Training Manual

EtherNet/IP Scanner

CIFX, COMX and netJACK - Configuration and Testing - Step by Step

Hilscher Gesellschaft für Systemautomation mbH
www.hilscher.com
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1 Introduction

1.1 About this Training Manual

This document provides step-by-step instructions on how to commission and configure an EtherNet/IP Scanner (master) by using the *SYCON.net* configuration software. How to read input data and how to write output data by using the I/O monitor is described for the *SYCON.net* configuration software and the *cifX Test* auxiliary tool.

The procedures are exemplified by using a cifX PC card. They can, however, also be applied to the comX and netJACK communication modules.

1.2 Required Hardware and Software

Prerequisite for the described commissioning and configuration example is a proper installation of all necessary hardware and software components.

For the example given in this document, you need the following components:

Hardware

- 1 x PC with standard equipment: monitor, keyboard, mouse, DVD drive, PCI slot
- 1 x CIFX 50-RE acting as Real-Time Ethernet master (requires master license)
- 1 x NXIO 50-RE Real-Time Ethernet slave with power supply unit
- 1 x CIFX 50-RE acting as Real-Time Ethernet slave
- 2 x Ethernet cable (CAT5)

Software

- *SYCON.net* configuration software
- Driver for cifX PC card (*cifX Device Driver*)
- Auxiliary tools *cifX Test* and *cifX Setup* (included in the *cifX Device Driver* installation)
- *Ethernet Device Configuration* (included in the *SYCON.net* installation)

For details about how to install the necessary hardware and software components, please refer to the user manual of the respective product.

1.3 List of Revisions

Index	Date	Chapter	Revision
2	2012-11-23	all	created

2 General Procedure

Set up network	1.1	Create new project in **SYCON.net**.	*Note:* *Hardware has not been assigned yet.* *Firmware has not been loaded yet.* *Network has not been configured yet.*
	1.2	Insert Hilscher master device in network (e. g. **CIFX 50-RE**).	
	1.3	If a non-Hilscher device is used as slave: import device description file first. Add slave to network (e. g. **NXIO 50-RE**).	
	1.4	If a full-scale Hilscher slave device is used (e. g. **CIFX 50-RE**), add also a Stand-Alone Slave.	
Assign hardware and load Firmware	2.1	Open **Configuration window** for **master** device.	*Note:* *Hardware has been assigned.* *Firmware has been loaded.* *Network has not been configured yet.*
	2.2	**Select driver** for access to the master device. Internal device driver → select CIFX Device Driver. External via Serial, USB or TCP/IP → select netX Driver.	
	2.3	Scan for connected hardware and **assign device**.	
	2.4	If PC cards are used: **Select and load Firmware**.	
Configure slave	3.1	Open **Configuration window** for **slave** device.	*Note:* *Slave has been configured in network. Real IP address has been set for slave by rotary switch.*
	3.2	Configure **Address** (e. g IP address). If a non-Hilscher slave is used: set real IP address, e. g. by rotary switch.	
	3.3	Configure **I/O data**, i.e. modules and lengths.	
Configure Hilscher Stand-Alone Slave	4.1	Open **Configuration window** for **Stand-Alone Slave**.	*Note:* *Hardware has been assigned to full-scale slave, firmware has been loaded and real IP address has been set.*
	4.2	**Assign hardware and load firmware**.	
	4.3	Configure **address, I/O data**. These must match the network configuration. **Set real IP address of the Hilscher slave device**. (e. g. by SYCON.net or Ethernet Device Configuration, etc.)	
	4.4	**Download configuration** to Stand-Alone Slave.	
Configure master	5.1	Open **Configuration window** for **master**.	*Note:* *Network has been completely configured and can be used.*
	5.2	Configure **Scanner address**, e. g. enter IP address.	
	5.3	Configure **IP addresses** of the slaves. These must match the real IP addresses of the slaves.	
	5.4	Configure **I/O data**. These must match the settings of the slaves.	
	5.5	Configure **Quick Connect**.	
	5.6	Configure **master and further settings**.	
	5.7	**Download configuration** to master.	
Diagnosis	6.1	Establish connection to master and open **Diagnosis** dialog.	*Note:* *Payload data is exchanged.*
	6.2	Use **General Diagnosis** to check state of the network.	
	6.3	Use **I/O Monitor** to test the communication.	
	6.4	Use **cifX Test** auxiliary tool to test the communication.	

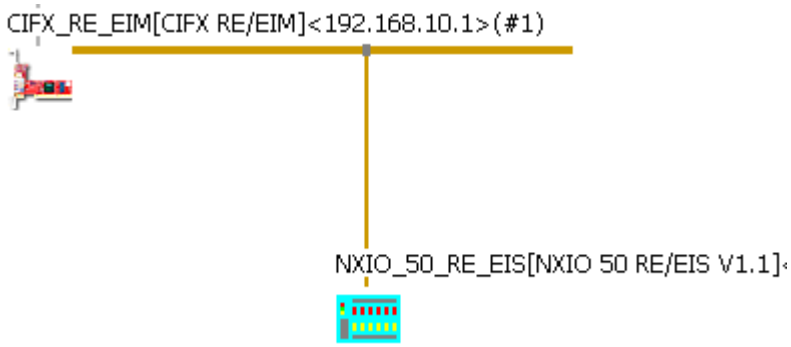
3 Network Setups

3.1 Setup 1: CIFX 50-RE with NXIO 50-RE

Setup 1 is a network consisting of a master and one slave.

Master: CIFX 50-RE\ML by Hilscher
(flexible Real-Time Ethernet PCI card)

Slave 1: NXIO 50-RE by Hilscher
(simple Real-Time Ethernet test slave)



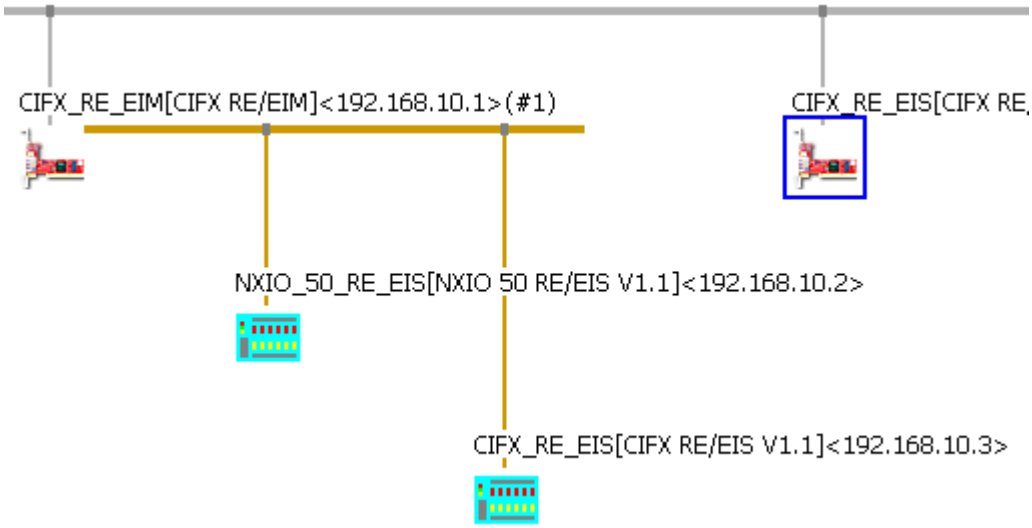
3.2 Setup 2: CIFX 50-RE Added as Second Slave

Setup 2 is a network consisting of a master and two slaves.

Master: CIFX 50-RE\ML by Hilscher
(flexible Real-Time Ethernet PCI card)

Slave 1: NXIO 50-RE by Hilscher
(simple Real-Time Ethernet test slave)

Slave 2: CIFX 50-RE by Hilscher
(flexible Real-Time Ethernet PCI card)



4 Step-By-Step Configuration

4.1 Setup 1: CIFX 50-RE with NXIO 50-RE

4.1.1 Set Up Network

1. Create a new project in SYCON.net.

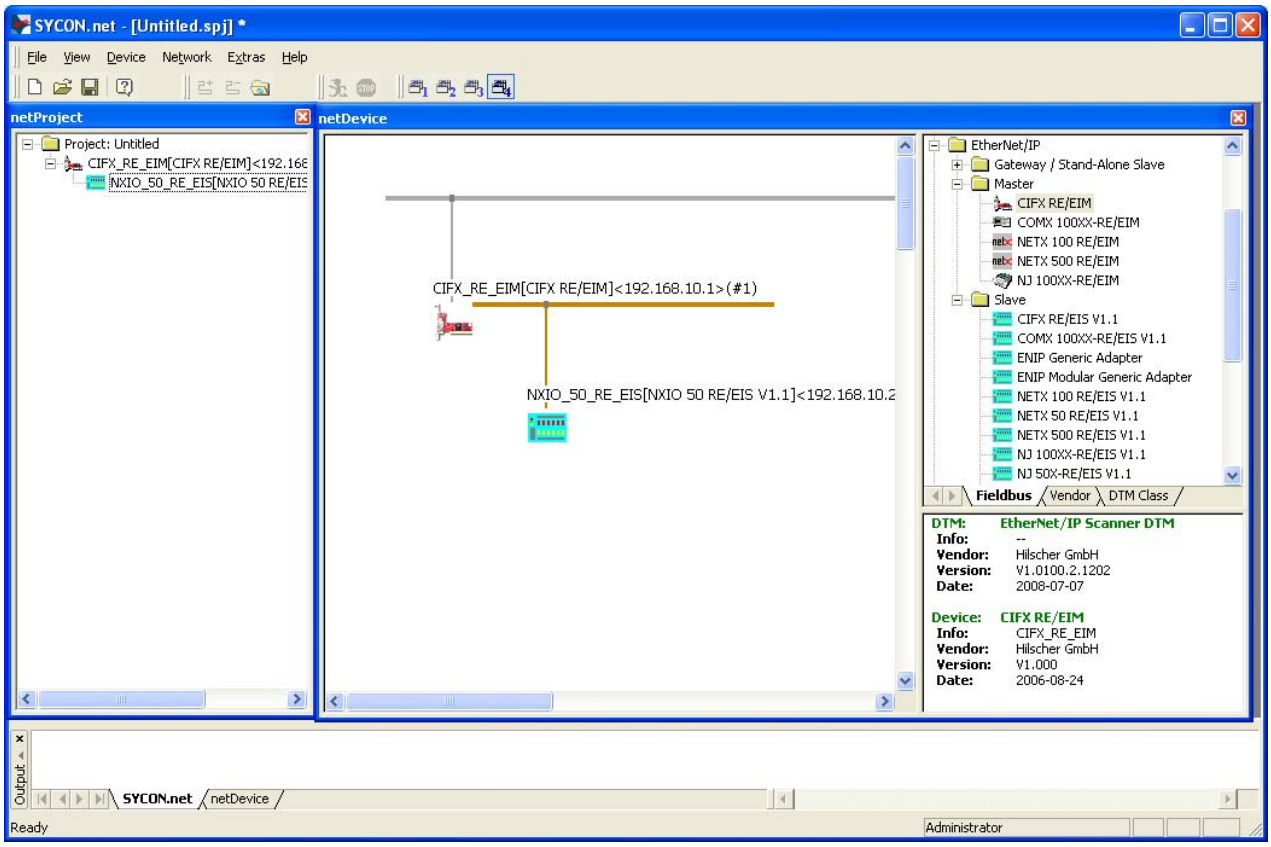
➢ In SYCON.net, choose **File > New**.

2. Insert Hilscher EtherNet/IP Scanner device in network.

➢ Select a **CIFX RE/EIM** from the **Device Catalog** (**Master**) and drag and drop it onto the upper line.

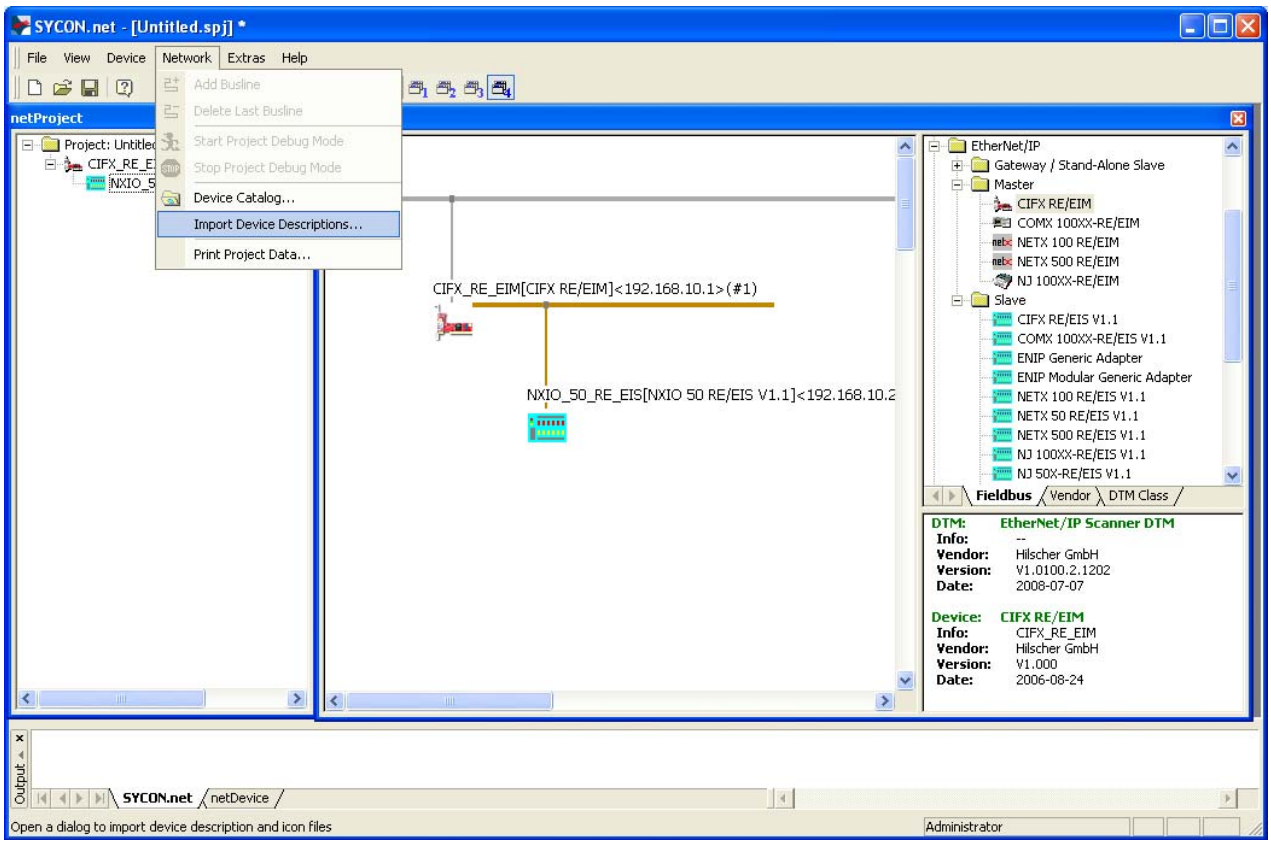
3. Add EtherNet/IP Adapter device to network.

➢ Select a **NXIO 50-RE** from the **Device Catalog** (**Slave**) and drag and drop it onto the EtherNet/IP network line.



➢ If EtherNet/IP Adapter devices of other manufacturers are used, a device description file has to be imported first, so that this slave device will be displayed in the **Device Catalog**.

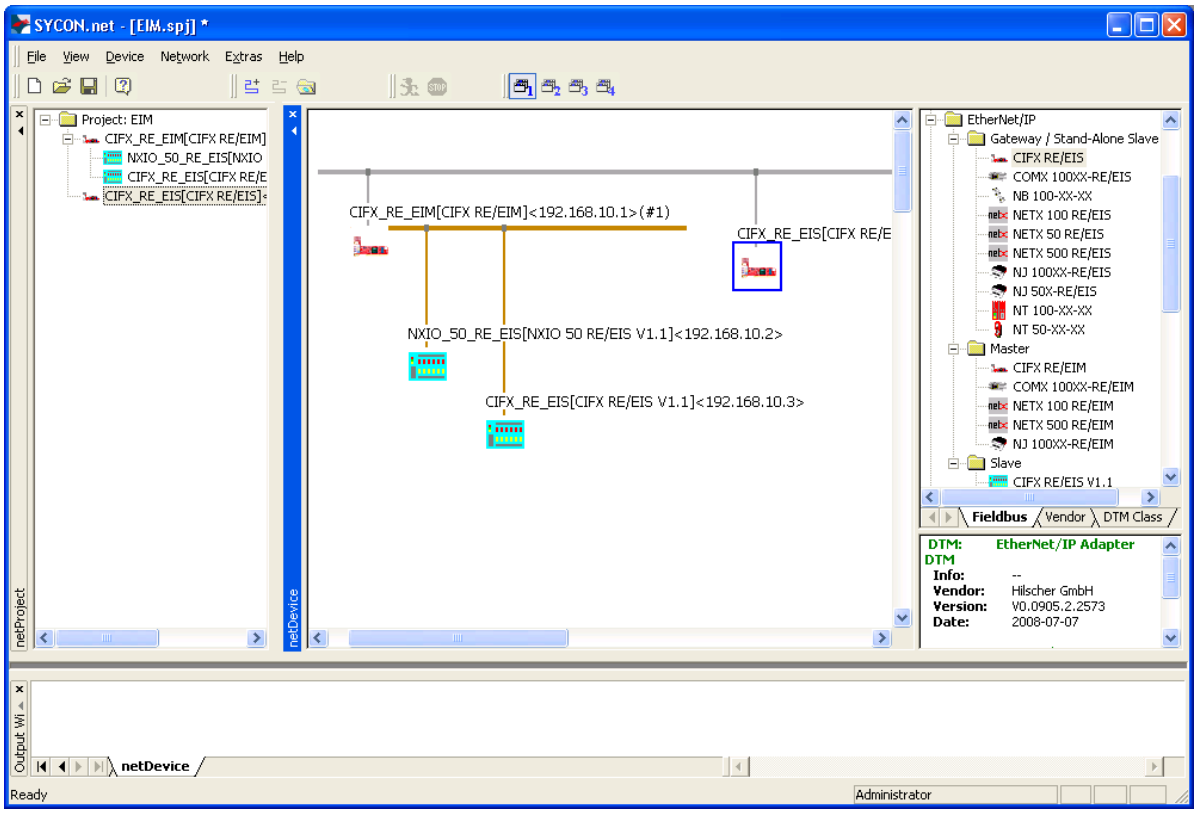
➢ To import the device description file, choose **Network** > **Import Device Descriptions…** in SYCON.net.



Note: Skip the following step, because it does not need to be performed for Setup 1.

4. If a full-scale Hilscher EtherNet/IP Adapter device is used, place also the corresponding Stand-Alone Slave in the network.

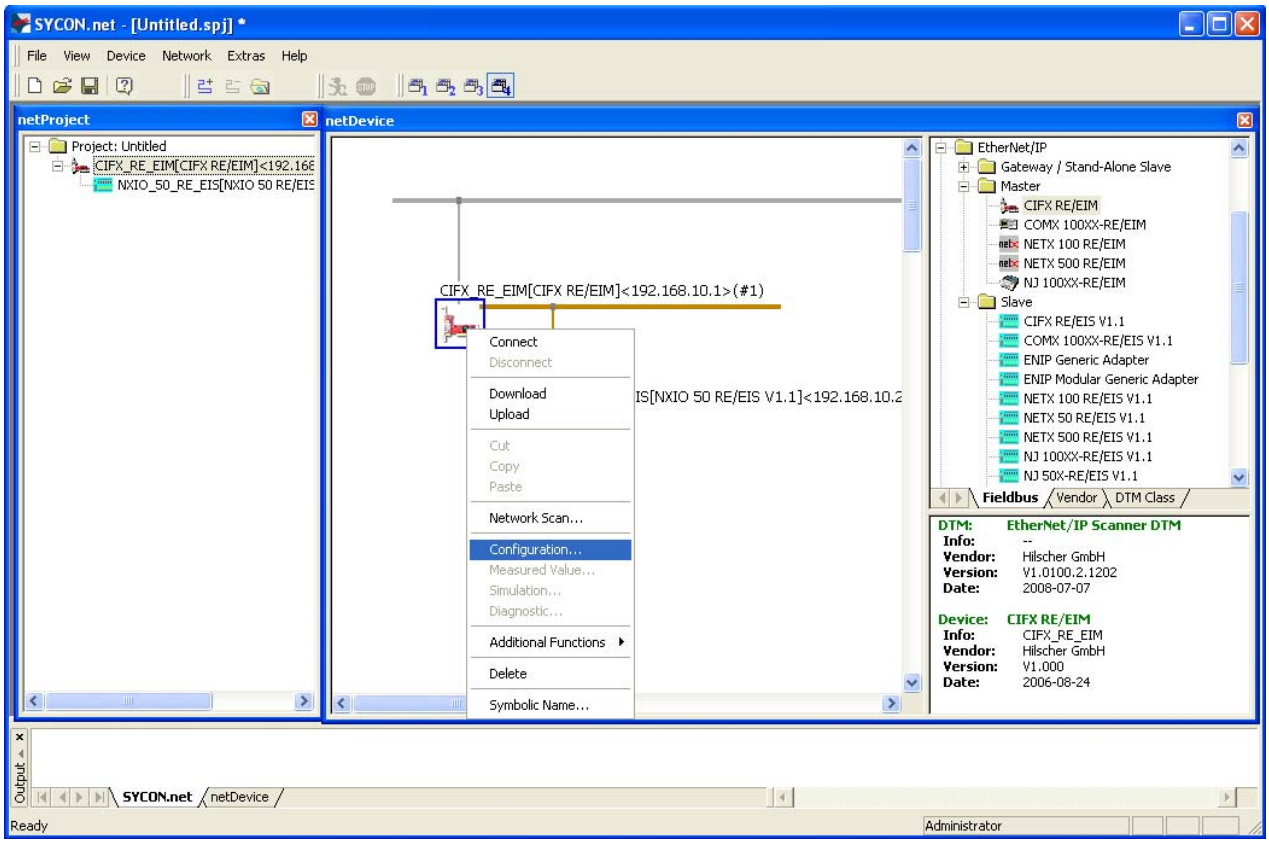
➢ Select a **CIFX RE/EIS** from the **Device Catalog** (**Gateway/Stand-Alone-Slave**) and drag and drop it onto the EtherNet/IP network line.



4.1.2 Assign Hardware and Load Firmware

1. Open Configuration window for **CIFX RE/EIM** master.

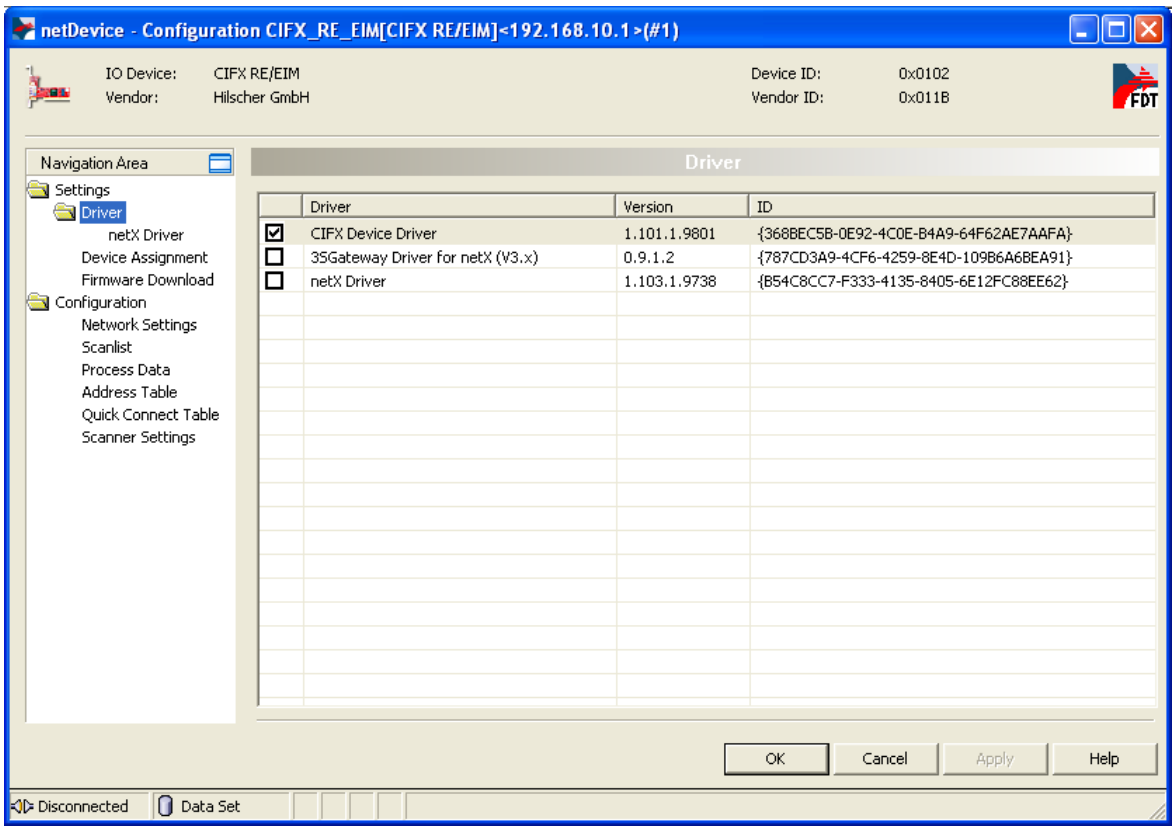
➢ Right-click on the master device to open the context menu, then choose **Configuration…**



2. Select driver for accessing the master device.

➢ In the **Navigation Area**, choose **Settings** > **Driver** and select the appropriate driver.

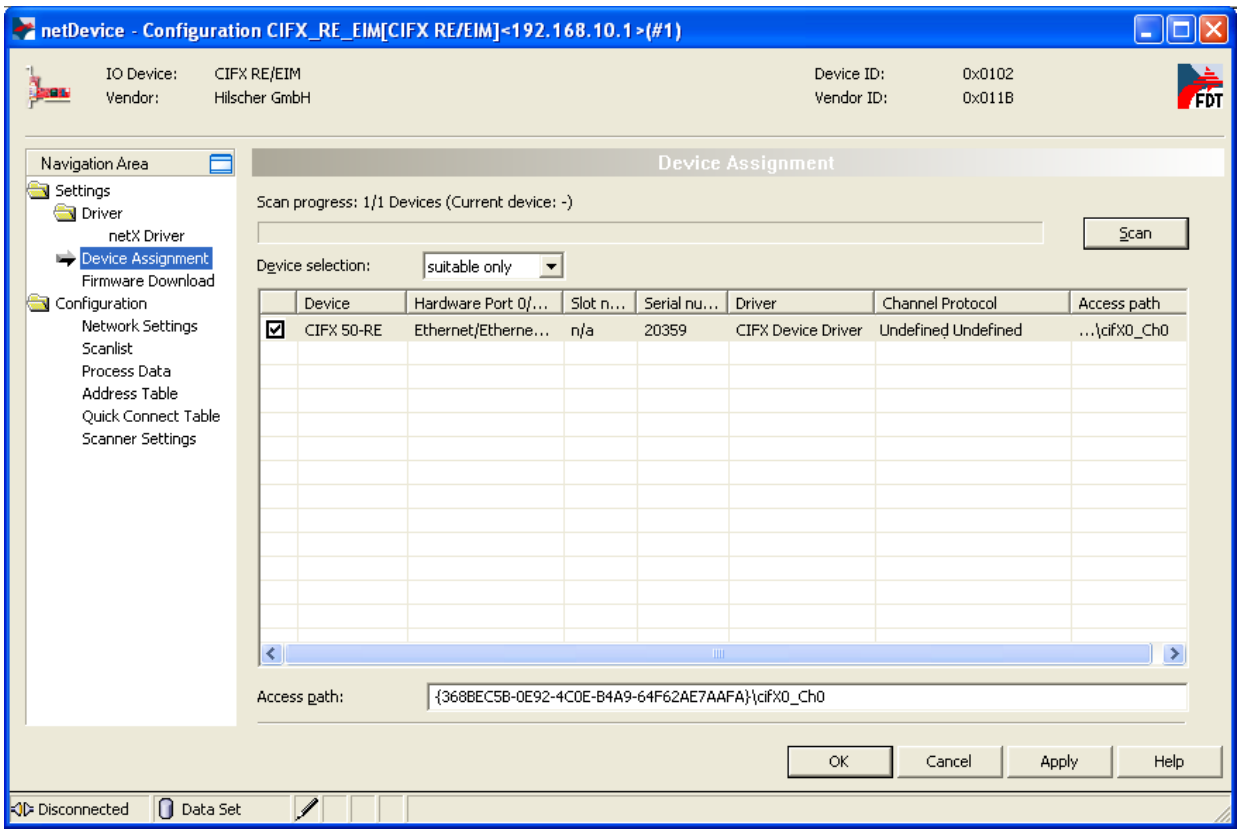
In case of access via RS-232, USB or TCP/IP – i. e. via netX Driver – additional configurations are possible under **Settings** > **Driver** > **netX Driver**.



3. Scan for connected hardware and assign device.

➢ In the **Navigation Area**, choose **Settings** > **Device Assignment** and scan for available Hilscher devices. Click **Scan** button.

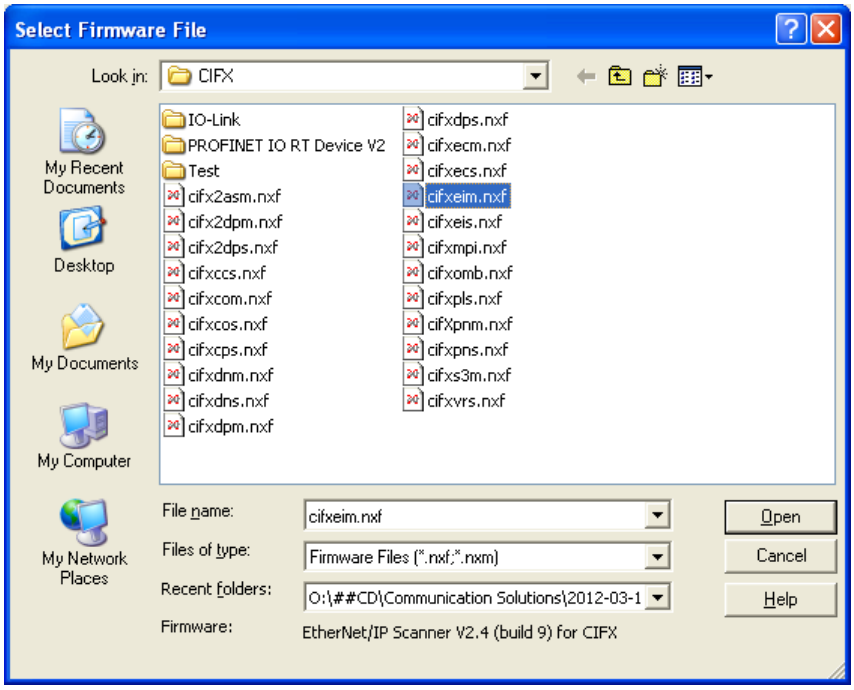
➢ Choose the **CIFX 50-RE** device by activating the check box ☑.

