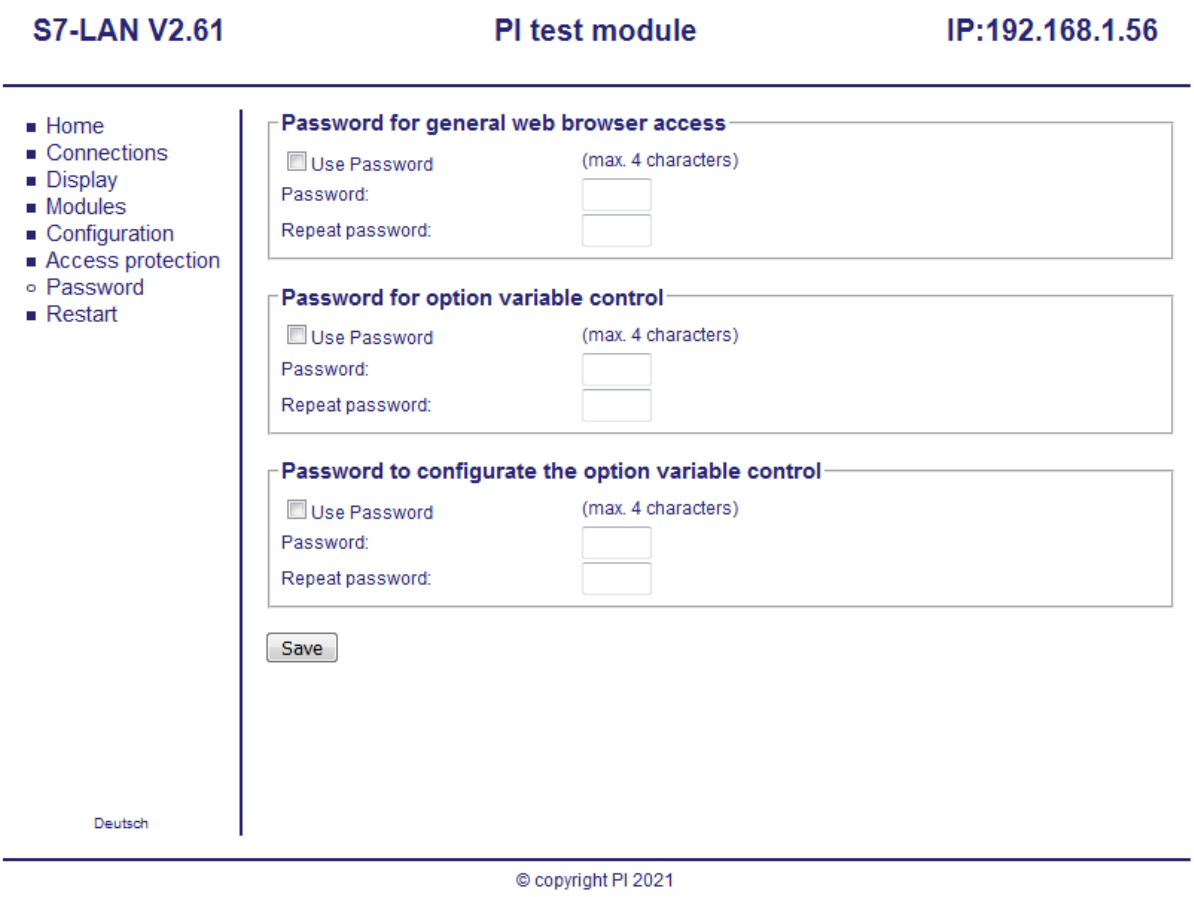
Hint:
If you want to specify operands of the variable area from a S7-200, you have to address them as data block 1 (e. g. VB24 as DB1.DBB24).

If you are using the access protection you should also use a password for the web server. Otherwise the access protection can be easily disabled by third parties.

Important:
The access protection applies only to RFC1006 connections (TCP port 102) who are incoming on the device. All other connections, e. g. for the web server, or outgoing connections from the device, which are used on active couplings (S7-Gateway and IPDeviceToS7), aren't affected by the access protection.

4.3.8 Password

On this page you can configure passwords which are then needed for the access to the web server. Each of the passwords can consists of a maximum of four characters. If a password protected page gets opened you will get requested to enter the highest available password.



If you want to specify one of the passwords you have to enable the “Use Password” field and enter the password in the two text fields. The input is concealed and shown as dots. If you have finished your configuration you have to click on the button “Save”.

If you want to remove a password again you have to disable the field “Use Password” of the corresponding password and then click on the “Save” button.

If you have enabled the password usage but aren't entered any password, no password gets configured because of security reasons.

Hint:
The password fields are always empty if you open the page again. This is completely normal and the password is kept nevertheless.

The following table shows, which password is needed for the access to the various web pages:

page	needed password
Home	-
Connections	-
Display	general password
Modules	-
Modules → Variable control	-
Modules → Variable control: controlling variables	password for variable control
Modules → Variable control: configuration	password for configuration of variable control
Modules → S7-Gateway	general password
Modules → Watchdog	general password
Modules → NTP-Server	general password
Modules → IPDeviceToS7	general password
Configuration	general password
Configuration: Factory defaults	general password or others *
Global data	general password
Access protection	general password
Password	general password or others *
Restart	-

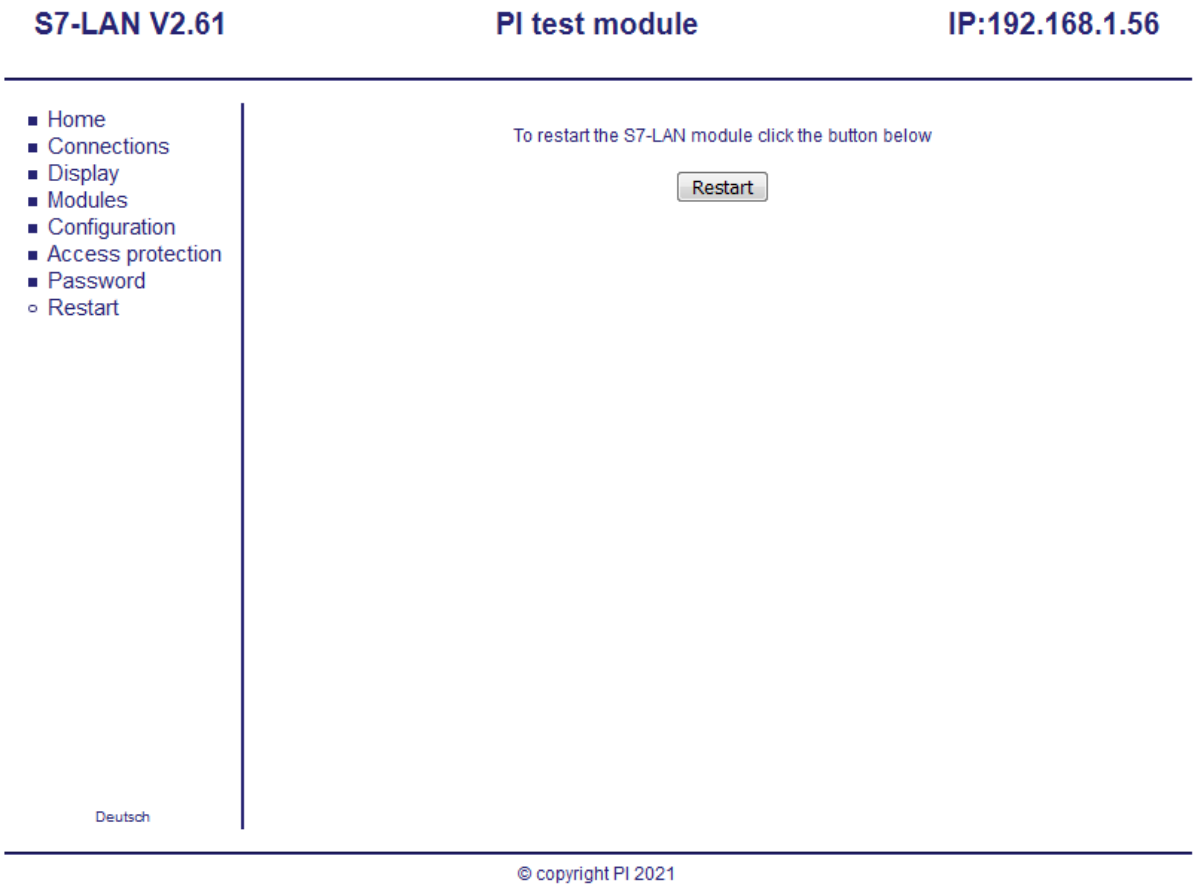
* If no general password for the web browser access is set you have to enter both other passwords (if configured) to access these page or use this function.

Please pay attention to the password prompts on the web pages. The device always tells you which password you have to enter now.

Important:
If you have logged in to your device with a password, the entry “Logout” is shown in the menu. This entry should be used to log off of the device again to protect your device against unauthorized configuration changes.

4.3.9 Restart

On the page “Restart” you can execute a restart of your device. The pages therefore shows a short hint as well as a button:



The restart doesn't get executed until you have clicked on the button. After you have clicked on the button the page will reload and then the device executes the restart.

5 TIC

The program TIC combines an interface configuration tool (formerly S7-IFC), which is used for searching, configuring and managing your devices, and the Direct Driver TIC (shortcut for Totally Integrated Communication), which is used for the communication with your devices.

Therefore the TIC driver signs up directly on the PG/PC Interface from Siemens. Here you can choose which device should be used for the communication as well as configure it. In this way the TIC driver is well integrated to Siemens programs like TIA Portal and SIMATIC Step 7 Manager, as well as STARTER, WinCC and many more programs.

5.1 Installation

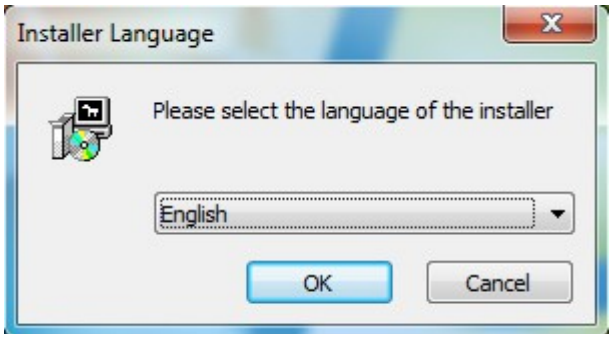
Before you can use the TIC driver for configuring and using your device for communication, you have to install it.

If you want to use the TIC as communication driver, you have to make sure that the needed Siemens software is installed already. Otherwise the TIC driver can't sign up itself within the PG/PC Interface.

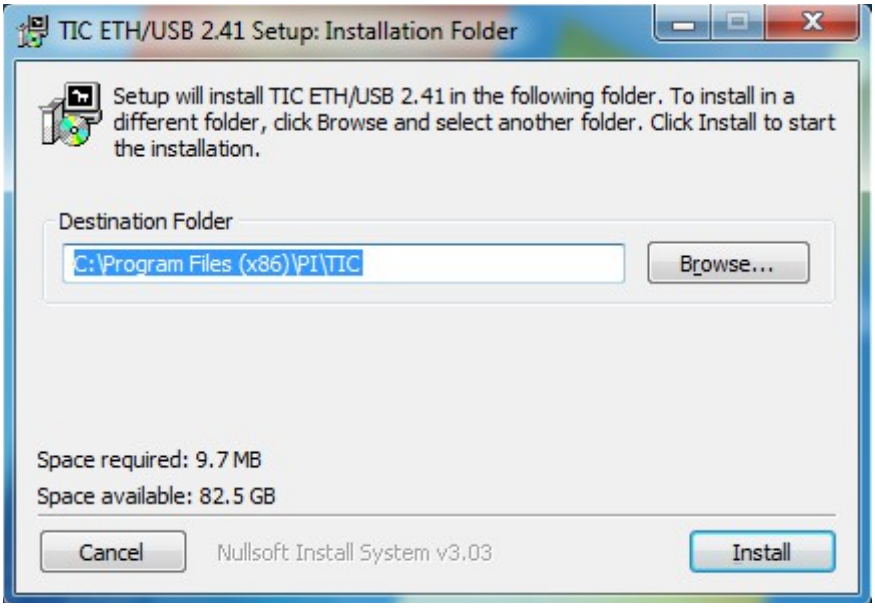
Hint:
If you already have installed an older version of the TIC, you can simply install the new version over the old one.

To start the installation you have to download the ZIP archive with the installation data from the product page. Now you can extract this archive and execute the file setup.exe.

In the first step you may get asked to choose the setup language:

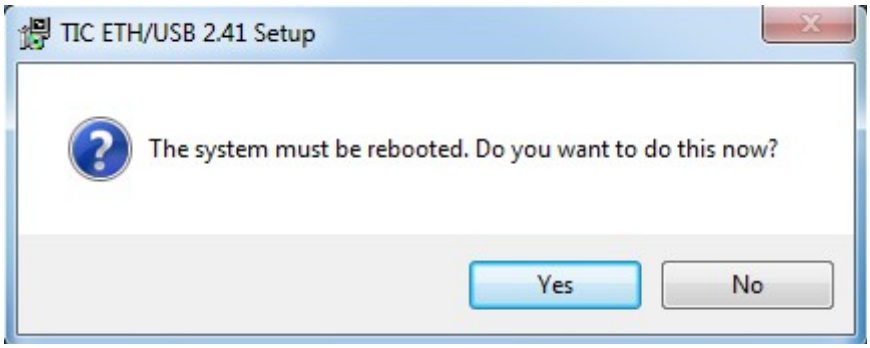


Next you can select in which folder the TIC should be installed. Normally the default suggestion can be used. But if you would like to install it to another folder, you can select it by clicking on the “Browse ...” button too.



When you have clicked on the “Install” button, the installation process get's started. Before and while the installation is running, some tests are getting executed (e. g. for an older version). The installation assistant will guide you through the whole process and shows you the current state.

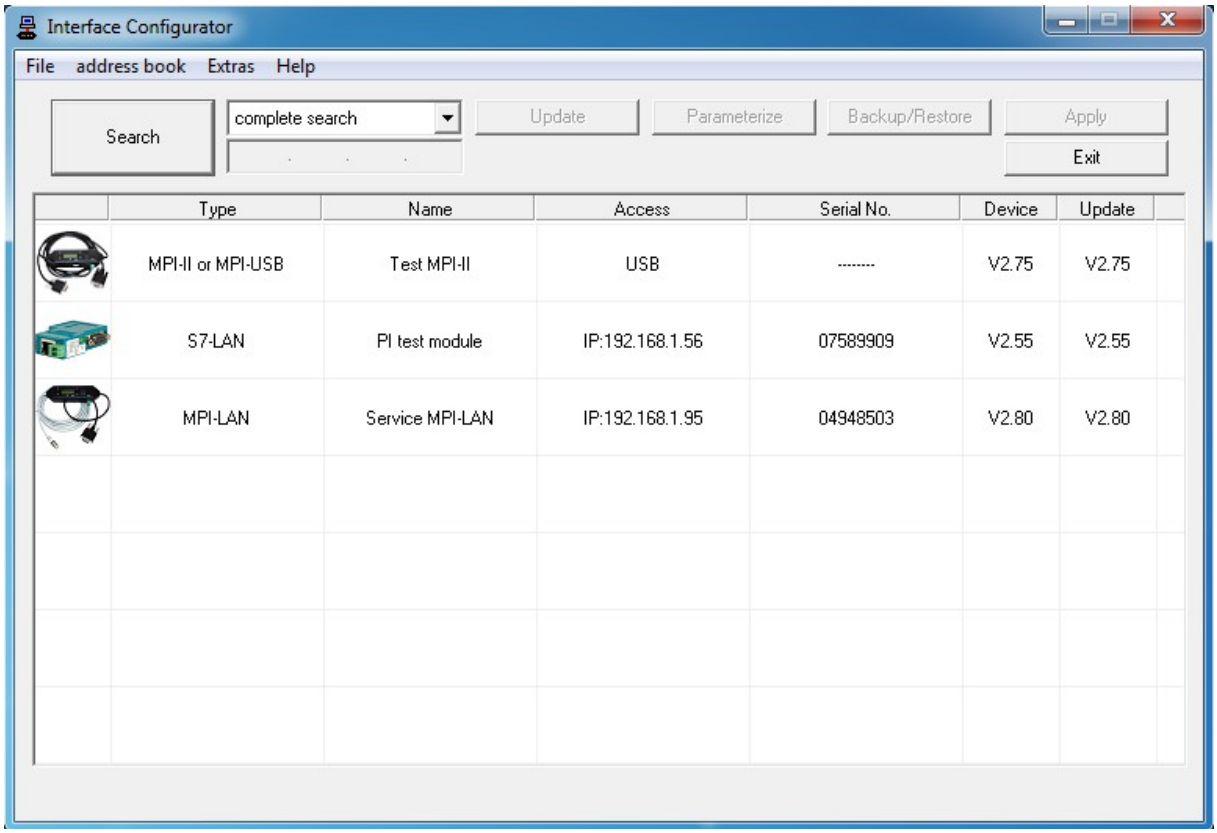
In the last step you get asked, if a restart of your PC may be executed. Here you should select “Yes” if possible. Otherwise you can do the restart later manually.



Important:
Before you can use the TIC driver the computer must be restarted.

5.2 Searching for devices

The main window of the TIC shows you a list with all found devices as well as a menu and some more control elements like buttons.



By default the TIC searches for all devices, which are connected to your PC or network, when starting the program. By clicking on the button “Search” a new search can be executed at any time. If you want to search only for a specific device type or via a specific interface, you can

select it via the selection list next to the search button. If you have selected “search via network” the IP field get's enabled and you can enter an IP address manually. The device with this IP address then get's directly addressed on the next search.

LAN devices which are behind a router, can unfortunately not be found by the normal search. If you want to access such a device, you have to select “search via network”, enter its IP address manually and search for devices again. Now the device should be shown in the list.

The columns within the list view have the following meanings:

column	**description**
Type	The type of the device. On the first column the image, which belongs to this device type, is shown additionally.
Name	The name of the device. This can be configured within the settings at will.
Access	A brief info about the way the device was found and gets accessed.
Serial No.	The serial number of the device. This info is available on LAN devices only.
Device	The firmware version which is running on the device.
Update	The current firmware version which is delivered with the TIC driver. If an update is possible the complete row gets colored in light blue.

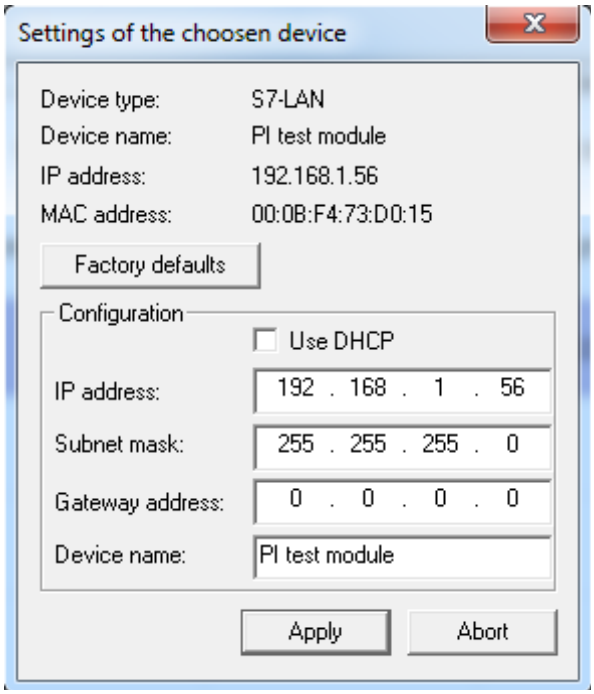
If you want to start with the configuration of a device, you have to select it from the list by clicking on it. After that a few buttons above the list as well as some menu items are getting enabled.

5.3 Configure devices

When you have selected a device from the device list, you can now begin to configure this device. Therefore you can use the buttons which are shown above the list. Furthermore you can also open some dialogues by executing double click on specific cells.

5.3.1 Network settings

The program TIC allows you to change the network settings of your LAN devices easily. For parameterization you have to execute a double click on the cell “Access”. Now a dialog should appear, where you can specify the IP address, the subnet mask, the IP address of the gateway as well as the device name. Furthermore some information respectively the current configuration about the selected device are shown on the top of the window.



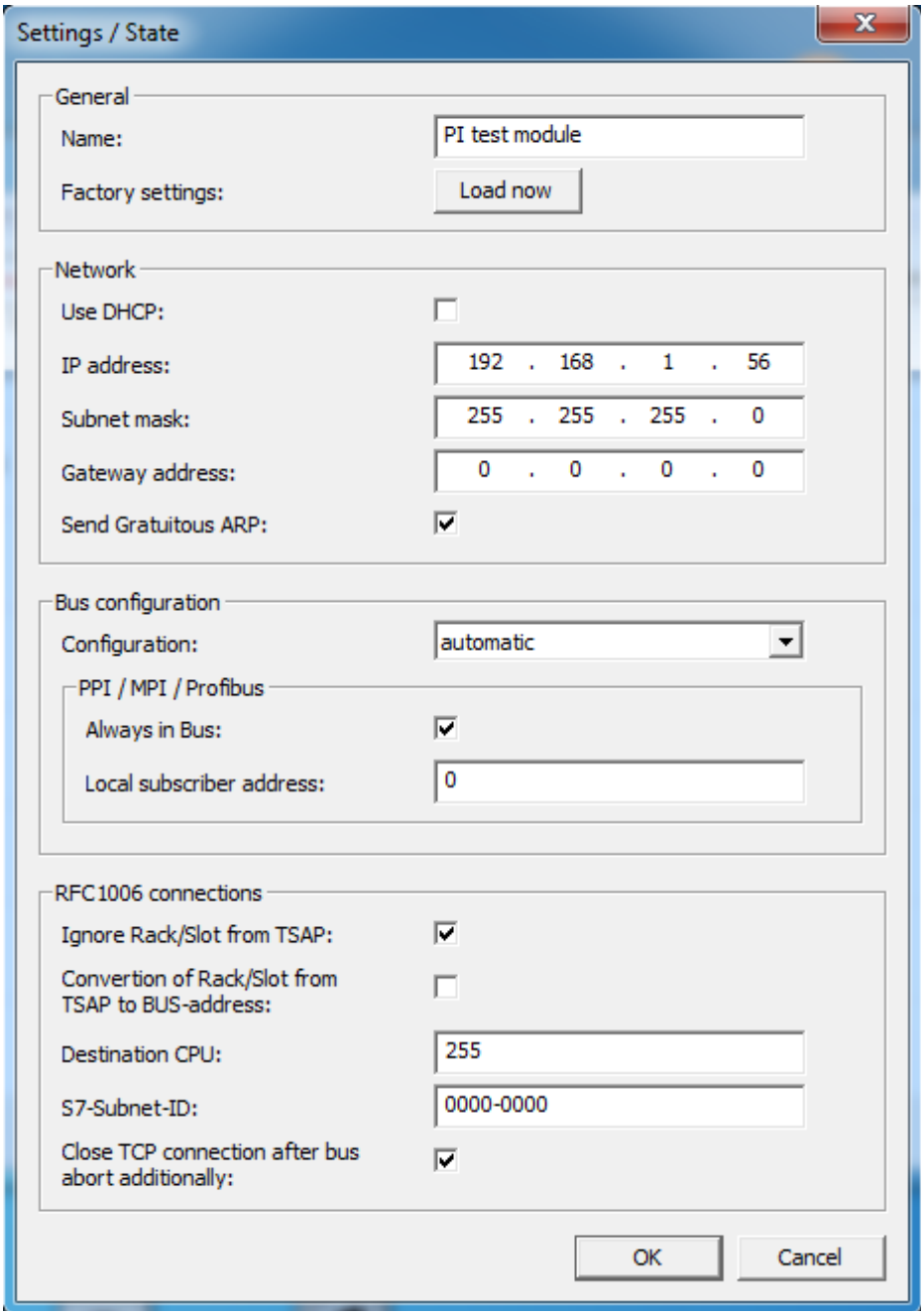
If you want to set your device back to the factory defaults you can click on the button “Factory defaults”. More information about this function can be found in the section “Special functions”.

The TIC can also change the network settings of devices, who aren't within the same subnet as your PC. So you don't need to change the IP address of your PC, if you want to change the network settings of your LAN device.

Hint:
The configuration of the network settings can also be done on the general settings dialog. But this dialog only works if the PC and the device is on the same subnet. The network dialog doesn't have this limit.

5.3.2 Settings

If you want to change the device settings, you have to click on the button “Parameterize”. Now a window with multiple settings grouped into some sections gets opened where you can now configure your device. Within the dialog only the settings relevant to your device type as well as to the configuration are shown. This allows an easier configuration.



Hint:
As an alternative to the click on the button “Parameterize” you can also execute a double click on the cell “Name” of the corresponding device.

Within the section “General” you can specify a name (max. 16 chars) for your device. This name can be used for an easier identification.

Furthermore you can set your device back to the factory defaults, by clicking on the button “Load now” within the line “Factory settings”. More

information about this function can be found in the section “Special functions”.

In the group “Network“ you can change the IP settings from your device *(LAN devices only)*:

fields	**description**
Use DHCP	Indicates if the device should obtain an IP address from a DHCP server. Otherwise the device will use the fixed configured IP address.
IP address	The IP address of the device, which should be used, so the device can communicate with your PC and maybe also other network participants.
Subnet mask	The subnet mask for the IP address. Both parameters determine the network area in which the device is located.
Gateway Address	The IP address of the gateway / router. This parameter is needed if the device have to communicate over a router junction.
Send Gratuitous ARP	Indicates if the device should sent it's IP address to all network participants via ARP cyclical.

Hint:
If you have enabled the DHCP option the device remains reachable via it's old (previously configured) IP address. The DHCP option will not take affect until a restart.
If the device boots up and DHCP is enabled the device queries for an IP address on all DCHP servers within your network. If the device can't obtain an IP address the device can be accessed with it's last configured fixed IP address.

If you aren't responsible for the administration of your network, you should ask your network administrator for the correct IP parameters.

The group “Bus configuration“ contains multiple parameters which are needed for the communication on the PPI/MPI/Profibus. Some parameters are grouped within sections again.

field	description
Configuration	Determines which bus configuration should be used from the device: • **automatic:** configuration gets detected automatically from the bus; if this information is not available the configuration from the PG/PC is used * • **from bus:** configuration gets detected automatically from the bus • **from PG:** configuration from the PG/PC is used • **fixed:** configuration from the device is used
Operation mode	Determines the operation mode of the device: • **PPI:** communication on the PPI bus for all S7-200 controllers • **PPI Advanced:** communication on the PPI bus with the advanced, MPI compatible, PPI protocol for newer S7-200 controllers • **MPI:** communication on the MPI bus • **Profibus DP:** communication on the Profibus with the profile DP • **Profibus Standard:** communication on the Profibus with the profile Standard • **Profibus Universal:** communication on the Profibus with the profile Universal • **PPI 9K6:** conversion to the PPI bus with 9600 Baud *(via COM port)* • **PPI 19K2:** conversion to the PPI bus with 19200 Baud *(via COM port)* • **PPI Multi-Master:** communication on the PPI bus with the multi master mode with 9600-187500 Baud *(via COM port)*

	• **RS232/485-Converter:** conversion from RS232 to RS485 *(via COM port)* → **Hint:** For the devices MPI-II and MPI-USB the modes are separated into “Serial” and “USB” to choose the communication path.
PPI / MPI / Profibus	
Always in Bus	Indicates if the device should stay within the bus after a communication. Otherwise the device leaves the bus after a communication.
PG/PC is the only master	Indicates if the device is the only master on the bus and have to act as bus master. Otherwise it's assumed that multiple masters are available on the bus.
Local subscriber address	The station address which should be used from the device. This address can't be used from any other participant and have to be smaller then the configured HSA.
Baudrate	The baud rate which should be used for the communication on the bus.
Highest station address	Determines the highest station address (HSA) which is used on the bus.
RS485 interface	
Baudrate	The baud rate for the RS485 bus. If you chose “Automatic” the device tries to detect the baud rate automatically.
Databit	The amount of data bits for the RS485 bus.
Parity	The parity for the RS485-Bus.
Stopbit	The amount of stop bits for the RS485 bus.

* The configuration “automatic” allows the correct function of the device in nearly all cases. By default the detection of the baudrate as well as the processing of the cyclical bus parameter protocol the correct configuration gets detected automatically. If this information

is not available, the device alternatively uses the configuration which gets sent from the PG/PC.

The group “For RFC1006 connections“ shows some settings for network connections via the RFC1006 protocol *(LAN devices only)*:

field	**description**
Ignore Rack/Slot from TSAP	Indicates if the values for rack and slot, which are transmitted via the TSAP, should be ignored.
Convertion of Rack/Slot from TSAP to BUS-address	Indicates if the vales for rack and slot within the TSAP should be interpreted as a bus address. This option allows you to communicate with multiple controllers when using different rack/slot values. An explanation and a table with the values can be found in the appendix.
Destination CPU	Determines the station address of the CPU which should be used for RFC1006 connections. The value 255 means that the directly connected CPU should be used as the destination.
S7-Subnet-ID	Determines the subnet ID of the MPI/Profibus which should be used for RFC1006 connections.
Close TCP connection after MPI abort additionally	Indicates if the TCP connection should be closed in addition to the sent error packet, when the connection on the MPI bus gets terminated.

In the section “TeleService” you can enable and then configure the TS function *(MPI-II and MPI-USB only)*. If you want to enable the function you have to set the check on the option “Use function” and save the configuration.

If the function is enabled you can open the configuration dialog of the TS function by clicking on the button “Open now” within the line “Configuration”. All further explanations about the function and the configuration can be found in the manual for the TeleService devices.

Furthermore the setting “A20-Terminal connected” will be shown as soon as the function is enabled. This option determines if the device is

connected with a A20 or M20 terminal and thus no controlling lines are used.

Important:
Even if the group “TeleService” is shown for MPI-USB devices too, the TS function can be used on MPI-II devices only.

The last section on this dialog is “Others” which contains various advanced settings, who doesn't belong to any of the other groups. This group is only shown when the configuration mode “fixed” is selected. Normally you don't have to change any of these settings:

field	**description**
Protocol type	Determines which protocol should be used between the PC and the PG. By using the setting “Automatic” the device tries to detect the protocol automatically. *(for LAN devices for serial communication with PLC-VCOM only)*
Delay before sending	Determines a delay (in 0.1ms units) which should be used before sending a reply. *(for LAN devices for serial communication with PLC-VCOM only)* This setting may be needed for ProTool RT, because otherwise the communication may get interrupted. *(recommended 30ms)*
Send HMI-cable-version directly	Indicates if the version number of the HMI cable should be send as soon as possible. *(for LAN devices for serial communication with PLC-VCOM only)* This setting may be needed for some touch panels, because otherwise a connection can't be established.
Show errors on display	Indicates if errors should be shown on the display. *(MPI-II, MPI-USB and MPI-LAN only)*
Requirement of USB current	Determines how much current (0mA or 360mA) for the USB interface the device should request

	during initialization with the PC. *(MPI-II and MPI-USB only)* → **Important:** Even if this setting can be changed for the MPI-USB, the setting should be changed for the MPI-II only. Otherwise the PC port may get overloaded.

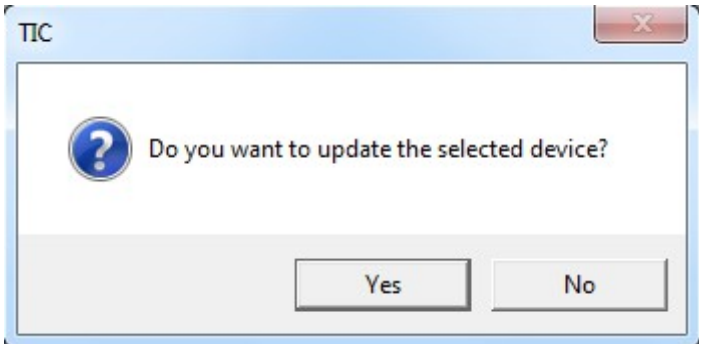
5.3.3 Web page parameterization

If you want to configure your device via the web page, you can simply execute a double click on the cell with the device image or type. After that the web page of your device should be opened within your default web browser. Navigate to the item “Configuration” via the hyperlinks on the menu on the left side. Now you should see the device settings and have the possibility to change them. A detailed explanation about the parameters can be found in the chapter “Control elements” within the section “Web server”.

Hint:
The parameterization via web page is only possible on LAN devices, because the other devices don't have an integrated web server.

