



**Application Note**  
**EtherCAT Master Programming Example**  
**SYCON.net based EtherCAT Master Configuration**

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## Table of Contents

<b>1</b>	<b>Introduction.....</b>	<b>3</b>
1.1	About this Document.....	3
1.2	List of Revisions .....	3
1.3	Features of the EtherCAT Master Application Example .....	3
<b>2</b>	<b>Configuration Application Description .....</b>	<b>4</b>
2.1	Configuring the Hilscher EtherCAT Master.....	4
2.2	Using SYNON.net to Create a Configuration.....	4
2.3	Basic Application Start-Up .....	10
2.4	Features of the Application Program .....	12
<b>3</b>	<b>Appendix .....</b>	<b>13</b>
3.1	List of Tables .....	13
3.2	List of Figures.....	13
3.3	Contacts .....	14

# 1 Introduction

## 1.1 About this Document

This manual describes how to run the Configuration Example Application for Hilscher EtherCAT Master.

The required components are

- 1 PC with 1 PC card cifX
- Hilscher EtherCAT Master firmware version 2.4.13.0 (or newer)
- Microsoft Visual Studio .NET 2005

Additionally some EtherCAT slaves are required to demonstrate the cyclic I/O exchange. For demonstration some Beckhoff I/O slave devices were used: EK1100, EL2004, EL1004 and EL1014. Anyway the exact type is not important. It is recommended to have some slaves with input and output.

## 1.2 List of Revisions

Rev	Date	Name	Chapter	Revision
1	2011-12-19	UJ	all	Created
2	2013-07-17	HH	all	Revised

Table 1: List of Revisions

## 1.3 Features of the EtherCAT Master Application Example

The EtherCAT Master configuration example application is a straight forward implementation which shows how to use the cifX Device Driver API and how to configure the EtherCAT Master using SYCON.net.

The example mirrors the cyclic process data (data received from master is sent back). The master mirrors up to 8 bytes cyclic data. The example must be modified for further I/O handling.

The configuration procedure and data exchange runs with a PC card cifX (requires a master license!). It runs with other hardware (with master license) as well. Within this example a CIFS 50-RE was used.

## 2 Configuration Application Description

### 2.1 Configuring the Hilscher EtherCAT Master

- Load EtherCAT Master firmware file via the cifX Driver Setup Utility into the PC card cifX.