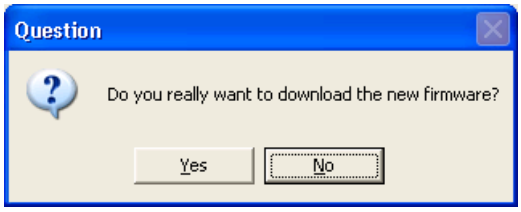


4. In case of PC cards: Select and load firmware.

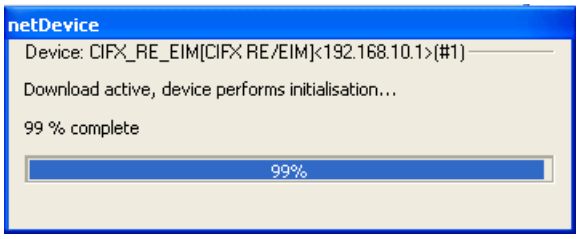
➢ In the **Navigation Area**, choose **Settings** > **Firmware Download**, then select the appropriate firmware: **cifxeim.nxf**.

➢ Click **Open** button to load firmware into the PC card.





➢ Click **Yes** button to start the download.

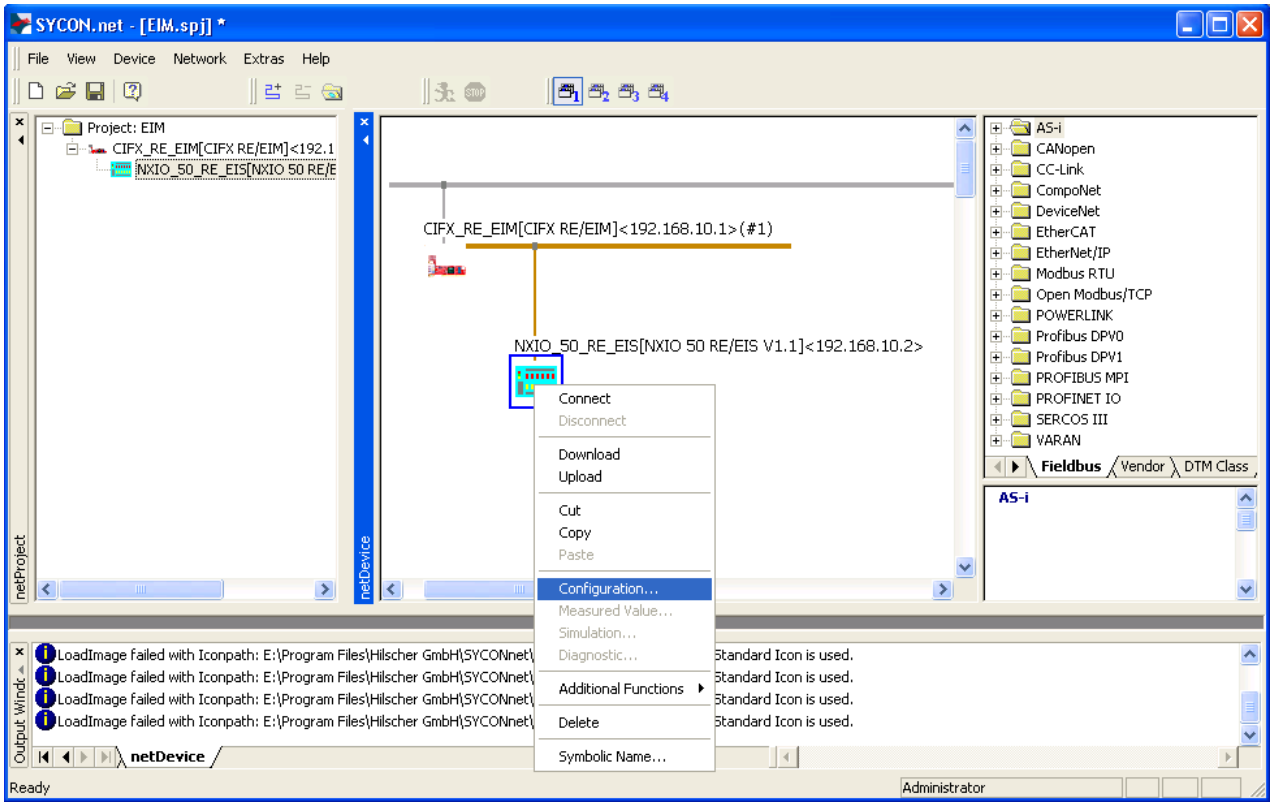


Note: Click **OK** to finally confirm the assignment of the PC card and the download of the firmware.

4.1.3 Configure Slave

1. Open Configuration window for **NXIO 50-RE** slave.

➢ Right-click on the slave device to open the context menu and choose **Configuration**.



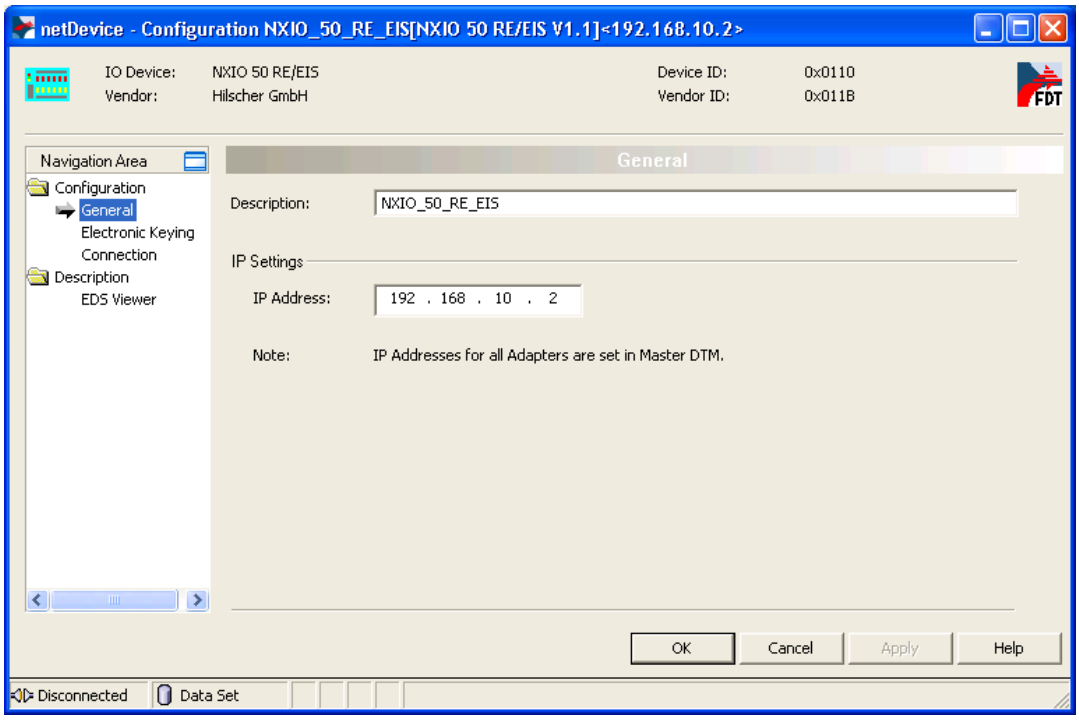
2. Configure address.

➢ **Set the real IP address of the NXIO 50-RE either via DHCP server (rotary switch at NXIO) or by using the Ethernet Device Configuration tool** (e. g. 192.169.19.2). You will find details about this on the following pages.

Note: The IP address of the NXIO 50-RE in the network which is displayed under **Configuration** > **General** can be adjusted via the master.

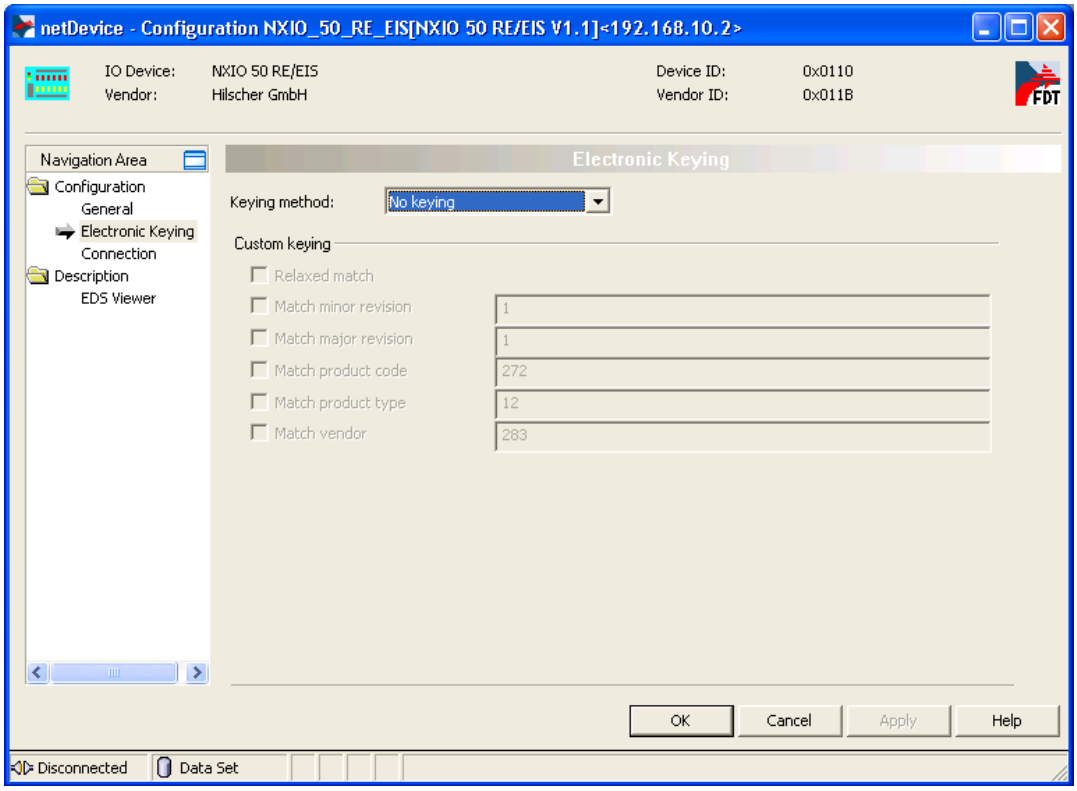
Note: In EtherNet/IP, unequivocal addressing takes place via the IP address. The IP address can either be set permanently by the user, or it can be received from a DHCP server.

Note: The real IP addresses of Hilscher slaves are set via Stand-Alone Slave or by using the Ethernet Device Configuration tool.



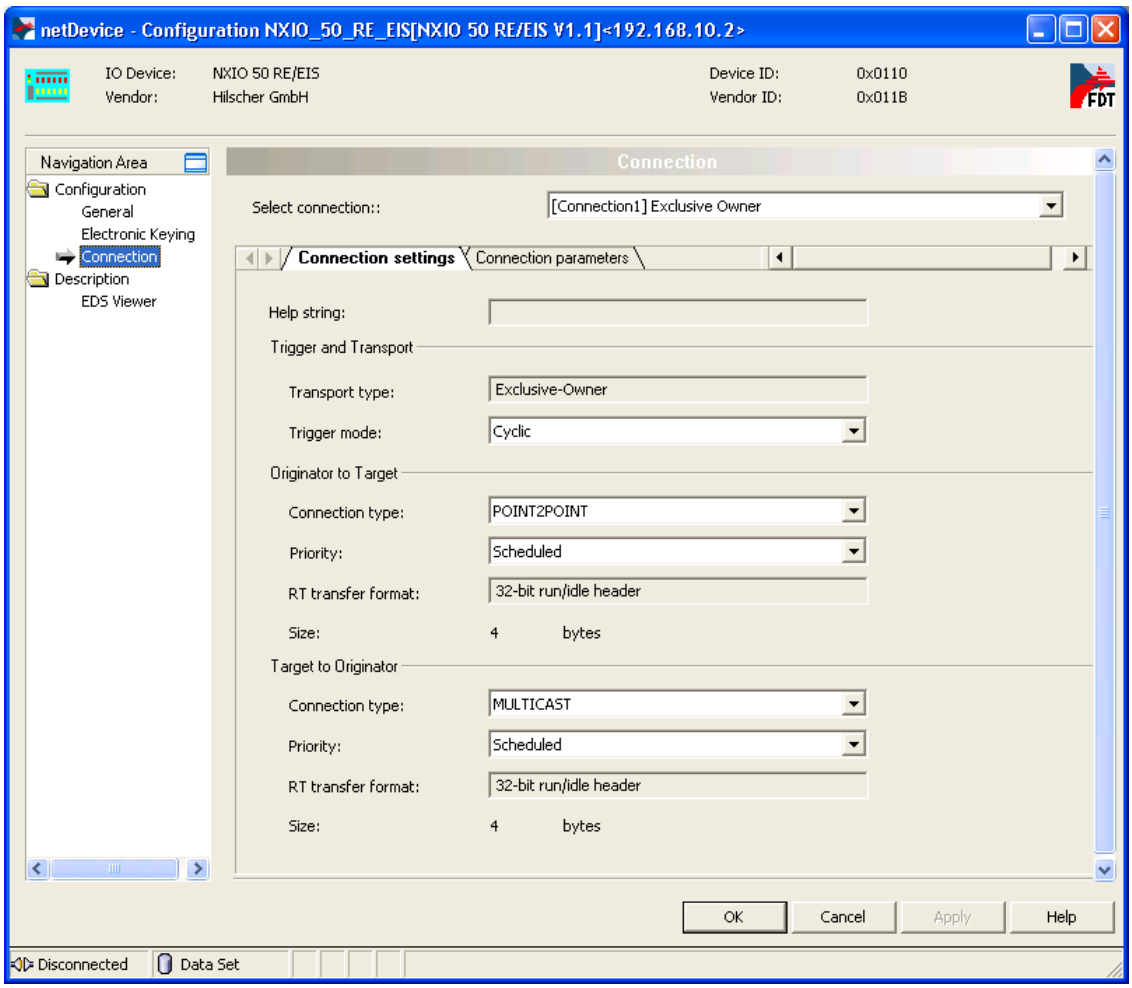
Configure Keying.

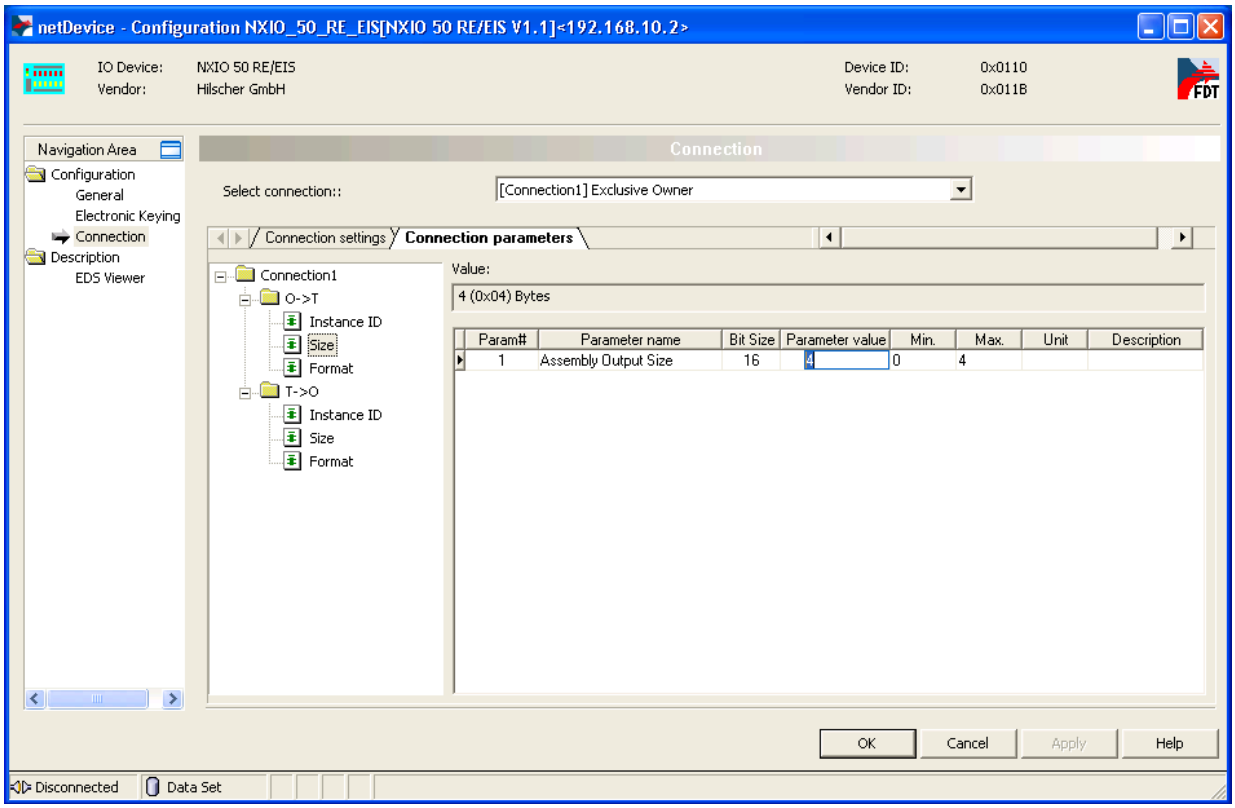
➢ In the **Navigation Area**, choose **Configuration** > **Electronic Keying**, then select Keying Method or disable Keying.



3. Configure I/O Data.

   The connections and I/O Data which are displayed under **Configuration** > **Connection** are preconfigured for the NXIO 50-RE. Only the quantity of the I/O data can be changed between 1 and 4 bytes. Keep the length at 4 bytes.

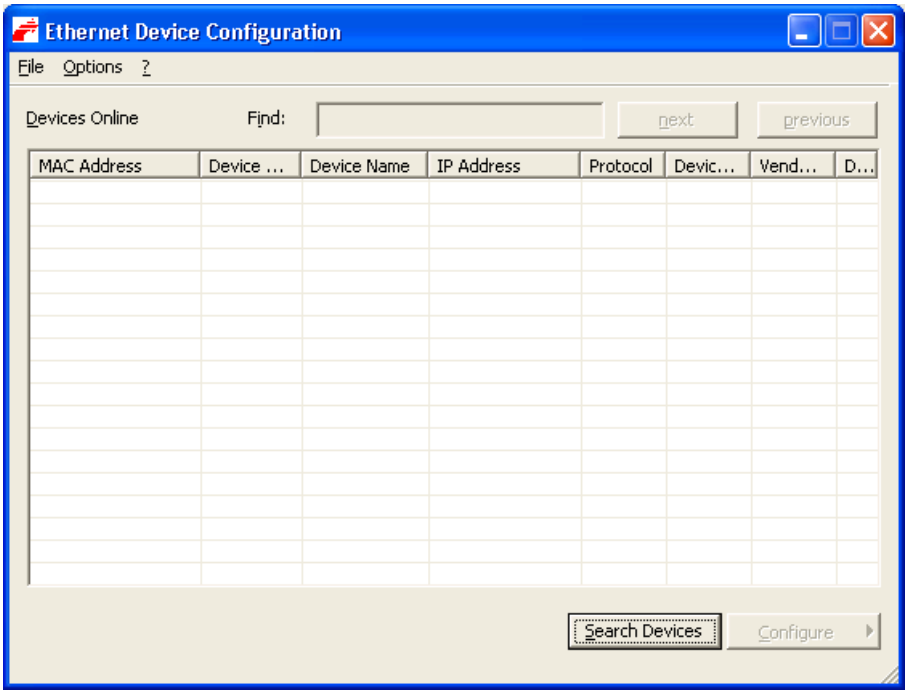


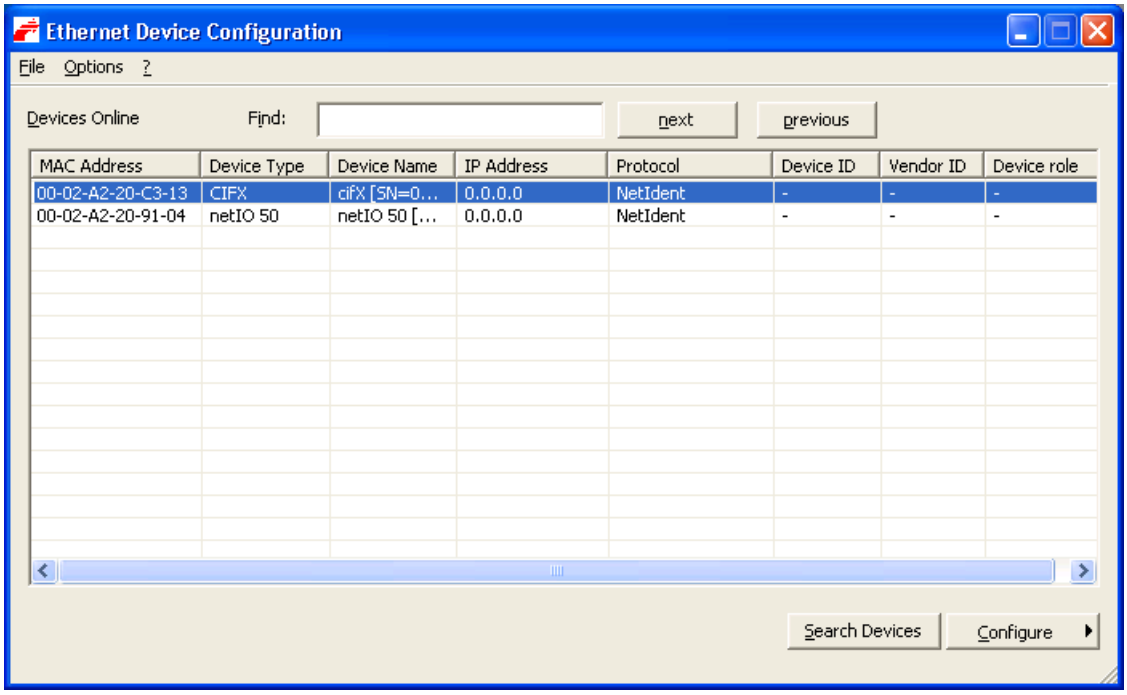


4. Configure real IP address of slave.

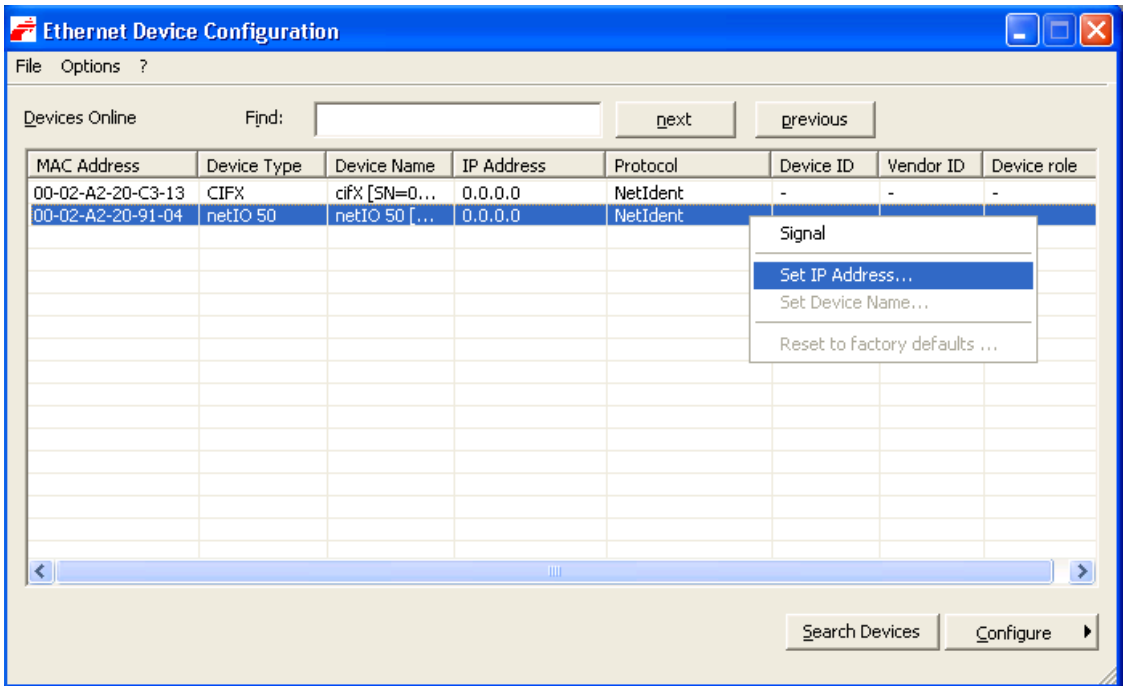
➢ In Windows, choose **Start** > **All Programs** > **SYCON.net System Configurator** > **Ethernet Device Setup**.

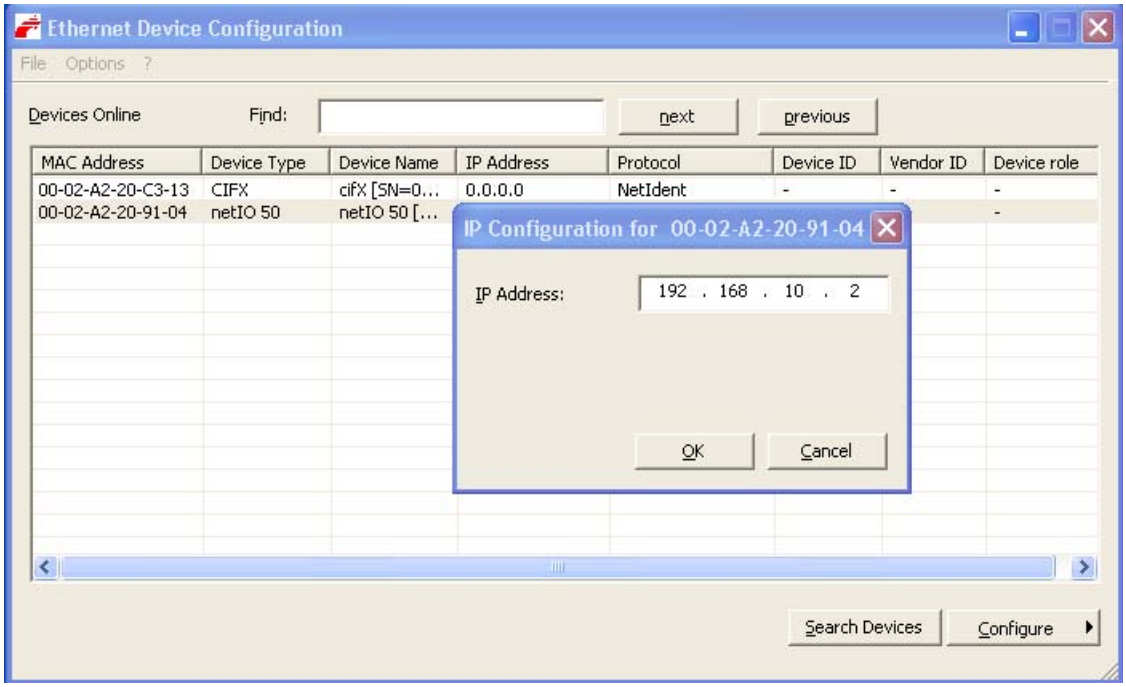
➢ Click **Search Devices** button to scan for connected Ethernet devices, then set IP addressing.