5.3.4 Firmware update

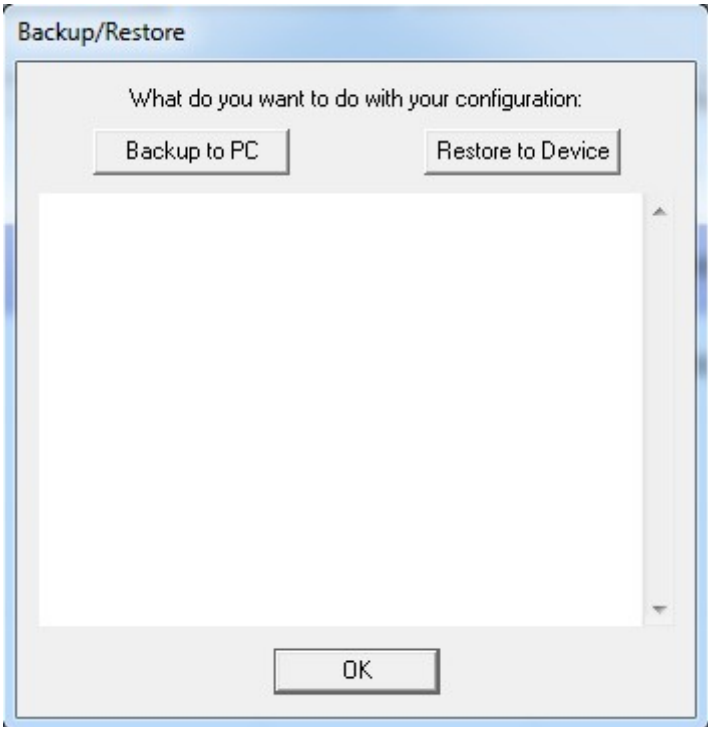
The interface configuration tool of the TIC also allows you do update the firmware of your device. The TIC program always contains the latest firmware files for all device types. If you want to execute an update you can simply click on the button “Update”. Now you have to confirm the questions and messages to start the process. If the firmware already is the latest one or even newer then the firmware which is delivered by the TIC, the button is grayed out.



The firmware version of your device should always be suitable to the TIC driver. Otherwise you may get problems while communicating with your device! We recommend you to always use the latest TIC driver and the contained firmware versions for your devices.

5.3.5 Backup/Restore

If your device configuration changes regularly it may be helpful to create a backup of these configurations by using the function “Backup/Restore” so you can restore them when needed. If you have selected a device and clicked on the button “Backup/Restore” within the main window the following dialog will appear:



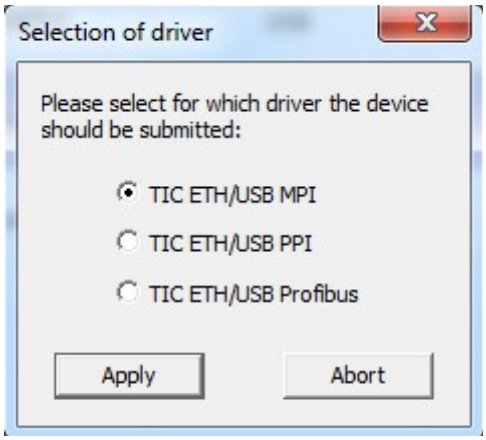
When you want to create a backup of the configuration you have to click on the button “Backup to PC”. Now the configuration from the device gets retrieved. After that you have to select a folder and enter a file name where the configuration should be stored.

If you already have a backup and want to load it back to the device you can click on the button “Restore to device” and select the created backup. The configuration then gets loaded back to the device.

Hint:
A configuration backup which was created for e. g. a S7-LAN module can merely be loaded back to a S7-LAN module. Only the backups for the devices MPI-USB and MPI-II are compatible among themselves.

5.3.6 Setting up the communication

If you have installed software from Siemens or generally the PG/PC Interface on your PC, the button “Apply” is shown on the top right corner of the main window. After you have clicked on the button a dialog will appear where you can select for which driver of the TIC you want to select the device and therefore use it for the communication. The selection of the device via the PG/PC Interface dialog isn't necessary anymore then.



Hint:
The PG/PC settings like for example the Automatic-mode can't be changed here. If you want to change these settings you will have to open the PG/PC Interface dialog anyway.

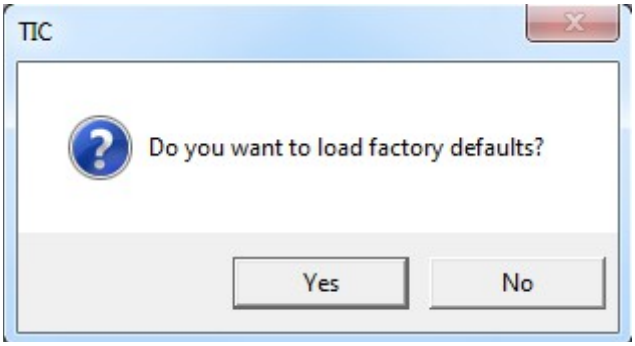
Important:
If you have opened the TIC via the PG/PC Interface dialog the window with the selection of the driver doesn't appear rather the device gets submitted for the chosen driver within the PG/PC Interface directly.

5.4 Special functions

In this section some further functions are described which doesn't belong to the basic configuration of a device.

5.4.1 Factory defaults

If you want to set your device back to the factory default settings, you can to this by clicking on the item “Factory defaults” within the menu “Extras”. As soon as you have clicked on the item a message will appear which have to be confirmed by clicking on “Yes”.



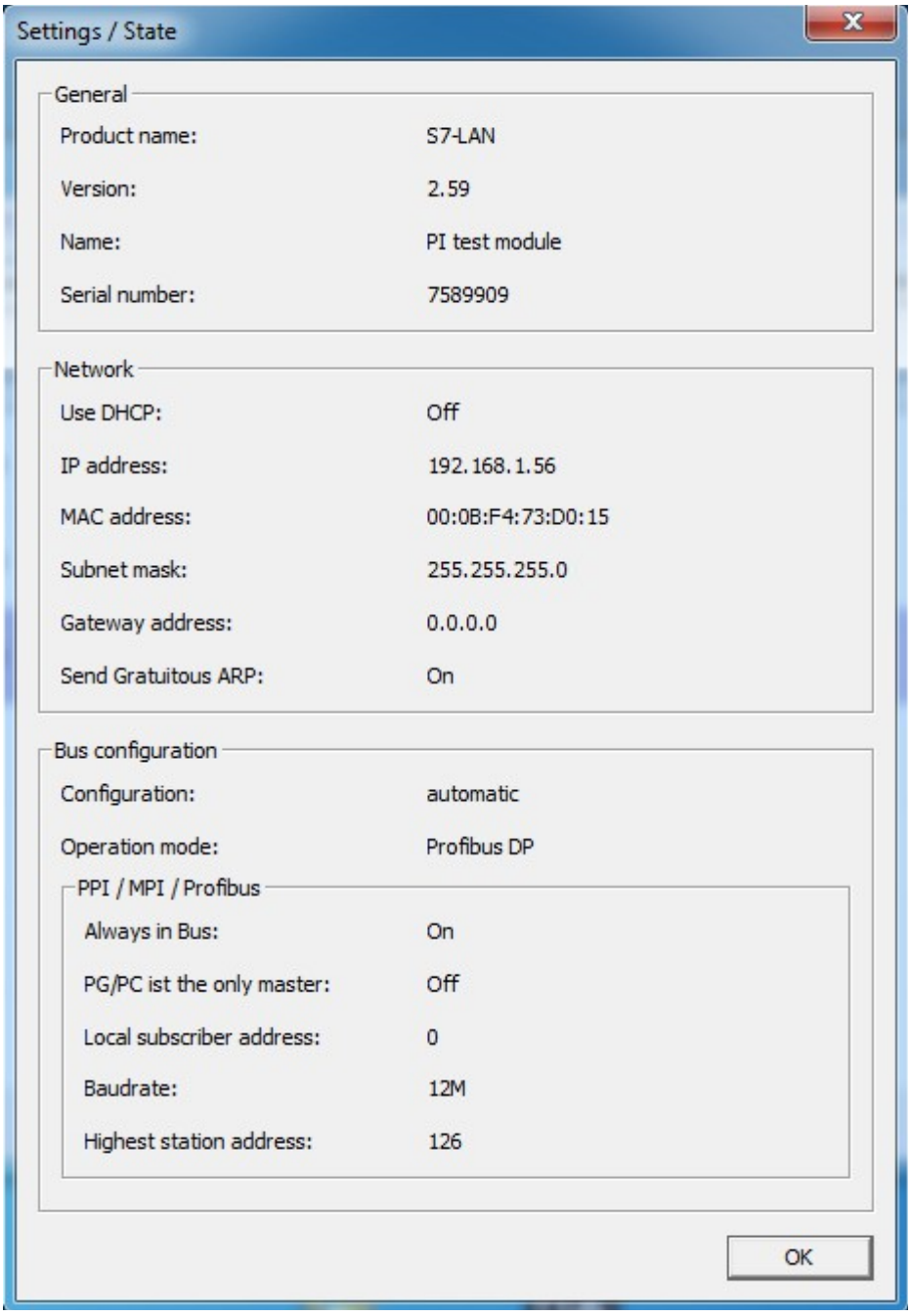
Hint:
The button “Factory defaults” within the dialog for network settings as well as the entry on the settings dialog does exactly the same thing as the here described menu item.

Please note, that if you set back a LAN device to it's factory defaults, it is reachable with the IP 192.168.1.56 subsequently!

5.4.2 Device state

Within the settings dialog you will always see the configuration of the device. But in some situations it may be useful you see the current parameters who are used by the device (e. g. if a bus configuration is expected from the bus or PC).

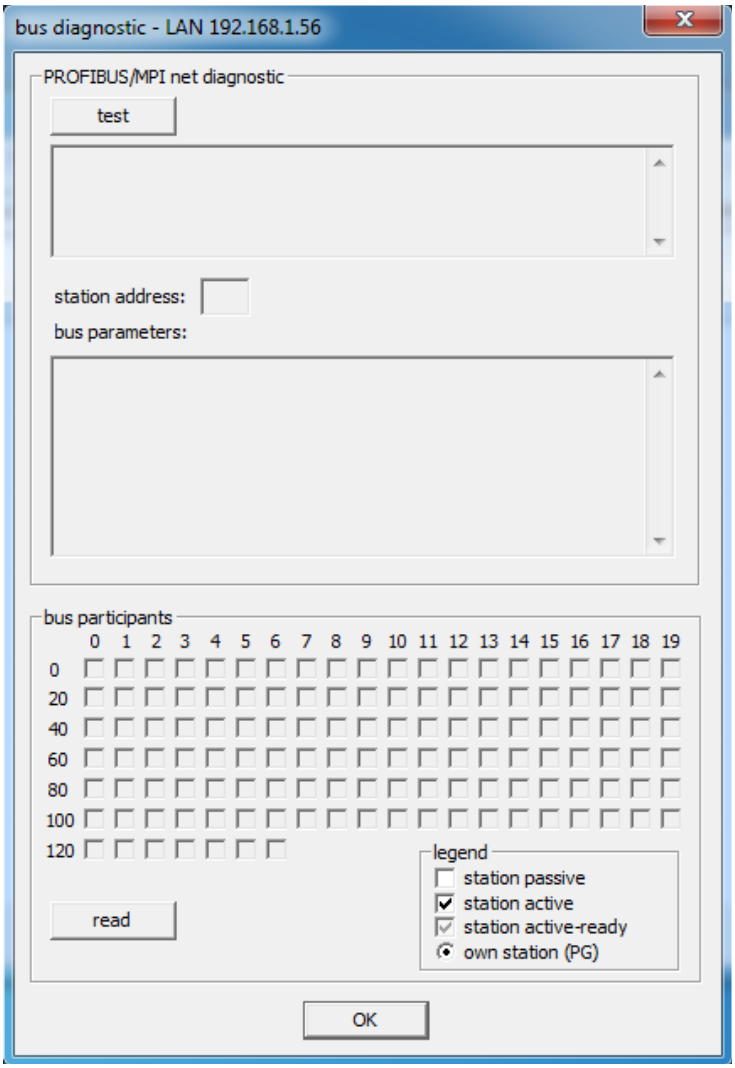
The TIC allows you to show this current device parameters. Therefore you have to click within the menu “Extras” to the item “Device state”. Now a dialog which looks similar to the settings dialog will be shown. In this dialog only the relevant parameters are shown too.



5.4.3 Bus diagnostic

Additionally to the viewing of the state and used configuration of a device it also could be useful to show some information about the bus state and parameters as well as the connected participants.

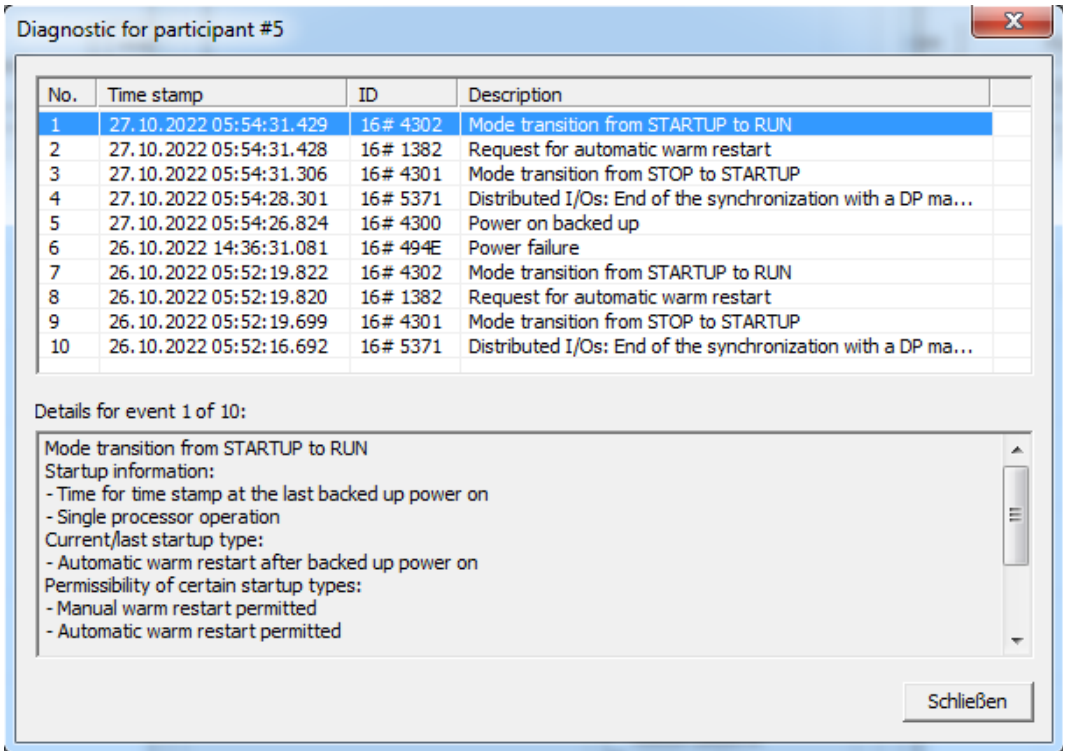
The TIC therefore provides an own dialog where you can extract all this information. This dialogue is the same as used as diagnostic dialog within the PG/PC interface. But you can also open this dialog from within the TIC without the need for any Siemens software installed on your PC. If you want to open the dialog you first have to select a device within the main window and then click on the entry “Bus diagnostic” from the “Extras” menu. The dialog should look like the following.



When you click on the button “test” a connection to the device and bus will be tried to establish. If an error occurs thereby this will be shown on the first field. Otherwise the collected information about the bus (baud rate, profile, bus times, etc.) as well as the own station address will be shown.

If you like to see a list with the available bus participants you can click on the button “read”. Now the participants will be determined and shown via the corresponding control fields. Please refer to the legend on the lower right of the dialog.

When you have refreshed the list with available bus participants you can click on the control fields of the participants. Thus the diagnostic buffer of the corresponding participant gets read and will be shown in a separate dialog:



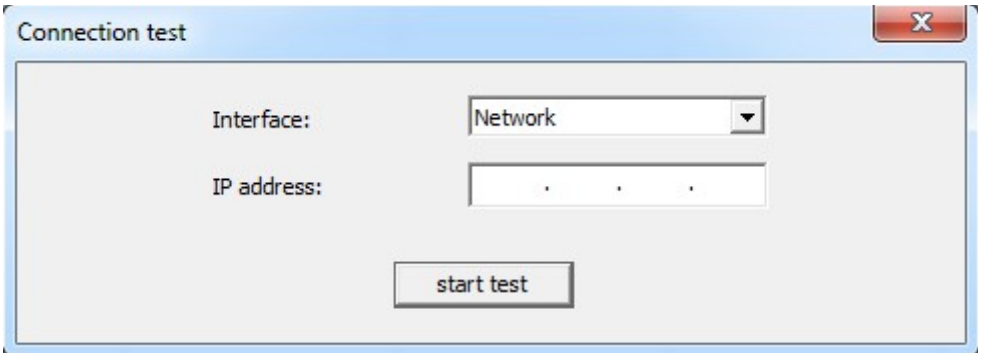
5.4.4 Connection test

If you have problems with the connection to your LAN or USB device, you can use the connection test to check why there are problems by the connection to the device.

The test for LAN connection checks the basic communication path as well as all from the device supported protocols. For USB connections the basic USB connection, the driver as well as the availability gets checked. With the help of the test result you should be able to detect and solve problems by your own in short time.

The connection test can be opened by clicking on the entry “Connection test” within the menu “Extras”. When you have selected the entry a

window will appear where you can choose the interface (Network or USB) and enter the IP address for the test. If a device was set in the main window its information will be preassigned for the test.



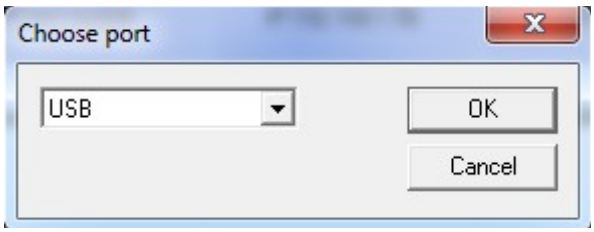
After you have selected the interface and entered the IP address you can click on the button “start test”. Depending on the connection the test may be finished in a few seconds. The process as well as the result will be shown within the window.

5.4.5 PPI Boot off

If your device works in a converter mode (PPI or manual) the normal communication isn't possible anymore, because all the protocols are redirected to the RS485 interface. USB and LAN devices can be found in this mode from the TIC driver with the integrated search function but not configured. Serial devices can't even be found, if they are in this mode.

When you have to access the device nevertheless (e. g. for configuration or executing a update), you can temporarily disable this mode on the device. This can be done with the function “PPI Boot off”.

If you want to execute this function you have to click on the entry “PPI Boot off” within the menu “Extras”. Now a dialog gets opened where you can select “USB” or a COM port. When you want to leave the converter mode for LAN devices temporarily you have to select the device within the device list, before you open the dialog. The entry “LAN” should be available and preselected then.

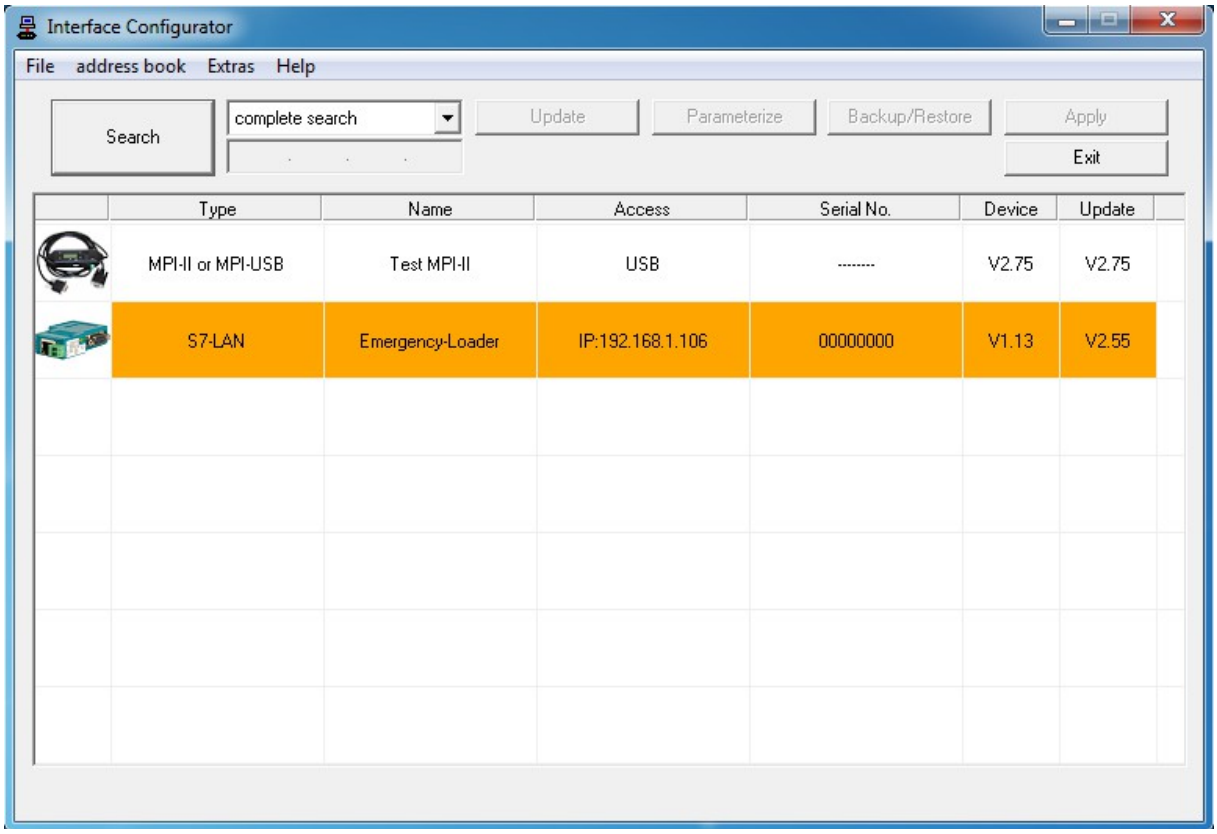


If you have selected an interface in the window and clicked on the “OK” button a short message will be shown. This message have to be confirmed. In the next step the function gets executed and you will get a message with a feedback. If the action was successful you can now configure your device normally or, for serial communication, search for it.

If you want to bring your device back to the previous mode, you have to disconnect it from the power supply and connect it again!

5.4.6 Emergency loader

The emergency loader is a small program within the device, which allows you to import the firmware to your module / cable again, if a previously started firmware update failed.



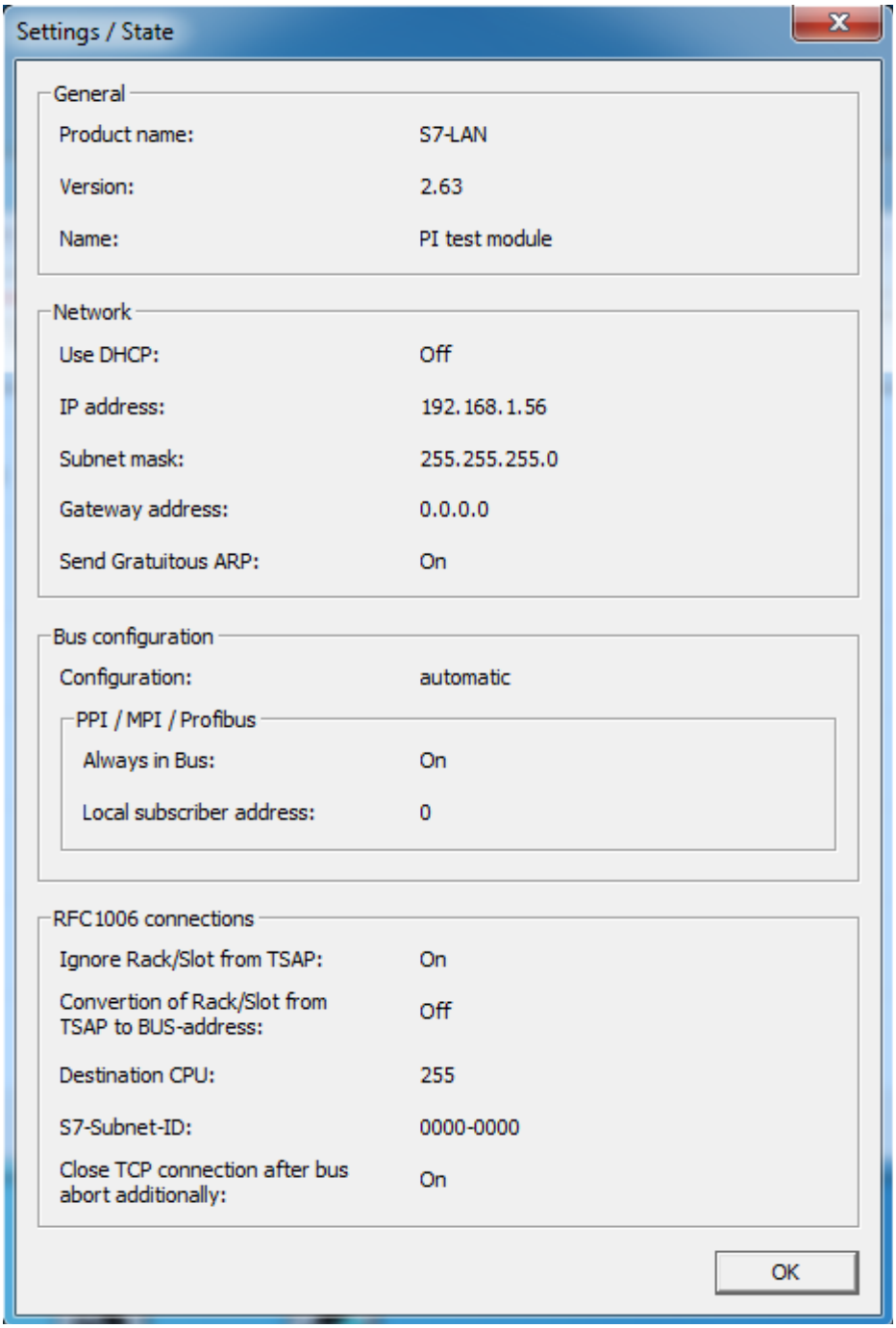
Devices who are in the emergency loader are colored in orange and assign them the next free IP address from the PC to itself automatically (only for LAN devices). The update can be executed normally by first choosing the device and then clicking on the button “Update”.

Important:
A device which is located in the emergency loader can't be used for PLC communication or normal configuration. The only possible function is the execution of the update process.

The access to a LAN device which is located in the emergency loader is only possible, if it's within the same physical network as your PC.

5.4.7 view config file

If you have created a backup from your device via the Backup/Restore dialog you can view the configuration from this file without the need to load the configuration back to the device. When you want to use this function you have to click on the entry “view config file” within the menu “extras” and select the created configuration file afterwards. Now you should see a dialog with the configuration:

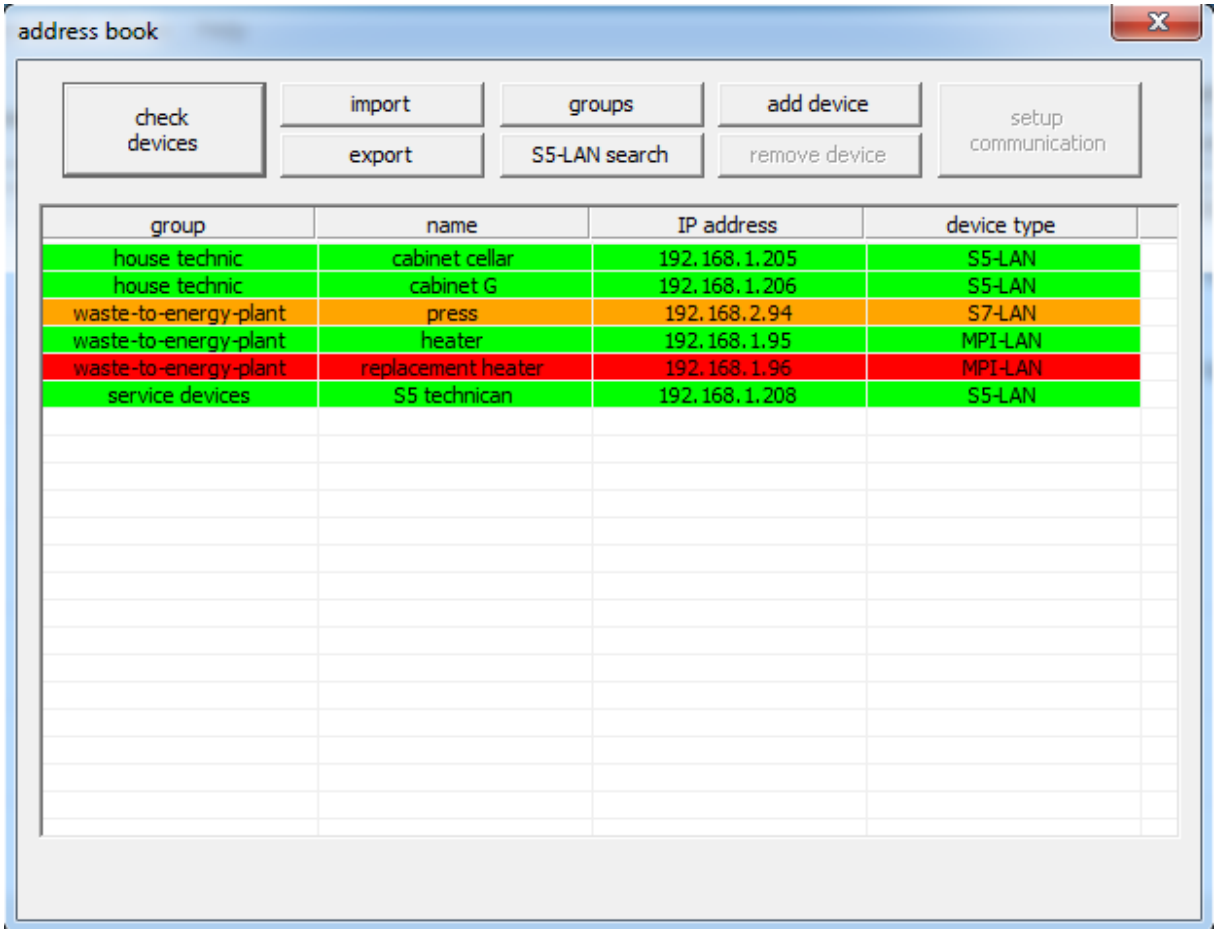


5.5 Address book

The TIC contains an address book which allows you to manage your network devices (S7-LAN, S7-GATE and MPI-LAN as well as S5-LAN). With the address book you can simply group multiple devices together as a plant or hall. Thereby you have a quick overview over all your devices. Furthermore you can directly assign a device for a communication driver.

Hint:
If you want to use the address book for assigning S5-LAN modules for communication you need the PLC-VCOM V2.81 or newer. Furthermore the setting “allow access via TIC address book” have to be enabled.

If you want to open the address book, you have to click on the entry “open address book” within the menu “address book”.

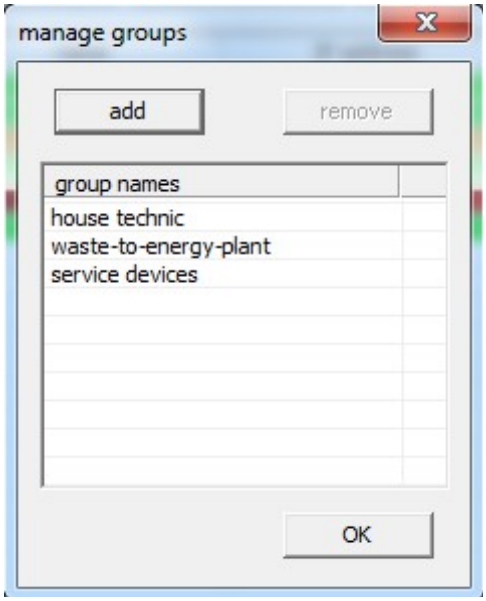


When the dialog opens a search for the availability of the configured devices is started automatically. If you want to execute the search again, you can click on the button “check devices”. The device entries in the list are automatically colored in red (device not found), orange (device not within the same subnet as the PC) or green (device reachable). If you select a device from the list some buttons get enabled.

Hint:
If you open the address book for the first time and haven't added any device to it, this device list is empty.

5.5.1 Groups

Before you can start with adding and managing your devices, you have to add groups for these devices. Therefore you have to click on the button “groups”. After that the following dialog should appear:



The usage of groups is necessary. If you don't want to group your devices, you nevertheless have to create a single group and name it e. g. “devices”.