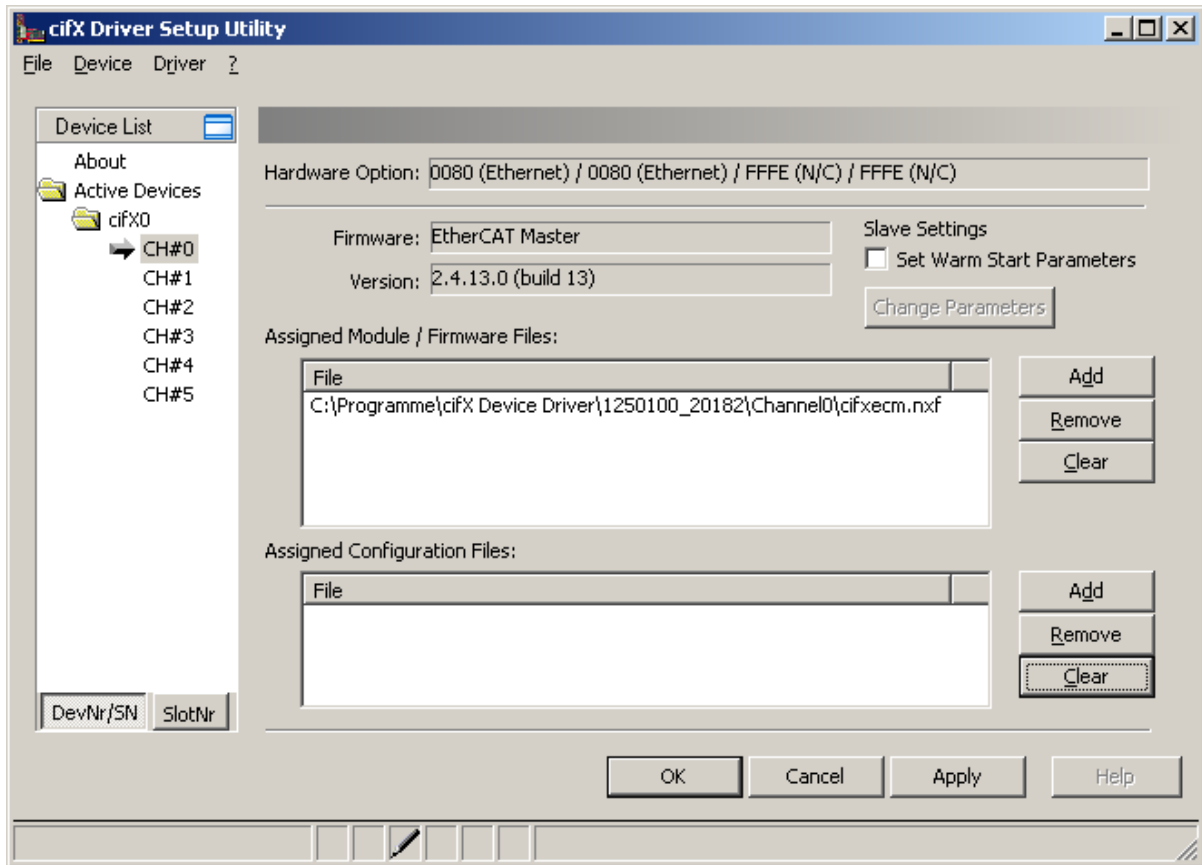


Figure 1: cifX Setup to load the EtherCAT Master Firmware

### 2.2 Using SYNON.net to Create a Configuration

The first step is to connect **Port0** of the CIFX board with the IN-Port of the first EtherCAT Slave device.

Start SYCON.net. An empty project appears. Select from **EtherCAT > Master** the CIFX RE/ECM board and place it in the main window at the gray line.

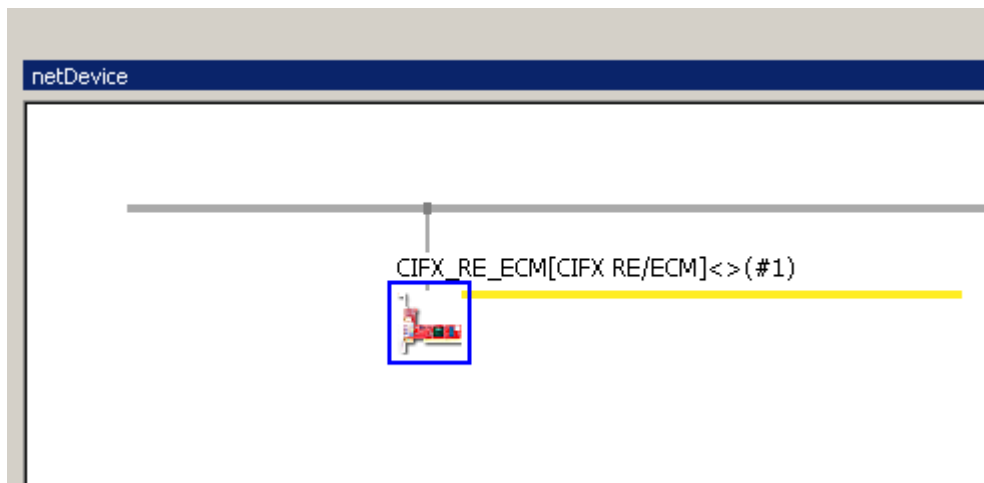


Figure 2: Add CIFS RE/ECM Master

Select in the main menu: **Network > Device Catalog**. Select File type **EtherCAT DDF (\*.xml)**. Select all relevant device description files for the used slaves. Afterwards confirm to reload the device catalog.