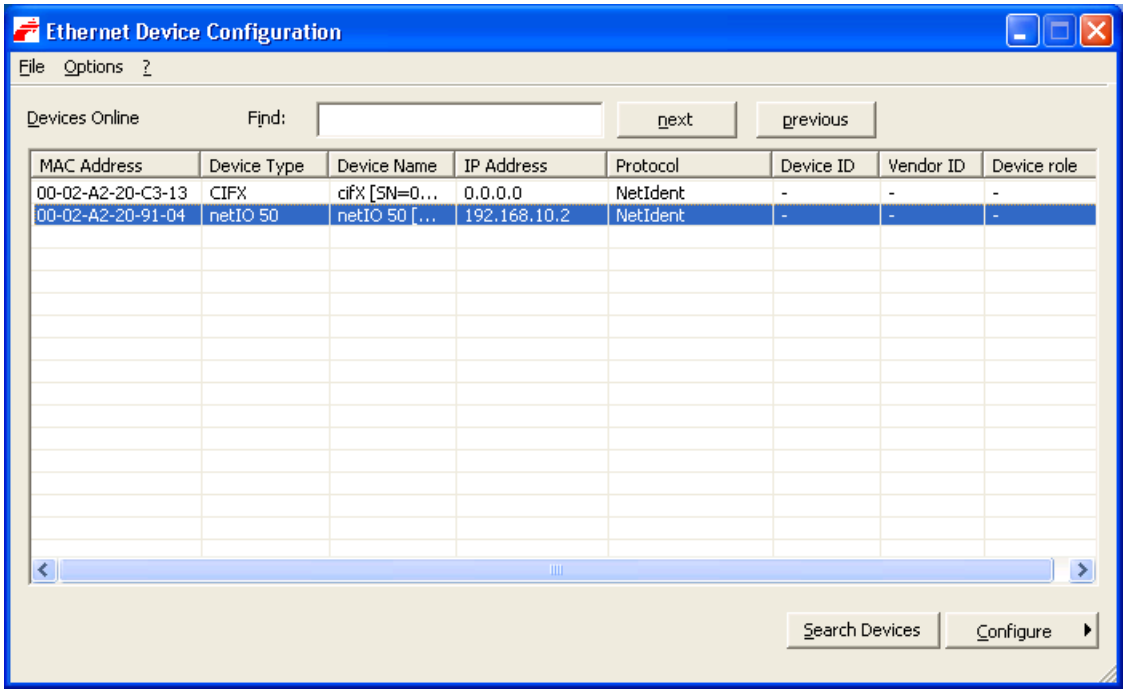




- Select the relevant Ethernet device, then right-click on the device to open the context menu. In the context menu, choose **Set IP Address…**







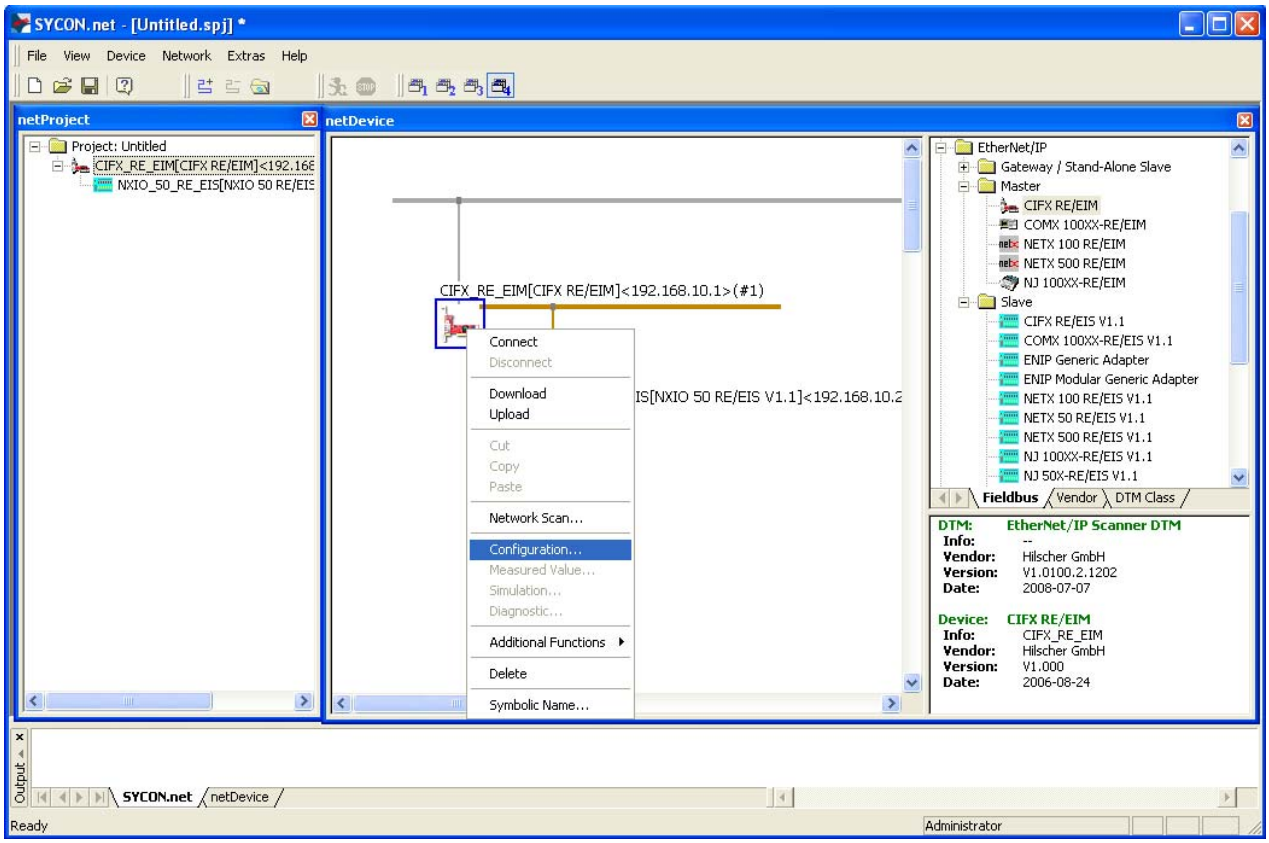
4.1.4 Configure Hilscher Stand-Alone Slave

Note: It is not necessary to configure a Hilscher Stand-Alone Slave for this example.

4.1.5 Configure Master

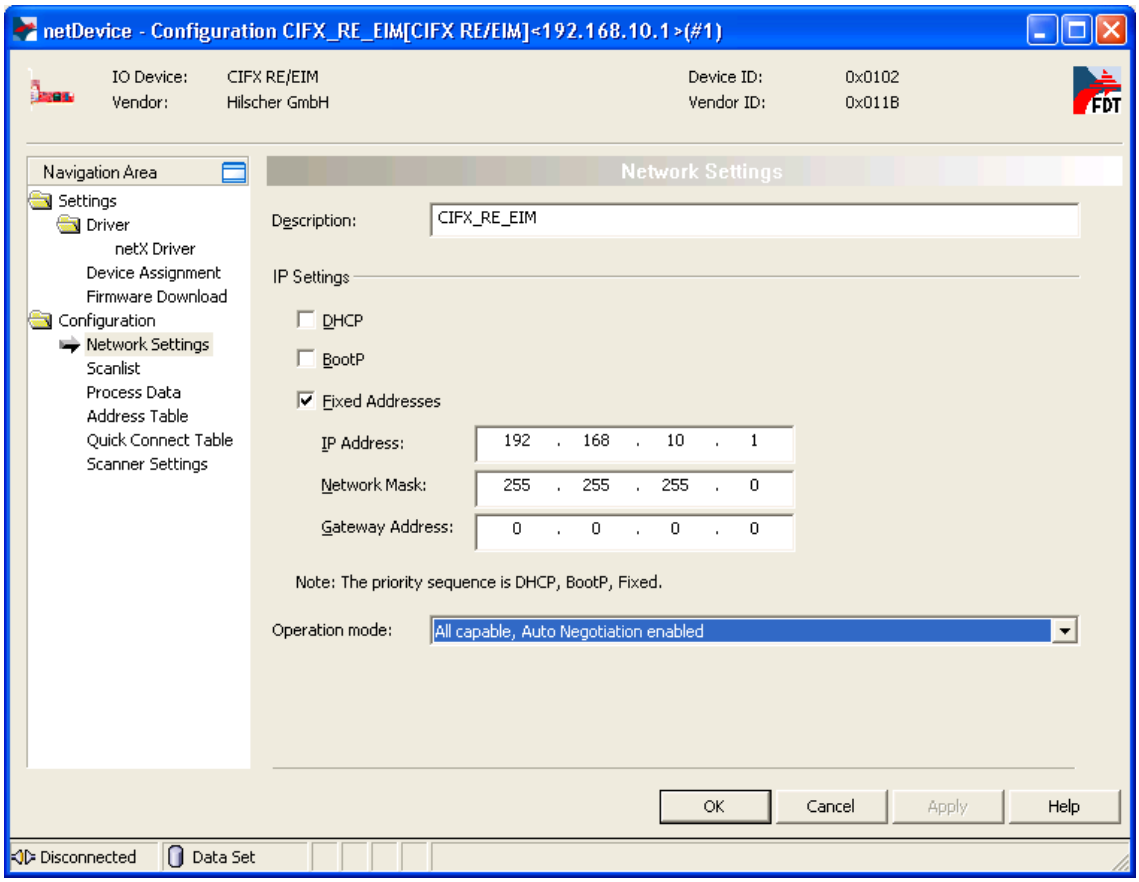
1. Open Configuration window for **CIFX RE/EIM** master.

➢ Right-click on the master device to open the context menu, then choose **Configuration**.



2. Configure Scanner address.

➢ In the **Navigation Area**, choose **Configuration** > **Network Settings**, then set the IP addressing, e. g. by setting a fixed address.

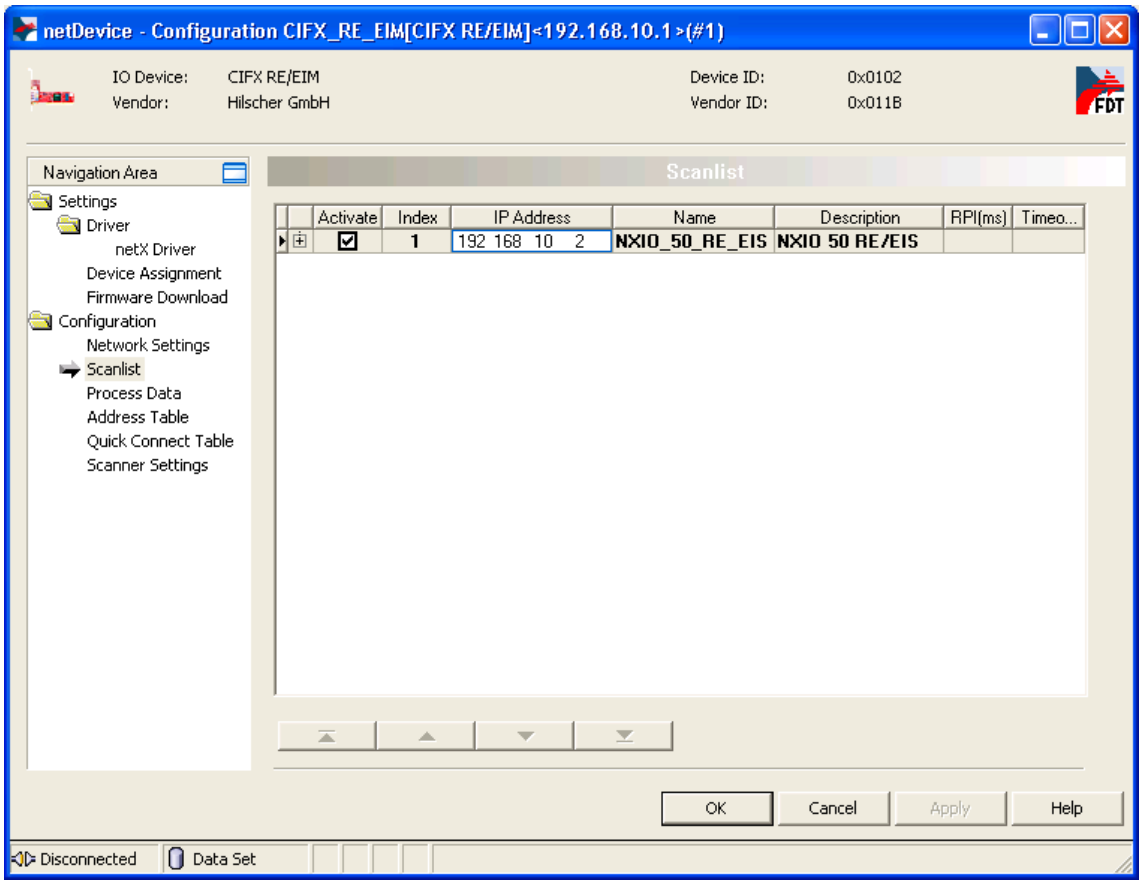


3. Configure IP address of slave.

➢ In the **Navigation Area**, choose **Configuration** > **Scanlist**, then set the IP address of the slave.

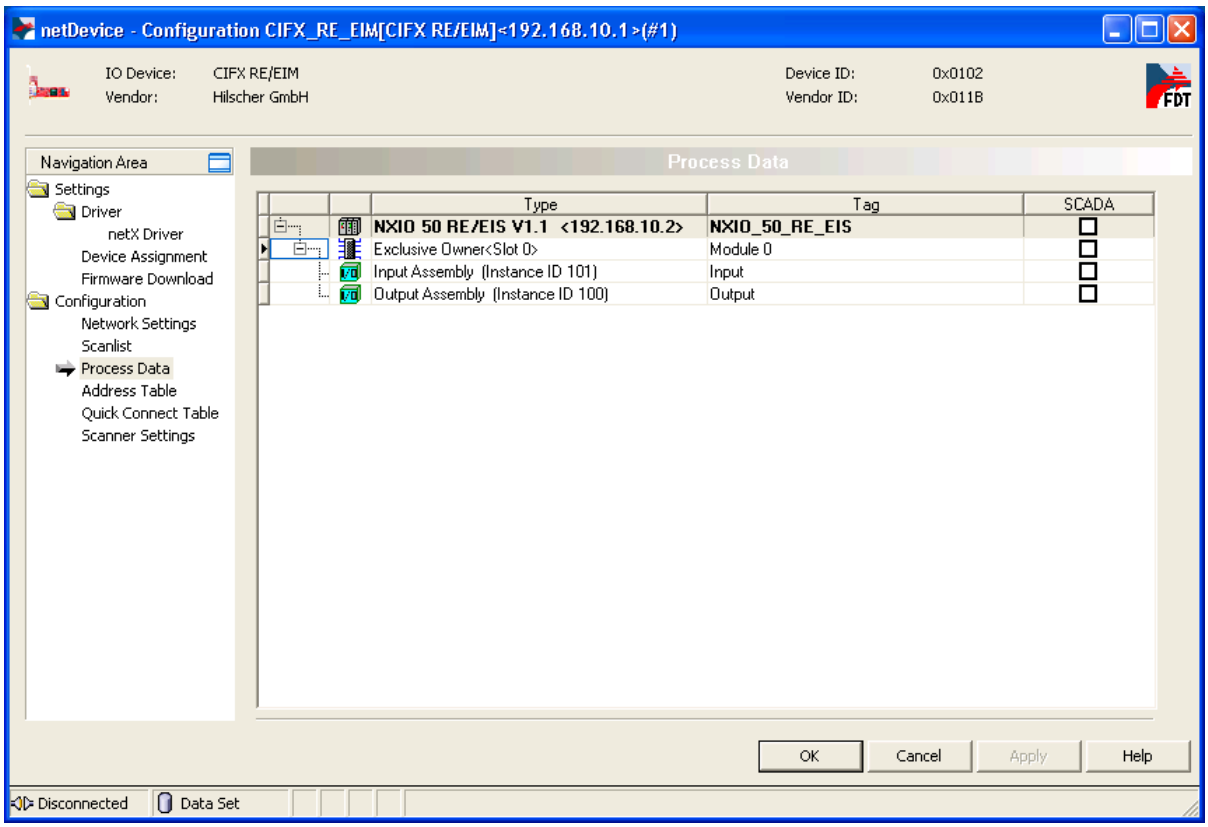
➢ In the **Scanlist** window, activate the slaves with which the master shall communicate.

Note: The IP address of the slave must be identical with the set real IP address. The NXIO 50-RE can receive its address either from a DHCP server (rotary switch at NXIO) or it can be set by using the Ethernet Device Configuration tool.

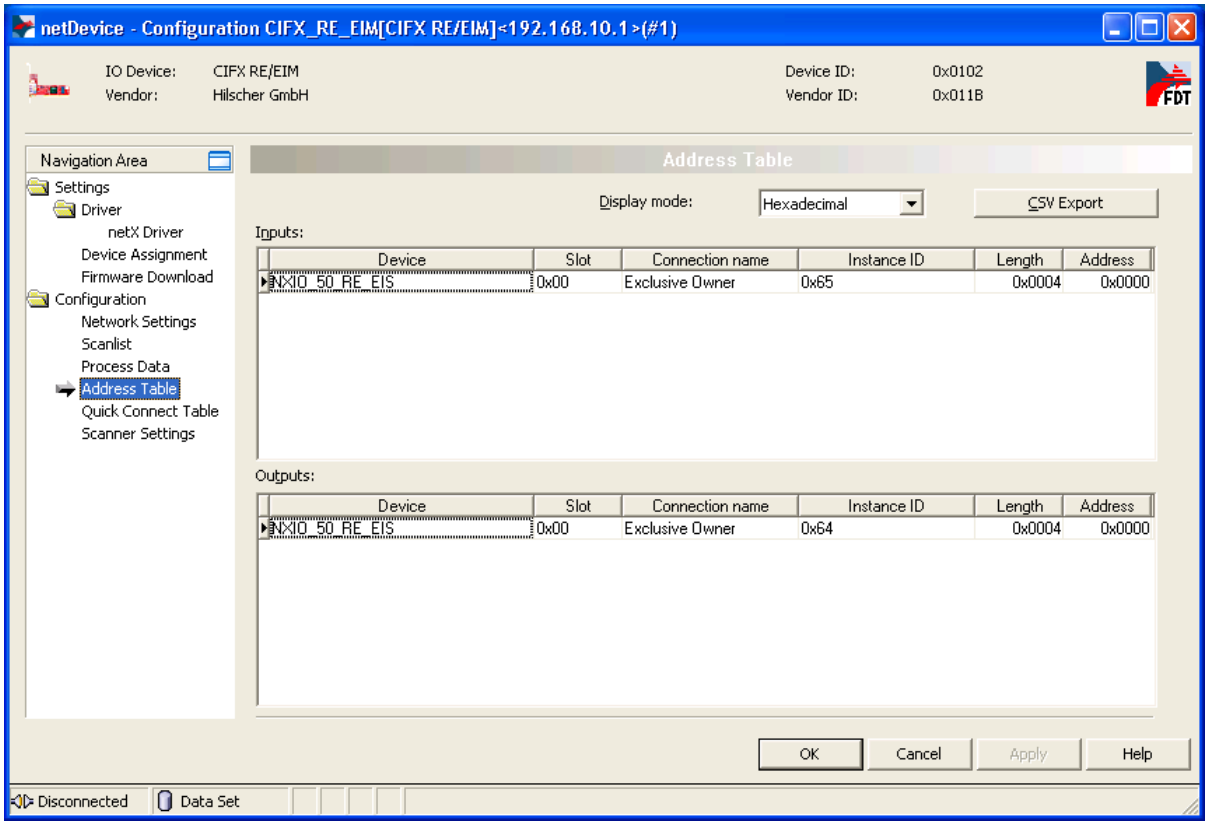


4. Configure I/O data.

➢ In the **Navigation Area**, choose **Configuration** > **Process Data** to display the mapping of the input and output data.

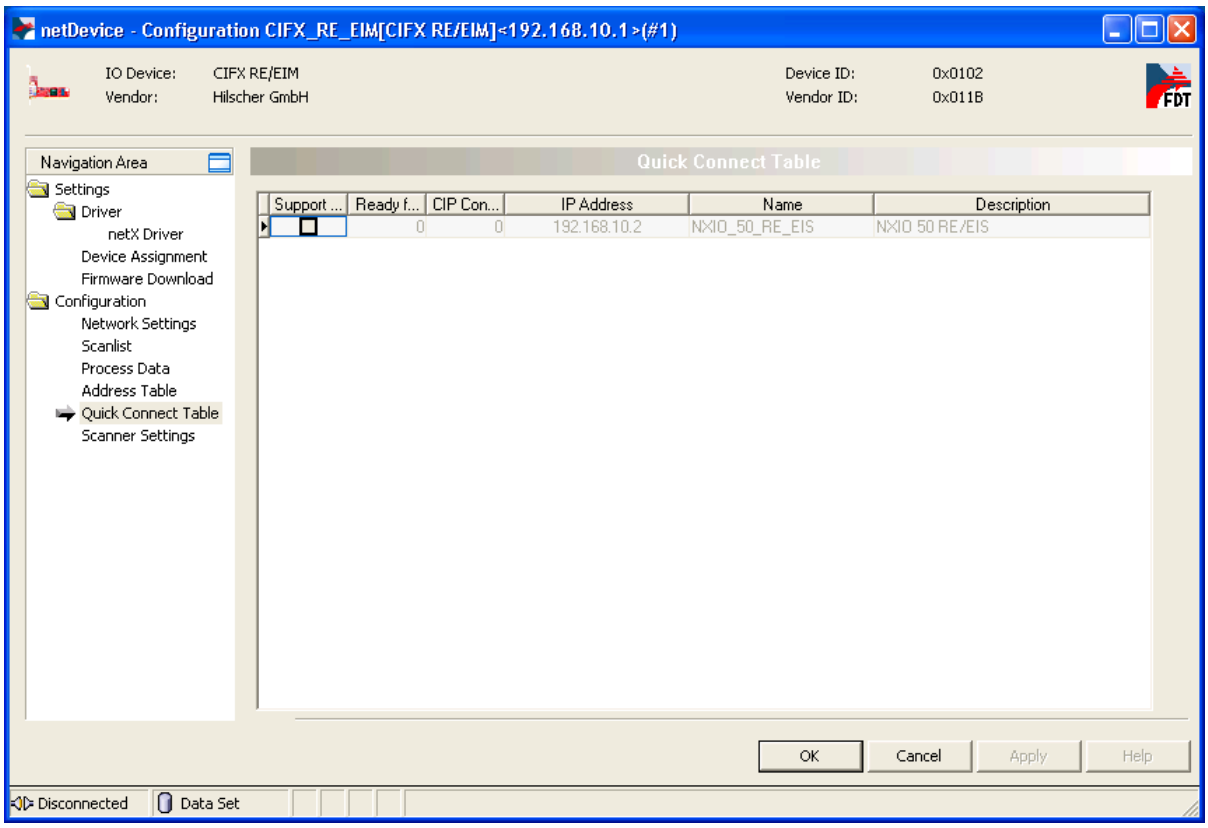


➢ In the **Navigation Area**, choose **Configuration** > **Address Table** to display the length and instance of the input and output data.



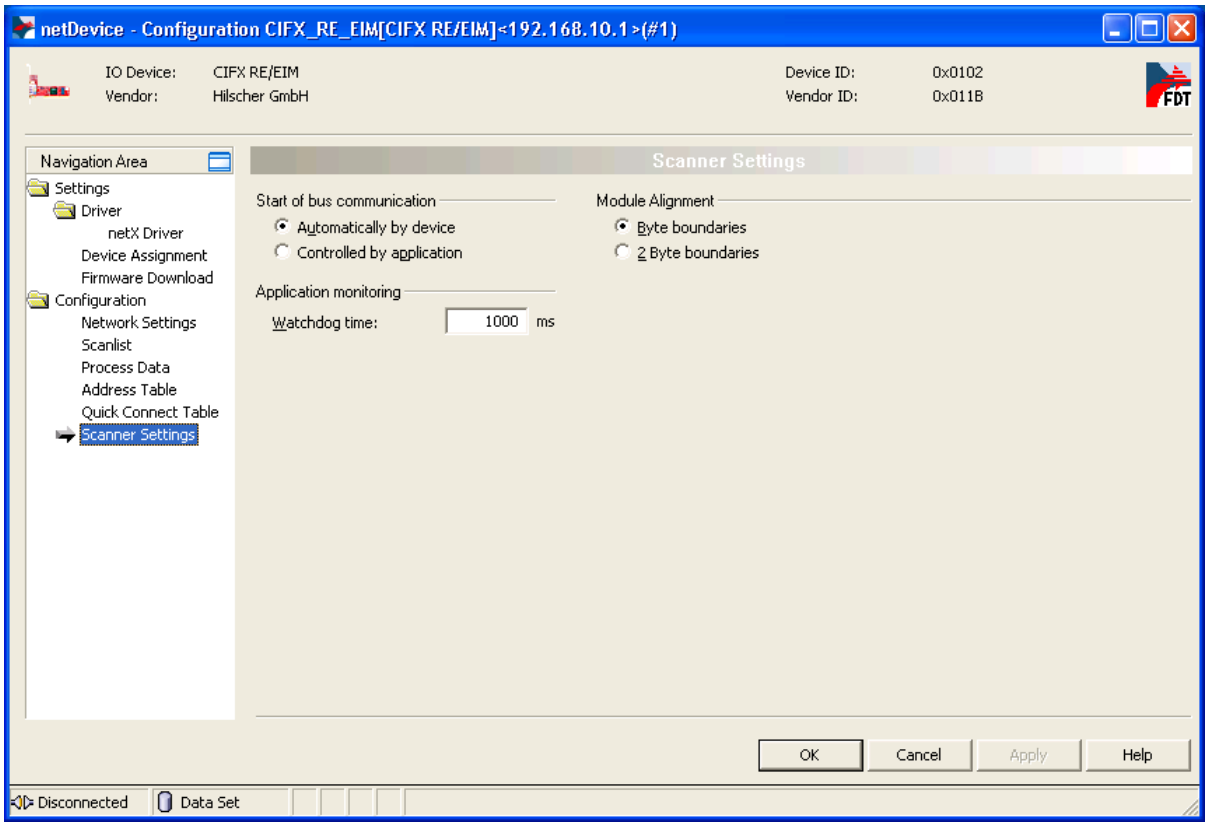
5. Configure Quick Connect.

➢ Under **Configuration** > **Quick Connect Table**, there are no settings to be made.



6. Configure master settings.

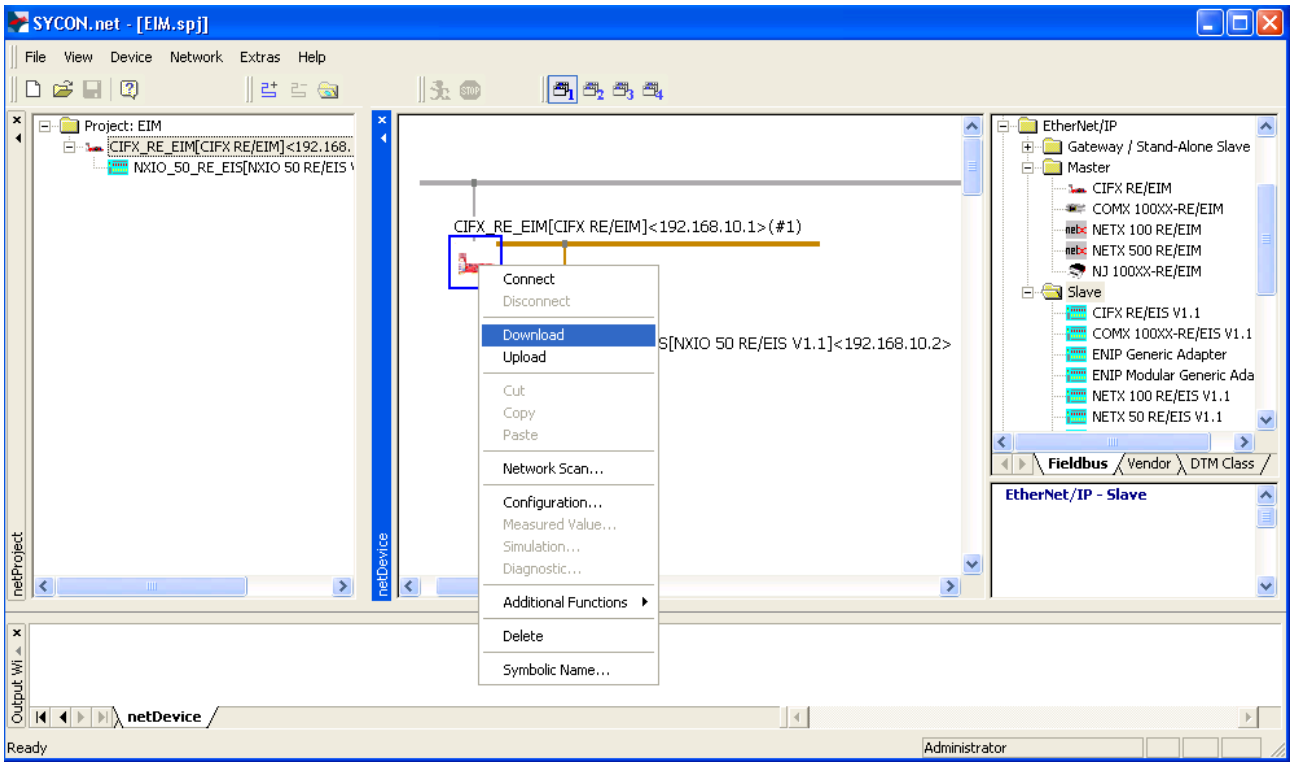
➢ Under **Configuration** > **Scanner Settings**, use the default settings.

