

Application Note

Omron PLC and CX-Programmer



This document guides you through the setup of proprietary vendor specific software installed on your PC. Your supervisor may provide you with additional or alternative instructions.

The document consists of standard instructions that may not fit your particular solution. Please visit our support website for latest revisions of documentation and firmware:

<http://www.secomea.com>

Version: 5.3, June 2012



Table of Contents

Prerequisites for This Guide	3
1. TCP Ethernet Access	4
2. UDP Ethernet Access	8
3. Serial Access via Serial Omron cable	11
4. Serial to USB conversion (Discontinued!)	15
5. USB Connection (CP1H)	16
6. Ethernet connection via Windows XP under VMWare	23
7. Serial connection via Windows XP under VMWare	25
7.1. Startup order of VMWare, LinkManager and CX-Programmer	27
8. USB connection via Windows XP under VMWare	28
Appendix A, Organizing COM ports in Windows	30
Appendix B, Serial Troubleshooting and Hints	31
Typical serial communication problems	31
Special Serial Agent settings	31
Serial communication through the “peripheral port”	32
Notices	34

Prerequisites for This Guide

The following guide will assist you to setup a remote and online connection to the Omron equipment placed on the customer site using your Omron CX-Programmer software installed on your PC.

Prerequisites for this guide are:

- You have an operational LinkManager installed on your PC with a GateManager certificate that allows you to connect to the SiteManager agents.
- You have the Omron software installed.
- You have the Omron device agent installed and configured on the SiteManager at the remote site, and there is access between the SiteManager and the Omron PLC.
 - A Serial attached PLC (Such as the CJ1M) must be configured with agent device type **Omron / Serial PLC** on the SiteManager.
 - A network attached PLC must be configured with agent device type **Omron / Ethernet PLC** on the SiteManager.
 - A USB attached PLC (such as the CP1H) must be configured with agent device type **Omron / USB PLC** on the SiteManager. Note that this connection type requires a SiteManager model with USB support and minimum SiteManager version 12035 and LinkManager version 12155.

If any of these prerequisites are not met, you should contact the person / department responsible within your own company or at the company responsible hereof.

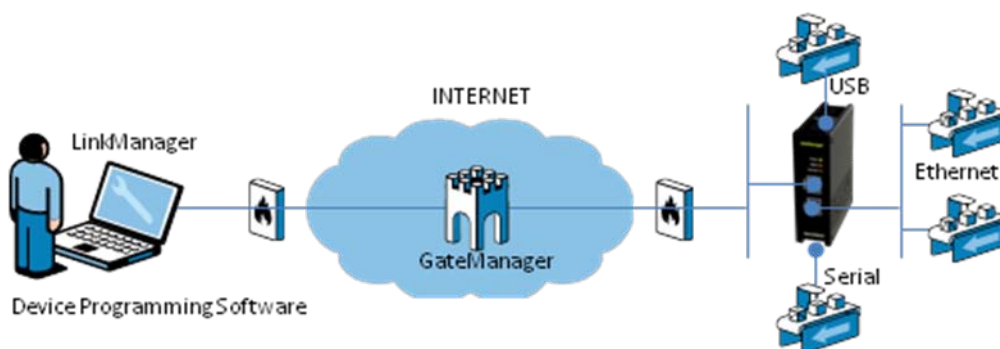
System Overview

The communication path is as follows:

CX-Programmer → **LinkManager** → GateManager → SiteManager → PLC.

This guide will elaborate on the components marked with **bold**.

The following system overview depicts a SiteManager 3229 at the customer location:

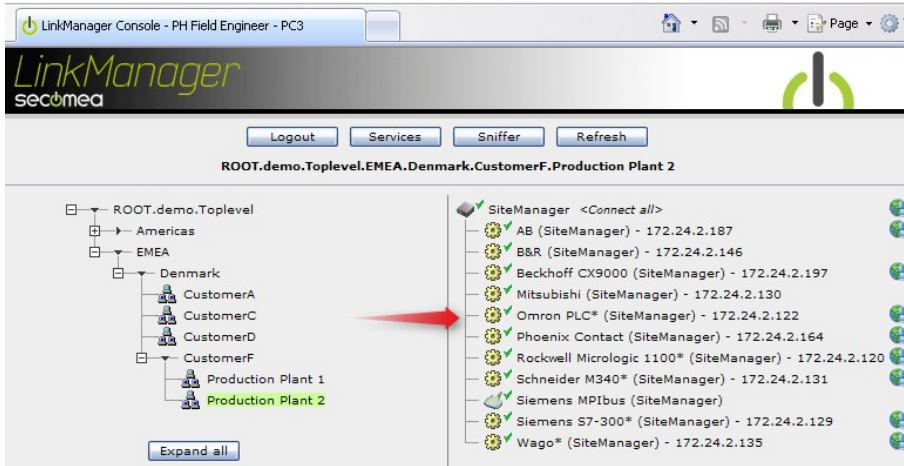


1. TCP Ethernet Access

The following describes how to connect the Omron CX-Programmer to an Omron PLC that is attached to a SiteManager via Ethernet. The description shows a CJ1M, but it could be any Ethernet enabled Omron PLC.

Note: A network attached PLC must be configured with agent device type **Omron/Ethernet PLC** on the SiteManager.

1. Locate the agent that represents you TCPI/IP attached Omron PLC



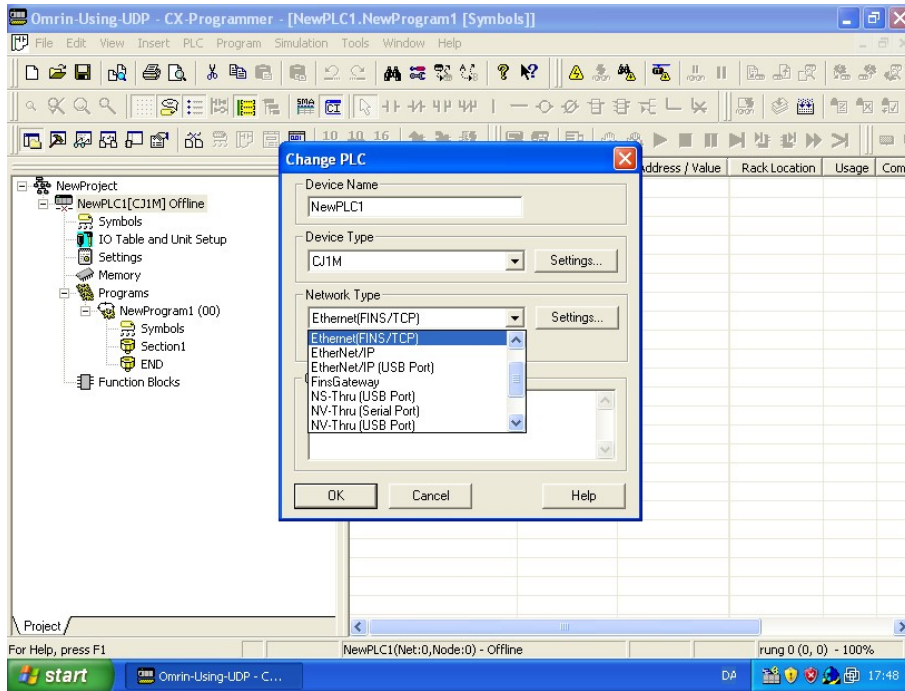
2. You will not see any activity on it yet. This only starts when you connect to the PLC via your project (Make a note of the IP address of the PLC):



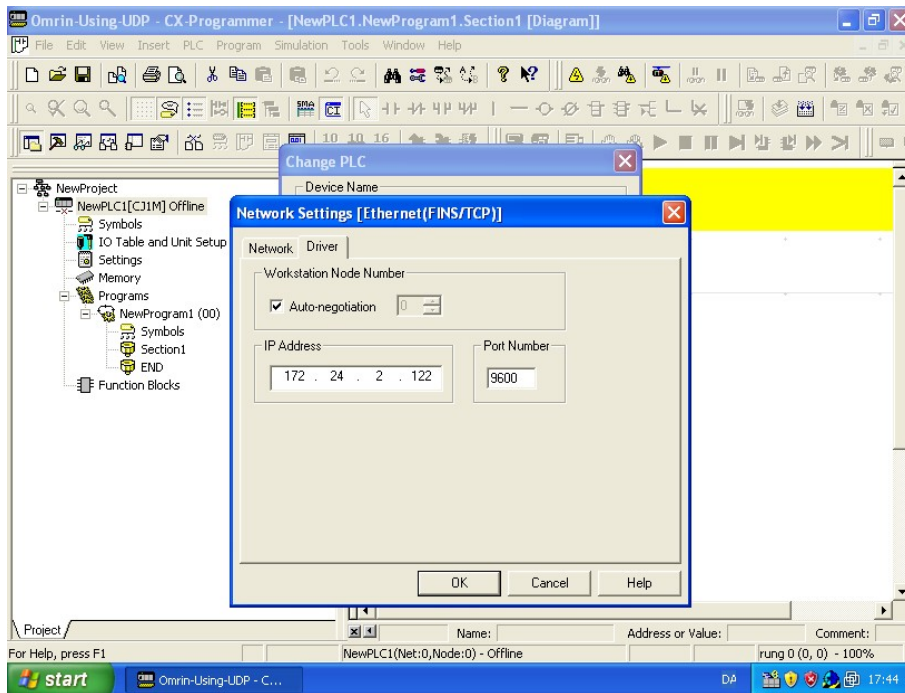
3. Start the CX-Programmer and open your project.

NOTE: The LinkManager does not allow CX-Programmer to scan for network attached devices. Therefore you will NOT be able to detect the PLC under the menu **Auto Online → EtherNet/IP Node Online**. Neither will you see any activity on the LinkManager before you access it with a project where the PLC's specific IP address is configured.

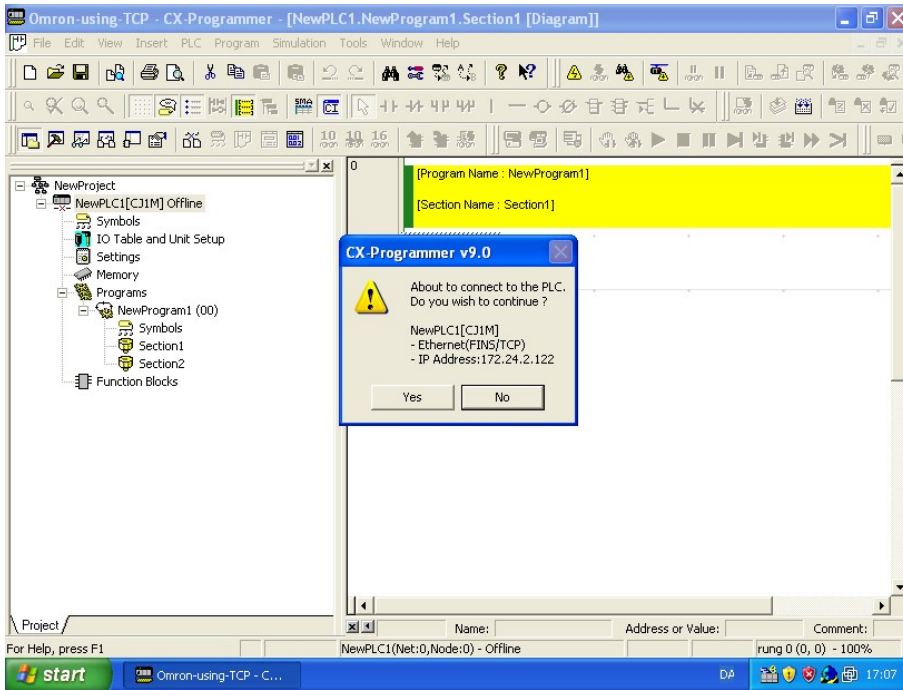
4. Double click the CPU icon in the screen “NewPLC[CJ1M] Offline”. Choose the Network Type “Ethernet(FINS/TCP)”, and select Settings → Driver:



