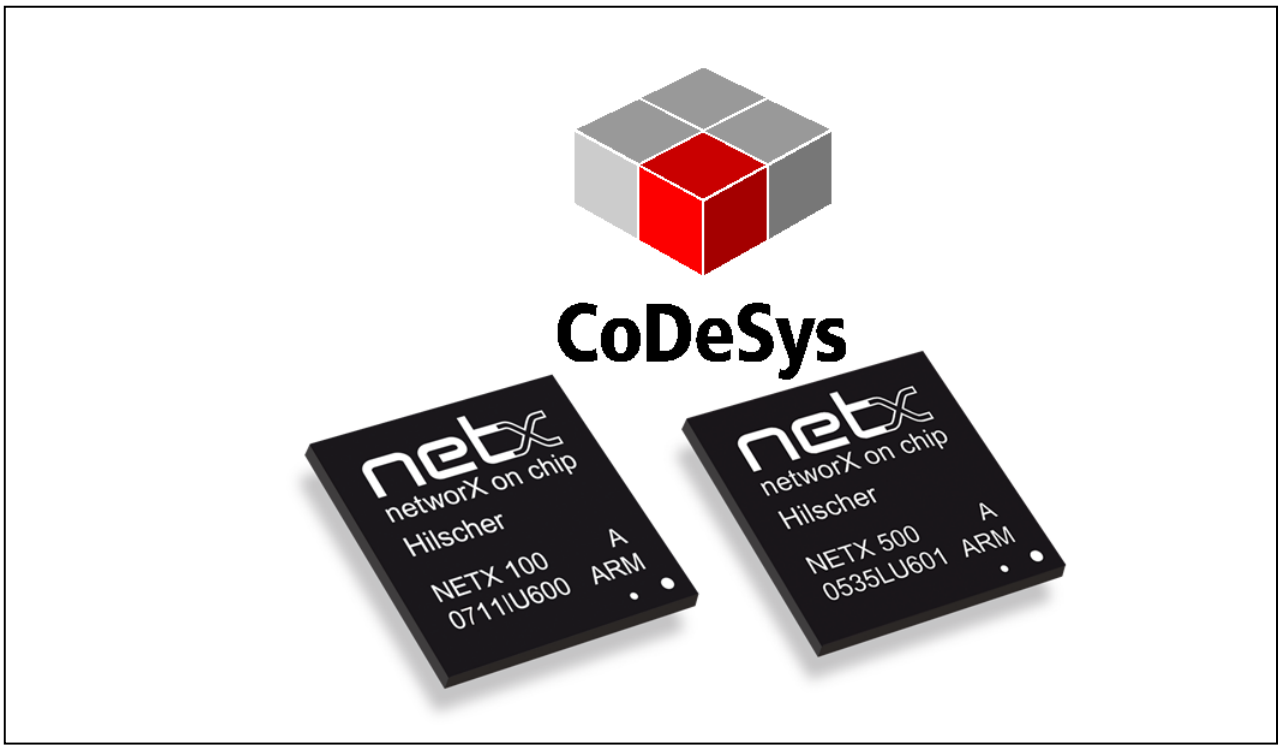
User Manual

netPLC with CoDeSys

Software Installation

V3.5



Hilscher Gesellschaft für Systemautomation mbH

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Table of Contents

1 Introduction

1.1 About the User Manual

This user manual describes the installation of the PLC programming software CoDeSys and other software programs which are needed to use netPLC components. It describes installation on a Windows® operating system.

netPLC components are

- Slot PLC NPLC-C100 and
- Module PLC NPLC-M100.

1.1.1 List of Revisions

Index	Date	Chapter	Revisions
1	2012-05-15	all	Created.
2	2014-01-23	1.2.1 1.3 4	Section *Directory Structure of the DVD* updadet. Section Reference to Hardware, Firmware, Server, Driver and Software: One firmware for CANopen and DeviceNet. Section *Installing netPLC CoDeSys*: Start screen updated.

Table 1: List of Revisions

1.1.2 Conventions in this Manual

Operation instructions, a result of an operation step or notes are marked as follows:

Operation Instructions:

➢ <instruction>

or

1. <instruction>
2. <instruction>

Results:

➪ <result>

Notes:

Important: <important note>

Note: <note>

<note, where to find further information>

Positions in Figures

The *Positions* ①, ②, ③ **...** or ⓐ, ⓑ, ⓒ **...** or Ⓐ, Ⓑ, Ⓒ **...** refer to the figure used in that section. If the numbers reference to a section outside the current section then a cross reference to that section and figure is indicated.

1.2 Contents of the Product DVD

The Product DVD for **netPLC CoDeSys** contains:

- Standard **CoDeSys** (PLC programming system) including device description files for Hilscher netPLC components
- Device driver for PC cards **cifX Device Driver**
- **USB Driver**, INF file for Windows
- **netPLC CoDeSys Server** program for slot PLCs
- Hilscher LAN device scanner tool
- Firmware with embedded CoDeSys SP and Fieldbus master functionality
- Documentation
- CoDeSys example projects

1.2.1 Directory Structure of the DVD

All manuals on this DVD are delivered in the Adobe Acrobat® Reader format (PDF).

Folder	Description
Documentation	Documentation in the Acrobat® Reader Format (PDF)
Firmware	Loadable firmware for slot PLC (firmware is already loaded in slot PLC when shipped) and data image for a SD memory card (to set slot PLC back to factory settings)
fscommand	Help programs for installation.
Programming & Development	Windows DLL to access host I/O.
Setup & Drivers	Setup for CoDeSys programming software Setup netPLC CoDeSys Server Setup for PC card driver USB driver
Supplements & Examples	CoDeSys example projects
Video-Audio Tutorial	Video podcast featuring commissioning example

Table 2: Folder Structure of the DVD

1.2.2 Documentation netPLC

The following documentation overview gives information about where to find further information and refers the corresponding manual.

All manuals listed in the overview below can be found in the **Documentation** directory on the CD delivered, in the Adobe Acrobat® Reader format (PDF).