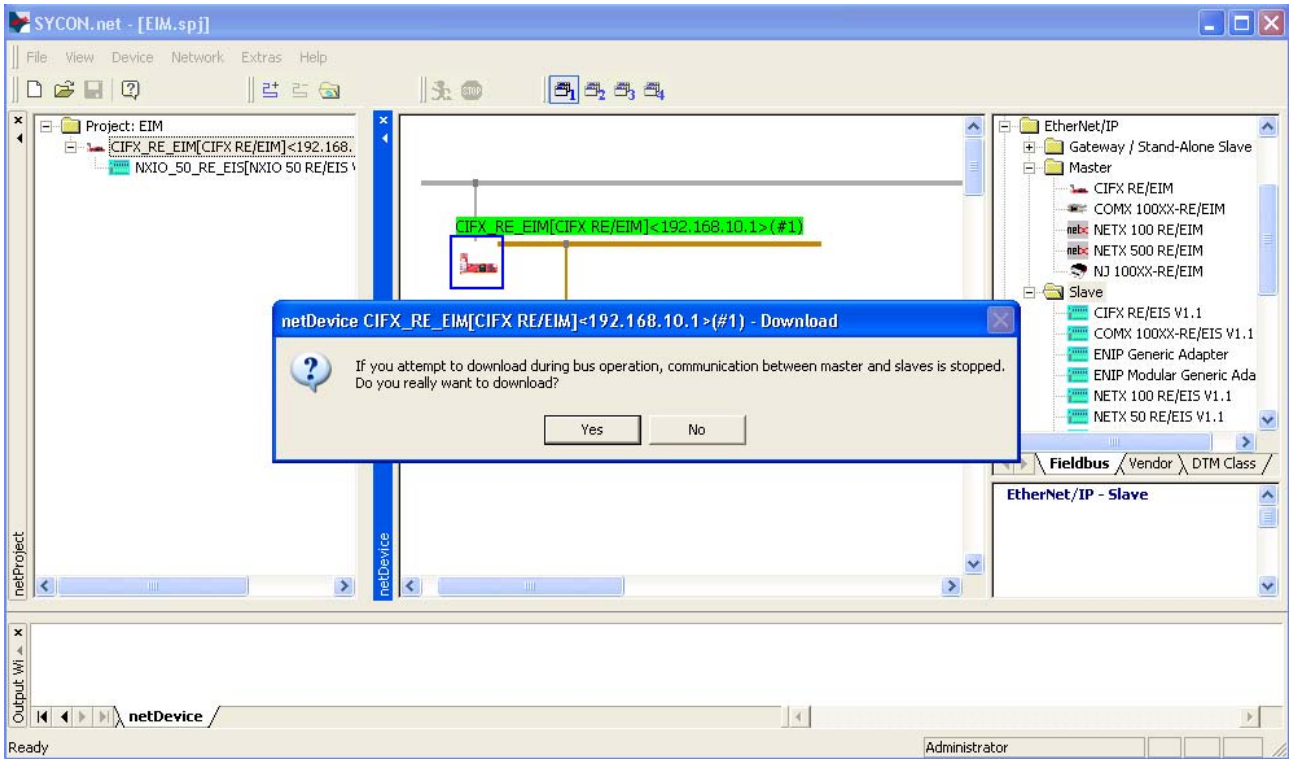


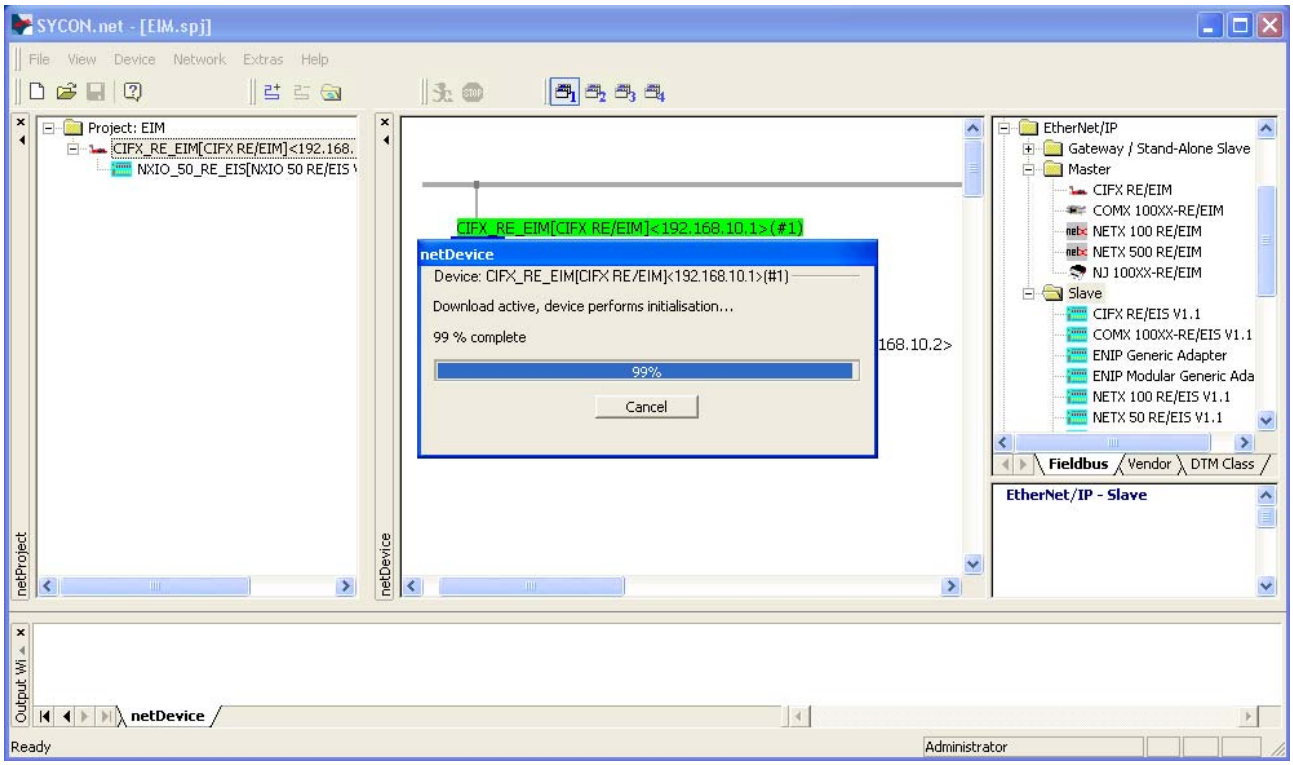
7. Download configuration to master.

➢ Right-click on the master device to open the context menu, then choose **Download**.

Note: After downloading the configuration, SYCON.net is connected to the master device for diagnostic purposes. The green highlighted display indicates an active connection to the master.







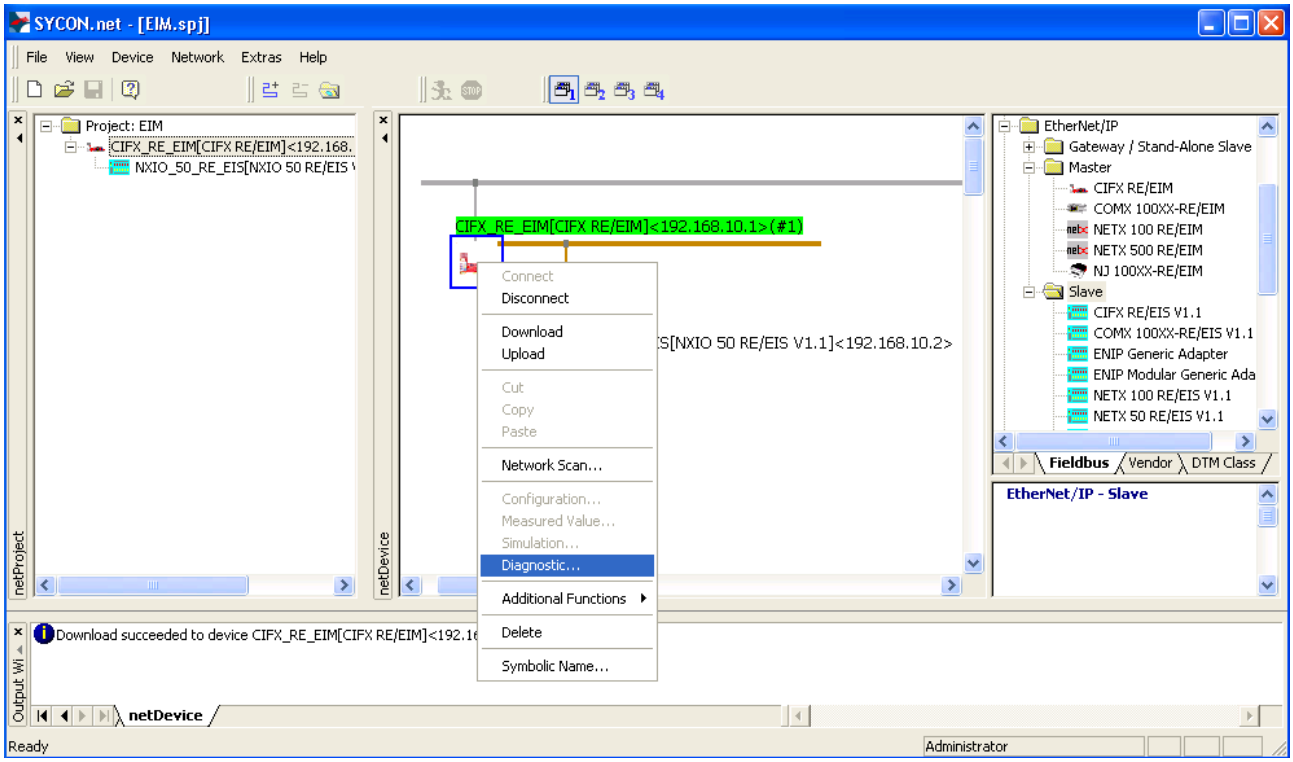
4.1.6 Diagnosis and Testing

Diagnosis and testing with SYCON.net

1. Connect with master and open diagnosis window for **CIFX RE/EIM**.

➢ Right-click on the master device to open the context menu, then choose **Diagnostic…**

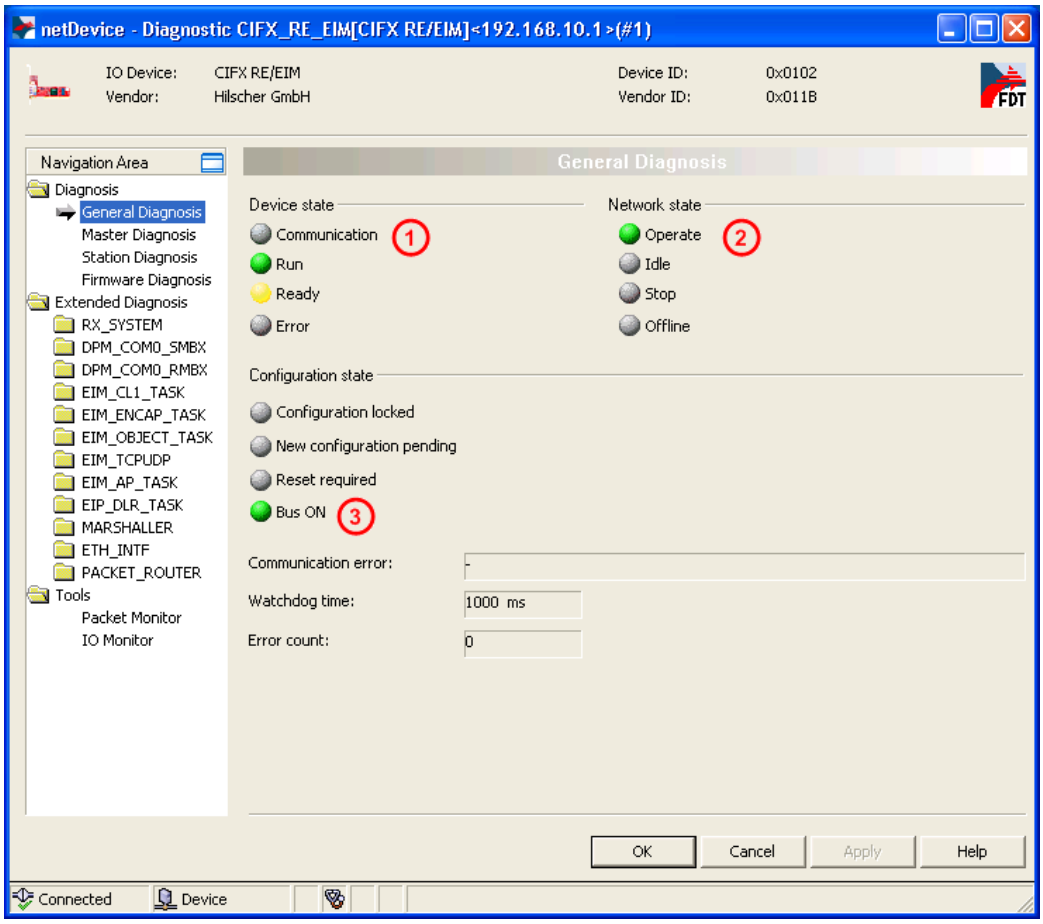
Note: After downloading the configuration, SYCON.net is automatically connected to the master device. If SYCON.net is not connected, right-click on the master device to open the context menu, then choose **Connect**.



2. Check state of the network in **General Diagnosis** window.

➢ In the **Navigation Area**, choose **Diagnosis** > **General Diagnosis**.

➢ Check if there is a green light for **Device state** > **Communication** ①, **Network state** > **Operate** ② and **Configuration state** > **Bus ON** ③. This indicates a functioning communication.

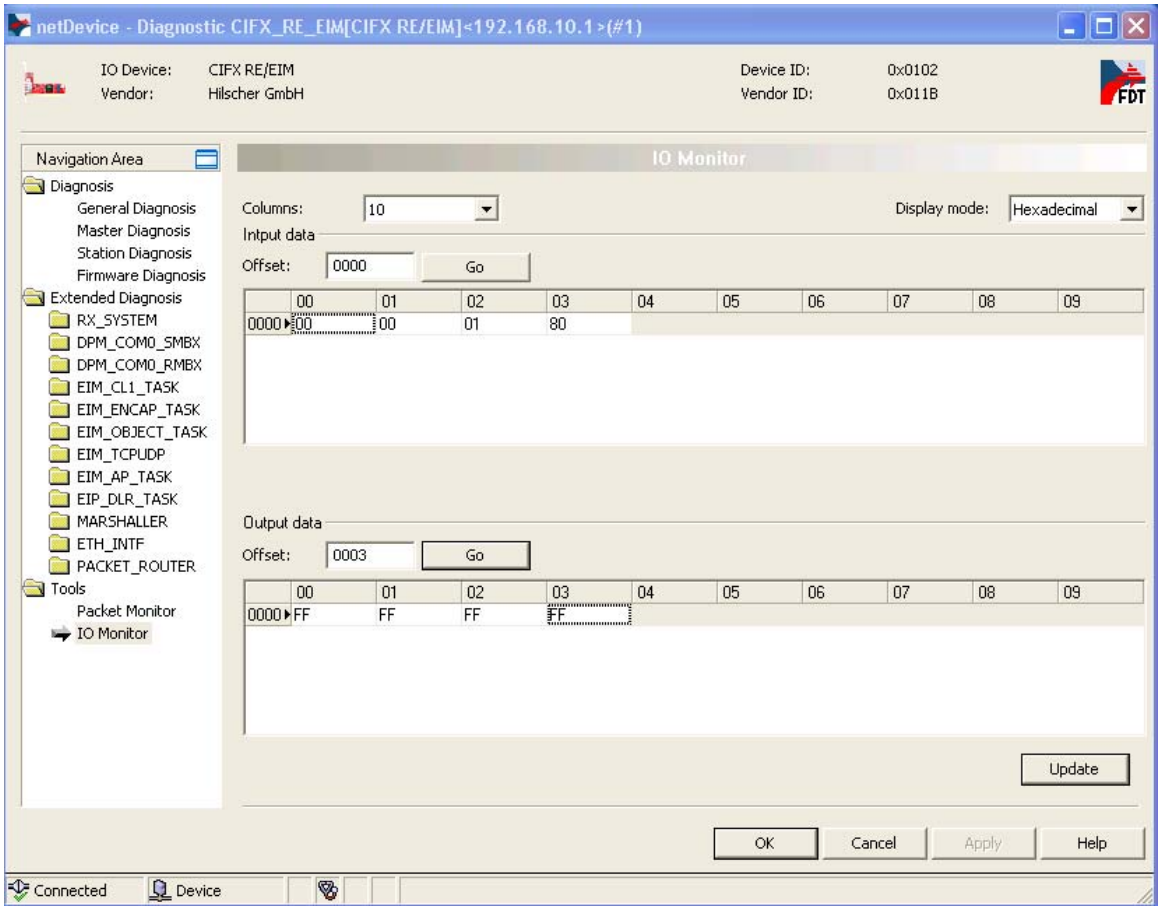


3. Use IO Monitor to test the communication.

➢ In the **Navigation Area**, choose **Tools** > **IO Monitor**.

➢ Enter output data, then click **Update** button.

The input data area displays the received input data.



Diagnosis and testing with cifX Test

4. Start cifX Test auxiliary tool.

➢ In Windows, choose **Start** > **Control Panel** > **cifX Test**.

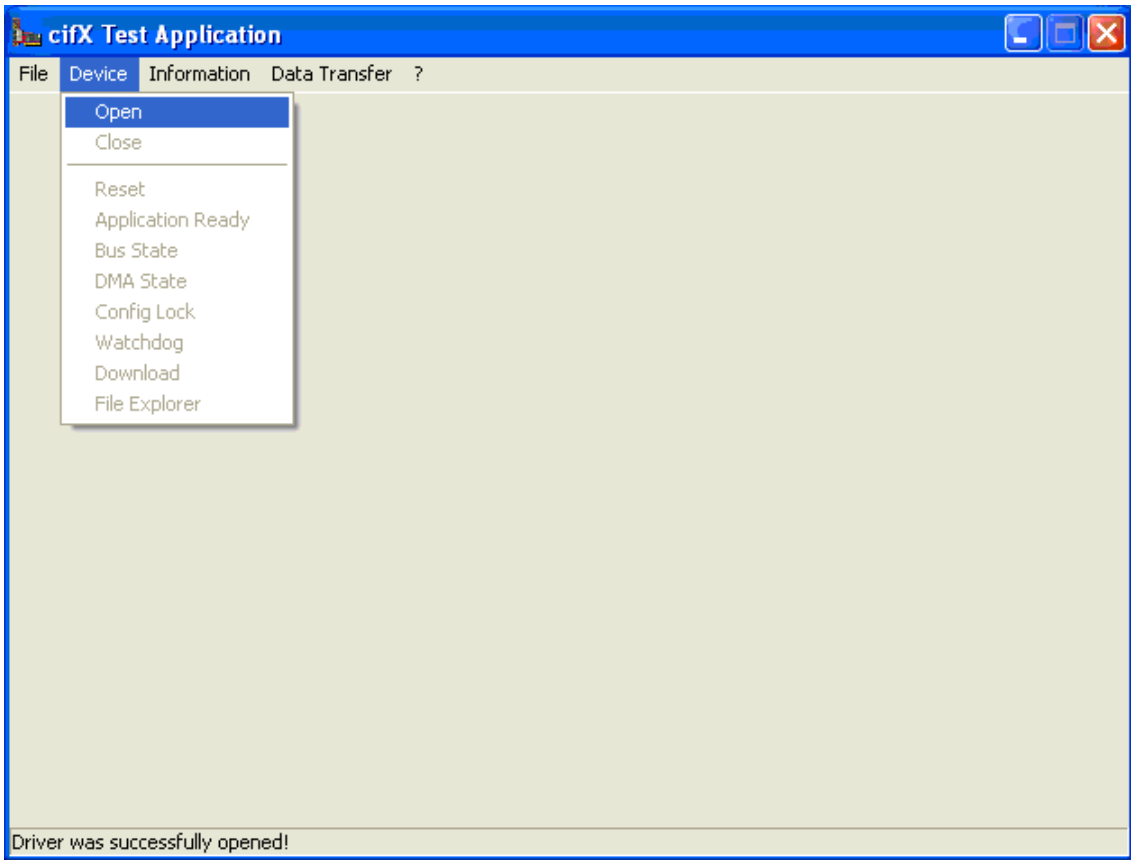
5. Establish connection to Hilscher device.

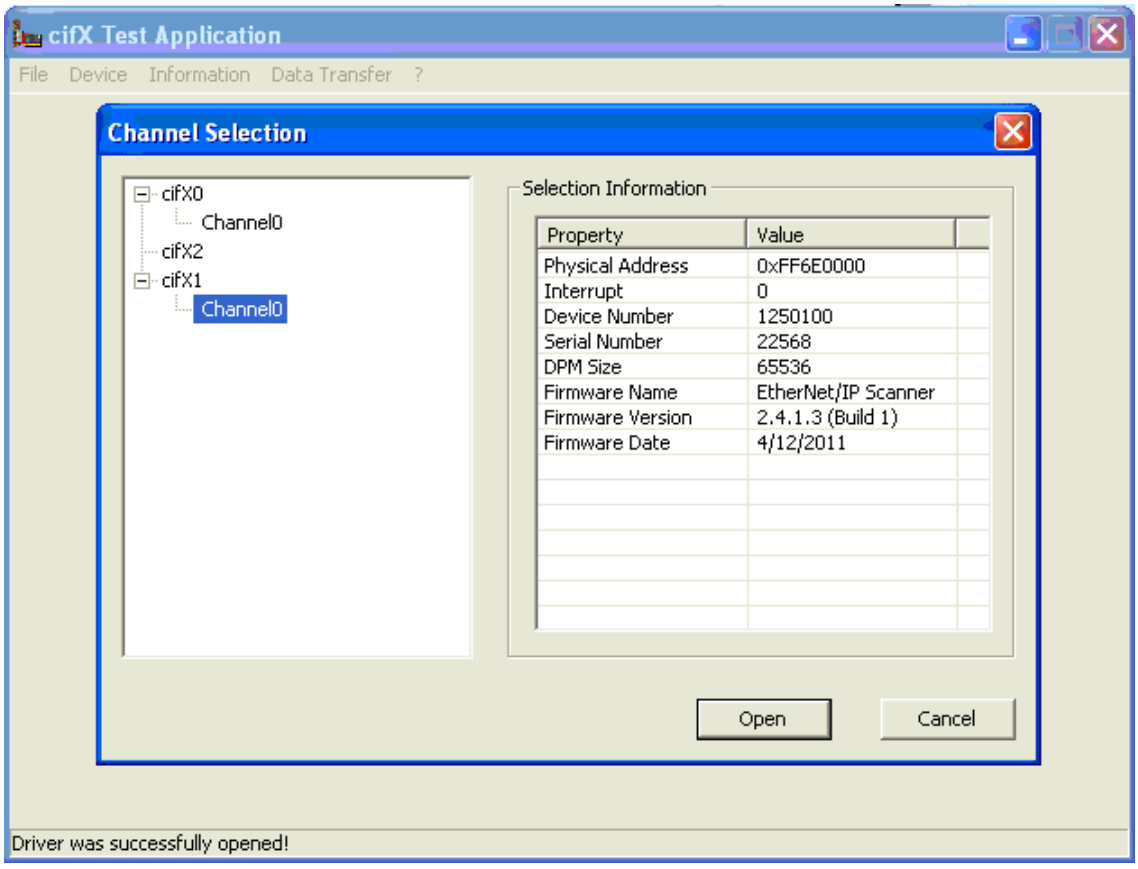
➢ In the menu, choose **Device** > **Open**.

➢ Select **cifX** > **Channel0**.

Note: If you open the cifX level, you can see and use all functions concerning the PC card, e. g. licenses.

If you open **cifX** > **Channel0**, you can see and use all functions concerning the communication channel, e. g. I/O data.





6. I/O data exchange.

➢ In the menu, choose **Data Transfer** > **I/O Data**.

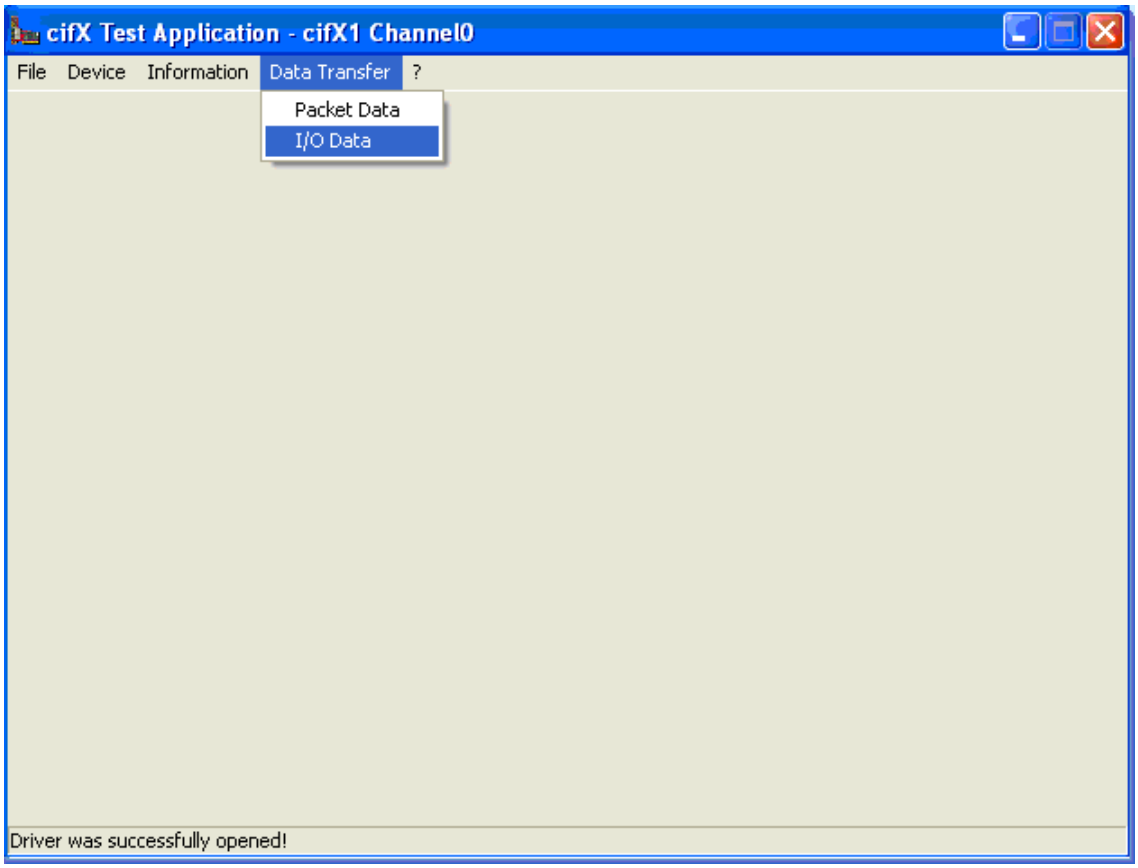
➢ Set output data, then click **Update**,
e. g. FF FF FF FF.

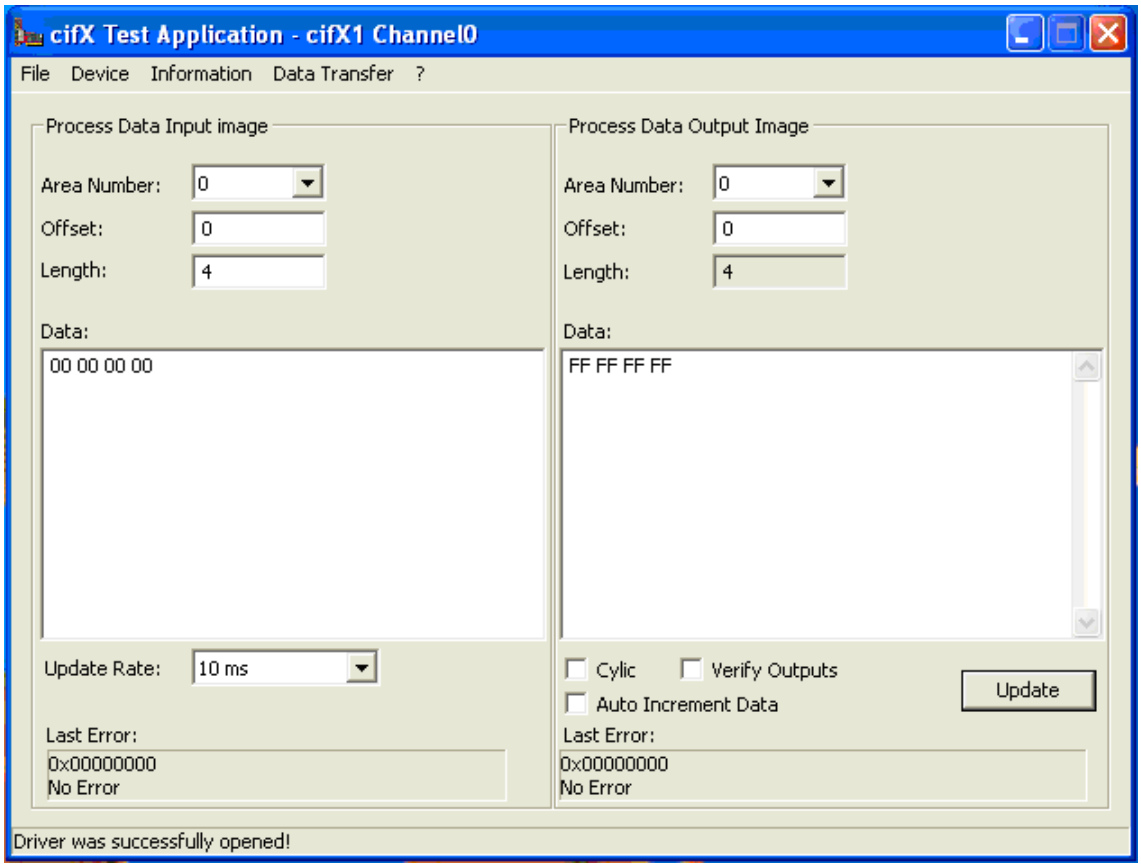
➢ Data is transferred to the NXIO 50-RE and displayed by LED.

➢ Enter the length of the input data to be displayed in the cifX Test auxiliary tool, e. g. “4”.

➢ Use the buttons on the NXIO 50-RE device to create new data, then watch the incoming data in the cifX Test auxiliary tool.

Note: Observe the data length. It must comply with the configuration.
With the output data, you can use **cyclic** and **auto increment**.





4.2 Setup 2: CIFX 50-RE Added as Second Slave

The following steps describe – on the basis of Setup 1 – how to integrate a CIFX 50-RE as second slave into the setup.

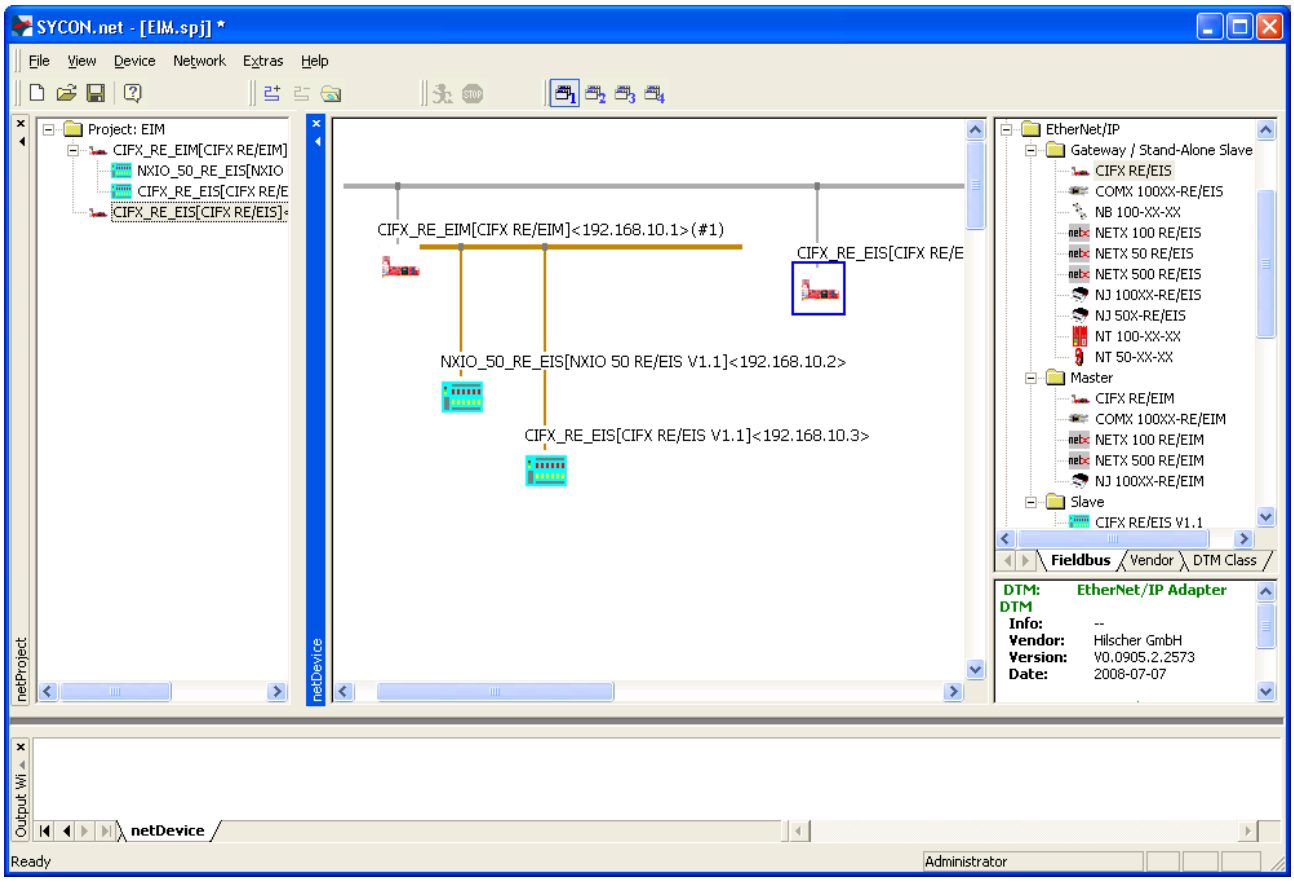
4.2.1 Set Up Network

1. Add EtherNet/IP Adapter device to network.

➢ Select a **CIFX RE/EIS** from the **Device Catalog** (**Slave**) and drag and drop it onto the EtherNet/IP network line.