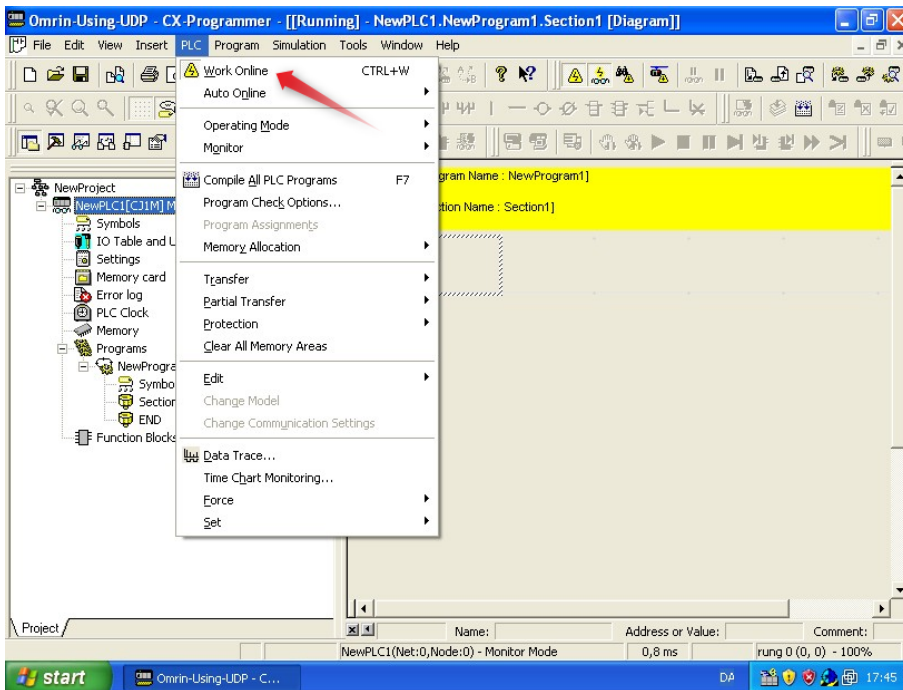
5. Specify the IP address of the PLC and Select OK



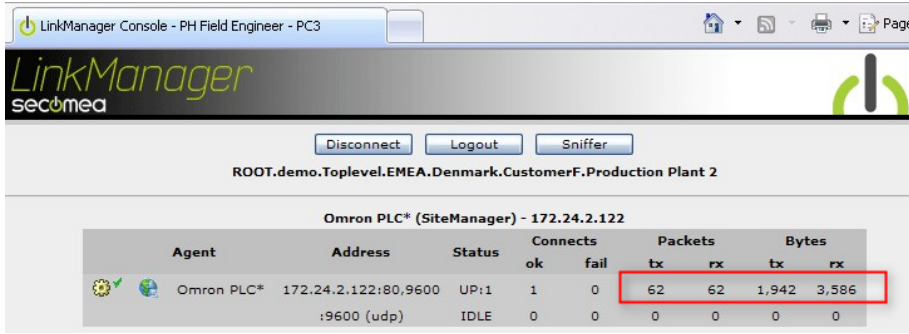
6. Click Yes to connect to the PLC via LinkManager:



7. In the top menu, select PLC → Work Online:



8. You are now online with the PLC. You can now observe data traffic in the LinkManager:



The screenshot shows the LinkManager console interface. At the top, there are buttons for 'Disconnect', 'Logout', and 'Sniffer'. Below these, the text 'ROOT.demo.Toplevel.EMEA.Denmark.CustomerF.Production Plant 2' is displayed. The main content area shows a table titled 'Omron PLC* (SiteManager) - 172.24.2.122'. The table has columns for Agent, Address, Status, Connects (ok, fail), Packets (tx, rx), and Bytes (tx, rx). The data row shows 62 packets and 3,586 bytes of traffic, which is highlighted with a red box.

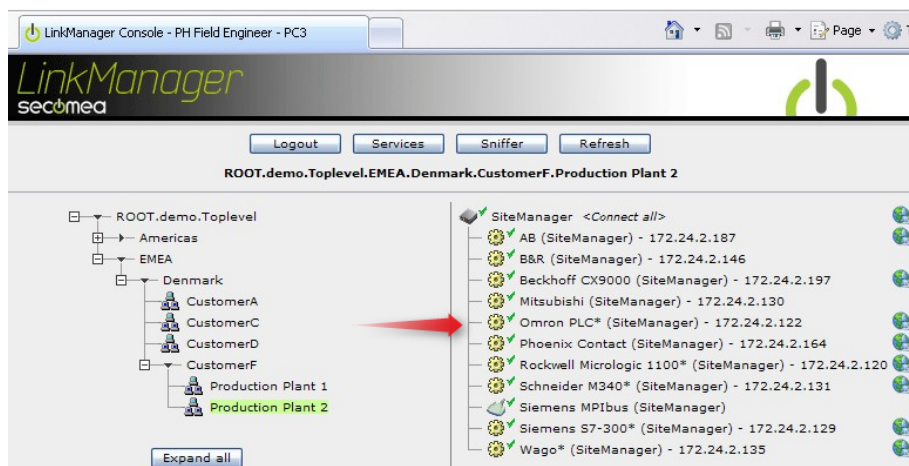
Agent	Address	Status	Connects		Packets		Bytes	
			ok	fail	tx	rx	tx	rx
Omron PLC*	172.24.2.122:80,9600	UP:1	1	0	62	62	1,942	3,586
	:9600 (udp)	IDLE	0	0	0	0	0	0

2. UDP Ethernet Access

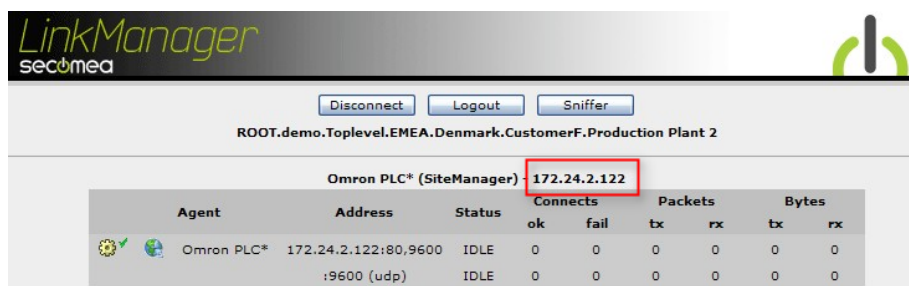
The following describes how to connect the Omron CX-Programmer to an Omron PLC that is attached to a SiteManager via Ethernet.

Note: A network attached PLC must be configured with agent device type **Omron/Ethernet PLC** on the SiteManager.

1. Locate the agent that represents your network attached Omron PLC



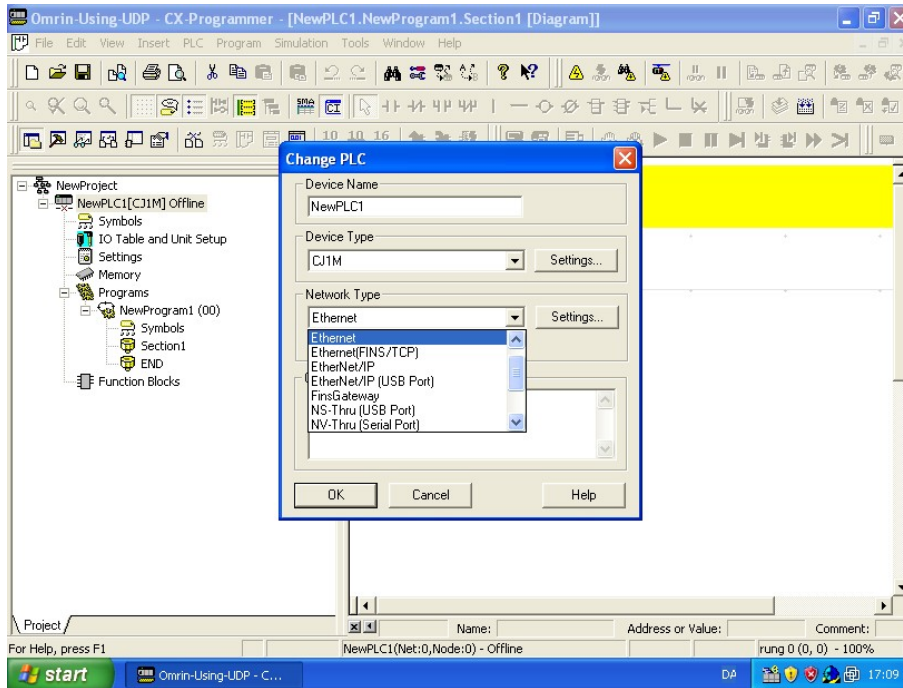
2. You will not see any activity on it yet. This only starts when you connect to the PLC via your project (Make a note of the IP address of the PLC):



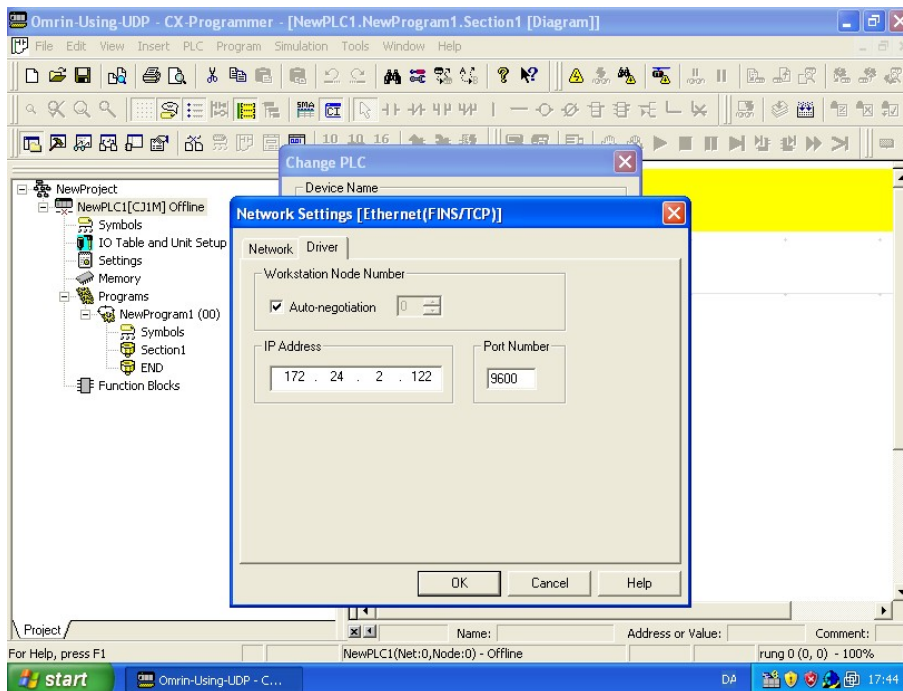
3. Start the CX-Programmer and open your project.

NOTE: The LinkManager does not allow CX-Programmer to scan for network attached devices. Therefore you will NOT be able to detect the PLC under the menu **Auto Online → EtherNet/IP Node Online**. Neither will you see any activity on the LinkManager before you access it with a project where the PLC's specific IP address is configured.

