EtherCAT Evaluation Kit Workshop – Installation Guide

EtherCAT.

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BECKHOFF

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DOCUMENT HISTORY

Version	Comment
0.1	First version
0.2	Compiler Suite selection added
1.0	MPLAB X related information added
1.1	Add Excel and Wireshark requirement
1.2	Remove old tool instructions
1.3	Email address and mention of board hardware revision updated

CONTENTS

1   Introduction

In order to properly operate with the Beckhoff EL9820 Evaluation Kit, the installation of three following software packages is needed:

- **Slave Stack Code (SSC)**: source code (written in C programming language) implementing all general-purpose functionalities of an EtherCAT Slave as well as some application examples.

- **MPLAB IDE for Microchip PIC (+ MPLAB XC 16 Compiler for PIC24)**: development environment for the programming and debugging of the Microchip PIC24 microcontroller integrated on board the EL9800 Evaluation Kit

- **TwinCAT Real-Time Control Suite**: PC-based control platform and development environment which enables to use a standard Windows PC as EtherCAT Master test platform, and therefore to control the EL9820 Evaluation Kit.

This Installation Guide is intended to allow customers to perform in advance all the preliminary steps which are required to successfully attend the EtherCAT Evaluation Kit Workshop.

In case any of the steps described in this Installation Guide fails, please contact the ETG support team at email address Techinfo@ethercat.org as soon as possible, in order find a solution before the workshop begins.

2   EL9800 Hardware Revision

The EtherCAT Evaluation Kit Workshop is based on the board hardware revision **EL9800_6A**.

The hardware revision can be checked on the board next to the Beckhoff and EtherCAT® logos.
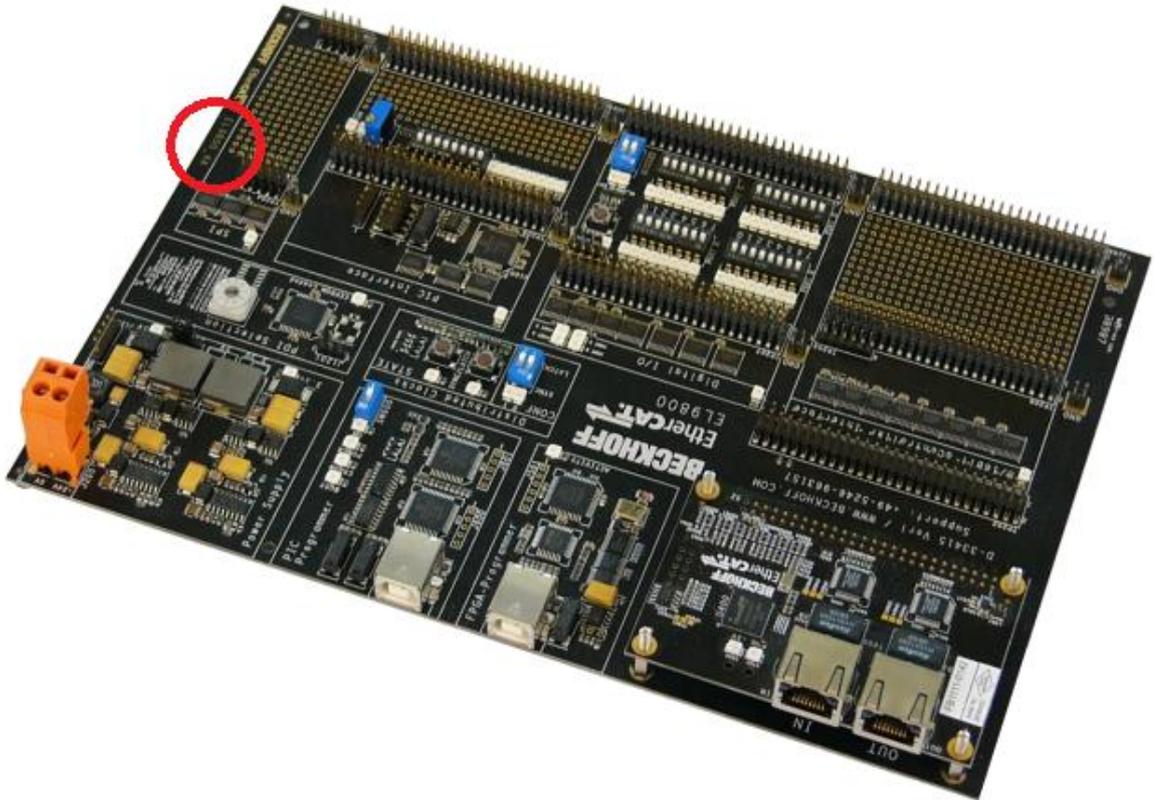
NOTE: Older board revisions (e.g. EL6800_4A) are not suitable to successfully attend the workshop, as they require programming software versions which are not available anymore.

3   Installation – Slave Stack Code

The Slave Stack Code is a source code written in C programming language, provided and supported free-of-charge by Beckhoff Automation GmbH & Co. KG.