2. cifX RE/EIS is a full-scale EtherNet/IP Adapter device, thus the corresponding Stand-Alone Slave has to be positioned in the network.

➢ Select a **CIFX RE/EIS** from the **Device Catalog** (**Gateway/Stand-Alone-Slave**) and drag and drop it onto the upper line.



4.2.2 Assign Hardware and Load Firmware

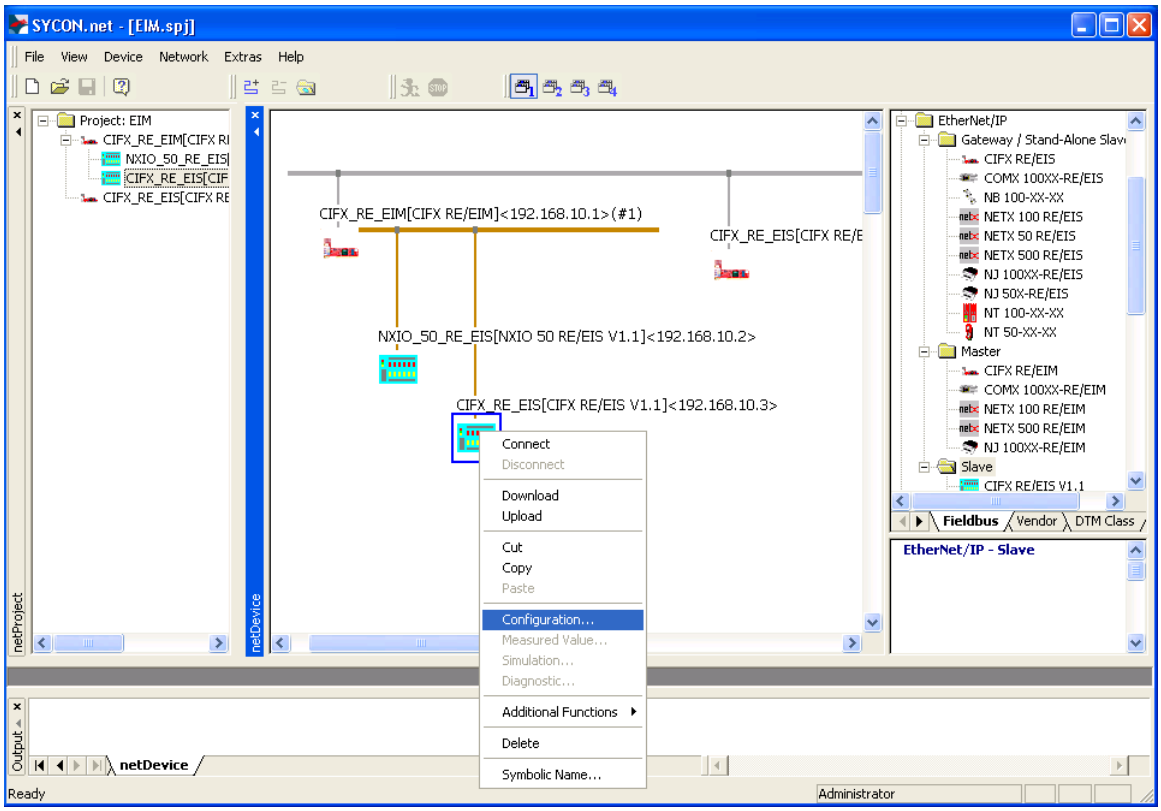
Note: Hardware assignment and firmware download for the master CIFX RE/EIM have already been carried out during configuration of Setup 1.

4.2.3 Configure Slave

Note: Configuration of the NXIO 50-RE has already been carried out during configuration of Setup 1.
What now has to be done, is to configure the second PC card as slave CIFX RE/EIS.

1. Open Configuration window for **CIF RE/EIS** slave.

➢ Right-click on the slave device to open the context menu and choose **Configuration**.



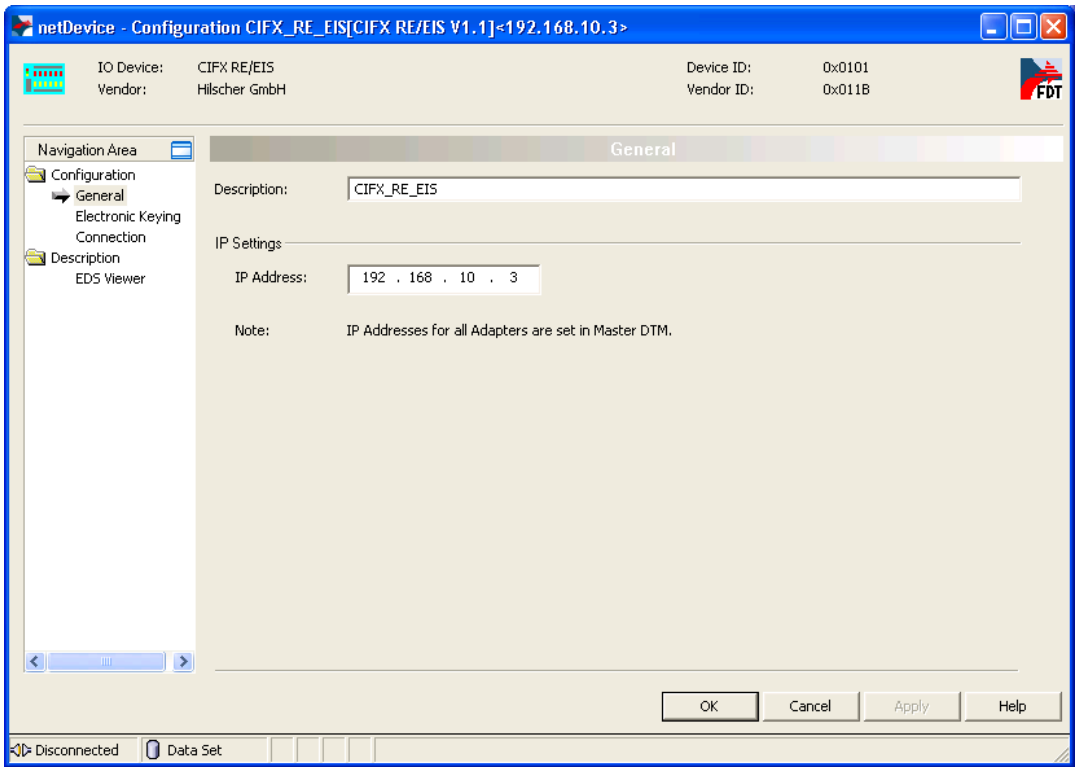
2. Configure address.

➢ **The real IP address of the CIFX RE/EIS is set via Stand-Alone Slave**, e. g. 192.169.19.3.

Note: The IP address of the CIFX RE/EIS in the network configuration, which is displayed under **Configuration** > **General**, can be adjusted via the master.

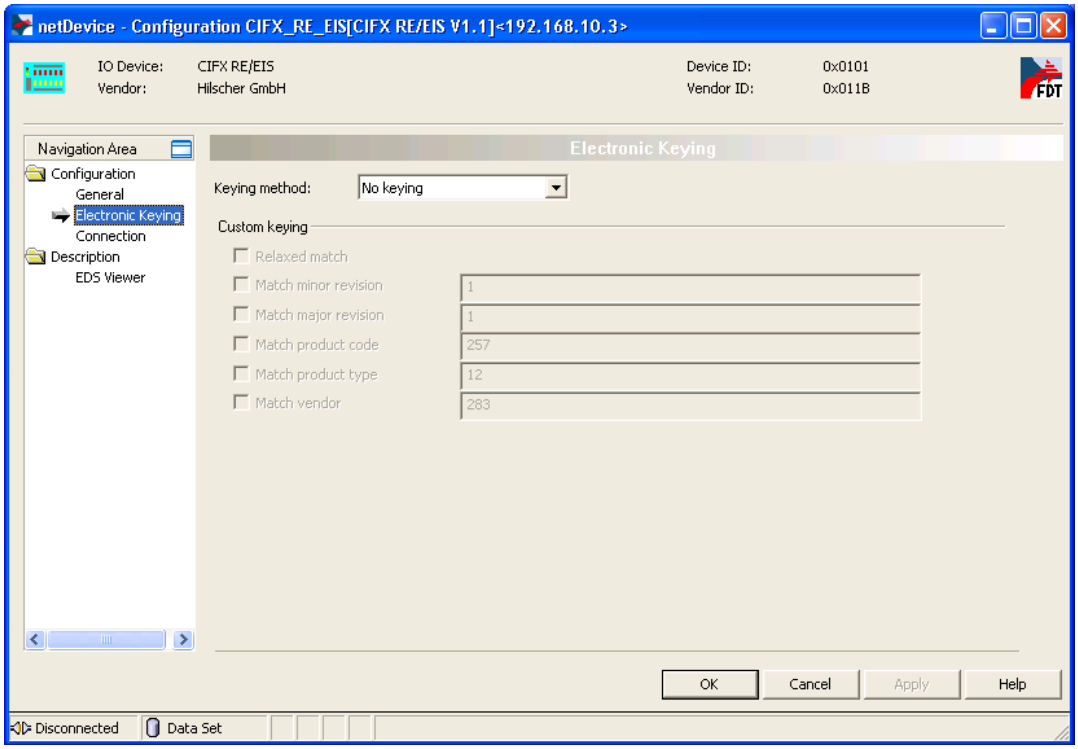
Note: In EtherNet/IP, unequivocal addressing takes place via the IP address. The IP address can either be set permanently by the user or can be received from a DHCP server.

Note: The real IP addresses of Hilscher slaves are set via Stand-Alone Slave or by using the Ethernet Device Configuration tool.



Configure Keying.

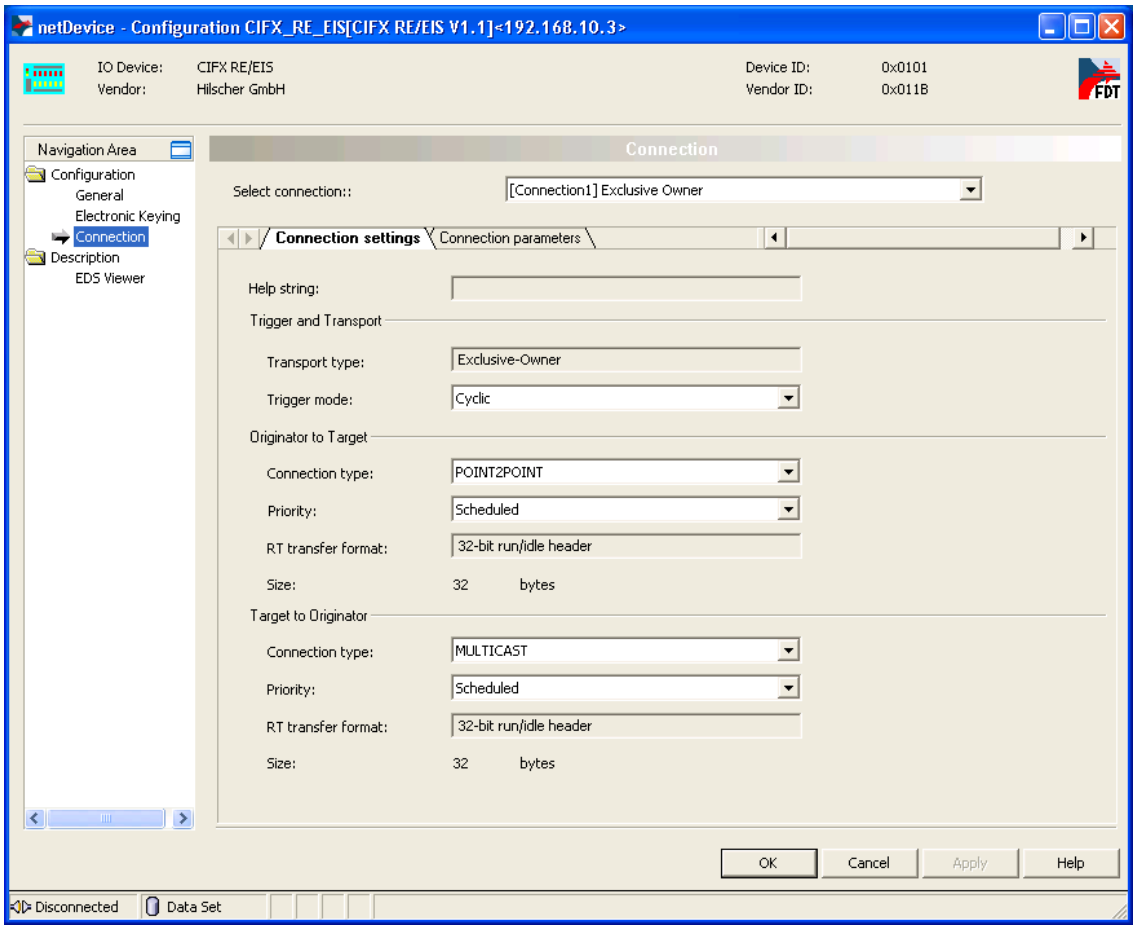
➢ In the **Navigation Area**, choose **Configuration** > **Electronic Keying**, then select Keying Method or disable Keying.

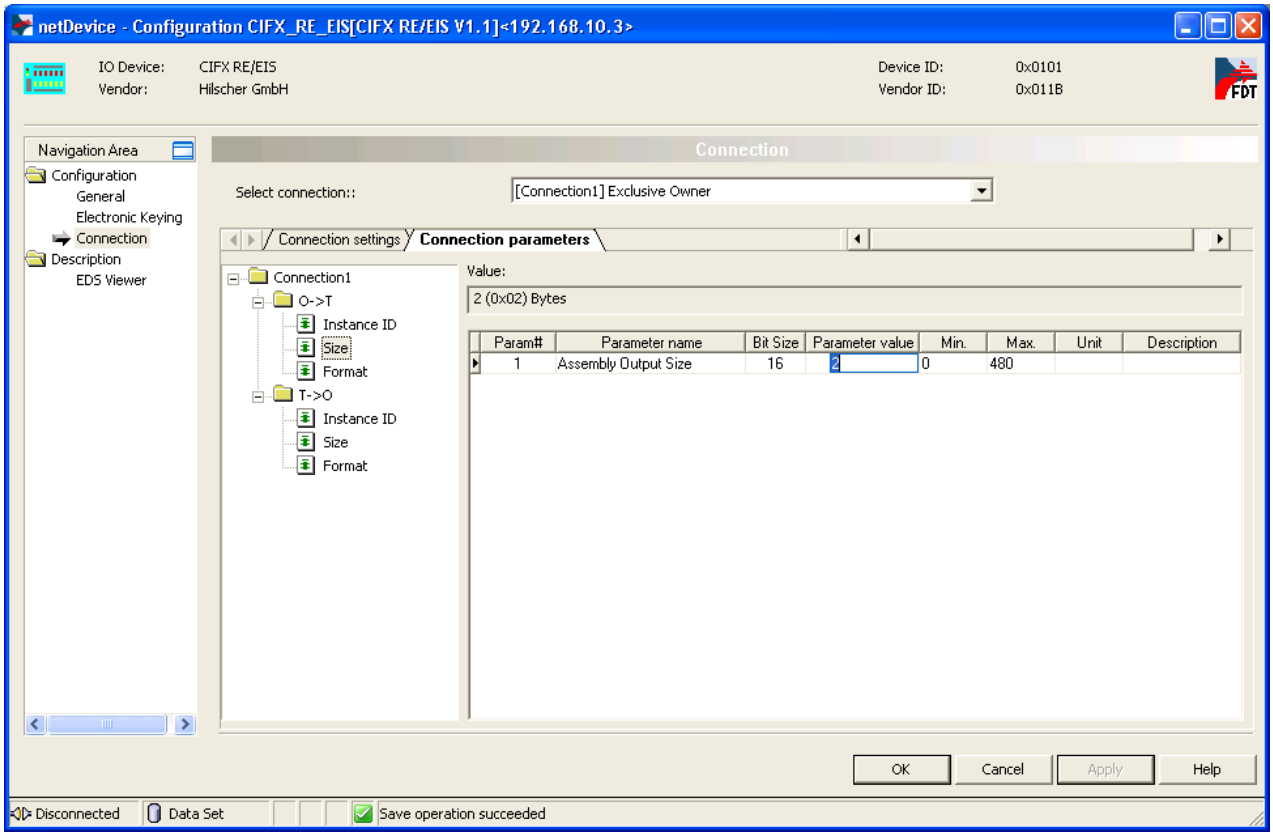


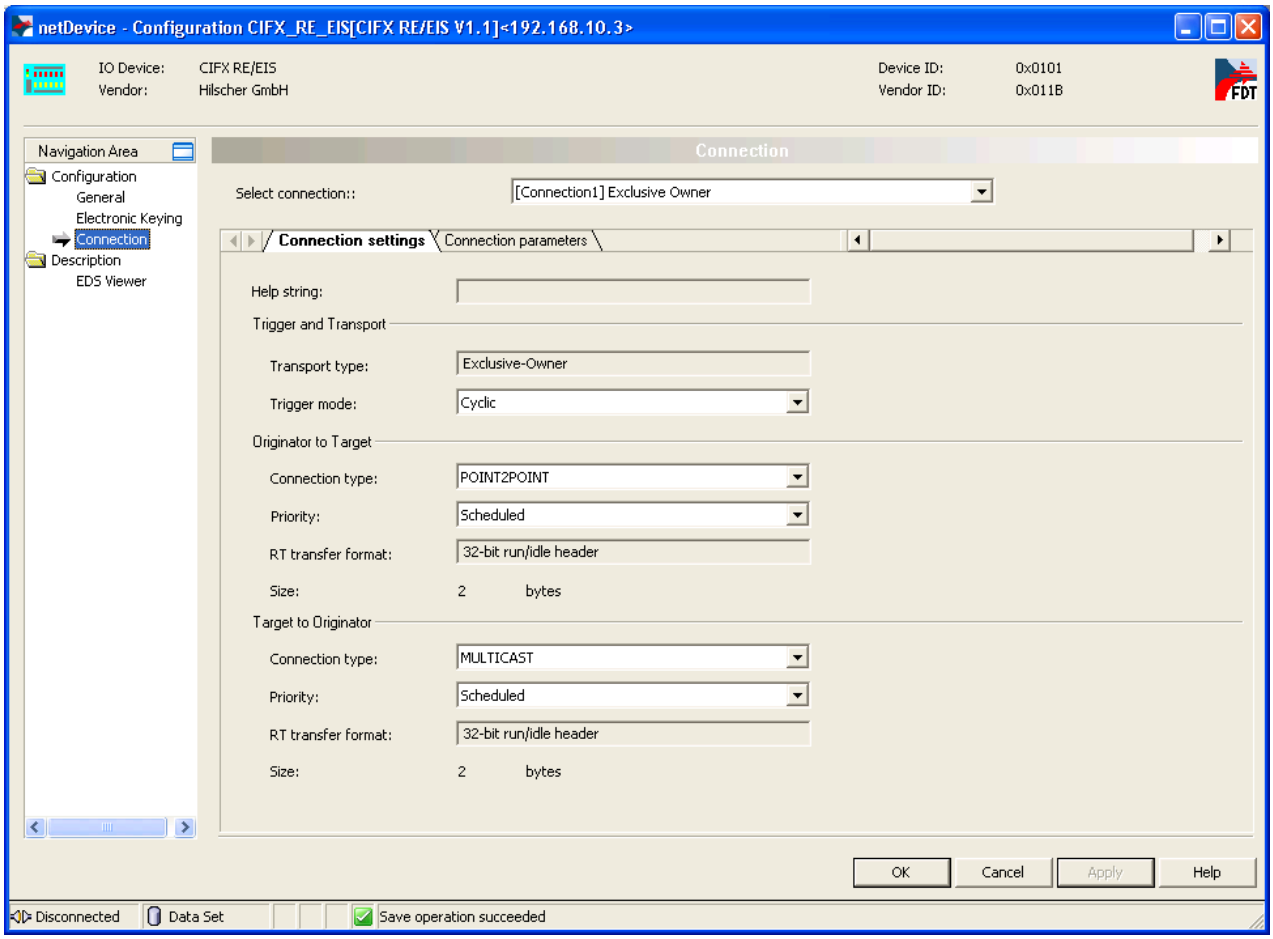
3. Configure I/O Data.

   I/O data for the CIFX RE/EIS can be freely configured, there are no pre-settings.

➢ In the **Navigation Area**, choose **Configuration** > **Connection**, then configure connections and I/O data for CIFX RE/EIS.



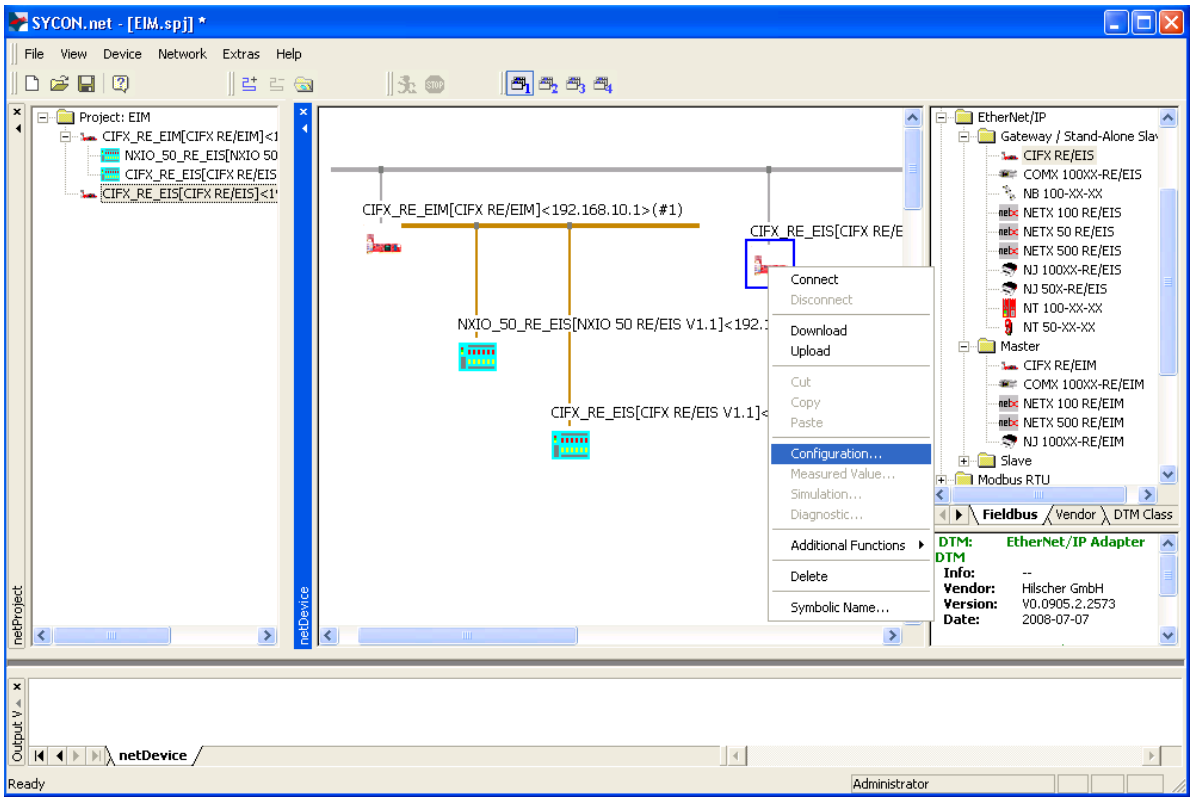




4.2.4 Configure Hilscher Stand-Alone Slave

1. Open Configuration window for **CIFX RE/EIS** slave.

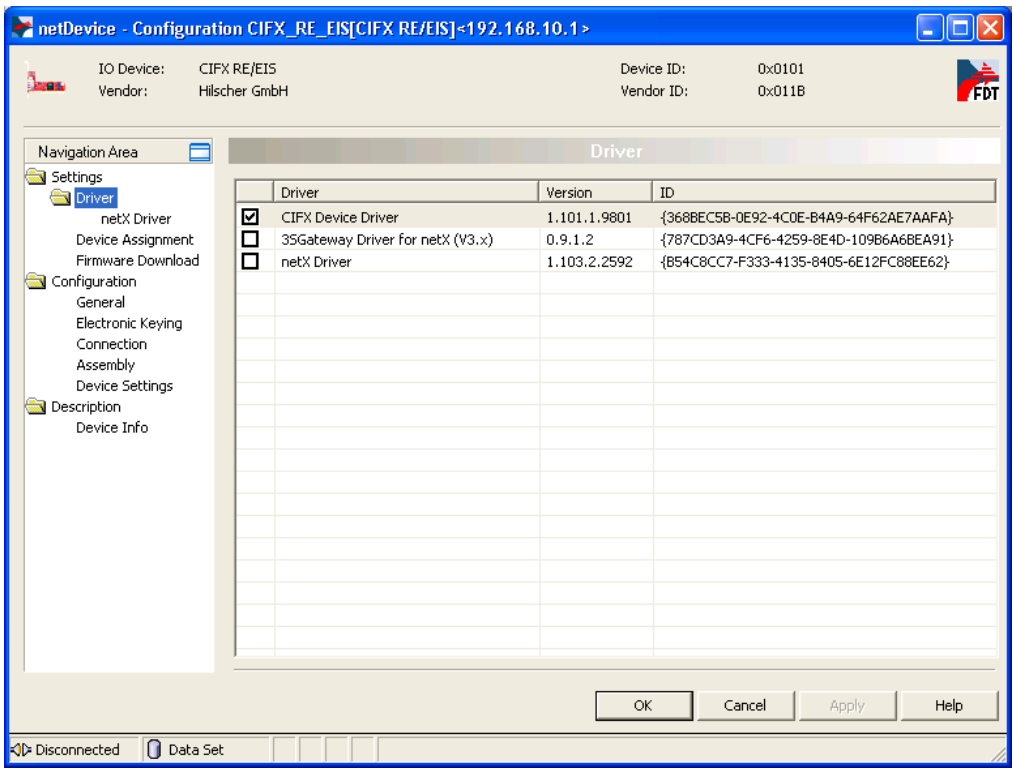
➢ Right-click on the slave device to open the context menu and choose **Configuration…**



2. Select driver for accessing the slave device.

➢ In the **Navigation Area**, choose **Settings** > **Driver** and select the appropriate driver.

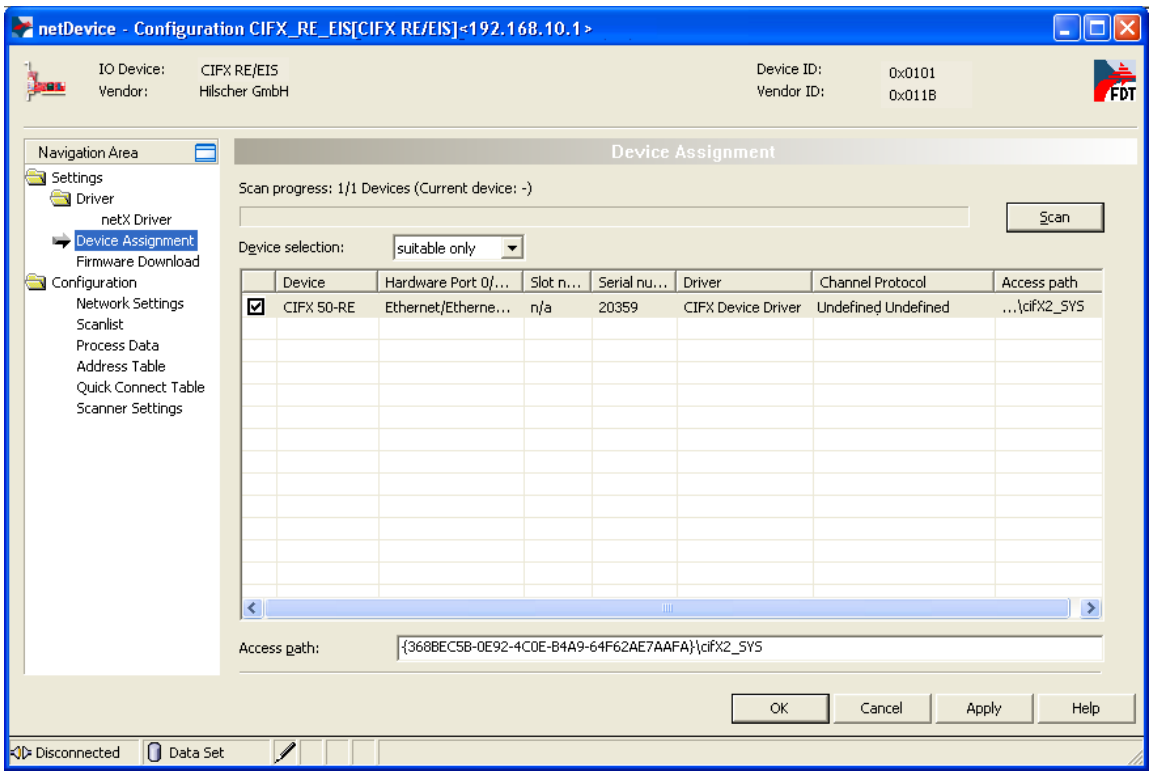
In case of access via RS-232, USB or TCP/IP – i. e. via netX Driver – additional configurations are possible under **Settings** > **Driver** > **netX Driver**.