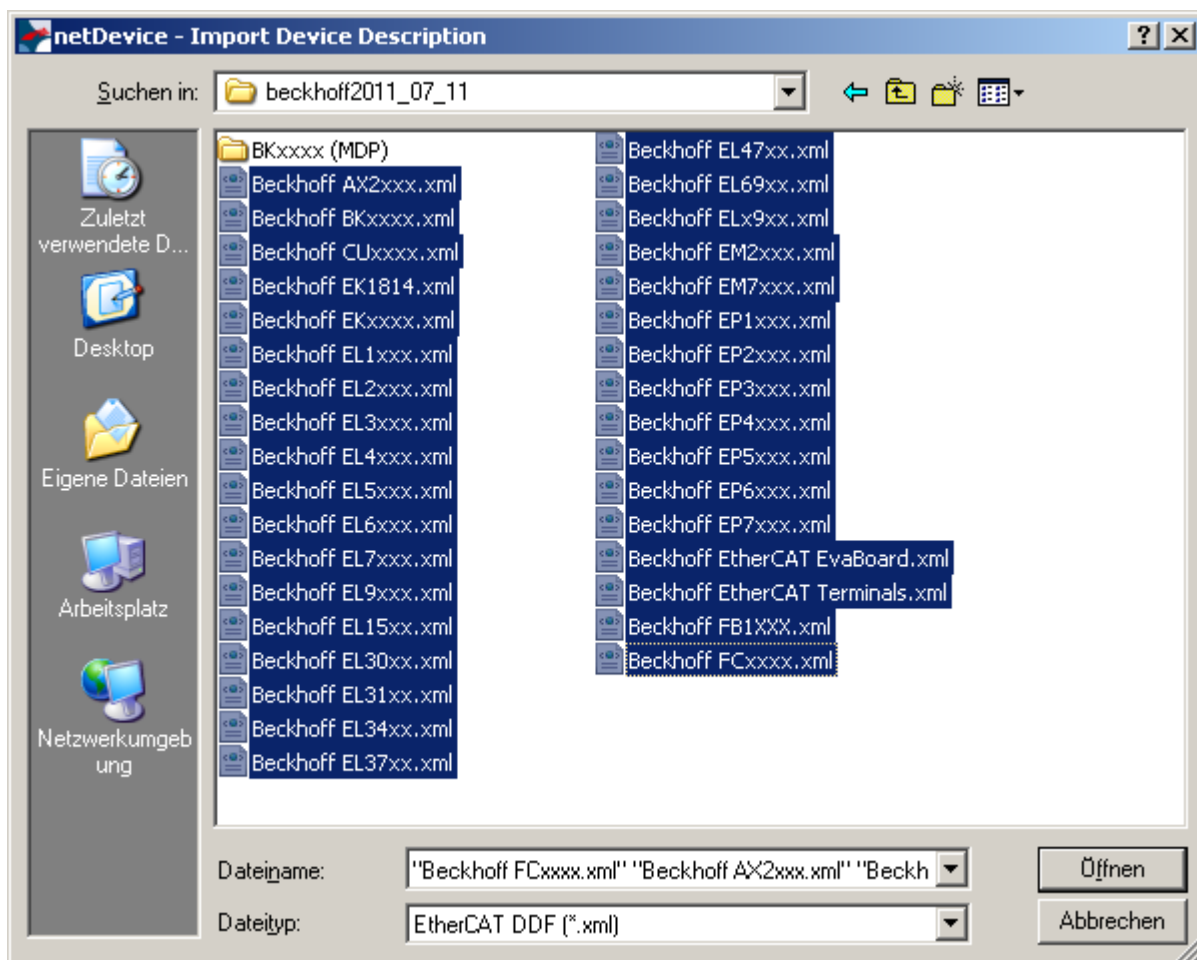


Figure 3: Import Device Description Files

Right click the symbol of the CIFS and select **Configuration**.

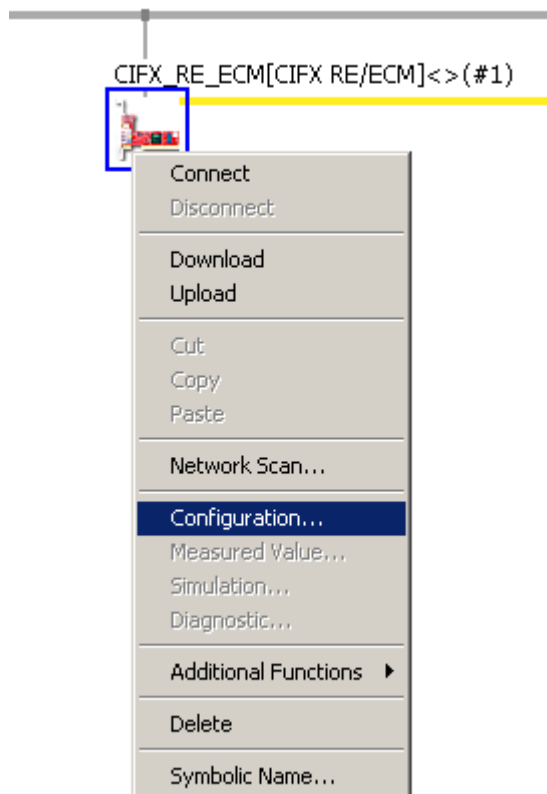
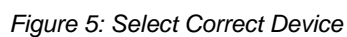


Figure 4: Context Menu: Configuration

(At least) one device shall be listed here (otherwise the firmware is not loaded). Select the correct device.