5.5.1.1 Add group

If you want to add a new group you have to click on the button “add” within the group dialog. Next a dialog will be opened where you can specify the name of the group:

Hint:
The specified name of the group have to be unique and can't be used multiple times.

5.5.1.2 Edit group

If you want to edit an already existing group, you have to execute a double click on the entry within the group list. Now you should see the same dialog as for adding a new group. In this window you can then change the name of the group.

5.5.1.3 Remove group

If you want to remove a group completely, you have to select it within the list and then click on the “remove” button.

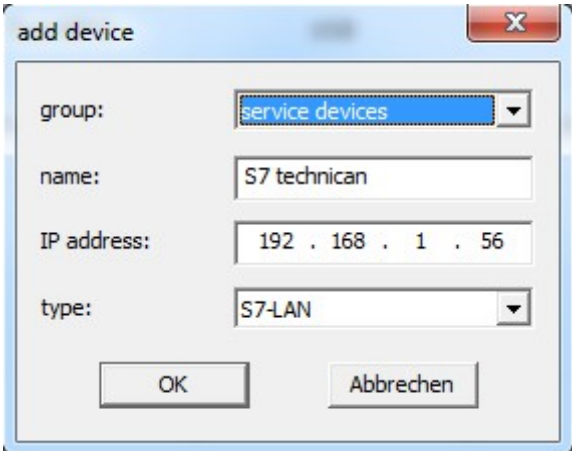
Important:
By removing a group, all devices in the address book which belong to this group are getting removed too.

5.5.2 Devices

If you have created all groups for the beginning, you can start to add and manage your devices. The list with all devices of the address book can be found on the main window of the address book.

5.5.2.1 Add device

If you want to add a new device to the address book, you have to click on the button “add device” which can be found above the device list on the address book window. Now a dialog should appear where you can specify the group, the name (this doesn't have to be equal with the real device name), the IP address and the device type:



Hint:

The selection of the device types “S7-LAN”, “S7-LAN++”, “S7-GATE” and “MPI-LAN” are basically without any meaning and doesn't have any effect to the function yet. Nevertheless we recommend you to choose the correct device type.

If you haven't created a (suitable) group, you can do this within this dialog by selecting the entry “<New group ...>” within the group selection. Now you get prompted to enter the name of the new group.

Instead of manually adding a device to the address book you can also submit a device from the device search within the main window of the TIC. Therefore you have to select your device and then click on the entry “add device” within the “address book” menu or execute a right click on the device entry and select “add to address book”. All fields for adding the device are filled in automatically and the normal adding dialog will be shown.

5.5.2.2 Edit device

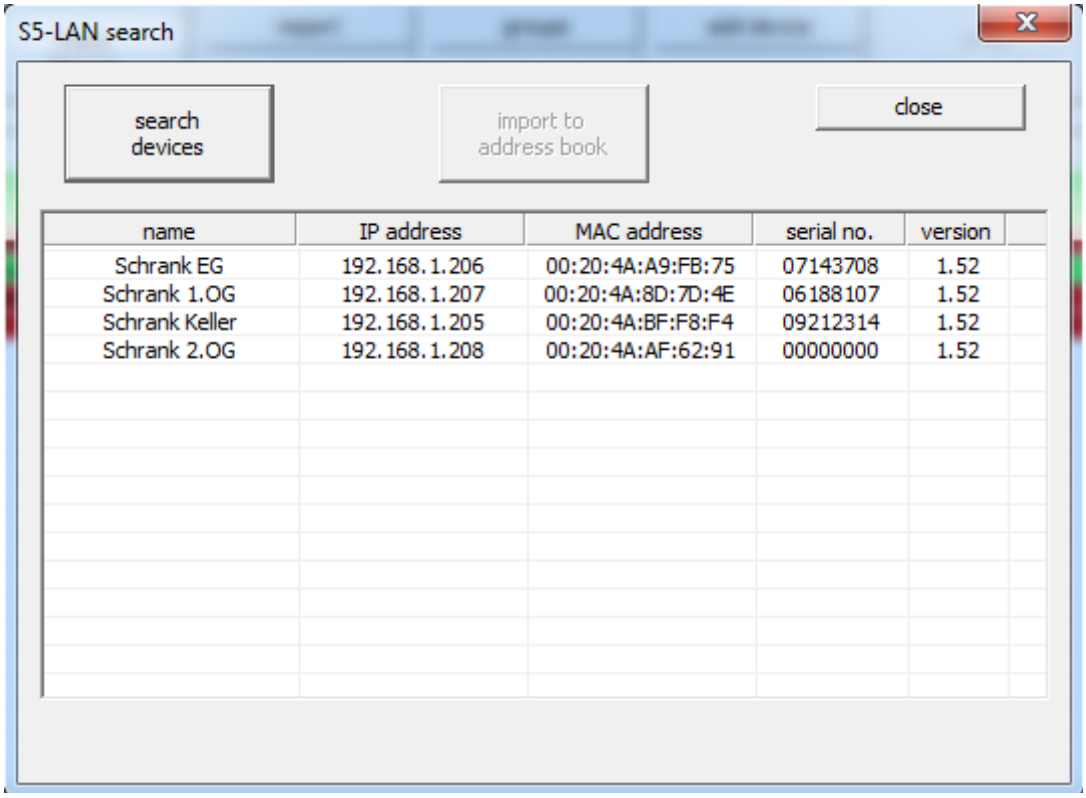
When you want to edit an already existing device you have to execute a double click on the corresponding device entry within the address book. Now the same dialog as for adding a new device will be shown. Here you can now change the settings of the device entry.

5.5.2.3 Remove device

If you want to remove a previously created device from the address book you have to select it and click on the button “remove device”. Please pay attention, that you have selected the correct device.

5.5.2.4 S5-LAN search

S5-LAN modules aren't shown in the main window of the interface configuration tool, because they aren't used for S7 devices. But since the address book also uses S5-LAN modules you can search for them by clicking on the button “S5-LAN search”. The search process starts automatically and is normally finished within a few seconds:

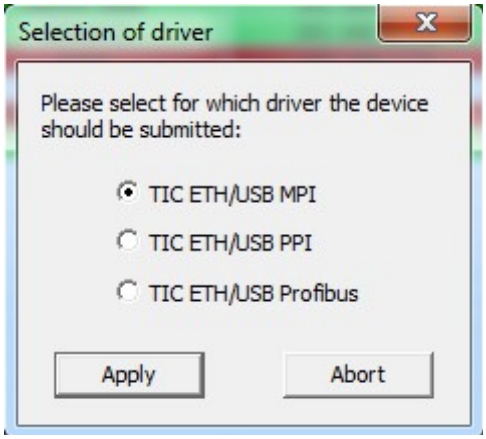


If you want to add one of the founded S5-LAN modules to your address book you have to select it and click on the button “import to address book”. You should then see the normal dialog for adding a new device but with prefilled fields.

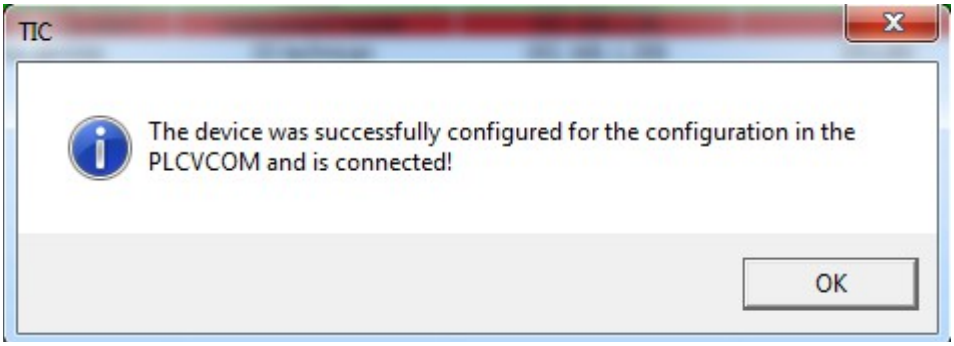
5.5.2.5 Setting up the communication

A further advantage of the address book is, that devices who are listed in the address book can directly be assigned to the TIC or PLC-VCOM driver for communication.

If you have selected a S7-LAN, S7-GATE or MPI-LAN from the address book you can click on the button “setup communication”. If you haven't opened the TIC via the PG/PC Interface from Siemens a window will be shown, where you can select, for which driver within the PG/PC Interface the selected device should be assigned. If you have opened the TIC via the PG/PC Interface this dialog won't appear and the selected device will be assigned directly.



When you have selected a S5-LAN module, the module can be set up for the usage together with the PLC-VCOM. After you have clicked on the button “setup communication”, the program will check if the PLC-VCOM is installed on your PC and not to old. After that the TIC will start the PLC-VCOM (if not already started) and then lets the PLC-VCOM connect to the specified device. Next the TIC waits for the response and finally shows you a message with the current state:



Hint:
If the PLC-VCOM is already connected with a device, you will get asked if the connection to this device may be disconnected.

The TIC have to remote control the program PLC-VCOM for this function! Please make sure that the setting “allow access via TIC address book” within the PLC-VCOM is enabled.

5.5.3 Import and export

If you want to use the address book on multiple PCs you may want to use the import and export function. Thereby you don't have to configure all devices twice rather you can just create a backup on you first PC and import this on your second PC. Of course you can also use the export function to create a backup only.

When you want to create a backup, this means export all groups and devices from the address book of your PC, you have to click on the button “export”. Now you get asked to specify a folder as well as a file name, where the backup should be stored.

If you want to restore a previously created backup (this can be a backup from the same or from another PC) you have to click on the “import” button and choose the backup file. Now you get asked, if the import should be done. This message have to be confirmed with “Yes”.

Important:
The import function overrides the address book in your PC which may exists. By importing an address book no reunification occurs.

5.6 Settings

The program TIC has, expect the settings within the PG/PC Interface dialog, no further complex settings.

Via the menu “Help” you can toggle the two small settings “Automatically search”, for the activation of the automatically device search when starting the application, and “show version hint”, for enabling the checking of the device version and showing a prompt, when a firmware update for the device should be executed.

Another item within the “Help” menu is “Language selection”. If you have clicked on that item a small window will be shown. There you can then configure the language for the TIC windows. If you have changed the language you have to click on “OK” to submit your selection. The setting isn't saved among program restarts.

Hint:
In general the language of the TIC don't have to be changed, because the TIC automatically detects the language by reading the registry keys of e. g. the language from Siemens software and of the windows operating system.

6 PLC-VCOM

The program PLC-VCOM offers you a virtual COM port for the devices S7-LAN, S7-GATE, MPI-LAN, S7-USB, MPI-USB and MPI-II (for communication via USB only) as well as for S5-LAN modules. Thereby the PLC-VCOM interacts as coupling tool between serial and USB / network communication. With this tool you can then directly communicate with your S5 or S7 controller.

In addition to the communication coupling the PLC-VCOM offers some simple tools to search for and configure your S7-LAN, S7-GATE and MPI-LAN devices as well as S5-LAN modules.

We recommend you to use the TIC driver for communication with S7 controllers and other bus participants. The PLC-VCOM should only be used when you have to communicate with a COM port.

Important:
The support for serial communication directly within the PG/PC Interface was removed by Siemens on all 64-bit operating systems.

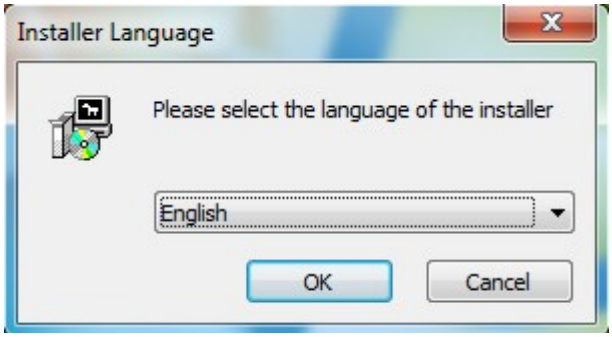
6.1 Installation

If you haven't install the PLC-VCOM yet, you have to do that now.

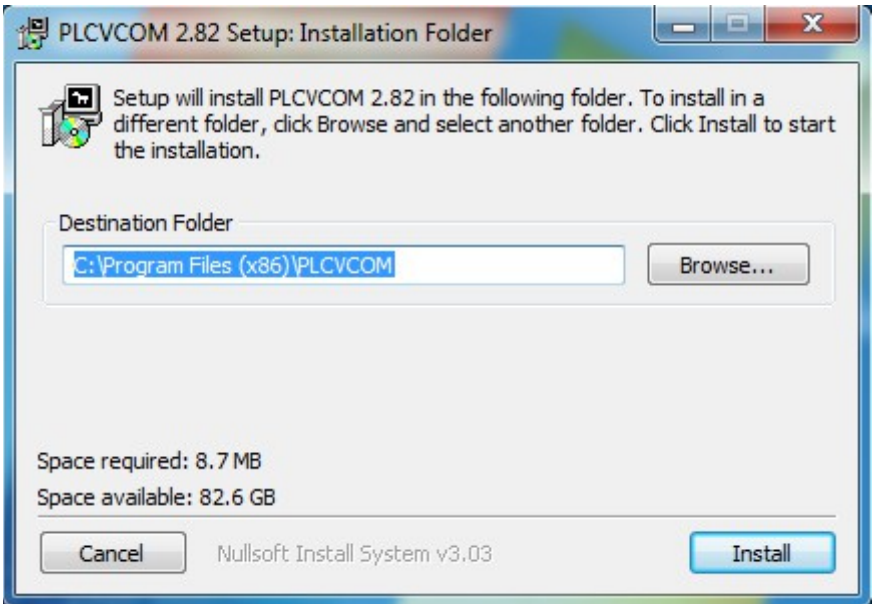
Hint:
If an older version of the PLC-VCOM is already running on your PC, you can simply install the new version over the old one.

Before you can start with the installation process, you have to download the setup from the product page of our website. The setup is packed within a ZIP archive and have to be unpacked. After that you can start the file Setup.exe.

In the first step of the installation you will get asked for the language, which should be used by the installer:

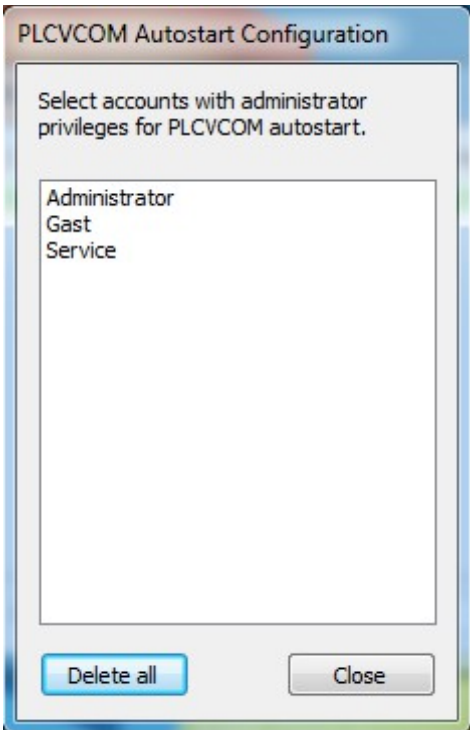


Next you can specify the folder, where the PLC-VCOM should be installed. In most cases this setting can be leaved as recommended from the installer, but of course you can specify another folder by clicking on “Browse ...” and navigating to the desired folder.

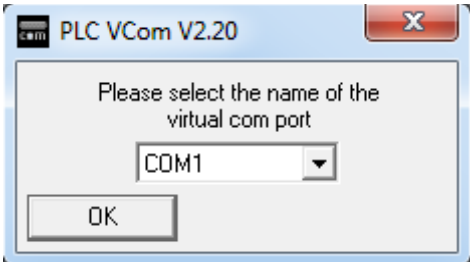


After you have clicked on “Install“ the process of the installation will be started. Before and while the installation is running some examinations are done by the installer. The setup assistant will guide you through the whole process of the installation and tells you, if you should take action.

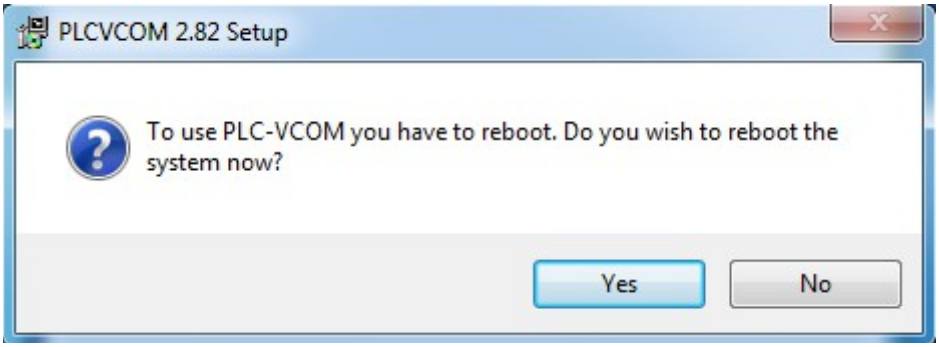
When the main installation process has finished the final configuration begins. First you will get asked for which users an autostart entry should be created. On the dialog you can select multiple users:



In the next step a further dialog will appear, where you have to select on which COM port the PLC-VCOM should be running. The selected port have not to be in use by any other program or a physical interface.



As last step you will get asked, if the setup is allowed to execute a restart. Here you should click on “Yes” if possible. Otherwise you can click on “No” and execute the restart later.

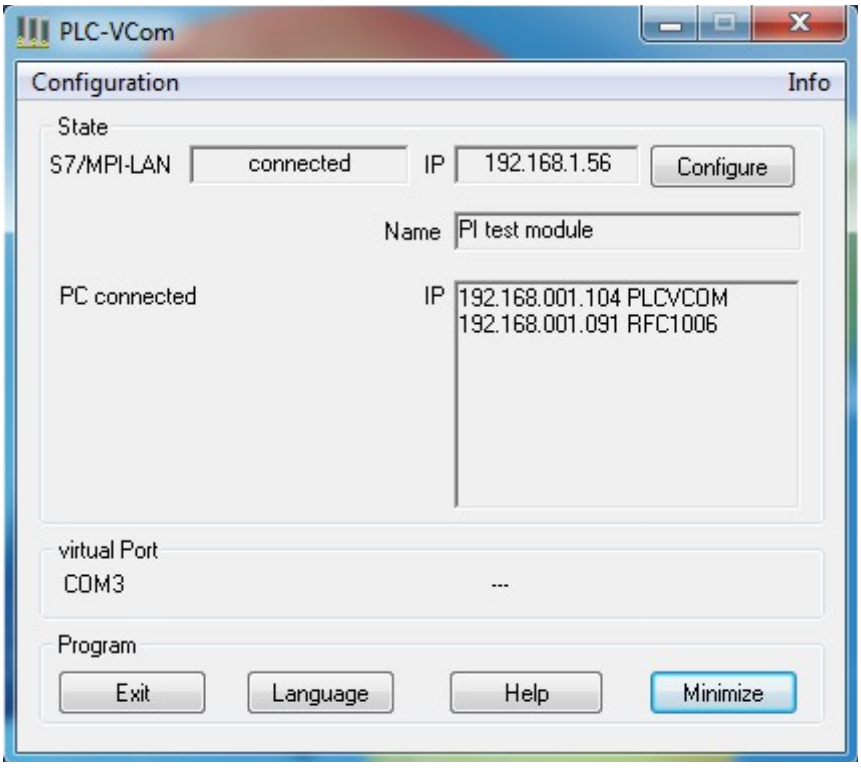


Important:
Before you use the PLC-VCOM for the first time, you have to restart your computer.

Hint:
The autostart configuration and the selection of the COM port can also be done later. Therefore you can use the corresponding entries within the start menu folder of the PLC-VCOM.

6.2 Overview window

The overview window is the main window of the PLC-VCOM and is also shown when starting the application. Within the dialog you can see to which device (type, IP and name) the program is connected, which connections are established on the device as well as which application accesses the virtual COM port of the PLC-VCOM.



By using the button “Language” you can toggle the language of the program windows between German and English.

The button “Minimize” is used to place the PLC-VCOM completely to the info area of the task bar. The virtual COM port keeps running normal thereby.

In the info area of the task bar you can see an icon of the PLC-VCOM. This icon indicates the current state of the connection between the PLC-VCOM and the device.

 There is no connection to the device.

 A connection to the device is established. The two small fields (left side for sending; right side for receiving) are lighting green on data transfer. If both fields are lighting red an error occurred.

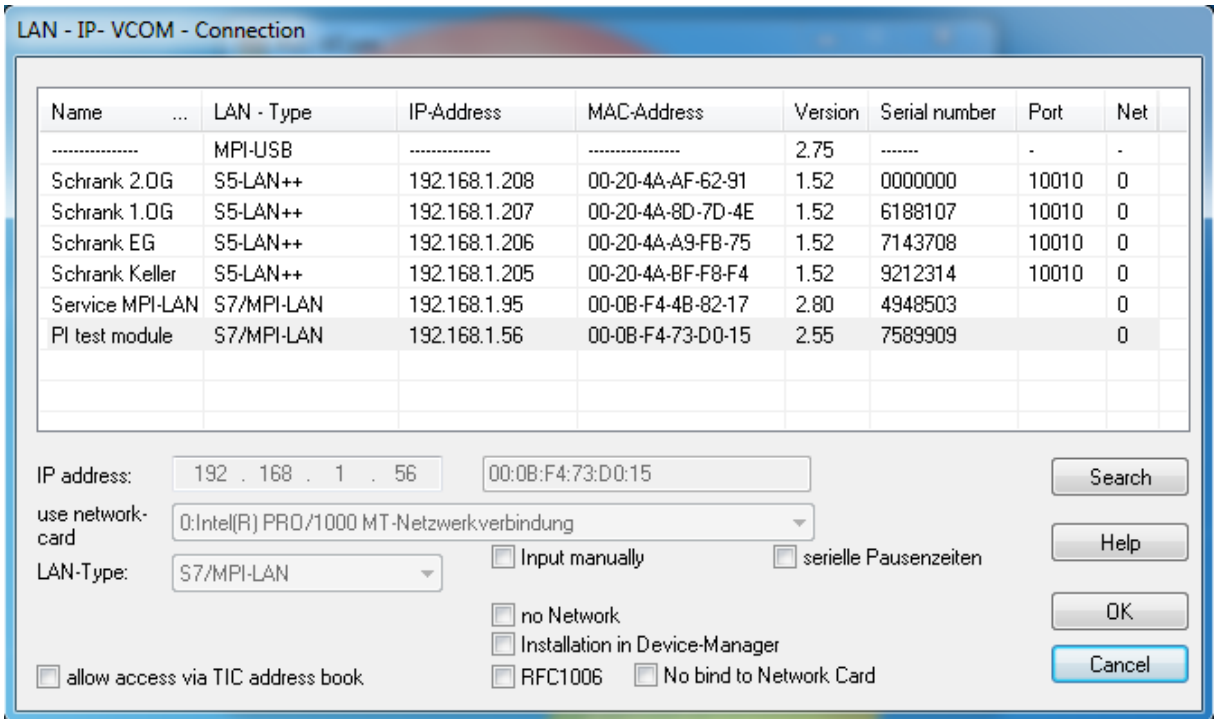
6.3 Configuration

In this section a description on how the PLC-VCOM and the LAN devices can be configured can be found.

The two programs S5-LAN-Manager and MPI-LAN-Manager are independent applications. But they are installed together with the PLC-VCOM and can be called up by the PLC-VCOM.

6.3.1 PLC-VCOM

If you want to change the settings of the PLC-VCOM or select a device, which should be used for the virtual COM port, you have to click on the button “Configure” behind the device view on the main window or click on the entry “PLC-VCOM” within the menu “Configuration”.



Hint:
The opening of the dialog can take a while, because the PLC-VCOM already executes a search for compatible devices.

On the top of the window you can see a list with all found USB and LAN devices.

column	**description**
Name	The name of the device which was configured by the user. *(LAN devices only)*
LAN-Type	The type of the device.
IP-Address	The IP address of the device. *(LAN devices only)*
MAC-Address	Die MAC address of the device. *(LAN devices only)*

Version	The firmware version of the device.
Serial number	The unique serial number of the device. *(LAN devices only)*
Port	The S5-PG-Port of the device. *(S5-LAN only)*
Net	The index of the network card where the device was found. *(LAN devices only)*

If you want to submit one of the founded devices for the communication, you have to click on the corresponding entry. All fields within the settings view below are filled in automatically.

All LAN devices who are located behind a router, can't be found by this search. If you want to set up such a device for the communication you have to select “Input manually”. After that you can configure the device settings manually.

Below of the device list you can find the settings view. There you can check the settings of a selected device again or configure it manually. If you want to configure the settings manually you have to enable the option “Input manually”. In addition to the device settings there are also some general parameters.

field	**description**
IP address	The IP address of the used device. Within the field behind the IP address the MAC address of the device may be viewed additionally.
use network card	The network card which should be used for the communication with the device.
LAN-Type	The type of the used device.
S5-PG-Port	The S5-PG-Port which should be used for the communication with the device. *(S5-LAN only)*
Input manually	Enable this option, if you want to set the device parameters manually.
serielle Pausezeiten	Indicates if the serial communication should be slowed down with breaks (maybe needed for

	e. g. panel transfers).
no Network	Indicates if the device doesn't need a network connection.
Installation in Device-Manager	Indicates if the virtual COM port from the PLC-VCOM should be installed within the Device-Manager (maybe needed for some applications).
RFC1006	Indicates if the connection should be done via the RFC1006 protocol. *(LAN devices only)*
No bind to Network Card	Indicates if the network card shouldn't be given to the operating system by the PLC-VCOM. In this case the operating system chooses the network card automatically.
allow access via TIC address book	Indicates if the address book from the TIC is allowed to remote control the PLC-VCOM (e. g. for setting up a device).

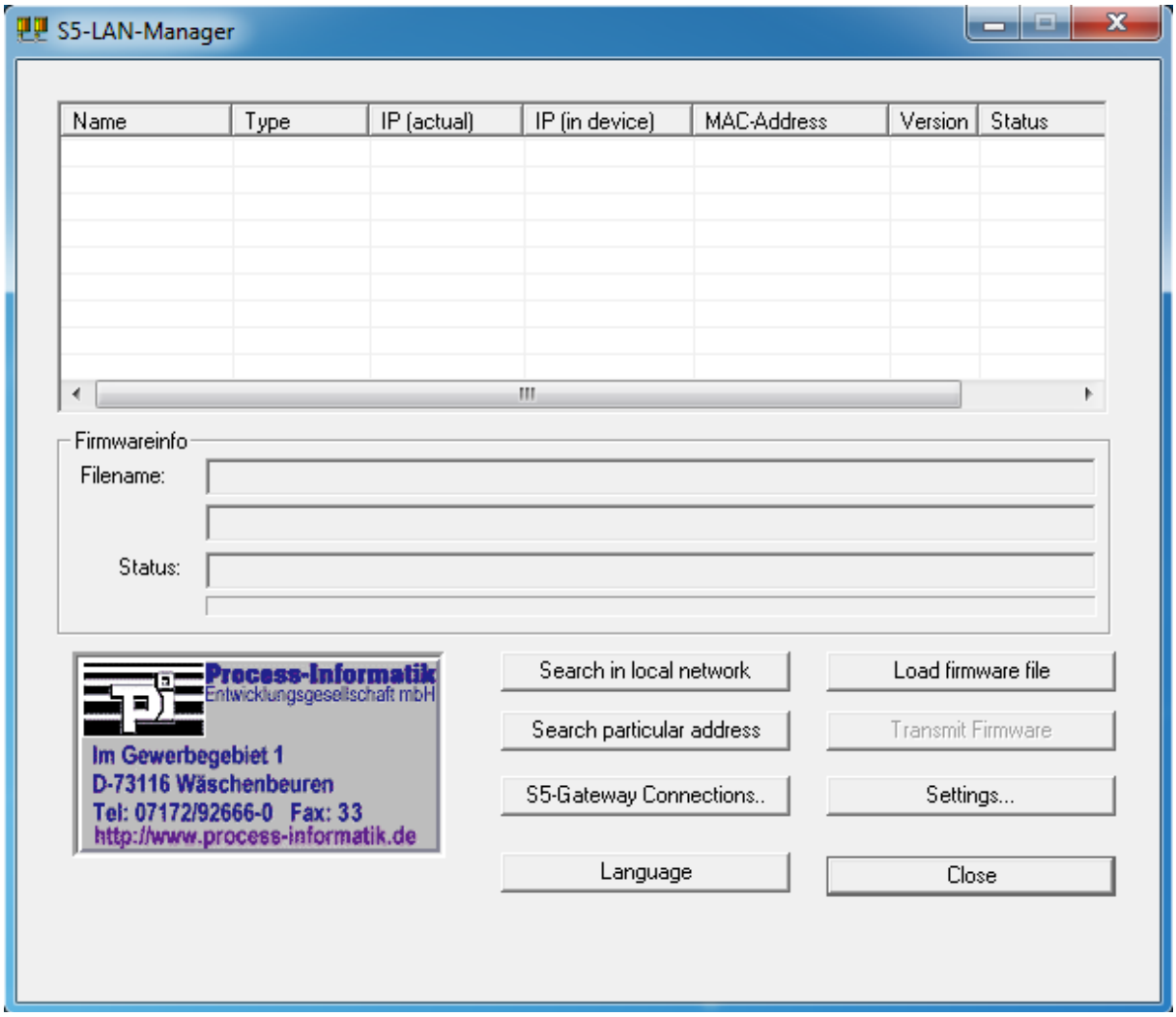
If you are done with the parameterization you can click on the button “OK”. All settings as well as the device selection are thereby saved and submitted.

When you want to exit the dialog without changing any setting you can click on the button “Cancel”.

If you click on the button “Search” you can execute a new search for devices again at anytime. This search can maybe be needed if you have connected a new device to your PC or network, after you have opened this dialog.

6.3.2 S5-LAN-Manager

The S5-LAN-Manager is a small tool which allows you to access and manage your S5-LAN modules. When you want to open the S5-LAN-Manager you have to click on the entry “S5LAN” in the “Configuration” menu.



If you want to search for all modules on your network you can click on the button “Search in local network”. After you have clicked on the button and waited for a few seconds all found devices will be shown in the list.

Devices which aren't within the same physical network as your PC (e. g. because the module is located behind a router) can't be found directly. If you want to search for such a device manually, you can click on the button “Search particular address” and then enter the IP address of this device on the dialog.

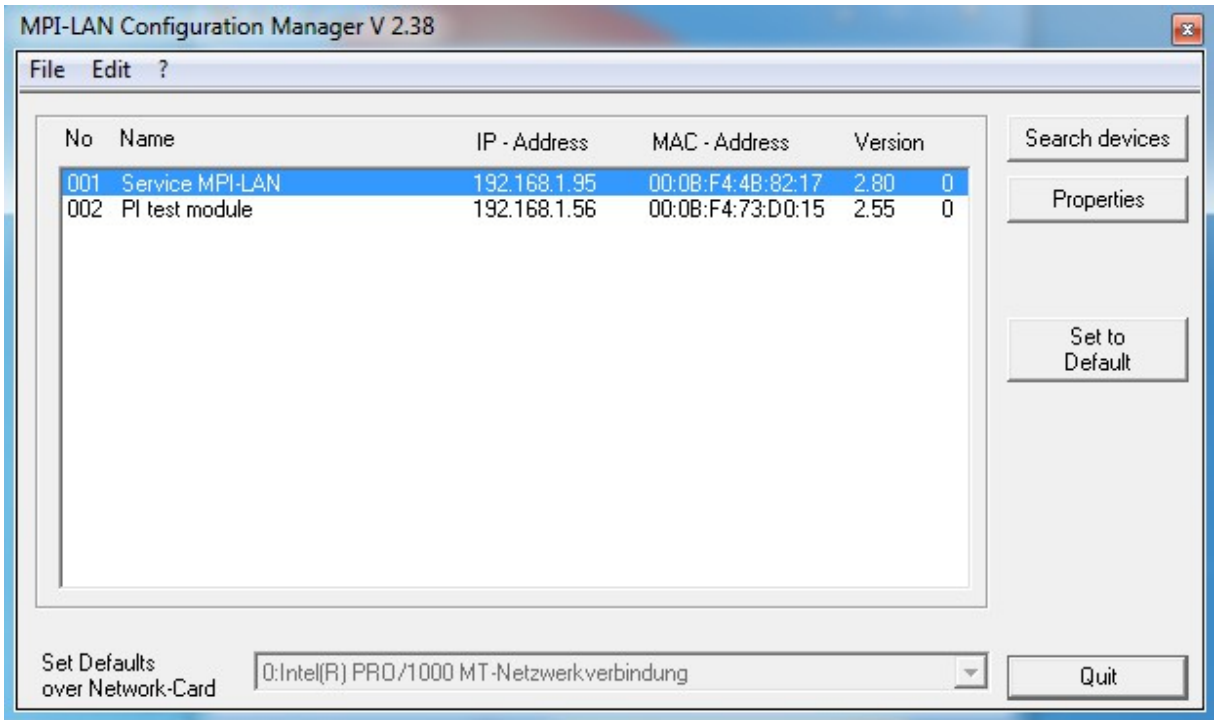
If your device was found, you can select it by clicking on the entry. In the next step you click on the button “Settings”, which opens a new dialog. There you can then change different parameters (e. g. the IP address or the S5-PG-Port) of the device.