3. Scan for connected hardware and assign device.

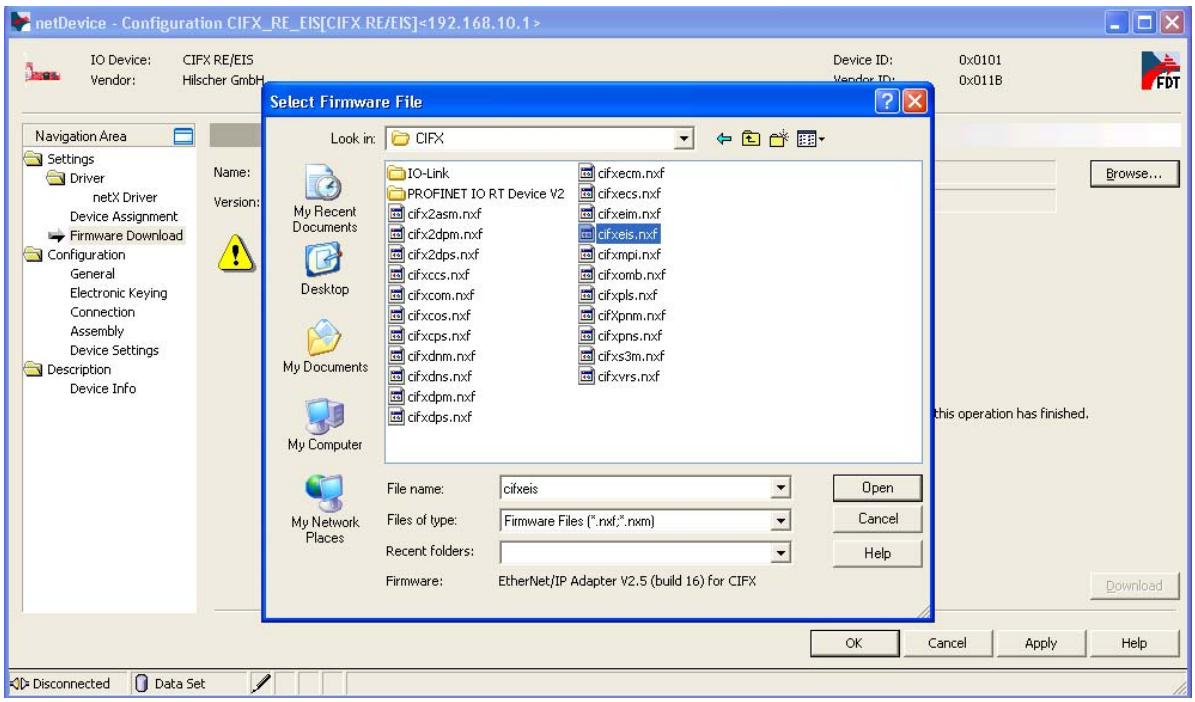
➢ In the **Navigation Area**, choose **Settings** > **Device Assignment** and scan for available Hilscher devices. Click **Scan** button.

➢ Choose the **CIFX 50-RE** by activating the check box ☑.



4. In case of PC cards: Select and load firmware.

- In the **Navigation Area**, choose **Settings** > **Firmware Download**, then select the appropriate firmware: **cifxeis.nxf**.
- Click **Open** button to load firmware into the hardware.

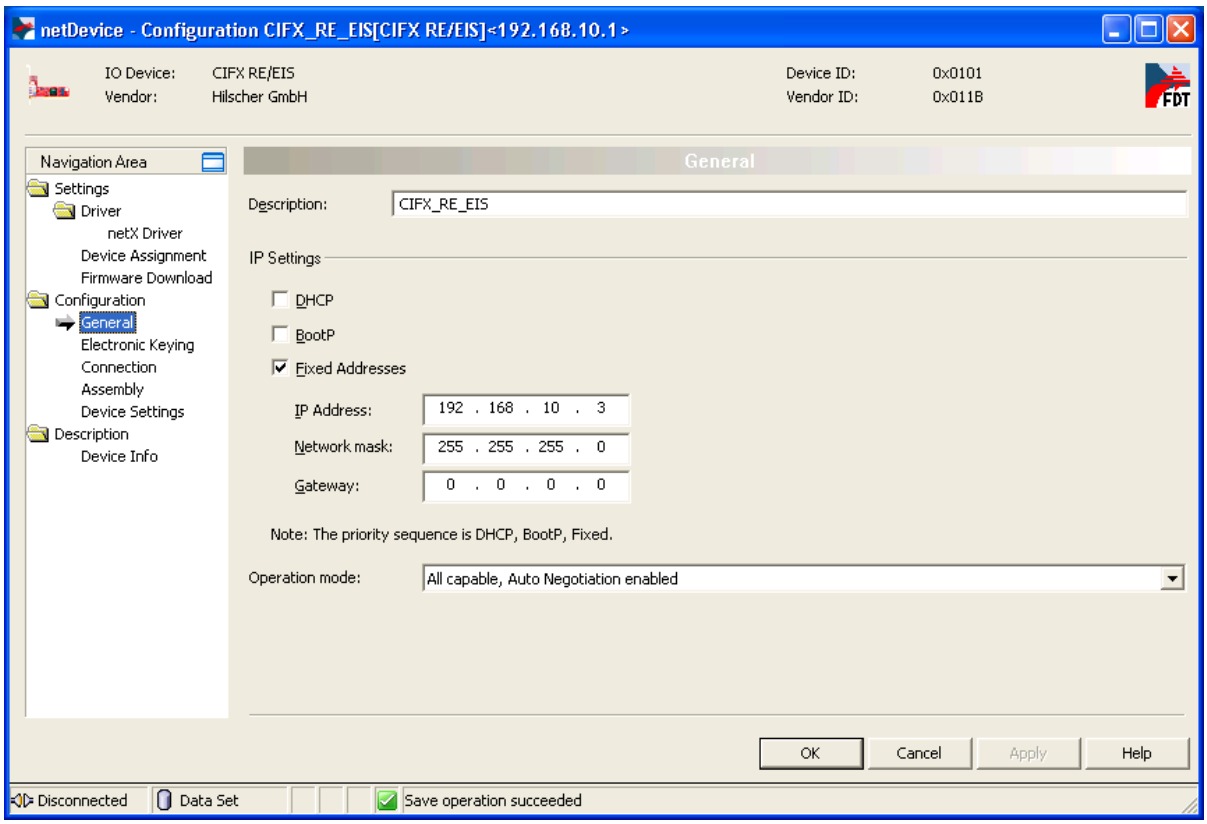


Note: Click **OK** to finally confirm the assignment of the PC card and the download of the firmware.

5. Configure slave settings.

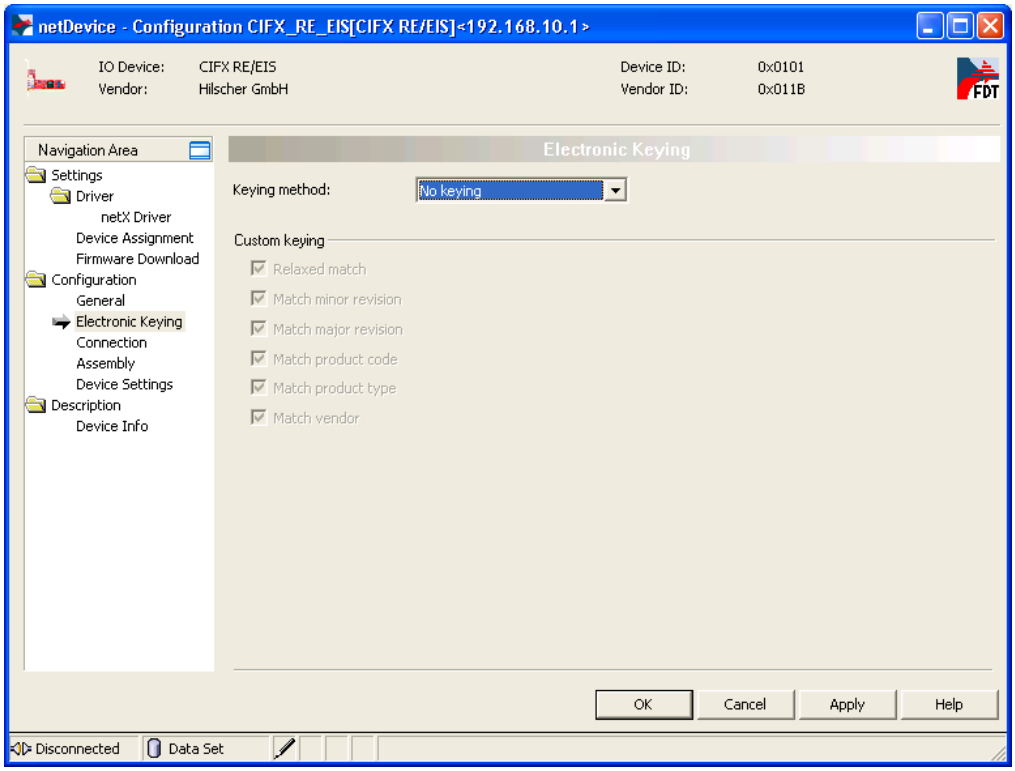
➢ In the **Navigation Area**, choose **Configuration** > **General**, then set the real IP address of the slave device.

The address must match the slave station name and the network configuration.



Configure Keying.

➢ In the **Navigation Area**, choose **Configuration** > **Electronic Keying**, then select Keying Method or disable Keying.



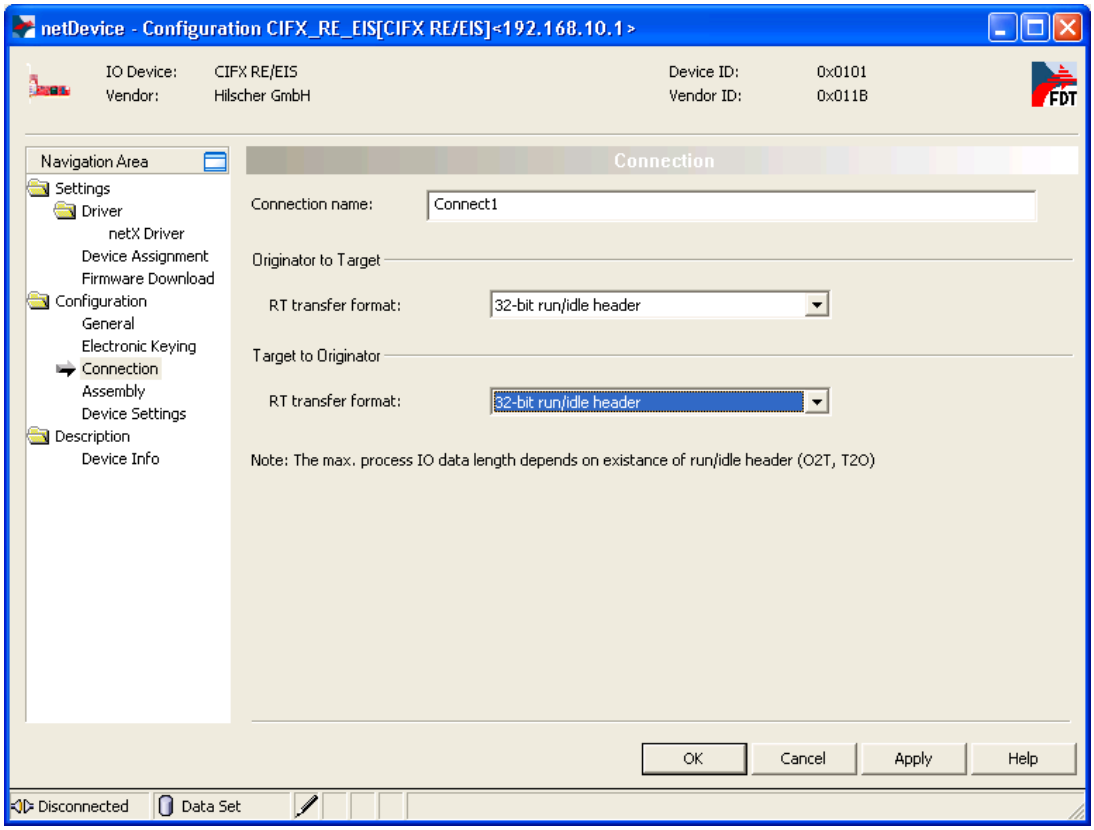
3. Configure I/O Data.

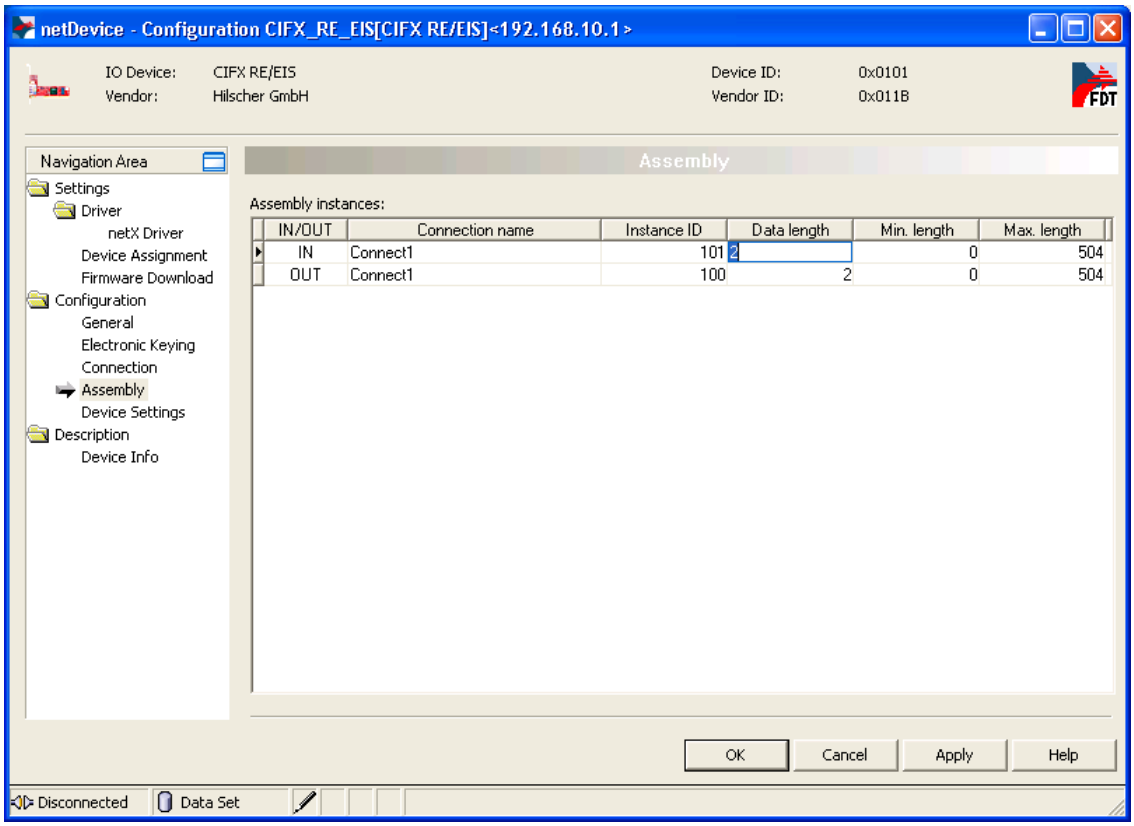
➢ In the **Navigation Area**, choose **Configuration** > **Connection**, then set the wanted connection (e. g. 32-bit run/idle header).

➢ I/O data for the CIFX RE/EIS can be freely configured, there are no pre-settings.

In the **Navigation Area**, choose **Configuration** > **Assembly**, then set the wanted I/O data, e. g. 2 byte input and 2 byte output.

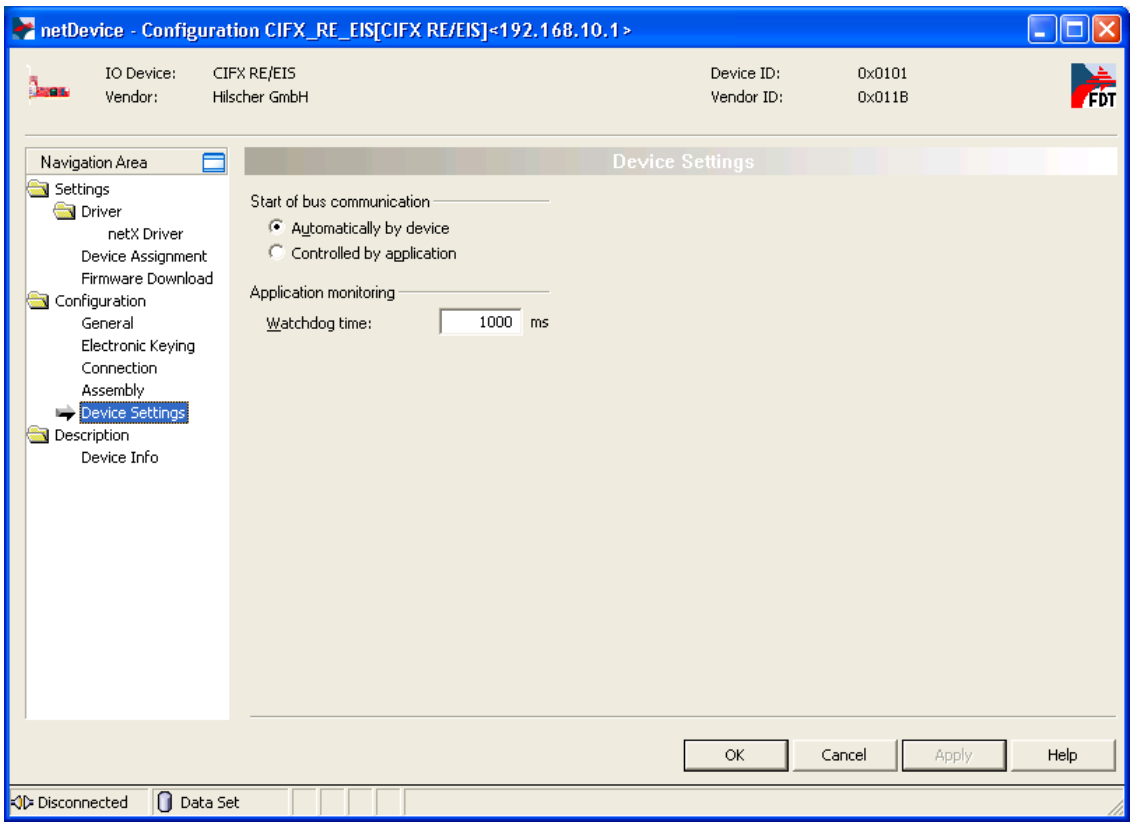
Make sure that these match the slave I/O data of the network configuration.





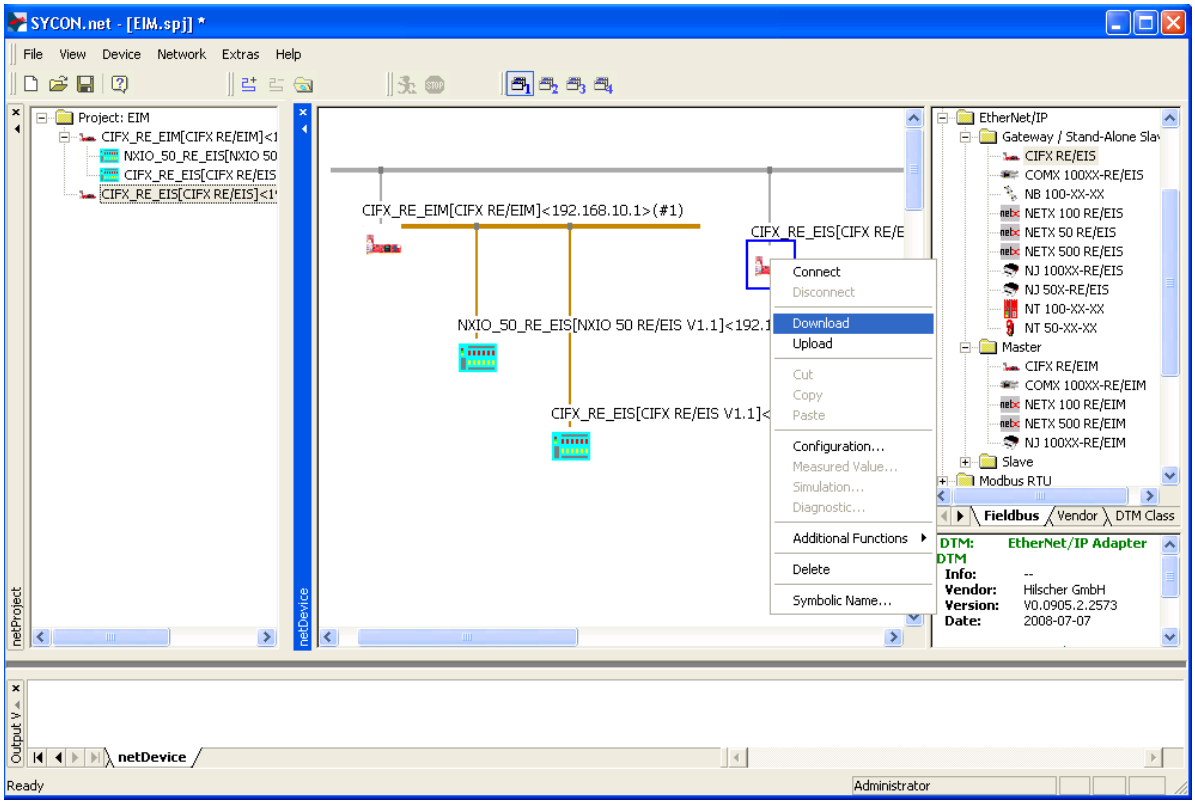
4. Configure device settings.

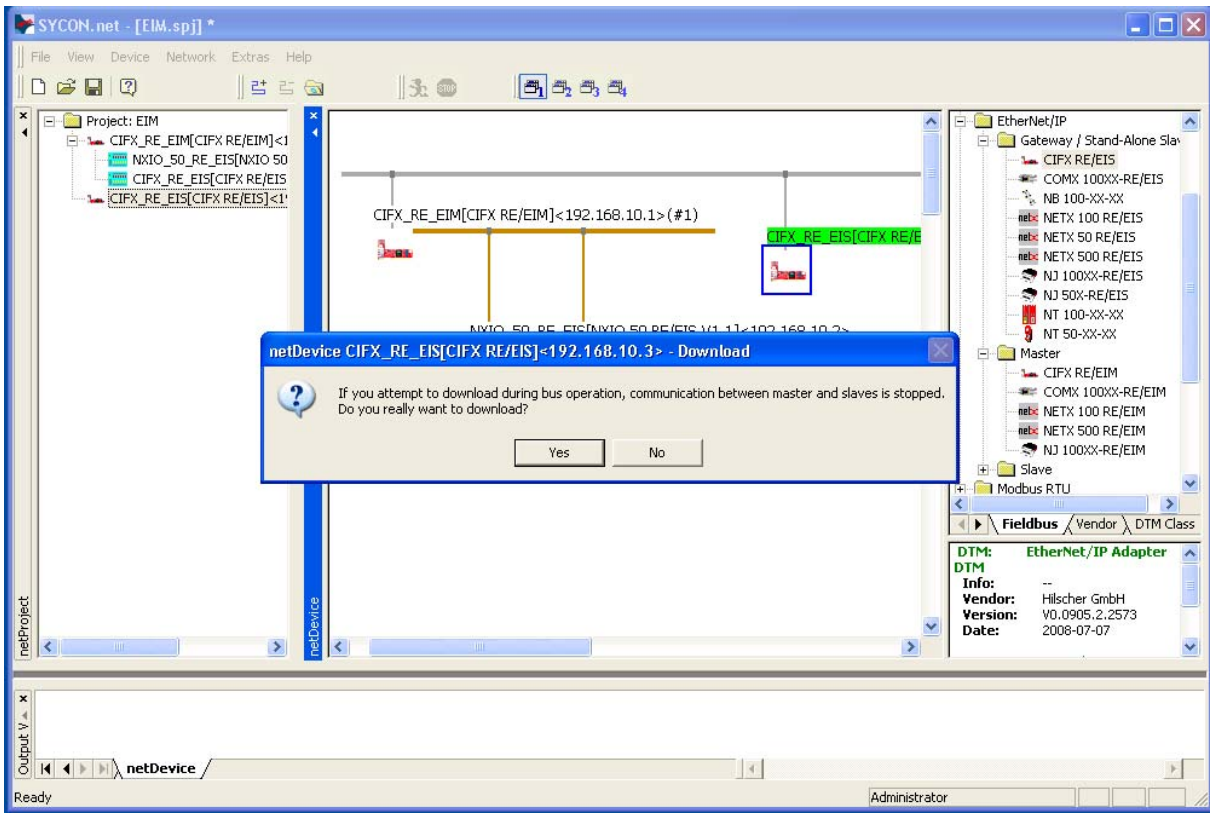
➢ Under **Configuration** > **Device Settings**, use the default settings.

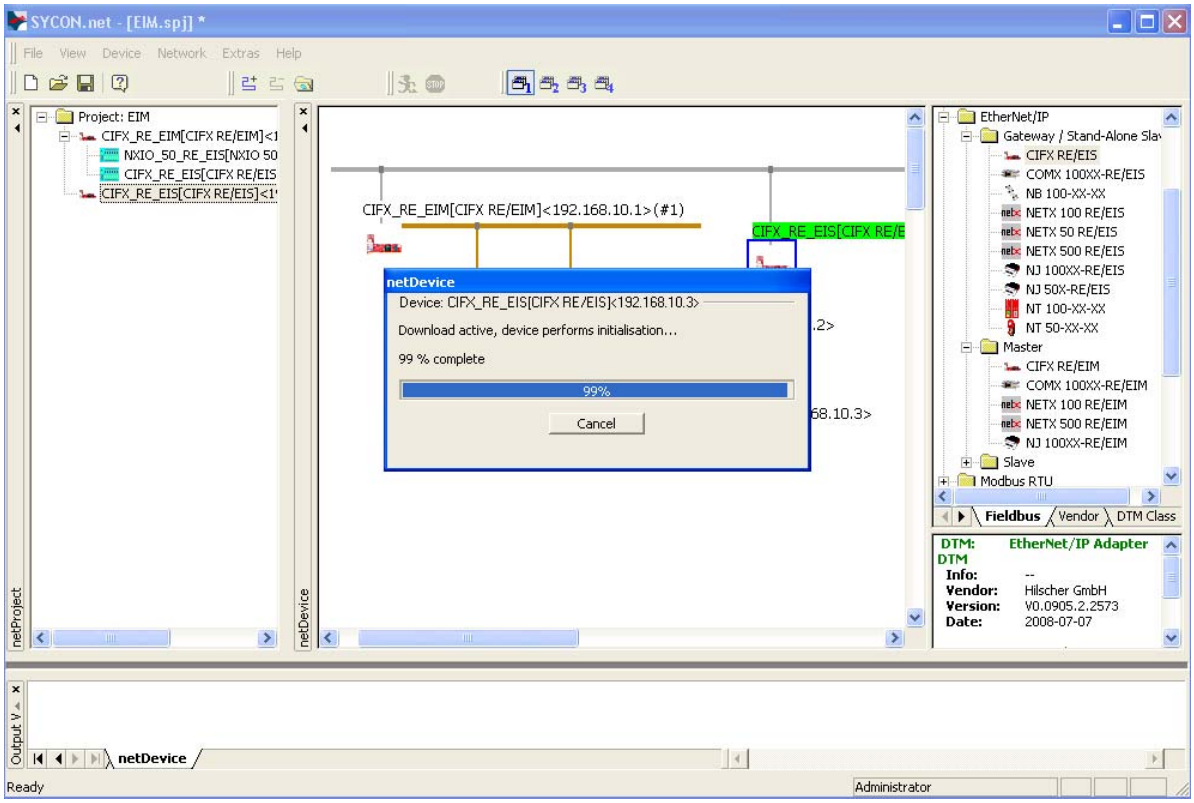


5. Download configuration to Stand-Alone Slave

➢ Right-click on the Stand-Alone Slave device to open the context menu, then choose **Download**.







4.2.5 Configure Master

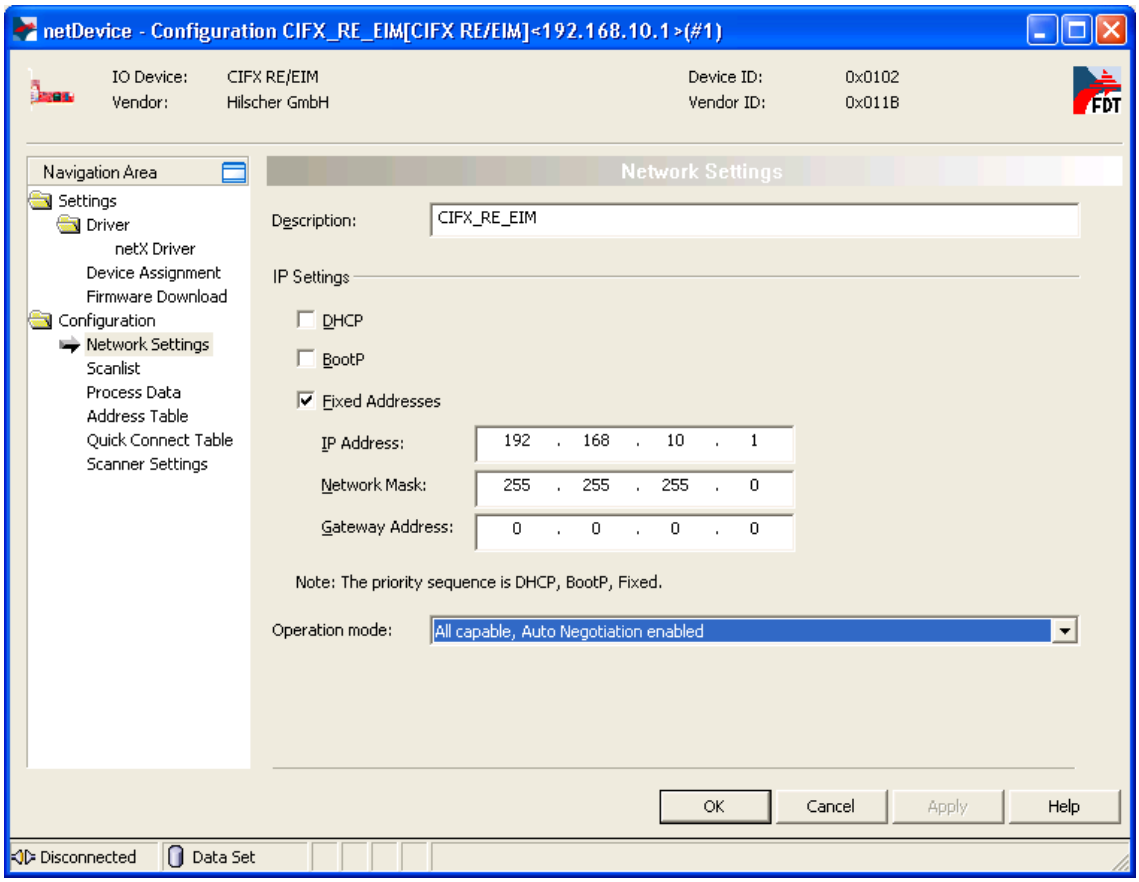
Note: The basic configuration of the CIFX RE/EIM and the NXIO 50-RE has already been carried out during configuration of Setup 1: CIFX 50-RE with NXIO 50-RE.