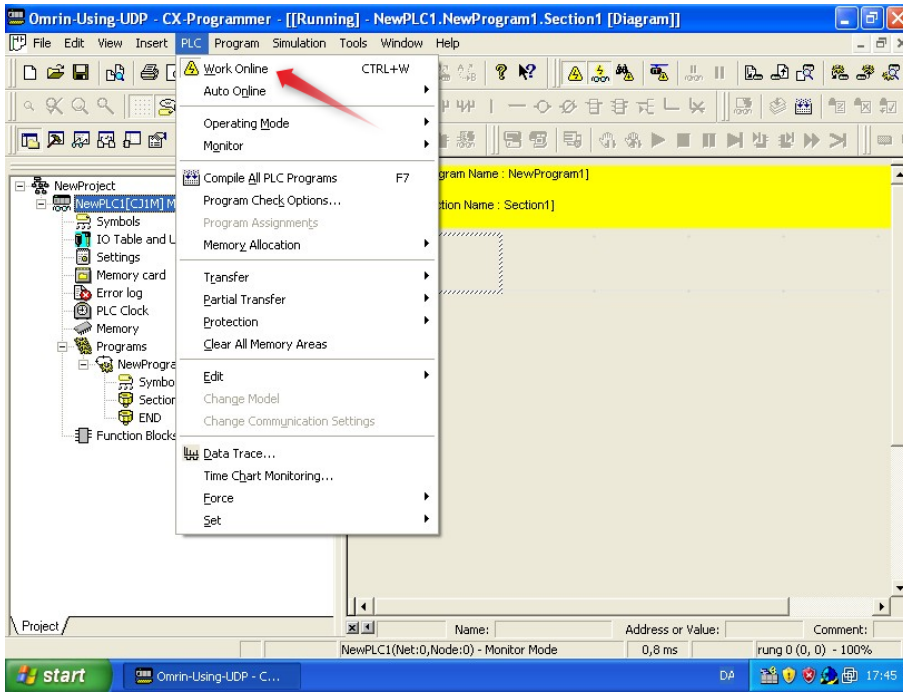
4. Double click the CPU icon in the screen “NewPLC[CJ1M] Offline”. Choose the Network Type “Ethernet(FINS/TCP)”, and select Settings → Driver:



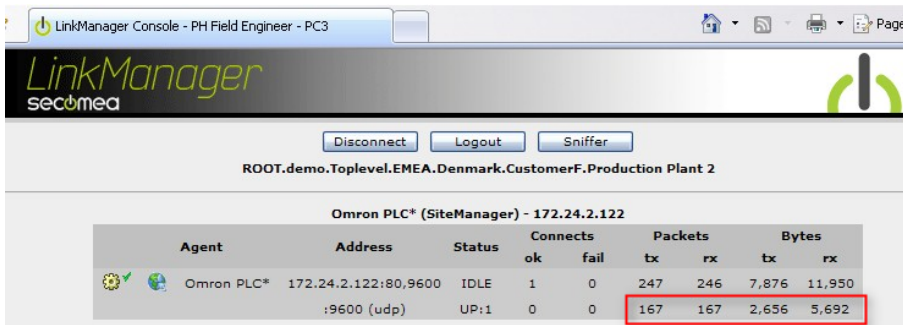
5. Specify the IP address of the PLC and Select OK.
6. Click Yes to connect to the PLC via LinkManager:



7. In the top menu, select PLC → Work Online:



8. You are now online with the PLC. You can now observe data traffic in the LinkManager:

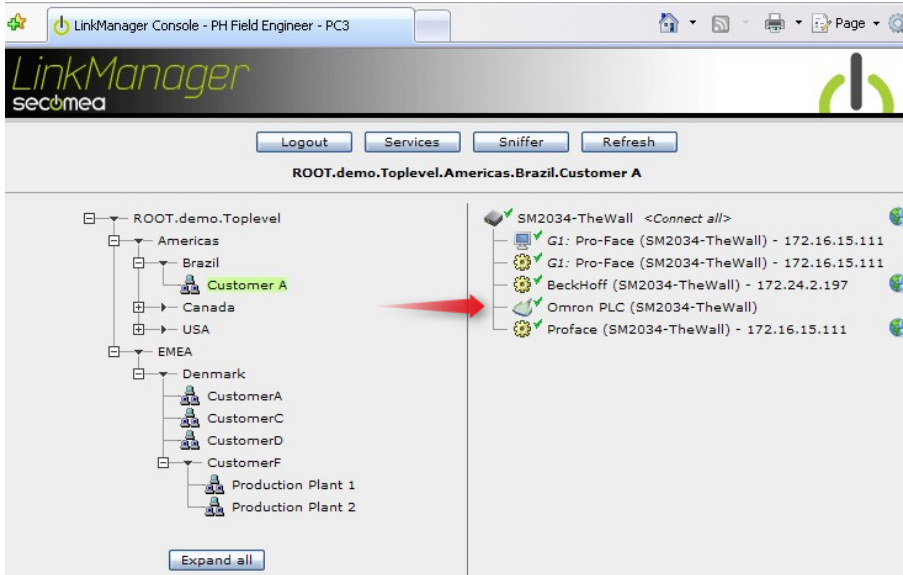


3. Serial Access via Serial Omron cable

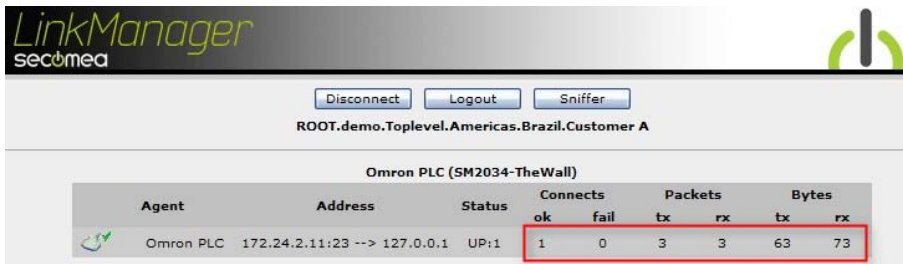
The following describes how to connect the Omron CX Programmer to an Omron PLC that is attached to a SiteManager via an Omron XM2S-09 Serial cable or Omron CS1W-CN226 cable (for the peripheral port).

Note: A Serial attached PLC (Such as the CJ1M) must be configured with agent device type Omron/Serial PLC on the SiteManager.

1. Locate the agent that represents you network attached Omron PLC



2. When connecting the agent, you should see some activity in the tray icon area, which is the auto configuring of a virtual serial port. If your SiteManager, and Omron PLC is correctly attached, you should also see the status of the agent become OK, and a few bytes of traffic:

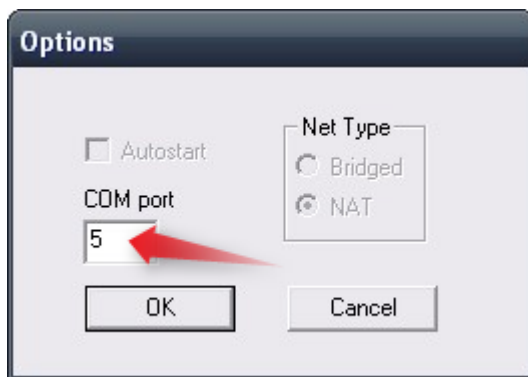


- Now right click the LinkManager system tray icon, and select **Status**. Make note of the Serial port that has been assigned (in this case COM5):



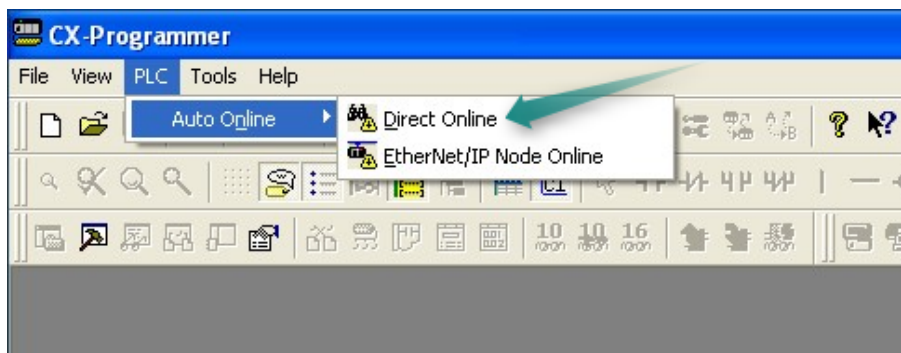
Right click the LinkManager system tray icon again, and select **Options**. Enter the number of the COM port you found under status. This will ensure that you will always get this port in the future.

IMPORTANT: if you change the port you must stop and start the LinkManager.

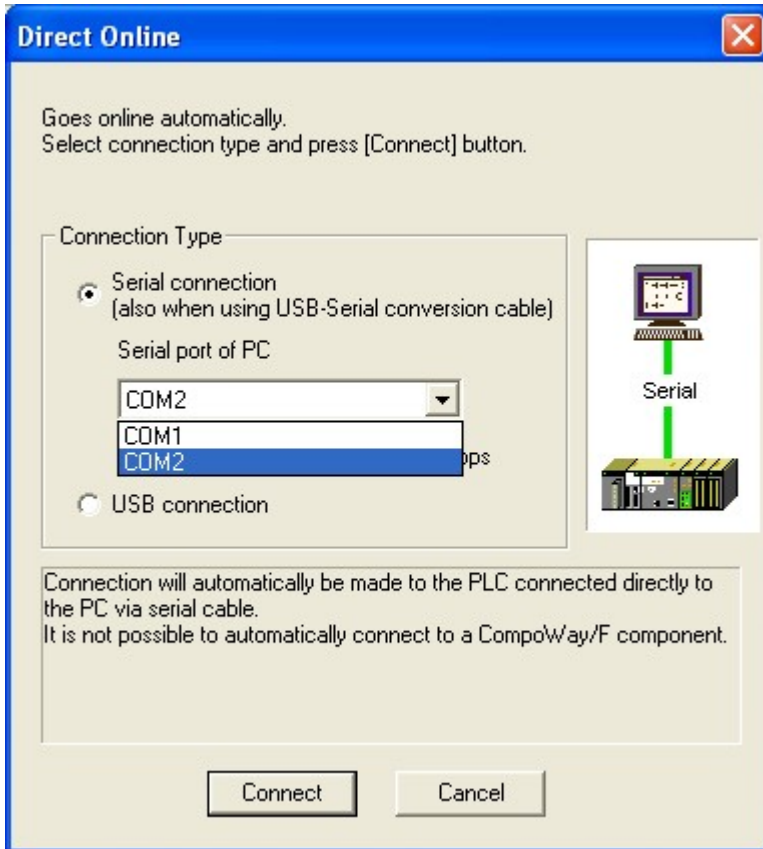


Note: You can also force another COM port (e.g. COM2). Just ensure in your Windows device manager, that the port is not conflicting with an existing COM port. See Appendix A for info on how to organize COM ports.