3.1   Vendor ID

Both for download and installation of the Slave Stack Code, an own EtherCAT Vendor ID is required. This information is reported in the answer to the Vendor ID Assignment Request applied by the company. A list of all registered Vendor IDs can be found in the ETG website (http://www.ethercat.org/en/vendor_id_list.html):
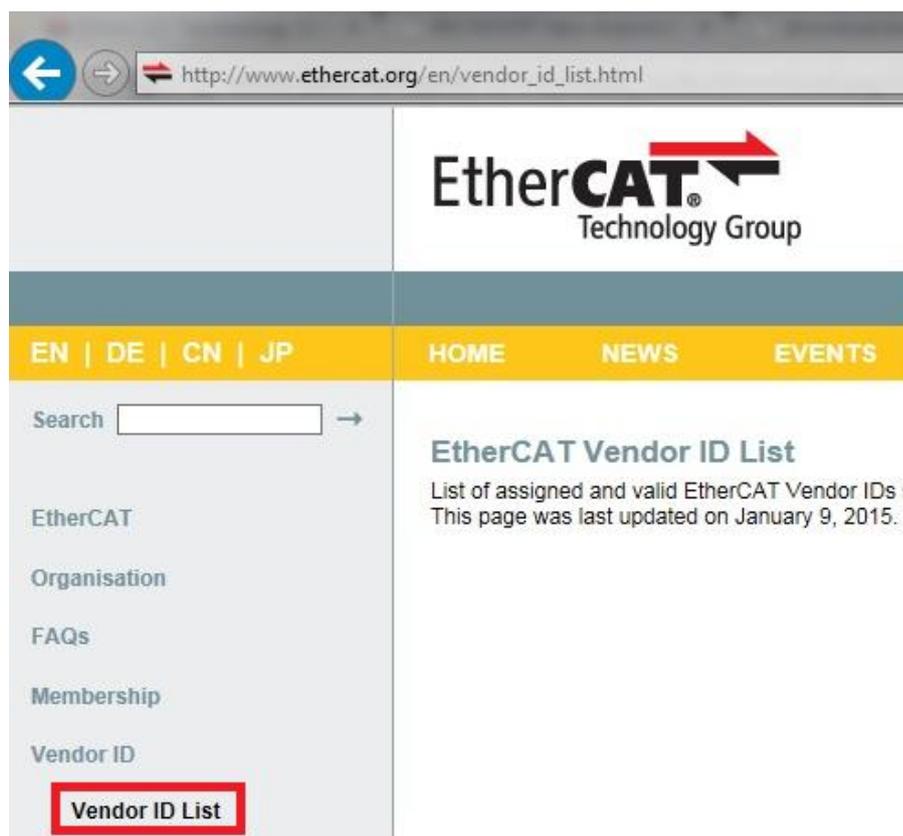
3.2   .NET Framework

The SSC Tool requires .NET Framework 4.0 or later. The Framework can be downloaded at the following link:

http://www.microsoft.com/germany/net/downloadFile.aspx?file=netframework.

3.3   SSC Source Files + Tool

The Slave Stack Code can be downloaded at the following link (Vendor ID required):

http://www.ethercat.org/memberarea/stack_code.aspx

The SSC source files and SSC tool are installed by launching the *.exe file provided within the *.zip package:
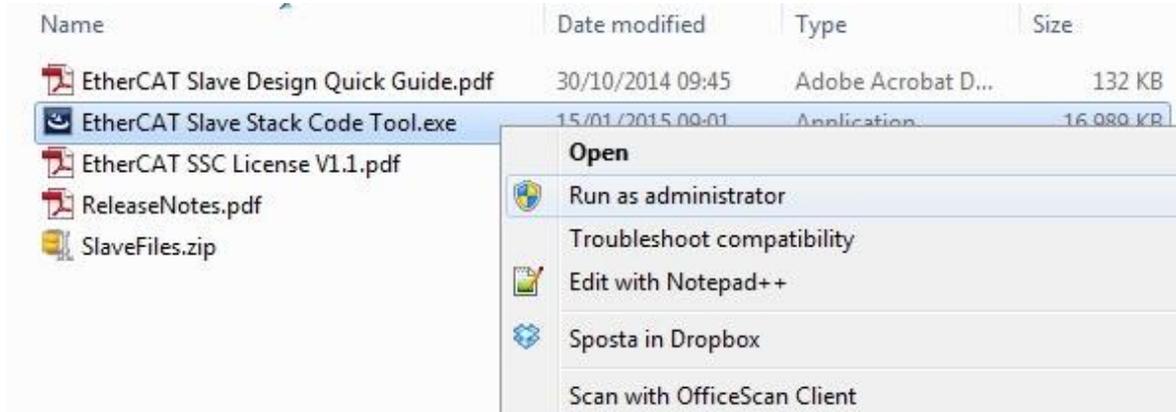
4   MPLAB X

4.1   Compiler Installation

The **XC16 C Compiler** needs to be separately installed. The component to be installed is the same both in case of MPLAB X and of MPLAB 8 IDEs. The installation file can be found at the directory: http://www.microchip.com/mplab/compilers.

Select "Downloads" at the bottom of the web page, then select the last available build of MPLAB XC16 Compiler for Windows platform (MPLAB XC16 Compiler vx.yz):

| Additional Information | Downloads | Downloads Archive | Documentation | Compiler FAQs |

Compilers

Title	Date Published	Size	D/L
Windows (x86/x64)			
MPLAB® XC8 Compiler v1.38	7/13/16	78.8 MB	
MPLAB® XC16 Compiler v1.26	3/4/16	62.6 MB	
MPLAB® XC32 Compiler v1.42	6/14/16	58.9 MB	

4.2   IDE Installation

The Development Environment for PIC microcontrollers is provided free-of-charge by Microchip.

NOTE: Do not keep MPLAB X and MPLAB 8 installed on your PC at the same time, as this could lead to driver conflicts. In case you need to change MPLAB version, uninstall the previous version and restart your PC first.

Download : http://www.microchip.com/pagehandler/en-us/family/mplabx/.

Select "Download" at the bottom of the web page, and then the latest available build of MPLAB X (MPLAB® X IDE vx.yz):

Features	Downloads	Documentation	Download Archive	Webinars		
Title				**Date Published**	**Size**	**D/L**
Windows (x86/x64)						
MPLAB® X IDE v3.35				6/23/2016	554.5 MB	
MPLAB® X IDE Release Notes / User Guide v3.35				6/23/2016	6.0 KB	

Run the *.exe setup file:

MPLABX-v3.35-windows-installer.exe

Confirm all the default installation settings proposed by the installation wizard.