Manual	Title Contents	File Name
User manual	netPLC with CoDeSys, software installation Contents of the product DVD Requirements System overview Installing software Technical data	netPLC with CoDeSys – Software Installation UM xx EN.pdf (This document)
User manual	Slot PLC NPLC-C100, hardware installation Requirements Device drawings Installing hardware (slot PLC) Changing battery Hardware description Technical data hardware Remark: The description of the LED is part of the document 'netPLC with CoDeSys, Commissioning'.	Slot PLC NPLC-C100 - Hardware Installation UM xx EN.pdf
User manual	netPLC with CoDeSys, Commissioning Create first project for netPLC Creating a PLC program Create bus configuration Connect to PLC Download PLC program and bus configuration Visualizing Functions Bus diagnostic Troubleshooting Description of LEDs	netPLC with CoDeSys - Commissioning UM xx EN.PDF
User documentation	CoDeSys V3, Installation and first steps	CoDesys Installation and Start.pdf
User documentation	OPC Server 3, Installtion and Usage	OPC_V3_how_to_use_E.pdf
User manual	Wiring instructions, PROFIBUS, CANopen, DeviceNet, AS-Interface, CompoNet, CC-Link That document contains information about cable characteristics, max. cable length in dependence of the baudrate as well as termination resistors.	Wiring Instructions UM xx EN.pdf

Table 3: Documentations netPLC CoDeSys DVD

Note: After having installed the CoDeSys programming system, you will find additional documents in the installation directory, usually under **C:\Programs\3S CoDeSys\CoDeSys\Documentation**

1.3 Reference to Hardware, Firmware, Server, Driver and Software

Note: The listed hardware revision, firmware and driver versions or versions of the programming software CoDeSys functionally belong together.

netPLC Components (Hardware)

netPLC components	Order number	Revision
NPLC-C100-DP/CDS-OPC	1800.410/CDS-OPC	4
NPLC-C100-CO/CDS-OPC	1800.500/CDS-OPC	4
NPLC-C100-DN/CDS-OPC	1800.510/CDS-OPC	4
NPLC-M100-DP/CDS-OPC	1830.410/CDS-OPC	3

Table 4: Reference to netPLC Components (Hardware)

Firmware

Firmware File	Device Type	Fieldbus System	Firmware Version
SC111000.NXF	NPLC-C100-DP	PROFIBUS DP Master	4.0
SC116000.NXF	NPLC-C100-CO	CANopen Master	4.0
	NPLC-C100-DN	DeviceNet Master	4.0
SM211000.NXF	NPLC M100-DP	PROFIBUS DP Master	4.0

Table 5: Reference to Firmware

Driver

Driver	Driver version
cifX Device Driver	1.2x.x
USB Driver	5.1.2600.2180

Table 6: Reference to Driver

Server and TCP/IP Gateway

Software	Software Version
CoDeSys Gateway	3.5.0.0
CoDeSys Service Control	3.5.0.0
CoDeSys Control Win V3	3.5.0.0

Table 7: Reference to Server

Software

Software	Software version
CoDeSys	V3.5

Table 8: Reference to Software

1.4 Legal Notes

1.4.1 Copyright

1.4.2 Important Notes

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1.4.6 Registered Trademarks

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Adobe-Acrobat® is an registered trademark of the Adobe Systems Incorporated.

1.5 Licenses

Operating the netPLC component with CoDeSys PLC function requires a license. This license is embedded in the netPLC device hardware and is included in the scope of delivery. It allows the use and operation of the CoDeSys programming system and of the PLC runtime environment in the hardware.

A license can not be deleted in the netPLC hardware nor converted.

For operating as fieldbus master, a master license is embedded in the netPLC hardware. This license allows operation as master in the corresponding fieldbus system.

2 Description and Requirements

2.1 Description

The netPLC components described in this manual are devices with PLC functionality and fieldbus communication interface.

Depending on the loaded firmware, the following fieldbus systems can be realized by using the corresponding netPLC component:

netPLC Component	Device Type	Fieldbus System
NPLC-C100-DP/CDS-OPC	Slot PLC (PC Card)	PROFIBUS DP Master
NPLC-C100-CO/CDS-OPC	Slot PLC (PC Card)	CANopen Master
NPLC-C100-DN/CDS-OPC	Slot PLC (PC Card)	DeviceNet Master
NPLC-M100-DP/CDS-OPC	Module PLC	PROFIBUS DP Master

Table 9: netPLC Components (Hardware)

2.2 System Requirements

2.2.1 System Requirements PC

- PC with minimum 1.8 GHz processor, 3.0 GHz recommended
- Windows® XP, Windows® Vista or Windows® 7
- DVD ROM drive
- Graphic resolution: min. 1024 x 768 pixel or higher
- Keyboard and Mouse

2.2.2 System Requirements CoDeSys

System requirements for the programming system CoDeSys

- NET Framework 4.0 (will be installed together with CoDeSys, if not already installed. Access to the internet required.)
- Free disk space: min. 600 MByte, recommended 1 GByte
- RAM: min. 512 MByte, recommended 1024 MByte
- Graphic resolution: min. 1024 x 768 pixel
- Keyboard and Mouse

2.3 Requirements for Operation

Note: For operating a slot PLC NPLC-C100-xx
Update older versions of the **cifX Device Driver** to **V1.1.1.0**.

2.3.1 netPLC Components

For operating the netPLC component, the following requirements must be fulfilled:

Software Installation	Only when operating a slot PLC NPLC-C100-xx: **cifX Device Driver** must be installed (V1.1.1.0 or higher).
netPLC CoDeSys Server	**netPLC CoDeSys Server** must be installed and running.
Firmware	Firmware with embedded CoDeSys runtime environment must be loaded into the netPLC component.
License	Licenses are required for the operation of the netPLC component for the fieldbus protocol with master functionality and for CoDeSys. These licenses are included in the scope of delivery and stored inside the netPLC component.
Configuration	The netPLC component must be configured by using the CoDeSys programming system included in the scope of delivery.
Programming	The PLC program must be created with CoDeSys and loaded into the netPLC component.
Communication	Slave devices of the used communication system are required for communication.

Table 10: Requirements for Operation of the netPLC Component

3 System Overview

The CoDeSys PLC (runtime) is embedded in different netPLC components.

The following system overviews provide an overview of the different use cases and commissioning procedures in relation to the different netPLC components.

This chapter features detailed descriptions of how the CoDeSys programming system, server and gateway establish communication with the netPLC components and how they interact with each other in order to program the targeted netPLC hardware.

Basic requirement for programming a netPLC component is an installed CoDeSys programming system. Other software components are required depending on the used netPLC component.

3.1 Use Case 1: CoDeSys Programming System and NPLC-C100 on one PC

CoDeSys programming system and netPLC NPLC-C100 are installed on the same PC.

The following software components are required on on this PC:

- CoDeSys programming system
- CoDeSys Gateway
- netPLC CoDeSys PC Card Server and the
- PC Card Device Driver (cifX Device Driver).