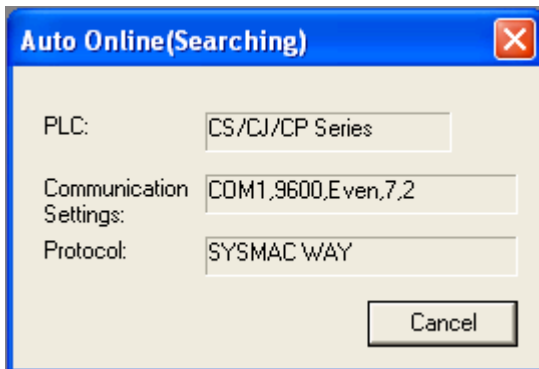
- Open the CX-Programmer and select Auto Online → Direct Online:



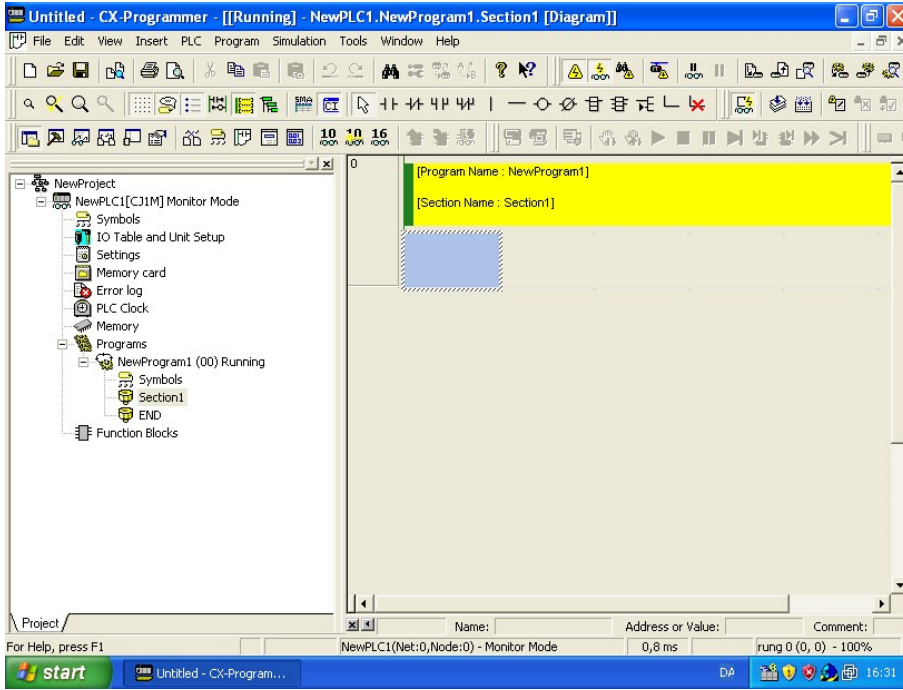
5. Select the COM port matching the COM port defined in the LinkManager:



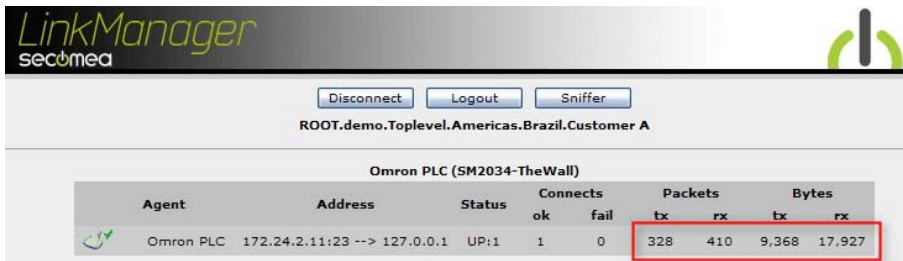
6. Click Connect, and it will start searching for the proper communication type:



7. You are now online with the PLC:



8. You can now observe data traffic in the LinkManager:



NOTE: In case you encounter connection or communication problems, refer to **Appendix B, Serial Troubleshooting and Hints.**

4. Serial to USB conversion (Discontinued!)

Serial to USB conversion was introduced in SiteManager firmware version 11234, but has been replaced with true USB redirect support in version 12035. (See next section **5 USB Connection**)

The reason for removing the possibility of having a serial connection from CX-Programmer converted into USB on the SiteManager is that only a few Omron PLCs would support it properly.

IMPORTANT: If you already have an agent configured with agent device type **Omron/Serial USB PLC** and you upgrade to version 12035 or later, this agent will automatically be set to agent type **Omron/USB PLC**, and subsequently you must select USB in CX-Programmer as target port. Note that true USB redirect requires the LinkManager to be upgraded to version 12081 or newer.

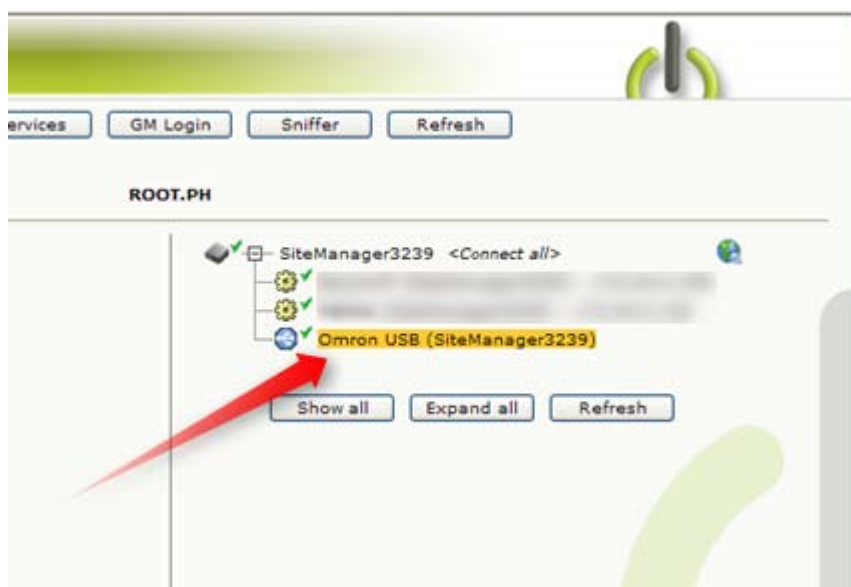
5. USB Connection (CP1H)

In SiteManager firmware version 12035 in combination with LinkManager 12081, true USB support is introduced. The new LinkManager version will, when connecting to the agent, create a USB controller on the PC that will perform redirection to the USB port on the SiteManager.

This means CX-Programmer should be configured to use a USB connected device.

The following steps have been performed with CX-One 4.03 including CX-Programmer 9.0 and USB drivers already installed on the PC, and a CP1H PLC. (NB: You can also connect to an Omron G9SP Safety PLC using the G9SP configuration. Refer to the separate guide for this)

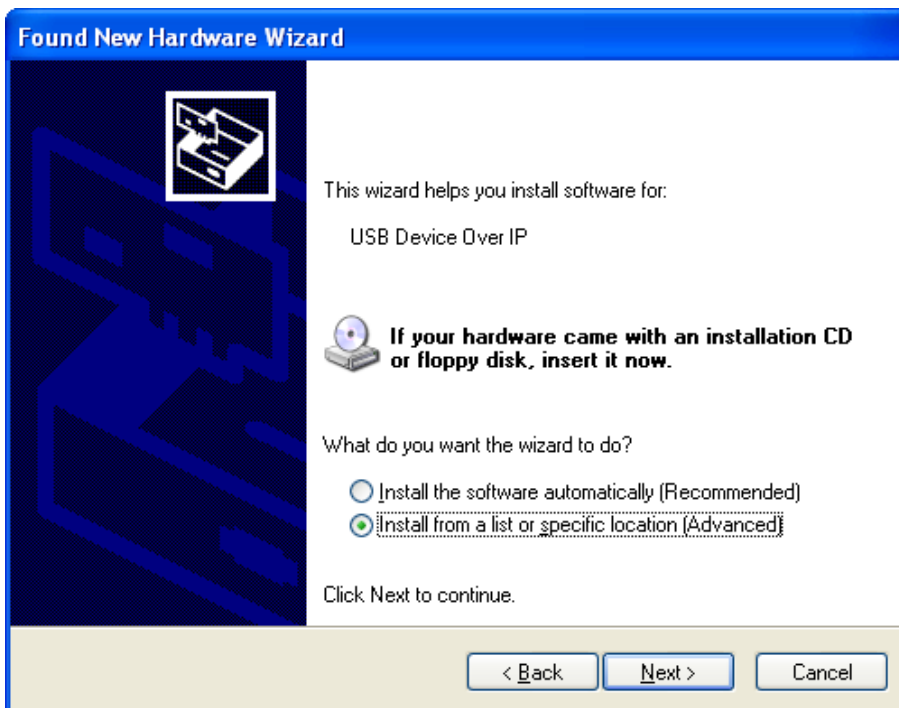
1. Locate the Omron USB PLC agent and click on it to establish a connection to it:



2. First time the connection is opened, the "Found New Hardware" Wizard will pop up. Select to not search for drivers on Windows Update site.

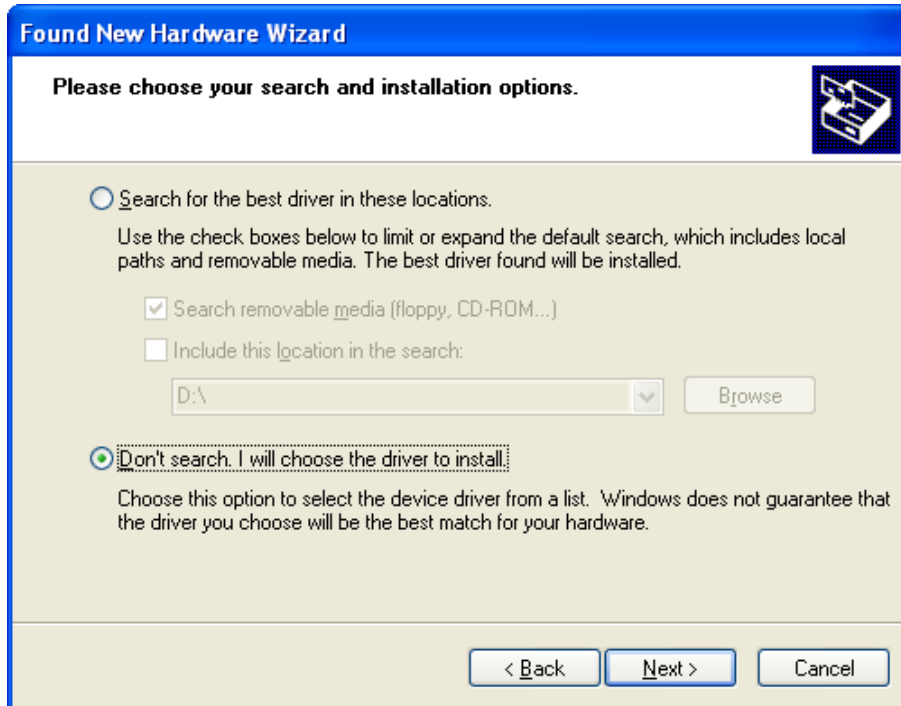


3. Select Installs from a specific location.

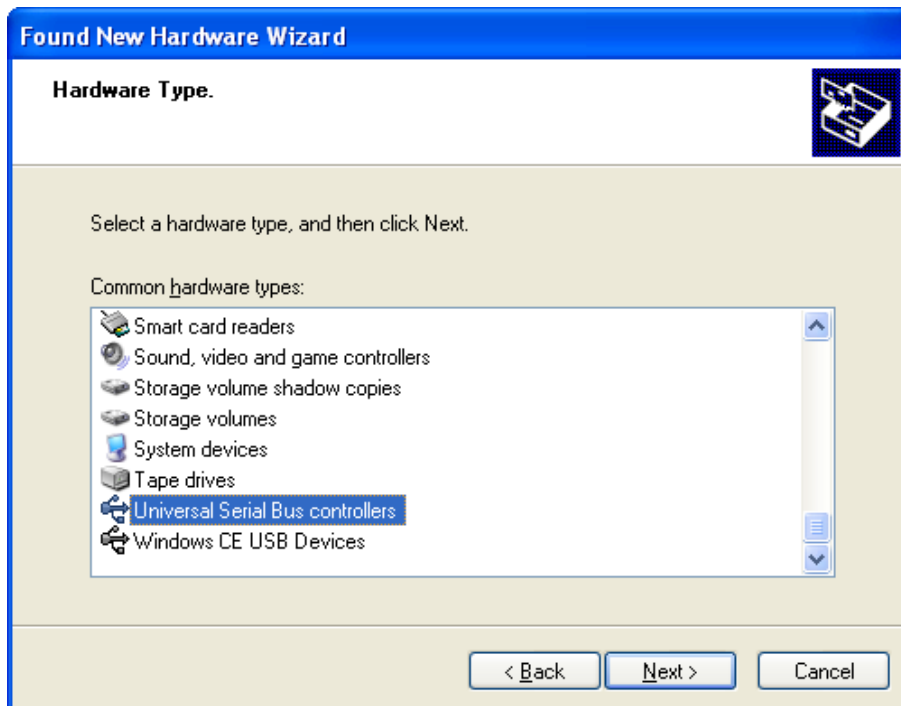


NOTE: In later LinkManager firmware the text "USB Device Over IP" may change to reflect the name of device USB driver.