4.3   USB driver and test of the communication

With the board powered-off, connect the USB cable from a USB port of the PC to connector **CON600** of the Evaluation Kit, and set switch **SW600** to ON in order to enable the on-board debugger interface.
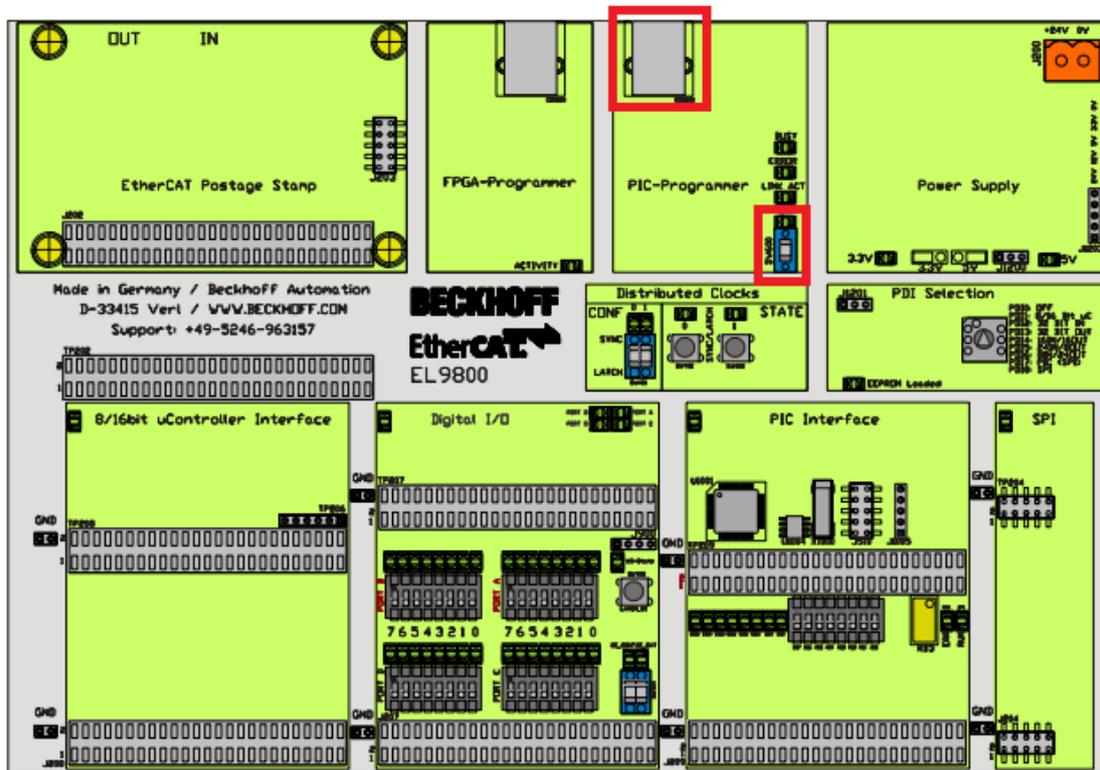
Power the Evaluation Kit on with a standard 24V power supply.
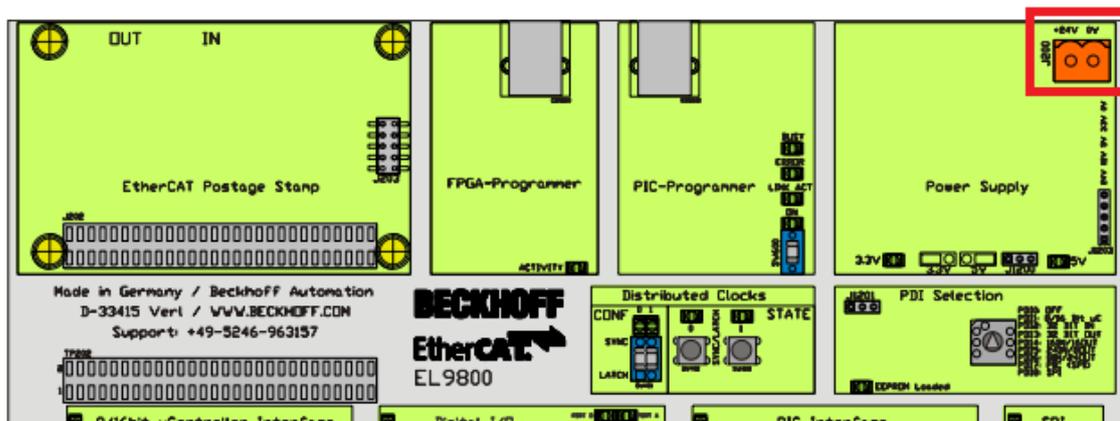
A new USB device will be detected. The corresponding USB driver should be automatically installed: in case the Operating System shows the dialog window, confirm the automatic installation.

4.4 Create a new Project

Open MPLAB IDE and create a new Project:

EtherCAT. Installation Guide
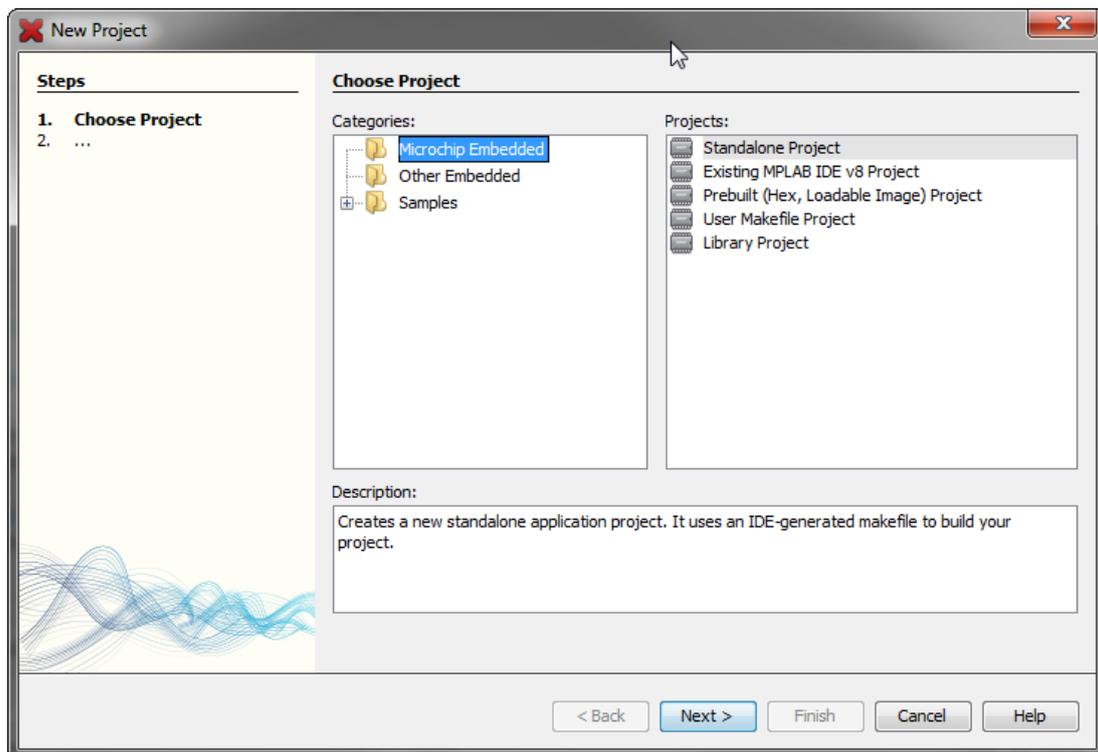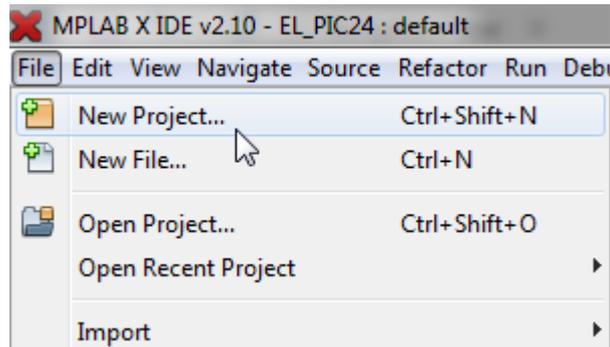
Select the Device "**PIC24HJ128GP306**"
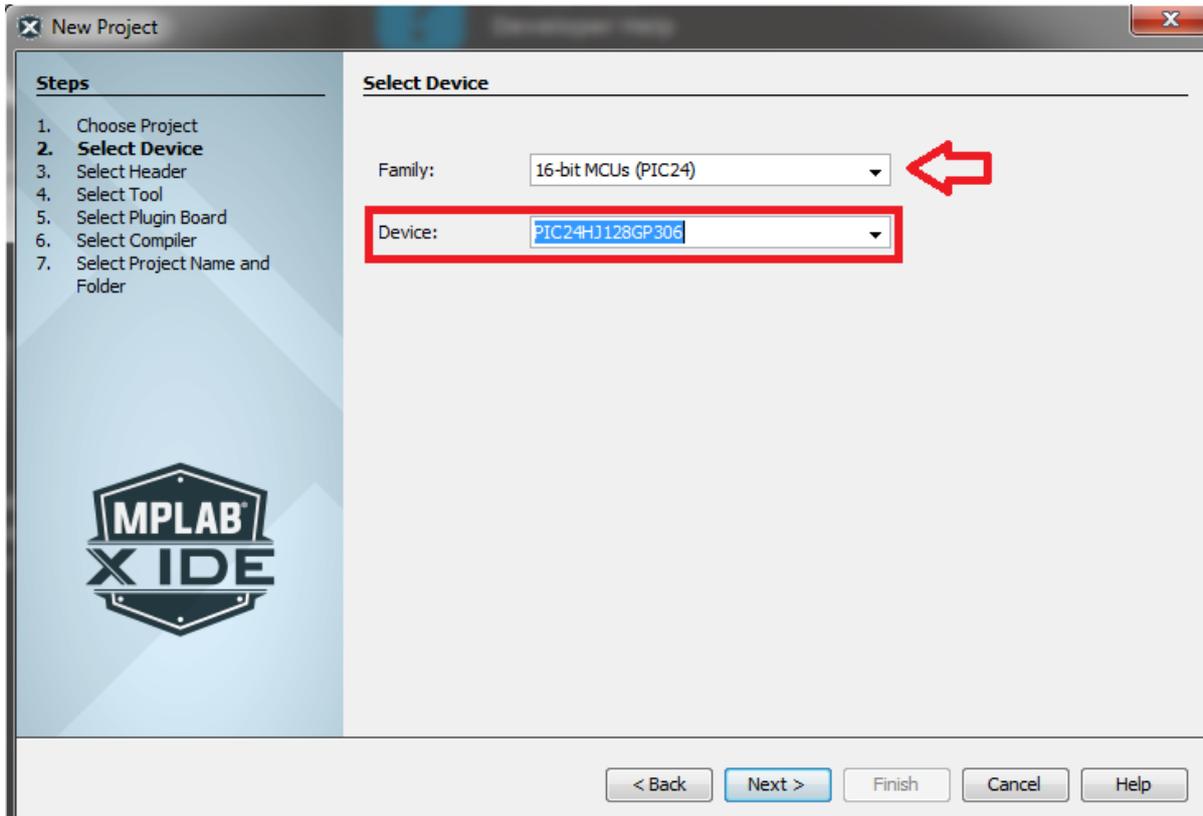
Select the "EL9800PICkit OnBoard Programmer". If this option is not listed, check the USB connection and the correct driver installation.