If you want to change the language of the S5-LAN-Manager you can click on the button “Language”. After that a small window appears where you can choose the language between German and English.

A detailed explanation about the S5-LAN-Manager can be found within the manual for the S5-LAN modules.

6.3.3 MPI-LAN-Manager

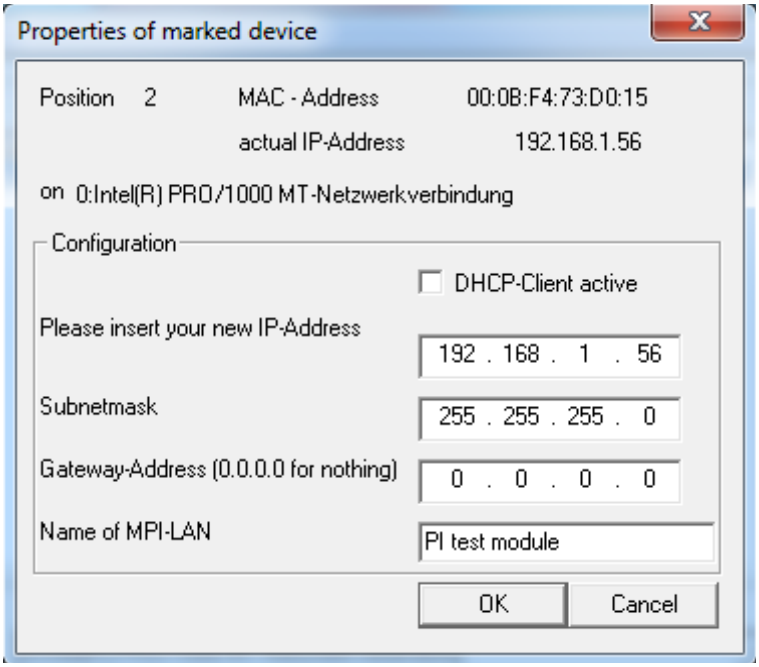
The MPI-LAN-Manager is a simple application for changing the network configuration from your LAN devices. To open the program you have to select the item “MPI/S7-LAN” from the menu “Configuration”. When the application starts the tool searches for reachable devices within your network automatically.



If you want to execute the search again, you can click on the button “Search devices” on the right side of the window.

The MPI-LAN-Manager can only find devices which are located on the same physical network as your PC. All devices which are located behind a router can't be found.

When you want to change the configuration of a device, you have to select it from the list first. After that you can click on the button “Properties” on the right side. Now a dialog should be opened, which allows you to configure the DHCP function, the IP address, the subnet mask and the IP address of the gateway as well as the device name. If you have finished your configuration you have to click on the button “OK” to submit the settings.



When the settings could be set successfully, you will get a success message, the dialog gets closed and a new search within the main window will be executed.

Hint:
The MPI-LAN-Manger can only be used to change the network configuration of your device. Other settings (e. g. for the MPI bus) can't be changed here. Please use the TIC driver or the web server of the device for further configurations.

Another function of the program is to reset all to the local network connected devices to factory defaults. Therefore you have to select in the list on which network card the special command should be send and the click on the button “Set to Default”. After a further safety query, which have to be confirmed, all devices in the network are reseted.

If you want to change the language of the configuration tool you have to click on “Edit” and afterwards on “Language”. Now you should see a dialog where you can select the language between German and English.

7 Project integration and couplings

Within this chapter a description can be found about how you can integrate your LAN device into your project without using a virtual COM port or the TIC driver as well as how to use couplings between multiple controllers or devices.

The project integration and couplings as described in this chapter can be done for LAN devices only. If you want to access your PLC via a USB device you always have to use a virtual COM port or the TIC driver.

7.1 SIMATIC Step 7 Manager

If you have created a project within the SIMATIC Manager for your controller you don't have to use a virtual COM port or the TIC driver for the communication between your PC and the device necessarily. Instead you can also communicate directly via network. This is possible, because the LAN devices are supporting the so called CP mode (RFC1006).

As a disadvantage of this variant it is to mentioned that you have to make a change on your Step7 project. Therefore you have to decide if you want to add a Dummy CP into the hardware configuration of your PLC or if you want to add an additionally Dummy PLC to your project. The Dummy PLC then gets connected and networked with the MPI or Profibus network of your real PLC.

Hint:
Even if the LAN device is integrated as a CP or network PLC the device can never replace the complete functions of a network CP.

If you can use the TIC driver this variant should be preferred from the here described project integration, because then you don't need to change anything on your project. You should use the project integration only if really necessary!

An advantage of the project integration for LAN devices is, that connections can be projected directly. This means you can configure a connection via network between a network controller and a further controller, where the S7-LAN, S7-GATE or MPI-LAN is connected to, easily. Without this integration into the project you would have to use a unspecified connection. A specified connection thereby provides an better overview.

Important:
The controller where the S7-LAN, S7-GATE or MPI-LAN is connected to always have to be the passive side. The module or cable thereby acts as a server. The client function where the device connects to another network participant isn't possible.

Even if the description in this chapter applies to the Siemens SIMATIC Manager the same procedure can also be done within the TIA Portal.

7.1.1 Usage of a Dummy CP

The usage of a Dummy CP within the hardware configuration of your PLC is the easier variant mostly. But you have to keep in mind that thereby the structure of your rack doesn't match the real existing structure anymore. Therefore you have to configure your PLC so that errors on the rack structure are getting ignored. This setting then applies to other modules as well. So if a module which should be connected to your rack but isn't connected currently, the controller remains within the RUN mode. If this isn't acceptable for you or if you don't want to change the hardware configuration of your PLC in this way you should consider to use a Dummy PLC (described within the next section).

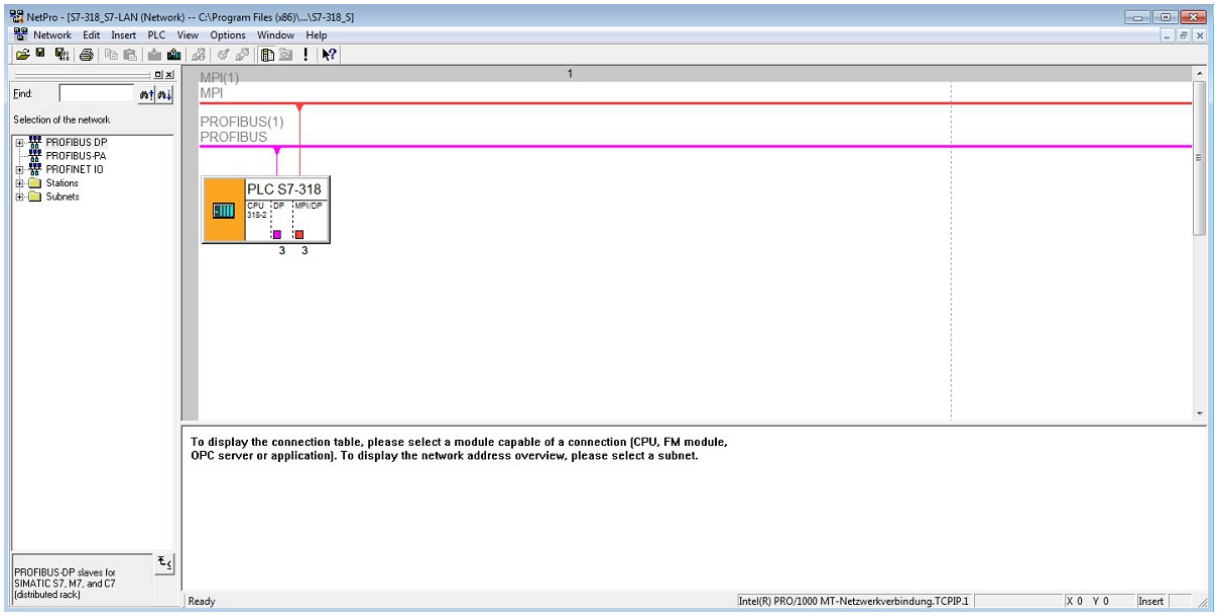
If you want to use the Dummy CP, you have to open the SIMATIC Manager as well as your Step7 project.

Before you can start with the configuration you should make sure that the PG/PC Interface is set up correctly. If you want to check this you can

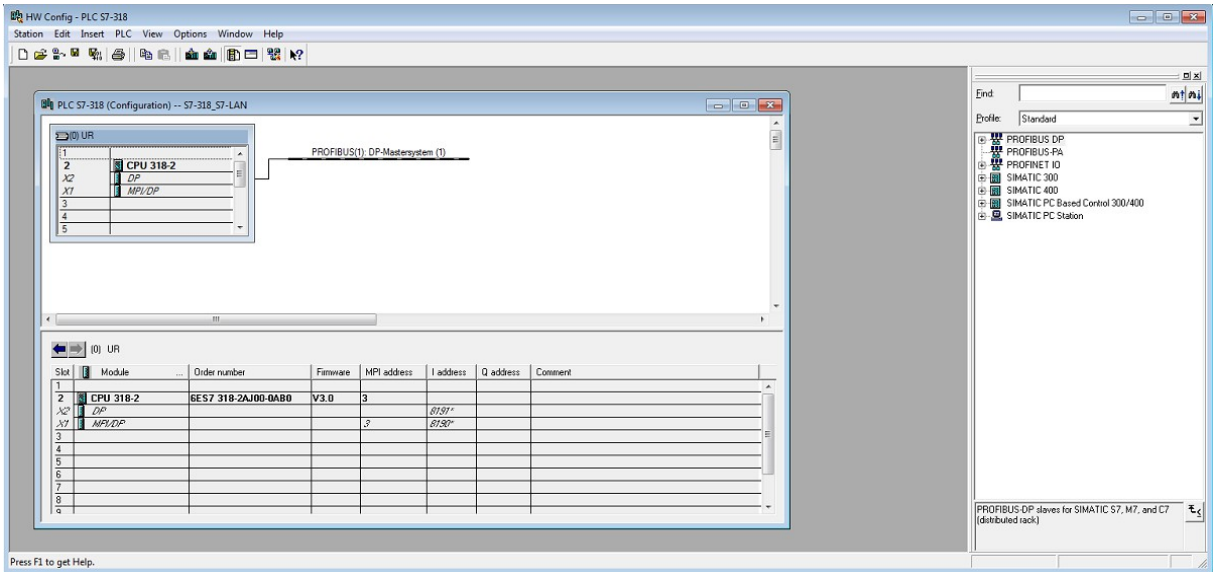
click in the menu “Options” on the entry “Set PG/PC Interface”. Thereby a new dialog gets opened where you should configure the selection “Interface Parameter Assignment Used”. On this list the TCP/IP driver suitable for your network card should be selected. Afterwards you can click on the button “OK”.

If you're using the Step7 program in version 5.2 or earlier the packet “SIMATIC NET” have to be bought and installed separately to use the TCP/IP communication. From version 5.3 this function is already included and gets installed automatically.

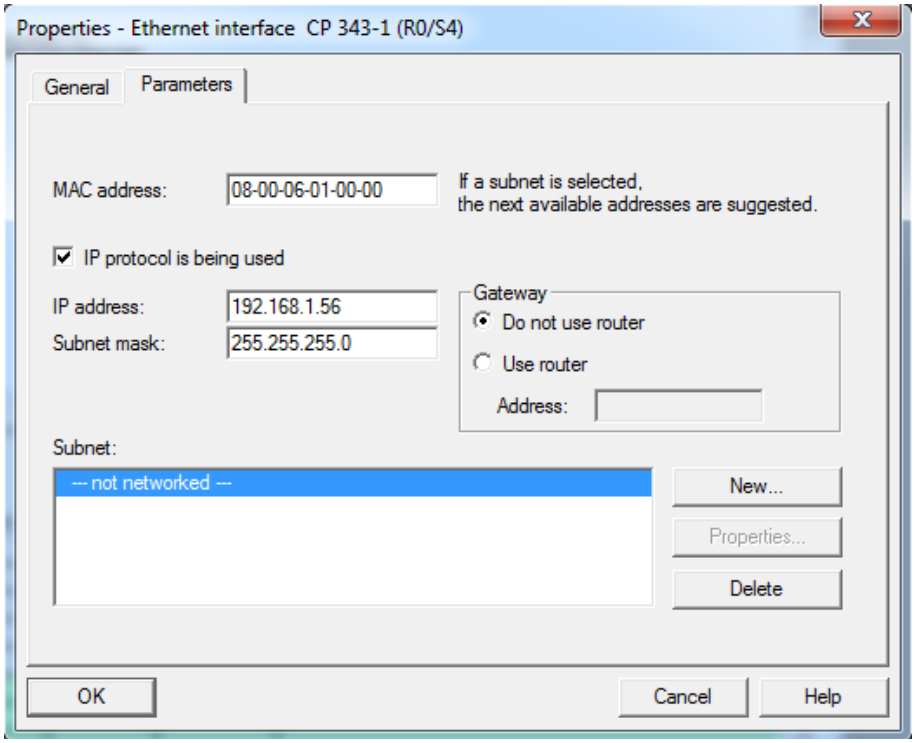
Now the Tool “NetPro”, which is part of the SIMATIC manager, have to be started. Therefore you can click on the menu “Options” on the entry “Configure Network”. Within the newly opened window you should see your PLC as well as further bus participants if available:



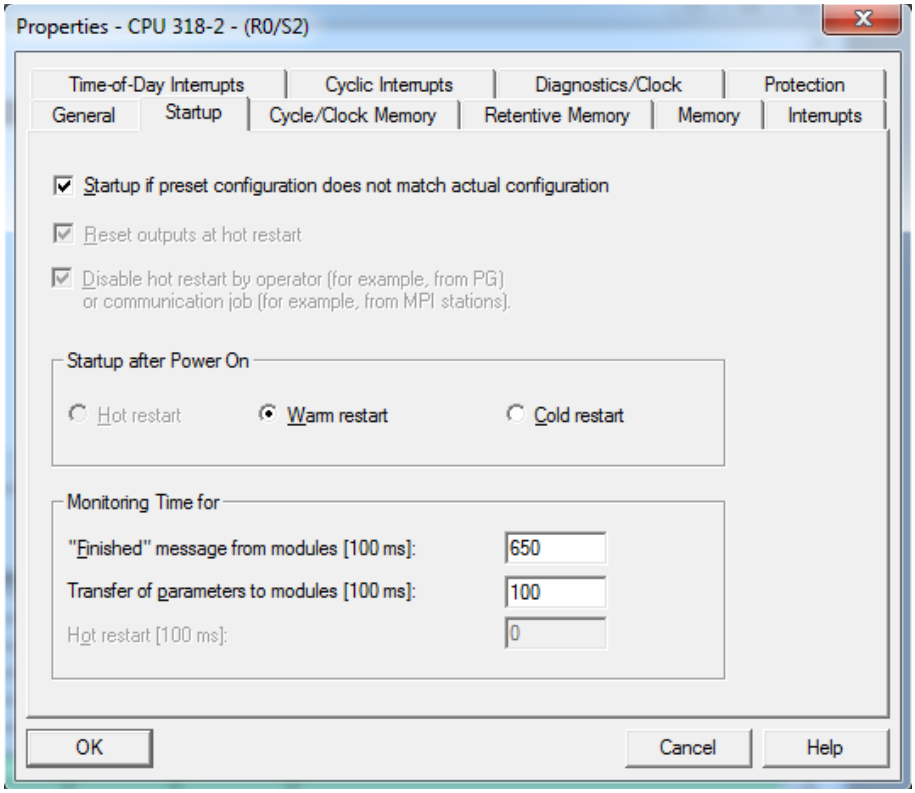
Afterwards you have to execute a double click on the SIMATIC 300/400 Station where the LAN device is connected to. Thereby the hardware configuration gets opened. This should then look similar to the following:



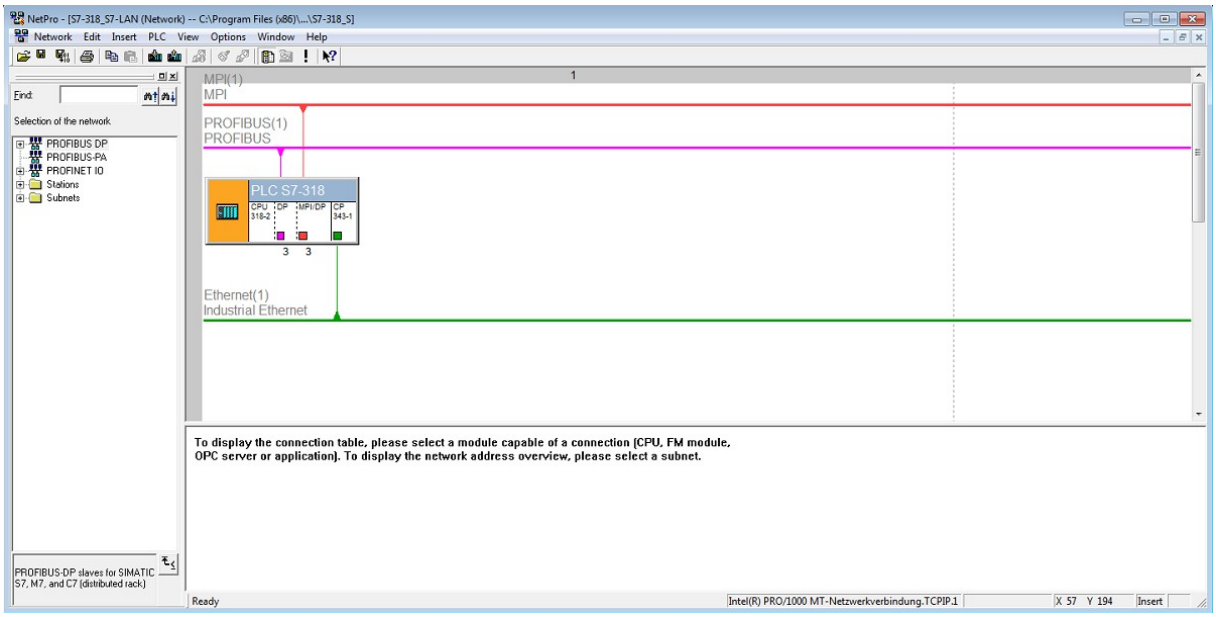
In the next step you can then add a CP (e. g. SIMATIC 300 → CP-300 → Industrial Ethernet → CP 343-1 → 6KG7 343-1EX10-0XE0 → V1.0) from the hardware catalog to your station. Afterwards the dialog with the properties of the CP will be opened automatically. On this dialog you have to enter the IP address and the subnet mask from your device. Furthermore you can also create a new Ethernet subnet or assign the the CP to an already existing subnet.



Subsequently you have to open the properties dialog of your CPU. This can be done by executing a double click on the CPU. There you have to navigate to the Tab “Startup” and make sure that the option “Startup if present configuration does not mach actual configuration” is enabled.

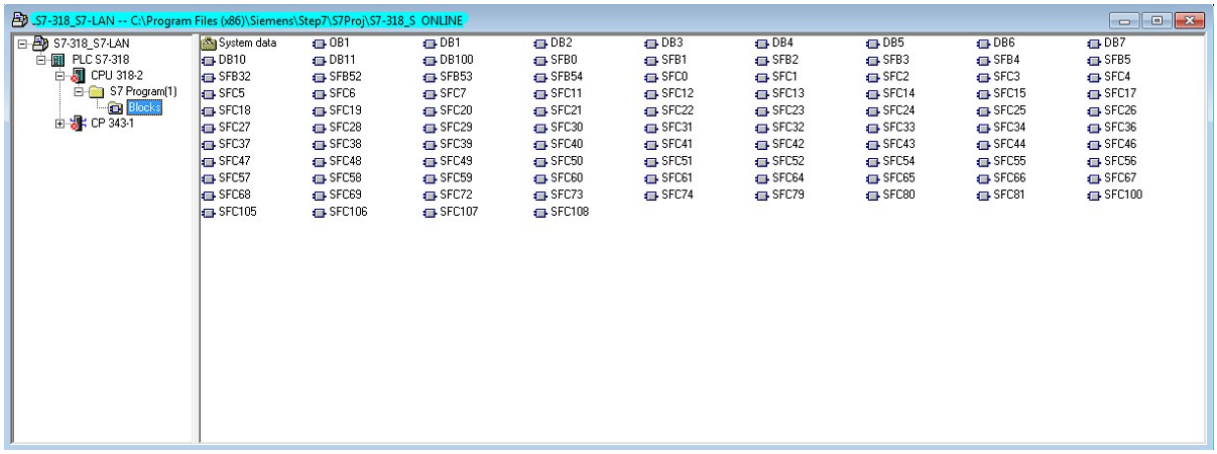


Now you can close this window, save the hardware configuration and close this dialog as well. The NetPro window should then be shown again. If you have created a new Ethernet subnet, this will now be visible on the dialog too.



In the next step you should save and compile your configuration again. Thereby the program also checks for possible errors or problems. When no errors occurred you can then download the configuration as well as your S7 program (only if needed) into your PLC.

Now all needed steps are done and you can communicate with your PLC directly via network. If you want to test the connection again you can e. g. switch the view to “Online” and show you up the blocks who are available in your PLC:



7.1.2 Usage of a Dummy PLC

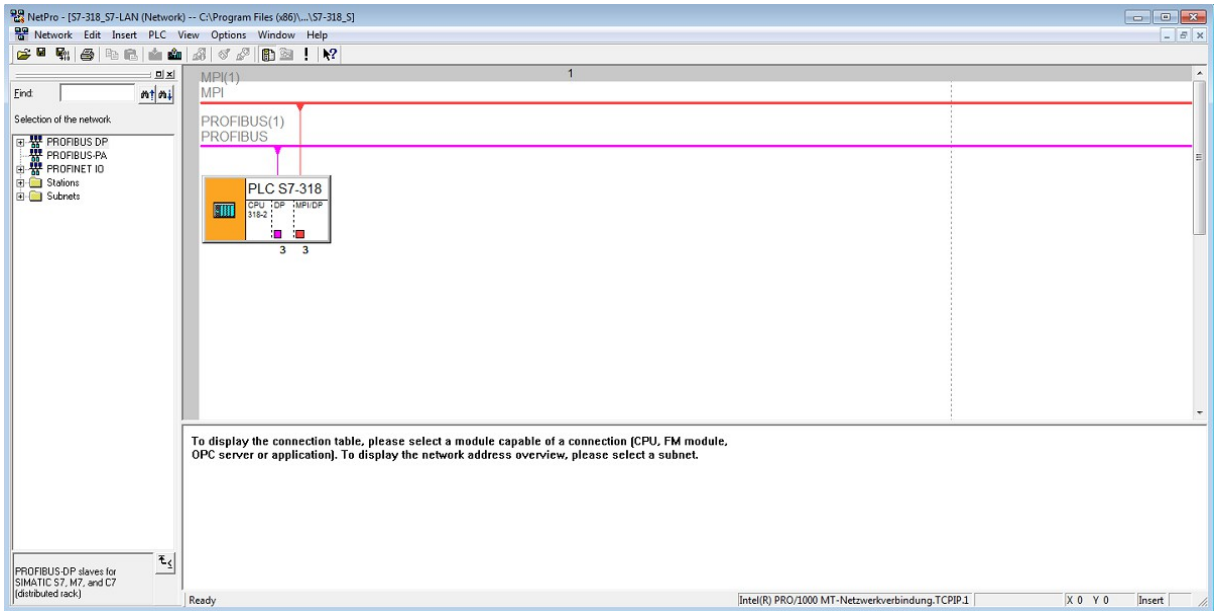
As an alternative to the usage of a Dummy CP you can also add a Dummy PLC to your project. This is also the saver and better variant in most situations, because you don't have to download a “wrong” configuration into your CPU.

Before you can start with the configuration you should have opened the SIMATIC Manager and the project of your controller.

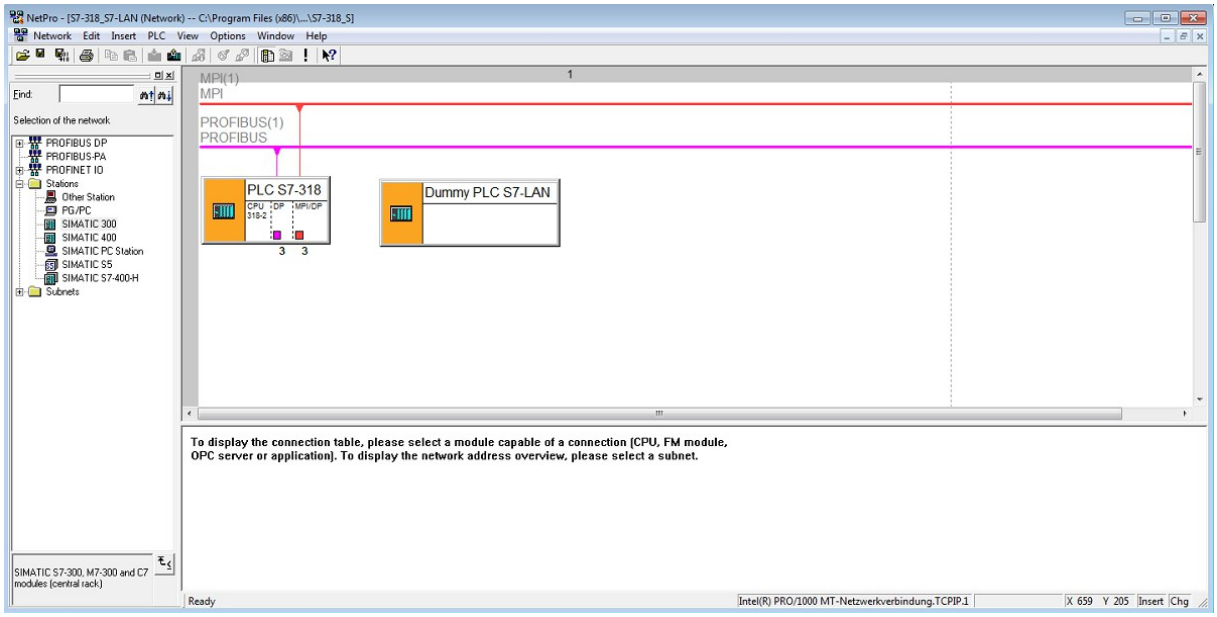
In the next step you should check and maybe change the settings within the PG/PC Interface. The settings dialog can be opened via the entry “Set PG/PC Interface” on the menu “Options”. Within this dialog the corresponding TCP/IP driver for your network card should be selected within the list “Interface Parameter Assignment Used”. If this isn't the case, please select the correct entry and finally click on the button “OK”.

When you have installed Step7 in version 5.2 or earlier the packet “SIMATIC NET” for using the TCP/IP communication have to be bought and installed separately. If you're using version 5.3 or newer this packet is already included.

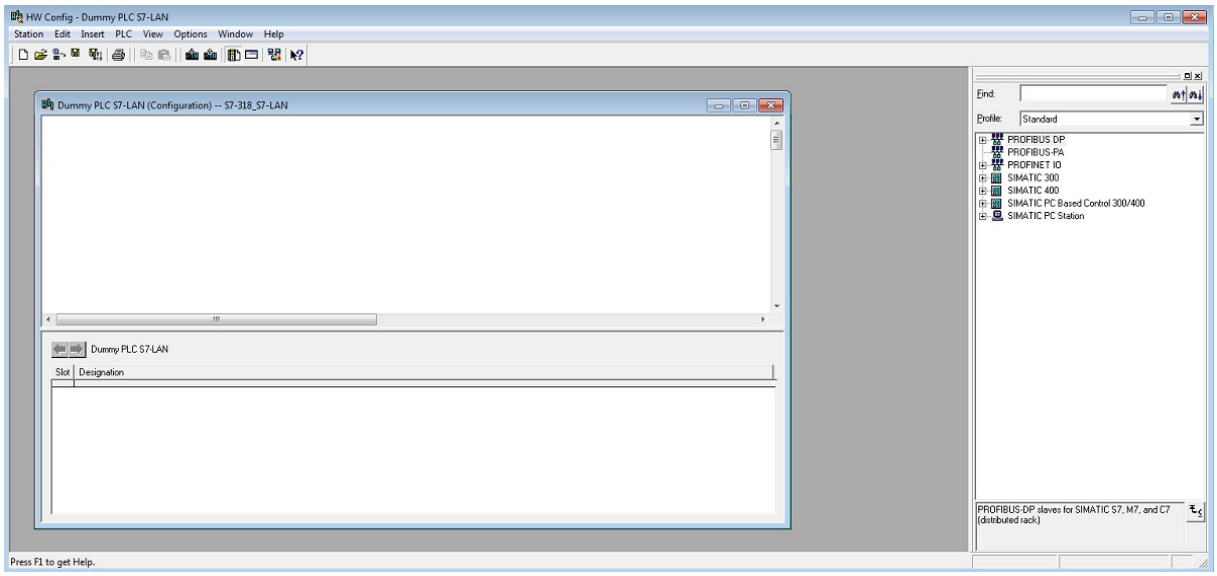
If all preparations are made you can begin with the configuration. Therefore you have to open the Tool NetPro. This can be done by clicking on the entry “Configure Network” within the menu “Options”. Within the NetPro window you should see all configured stations, this means your PLC as well as other bus participants if available:



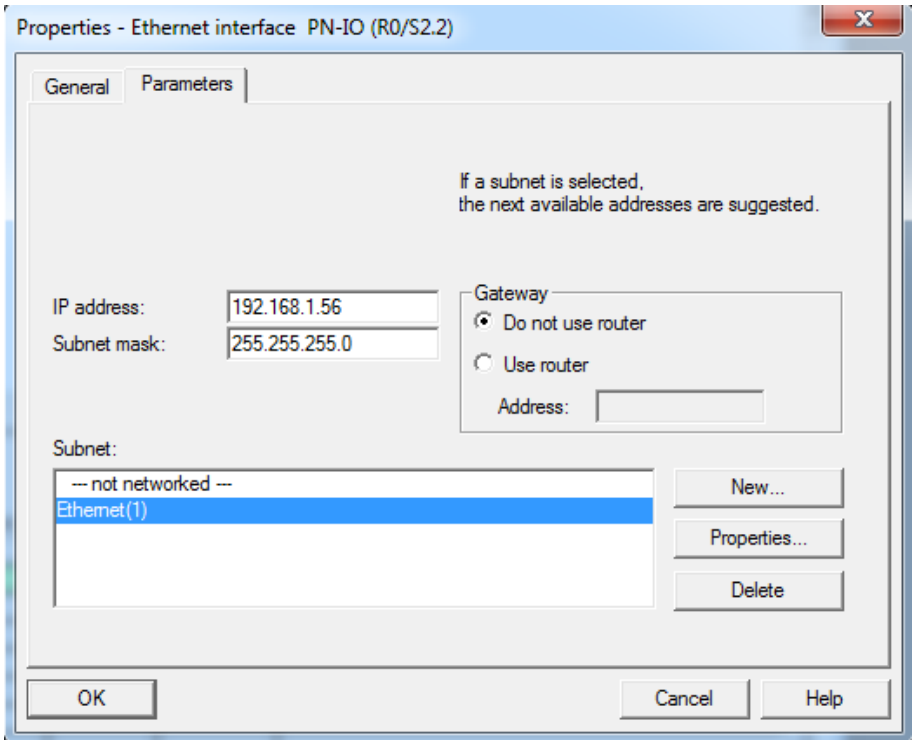
In the next step you have to add a “SIMATIC 300” station from the catalog on the left side. This can be renamed for a better understanding.