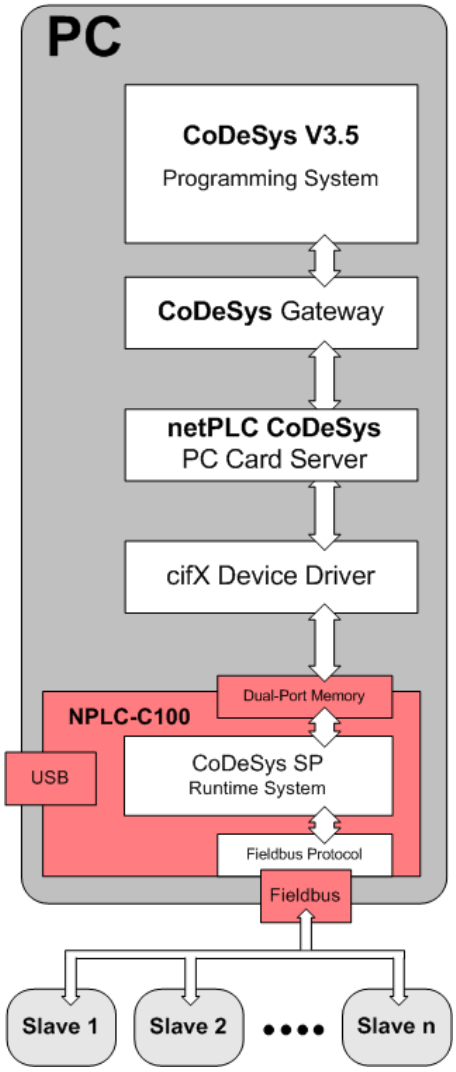


Figure 1: System Overview – Use Case 1 (One PC)

3.2 Use Case 2: CoDeSys Programming System and NPLC-C100 are installed on separate PCs and connected via Ethernet

The CoDeSys programming system is installed on PC1 and the slot PLC NPLC-C100 is installed in PC2. Both PCs are connected via Ethernet (local network).

The following software components are necessary for PC1:

- CoDeSys programming system
- CoDeSys Gateway

The following software components are necessary for PC2:

- netPLC CoDeSys PC Card Server and the
- PC Card Device Driver (cifX Device Driver).

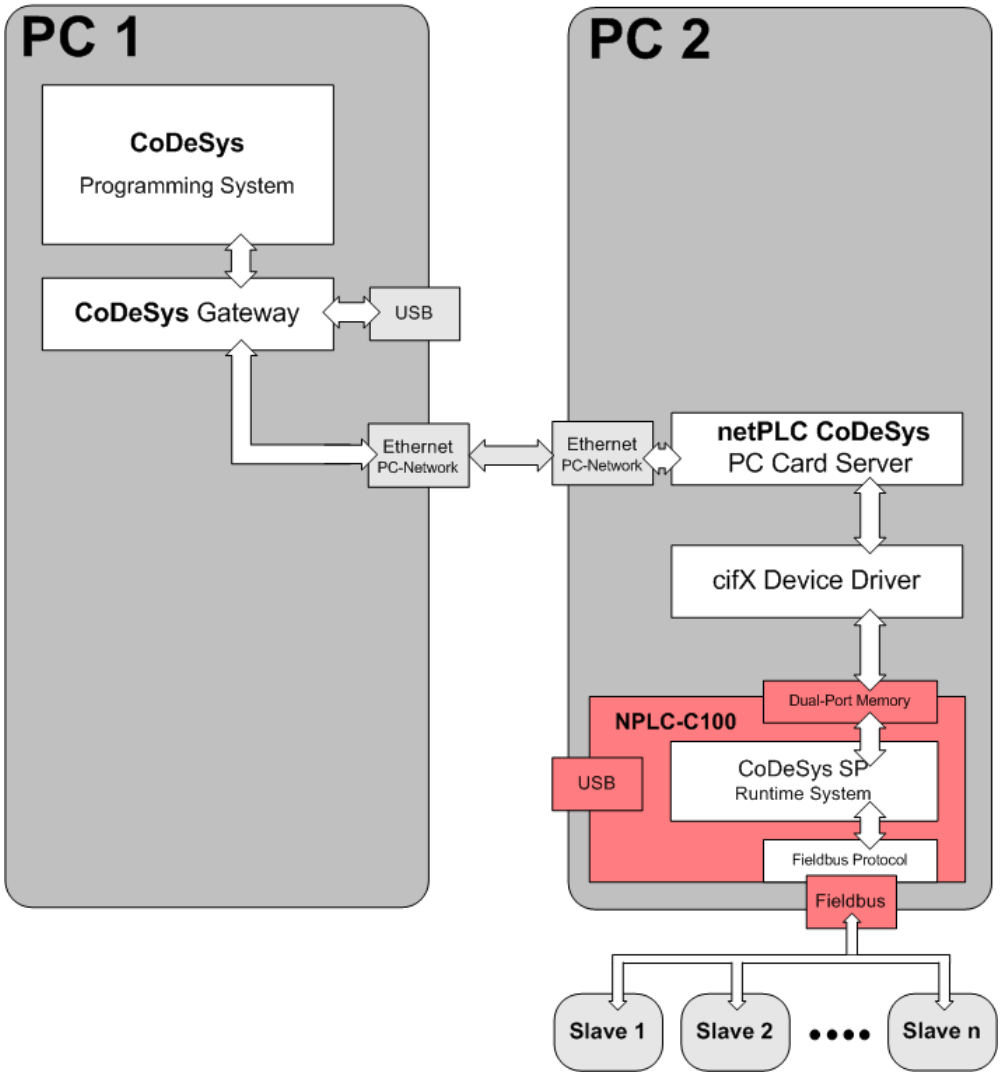


Figure 2: System Overview – Use Case 2 (Two PCs with Ethernet Connection)

3.3 Use Case 3: CoDeSys Programming System and NPLC-C100 are installed on separate PCs and connected via USB

The CoDeSys programming system is installed on PC1 and the slot PLC NPLC-C100 is installed in PC2. The USB port of PC1 is connected via an USB cable to the USB port of the slot PLC NPLC-C100.

The following software components are necessary for PC1:

- CoDeSys programming system
- CoDeSys Gateway
- USB Driver (auto-installs when USB cable is plugged in)