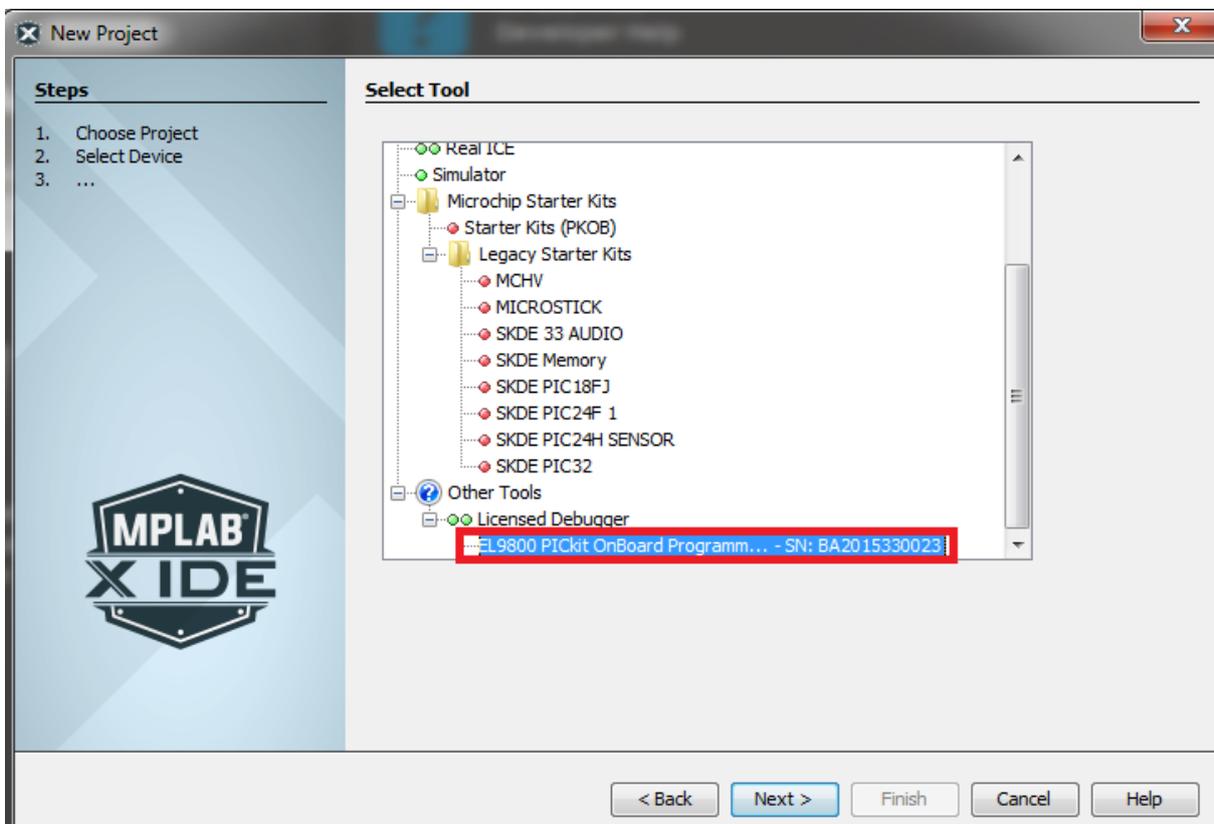
Select the XC 16 compiler
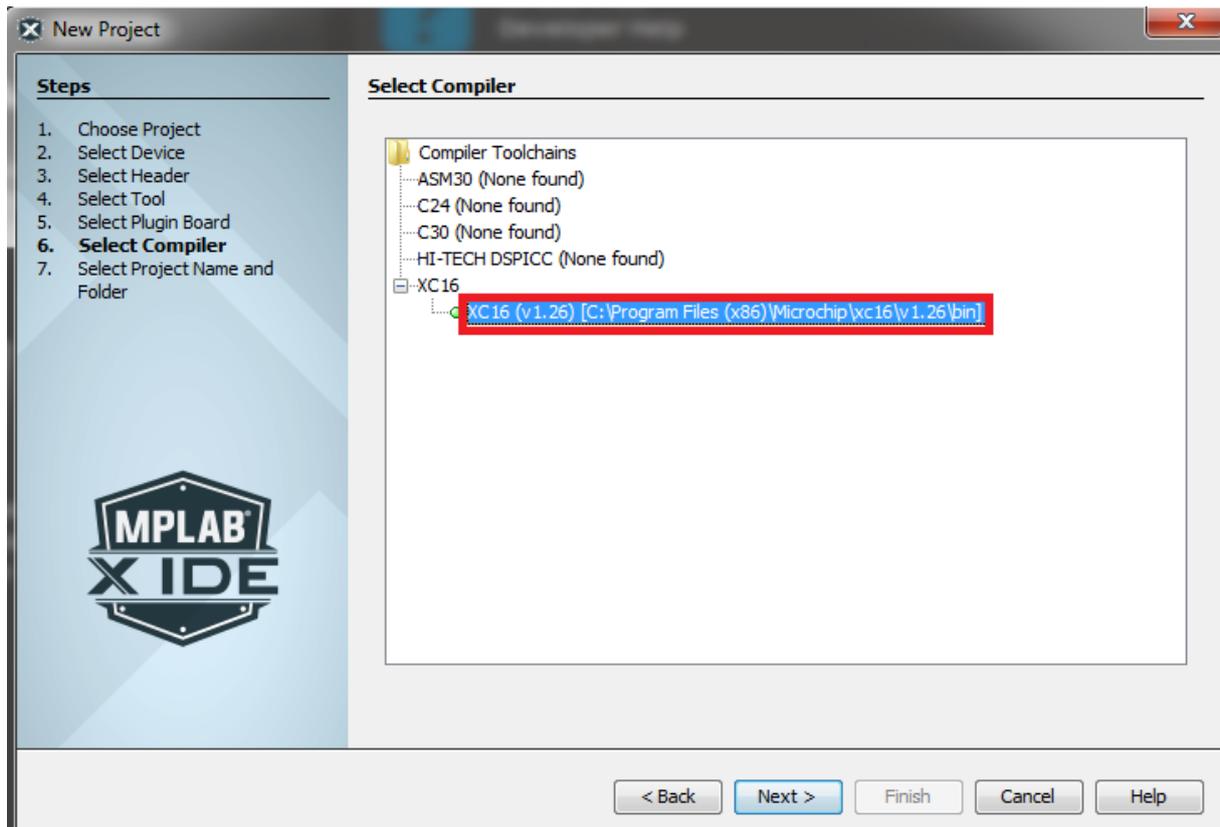
Create the Project in a temporary location (directory and project name are not relevant):
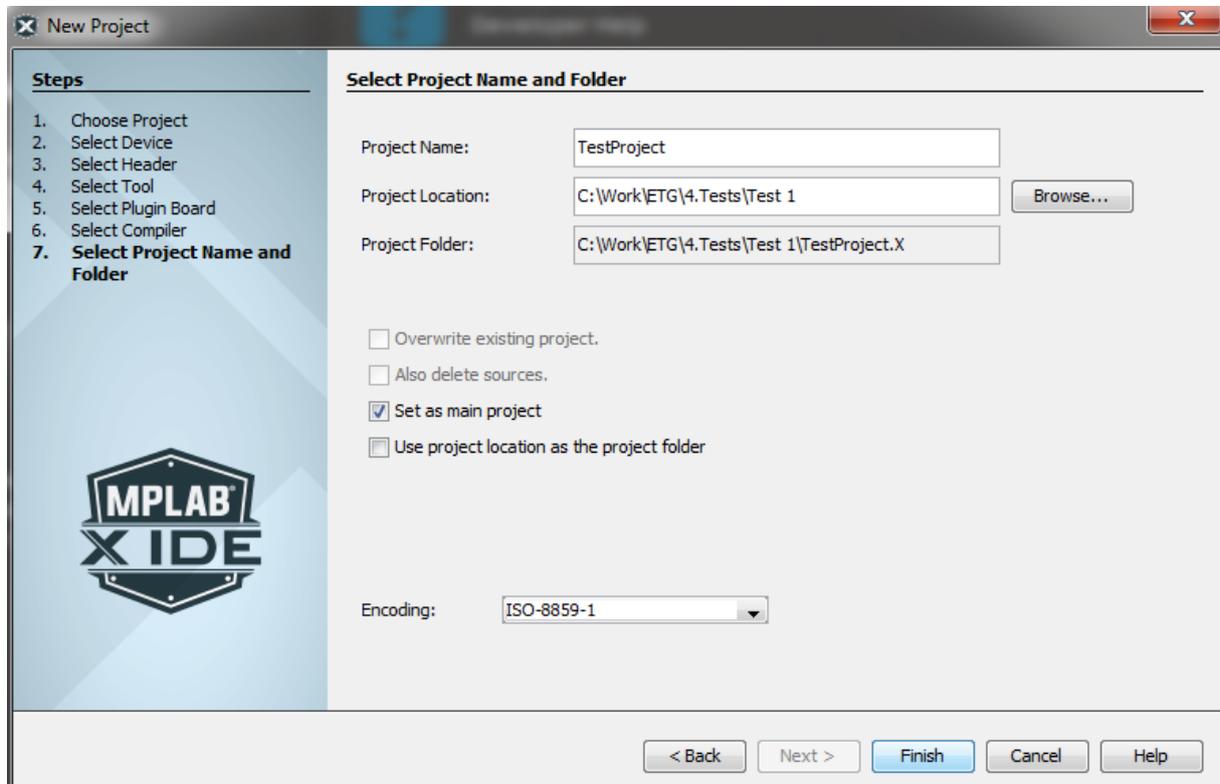