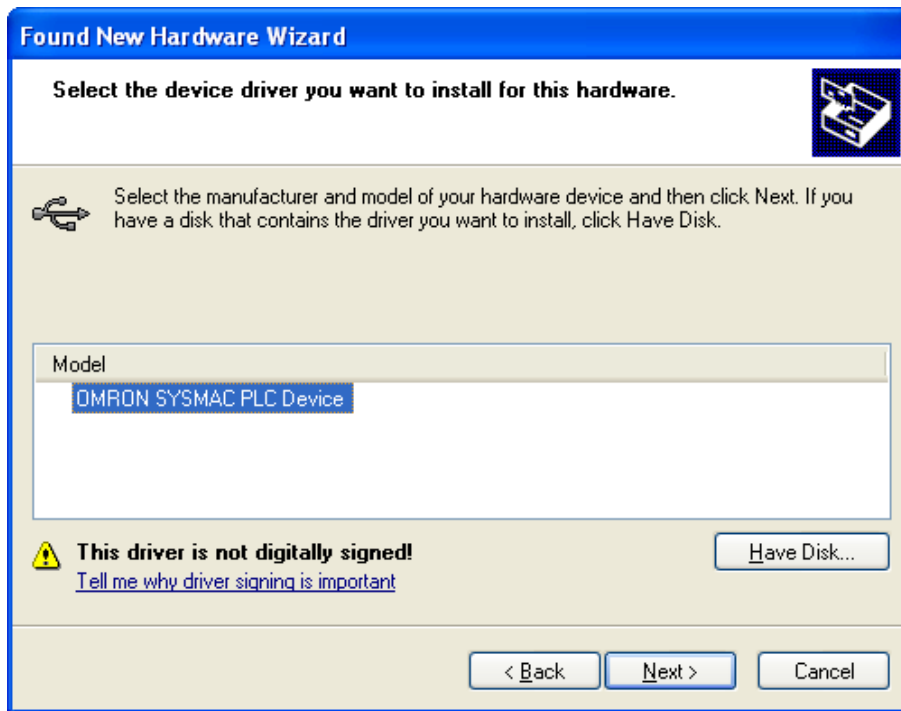
4. Even though the driver is already installed into the Windows driver store, Windows may not automatically choose to bind it (because it is not WHQL signed). So select don't search as in most cases In most cases it is necessary to select the driver manually



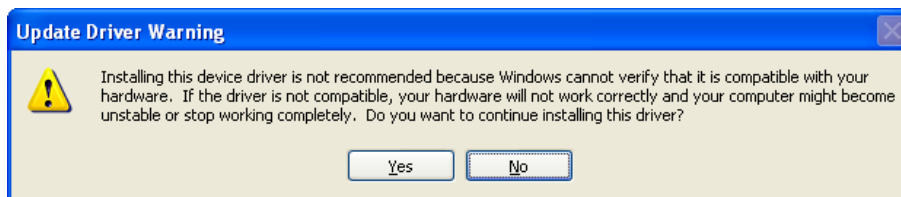
5. Omron has (incorrectly) classified the PLC USB driver as a USB controller, so you will find the driver in the section "Universal Serial Bus controllers":



6. Select the SYSMAC device driver



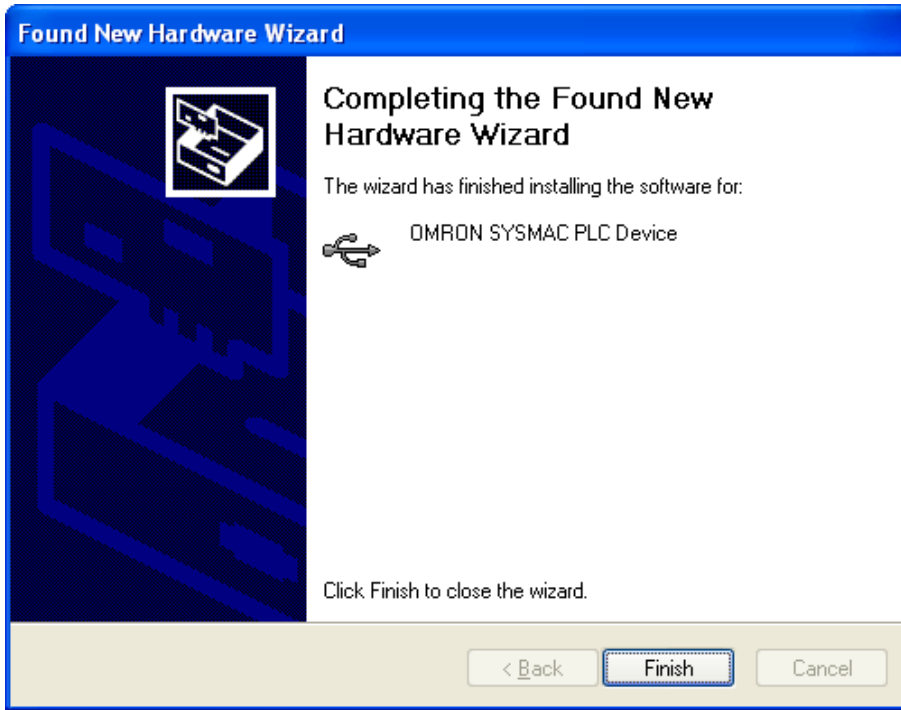
7. Windows may warn that the driver may be incompatible with the hardware. Select "Yes" to continue installing anyhow:



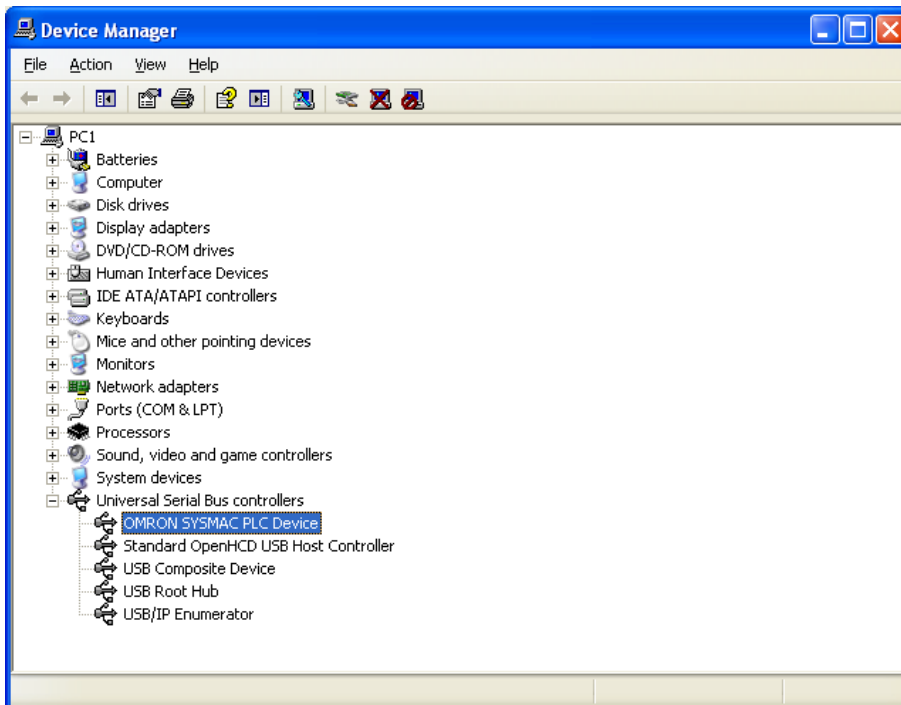
8. You will get a warning that the driver is not WHQL signed. Select "Continue Anyway".



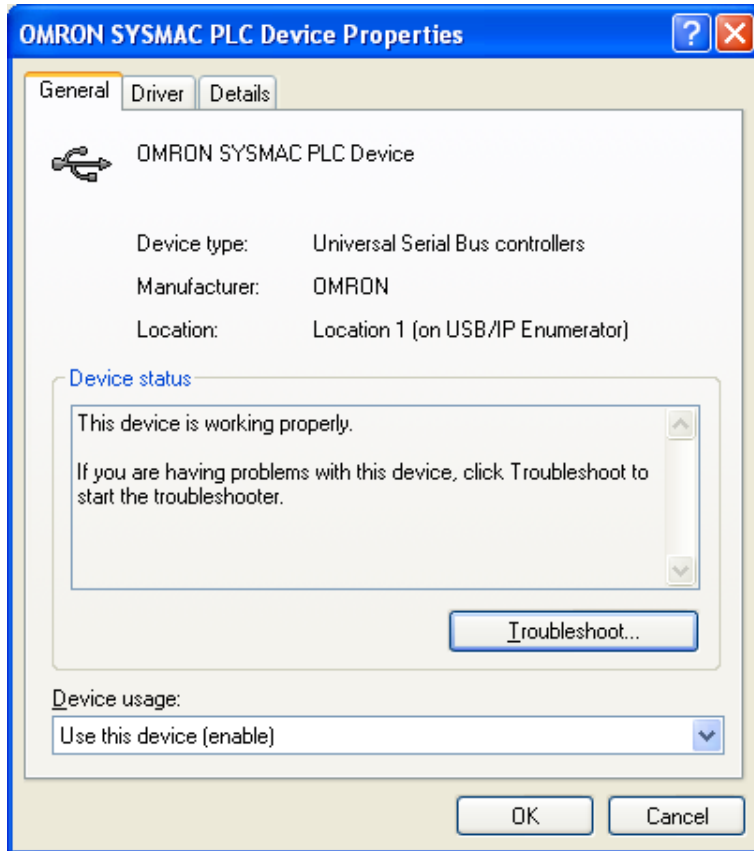
9. The driver should now be installed.