1. Open Configuration window for **CIFX RE/EIM** master.

➢ Right-click on the master device to open the context menu, then choose **Configuration…**

2. Configure Scanner.

➢ In the **Navigation Area**, choose **Configuration** > **Network Settings**, then set the IP addressing.

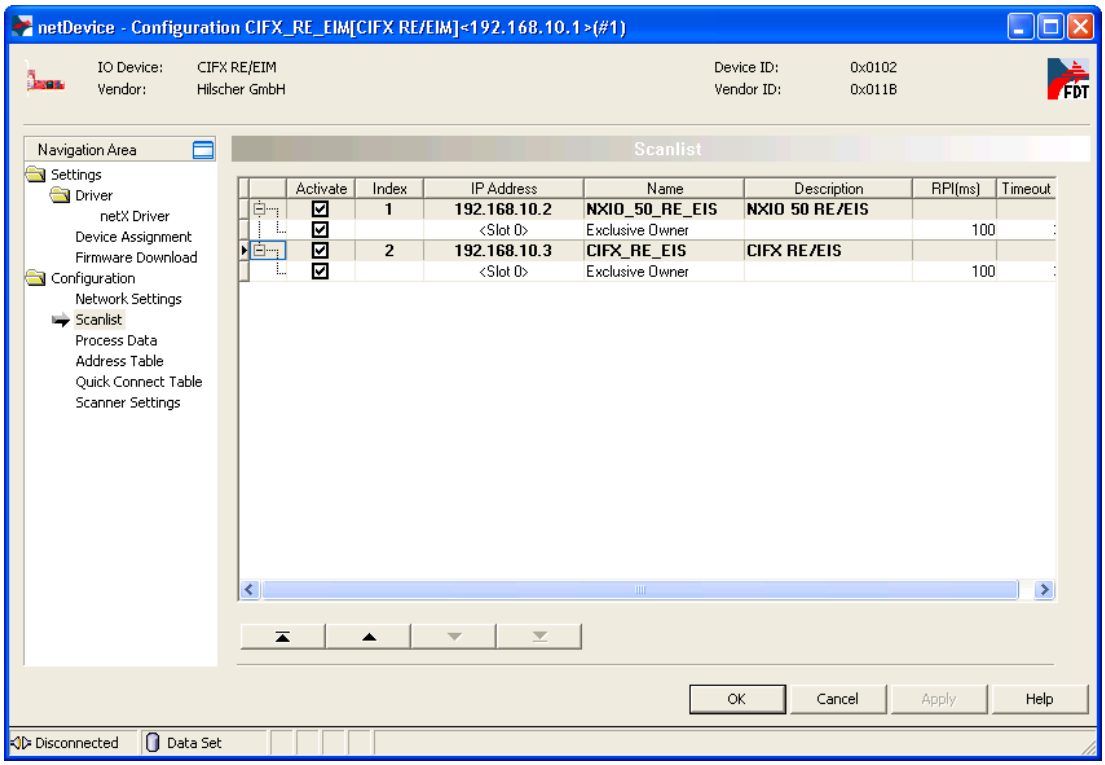


3. Configure IP address of slave.

➢ In the **Navigation Area**, choose **Configuration** > **Scanlist**, then set the IP address of the slave.

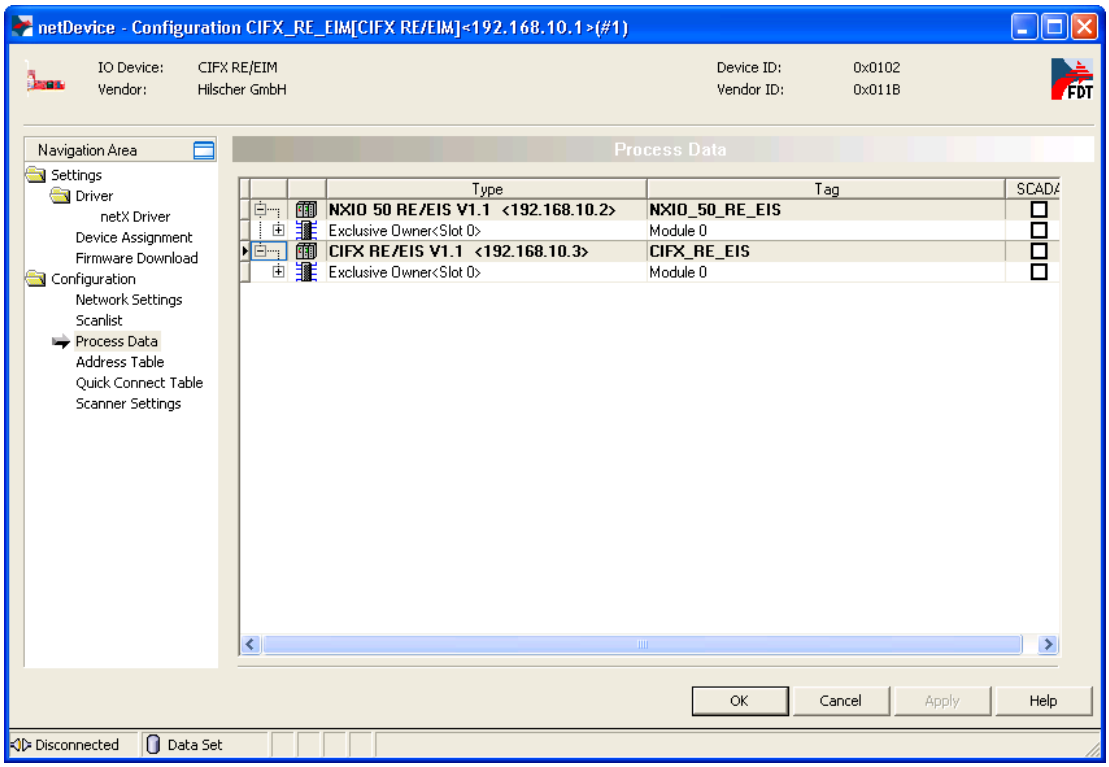
➢ In the **Scanlist** window, activate the slaves with which the master shall communicate.

Note: The IP address of the slave must be identical with the set real IP address. The NXIO 50-RE can receive its address either from a DHCP server (rotary switch at NXIO) or it can be set by using the Ethernet Device Configuration tool.

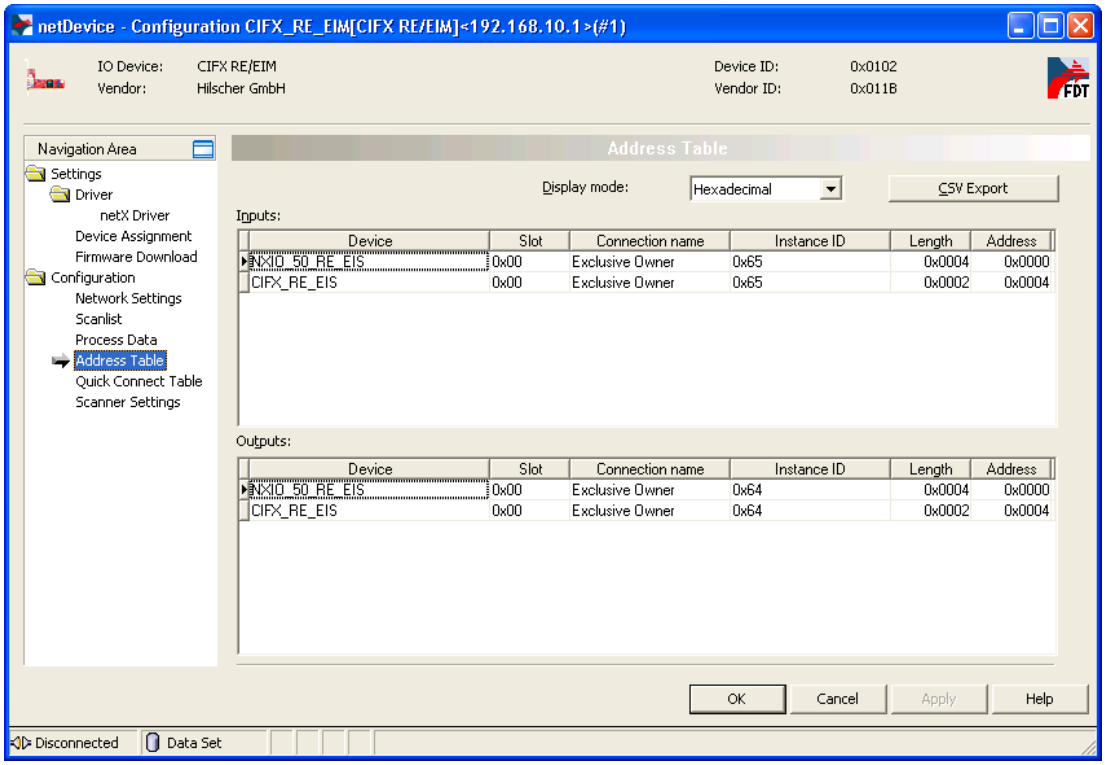


4. Configure I/O data.

➢ In the **Navigation Area**, choose **Configuration** > **Process Data** to display the mapping of the input and output data.

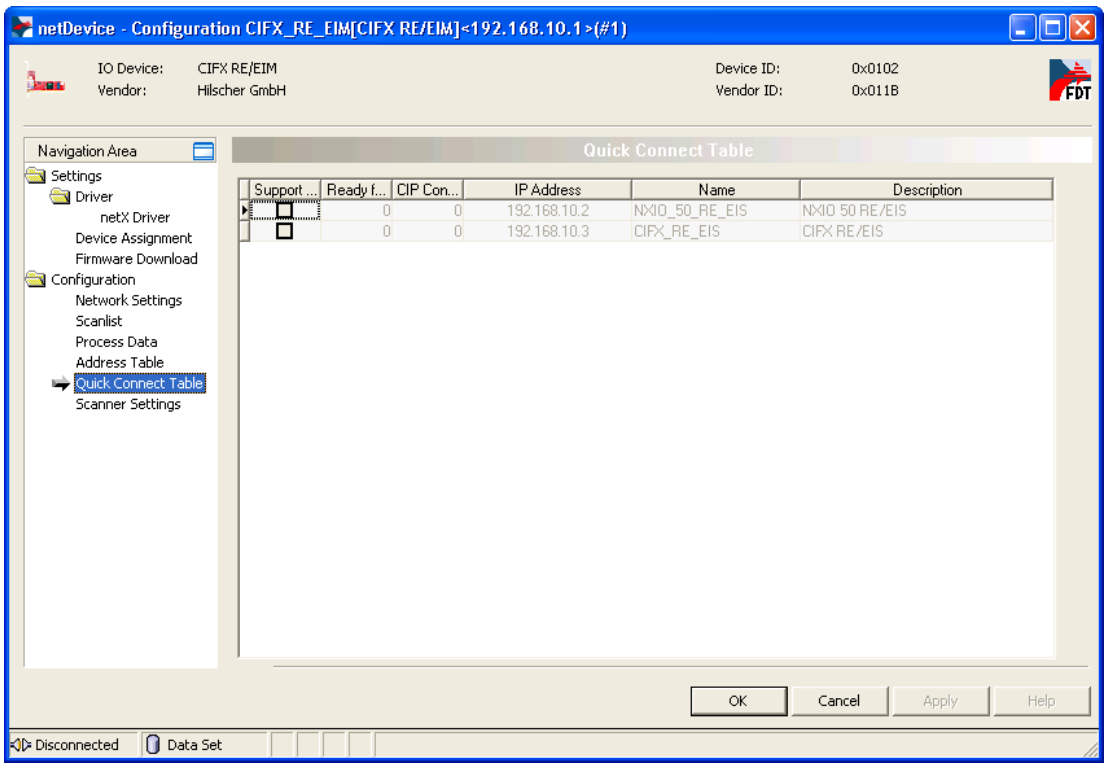


➢ In the **Navigation Area**, choose **Configuration** > **Address Table** to display the length and instance of the input and output data.



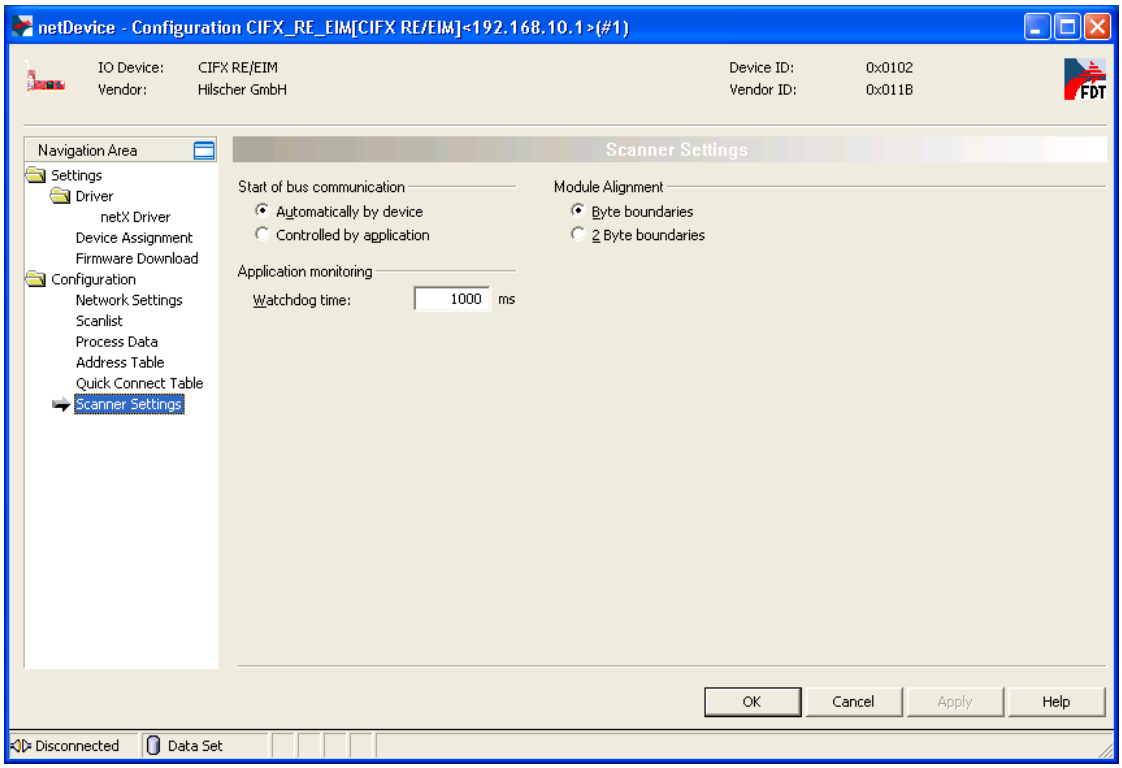
5. Configure Quick Connect.

➢ Under **Configuration** > **Quick Connect Table**, there are no settings to be made.



6. Configure master settings.

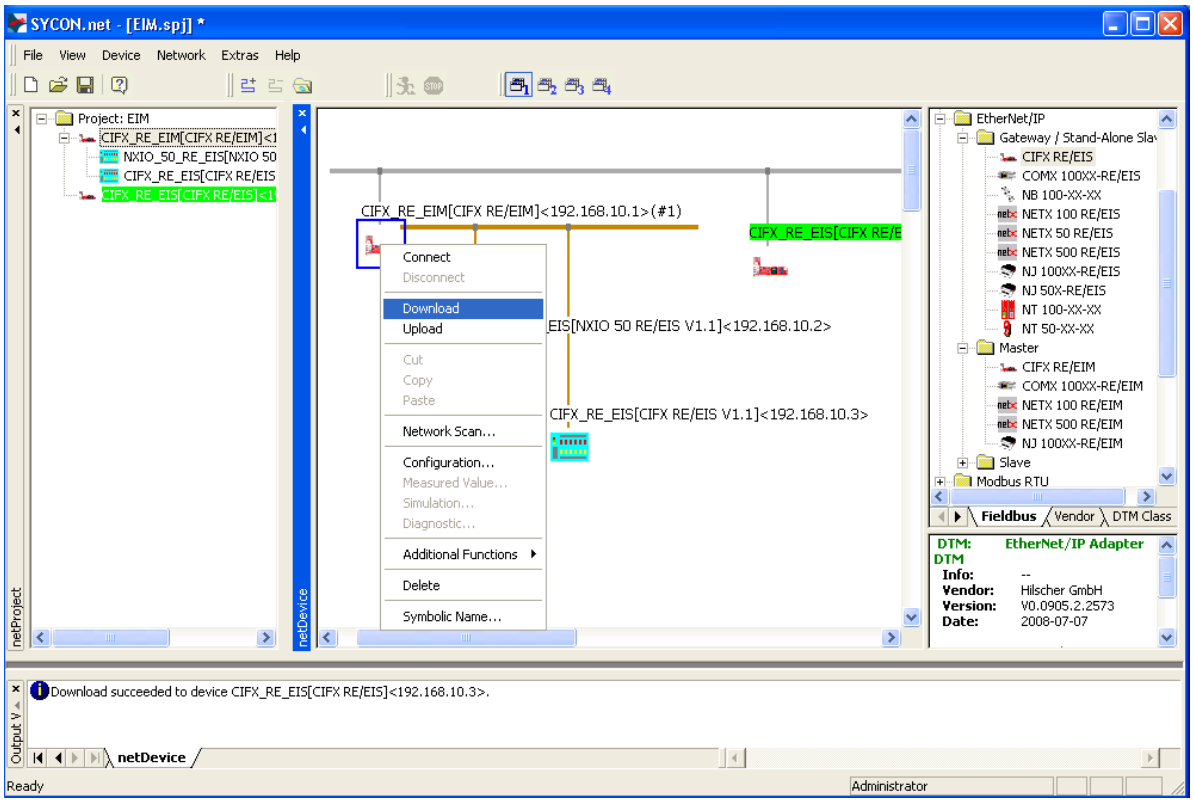
➢ Under **Configuration > Scanner Settings**, use the default-settings.



7. Download configuration to master.

➢ Right-click on the master device to open the context menu, then choose **Download**.

Note: After downloading the configuration, SYCON.net is connected to the master device for diagnostic purposes. The green highlighted display indicates an active connection to the master.



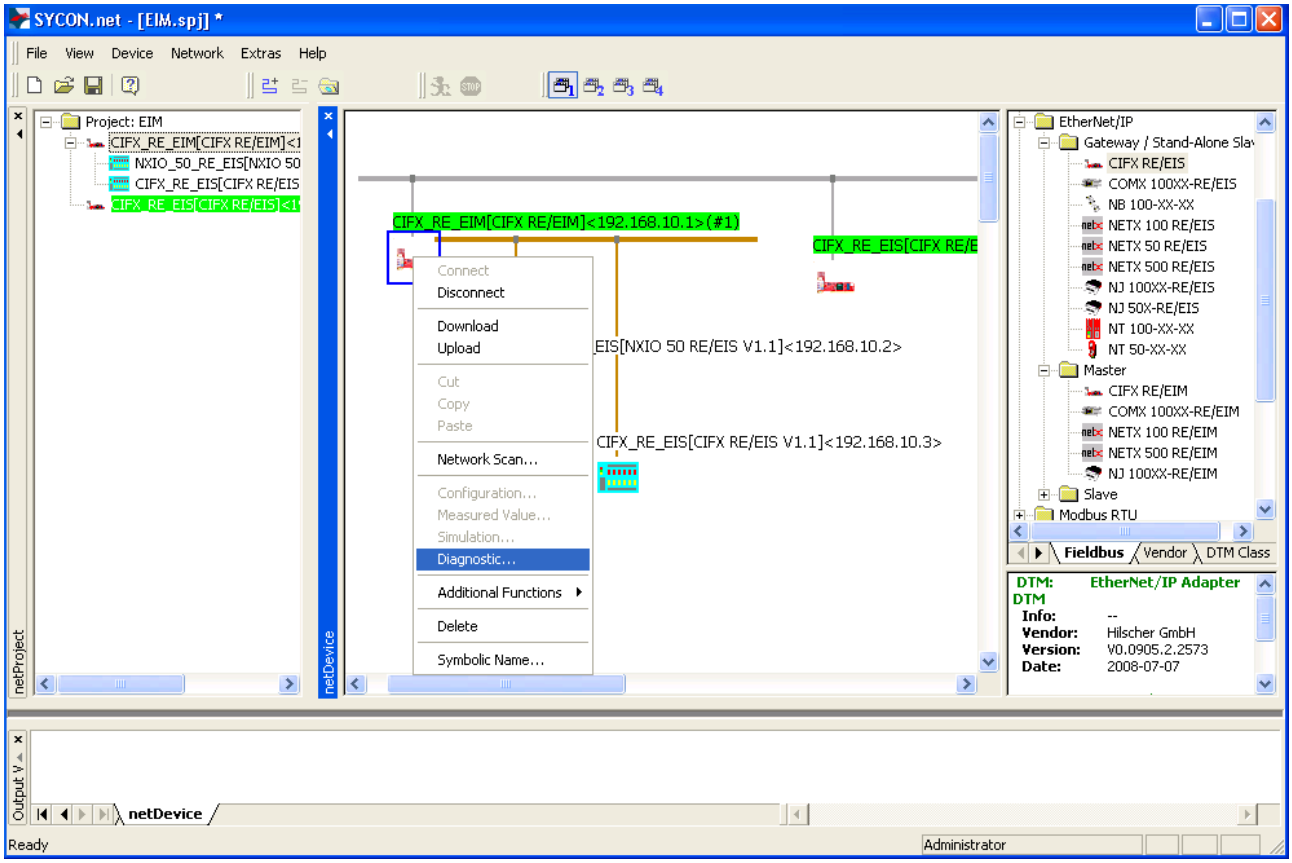
4.2.6 Diagnosis and Testing

Diagnosis and testing with SYCON.net

1. Connect with master and open diagnosis window for **CIFX RE/EIM**.

➢ Right-click on the master device to open the context menu, then choose **Diagnostic…**

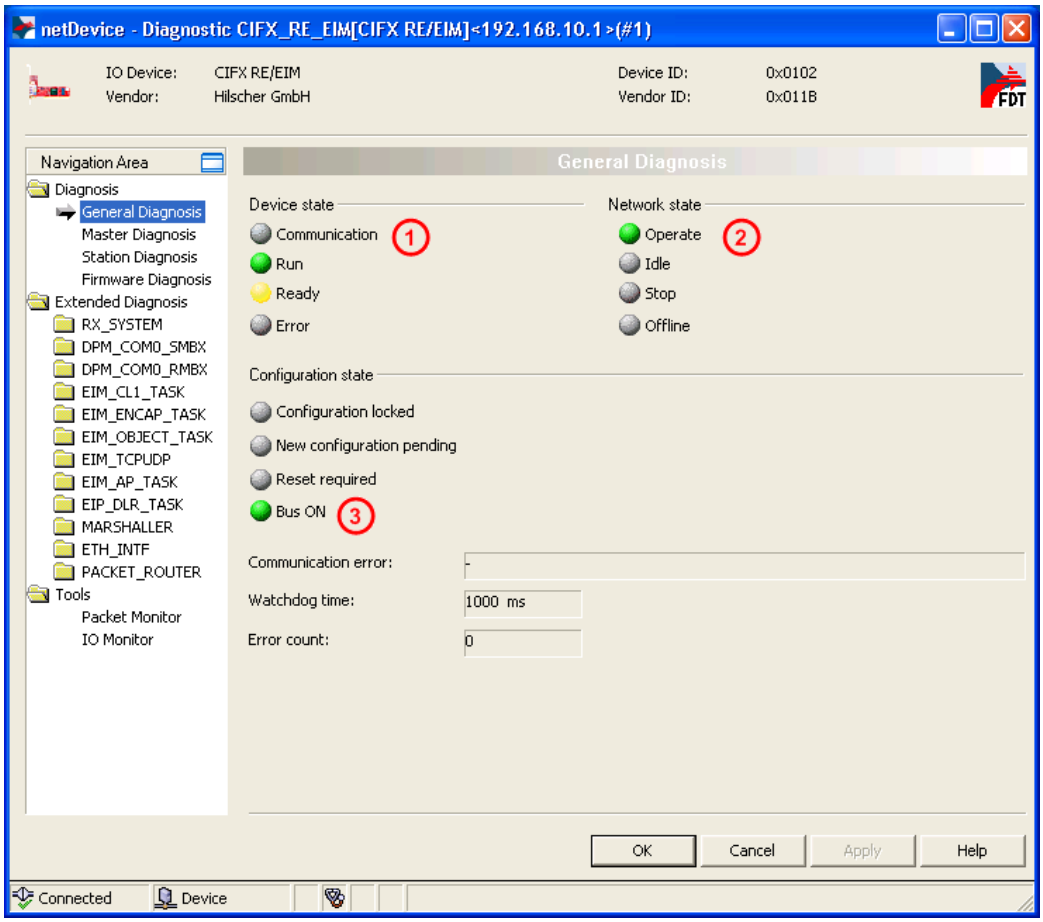
Note: After downloading the configuration, SYCON.net is automatically connected to the master device. If SYCON.net is not connected, right-click on the master device to open the context menu, then choose **Connect**.



2. Check state of the network in **General Diagnosis** window.

➢ In the **Navigation Area**, choose **Diagnosis** > **General Diagnosis**.

➢ Check if there is a green light for **Device state** > **Communication** ①, **Network state** > **Operate** ② and **Configuration state** > **Bus ON** ③. This indicates a functioning communication.

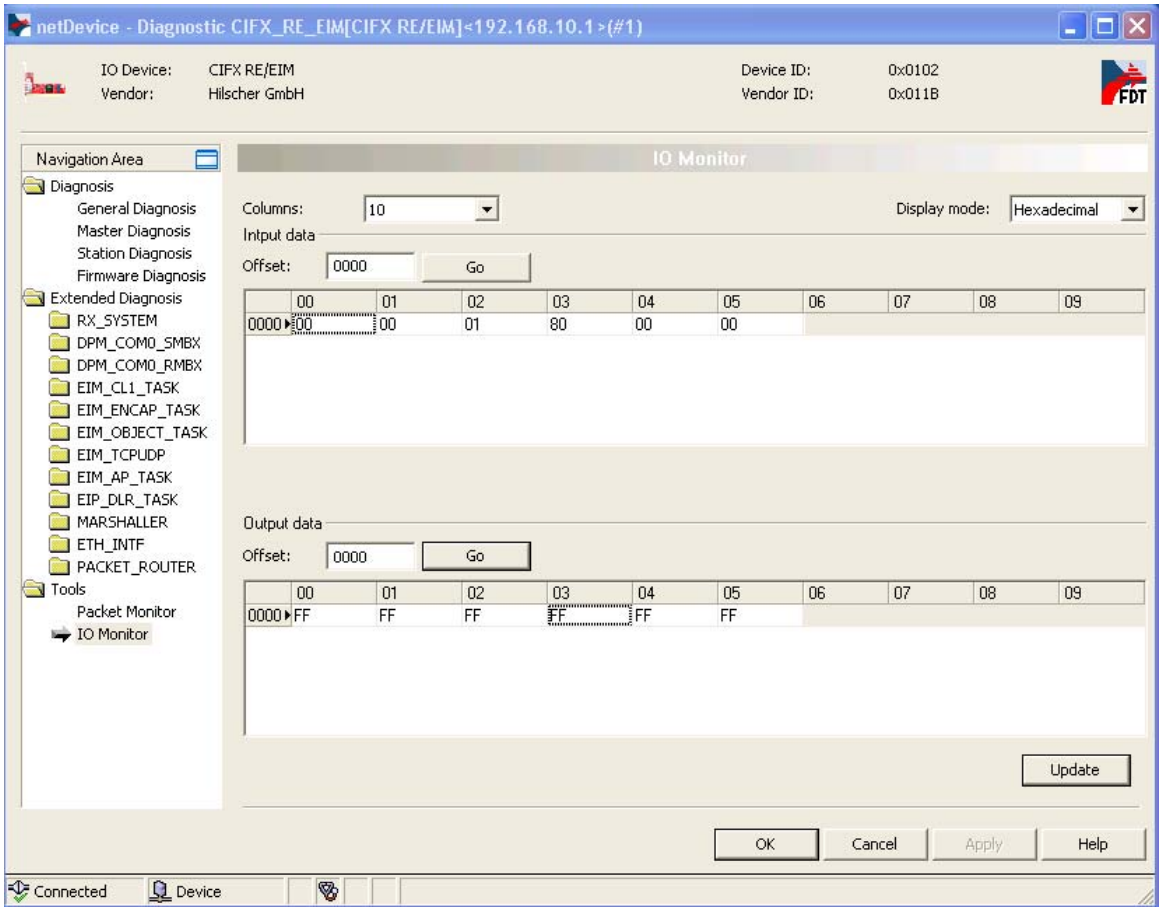


3. Use IO Monitor to test the communication.

➢ In the **Navigation Area**, choose **Tools** > **IO Monitor**.

➢ Enter output data, then click **Update** button.

The input data area displays the received input data.



Diagnosis and testing with cifX Test

4. Start cifX Test auxiliary tool.

➢ In Windows, choose **Start** > **Control Panel** > **cifX Test**.