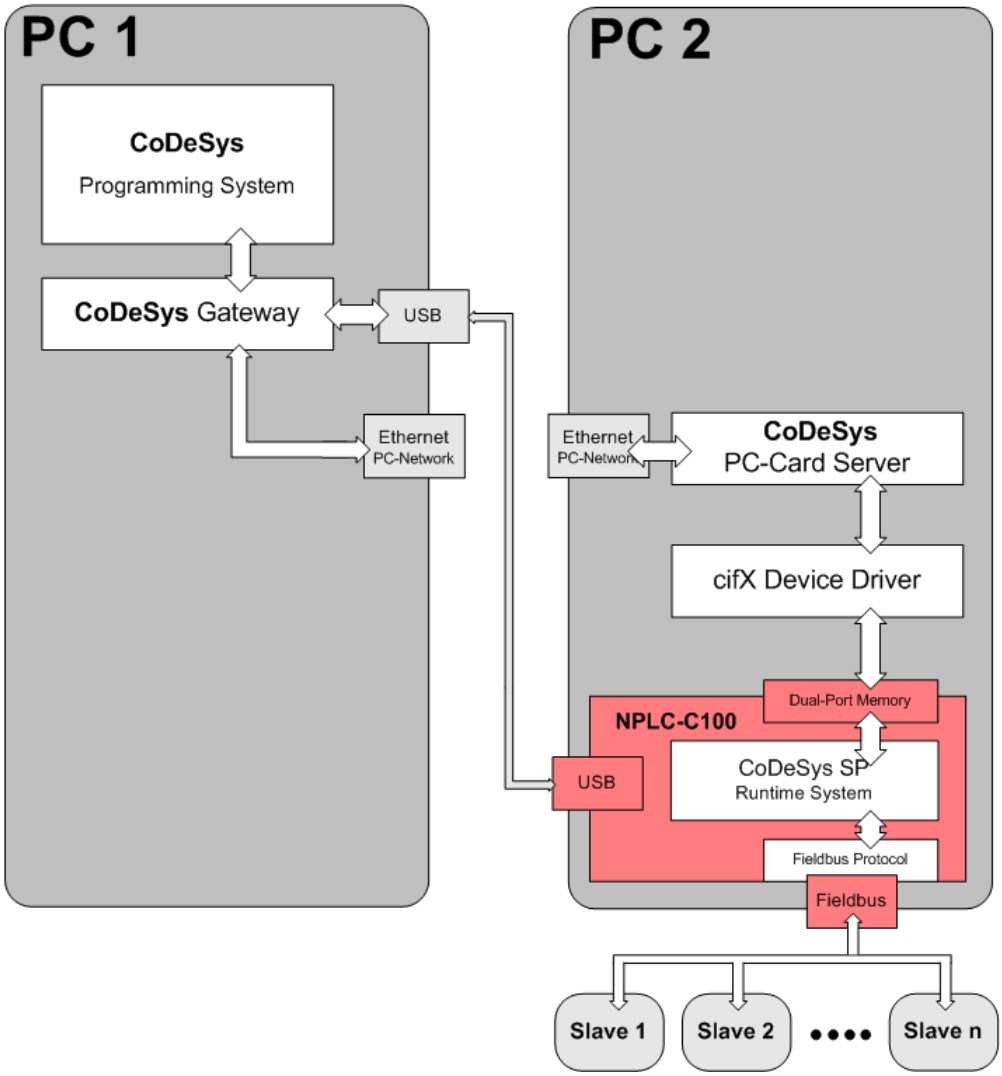


Figure 3: System Overview – Use Case 3 (Two PCs with USB Connection)

The following software components are optional for PC2 to connect to a visualization software:

- netPLC CoDeSys Server and the
- PC Card Device Driver (cifX Device Driver).

3.4 Use Case 4: CoDeSys Programming System and NPLC-M100 connected via USB or Ethernet

The CoDeSys programming system is installed on PC1. From PC1, a connection to the corresponding PLC component is established via USB or Ethernet cable.

On PC1, the following software components are required:

- CoDeSys programming system
- CoDeSys Gateway
- USB Driver (auto-installs when USB cable is plugged in)

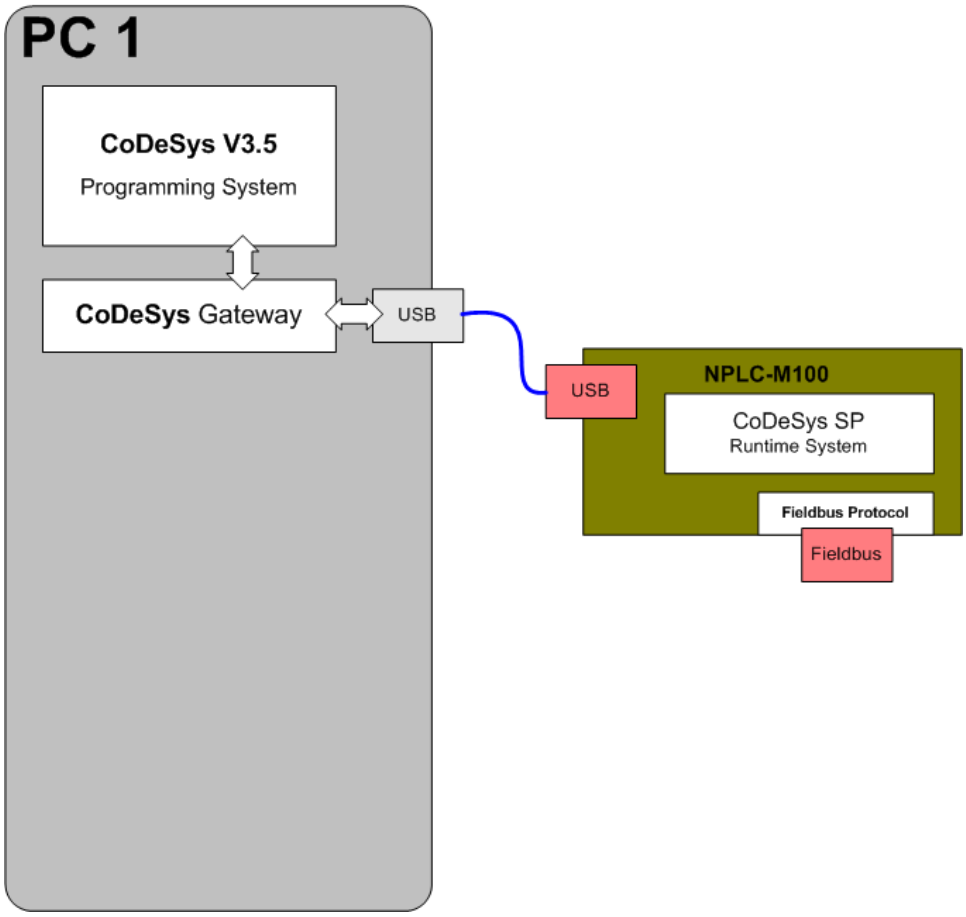


Figure 4: System Overview – Use Case 4: Connection via USB to NPLC-M100

The module PLC NPLC-M100 can be programmed straight after the USB driver has been installed.

4 Installing netPLC CoDeSys

- Insert the netPLC DVD into your local DVD ROM drive.
- If the autostart function is deactivated on your PC, choose **netPLC.exe** in the root directory of your DVD ROM drive.

Note: Administrator privileges are required on Windows® XP / Vista / 7 systems for installation!