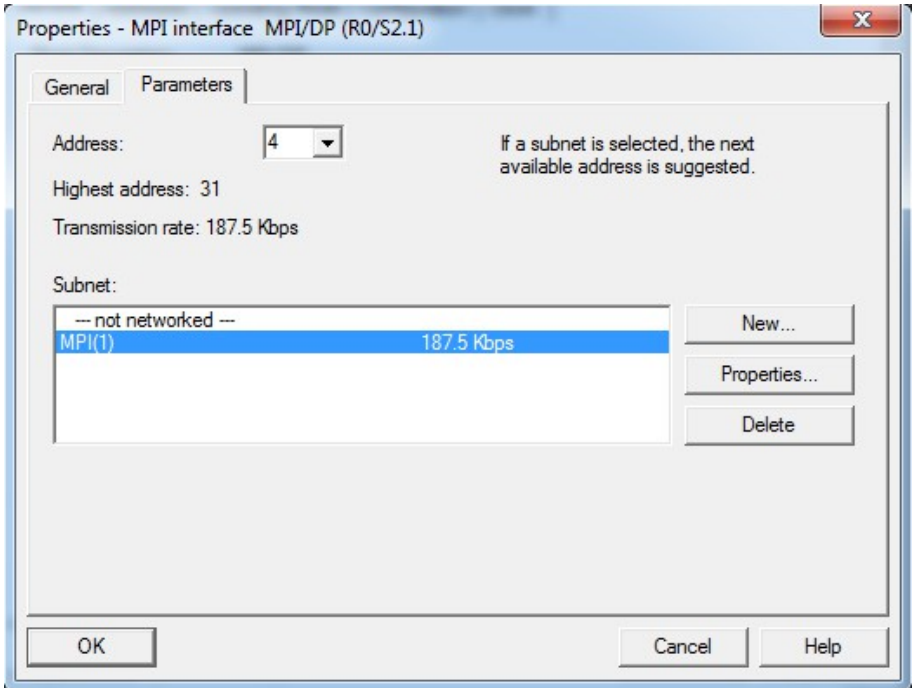
Now you have to execute a double click on the newly created station. This opens the hardware configuration, which should still be empty at the current moment.



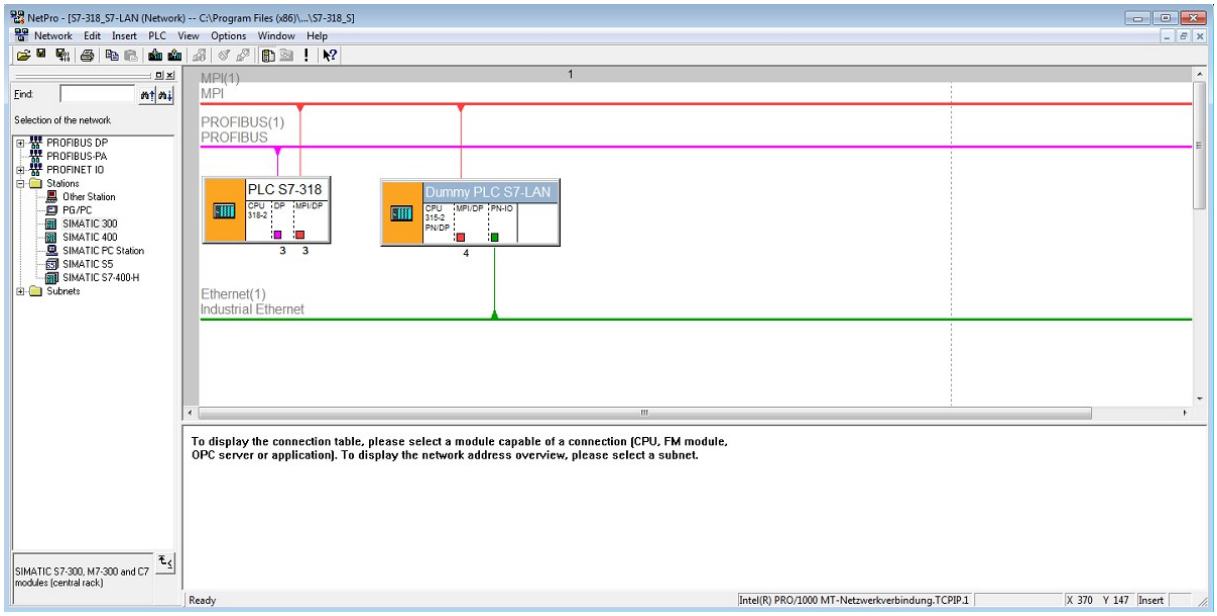
For adding new modules into the hardware configuration you have to add a rail (SIMATIC 300 → RACK-300 → Rail) from the catalog first. Afterwards you can add a PLC with integrated network connection (e. g. SIMATIC 300 → CPU-300 → CPU 315-2 PN/DP → 6ES7 315-2EG10-0AB0 → V2.3). Subsequently you should get a dialog with the network properties of the PLC. There you then have to enter the IP address and subnet mask from your LAN device:



In the next step you have to open the settings for the MPI or Profibus interface from your new PLC and then click on the button “Properties” within the section “Interface”. Now within the second dialog you then have to assign the interface to the subnet of your real PLC. If no subnet exists you have to create a new one by clicking on the button “New” and then assign your real PLC to the same subnet later. Furthermore you have to configure the station address of the Dummy PLC. This address have to be unused on the bus.

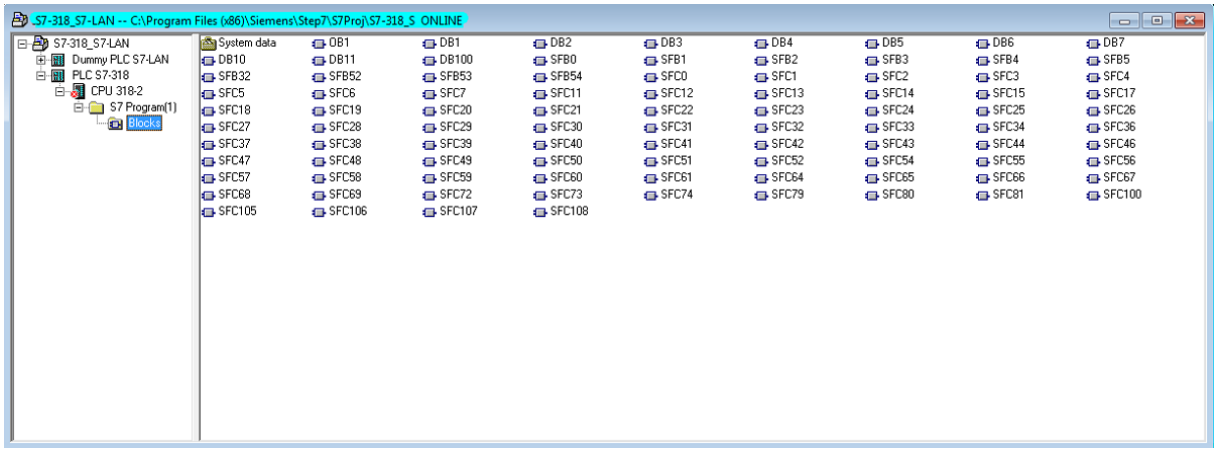


Now you can close both property windows, save the configuration and close the hardware configuration program. Afterwards you should see the NetPro window again. There you should then see your configuration of the Dummy PLC as well as the connection on the MPI/Profibus:



In one of the last steps you should save and compile the configuration again. If an error while compiling occur you should check all done settings again. Otherwise the configuration can be downloaded to the real existing controller. The transmission of the configuration to the Dummy PLC isn't possible and also don't needed.

Now, when the configuration is done, you can communicate with your PLC directly via network. If you want to test this, you can e. g. toggle the view to “Online” and let you show the block list of your CPU:



Hint:
Instead of a PLC with network interface you can also use a not network suitable controller together with a CP (e. g. CP 343-1). This may be needed on some situations like using a specified coupling with a ISO-on-TCP connection.

7.2 WinCC (also TIA version)

If you want to work with WinCC Runtime, you have to add another S7-PLC with an Ethernet interface as a "placeholder PLC" for the device to your WinCC project. For example you can use a S7-315-PN/DP.

The IP address of this PLC have to correspond to the IP address of the S7-LAN or S7-GATE module or the MPI-LAN cable. Of course, both participants (PC and module) have to be in the same subnet. The communication of WinCC and the placeholder controller takes place via S7-TCPIP (RFC1006), and so via network. This connection have to be done even if the "real" controller can be addressed via MPI or Profibus only.

In order to import the symbols and the data blocks into WinCC, they must be copied from the real S7-PLC to the “virtual” PLC first. Only with this manual step, you have the comfort of reading and using the variables of your PLC in WinCC.

7.3 Coupling between controllers

The module S7-Gateway can be used for the coupling between two controllers. The partner controller thereby can be another S7-PLC with a S7-LAN, S7-GATE or MPI-LAN, a S7-PLC with a network interface or network CP as well as a S5-PLC with a S5-LAN++ module.

When using a SEND/RECV coupling a send and receive buffer is available on both sides, whereby a data exchange in both directions is possible. Each side then can decide what happens with the data in the receive buffer.

In comparison to this coupling, a coupling with PUT/GET directly reads (GET) or writes (PUT) the data areas of the partner PLC (e. g. flags or data blocks). This means the side where PUT/GET gets controlled decides from where the data should be read in and where the data should be written to.

Within the chapter “Example applications” you can find detailed explanations about the example programs for the S7-Gateway module.

The communication between the two controllers uses the RFC1006 protocol (port 102; from Siemens also called ISO-on-TCP connection). When using SEND/RECV the device can be used to actively connect to the partner CPU as well as waiting for a connection from the partner. If the S7-Gateway module is used with a PUT/GET coupling, the S7-LAN, S7-GATE or MPI-LAN always actively connects to the partner controller. The connection within the partner controller haven't to be configured.

The data exchange via SEND/RECV is managed with a data block on each controller. This data block should have the following structure:

address	**description**
DW0	receive buffer: data type (e. g. 'I', 'Q', 'F' or 'D')
DW2	receive buffer: data block number (only for type 'D')
DW4	receive buffer: offset / start address in the buffer in bytes
DW6	receive buffer: length of the buffer in bytes
DW8	*receive buffer: reserved for future use*
DW10	send buffer: data type (e. g. 'I', 'Q', 'F' or 'D')
DW12	send buffer: data block number (only for type 'D')
DW14	send buffer: offset / start address in the buffer in bytes
DW16	send buffer: length of the buffer in bytes
DW18	*send buffer: reserved for future use*
DW20	send job: length of the data to send
DW22	send job: state of the transmission (see below)
DB24	send job: control and status bits Bit 0 = do sending Bit 1 = error on execution Bit 2 = execution done
DB25	*send job: reserved for future use*

DW26	receive job: length of the received data
DW28	receive job: state of the transmission (see below)
DB30	receive job: control and status bits Bit 0 = release receiving Bit 1 = error on execution Bit 2 = execution done
DB31	*receive job: reserved for future use*

If you are using PUT/GET as coupling, a data block only have to exists in the PLC, where the S7-LAN, S7-GATE or MPI-LAN is connected to. The structure of this data block is as follows:

address	**description**
DW0	GET locale CPU: data type (e. g. 'I', 'Q', 'F' or 'D')
DW2	GET locale CPU: data block number (for type 'D')
DW4	GET locale CPU: offset / start address in bytes
DW6	GET locale CPU: length in bytes
DW8	*GET locale CPU: reserved for future use*
DW10	PUT locale CPU: data type (e. g. 'I', 'Q', 'F' or 'D')
DW12	PUT locale CPU: data block number (for type 'D')
DW14	PUT locale CPU: offset / start address in bytes
DW16	PUT locale CPU: length in bytes
DW18	*PUT locale CPU: reserved for future use*
DW20	PUT: length of the data to send
DW22	PUT: state of the transmission (see below)
DB24	PUT: control and status bits Bit 0 = do sending Bit 1 = error on execution Bit 2 = execution done
DB25	*PUT: reserved for future use*
DW26	GET: length of the received data
DW28	GET: state of the transmission (see below)

DB30	GET: control and status bits Bit 0 = release receiving Bit 1 = error on execution Bit 2 = execution done
DB31	*GET: reserved for future use*
DW32	GET partner CPU: data type (e. g. 'I', 'Q', 'F' or 'D')
DW34	GET partner CPU: data block number (for type 'D')
DW36	GET partner CPU: offset / start address in bytes
DW38	*GET partner CPU: reserved for future use*
DW40	PUT partner CPU: data type (e. g. 'I', 'Q', 'F' or 'D')
DW42	PUT partner CPU: data block number (for type 'D')
DW44	PUT partner CPU: offset / start address in bytes
DW46	*PUT partner CPU: reserved for future use*

Hint:
When you want to transfer data from or to the variable area of a S7-200 controller the data type 'D' and the data block number 1 have to be used.

For an easier integration within your PLC program there are function blocks / codes available. These as well as a template of the data block can be found within the example programs. You can use them if you like to.

The values for the job status are oriented on the codes used by Siemens for FC5/6. The following codes are used from the LAN devices:

value	**description**
0x0000	query successfully executed
0x7000	query not executed yet
0x80B0	data area does not exists
0x80B1	length parameter is wrong
0x80C2	query overflow

0x80C3	memory overflow
0x80C4	communication error
0x8180	no query present
0x8181	query in progress (PUT/GET only)
0x8184	data type is wrong
0x8185	length exceeds data area
0x8302	S7-TCP connection not established
0x8304	IP connection not established
0x8311	destination IP address not existing
0x8312	TCP connection not available
0x8F3A	control DB does not exists
0x9000	protocol error in response (PUT/GET only)
0x9001	data area on partner does not exists (PUT/GET only)
0x9002	data type for partner is wrong (PUT/GET only)

Hint:
The status of a configured gateway connection can also be viewed within the page “Connections” on the web server of the device.

7.4 Translation from MPI to network

In regular the S7-LAN, S7-GATE and MPI-LAN works as a gateway or translator between network and MPI. This means that a network participant can access the device as if it were a controller with network interface. With the included module S7-Gateway and the coupling variant “X_PUT/X_GET” it is possible that a MPI participant can access a controller with network interface through the S7-LAN, S7-GATE or MPI-LAN. This controller thereby can be a S7-PLC with another S7-LAN, S7-GATE or MPI-LAN, a S7-PLC with a network interface or network CP as well as a S5-PLC with a S5-LAN++. For this coupling the device interacts as a translator between MPI and network.

Within the chapter “Example applications” you can find a detailed explanation about the example program which uses the coupling “X_PUT/X_GET” from the S7-Gateway module.

For the communication between the controller and the LAN device the function codes X_PUT (SFC68) and X_GET (SFC67) who are delivered by Siemens can be used. A configuration of the connection within the PLC haven't to be done, because the MPI address is directly passed to the functions X_PUT and X_GET.

Hint:
The function codes X_PUT and X_GET can be used for connections on the MPI bus only. On the Profibus this functions and thereby this coupling can't be used.

Instead of the coupling between a controller with MPI interface and a controller with network interface, the coupling for “X_PUT/X_GET” can also be used to connect a terminal with MPI or Profibus interface to a PLC with network interface. Therefore you only have to configure a HMI/S7connection on the MPI or Profibus interface to the station address of the S7-LAN, S7-GATE or MPI-LAN as well as the desired variables within your terminal.

For the communication between the S7-LAN, S7-GATE or MPI-LAN and the controller with network interface a RFC1006 connection (port 102; from Siemens also called ISO-on-TCP connection) is needed. The connection is actively started by the device to the partner controller when the first job with user data is received from a participant on the bus. The connection within the partner controller haven't to be configured.

Because the MPI bus doesn't know anything about IP addresses the LAN device have to know to which network participant a connection should be established.

The easiest way to do this is by adding a connection with the type “X_PUT/X_GET” on the page “S7-Gateway”. There you can then specify the IP address of the partner as well as the both TSAPs.

If you want to control the IP partner from within the PLC program, e. g. to execute multiple PUT and GET jobs to different network controllers, you have to create a data block within your PLC. This data block then have to be transmitted to the device with a call of the X_PUT function. An existing connection thereby gets closed and the parameters will be stored for the next connection. The specified destination address for such a X_PUT call is completely arbitrary, with the single exception that a data block have to be referred. The data block with the IP data needs the following structure and content:

address	**description**	**example**
DB0	Identification for IP data (fixed)	'S'
DB1	Identification for IP data (fixed)	'7'
DD2	IP address of the partner controller	DW#16#C0A80137
DB6	Length of the source TSAP	B#16#02
DB7	Length of the destination TSAP	B#16#02
DB8	Connection type of the source TSAP	B#16#02
DB9	Rack/Slot of the source TSAP	B#16#00
DB10-DB23	Remaining bytes of the source TSAP *(usually not used)*	-
DB24	Connection type of the destination TSAP	B#16#02
DB25	Rack/Slot of the destination TSAP	B#16#02
DB26-DB39	Remaining bytes of the destination TSAP *(usually not used)*	-

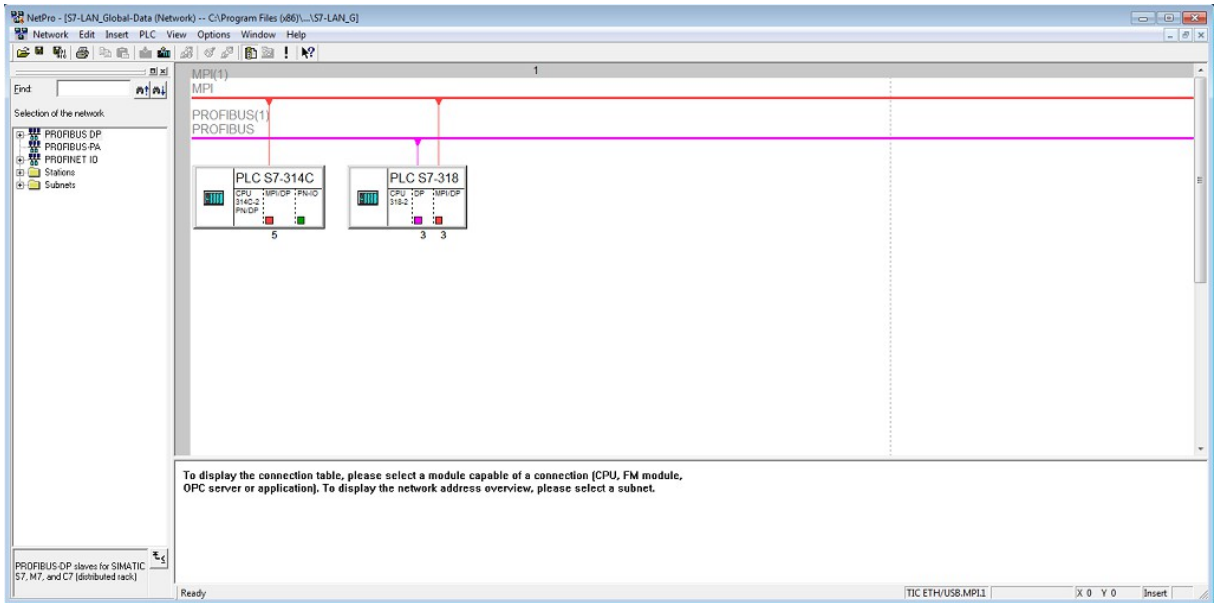
Hint:
A maximum of one coupling via X_PUT/X_GET can be used at the same time. This is also the reason why you can only specify one coupling of this type on the page “S7-Gateway”.

7.5 Global data communication

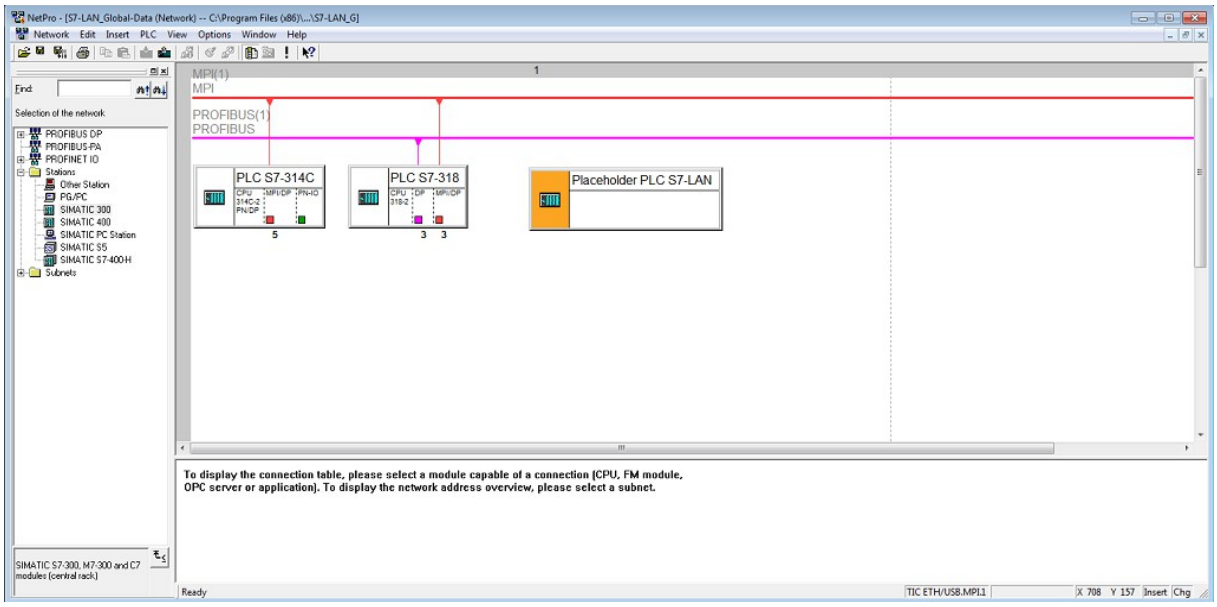
Within the SIMATIC Manager you have the possibility to configure a data exchange between multiple S7-300/400 controllers called Global data communication. But this communication is limited to controllers who are connected with each other on the MPI bus. With a S7-LAN, S7-GATE or MPI-LAN you are now able to extend this communication to a controller with a network interface. This controller can be another S7-PLC with a S7-LAN, S7-GATE or MPI-LAN, a S7-PLC with network interface or an integrated network CP as well as S5-PLC with a S5-LAN++.

To be able to use the Global data on your LAN device you will have add your device as a placeholder PLC into your project.

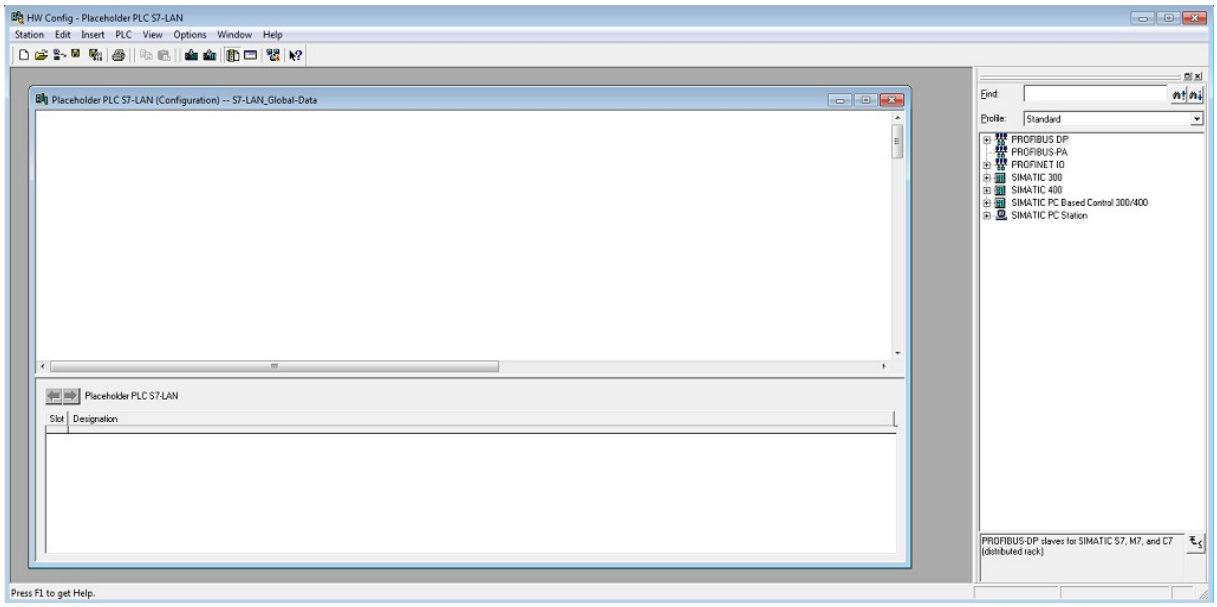
First you need to open your existing project and open the tool NetPro. This can be done by clicking on “Configure network” within the menu “Options”. In the newly opened window you should now see all stations who are already within your project:



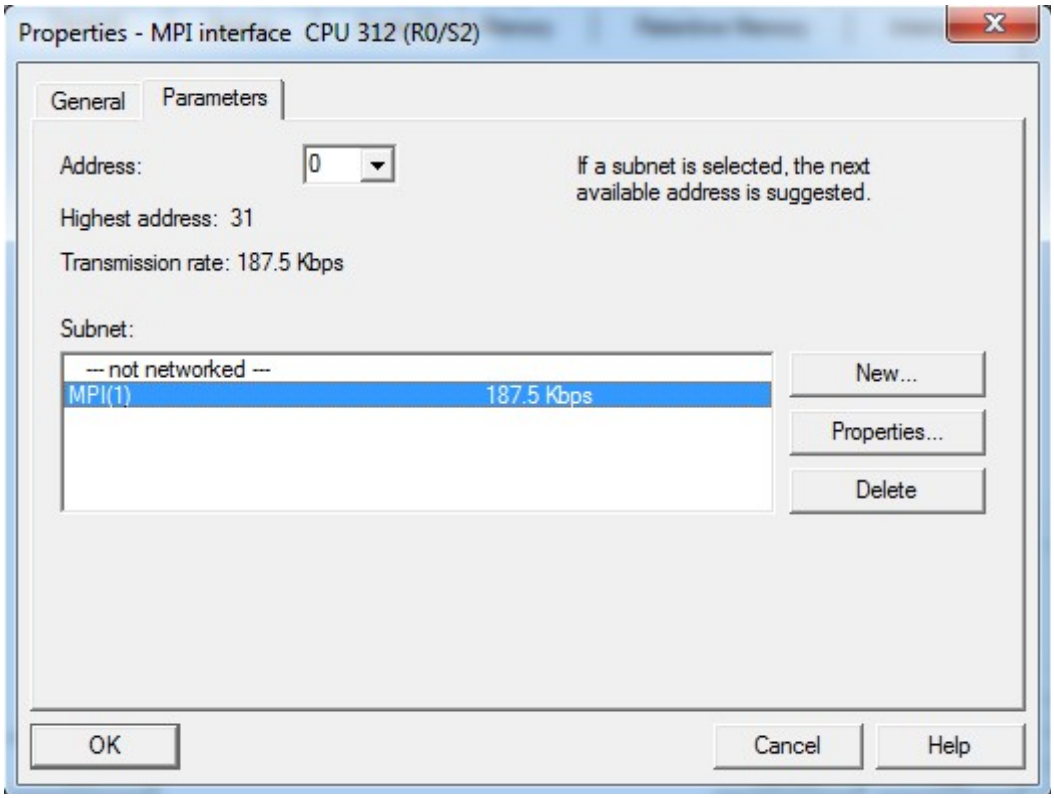
Now you have to add a new “SIMATIC 300” station to your project. This can be selected from the catalog on the left side. Finally you should give the station a suitable name for a better identification.



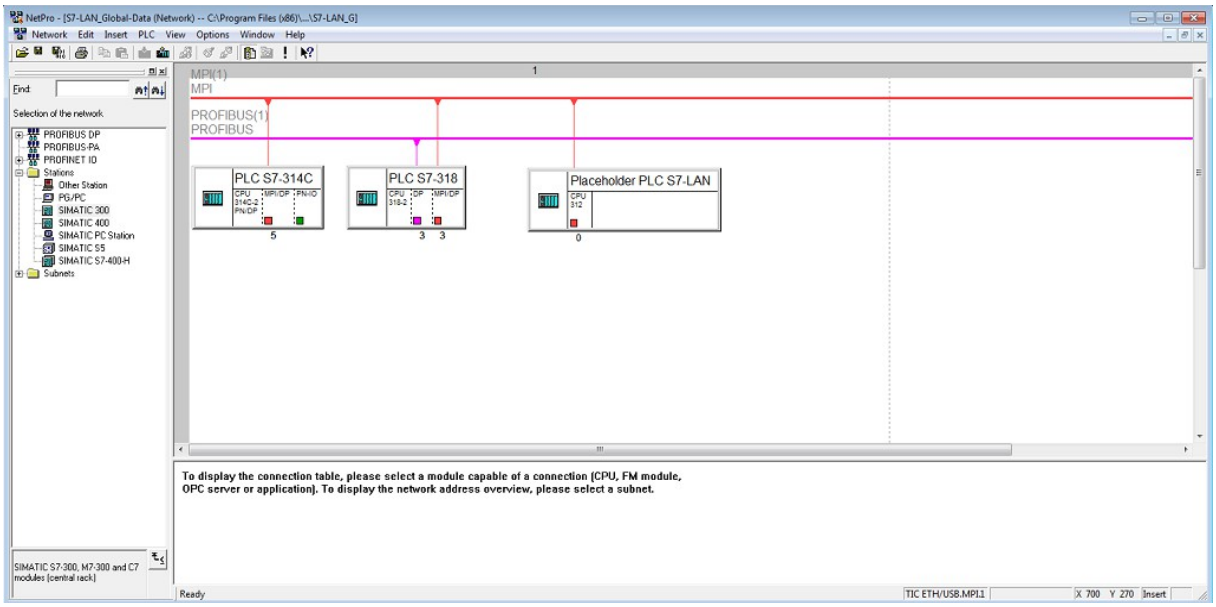
Next you should execute a double click on the newly created station to open the hardware configuration program:



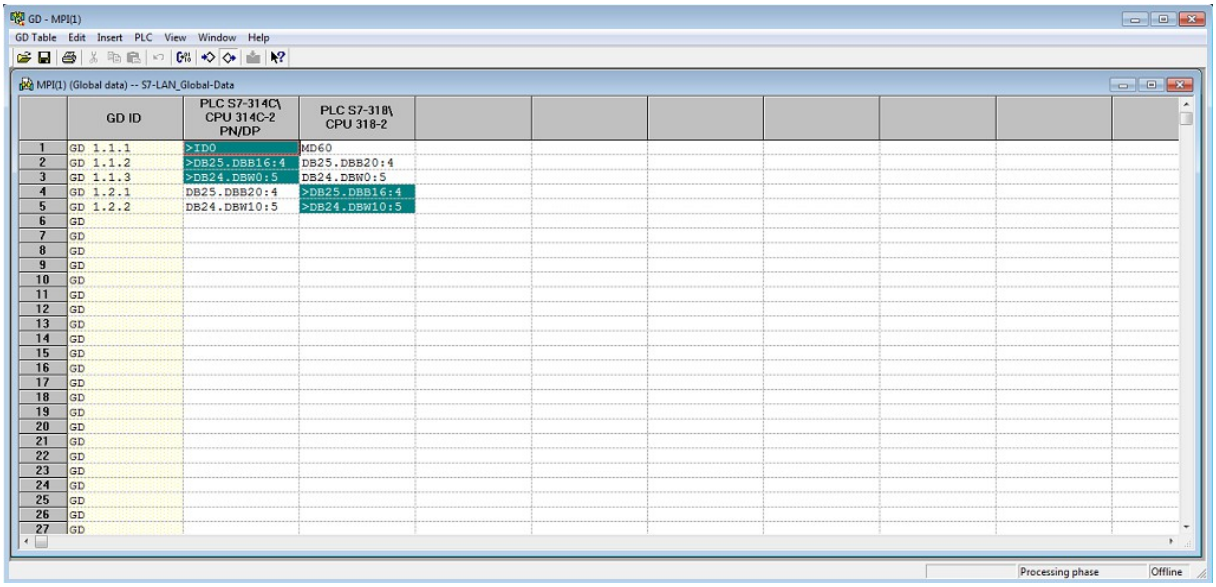
Within this window you now have to add some components from the catalog on the right side. First you will have to add a rail (SIMATIC 300 → RACK 300 → Rail) and afterwards a CPU (e. g. SIMATIC 300 → CPU-300 → CPU 312 → 6ES7 312-1AE14-0AB0 → V3.3). In the next step you have to open the properties from your CPU and then click on the button “Properties” within the section “Interface”. In this dialog you then have to select your existing MPI subnet and enter the local subscriber address of your LAN device as the address of the CPU.