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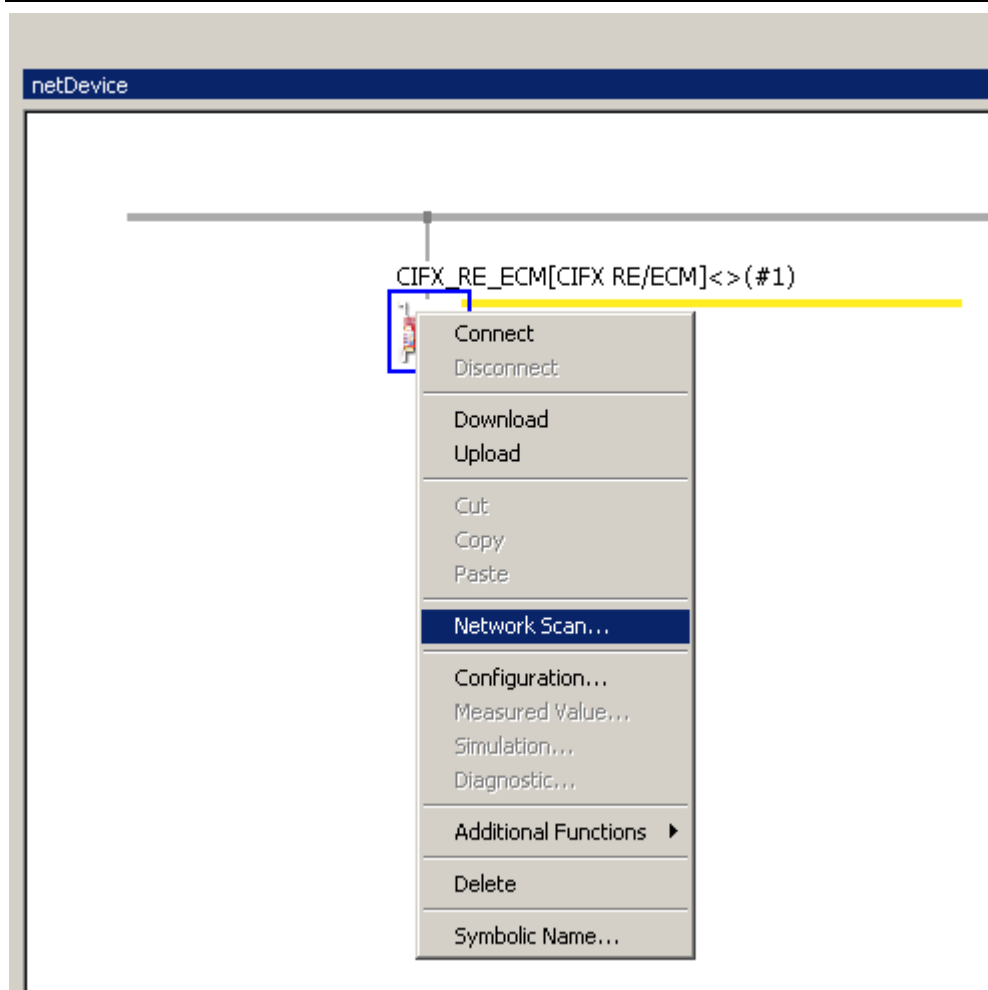


Figure 6: Context Menu: Network Scan

Wait a few seconds and a dialog appears (as shown in the following figure), which lists the devices found. Select **Create Devices**.

If no devices were found, make sure that the slaves have power and are connected to the correct port which is channel0 (CH0) of the master!

If the devices are not known, make sure that you have imported the correct device description files and reload the device catalog!