The installation program starts and the following screen is displayed:

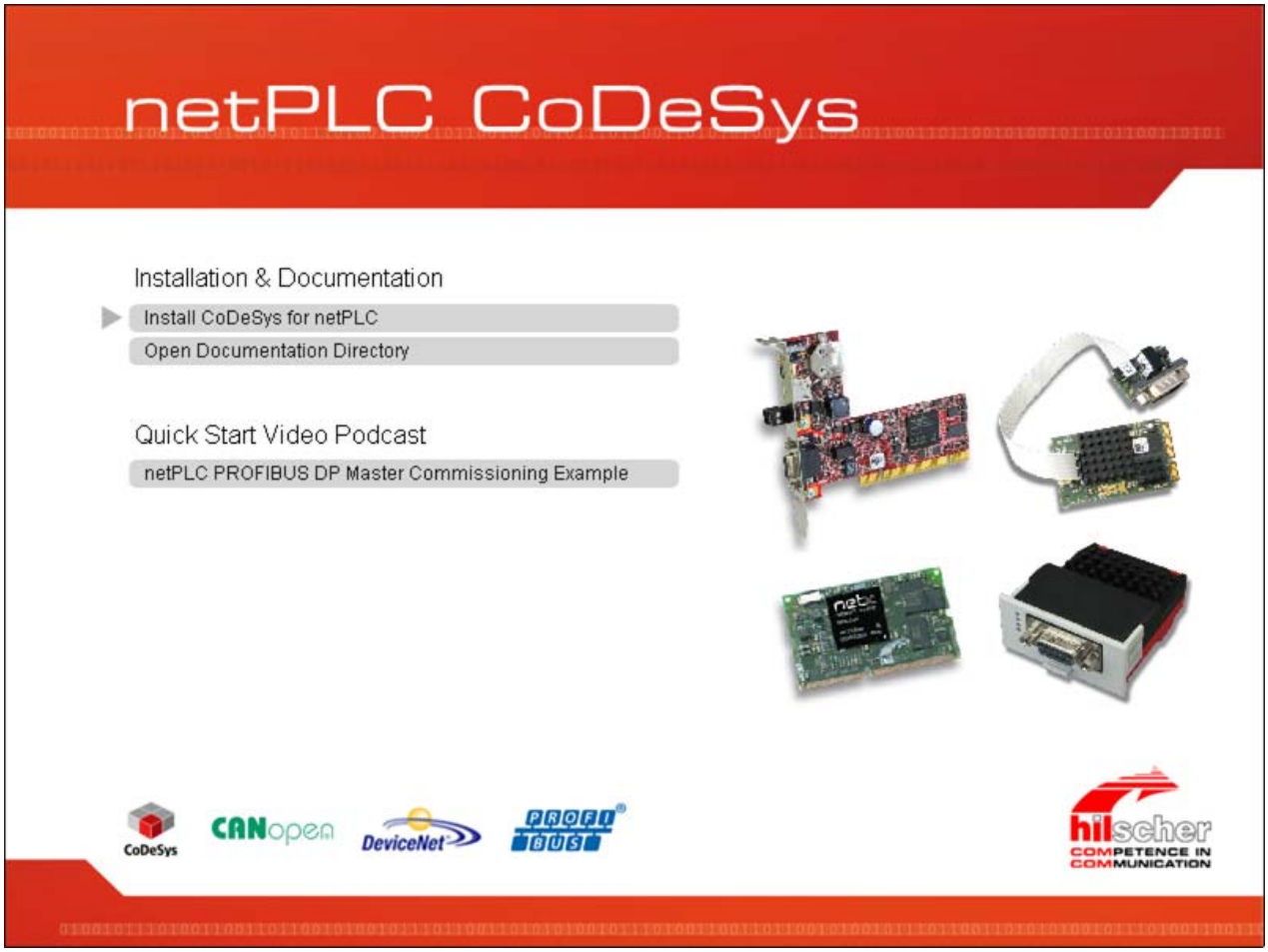


Figure 5: netPLC CoDeSys Installation

- Select **Install CoDeSys for netPLC** ①.

  Entry ② opens in the Windows Explorer the documentation directory of the DVD.

  Entry ③ opens commissioning example.

A window featuring installation options opens:

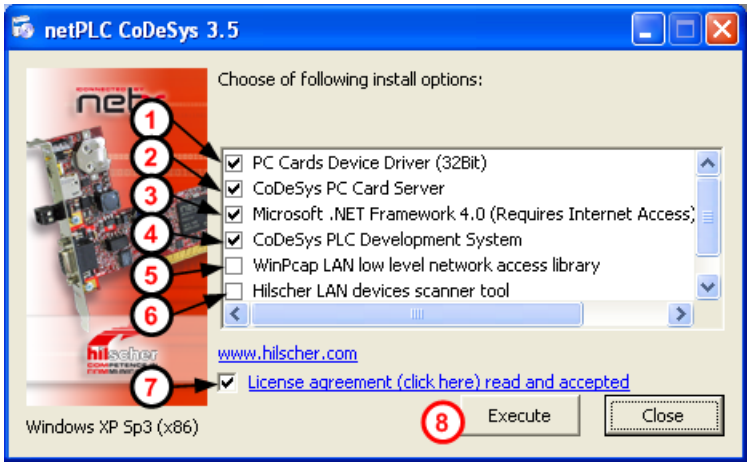


Figure 6: netPLC CoDeSys Installation Options

The installer checks, which of the necessary components are already installed on your PC. Thus, it is possible that your installer actually displays less components than shown in the figure above.

- Select by activating the appropriate check box the necessary components according to the scenarios described in the *System Overview* chapter on page 14.

  ① You need the *PC Cards Device Driver* only if you use slot PLC NPLC-C100 on a PC with installed NPLC-C100 card.

  ② You need the *CoDeSys PC Card Server* only if you use slot PLC NPLC-C100 on a PC with installed NPLC-C100 card.

  ③ This entry is only shown if no .NET Framework 4.0 has already been installed on the PC. This software component is needed for the operation of the CoDeSys PLC programming system.

  ④ The *CoDeSys PLC Development System* is needed on the PC from which the programming of the netPLC components is going to take place.

  ⑤ WinPcap is needed for netPLC components with Ethernet interface. It features a Windows network access library used by the Hilscher LAN device scanner tool.

  ⑥ The *Hilscher LAN device scanner tool* is needed to set a temporary IP address for Ethernet-capable netPLC components.

- Accept the license agreement ⑦.
- Click **Execute** ⑧.
- Follow the instructions of the installer until you get to the next selection dialog for software components:

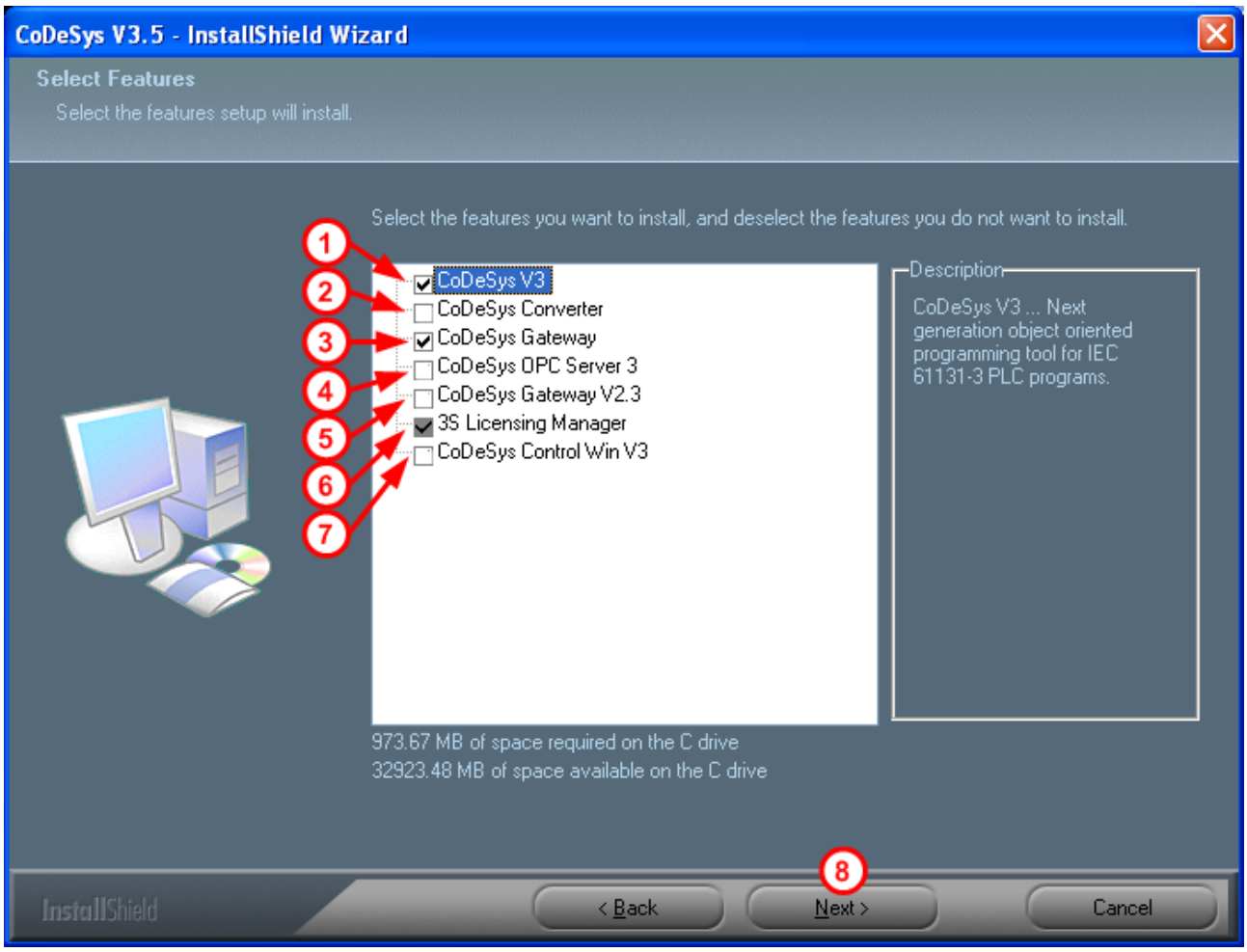


Figure 7: CoDeSys Installation Selection

The figure above shows the selection options of the CoDeSys Installation. Only components essential for the installation of the configuration environment are checked.

The installation components are:

1. **CoDeSys V3**: The tool for PLC programming according to IEC 61131-3
2. **CoDeSys Converter**: Needed on the programming PC if you want to integrate programs which have been created with an earlier CoDeSys version than V3.5.
3. **CoDeSys Gateway**: Needed on the PC, from which the netPLC components are going to be programmed, and also on the PC, on which the OPC Server 3 is going to be running.
4. **CoDeSys OPC Server 3**: Is not needed on the programming PC. Is needed on a PC, if visualization and operation by OPC Client is intended. In this case, this software component is to be installed on a PC which lies on the Ethernet communication pathway to the OPC Client.
5. **CoDeSys Gateway V2.3**: Needed on the PC, from which the netPLC components are going to be programmed, if communication with NPLC-C100 components running on older firmware versions (< 3.5.x.x NPC1CDPM.nxf) is intended.
6. **3SLicensing Manager**: Needed for installation of each single component.

⑦ **CoDeSys Control Win V3**: Check this box to install a Soft PLC for the PC. This PLC does not run on the netPLC component, but is served by the CPU of the PC, and is not required for operating the netPLC component. A license for this Soft PLC component is available from the CoDeSys manufacturer 3S.

After having selected the components to be installed, click **Next** ⑧, to continue installation.

➢ Follow the instructions of the installer.

Note: If you work with a **slot PLC PLC-C100**, then – after having finished the software installation – follow the installation instructions according to the hardware documentation of the component.

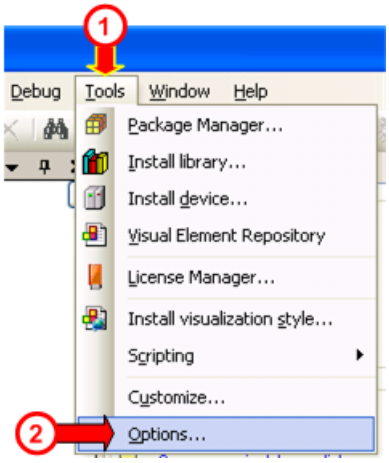
Note: If you work with a **module PLC NPLC-M100** and want to program these components via USB connection, you must install the USB driver as described in *Installing USB Driver* section on page 24.

4.1 Basic Settings

For more convenient working with CoDeSys, please change basic settings.

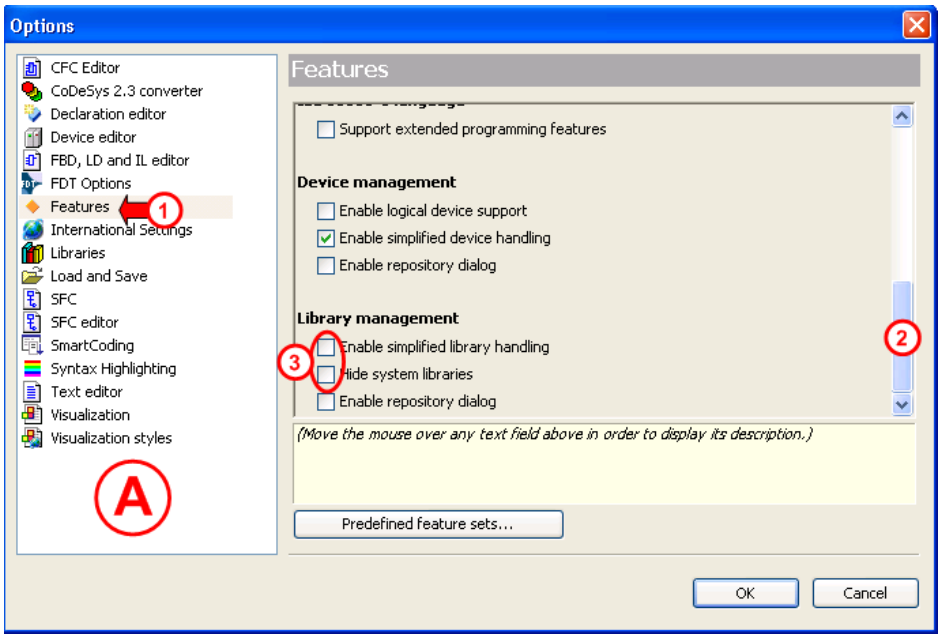
Proceed as follows:

➢ Start CoDeSys.