Refresh the debug tool status, and wait until the output interface reports correct connection (a new firmware version will be automatically installed if needed during the process).
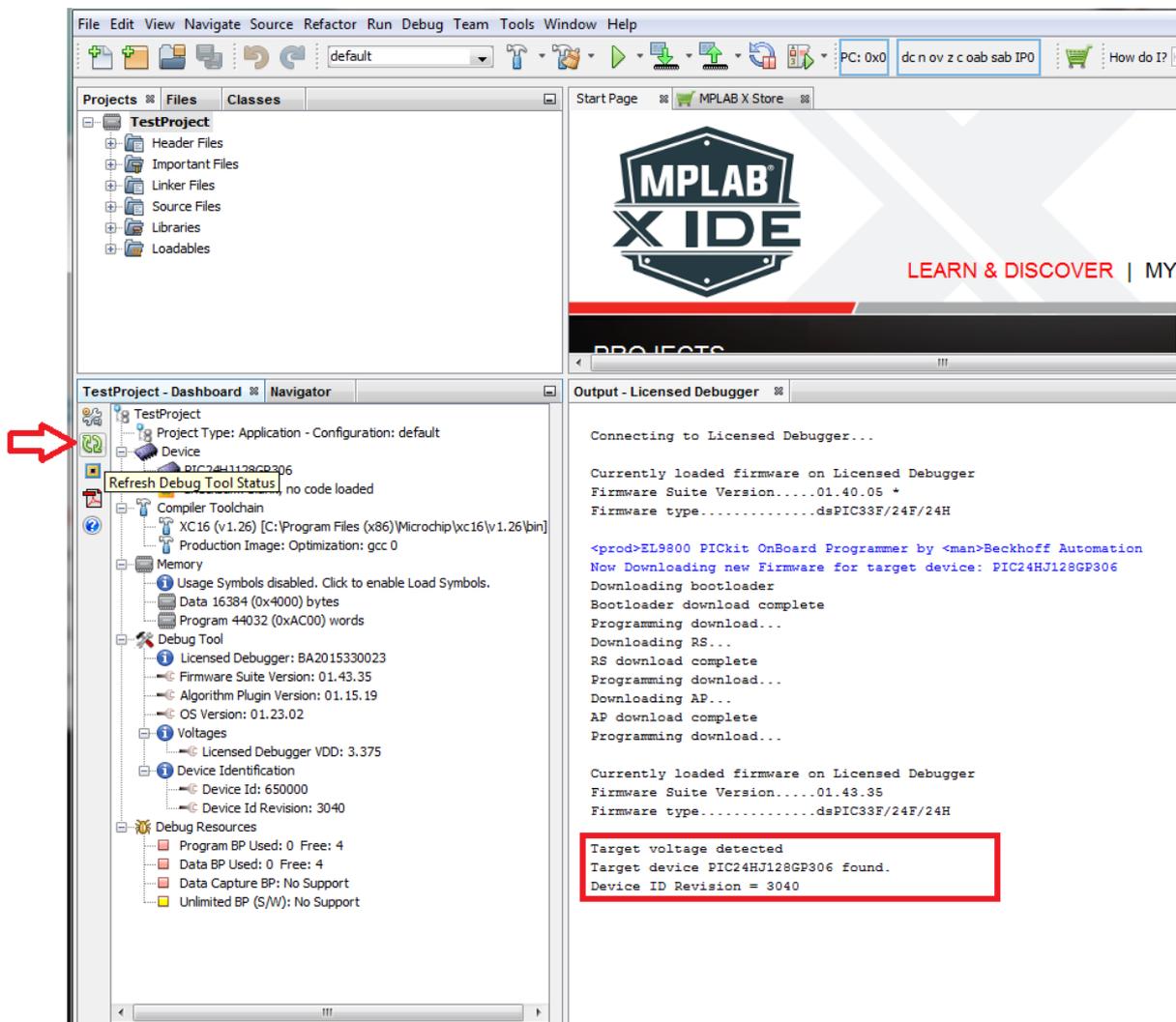
This confirms a correct communication between MPLAB X IDE and the Evaluation Kit.