5. Open the Hilscher device to which you want to establish a connection.

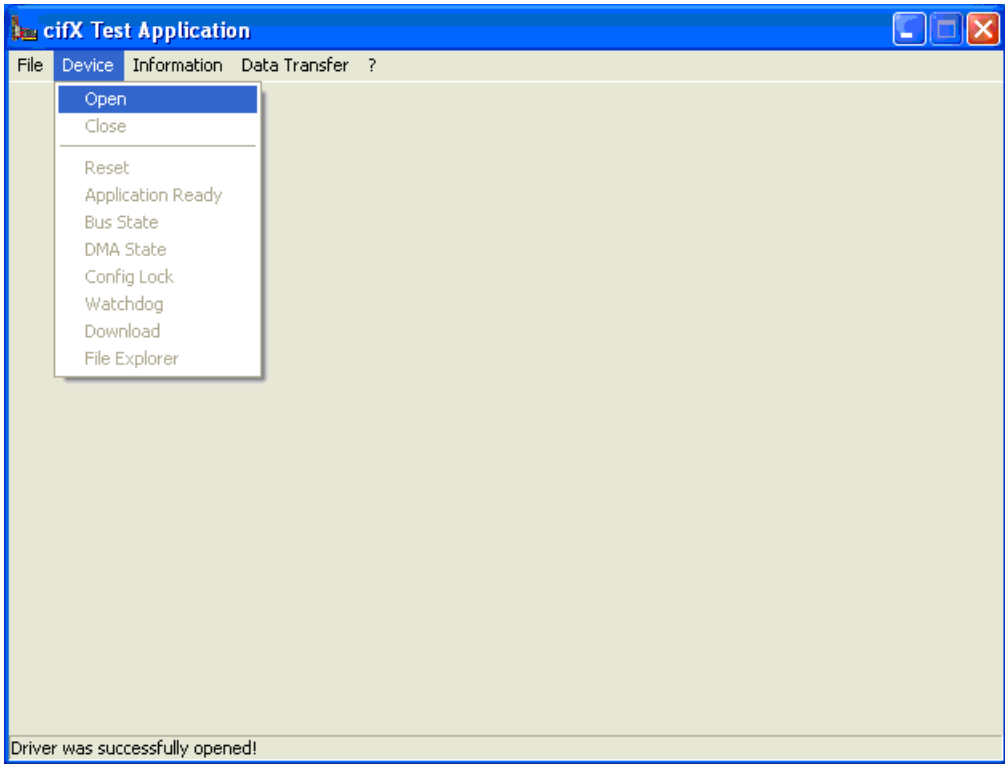
➢ In the menu, choose **Device** > **Open**.

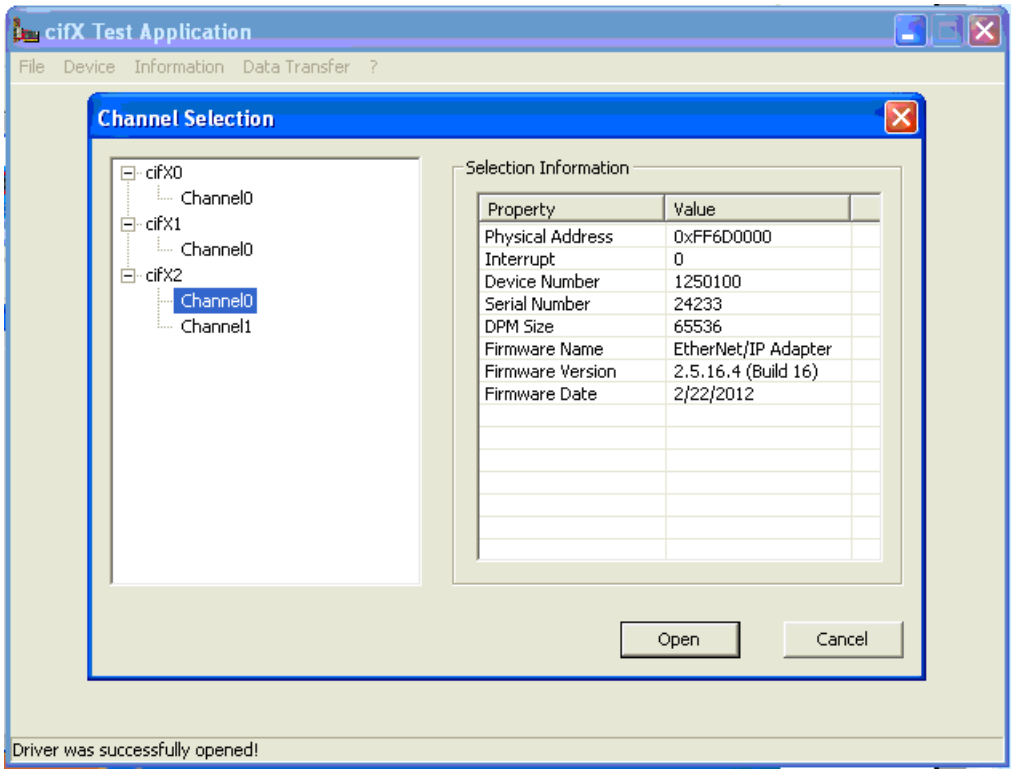
➢ Select **cifX** > **Channel0**.
Open the EtherNet/IP slave card.

Note: If you open the cifX level, you can see and use all functions concerning the PC card, e. g. licenses.

If you open **cifX** > **Channel0**, you can see and use all functions concerning the communication channel, e. g. I/O data.

Note: You can run several instances of the cifX Test application simultaneously. Thus you can connect to the master (CIFX RE/EIM) and the slave (CIFX RE/EIS) at the same time, and exchange data between the two devices.





6. I/O data exchange.

➢ In the menu, choose **Data Transfer** > **I/O Data**.

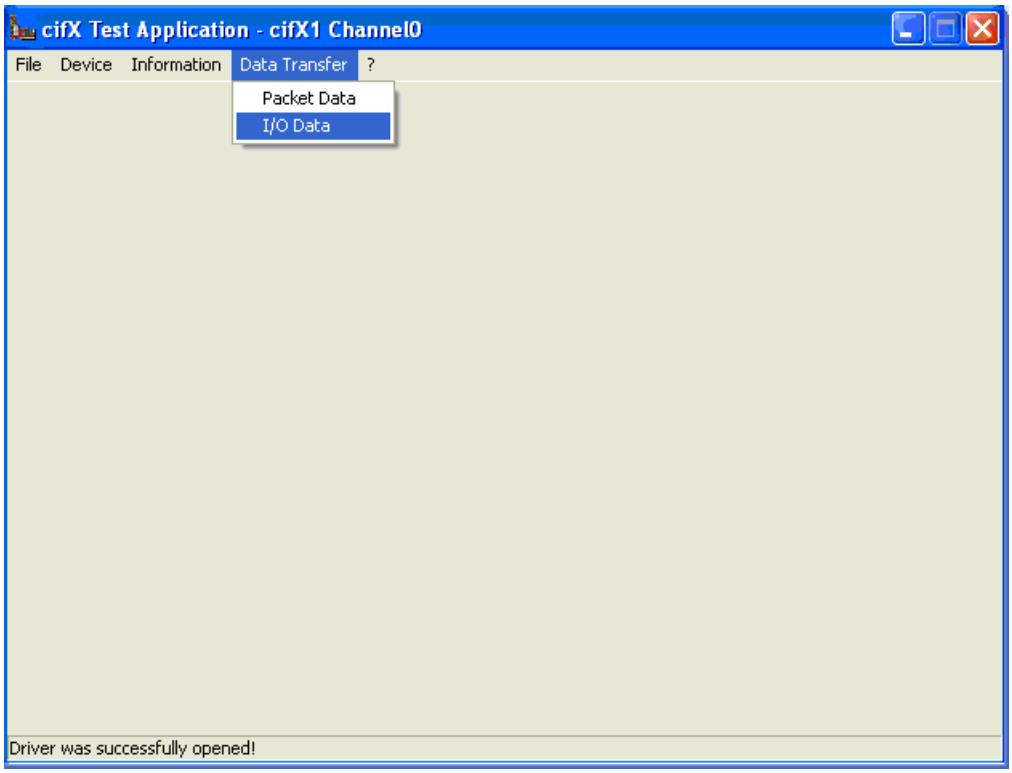
➢ Set output data, then click **Update**,
e. g. FF FF FF FF.

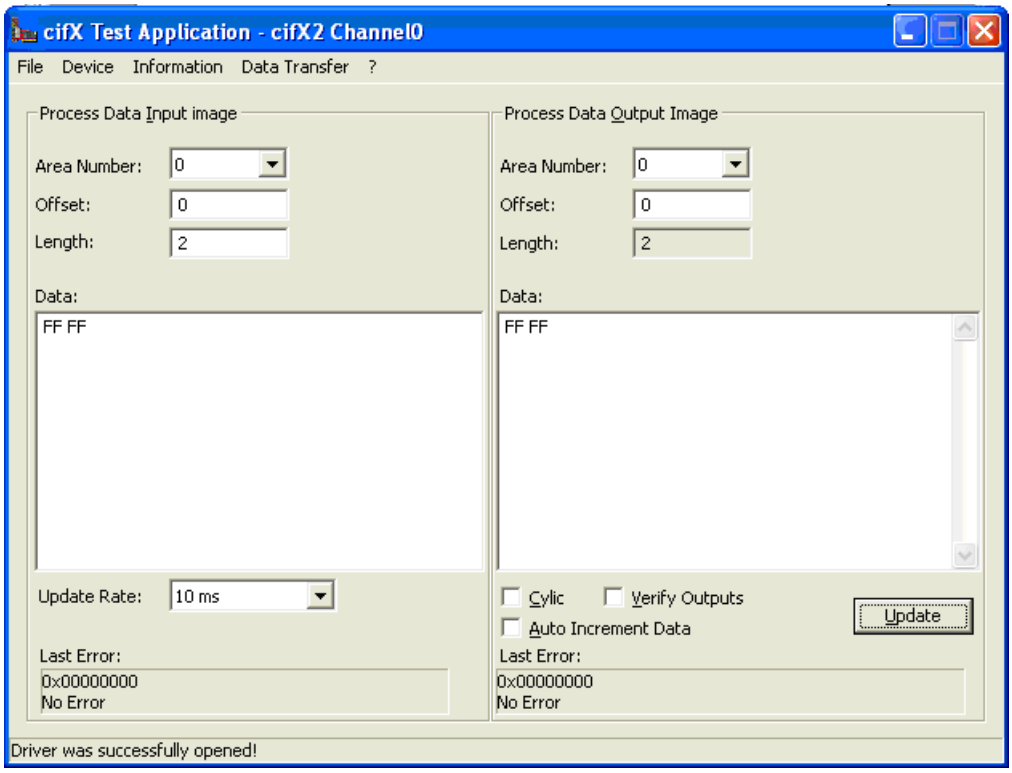
➢ Data is transferred to the CIFX RE/EIS and sent to the master via EtherNet/IP network.

➢ Enter the length of the input data to be displayed in the cifX Test auxiliary tool, e. g. “2”.

➢ Send data from the master (e. g. via I/O Monitor or cifX Test), then use the cifX Test auxiliary tool to watch the data incoming at the slave.

Note: Observe the data length. It must comply with the configuration.
With the output data, you can try **cyclic** and **auto increment**.





5 Tips and Tricks

5.1 Checking, Setting and Reordering a License

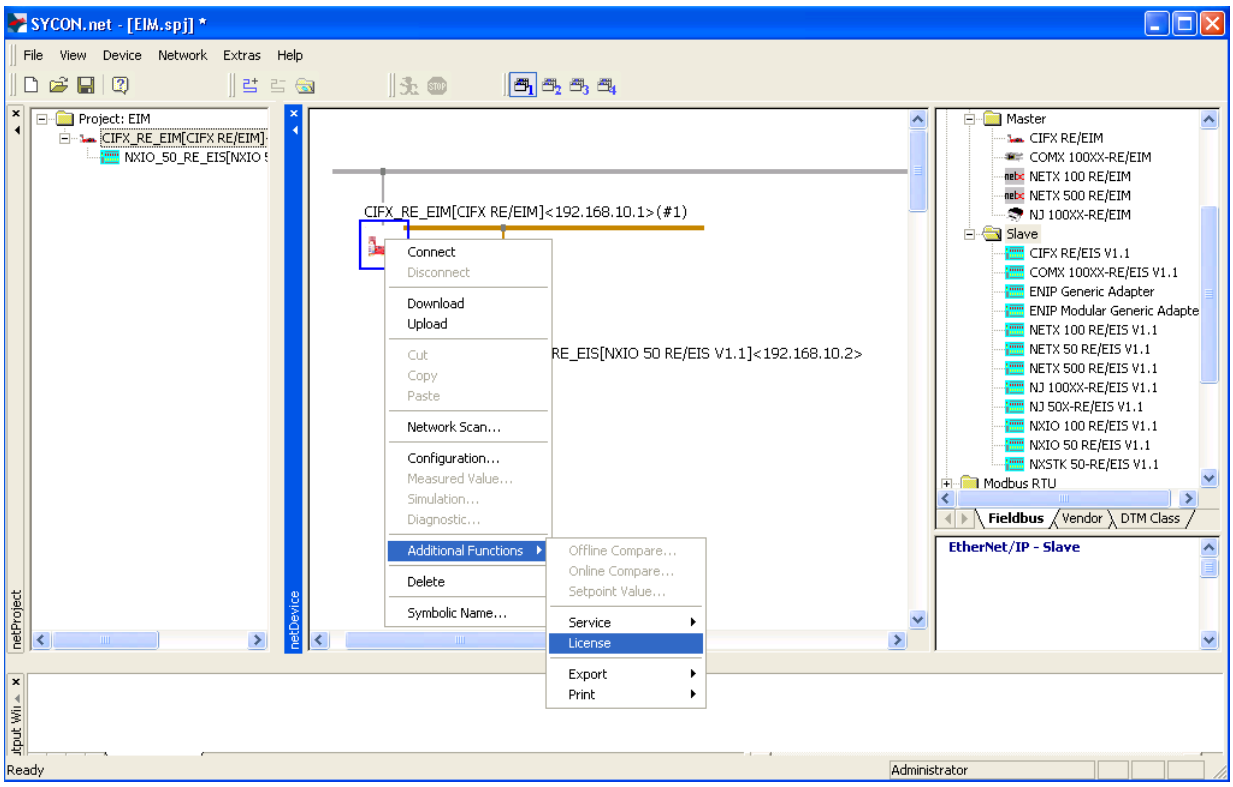
1. Check license, reorder license and set license.

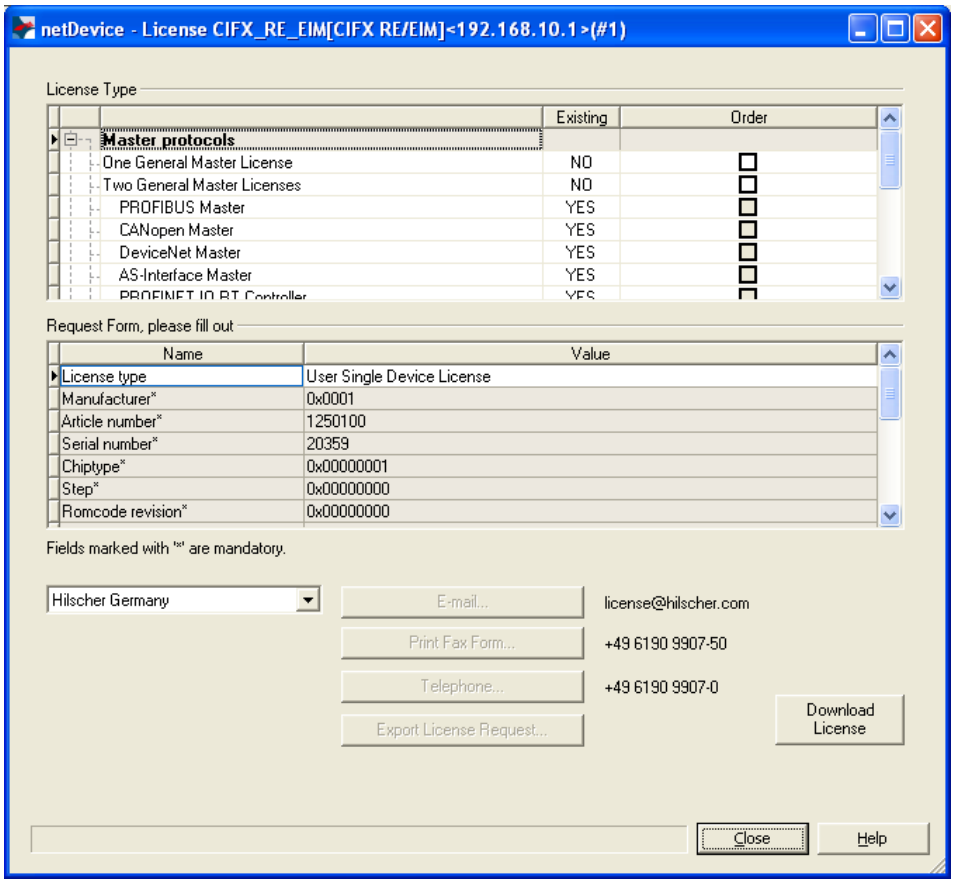
➢ Right-click on the master device to open the context menu, then choose **Additional Functions** > **License**.

Note: To use this function, make sure that SYCON.net is **not** connected to the master for diagnostic purposes. You possibly have to disconnect. To do so, right-click on the master device to open the context menu, then choose **Disconnect**.

Note: Licenses can easily be reordered by simply exporting the filled-in form and handing it over to Hilscher, as if in an ordinary ordering process. Use the **Export License Request…** button for this.

A license is delivered as a license file with the ending **.nxl**. It can be transferred to the device from the same dialog sheet by clicking the **Download License** button.





5.2 Setting IP Addresses of EtherNet/IP Devices

By using Ethernet Device Configuration auxiliary tool

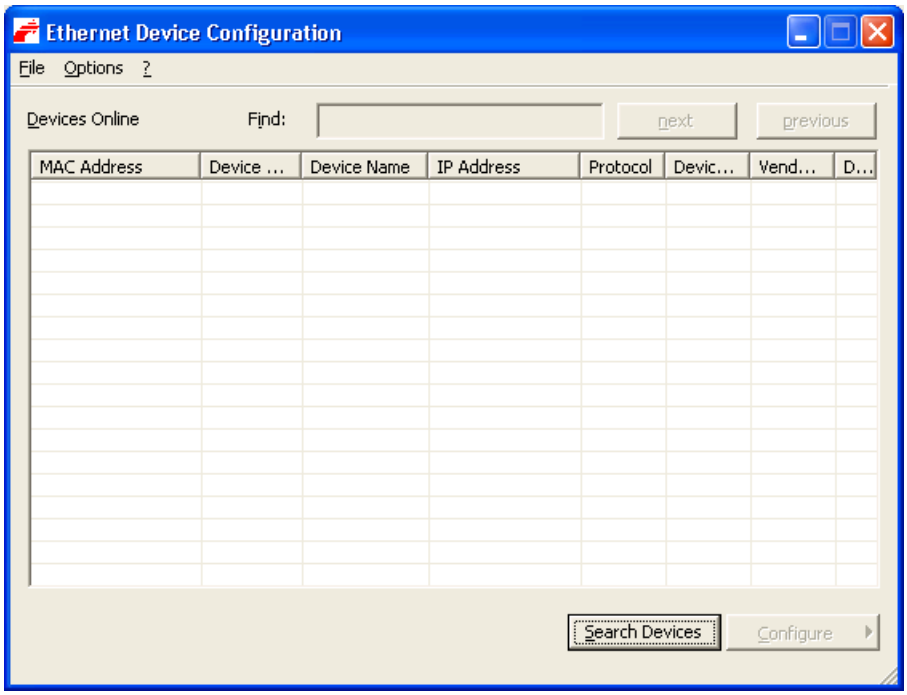
1. Start Ethernet Device Configuration.

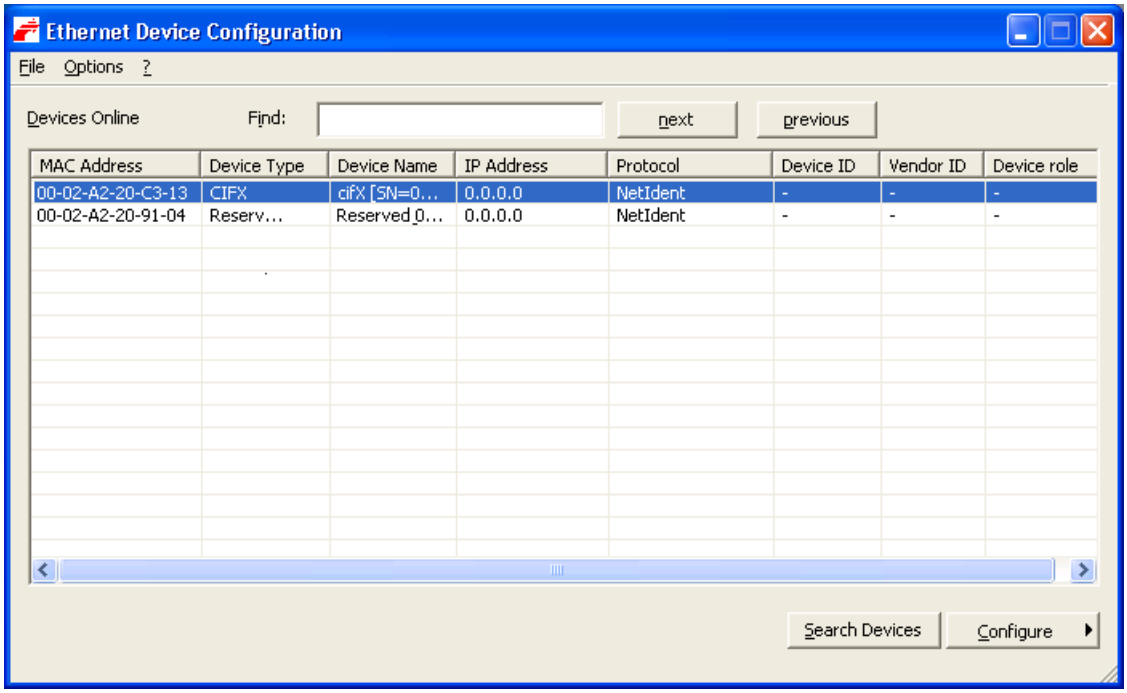
➢ In Windows, choose **Start** > **All Programs** > **SYCON.net System Configurator > Ethernet Device Setup**.

➢ Click **Search Devices** button to scan for connected Ethernet devices and set station names and IP addressing.

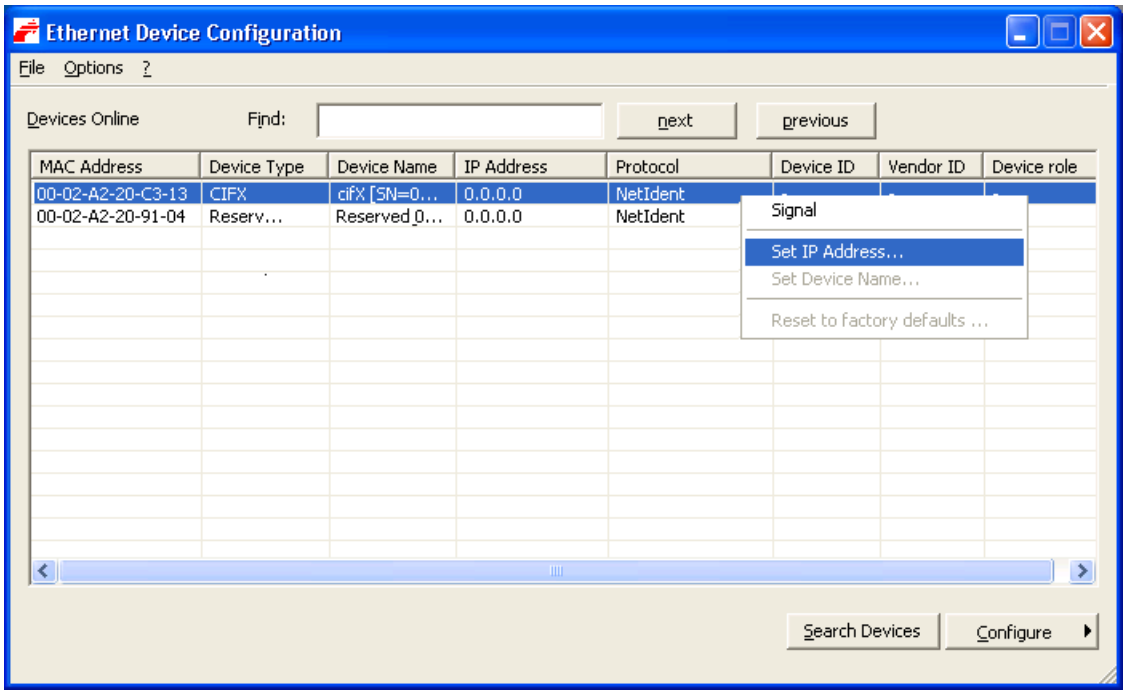
Note: The Ethernet devices must be connected to your network adapter card via a suitable cable.

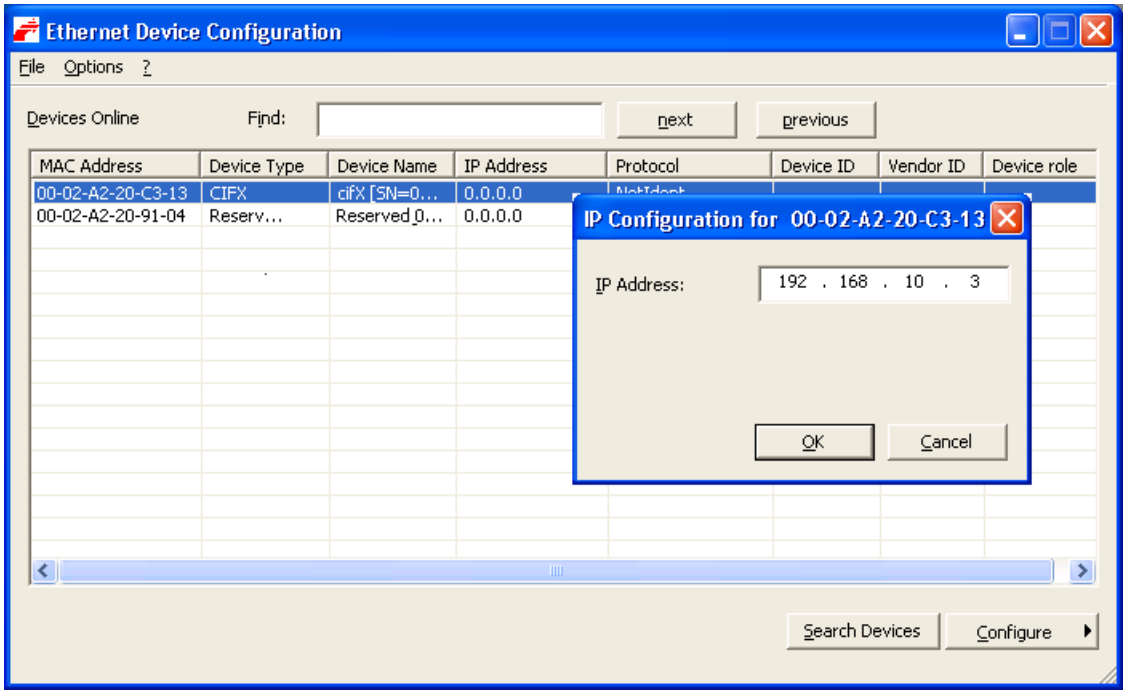
➢ Click **Search Devices** button to scan for connected Ethernet devices and set the IP addressing.

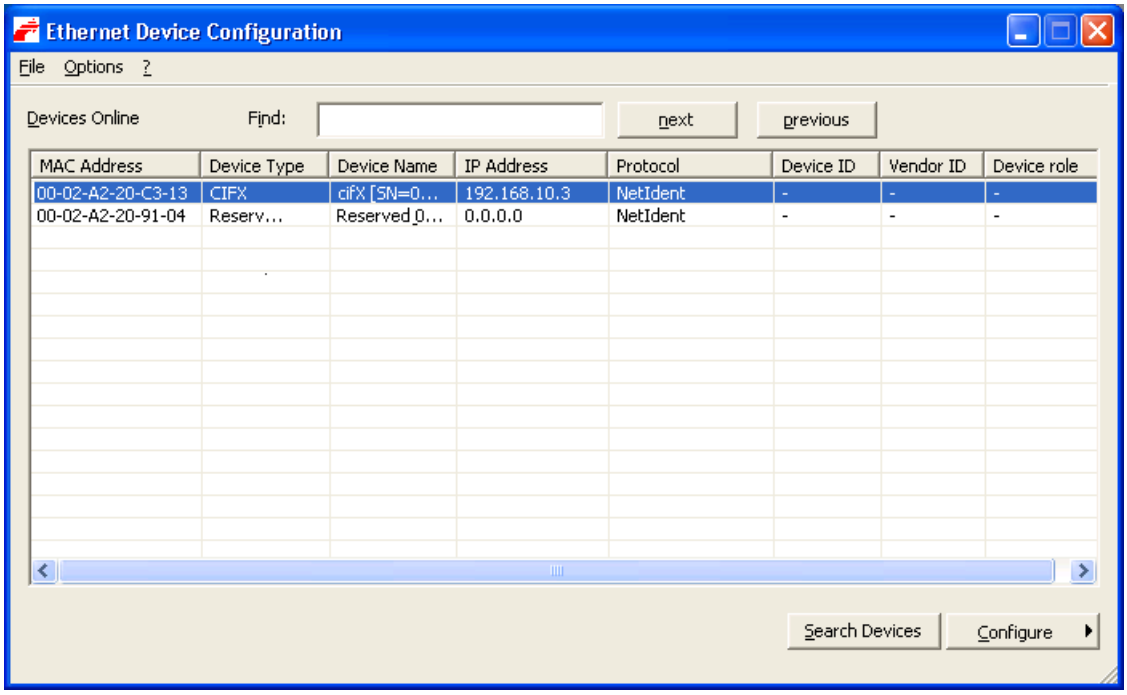




- Select the relevant Ethernet device, then right-click on the device to open the context menu. In the context menu, choose **Set IP Address…**







Note: With the **Signal** option, PROFINET devices can be identified by a flashing light.

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