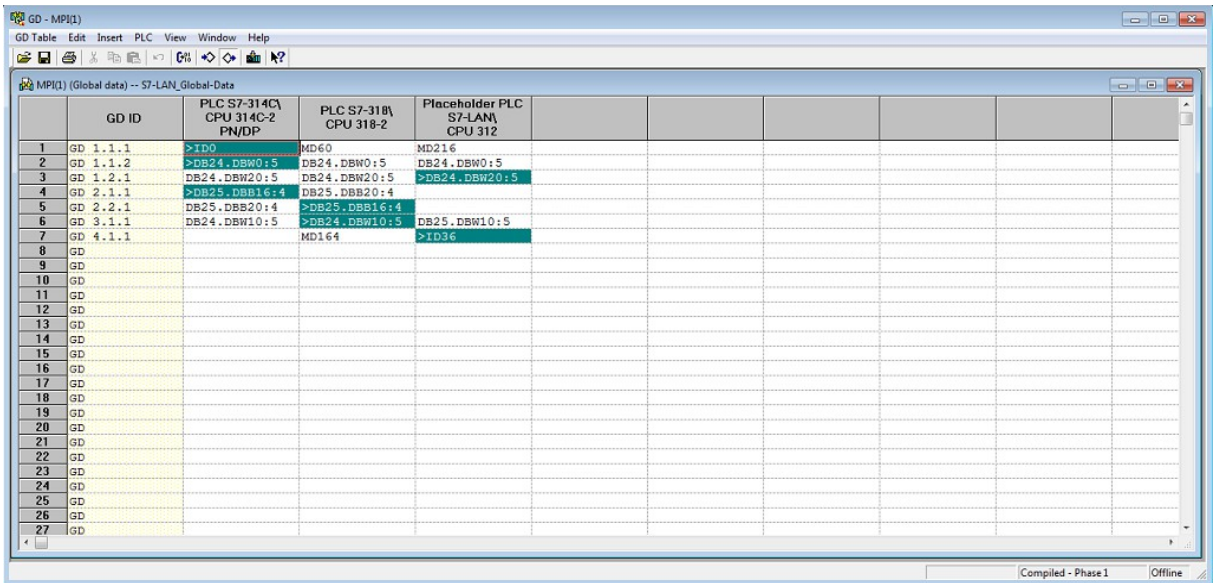
Now you can close the both property windows, acknowledge the warn message with “No”, save and compile your configuration and close the hardware configuration window. You then should see the NetPro window again with the connection on the MPI bus:



In the step the Global data needs to be configured. For this you will have to execute a right click on the MPI subnet and select “Define Global data”. Thereby a new window with the Global data table gets opened:

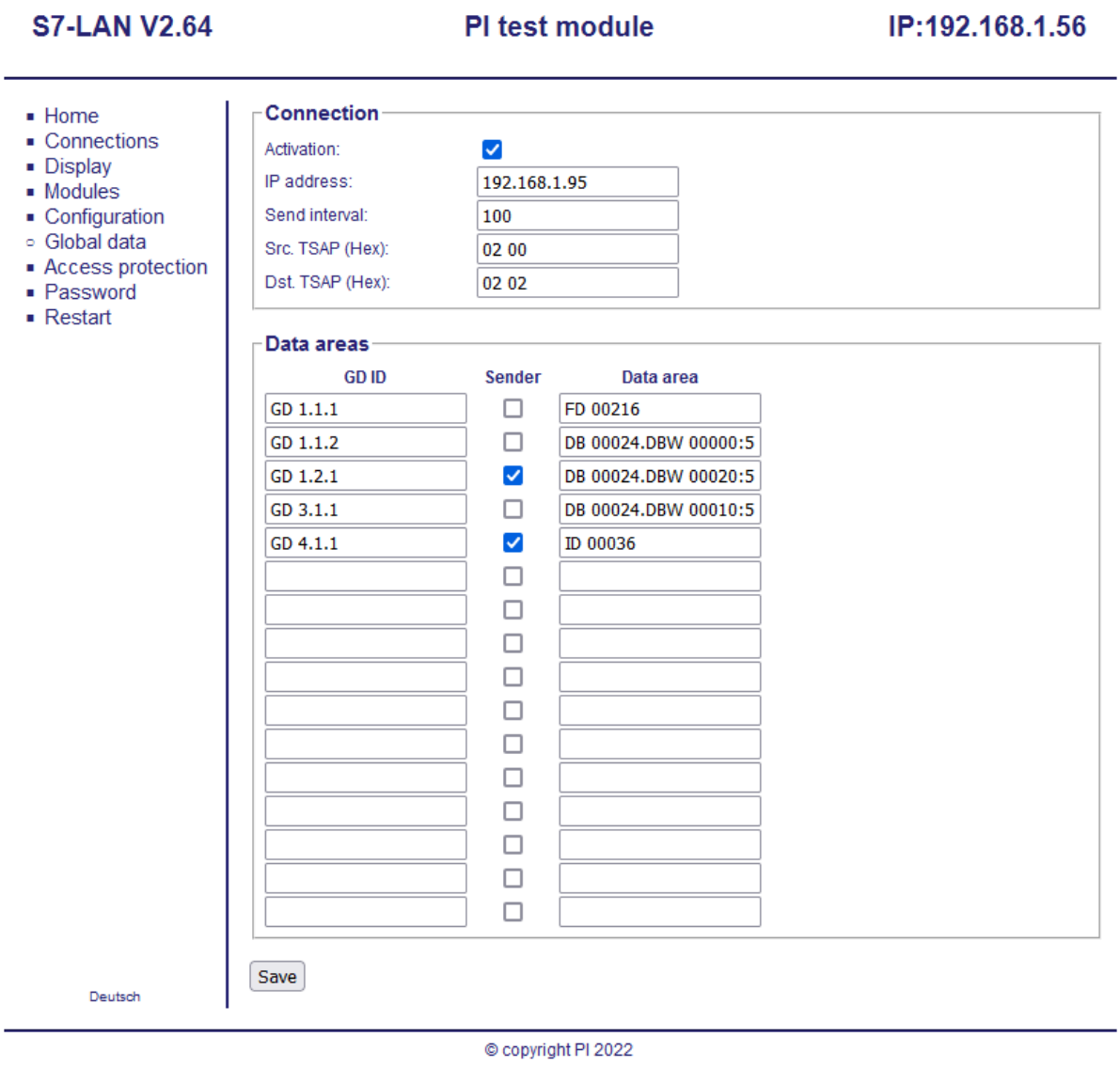


Here you will now have to add your placeholder PLC. This can be done by double-clicking on the first free column of the table and selecting the CPU of the placeholder PLC. Afterwards you can then fill in the cells of the table as usual. The LAN device can be used as a sender as well as a receiver. If you have finished you configuration you should save and compile it. Through this step the GD identifiers gets generated and the table will be sorted after this.



Finally you have to load the configuration into your controllers. Please note that you can't load the configuration into the placeholder PLC. You will have to enter this data manually via the web server of your LAN device.

When you have finished the configuration of the Global data within the SIMATIC Manager and loaded it into the controllers you will have to announce the data areas on the LAN device. For this you will have to open the page “Global data” on the web server. In the first step you have to specify the connection to the controller with network interface where the data should be transmitted to or read from. Afterwards you can fill in the table with the data areas. The GD identifiers and the data areas have to be taken over from the configuration within the SIMATIC Manager.



Important:
A Global data entry where the LAN device is not involved may not be specified within the table on the web server.

On the partner controller with network interface the connection have not to be configured. This is possible because the LAN actively connects to the controller and read and writes the data via the PUT/GET access.

Hint:
If you use a S7-120/1500 as partner controller, pleas make sure that the access via PUT/GET is enabled.

7.6 Coupling between IP devices

Alternatively to the coupling between two controllers you can also couple your S7-LAN, S7-GATE or MPI-LAN with another network participant which doesn't support connections via the RFC1006 protocol. If the connection is established you can also exchange data within both directions like on the coupling between two controllers.

The connection is thereby opened by your LAN device or the partner device depending on your configuration. The port can be configured too.

After the connections has established you can send and receive data without any header or further information via the TCP socket. If needed you can also configure a start and / or stop sequence which should be sent in front and / or after the payload. This sequence is then discarded on reception.

The usage of a start and stop sequence increases the security, so that partly received payload isn't considered as valid and complete data. But this function have to be supported on the partner device too.

The management of the data exchange is controlled via a data block within the PLC where the LAN device is connected to. The structure of this data block is the same as described within the topic “Coupling between controllers” (SEND/RECV). If you like to, you can use the Step7 project “S7anS7-Gateway” or MicroWin project “S7-LAN_SEND-RECV” as reference which can be found within the ZIP archive of example applications.

7.7 Access via PUT/GET

The LAN devices can also be directly accessed from other controllers with PUT/GET. Thereby the RFC1006 protocol is used, which is supported by all LAN devices. The PUT/GET communication allows the coupling between a various number of controllers. So for example you can couple a S7-1200/1500 CPU with a S7-200/300/400 CPU who only has a network interface trough the S7-LAN module.

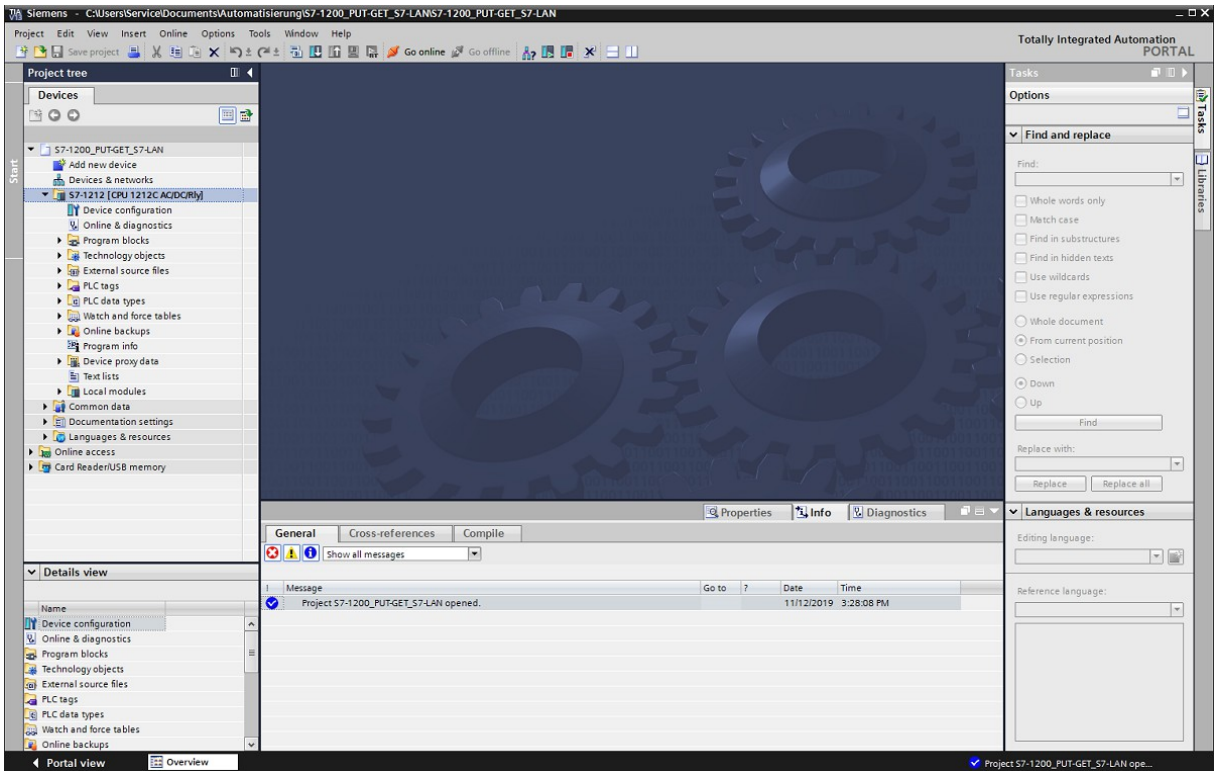
The coupling described in this topic assumes that PUT/GET is used from a PLC with network connection to connect to a S7-LAN, S7-GATE or MPI-LAN. If you want to use PUT/GET on the device to connect with a network PLC you should read the section “Coupling between controllers” in this chapter.

Hint:
A big advantage when using PUT/GET is, that changes have to be made only on the controller who actively establishes the connection and manages the jobs. A change on the destination CPU, where data gets read from or written to is not necessary.

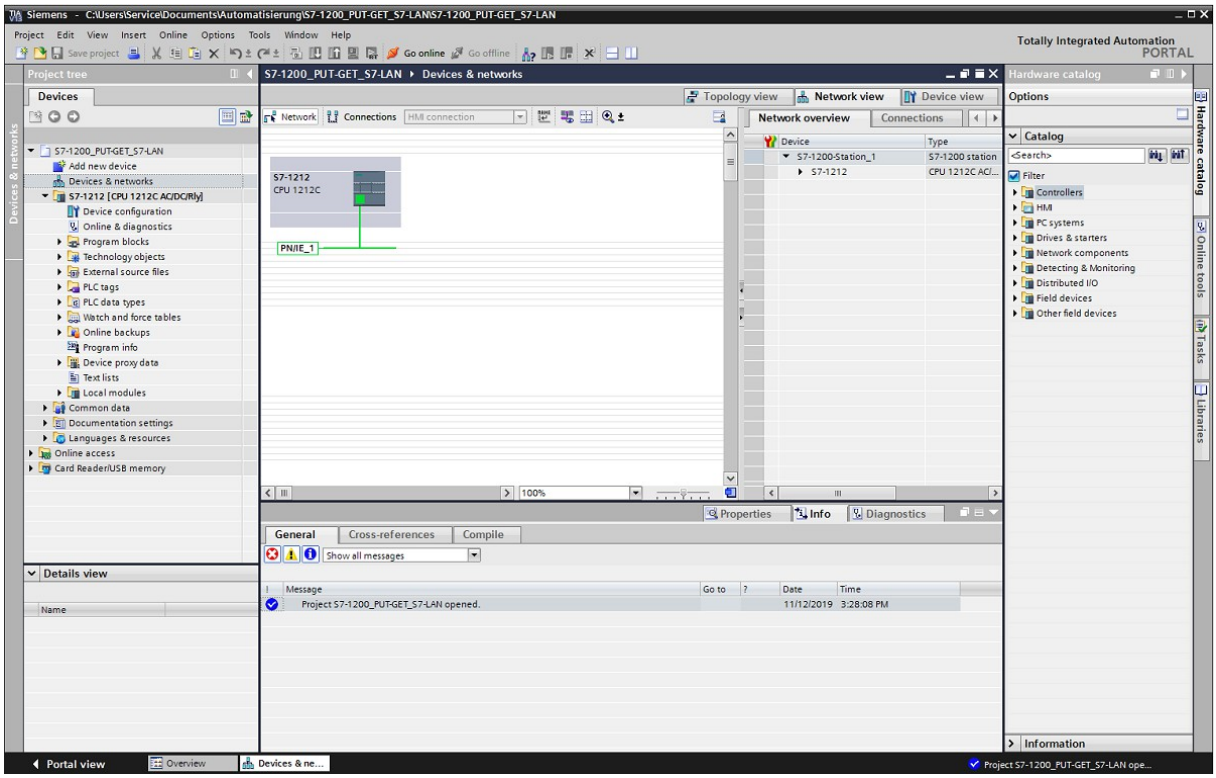
Important:
When you want to use PUT/GET you need a PLC with an integrated network interface or with an additionally network CP, which supports the connection type “S7 connection”.

Within the following pages the needed configuration for PUT/GET from a S7-1200 to a S7-300 with a S7-LAN, S7-GATE or MPI-LAN via the TIA Portal is described. But the procedure should be similar for S7-300/400 controllers via the SIMATIC Manager, even if the windows look a bit different there.

First of all you should start the TIA Portal and open the project for your controller, who should communicate with another controller via PUT/GET later. The basic configuration (e. g. the network settings) should be already done and downloaded into the PLC. Afterwards you should swap to the project view.

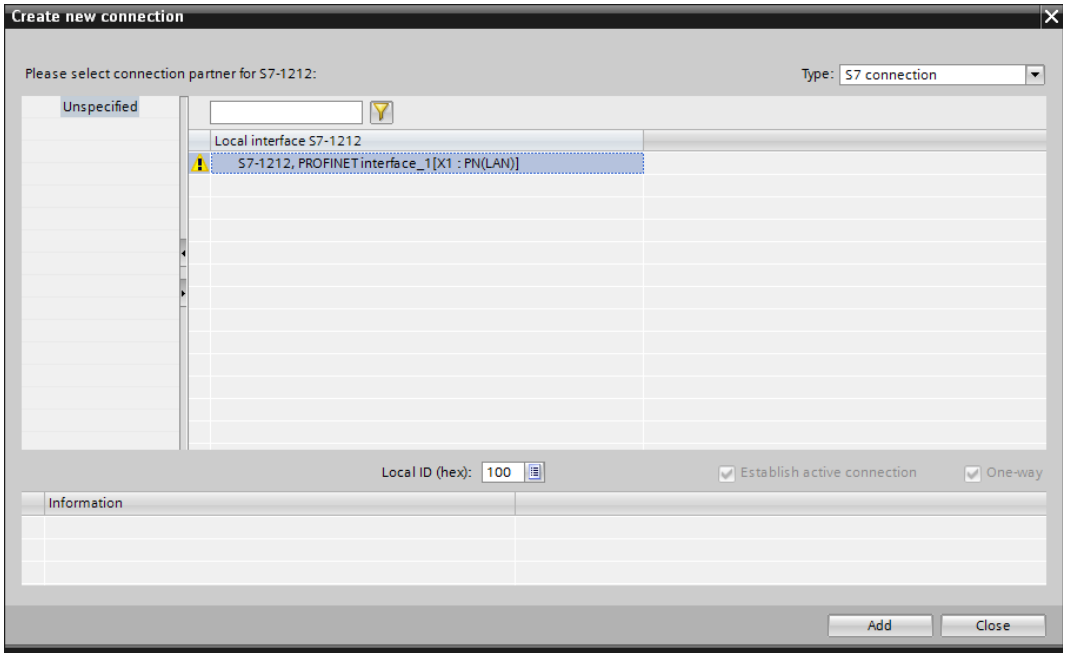


Now you can click on the entry “Devices & networks” within the project navigation. Afterwards you should see the devices configurations in the “Network view” together with all projected controllers:

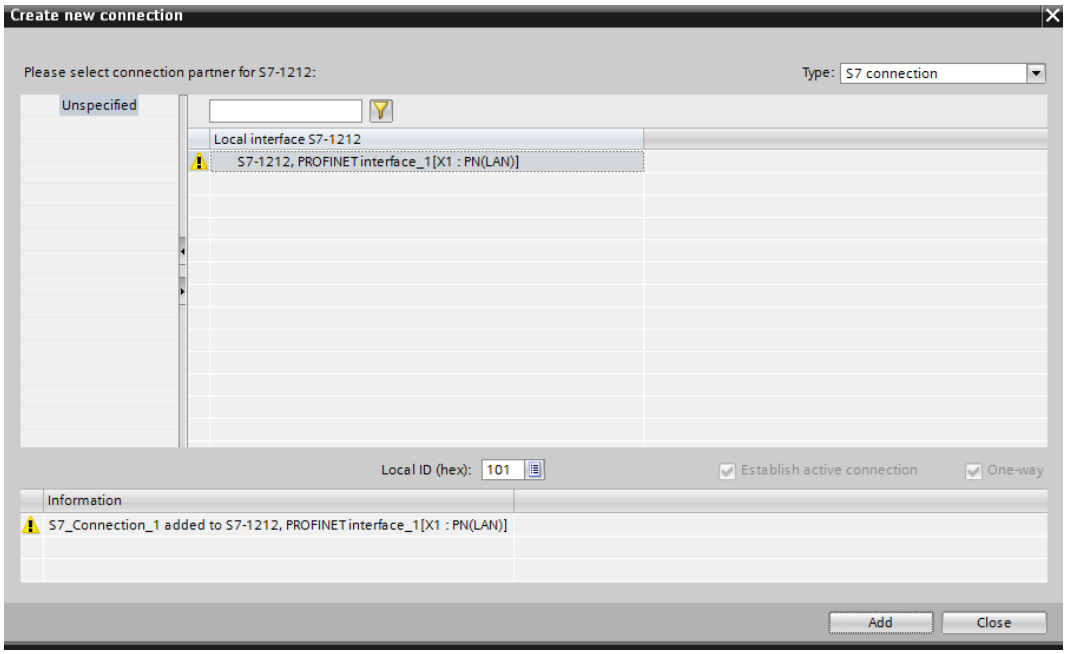


In the next step you should click on “Connections” within the control line above the device view. Furthermore you have to select “S7 connection” on the field on the right side. Then you can execute a right click on your

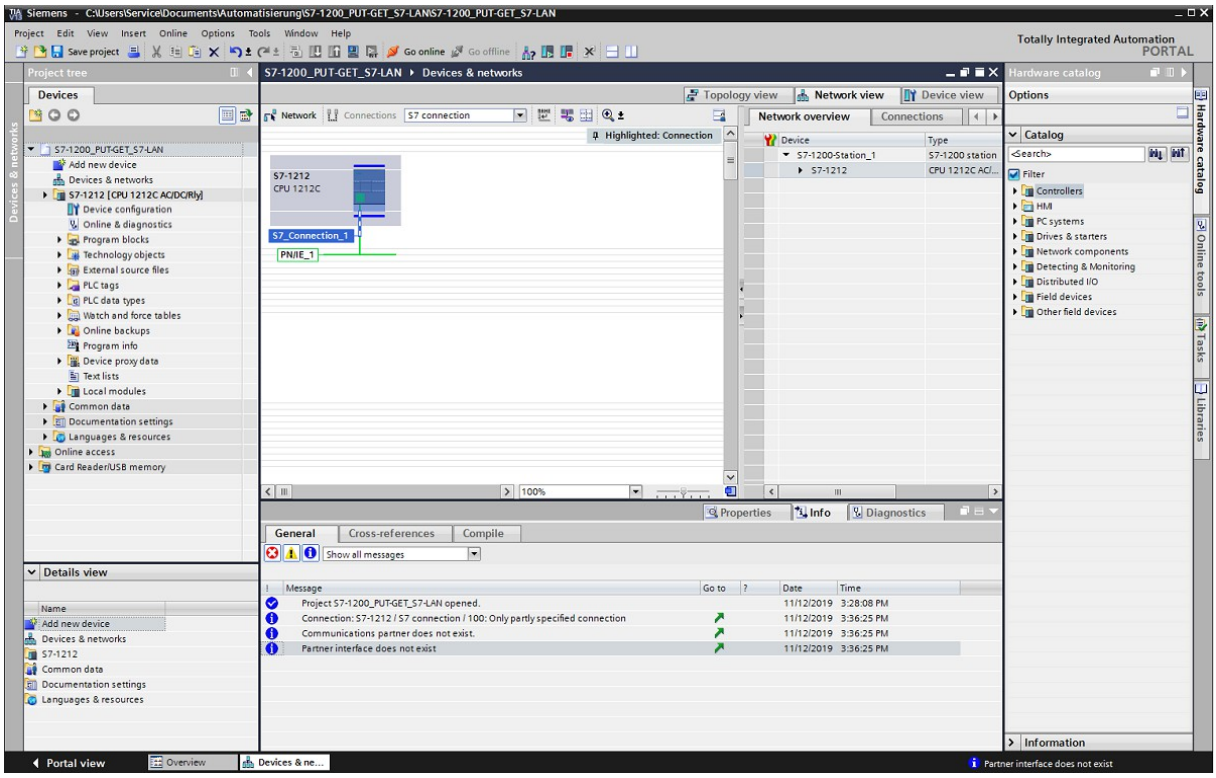
controller which should send PUT/GET queries and finally click on “Add new connection”. Subsequently the following dialog will be shown:



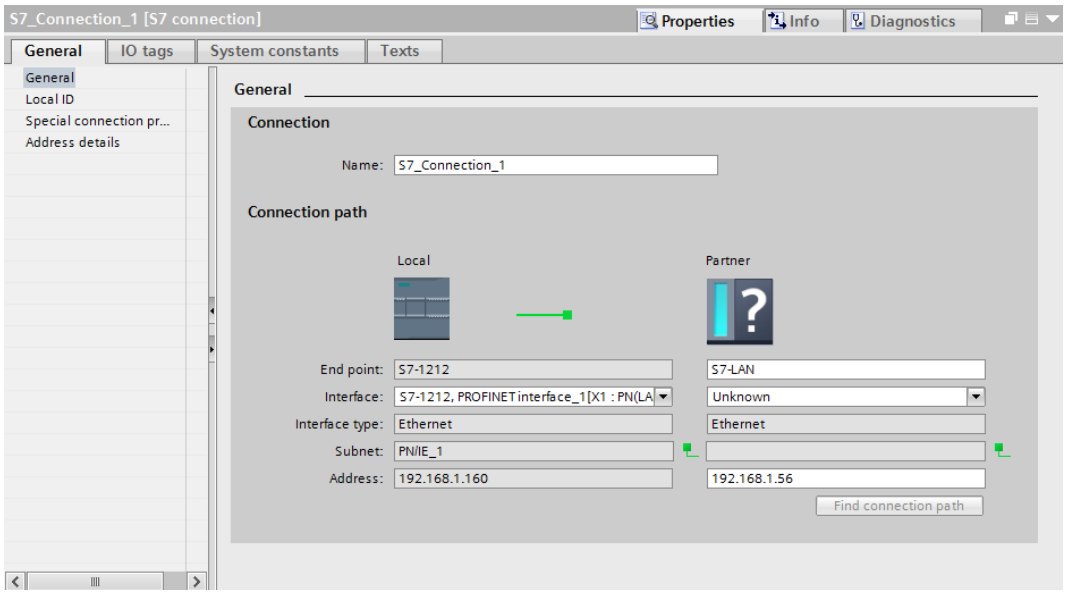
There you then have to select “Unspecified” (or the destination controller when using a Dummy PLC) within the left side. Furthermore you have to make sure, that the correct local interface of your source controller (when multiple exists) is selected and the option “Establish active connection” is enabled (always selected and grayed out when using an unspecified connection). Now you can click on the “Add” button. The successful addition of a new connection should be shown on the info area on the bottom of the dialog:



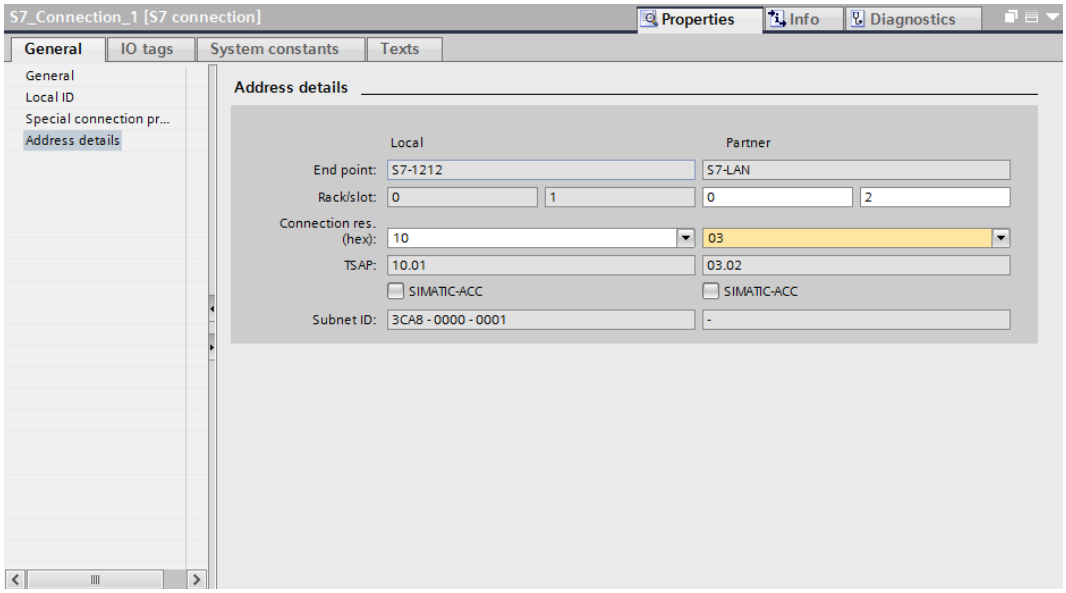
If the connection was added you can close the window again. Now some more settings have to be configured. The newly created connection should therefore be shown and selected directly on the network view:



Now you can open the properties area and navigate to the tab “General” and then to the category “General”. There you have to configure the IP address of the partner device. When needed you can also assign a name to the connection and device.


S7_Connection_1 [S7 connection]
Properties
Info
Diagnostics
General
IO tags
System constants
Texts
General
Local ID
Special connection pr...
Address details
General
Connection
Name:
S7_Connection_1
Connection path
Local
Partner
End point:
S7-1212
S7-LAN
Interface:
S7-1212, PROFINET interface_1[X1 : PN(LA
Unknown
Interface type:
Ethernet
Ethernet
Subnet:
PN/IE_1
Address:
192.168.1.160
192.168.1.56
Find connection path

Afterwards you have to navigate to the category “Address details”. There you have to disable the function “SIMATIC-ACC” first. Then you can select the connection resource for the the local CPU as well as for the partner CPU. As the local connection resource all values expect 00 are allowed. For the partner CPU a connection resource between 03 and 1F should be used. Furthermore you have to fill out the fields for rack and slot. But please pay attention to the parameters “Ignore Rack/Slot from TSAP” as well as “Convertion of Rack/Slot from TSAP to BUS-address” within your LAN device.



On the next step you have to expand your PLC program by calls to the PUT/GET functions. The correct connection number can be found within the properties of the connection. If this connection is the first one, the ID as a general rule should be 16#100.

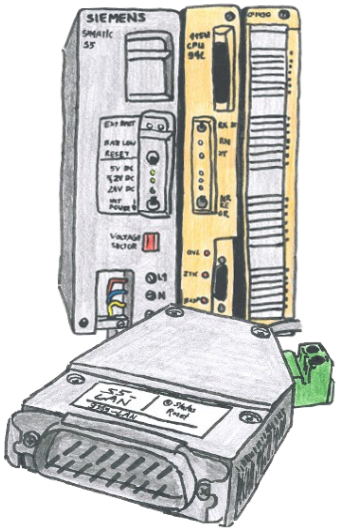
If your programming is completed, you have to save your project and download it to the PLC (Hardware and Software). The access via PUT/GET should then be working.

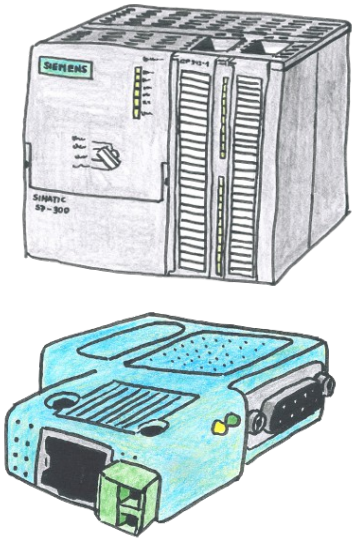
Instead of using an unspecified connection, you can also use a specified connection! But therefore you have to create a Dummy PLC with network interface or network CP in your project, to configure the connection.

8 Example applications

8.1 S5-LAN++ on S7-LAN (SEND/RECV for S7-300/400)

The example application “S5anS7“ allows you to couple a S5-LAN++ module with a S7-LAN, S7-GATE or MPI-LAN. This example project contains all needed blocks for the S5 and S7 controller and can be found in the ZIP archive with communication examples that can be downloaded from the product page.





Example configuration data:

IP address:	192.168.1.50	192.168.1.56
subnet mask:	255.255.255.0	255.255.255.0
TSAP local:	0x1234	0x1234
TSAP partner:	0x1234	0x1234
bus address:	-	2

8.1.1 Configuration S5-LAN++

In the first step you should make sure that the network settings of the S5-LAN++ module are correct.

Afterwards you should open the S5-LAN-Manager and search for available modules if not done already. Now you should select the module, which you want to use for the coupling, and click on the button “S5-Gateway connections”. Thereby a new window gets opened. Here you should now select a free connection (normally the first one) from the

list on the bottom of the window. As the last step you can then configure the parameters within the dialog as follows:

field	**value**
Name	*freely definable, hasn't any effect on the function*
Configuration-DB	20 from DW 0
Type of	ISO-on-TCP connection → active connection NOT set
Poll cycle	5000
Addresses local → TSAP	*freely definable, but have to match "Dst. TSAP" within the LAN device* *e. g.: 0x1234*
Addresses Partner → IP-Address	*IP address of the LAN device* *e. g.: 192.168.1.56*
Addresses Partner → TSAP	*freely definable, but have to match "Src. TSAP" within the LAN device* *e. g.: 0x1234*

8.1.2 Configuration S7-LAN

In the first step you should make sure that the general configuration (network and bus parameters) of your device is done already.