5   Installation - TwinCAT

The TwinCAT software can be installed free-of-charge for a 7-day trial period. The trial can be extended for an arbitrary number of times - always in 7-day steps - without re-installing the entire software (only a displayed 5-digit code shall be copied in order to restart the trial license).

5.1   TwinCAT development environment + runtime

The installation file for TwinCAT can be downloaded by the website www.beckhoff.com. Select "Download" at the top of the page:
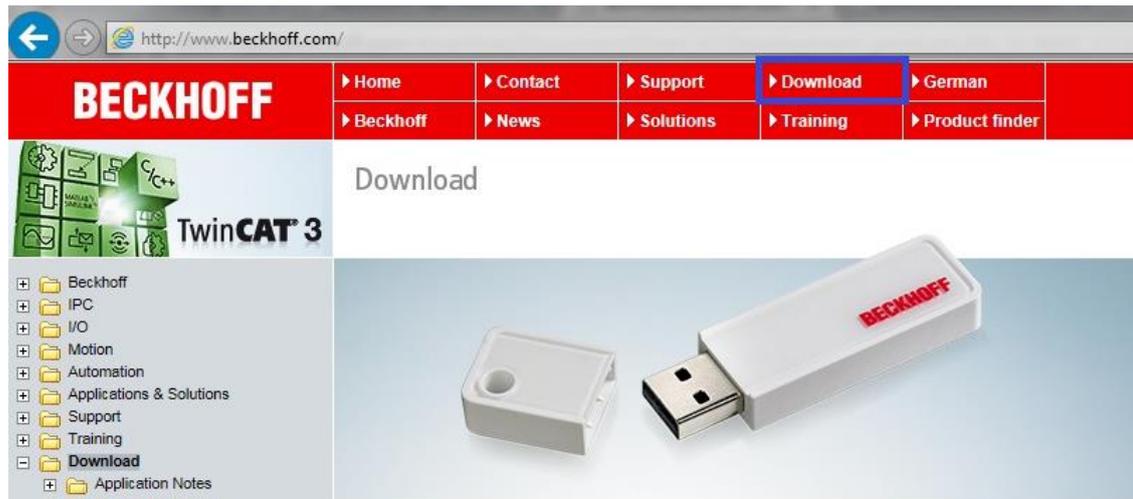
Select the **TE1xxx | Engineering** version:
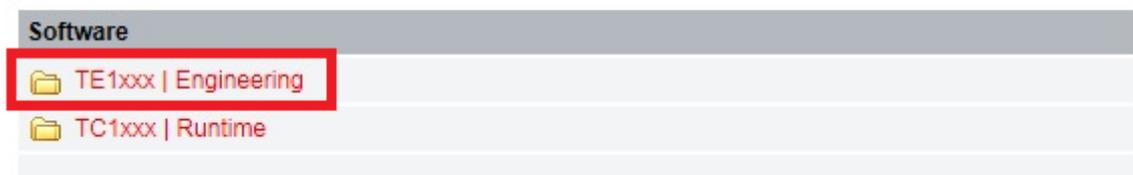
NOTE : Take care not to install the "Runtime" version: this installation version will not provide the TwinCAT development environment, which is instead needed to test the EtherCAT communication.

NOTE : This Installation Guide refers to TwinCAT 3.1, which is compatible both with 32-bit and with 64-bit Windows Operating Systems. For those who already installed TwinCAT 2 runtime on their 32-bit PC, the installation of TwinCAT 3.1 will not be necessary. Please be sure in this case to have installed the latest build of TwinCAT 2.11 R3. Do not install the TwinCAT 2.11 x64 Engineering version on a 64-bit PC, as this version contains only the development environment for TwinCAT 2 and not the runtime (in case of Windows 64-bit, only TwinCAT 3.1 can be used).

Select the installation file for **TwinCAT 3.1**:

The download can be performed as Guest (the personal/company data provided are intended for information purposes only):

NOTE : if you are working with Windows 7 Operating System or later, always perform the installation by selecting **Run as Administrator**:
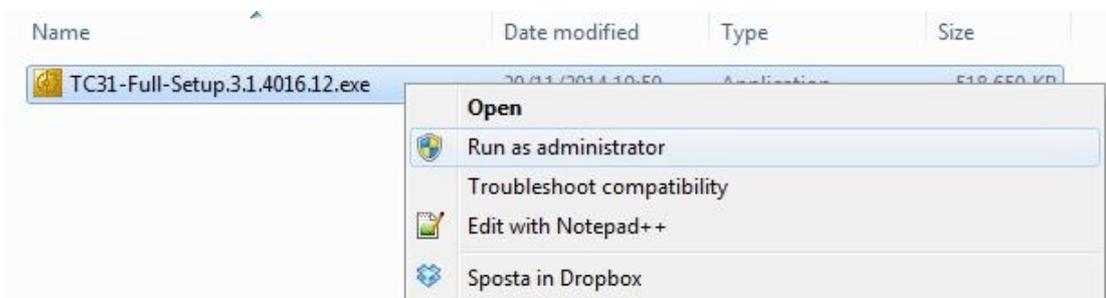
5.2   Real-Time Ethernet Driver

In order to use the standard PC network card of a PC as EtherCAT Master, an additional Real-Time Ethernet Driver shall be installed.