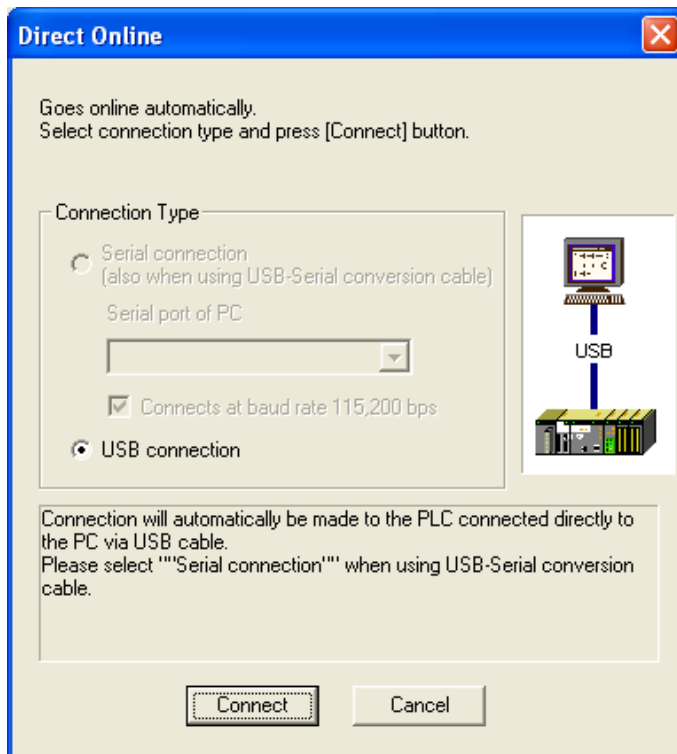
10. Optionally, you can verify that the driver started correctly. Open the Device Manager and look under USB controllers for the OMRON SYSMAC PLC Device:



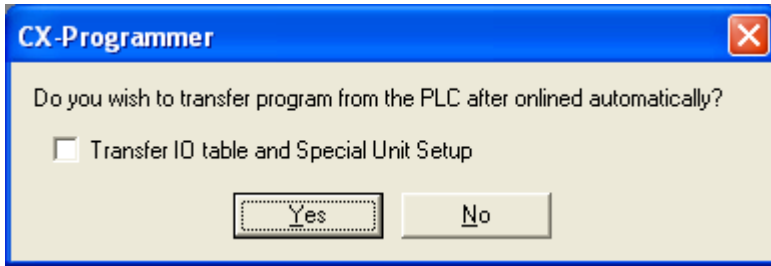
11. Check that Device status says "This device is working properly".



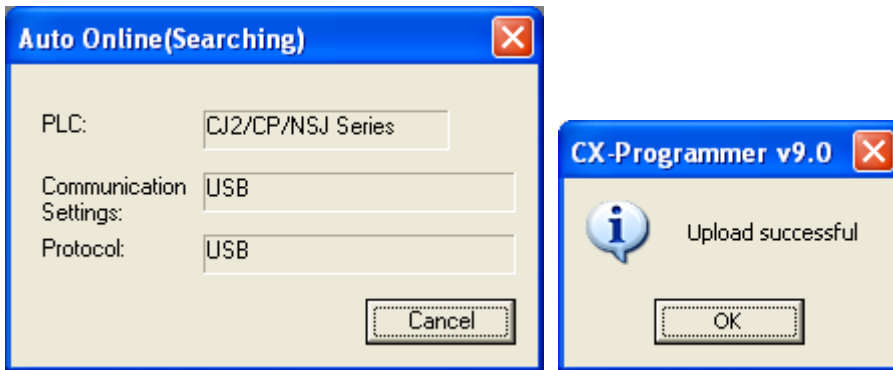
12. In CX-Programmer select **PLC > Auto Online > Direct Online**. Select "USB connection" and select Connect:



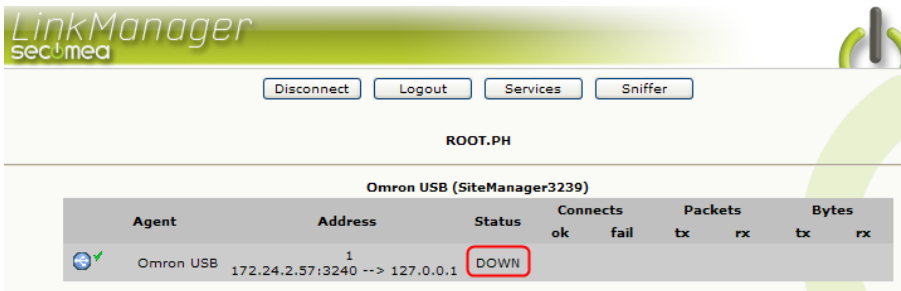
13. Select what you prefer for the next dialog:



14. The program will now search for known PLC types and start the transfer



IMPORTANT: If LinkManager status is DOWN:



In the current LinkManager version, the connection is not automatically re-established in case the PLC restarts, or if the cable is un-plugged/re-plugged.

It is necessary to Disconnect and re-establish the connection (first step of this section).

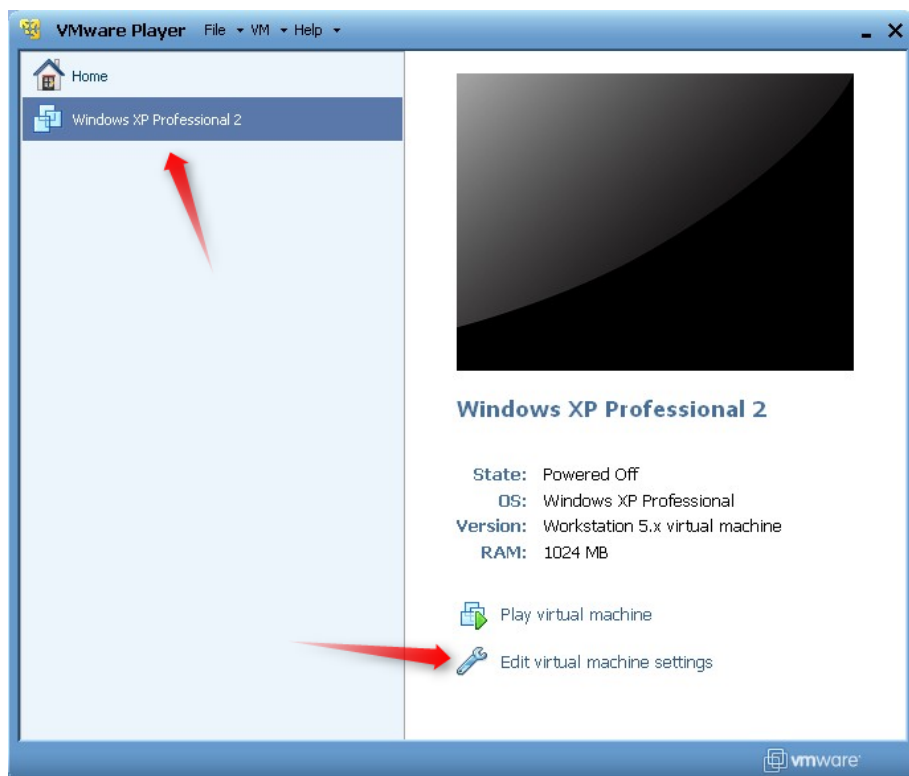
6. Ethernet connection via Windows XP under VMWare

You can run the CX-Programmer software inside a VMWare engine, to an Omron PLC that is Ethernet attached to a SiteManager.

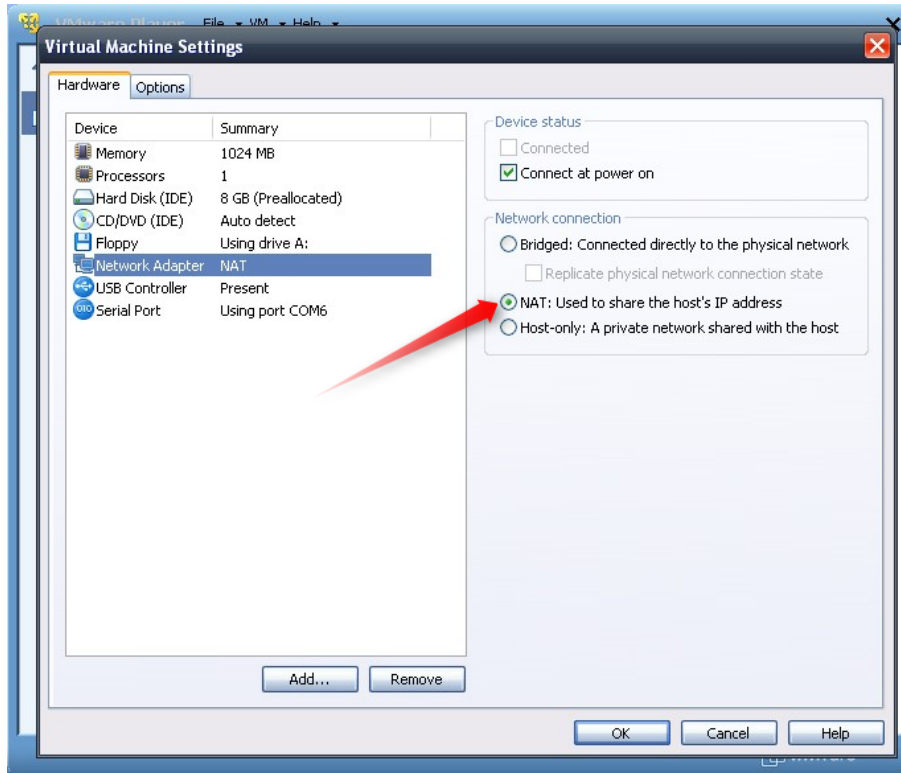
From LinkManager version 12155 you can choose to run the LinkManager inside or outside the virtual machine. Note that LinkManager can only run inside VMWare if the host OS is Windows 7 and the PC's CPU has support for virtualization.

The following illustrates VMWare Player, which can be downloaded from <http://www.vmware.com/support/product-support/player/>, and for LinkManager running outside the virtual machine (i.e. on the host OS system)

1. Locate your Windows XP that has CX-Programmer installed, and enter **Edit virtual machine settings**.



2. Make sure the Network Adapter settings is set to **NAT**:



3. Start the VMWare engine and on the host PC start LinkManager.
4. Follow the procedure of section **2 TCP Ethernet Access** or section **3 UDP Ethernet Access** to get access to the PLC via LinkManager

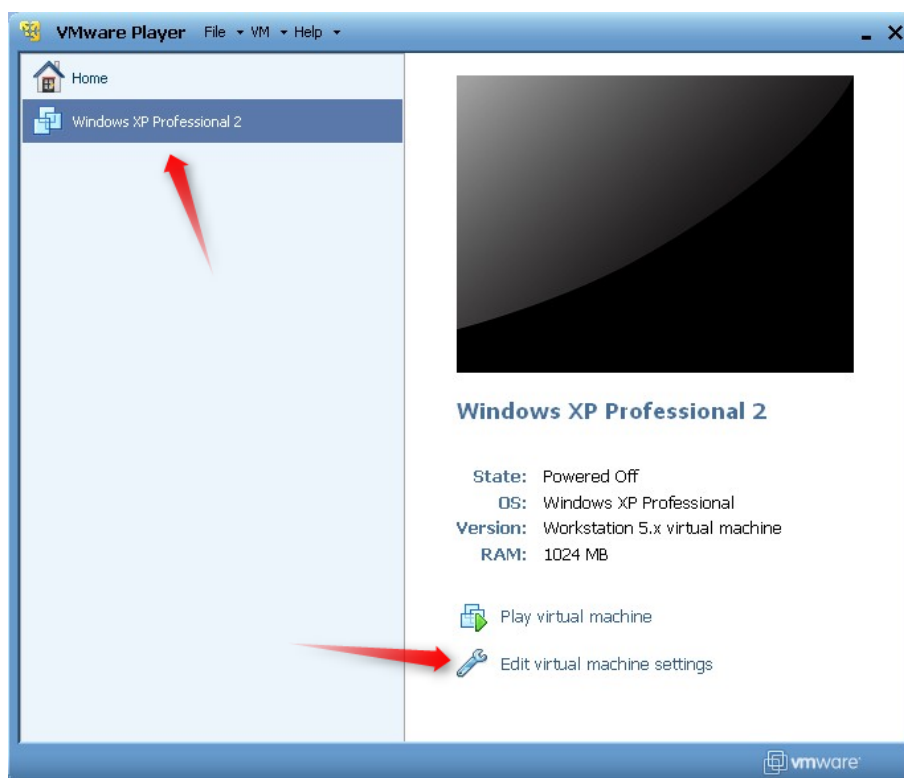
7. Serial connection via Windows XP under VMWare

You can run the CX-Programmer software inside a VMWare engine, to an Omron PLC that is Serial attached to a SiteManager.