After that you can open your web browser and access the web page of your device if not done already. Now you can navigate to the page "Modules" → "S7-Gateway". There you then have to pick one of the connection entries, select the connection type "DB-active" and configure the renaming parameters as follows:

field	**value**
Partner IP address	*IP address of the S5-LAN++ module* *for e.g.: 192.168.1.50*
Poll time	100
CPU	*bus address of the PLC which controls this connection and uses the data* *e. g.: 2*
Data block	10

Data word	0
Src. TSAP	*configuration as the Partner TSAP on the S5-LAN++ module* *e. g.: 0x1234*
Dst. TSAP	*configuration as the local TSAP on the S5-LAN++ module* *e. g.: 0x1234*

8.1.3 Transferring blocks

First of all you should open the file “S5anS7ST.S5D” from the ZIP archive. This file can be opened by the Step 5 from Siemens or with the program PG-200 from us. The following blocks have to be transmitted to the S5-PLC:

block	**usage case**
OB1	main cycle: contains the call of both function blocks and manages the send job as well as the receive release via two inputs
FB55	function block for sending data
FB56	function block for receiving data

The DB20 which is used for the connection and job management as well as the DB100 which contains the payload for sending and receiving is created automatically.

In the next step you have to open the S7 project “S5anS7-Gateway”, which can be found within the ZIP archive together with the other communication examples too. In the project you have to navigate to the S7 program folder “DB-Kopplung”. Now you should connect to your PLC (directly via network or with the TIC driver) where the LAN device is connected to and transmit the following blocks into your S7-PLC:

block	**usage case**
OB1	main cycle: contains a call for FB10
FB10	function block which repeatedly executes a send job and grants a receive release

FC15	function code for sending data
FC16	function code for receiving data
DB10	data block for the connection and job management
DB14	data block with the payload for sending and receiving data

8.1.4 Starting orders

In the example program for the S5-PLC both jobs are defined and started and released via two inputs within the block OB1.

The call of the function S5L_SEND (FB55) starts a send job for the first 20 bytes of DB100 via the bit F10.0, which gets set from the input I8.0.

Via the call of the function S5L_RECV (FB56) a receive release is granted trough the bit F12.0, which gets set from the input I9.0. The received data (in this example a maximum of 20 bytes) then gets stored in DB100 at a offset of 100 bytes.

In the example program for the S7-PLC both jobs are defined and started and released permanently within the block FB10.

The call of the function S7LAN_SEND (FC15) starts a send job for the first 20 bytes of DB14 via the bit F10.0, which is set constantly.

Via the call of the function S7LAN_RECV (FC16) a receive release is granted through the bit F11.0, which is set constantly too. The received data (in this example a maximum of 20 bytes) then gets stored in DB14 at a offset of 100 bytes.

8.1.5 Used variables

In addition to the above listed blocks the following variables are used from the PLC program on the S5 controller:

variable	**usage case**
F10.0	bit for starting the send job
F11.0	bit for success feedback for the send job
F11.1	bit for error feedback for the send job

F12.0	bit for granting the receive job
F13.0	bit for success feedback for the receive job
F13.1	bit for error feedback for the receive job
FW20	status of the send job
FW22	status of the receive job
FW24	length of the data from the receive job
FW122	status of the last receive job
FW124	length of the data from the last receive job
FW200	temporary variable for the FB55 and FB56
FW202	temporary variable for the FB55 and FB56
I8.0	input for controlling F10.0 (starting send job)
I9.0	input for controlling F12.0 (granting receive job)
I11.0	input to reset all outputs (Q4.0, Q4.1, Q5.0 and Q5.1)
Q4.0	output which gets sent from F11.0 (success on send job)
Q4.1	output which gets sent from F11.1 (failure on send job)
Q5.0	output which gets sent from F13.0 (success on receive job)
Q5.1	output which gets sent from F13.1 (failure on receive job)

The example program doesn't work on all S5 controllers without changing the program. Please check if the address areas of data blocks and flags as well as the used commands within the function blocks are supported from your PLC type.

In addition to the above listed blocks the following variables are used from the PLC program on the S7 controller:

variable	**usage case**
F10.0	bit for starting the send job

F10.1	bit for success feedback for the send job
F10.2	bit for error feedback for the send job
F11.0	bit for granting the receive job
F11.1	bit for success feedback for the receive job
F11.2	bit for error feedback for the receive job
FW12	status of the send job
FW14	status of the receive job
FW16	length of the data from the receive job
FW20	counter for successful send jobs
FW22	counter for failed send jobs
FW24	counter for successful receive jobs
FW26	counter for failed receive jobs

8.1.6 Testing the coupling

If the PLC program was transmitted to both controllers the data exchange between the S5 and S7 controller should be ready.

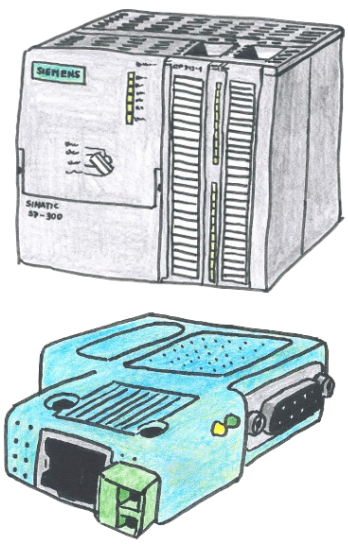
In the first step you should connect with your S5 controller and control various values (e. g. 1, 2, 3, 4 etc.) to the first 20 bytes of the DB100. Afterwards you should do the same within the first 20 bytes of the DB14 within your S7 controller.

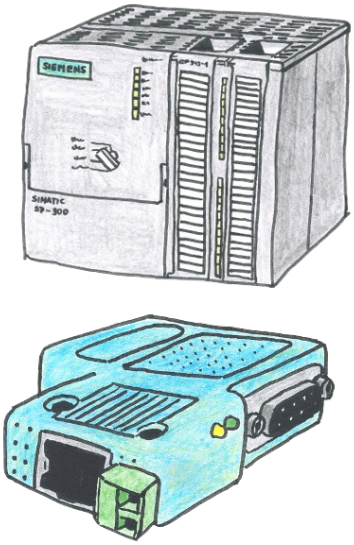
In the next step you have to set the inputs I8.0 and I9.0 on the S5 PLC.

Now you can open the DB100 of your S5 controller again. There you should then see within word 100 and above the data which was set within the DB14 of the S7 controller. Following you can check the byte 100 and above of DB14 on your S7-PLC. There you should then see the data from DB100 of your S5-PLC.

8.2 S7-LAN on S7-LAN (SEND/RECV for S7-300/400)

The example application “S7anS7“ allows you to couple two S7-LAN, S7-GATE or MPI-LAN devices. This example project contains the blocks for both S7 controllers and can be found in the ZIP archive with communication examples that can be downloaded from the product page.





Example configuration data:

IP address:	192.168.1.55	192.168.1.56
subnet mask:	255.255.255.0	255.255.255.0
TSAP local:	0x1234	0x5678
TSAP partner:	0x5678	0x1234
bus address:	4	2

8.2.1 Configuration S7-LAN

In the first step you should make sure that the general configuration (network and bus parameters) of both devices is done already.

After that you can open your web browser and access the web page of your first device if not done already. Now you can navigate to the page “Modules” → “S7-Gateway”. There you then have to pick one of the connection entries, select the connection type “DB-passive” and configure the renaming parameters as follows:

field	value
Partner IP address	*IP address of the second LAN device* *e. g.: 192.168.1.56*
Poll time	500
CPU	*bus address of the PLC which controls this connection and uses the data* *e. g.: 4*
Data block	10
Data word	0
Src. TSAP	*freely definable, but have to be crossed among the two devices (Src. TSAP of the first device is the Dst. TSAP on the second device)* *e. g.: 0x1234*
Dst. TSAP	*freely definable, but have to be crossed among the two devices (Dst. TSAP of the first device is the Src. TSAP on the second device)* *e. g.: 0x5678*

If you have finished the configuration on the first device you can now open the web page of the second device. There you have to navigate to the page “S7-Gateway” too, but then choose the connection type “DB-active” and configure the renaming parameters as follows:

field	value
Partner IP address	*IP address of the first LAN device* *e. g.: 192.168.1.55*
Poll time	500
CPU	*bus address of the PLC which controls this connection and uses the data* *e. g.: 2*
Data block	10
Data word	0
Src. TSAP	*freely definable, but have to be crossed among the two devices (Src. TSAP of the first device is the Dst. TSAP on the second device)*

	e. g.: 0x5678
Dst. TSAP	*freely definable, but have to be crossed among the two devices (Dst. TSAP of the first device is the Src. TSAP on the second device)* *e. g.: 0x1234*

8.2.2 Transferring blocks

First of all you have to open the S7 project “S7anS7-Gateway”, which can be found within the ZIP archive together with the other example applications. In the project you have to navigate to the S7 program folder “DB-Kopplung”. Now you should connect to your PLC (directly via network or with the TIC driver) where the first LAN device is connected to and transmit the following blocks into your PLC:

block	**usage case**
OB1	main cycle: contains a call for FB10
FB10	function block which repeatedly executes a send job and grants a receive release
FC15	function code for sending data
FC16	function code for receiving data
DB10	data block for the connection and job management
DB14	data block with the payload for sending and receiving data

After that you can repeat the same procedure for the second PLC with the other LAN device.

8.2.3 Starting orders

In the example program for the S7-PLC both jobs are defined and started and released permanently within the block FB10.

The call of the function S7LAN_SEND (FC15) starts a send job for the first 20 bytes of DB14 via the bit F10.0, which is set constantly.

Via the call of the function S7LAN_RECV (FC16) a receive release is granted through the bit F11.0, which is set constantly too. The received

data (in this example a maximum of 20 bytes) then gets stored in DB14 at a offset of 100 bytes.

8.2.4 Used variables

In addition to the above listed blocks the following variables are used from the PLC program on both controllers:

variable	usage case
F10.0	bit for starting the send job
F10.1	bit for success feedback for the send job
F10.2	bit for error feedback for the send job
F11.0	bit for granting the receive job
F11.1	bit for success feedback for the receive job
F11.2	bit for error feedback for the receive job
FW12	status of the send job
FW14	status of the receive job
FW16	length of the data from the receive job
FW20	counter for successful send jobs
FW22	counter for failed send jobs
FW24	counter for successful receive jobs
FW26	counter for failed receive jobs

8.2.5 Testing the coupling

If the PLC program was transmitted to both controllers the data from DB14 should be exchanged between the two S7-PLCs automatically.

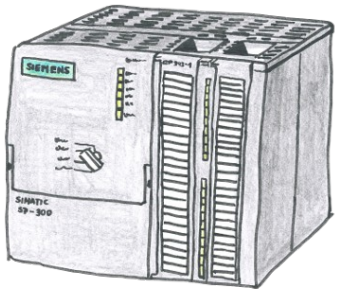
If you want to check the coupling you can now connect to the first LAN device again. Then you should control various values (e. g. 1, 2, 3, 4 etc.) to the first 20 bytes of the DB14.

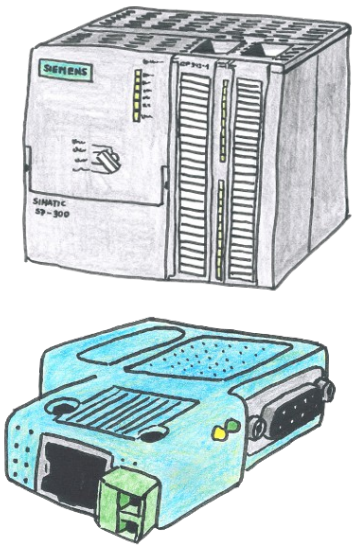
In the next step you have to connect with the second device and monitor the content of DB14. At the offset of 100 bytes you should then see the 20 bytes long data which you have controlled on the first PLC on the beginning of the DB14.

Afterwards you can test the other direction of the coupling if you like to.

8.3 S7-CP on S7-LAN (SEND/RECV for S7-300/400)

The example application “S7CPanS7“ allows you to couple a S7-CP or S7-PLC with network interface with a S7-LAN, S7-GATE or MPI-LAN device. This example project contains the blocks for both S7 controllers and can be found in the ZIP archive with communication examples that can be downloaded from the product page.





Example configuration data:

IP address:	192.168.1.55	192.168.1.56
subnet mask:	255.255.255.0	255.255.255.0
TSAP local:	0x1234	0x5678
TSAP partner:	0x5678	0x1234
bus address:	-	2

8.3.1 Configuration S7-LAN

In the first step you should make sure that the general configuration (network and bus parameters) of your device is done already.

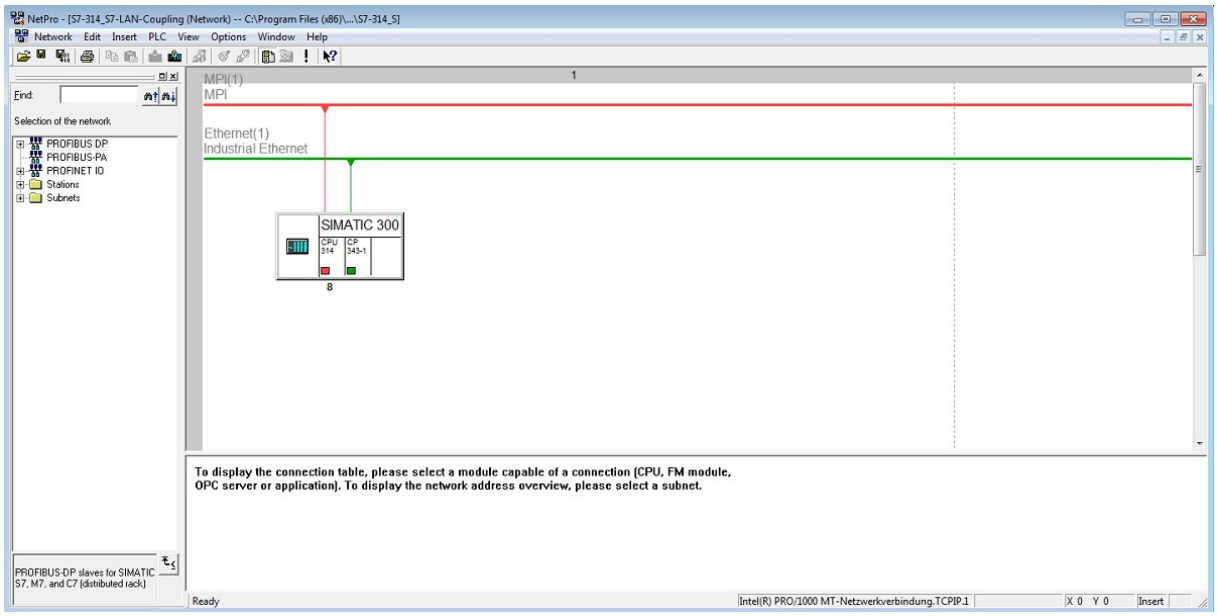
After that you can open your web browser and access the web page of your device if not done already. Now you can navigate to the page “Modules” → “S7-Gateway”. There you then have to pick one of the connection entries, select the connection type “DB-passive” and configure the renaming parameters as follows:

field	**value**
Partner IP address	*IP address of the S7-CP* *e. g: 192.168.1.55*
Poll time	500
CPU	*bus address of the PLC which controls this connection and uses the data* *e. g.: 2*
Data block	10
Data word	0
Src. TSAP	*freely definable, but have to be crossed with the connection settings on the S7-CP* *e. g.: 0x5678*
Dst. TSAP	*freely definable, but have to be crossed with the connection settings on the S7-CP* *e. g.: 0x1234*

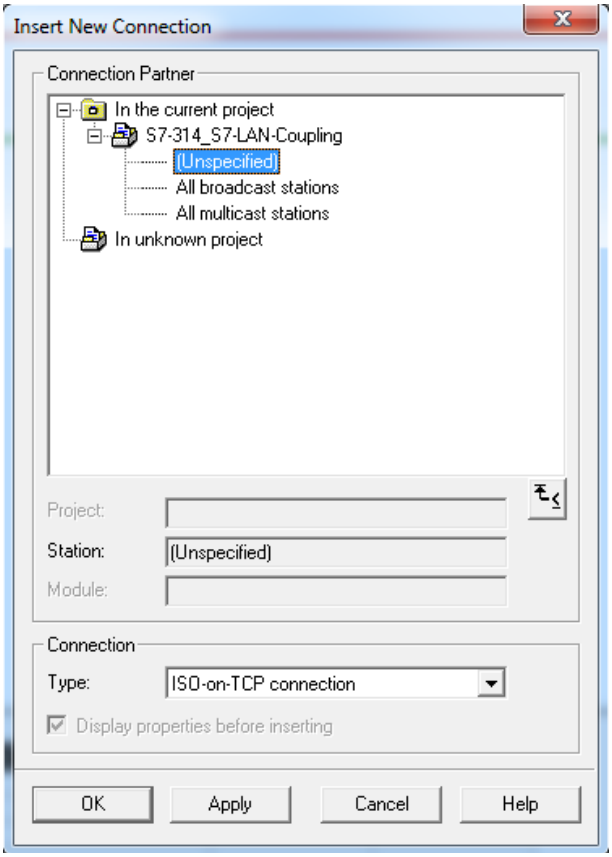
8.3.2 Configuration S7-CP

In the first step you should make sure that the general configuration (network and bus parameters) of your PLC and / or CP is correct and already downloaded to your PLC.

Then you can open the project for the PLC, which should connect to the LAN device, or simply load the hardware configuration into the PG and thereby also into the PC. As the next step you will have to open the tool “NetPro” if not done already.

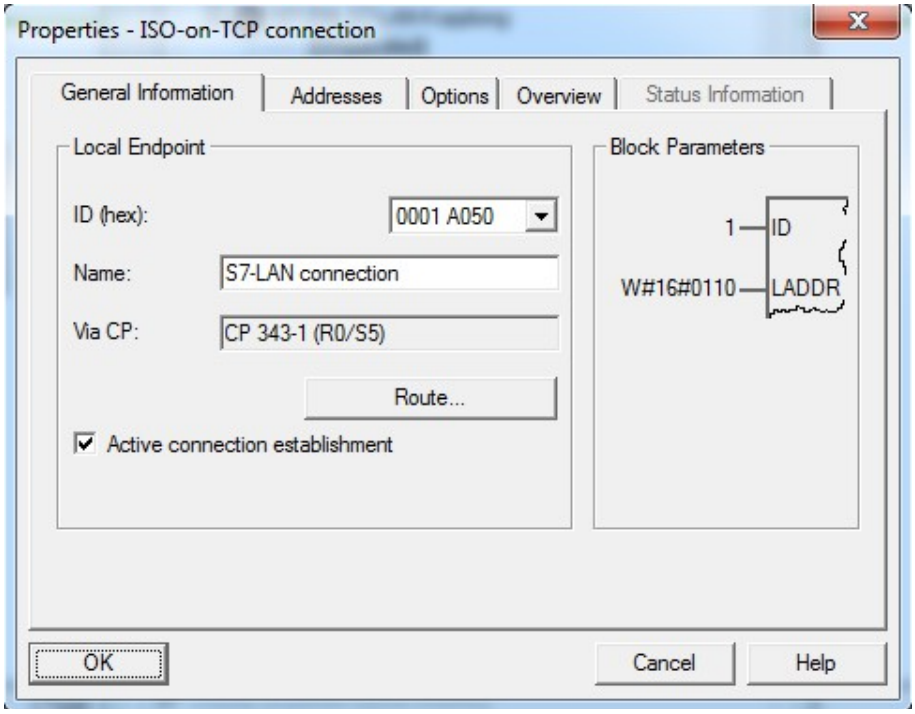


Now you should execute a right click on the CPU of the SIMATIC station and select the entry “Insert New Connection” from the context menu. Afterwards a window will be opened where you have to select the partner device. There you should choose “(Unspecified)” and then select the connection type “ISO-on-TCP connection” from the list below:

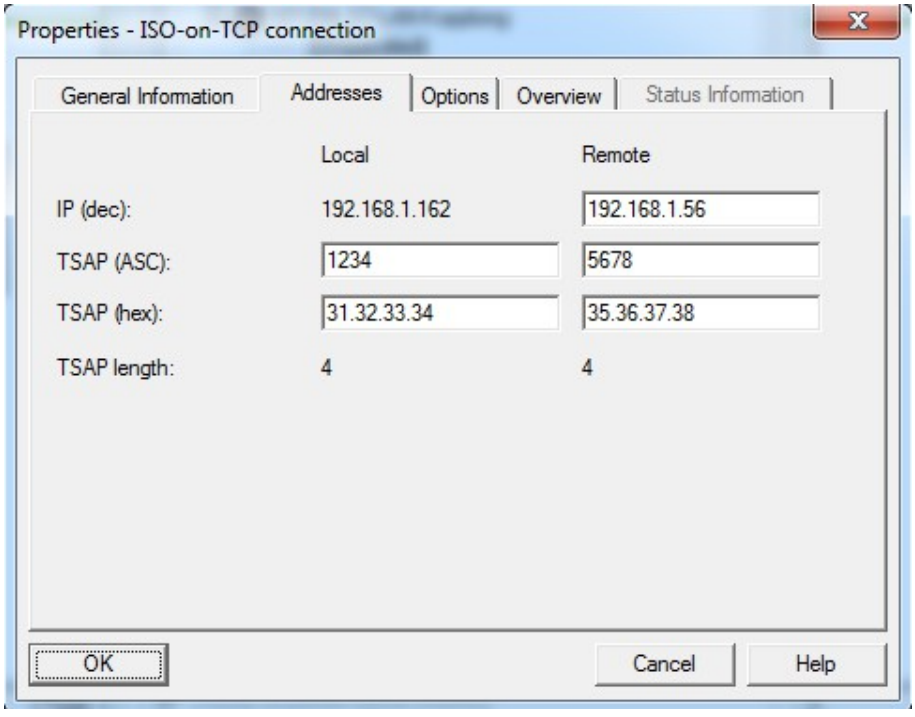


If you have confirmed the dialog with a click on the “OK” button a further window will get opened. Within the tab “General Information” you can assign a name to the connection. Furthermore you should make sure

that the option “Active connection establishment” is enabled. On the right side you should always pay attention to the fixed parameters “ID” and “LADDR”. This parameters have to be compared to and maybe configured in the FB1 before loading the blocks into the PLC.



In the next step you should navigate to the tab “Addresses”. There you have to configure the IP address of your LAN device as the Remote IP as well as both TSAP values. But keep in mind that the TSAP values have to be crossed with the configuration on the S7-LAN. This means the “Local TSAP” within the S7-CP equals the “Dst. TSAP” within the LAN device and the “Partner TSAP” equals the “Src. TSAP”.



As the last step you have to confirm the dialog with a click on the “OK” button and then compile and download the configuration into your PLC.

8.3.3 Transferring blocks

First of all you have to open the S7 project “S7CPanS7”, which can be found within the ZIP archive together with the other communication examples. In the project you have to navigate to the blocks within the SIMATIC Station “SIMATIC 300(1)” with the S7-314-IFM CPU. This station thereby represents your PLC with the LAN device. Now you should connect to this PLC (directly via network or with the TIC driver) and transmit the following blocks into your PLC:

block	**usage case**
OB1	main cycle: contains a call for FB10
FB10	function block which repeatedly executes a send job and grants a receive release
FC15	function code for sending data
FC16	function code for receiving data
DB10	data block for the connection and job management
DB14	data block with the payload for sending and receiving data

In the next step you have to navigate to the blocks of the “SIMATIC 300” station with the S7-315-2DP CPU. This station thereby represents your PLC with network CP. Now you should connect to this PLC directly via network and transmit the following blocks into your PLC:

block	**usage case**
OB1	main cycle: contains a call for FB1
FB1	function block which successively starts a send job and grants a receive release → **Important:** You should make sure that the values for “ID” and “LADDR” are correct for both function calls and maybe adjust them before transmission!
FC5	function code from Siemens for sending data (AG_SEND)

FC6	function code from Siemens for receiving data (AG_RECV)
DB10	data block for the payload for sending and receiving data

8.3.4 Starting orders

Within the example program for the LAN device side both jobs are defined and started and released permanently within the block FB10.

The call of the function S7LAN_SEND (FC15) starts a send job for the first 20 bytes of DB14 via the bit F10.0, which is set constantly.

Via the call of the function S7LAN_RECV (FC16) a receive release is granted through the bit F11.0, which is set constantly too. The received data (in this example a maximum of 20 bytes) then gets stored in DB14 at a offset of 100 bytes.

On the side of the S7-CP the two jobs are also defined and started and released within the example program. Therefore FB1 is used here.

The call of the function AG_SEND (FC5) starts a send job for the first 20 bytes of DB10 via the bit F0.0 alternately to the data reception.

Via the call of the function AG_RECV (FC6) a receive release is granted automatically if possible. The received data (in this example a maximum of 20 bytes) then gets stored in DB10 at a offset of 100 bytes.

8.3.5 Used variables

In addition to the above listed blocks the following variables are used from the PLC program on the S7 controller where the LAN device is connected to:

variable	**usage case**
F10.0	bit for starting the send job
F10.1	bit for success feedback for the send job
F10.2	bit for error feedback for the send job
F11.0	bit for granting the receive job

F11.1	bit for success feedback for the receive job
F11.2	bit for error feedback for the receive job
FW12	status of the send job
FW14	status of the receive job
FW16	length of the data from the receive job
FW20	counter for successful send jobs
FW22	counter for failed send jobs
FW24	counter for successful receive jobs
FW26	counter for failed receive jobs

On the controller with the S7-CP the following variables are used by the PLC program:

variable	**usage case**
F0.0	bit for starting the send job
FW11	status of the send job
F15.0	bit for success feedback for the send job
F15.1	bit for error feedback for the send job
F20.0	bit for success feedback for the receive job
F20.1	bit for error feedback for the receive job
FW21	status of the receive job
FW23	length of the data from the receive job

8.3.6 Testing the coupling

If the PLC program was transmitted to both controllers the data from DB10 and DB14 should be exchanged between the S7-PLC with the LAN device and the controller with the S7-CP automatically.

If you want to check the coupling you can now connect to the controller with the LAN device again. Then you should control various values (e. g. 1, 2, 3, 4 etc.) to the first 20 bytes of the DB14.

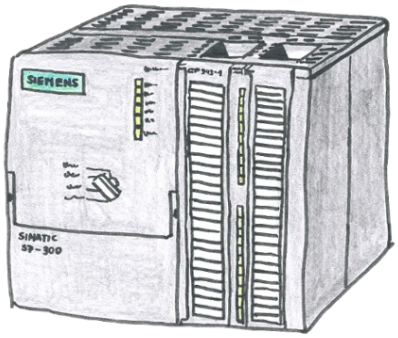
In the next step you have to connect to the S7-CP and monitor the content of DB10. At the offset of 100 bytes you should then see the 20

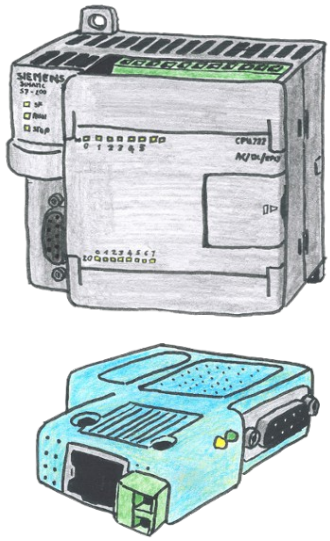
bytes long data which you have controlled on the first PLC on the beginning of the DB14.

Afterwards you can test the other direction of the coupling if you like to.

8.4 Coupling with SEND/RECV for S7-200

The example application “S7-LAN_SEND-RECV“ allows you to couple a S7-200 controller with a S7-LAN, S7-GATE or MPI-LAN with another network PLC via SEND/RECV. The partner controller can either be another S7-200/300/400 controller with a S7-LAN, S7-GATE or MPI-LAN as well as a S7-CP or S7-PLC with network interface or a S5 controller with S5-LAN++ module. This example project contains only the program for the S7-200 controller and can be found in the ZIP archive with communication examples that can be downloaded from the product page. If you want to do a coupling to a S7-300/400 controller or S5 controller please also read the corresponding section of the other example applications.





Example configuration data:

IP address:	192.168.1.55	192.168.1.56
subnet mask:	255.255.255.0	255.255.255.0
TSAP local:	0x5678	0x1234
TSAP partner:	0x1234	0x5678
bus address:	-	2

8.4.1 Configuration S7-LAN

In the first step you should make sure that the general configuration (network and bus parameters) of your device is done already. Please

note that the bus parameters have to be configured manually, because on a S7-200 controller they can't be detected automatically.

After that you can open your web browser and access the web page of your device if not done already. Now you can navigate to the page “Modules” → “S7-Gateway”. There you then have to pick one of the connection entries, select the connection type “DB-active” or “DB-passive” (depending on which connection partner should establish the connection) and configure the renaming parameters as follows:

field	**value**
Partner IP address	*IP address of the partner controller* *e. g.: 192.168.1.55*
Poll time	500
CPU	*bus address of the PLC which controls this connection and uses the data* *e. g.: 2*
Data block	1
Data word	0
Src. TSAP	*freely definable, but have to be crossed among the devices (Src. TSAP of the first device is the Dst. TSAP on the second device)* *e. g.: 0x1234*
Dst. TSAP	*freely definable, but have to be crossed among the two devices (Dst. TSAP of the first device is the Src. TSAP on the second device)* *e. g.: 0x5678*

8.4.2 Transferring blocks

First of all you have to open the MicroWIn project “S7-LAN_SEND-RECV”, which can be found within the ZIP archive together with the other example applications.

Now you have to click on “Communication”, choose the TIC driver for PPI in the PG/PC interface and refresh the list with participants. When the list got refreshed you have to select your controller and click on “OK”.

Afterwards you should transmit the “Program Block” and “Data Block” into your controller. This selection can be done within the “Options” section after you have clicked on “Download”.

The example project contains the following program blocks:

block	usage case
OB1	main cycle: contains the generation of an Always-On-Bit and a call for SBR1
SBR1	subroutine which repeatedly executes a send job and grants a receive release
SBR5	subroutine for sending data
SBR6	subroutine for receiving data

The example program contains the program for one S7-200 controller. If you want to do a coupling between two S7-200 controllers, you also have to load the project into the second controller. For S7-300/400 as well as S5 controllers you have to read the description of the other example applications.

8.4.3 Starting orders

In the example program for the S7-PLC within the SBR1 both jobs are started and released permanently and the subroutines are called. The specification of the send and receive buffer can be found within the subroutines SBR5 for SEND and SBR6 for RECV.

The call to SEND (SBR5) starts a send job for the bytes 192 to 211 of the variable area via the bit F10.0, which is set constantly.

Via the call to RECV (SBR6) a receive release is granted through the bit F11.0, which is set constantly too. The received data (in this example a maximum of 20 bytes) then gets stored in the variable area at a offset of 128 bytes.

8.4.4 Used variables

In addition to the above listed blocks the following variables are used from the PLC program on the controller where the LAN device is connected to:

variable	usage case
F0.1	Always-On-Bit (constant 1)
FW8	length of the data from the receive job
F10.0	bit for starting the send job
F10.1	bit for success feedback for the send job
F10.2	bit for error feedback for the send job
F11.0	bit for granting the receive job
F11.1	bit for success feedback for the receive job
F11.2	bit for error feedback for the receive job
FW12	status of the send job
FW14	status of the receive job
VB0-VB31	data for the connection and job management
VB128-VB147	payload from the receive job
VB192-VB211	payload for the send job

8.4.5 Testing the coupling

If the PLC program was transmitted the data between the two controllers should be exchanged automatically.

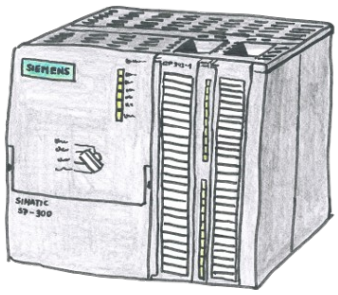
If you want to check the coupling you can now connect to the LAN device again. Then you should control various values (e. g. 1, 2, 3, 4 etc.) to some of the bytes between offset 192 and 211 of the variable area.

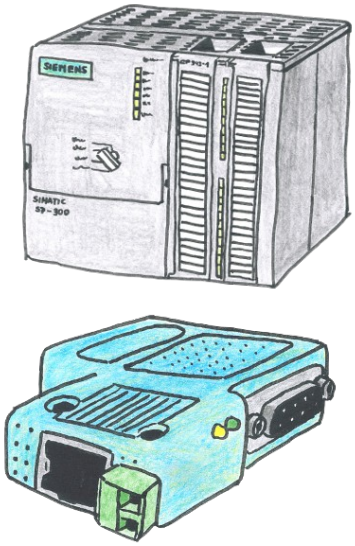
In the next step you have to connect with the partner controller and monitor the content of the receive buffer. There you should then see the bytes which you have controlled on the first PLC on the variable area.