➢ 

In the **Tools** menu ①, select **Options** entry ②.

➢ The **Options** window opens.



- In the navigation area (A), select **Features** entry (1).
- Use the scroll bar (2) to scroll down to the bottom of the **Features** dialog area.
- Uncheck the check boxes which are indicated at position (3) in the figure above.

  This has the effect that all available functional libraries will later be visible for you.

4.2 Installing USB Driver

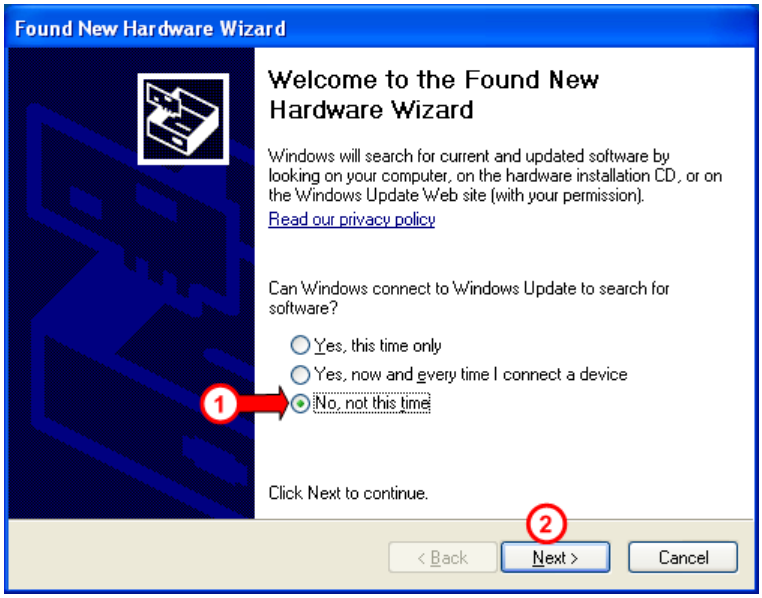
Note: If the netPLC component is connected via USB to your PC, then the Windows® hardware detection asks for a driver.

1. Connect a USB cable

➢ Connect a USB cable your PC with the USB port of the netPLC component.

Windows® detects the netPLC component automatically.

The message **Found New Hardware** is displayed and the **Found new Hardware Wizard** is started.

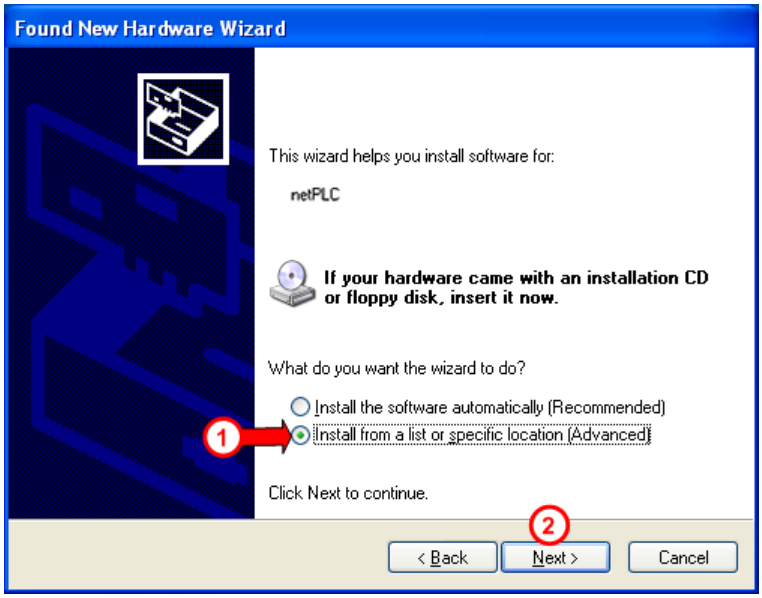


2. Windows update

➢ Select **No, not this time** (1)

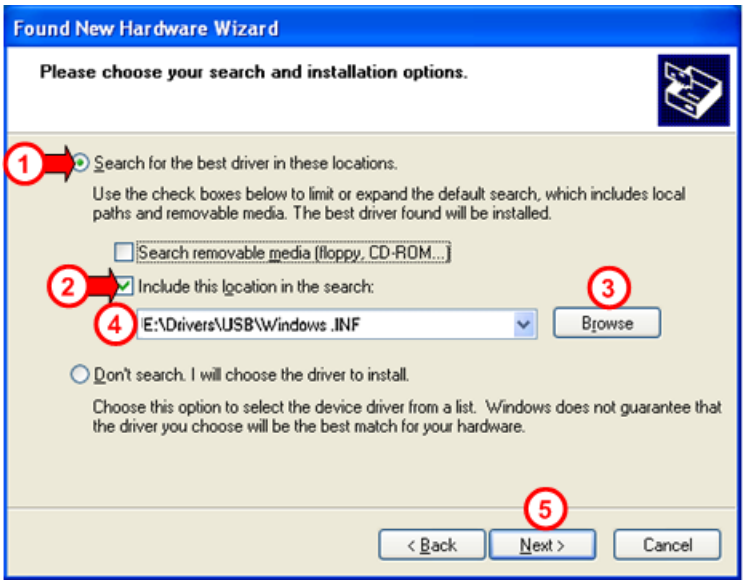
➢ Click on **Next >** (2) to continue.

3. Choose installation mode.



- Select **Install from a list or specific location** (1)
- Click on **Next >** (2) to continue.