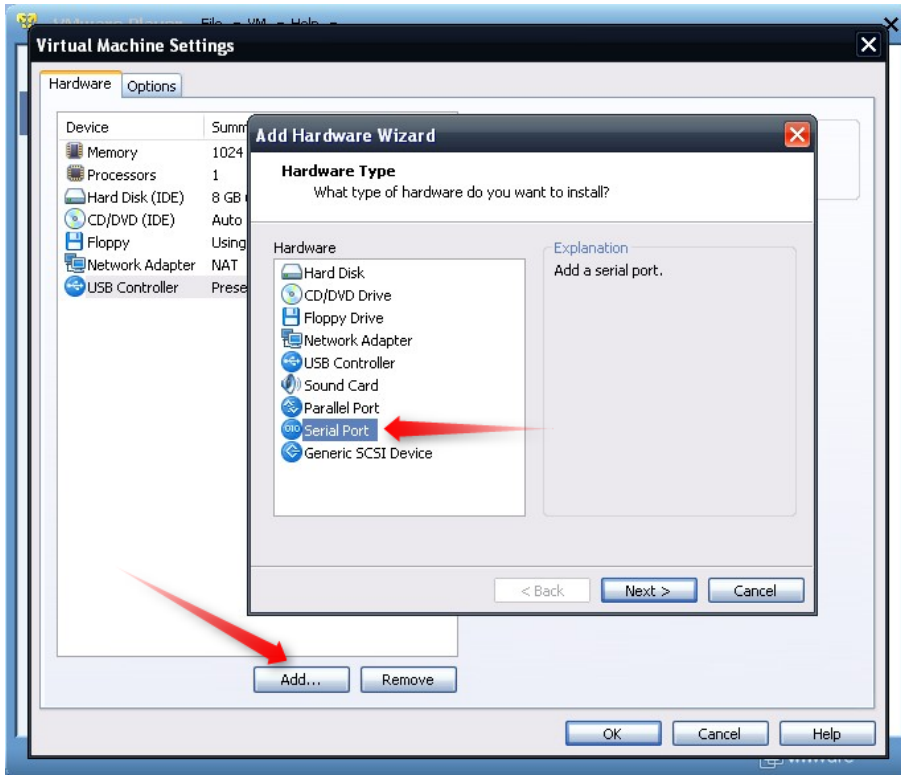
From LinkManager version 12155 you can choose to run the LinkManager inside or outside the virtual machine. Note that LinkManager can only run inside VMWare if the host OS is Windows 7 and the PC's CPU has support for virtualization.

The following illustrates VMWare Player, which can be downloaded from <http://www.vmware.com/support/product-support/player/>, and for LinkManager running outside the virtual machine (i.e. on the host OS system)

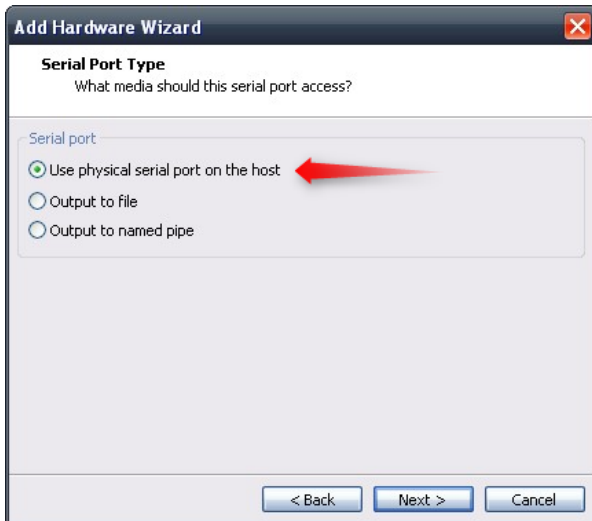
1. Follow step 1-3 of section **3 Serial Access via Serial Omron** cable on page **11**. This will create a COM port even if the PC does not have a physical COM port.
2. Locate your Windows XP that has CX-Programmer installed, and without starting it, enter **Edit virtual machine settings**.



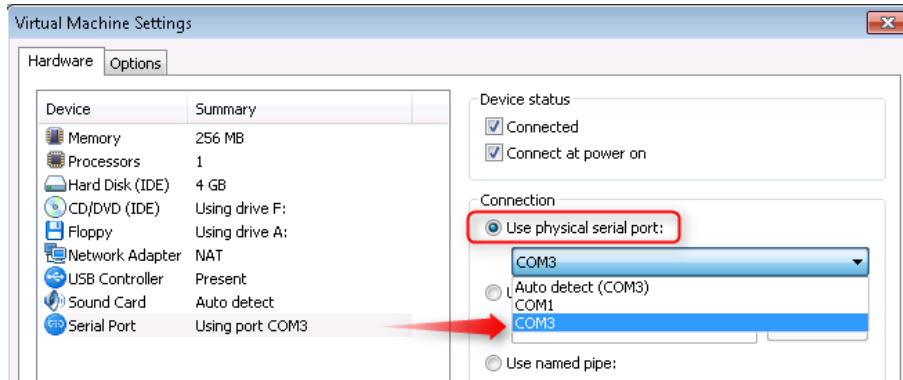
3. Add Serial Port to the Hardware list (if it does not already exist).



4. Select "Use physical port" (Even though LinkManager makes a virtual COM port, VMWare sees it as a physical port)



5. Set the port to the COM port used by the LinkManager (see section 3. **Serial Access via Serial Omron cable**)



6. If VMWare does not allow you to add a Serial port, it may be because the PC does not have a physical Serial port.
7. Press **OK** twice, and select the Select **Finish** and **OK**, Start the VMWare WindowsXP image, and start the CX-Programmer software.
8. Follow the procedure described in section 3 **Serial Access** on getting access to the PLC via LinkManager.

Note: VMWare will typically make the physical COM port of the host system (e.g. COM3) appear to the virtual OS as COM1. You should configure the CX-Programmer to use the port of VMWare (COM1) and not the physical port of the host system (COM3) that is used by LinkManager.

7.1. Startup order of VMWare, LinkManager and CX-Programmer

If you have already preset a COM port in LinkManager as well as in VMWare, the startup order would be irrelevant. You can stop and start the components individually.

If you encounter problems, or you have changed the COM port setting of LinkManager it is recommended to do the following:

1. Stop the VMWare engine.
2. Stop LinkManager completely.
3. Start LinkManager.
4. Connect to the Serial PLC and check the assigned COM port under Status (by right-clicking the LinkManager tray icon)
5. Check the COM port settings of the Virtual Machine Settings of the Windows image with the CX-Programmer software.
6. Start the VMWare image.
7. Start CX-Programmer and connect to the PLC

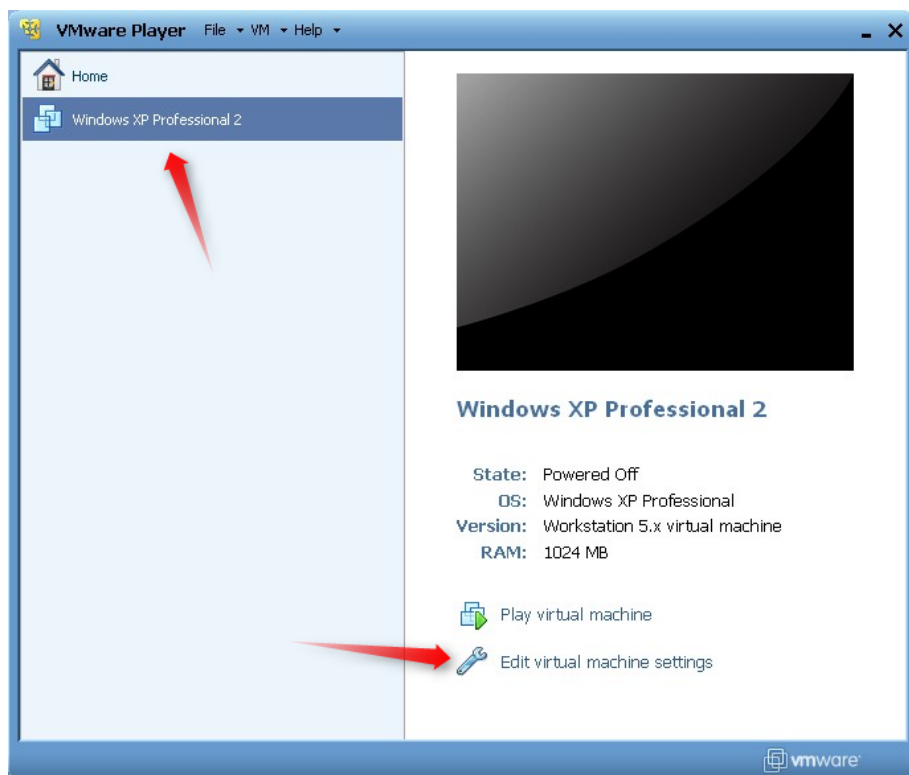
8. USB connection via Windows XP under VMWare

You can run the CX-Programmer software inside a VMWare engine, to an Omron PLC that is USB attached to a SiteManager.

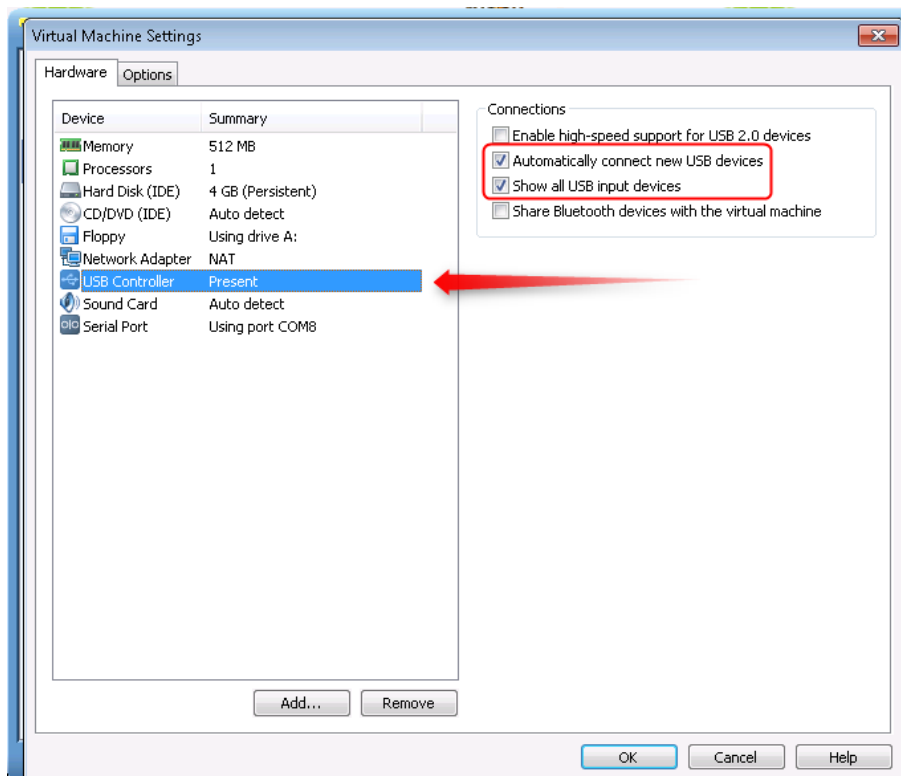
Important: LinkManager must run inside the virtual machine also and must be version 12155 or later. Note that LinkManager can only run inside VMWare if the host OS is Windows 7 and the PC's CPU has support for virtualization.