Afterwards you can test the other direction of the coupling if you like to.

8.5 Coupling with active PUT/GET for S7-300/400

The example application “S7-LAN_PUT_GET“ allows you to couple a S7-300/400 controller with a S7-LAN, S7-GATE or MPI-LAN with a network PLC via PUT/GET. This example project contains the blocks for the S7 controller and can be found in the ZIP archive with communication examples that can be downloaded from the product page.





Example configuration data:

IP address:	192.168.1.55	192.168.1.56
subnet mask:	255.255.255.0	255.255.255.0
bus address:	-	2

8.5.1 Configuration S7-LAN

In the first step you should make sure that the general configuration (network and bus parameters) of your device is done already.

After that you can open your web browser and access the web page of your device if not done already. Now you can navigate to the page “Modules” → “S7-Gateway”. There you then have to pick one of the connection entries, select the connection type “PUT/GET active” and configure the renaming parameters as follows:

field	**value**
Partner IP address	*IP address of the partner controller* *e. g.: 192.168.1.55*

Poll time	500
CPU	*bus address of the PLC which controls this connection and uses the data* *e. g.: 2*
Data block	10
Data word	0
Src. TSAP	02 00 (Hex)
Dst. TSAP	02 00 (Hex)

8.5.2 Transferring blocks

First of all you have to open the S7 project “S7-LAN_PUT-GET”, which can be found within the ZIP archive together with the other example applications. In the project you have to navigate to the S7 program folder “PUT-GET”.

Now you should connect to your partner controller via network and transmit the block DB20 into the PLC. This data block is needed in the example for the data exchange.

Afterwards you should connect to your controller (directly via network or with the TIC driver) where the LAN device is connected to and then transmit the following blocks into your PLC:

block	**usage case**
OB1	main cycle: contains a call for FB10
FB10	function block which repeatedly executes a PUT and GET job
FC15	function code for PUT
FC16	function code for GET
DB10	data block for the connection and job management
DB20	data block with the payload for reading and writing data

8.5.3 Starting orders

In the example program for the S7-PLC both jobs are defined and started permanently within the block FB10.

The call of the function S7LAN_PUT (FC15) starts a PUT job via the bit F10.0, which is set constantly. The PUT job reads 64 bytes of data of DB20 of the local controller and transmit them to DB20 at a offset of 64 bytes to the partner controller.

Via the call of the function S7LAN_GET (FC16) a GET job is started through the bit F11.0, which is set constantly too. The GET job in the example reads 64 bytes of data of DB20 of the partner controller and transmit them to DB20 at a offset of 64 bytes to the local controller.

8.5.4 Used variables

In addition to the above listed blocks the following variables are used from the PLC program on the controller where the LAN device is connected to:

variable	**usage case**
F10.0	bit for starting the PUT job
F10.1	bit for success feedback for the PUT job
F10.2	bit for error feedback for the PUT job
F11.0	bit for starting the GET job
F11.1	bit for success feedback for the GET job
F11.2	bit for error feedback for the GET job
FW12	status of the PUT job
FW14	status of the GET job

8.5.5 Testing the coupling

When the PLC program was transmitted the data from DB20 should be exchanged between the two controllers automatically.

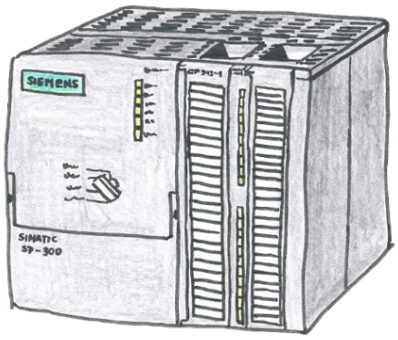
If you want to check the coupling you can now connect to the LAN device again. Then you should control various values (e. g. 1, 2, 3, 4 etc.) to some of the bytes between offset 64 and 128 of the DB20.

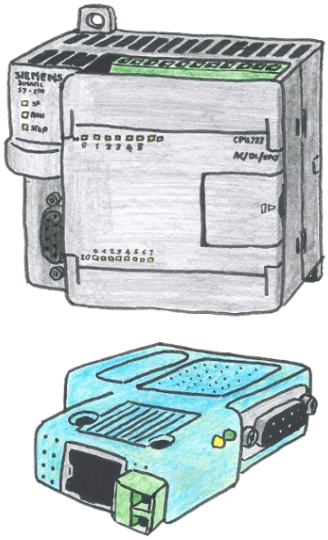
In the next step you have to connect with the partner controller and monitor the content of DB20. Within the first 64 bytes you should then see the bytes which you have controlled on the first controller on DB20.

Afterwards you can test the other direction of the coupling if you like to.

8.6 Coupling with active PUT/GET for S7-200

The example application “S7-LAN_PUT_GET“ allows you to couple a S7-200 controller with a S7-LAN, S7-GATE or MPI-LAN with a network PLC via PUT/GET. This example project contains the program for the S7 controller and can be found in the ZIP archive with communication examples that can be downloaded from the product page.





Example configuration data:

IP address:	192.168.1.55	192.168.1.56
subnet mask:	255.255.255.0	255.255.255.0
bus address:	-	2

8.6.1 Configuration S7-LAN

In the first step you should make sure that the general configuration (network and bus parameters) of your device is done already. Please note that the bus parameters have to be configured manually, because on a S7-200 controller they can't be detected automatically.

After that you can open your web browser and access the web page of your device if not done already. Now you can navigate to the page “Modules” → “S7-Gateway”. There you then have to pick one of the connection entries, select the connection type “PUT/GET active” and configure the renaming parameters as follows:

field	**value**
Partner IP address	*IP address of the partner controller* *e. g.: 192.168.1.55*
Poll time	500
CPU	*bus address of the PLC which controls this connection and uses the data* *e. g.: 2*
Data block	1
Data word	0
Src. TSAP	02 00 (Hex)
Dst. TSAP	02 00 (Hex)

8.6.2 Transferring blocks

First of all you have to open the MicroWin project “S7-LAN_PUT-GET”, which can be found within the ZIP archive together with the other example applications.

Now you have to click on “Communication”, choose the TIC driver for PPI on the PG/PC interface and refresh the list with participants. When the list got refreshed you have to select your controller and click on “OK”.

Afterwards you should transmit the “Program Block” and “Data Block” into your controller. This selection can be done within the “Options” sections after you have clicked on “Download”.

The example project contains the following program blocks:

block	**usage case**
OB1	main cycle: contains the generation of an Always-On-Bit and a call for SBR1
SBR1	subroutine which repeatedly executes a PUT and GET job

SBR5	subroutine for PUT
SBR6	subroutine for GET

Important:
If you want to use the program without any change you have to create a DB1 with a length of 256 bytes within the partner controller.

Hint:
On a S7-200 controller the variable area refers to the DB1.

8.6.3 Starting orders

In the example program for the S7-PLC within the SBR1 both jobs are started permanently and the subroutines are called. The specification which data should be transferred can be found within the subroutines SBR5 for PUT and SBR6 for GET.

The call to PUT (SBR5) starts a PUT job via the bit F10.0, which is set constantly. The PUT job reads 64 bytes of the variable area starting from byte 192 of the local controller and transmit them to DB1 at a offset of 128 bytes to the partner controller.

Via the call to GET (SBR6) a GET job is started through the bit F11.0, which is set constantly too. The GET job in the example reads 64 bytes data of DB1 starting from byte 192 of the partner controller and transmit them to the variable area at a offset of 128 bytes to the local controller.

8.6.4 Used variables

In addition to the above listed blocks the following variables are used from the PLC program on the controller where the LAN device is connected to:

variable	**usage case**
F0.1	Always-On-Bit (constant 1)
F10.0	bit for starting the PUT job
F10.1	bit for success feedback for the PUT job
F10.2	bit for error feedback for the PUT job

F11.0	bit for starting the GET job
F11.1	bit for success feedback for the GET job
F11.2	bit for error feedback for the GET job
FW12	status of the PUT job
FW14	status of the GET job
VB0-VB47	data for the connection and job management
VB128-VB191	payload from the GET job
VB192-VB255	payload for the PUT job

8.6.5 Testing the coupling

When the PLC program was transmitted the data from the variable area of the S7-200 controller and from the DB1 of the partner controller should be exchanged automatically.

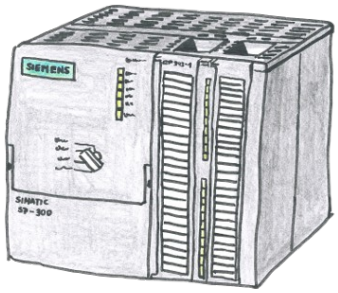
If you want to check the coupling you can now connect to the LAN device again. Then you should control various values (e. g. 1, 2, 3, 4 etc.) to some of the bytes between offset 192 and 255 of the variable area.

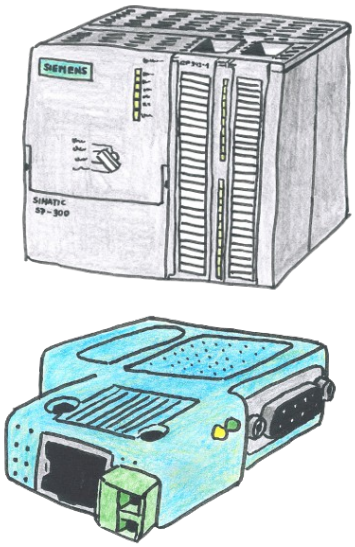
In the next step you have to connect with the partner controller and monitor the content of DB1. Within the bytes 128 to 191 you should then see the bytes which you have controlled on the first controller on the variable area.

Afterwards you can test the other direction of the coupling if you like to.

8.7 Coupling with X_PUT/X_GET

The example application “S7-LAN_XPUT_XGET“ allows you to couple a S7-LAN, S7-GATE or MPI-LAN with a network PLC via PUT/GET and the Siemens functions codes X_PUT and X_GET. This example project contains the blocks for the S7 controller and can be found in the ZIP archive with communication examples that can be downloaded from the product page.





Example configuration data:

IP address:	192.168.1.55	192.168.1.56
subnet mask:	255.255.255.0	255.255.255.0
bus address:	-	0 *(device address!)*

8.7.1 Configuration S7-LAN

In the first step you should make sure that the general configuration (network and bus parameters) of your device is done already.

After that you can open your web browser and access the web page of your device if not done already. Now you can navigate to the page “Modules” → “S7-Gateway”. There you then have to pick one of the connection entries, select the connection type “X_PUT/X_GET” and configure the renaming parameters as follows:

field	**value**
Partner IP address	*IP address of the partner controller* *e. g.: 192.168.1.55*
Src. TSAP	02 00 (Hex)
Dst. TSAP	02 02 (Hex)

8.7.2 Transferring blocks

First of all you have to open the S7 project “S7-LAN_XPUT-XGET”, which can be found within the ZIP archive together with the other

example applications. In the project you have to navigate to the S7 program folder “XPUT-XGET”.

Now you should connect to your controller (directly via network or with the TIC driver) where the LAN device is connected to and then transmit the following blocks into your PLC:

block	**usage case**
OB1	main cycle: contains a call for FB10
FB10	function block which executes a PUT job with IP data, a PUT job with user data and a GET job with user data after request
DB10	data block for handing over the IP data
SFC67	function code from Siemens for X_GET
SFC68	function code from Siemens for X_PUT

8.7.3 Starting orders

In the example program the PUT and GET jobs are defined and started by request through flag bits.

The call of the function X_PUT (SFC68) with the IP data is started by F10.0. Thereby the IP data with the IP address of the partner controller as well as both TSAP values which are located in DB10 are getting transmitted to the LAN device. With this job no user data is transmitted to the partner controller.

With F10.2 the call of the function X_PUT (SFC68) with user data is started. This job sends the content of the FD100 from the own controller to the FD104 of the partner controller.

The call of the function X_GET (SFC67) with user data is started by F10.4. On this data exchange the content of the FD100 from the partner controller is requested and gets transmitted to the FD104 of the own controller.

8.7.4 Used variables

In addition to the above listed blocks the following variables are used from the PLC program on the controller where the LAN device is connected to:

variable	usage case
F10.0	bit for starting the PUT job with IP data
F10.1	bit for busy report of the PUT job with IP data
F10.2	bit for starting the PUT job with user data
F10.3	bit for busy report of the PUT job with user data
F10.4	bit for starting the GET job with user data
F10.5	bit for busy report of the GET job with user data
F10.7	bit to hold the connection open
FW12	status of the current PUT job with IP data
FW14	status of the current PUT job with user data
FW16	status of the current GET job with user data
FW22	status of the last PUT job with IP data
FW24	status of the last PUT job with user data
FW26	status of the last GET job with user data

8.7.5 Testing the coupling

When the PLC program was transmitted the data exchange between the two controllers can occur.

If you want to test the coupling you first have to connect to the PLC with the LAN device. Then you can should control any value to the FD100. Afterwards you have to set F10.2 to 1 to start the PUT job and wait until its 0 again. When the job was successful FW24 shows the value 0.

Now you should connect to your partner controller and check if the FD104 from this PLC now contains the value which you have previously controlled to the FD100 of the other controller.

When you want to test the other direction as well you can now control any value to the FD100 on this PLC. After that you have to connect to the LAN device again and set F10.4 to 1. As soon as F10.4 gets reseted to 0 and FW26 shows 0 too, the FD104 should contain the value which was controlled on the partner controller.

When needed you can also test the transmission of the IP data. This allows you to change the IP partner during the runtime of the PLC

program, without the need for changing the configuration on the LAN device. For this you first have to enter the IP address and the TSAP values to the DB10 of the PLC. Then you can start the transmission of the IP data by setting F10.0 to 1. All further PUT and GET jobs with user data will now be sent to the partner which was addressed in DB10. If you want to change the partner again, you have to execute the PUT job with IP data again.

8.8 Reading watchdog information

The watchdog module allows you to determine the amount of parity errors and spikes on your bus with a LAN device. This values can't only be shown on the web page of the device rather it can be also retrieved via a simple network protocol. An example program which retrieves this information can be downloaded from the product page.

8.8.1 Structure of the connection and packet

Before you can start retrieving the information you have to establish a TCP connection on the port 133 of your S7-LAN, S7-GATE or MPI-LAN. The LAN device thereby acts as server and your application have to be the client.

If the connection is established the client should sent one or more byte(s) with various data. If these bytes are received from the partner device, you will get a response with the available information. The response packet is 10 bytes tall and has the following structure:

offset	data type	description	example
0	char[4]	amount of parity errors as ASCII characters including the termination character	'0' '2' '7' '\0'
4	char[4]	amount of spikes as ASCII characters including the termination character	'1' '8' '3' '\0'
8	unsigned char	amount of parity errors as decimal value	27
9	unsigned char	amount of spikes as decimal	183

		value	

The two values are always reseted back to zero if they were retrieved. This is the same process as on the web page.

If you want to retrieve the information again you have to sent one or more byte(s) again. Thereby you will get another reply. This procedure can be repeated as often as needed. When you don't want to retrieve the information again you should close the TCP connection to the device.

8.8.2 Using the application

On the product page of the device you can download an example application for the watchdog module. The download is a ZIP archive which contains a Visual C++ 6.0 project.

The file “WDTest.cpp” contains the source code of the application. There you can find the main() function which initializes the Windows Socket Library and tries to connect to the LAN device. If the connection is established the program sends the letter “A” to the device and waits for a reply. If the reply was received the contained information will be shown on the console. Now the connection to the device gets closed and the application exits.

An already compiled version of the program can be found within the folder “Release” as “WDTest.exe”.

Hint:
You should start the program via the command prompt (CMD) because the program automatically closes when the program has finished and you wouldn't see the output thereby.

Important:
The compiled version of the program always connects to the default IP address 192.168.1.56. If you want to test the program together with another IP address you have to change the address within the source code and recompile the application.

9 Technical data

9.1 Technical data S7-LAN and S7-GATE

Supply voltage:	24V/DC +/- 20%
Power consumption:	2 watt
Display:	web browser status LED's
Handling/Configuration:	web browser TIC driver and configuration tool
Interfaces:	**to the PLC:** PPI/MPI/Profibus interface 9,6 kBd – 12 MBd **to the PG/PC:** 9-pin PG/Diagnostic jack 10/100 BaseTX RJ45-Ethernet jack
Galvanic isolation:	1500V PPI/MPI/Profibus to the PC
Protocols:	RFC1006, DHCP, HTTP
Operating temperature:	0 - 55°C
Case:	ABS plastic case
Dimensions:	65 x 43 x 17 mm

9.2 Technical data MPI-LAN

Supply voltage:	24V/DC +/- 20%
Power consumption:	2 watt
Display:	web browser LCD display
Handling/Configuration:	web browser keyboard on the back side TIC driver and configuration tool
Interfaces:	**to the PLC:** PPI/MPI/Profibus interface 9,6 kBd – 12 MBd **to the PG/PC:** 10/100 BaseTX RJ45-Ethernet jack
Galvanic isolation:	1500V PPI/MPI/Profibus to the PC
Protocols:	RFC1006, DHCP, HTTP
Operating temperature:	0 - 55°C

Case:	ABS plastic case
Dimensions:	146 x 41 x 29 mm

9.3 Technical data S7-USB

Supply voltage:	5V/DC
Power consumption:	2 watt
Display:	status LED's
Handling/Configuration:	TIC driver and configuration tool
Interface:	**to the PLC** PPI/MPI/Profibus interface 9,6 kBd – 12 MBd **to the PG/PC:** 9-pin PG/Diagnostic jack Mini-USB-B jack
Galvanic isolation:	1000V PPI/MPI/Profibus to the PC
Operating temperature:	0 - 55°C
Case:	ABS plastic case
Dimensions:	65 x 43 x 17 mm

9.4 Technical data MPI-USB

Supply voltage:	5V/DC
Power consumption:	2 watt
Display:	LCD display
Handling/Configuration:	keyboard on the back side TIC driver and configuration tool
Interface:	**to the PLC:** PPI/MPI/Profibus interface 9,6 kBd – 12 MBd **to the PG/PC:** USB-A jack
Galvanic isolation:	1000V PPI/MPI/Profibus to the PC
Operating temperature:	0 - 55°C
Case:	ABS plastic case
Dimensions:	146 x 41 x 29 mm

9.5 Technical data MPI-II

Supply voltage:	24V/DC +/- 20%
Power consumption:	2,5 watt
Display:	LCD display
Handling/Configuration:	keyboard on the back side TIC driver and configuration tool
Interface:	**to the PLC:** PPI/MPI/Profibus interface 9,6 kBd – 12 MBd **to the PG/PC:** RS232 interface 9,6 kBd – 115,2 kBd USB-A jack
Galvanic isolation:	1000V PPI/MPI/Profibus to the PC
Operating temperature:	0 - 55°C
Case:	ABS plastic case
Dimensions:	146 x 41 x 29 mm

9.6 Pin assignment MPI

no.	notation	description	direction
1	NC	not connected	-
2	M24V	ground 24V/DC	input
3	LTG_B	data line B	bidirectional
4	RTS-AS	request to send from PLC	input
5	M5V	ground 5V/DC	input
6	P5V	5V/DC power output	output
7	P24V	24V/DC power input	input
8	LTG_A	data line A	bidirectional
9	RTS-PG	request to send to PLC	output

For the detection of directly connected participants the lines RTS-AS and M5V have to be wired on the interface.

P5V is an output on this cable and is used for bus-termination only. This 5V/DC isn't loadable and therefore secured with an 100 ohms resistor.

Hint:
The shield on the SUB-D plugs are connected.

Important:
This cable side shouldn't be extended with all lines, because it also carries 24V/DC and 5V/DC for power supply.

If you want to extend this cable side, please connect your device with an external power supply and extend only the two lines LTG_A and LTG_B 1:1. The shield should be connected on both SUB-D plugs. Also you may have to include a resistor on the line end for bus termination.

9.7 Pin assignment Ethernet

no.	notation	description	direction
1	TX+	send line +	output
2	TX-	send line -	output
3	RX+	receive line +	input
4	NC	not connected	-
5	NC	not connected	-
6	RX-	receive line -	input
7	NC	not connected	-
8	NC	not connected	-

Hint:
The MPI-LAN device contains a build in crossover cable. Therefore the two data pairs TX+/TX- and RX+/RX- are crossed.

9.8 Pin assignment USB-A

no.	notation	description	direction
1	VCC	power supply (DC)	input
2	D-	data line -	bidirectional
3	D+	data line +	bidirectional
4	GND	signal ground	input

Important:
The USB cable side shouldn't be extended, because it also carries 5V/DC as power supply. The cable length must not be longer then the maximum allowed length of 5m.

The extension of the USB cable side would lower the signal strength of the bus and lead to transmission errors!

9.9 Pin assignment Mini-USB-B

no.	notation	description	direction
1	VCC	power supply (DC)	input
2	D-	data line -	bidirectional
3	D+	data line +	bidirectional
4	ID	not connected	-
5	GND	signal ground	input

Important:
The USB cable side shouldn't be extended, because it also carries 5V/DC as power supply. The cable length must not be longer then the maximum allowed length of 5m.

The extension of the USB cable side would lower the signal strength of the bus and lead to transmission errors!

9.10 Pin assignment RS232

no.	notation	description	direction
1	DCD	receive signal detected	input
2	TXD	send data	output
3	RXD	receive data	input
4	DSR	transmission unit is ready	output
5	GND	signal ground	-
6	DTR	data device is ready	input
7	CTS	clear to send	output
8	RTS	request to send	input
9	RI	ring tone	input

The cable is made for the direct connection to the PC. When needed this cable side can be extended to up to 15m with an 1:1 extension cable. A good quality of the extension cable must be used.

10 Application-examples

10.1 S5/S7-PLC-couplings

10.1.1 Commissioning of S5-LAN++ and S7-LAN

Before you can start with the configuration of the coupling you should first set up your S5-LAN++ (to access your S5 controller via the PG interface) and / or S7-LAN (to access your S7 controller via PPI/MPI/Profibus) modules. For this please read the short instructions for the S5-LAN++ or S7-LAN.

10.1.2 Configure coupling

The S5-LAN++ and S7-LAN are supporting multiple couplings. In general a distinction is made between a active controller, which establishes and manages the connection, and a passive controller, which waits for the connection and queries.

For the coupling type “PUT/GET” a change is only needed on the active controller, because here flags and data blocks from the passive controller are directly accessed by the active controller.

For the coupling type “SEND/RECV” a change on both controllers is needed.

The following table shows a overview about possible couplings between controllers and shows up, where you can find more information about the configuration of the coupling. All descriptions and example applications can be downloaded on the product page of the S5-LAN++ and S7-LAN.

controller 1 (active)	**controller 2 (passive)**	**coupling type**	**description / example**
S7-200 via PPI	any	PUT/GET	project „S7-LAN_PUT-GET“
	S7-200 via PPI	SEND/RECV	project „S7-LAN_SEND-RECV“
S7-300/400	any	PUT/GET	project „S7-LAN

via MPI/DP			Aktives PUT-GET“
	S7-300/400 via MPI/DP	SEND/RECV	project „S7-LAN an S7-LAN“
	S5 via PG port	SEND/RECV	project „S5-LAN++ an S7-LAN“
S7-300/400 via Ethernet-CP	S7-200/300/ 400 via PPI/MPI/DP	PUT/GET	S7-LAN manual section „Access via PUT/GET“
	S7-300/400 via MPI/DP	SEND/RECV	project „S7-LAN an S7-CP“
	S5 via PG port	PUT/GET	S5-LAN short instruction „S5-S7-coupling“
	S5 via PG port	SEND/RECV	Project „S5-LAN++ an S7-CP“
S7-1200/1500 via Ethernet	S7-200/300/ 400 via PPI/MPI/DP	PUT/GET	S7-LAN manual section „Access via PUT/GET“
	S5 via PG port	PUT/GET	S5-LAN short instruction „S5-S7-coupling“
S5 via PG port	S5 via PG port	SEND/RECV	project „S5-LAN++ an S5-LAN++“

For every example project shown in the table above there is also a description of the project. For S5 couplings this can be found within the ZIP archive with the example projects and for S7 couplings within the manual of the S7-LAN module.

10.2 Panel-connection to S5/S7-PLC

10.2.1 Prepare controller

If you want to access a S7-200 via PPI or S7-300/400 via MPI/DP from your panel you will first have to connect the S7-LAN to the PPI/MPI/DP

interface of your controller. The module normally will get the power supply directly from the controller and detects the bus parameters completely automatically. This means no manual configuration within the module is necessary. By default the S7-LAN has the IP address 192.168.1.56. This IP and further settings can be changed via the TIC or the web interface of the module if desired. For further information please read the short instructions and the manual from the S7-LAN module.

For the access to a S7-1200/1500 or LOGO! no S7-LAN is needed, because the panel can be directly connected through a Ethernet cable or via WiFi with two ALF-UA devices.

If you instead want to access a S5 controller from your panel you will first have to connect the S5-LAN++ to the PG interface of your controller. The module normally will get the power supply directly from the controller. For controllers (e. g. AG90/95/100U) which do not offer a power supply on the PG interface the module have to be powered externally via 24V DC. By default the S5-LAN++ does not have a IP address. To change this you will need to connect the S5-LAN++ to your PC and assign an address to the module (e. g. 192.168.1.56) with the help of the tool S5-LAN-Manager. For further information please read the short instructions and the manual from the S5-LAN++ module.

Important: Your controller with Ethernet interface or S5-LAN++ or S7-LAN as well as the panel and if applicable the two ALF-UA devices have to be all in the same subnet. In this instructions the subnet 192.168.1.xxx is used, but you choose another subnet if you want.

10.2.2 Configure connection via WiFi

If you want to connect your controller and panel wireless via WiFi you will now have to configure the both ALF-UA devices.

First you should only connect the first device, which you later want to connect with the controller, and establish a connection to the WiFi network with the SSID “ALF-UA”. Your PC will automatically gets a IP address from the device. Now open the web interface of the device via

the IP address 192.168.2.1 and log in with the user name “admin” and password “admin”.

Next change the operation mode of this device to “AP Bridge” and give the device a unique IP address from your subnet (e. g. 192.168.1.1) and enter a SSID (name of the network). For safety reasons you should choose “WPA2 PSK” as encryption and protect the network with a password.

In the next step you will have to connect to the second device, which you later want to connect with the panel. The first steps are the same as for the first device. For the operation mode you now select “Client Bridge” and give the device another IP address from the subnet (e. g. 192.168.1.2). For the WLAN parameters (SSID, encryption and password) you will have to enter the same values as for the first device.

>> Further information about the commissioning and the further configuration parameters can be found in the short instructions and the manual of the ALF-UA.

10.2.3 Configure connection in WinCC

In the last step you will have configure the connection to your controller within your panel. Therefore you have to open your WinCC or TIA project and navigate to the connections of the panel. Here you will need to add a new entry. For the interface of the control panel you will have to select “ETHERNET”. The remaining parameters can be taken from the following table.

controller type and access type	**Communication driver**	**IP address**	**Rack**	**Slot**
S7-200 via PPI	SIMATIC S7 300/400	IP from S7-LAN	0	2
S7-300/400 via MPI/DP	SIMATIC S7 300/400	IP from S7-LAN	0	2
S7-300/400 via	SIMATIC S7	IP from PLC	0	2

Ethernet-CP	300/400			
S7-1200/1500 via Ethernet	SIMATIC S7 1200/1500	IP from PLC	0	1
LOGO! via Ethernet	SIMATIC S7 300/400	IP from PLC	0	1
S5 via PG port	SIMATIC S7 300/400	IP from S5-LAN++	0	2

As soon as you have configured your connection you will also can create variables within your panel project to read and write data from / to your controller.

11 Appendix

11.1 Structure of a TSAP value

On a S7 connection the TSAPs are used to address a specific module and usually are 2 bytes long. Thereby the destination TSAP is important here. In most cases the source TSAP can be chosen arbitrarily.

The first byte of the TSAP specifics the connection type:

- 01: PG connection (reserved for programming device)
- 02: OP connection (used for panels)
- 03: unspecific connection (e. g. for OPC server, PDA, ...)

The second byte consists of the parameters rack and slot. The rack is decoded via the upper 3 bits. Apart from the plants with multiple racks this value is always 0. The remaining 5 bits of the byte define the slot. For a S7-300 controller the CPU is always located on slot 2. On S7-400 controllers it needs to be differ if a single or double wide power supply is used (slot 2 or 3). If the value 0 is used for rack and slot the directly connected module will be addressed.

On a S7-1200/1500 controller the CPU is always located at rack 0 and sot 1.

11.1.1 Conversion table for bus address to Rack/Slot

If you have enabled the option “Convertion of Rack/Slot from TSAP to BUS-address” within your LAN device you will be able to address a specific bus address with the values for rack and slot. This allows you to establish a connection to another bus participant with each RFC1006 connection. Within the following table you can see which values you have to use for rack and slot to connect with a specific bus address:

bus address	rack	slot	dst. TSAP
0	0	0	02 00

bus address	rack	slot	dst. TSAP
1	0	1	02 01
2	0	2	02 02
3	0	3	02 03
4	0	4	02 04
5	0	5	02 05
6	0	6	02 06
7	0	7	02 07
8	0	8	02 08
9	0	9	02 09
10	0	10	02 0A
11	0	11	02 0B
12	0	12	02 0C
13	0	13	02 0D
14	0	14	02 0E
15	0	15	02 0F
16	0	16	02 10
17	0	17	02 11
18	0	18	02 12
19	0	19	02 13
20	0	20	02 14
21	0	21	02 15
22	0	22	02 16
23	0	23	02 17
24	0	24	02 18
25	0	25	02 19
26	0	26	02 1A
27	0	27	02 1B

bus address	rack	slot	dst. TSAP
28	0	28	02 1C
29	0	29	02 1D
30	0	30	02 1E
31	0	31	02 1F
32	1	0	02 20
33	1	1	02 21
34	1	2	02 22
35	1	3	02 23
36	1	4	02 24
37	1	5	02 25
38	1	6	02 26
39	1	7	02 27
40	1	8	02 28
41	1	9	02 29
42	1	10	02 2A
43	1	11	02 2B
44	1	12	02 2C
45	1	13	02 2D
46	1	14	02 2E
47	1	15	02 2F
48	1	16	02 30
49	1	17	02 31
50	1	18	02 32
51	1	19	02 33
52	1	20	02 34
53	1	21	02 35

bus address	rack	slot	dst. TSAP
54	1	22	02 36
55	1	23	02 37
56	1	24	02 38
57	1	25	02 39
58	1	26	02 3A
59	1	27	02 3B
60	1	28	02 3C
61	1	29	02 3D
62	1	30	02 3E
63	1	31	02 3F
64	2	0	02 40
65	2	1	02 41
66	2	2	02 42
67	2	3	02 43
68	2	4	02 44
69	2	5	02 45
70	2	6	02 46
71	2	7	02 47
72	2	8	02 48
73	2	9	02 49
74	2	10	02 4A
75	2	11	02 4B
76	2	12	02 4C
77	2	13	02 4D
78	2	14	02 4E
79	2	15	02 4F

bus address	rack	slot	dst. TSAP
80	2	16	02 50
81	2	17	02 51
82	2	18	02 52
83	2	19	02 53
84	2	20	02 54
85	2	21	02 55
86	2	22	02 56
87	2	23	02 57
88	2	24	02 58
89	2	25	02 59
90	2	26	02 5A
91	2	27	02 5B
92	2	28	02 5C
93	2	29	02 5D
94	2	30	02 5E
95	2	31	02 5F
96	3	0	02 60
97	3	1	02 61
98	3	2	02 62
99	3	3	02 63
100	3	4	02 64
101	3	5	02 65
102	3	6	02 66
103	3	7	02 67
104	3	8	02 68
105	3	9	02 69

bus address	rack	slot	dst. TSAP
106	3	10	02 6A
107	3	11	02 6B
108	3	12	02 6C
109	3	13	02 6D
110	3	14	02 6E
111	3	15	02 6F
112	3	16	02 70
113	3	17	02 71
114	3	18	02 72
115	3	19	02 73
116	3	20	02 74
117	3	21	02 75
118	3	22	02 76
119	3	23	02 77
120	3	24	02 78
121	3	25	02 79
122	3	26	02 7A
123	3	27	02 7B
124	3	28	02 7C
125	3	29	02 7D
126	3	30	02 7E