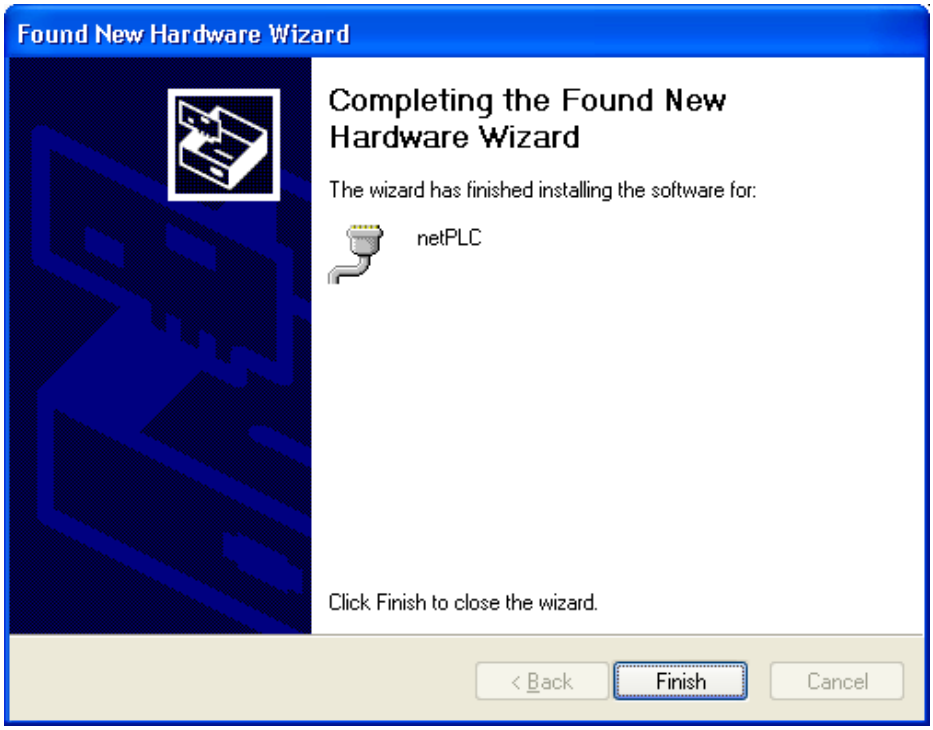
4. Select search options.



- Insert the netPLC CoDeSys DVD into your local DVD ROM drive.
- Select **Search for the best driver in these locations** (1).
- Select **Include this location in the search** (2).
- Click on **Browse** (3).
- Select the folder **Drivers\USB\Windows .INF** (4) from the DVD
- Click on **Next >** to continue.
- The USB driver is installed

5. Finish installation

➢ Click on **Finish**

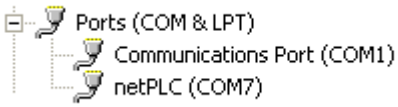


➢ The Installation is completed.

6. Check in the **Device Manager** if the driver for the netPLC component is installed properly.

➢ Open the **Device Manager**: Desktop symbol **My Computer >** right mouse button **Properties >** Tab **Hardware >** button **Device Manager.**

➢ Check, if the display in the **Device Manager** shows **netPLC (COMx)**



5 Appendix

5.1 netPLC CoDeSys PC Card Server

The netPLC CoDeSys PC Card Server is a TCP/IP Server.

It provides access services according to the guidelines defined by the CoDeSys manufacturer 3S, which allow communication with the targeted CoDeSys hardware.

The server uses the IP address of the PC on which it is installed, and is accessible by other remote PCs under this IP address. On the PC on which the server is working, it is to be addressed with the “localhost” address 127.0.0.1.

The server is capable of serving multiple target hardware devices. For each targeted hardware, it has exactly one port address ready, via which the communication takes place. The server allows up to three connections at the same time.

The server works in combination with the PC card cifX Device Driver and forwards the service requests from the CoDeSys programming system to the slot PLC NPLC-C100.

The Server is addressed by the CoDeSys Gateway via TCP/IP services. In a scanning process initiated by the CoDeSys programming system, the server reads data from the NPLC-C100 component and depicts it as CoDeSys compatible device.

5.1.1 Starting netPLC CoDeSys Server

The netPLC CoDeSys Server will be installed under Windows so that it starts automatically each time the PC is powered.

To start the server manually select **Start > All Programs > Hilscher GmbH > netPLC CoDeSys Server**.

In case the netPLC CoDeSys Server Program is started and running you will find the following icon in the system tray:

Figure 8: netPLC CoDeSys Server System Tray Icon

5.1.2 netPLC CoDeSys Server Window

With a double click to the system tray icon the following window appears:

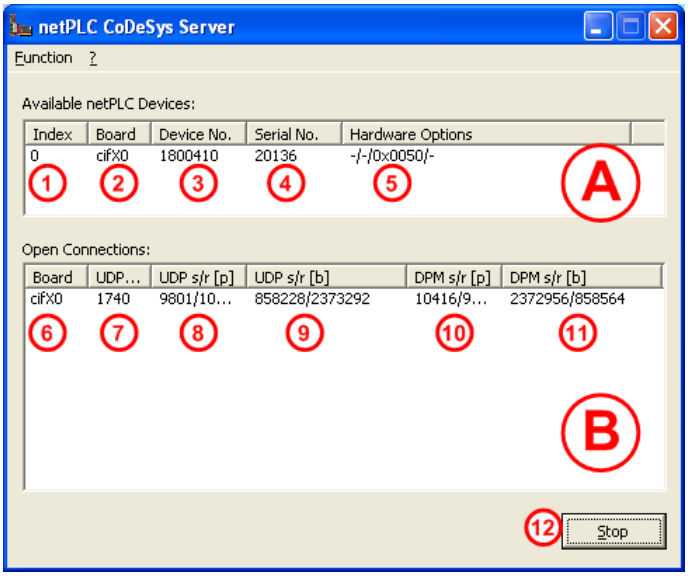


Figure 9: netPLC CoDeSys Server Window

The displayed items have the following meaning:

The upper area (A) of the window displays the available slot PLCs NPLC-C100.

The lower area (B) of the window displays the components to which a connection has been established.

Item	Description
(1) Index	Consecutive numbering
(2) Board	Shows which slot PLC NPLC-C100 (cifX0, cifX1, …) the netPLC CoDeSys Server is able to access via the device driver.
(3) Device No.	Part number of the component
(4) Serial No.	Serial number of the component
(5) Hardware Options	Shows interface type (id)
(6) Board	Shows to which slot PLC NPLC-C100 (cifX0, cifX1, …) access has been established via the PC card device driver.
(7) UDP Port	Port, the netPLC CoDeSys Server is using to send and receive data packets from and to the 3S Gateway
(8) UDP s/r [p]	Counter for transmitted packets (UDP s = send) as well as for received packets (UDP r = receive) via the connection to the 3S gateway
(9) UDP s/r [b]	Counter for transmitted bytes (UDP s = send) as well as for received bytes (UDP r = receive) via the connection to the 3S gateway
(10) DPM s/r [p]	Counter for transmitted packets (DPM s = send) as well as for received packets (DPM r = receive) via the device driver to the slot PLC.
(11) DPM s/r [b]	Counter for transmitted bytes (DPM s = send) as well as for received bytes (DPM r = receive) via the device driver to the slot PLC.

Table 11: netPLC CoDeSys Server Window – Items

5.1.3 Stopping netPLC CoDeSys Server

- To quit operation of the netPLC CoDeSys Servers, click on the system tray icon with the right mouse button. From the context menu, select **Stop**, or press the button **Stop** ⑫ in the window of the server itself.
- Answer the confirmation prompt with **Yes** to quit the netPLC CoDeSys Server.

If the server is stopped at runtime, currently running communication with CoDeSys programming system and OPC client immediately stops.

5.2 List of Figures

5.3 List of Tables

5.4 Contacts

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