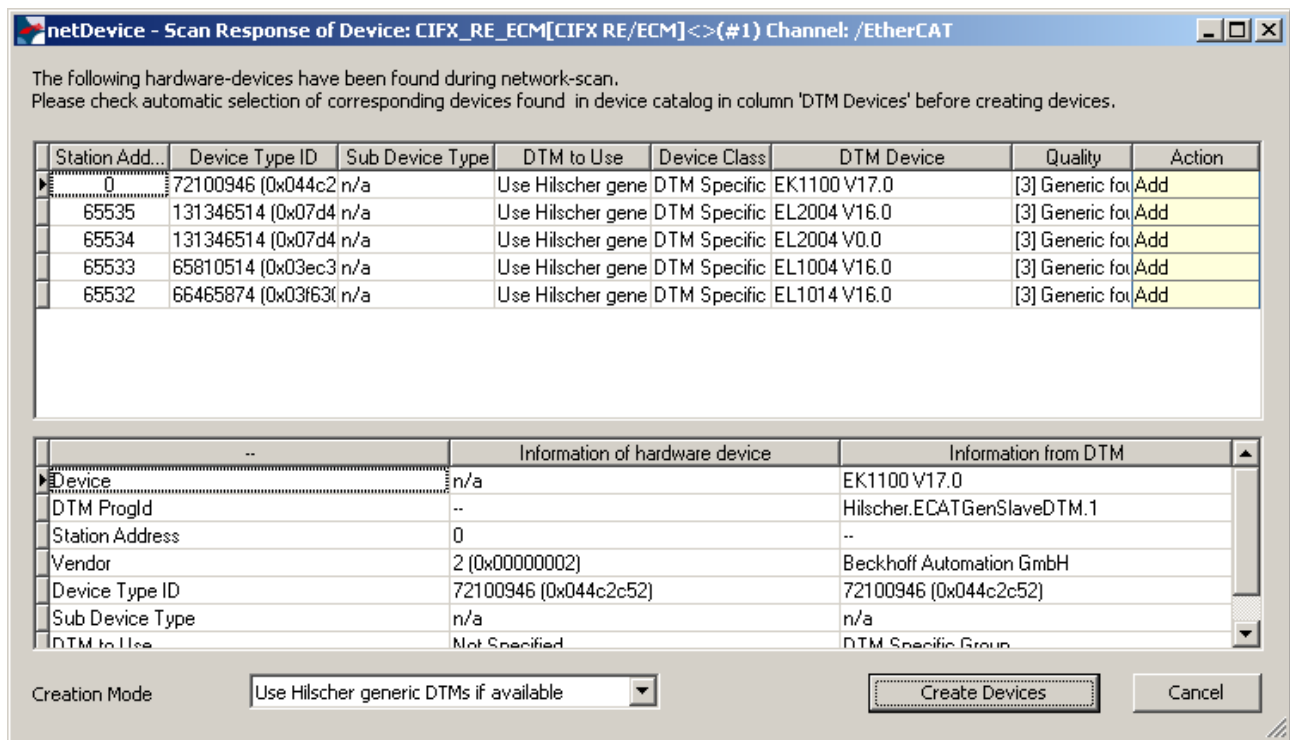


Figure 7: A Possible Bus Scan Result

Afterwards the slaves are attached at the CIFS in the project. Right click on the CIFS again and select **Download**. The configuration file will be downloaded to the CIFS. The cifX Device Driver will transfer the configuration into the PC card cifX again on each PowerUp of the PC.

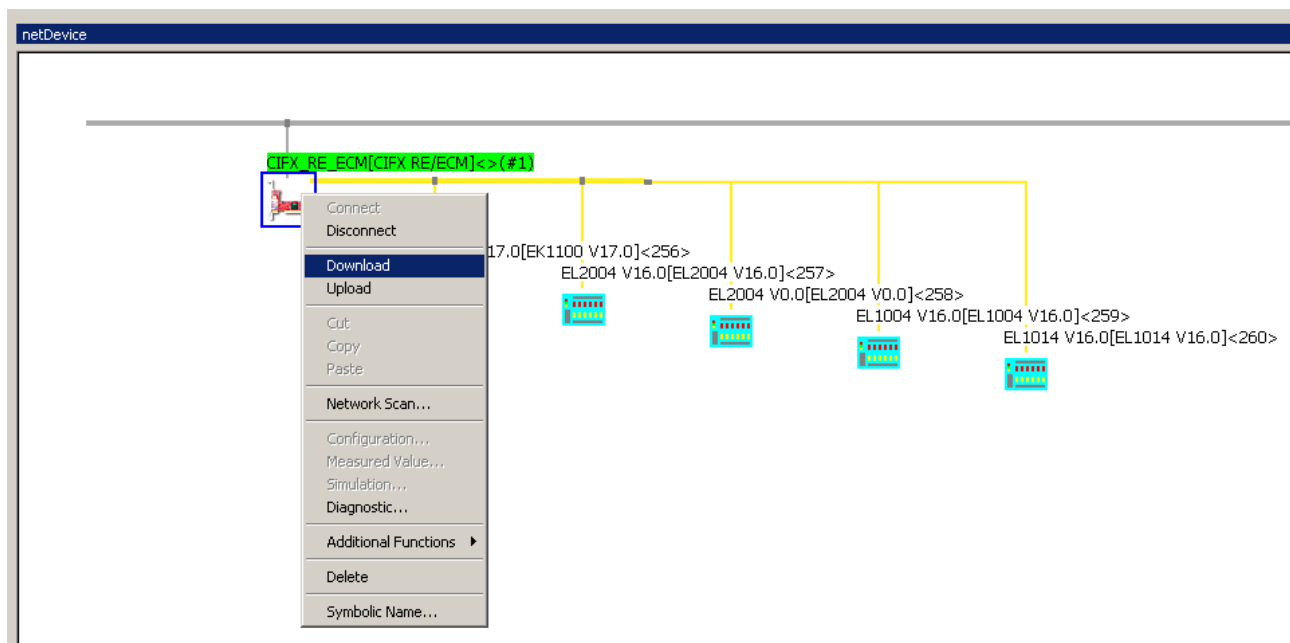


Figure 8: Context Menu: Download

Confirm that the bus is in OPERATIONAL. Open the online diagnosis. It shall look like the following figure. The **Communication** bit shall be set.