The following illustrates VMWare Player, which can be downloaded from <http://www.vmware.com/support/product-support/player/>, and for LinkManager running outside the virtual machine (i.e. on the host system)

5. Locate your Windows XP that has CX-Programmer installed, and enter **Edit virtual machine settings**.



6. Make sure that **USB Controller** has been added as Hardware component:



7. Start the VMWare engine and the LinkManager inside the VMWare engine.

8. Follow the procedure of section **5 USB Connection (CP1H)** on page **16** to get access to the PLC via LinkManager

Appendix A, Organizing COM ports in Windows

Clean up Windows Registry for redundant COM ports:

You may experience that older versions of the Omron software require a lower COM port number. In case your PC assigns a COM port of e.g. 13, it may be due to previous installs of virtual COM ports from in relation to installation of other programs.

You can clean your PC for redundant COM ports in Windows registry:

1. Open regedit (Start → run → Regedit)
2. Navigate to:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\COM Name arbiter

3. In the ComDB set all values to 00
4. Restart your PC

Enable LinkManager to use COM1:

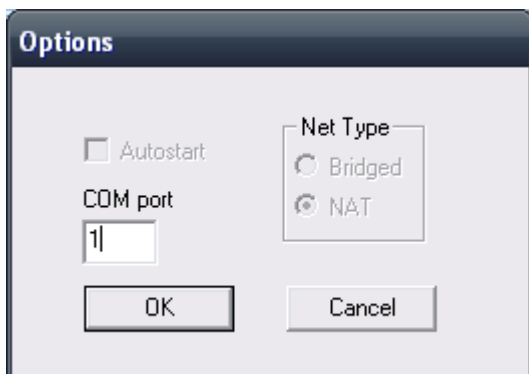
If you prefer the COM port to be COM1:

Even if no COM ports are installed on the PC, Windows will never assign a COM port lower than COM3 to the LinkManager. You therefore have to do the following to force LinkManager to use COM1:

1. Open Windows Control Panel → System → Hardware → Device Manager → Ports (COM & LPT).
2. If there already are physical COM ports listed, you must re-assign the port numbers to free up COM1.

Right click a COM port and select Properties → Port Settings → advanced

3. Change the COM port number in the drop down list.
4. Restart your PC.
5. Right click the LinkManager system tray icon and select Options.
6. Enter 1 in the COM port field.



7. Stop and Start the LinkManager and start the Serial agent.

Appendix B, Serial Troubleshooting and Hints

Typical serial communication problems

If you experience problems with communication loss during transfer etc., it may be due to the CX Programmer trying to negotiate a high speed without flow control. This can be problematic, especially with slow lines (2G connection).

Try changing the parameters of the PLC and CX programmer to use a lower baud rate and use of flow control, e.g. 9600 8N1.

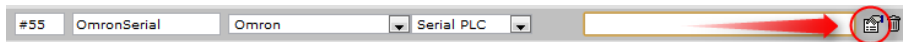
Also you may try to change the timeout to e.g. 10 seconds and decrease the package size to e.g. 260 bytes.

Please refer to your Omron documentation for details on changing these settings in your Omron hardware and software.

Special Serial Agent settings

If you experience problems connecting to your Serial Omron PLC, it could be due to your Omron PLC being configured with some special settings.

You could therefore try to alter the serial settings under **Parameter Details** for the agent in the SiteManager.



There are two settings that may be relevant.

A screenshot of the "Serial 'OmronSerial' - Omron Serial PLC Agent" configuration window. The window contains a note about the Omron XM25-09 serial cable, a reference to Quick Guides on www.secomea.com, and several configuration fields: "Address on LinkManager:", "Baud Rate:", "Data,Parity,Stop:", "Use CPM compatibility mode:", "Use hardware flow-control:", and "Enable Go To Appliance Service (omser):". The "Use CPM compatibility mode:" checkbox is highlighted with a red box. At the bottom, there are buttons for "Save", "Back", "Serial >>", and "Monitor >>".

The **CPM compatibility mode** setting, forces serial settings to 9600/7e2. This may solve problems connecting to CPM1 or CJ2M Serial PLCs (and maybe others)

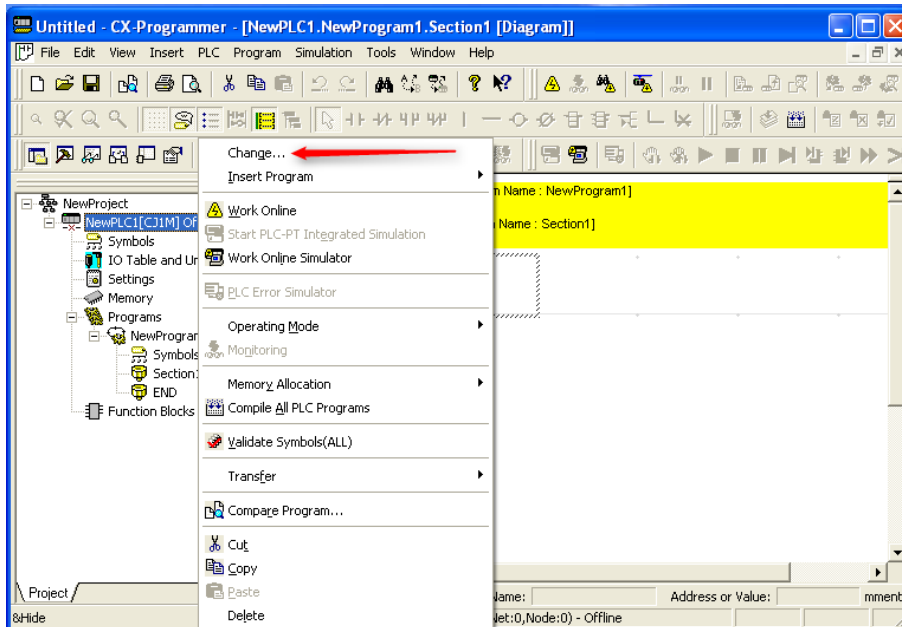
The **Use hardware flow-control** option may in some cases solve a problem with CX programmer reporting a communication error when shifting between going Offline and Online. Forcing hardware flow-control may have a positive effect on this. Note that if this does not solve your problem, it is recommended to disable it.

Serial communication through the “peripheral port”

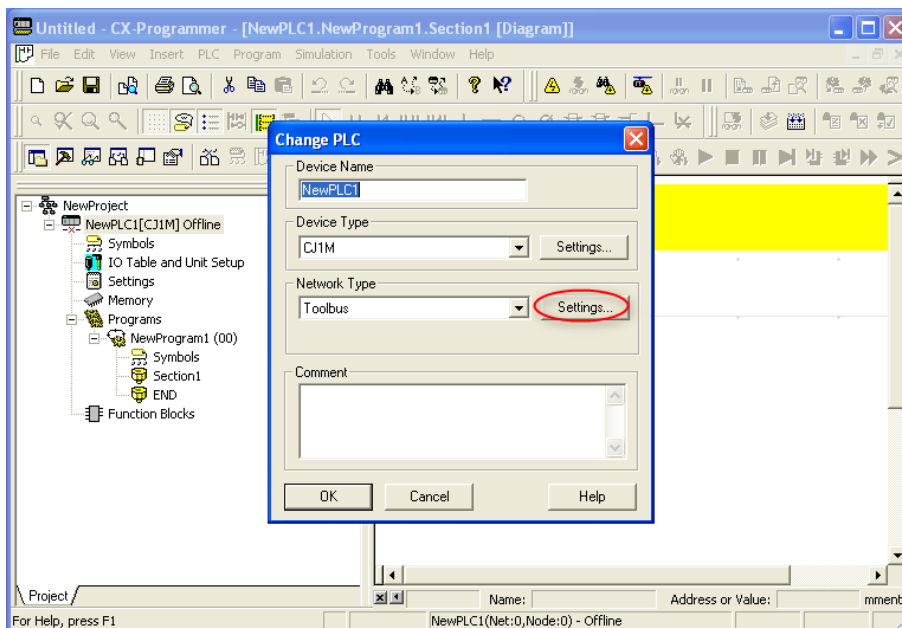
If you are experiencing trouble with the auto-search function, it might be due to speed-setting-negotiations between the SiteManager and the PLC's peripheral port (using the Omron CS1W-CN226 cable).

To avoid this, you need to manually tell the project which protocol to use, before connecting to the PLC.

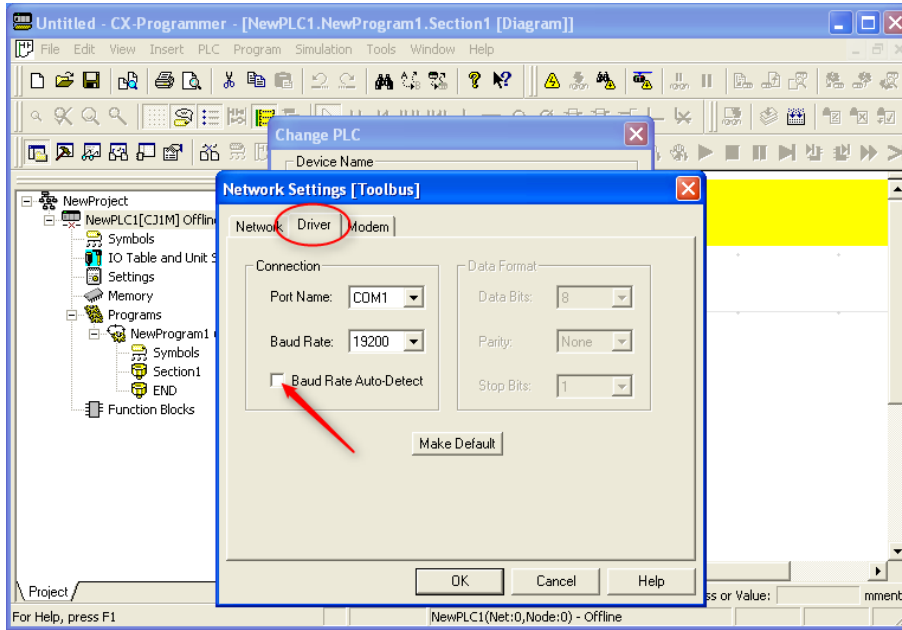
1. Create a new project (or open an existing one), and right-click on the projects name, and select change:



2. Select Toolbus in network type, and click Settings



- Click on the tab Driver, and make sure "Baud Rate Auto-Detect" is turned off. Select the proper speed to communicate via serial (usually 19200) and click OK and OK.



After this, you should be able to connect to the PLC.

Notices

Publication and copyright

© **Copyright Secomea A/S 2008-2012**. All rights reserved. You may download and print a copy for your own use. As a high-level administrator, you may use whatever you like from contents of this document to create your own instructions for deploying our products. Otherwise, no part of this document may be copied or reproduced in any way, without the written consent of Secomea A/S. We would appreciate getting a copy of the material you produce in order to make our own material better and – if you give us permission – to inspire other users.

Trademarks

SiteManager™, LinkManager™ and GateManager™ are trademark of Secomea A/S. Other trademarks are the property of their respective owners.

Disclaimer

Secomea A/S reserves the right to make changes to this publication and to the products described herein without notice. The publication of this document does not represent a commitment on the part of Secomea A/S. Considerable effort has been made to ensure that this publication is free of inaccuracies and omissions but we cannot guarantee that there are none.

The following paragraph does not apply to any country or state where such provisions are inconsistent with local law:

SECOMEA A/S PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE

SECOMEA A/S SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGE ALLEGED IN CONNECTION WITH THE FURNISHING OR USE OF THIS INFORMATION.

Secomea A/S
Denmark

CVR No. DK 31 36 60 38

E-mail: sales@secomea.com
www.secomea.com