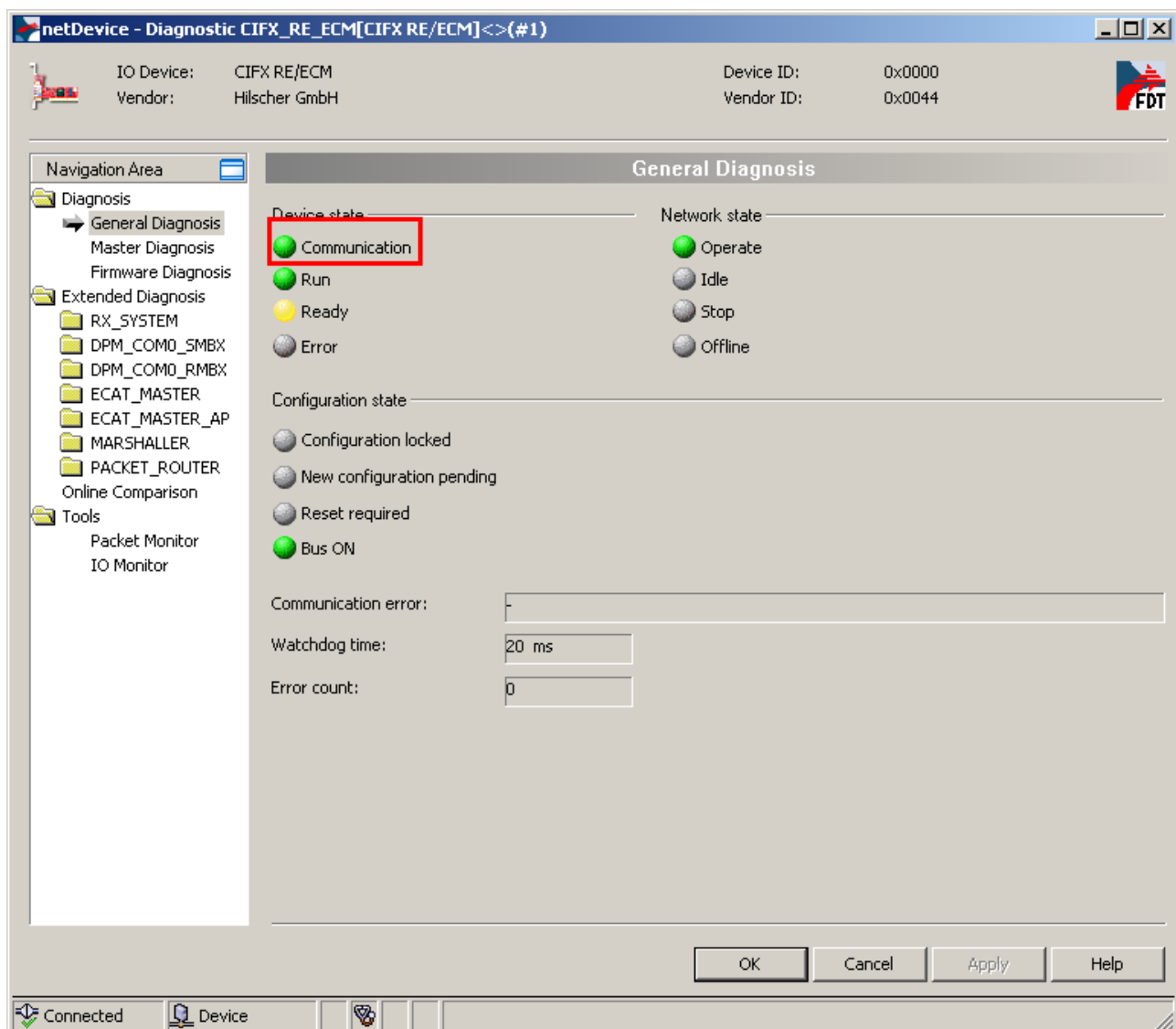


Figure 9: Online Diagnosis: Master is in Cyclic Data Exchange

The configuration is done now. Save the project. Close SYCON.net to prevent concurrent access to the master.

## 2.3 Basic Application Start-Up

- Open the EtherCAT Master example application (CifX\_ECM\_Demo.sln) using Microsoft Visual Studio 2005 or higher.
- Open the file Application.cpp and adjust the board name at the beginning of the App\_main() function. Set the board instance of the PC card cifX to which you have loaded the firmware. When only one card is in the PC, the correct selection is always **CIFX0**.

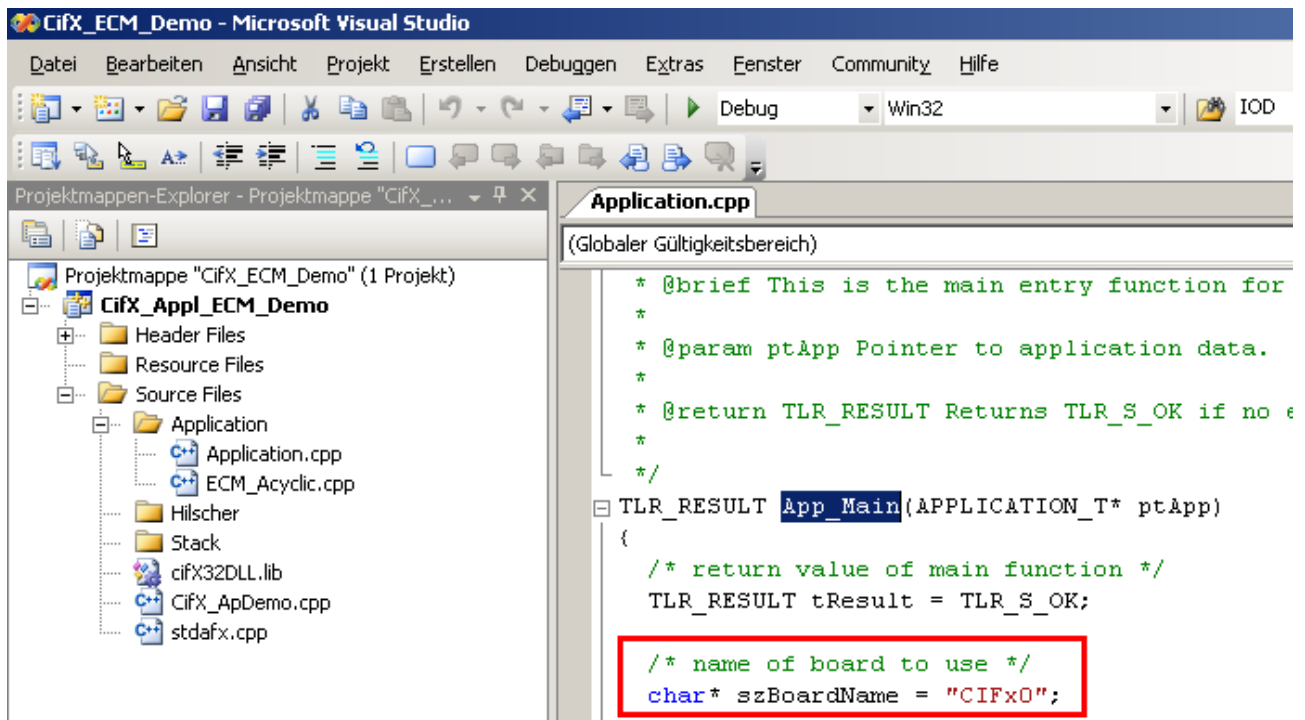


Figure 10: Adjust the cifX Board Instance

- Build and start the Configuration Example Application.

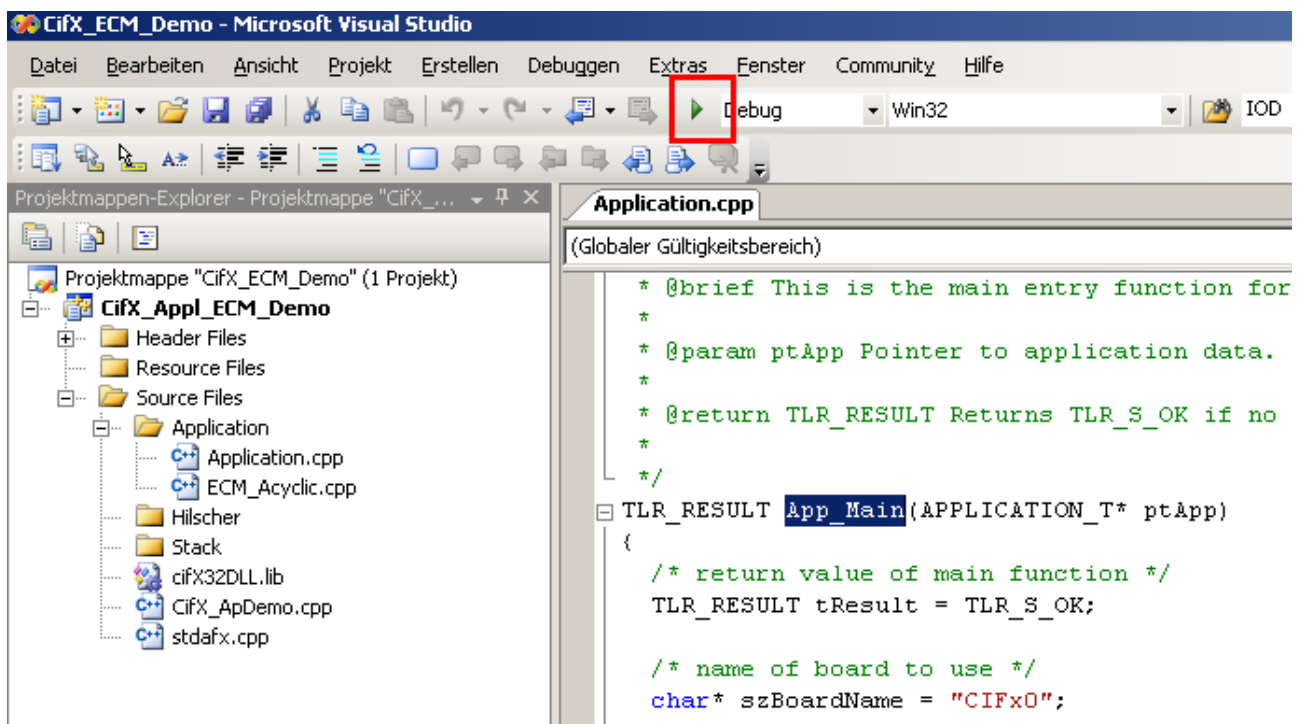


Figure 11: Starting the Example

- You can monitor the system startup by checking the console output.

```

C:\d:\software\Examples\ECM\cifX_ECM_Config\VS8\CifX_ApDemo\Debug\CifX_ApDemo.exe
Allocating resources...
Successful.

*****
* Configuration example for EtherCAT Master *
* Copyright (c) Hilscher GmbH. All Rights Reserved. *
*****

Opening driver...
Opening channel 0 on board CifX0...
Processing system restart...
Initializing application...
Assuming configuration to exist in EtherCAT Master.
Setting bus state on and wait for communication to be established...
Entering endless loop...

key      Action
h        show this help
g        get DeviceHandles and print out some information
u        perform acyclic CoE Upload (requires slave mailbox support)
q        quit application

Configured Slaves amount changed from 0 to 5.
Handle 0: StationAddress: 256,
          AutoIncAddress: 0x0, Name EK1100 U17.0(EK1100)
Handle 1: StationAddress: 257,
          AutoIncAddress: 0xFFFF, Name EL2004 U16.0(EL2004)
Handle 2: StationAddress: 258,
          AutoIncAddress: 0xFFFE, Name EL2004 U0.0(EL2004)
Handle 3: StationAddress: 259,
          AutoIncAddress: 0xFFFD, Name EL1004 U16.0(EL1004)
Handle 4: StationAddress: 260,
          AutoIncAddress: 0xFFFC, Name EL1014 U16.0(EL1014)
Active Slave amount changed from 0 to 5.

```

Figure 12: Startup

- The startup sequence is now finished. The EtherCAT Master application example will mirror the cyclic process data.

## 2.4 Features of the Application Program

The example application program requires that SYCON.net was used before in order to create and download the configuration into the PC card cifX.

After startup, a loop is performed:

- Read data from bus, write same data (up to 8 bytes) back to bus
- Check for received acyclic packets
- Check for user input (via keyboard)

## 3 Appendix

### 3.1 List of Tables

Table 1: List of Revisions .....	3
----------------------------------	---

### 3.2 List of Figures

Figure 1: cifX Setup to load the EtherCAT Master Firmware.....	4
Figure 2: Add CIFX RE/ECM Master.....	5
Figure 3: Import Device Description Files .....	5
Figure 4: Context Menu: Configuration .....	6
Figure 5: Select Correct Device .....	7
Figure 6: Context Menu: Network Scan .....	8
Figure 7: A Possible Bus Scan Result.....	9
Figure 8: Context Menu: Download.....	9
Figure 9: Online Diagnosis: Master is in Cyclic Data Exchange.....	10
Figure 10: Adjust the cifX Board Instance .....	11
Figure 11: Starting the Example.....	11
Figure 12: Startup .....	12

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