The driver can be installed directly from the TwinCAT development environment. Open (the most recent version of) Visual Studio from the TwinCAT icon located on the Windows task bar:
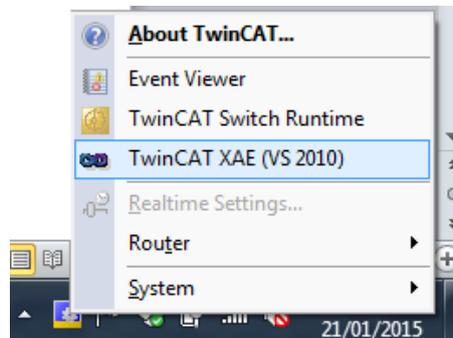
Select the menu "TwinCAT" → "Show Realtime Ethernet Compatible Devices…". All the network cards of the PC where the Real-Time Ethernet Driver was not yet installed will be listed either under "Compatible devices" or under "Incompatible devices".

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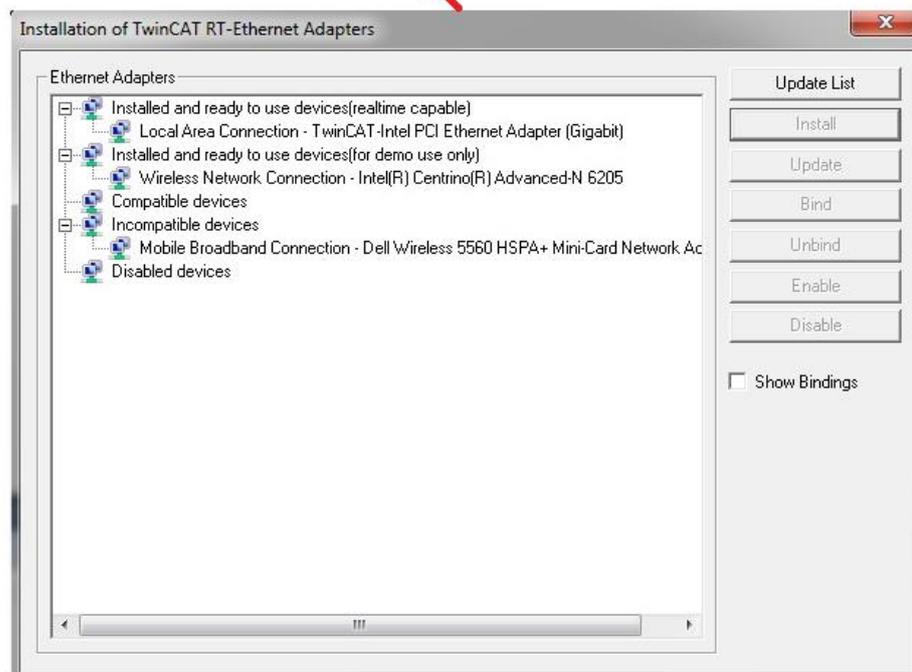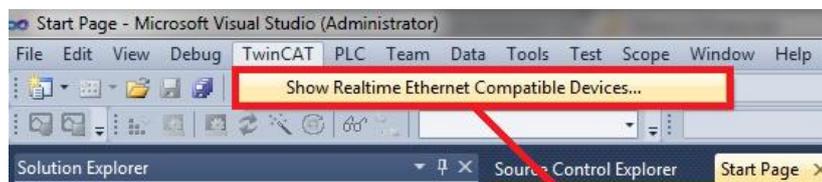
Select the network card that will be used as EtherCAT Master for testing purposes, and click on "Install".
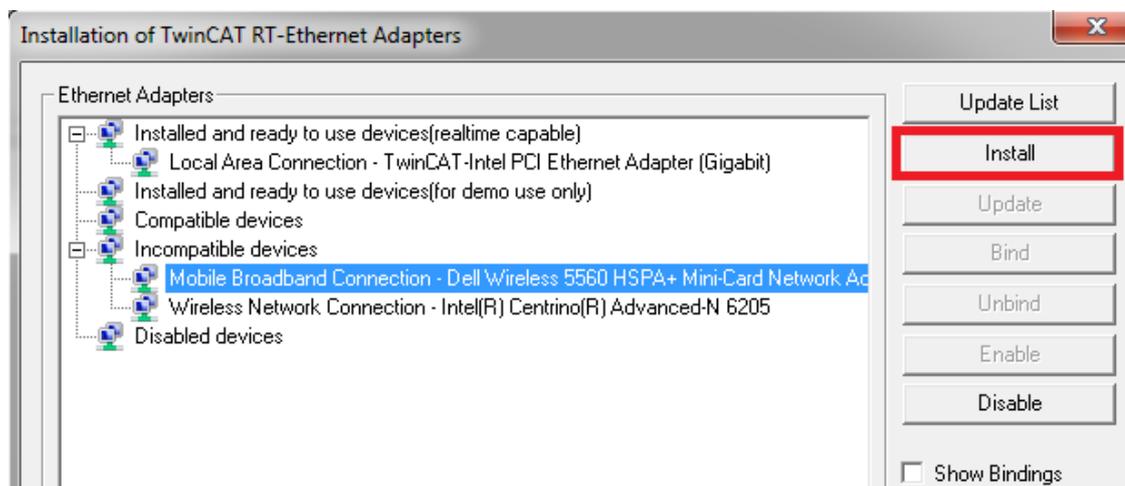
NOTE : If a network card is listed under "Incompatible devices", this does not mean that the card cannot be used as EtherCAT Master for testing purposes. It only means that this card will provide only weak real-time capabilities. For testing purposes this is more than enough, therefore you can proceed with the installation.

If the installation was successfully completed, the network card should have been moved under the "Installed and ready to use devices" list:

- Compatible devices → Installed and ready to use devices (realtime capable)
- Incompatible devices → Installed and ready to use devices (for demo use only)

5.3 Test of the communication

Connect the Evaluation Kit to the PC network card where the Real-Time Ethernet Driver was installed with a standard Ethernet cable (straight or cross), and power-on the Evaluation Kit.

Create a new TwinCAT project by selecting the corresponding template in Visual Studio (project name and directory are arbitrary):
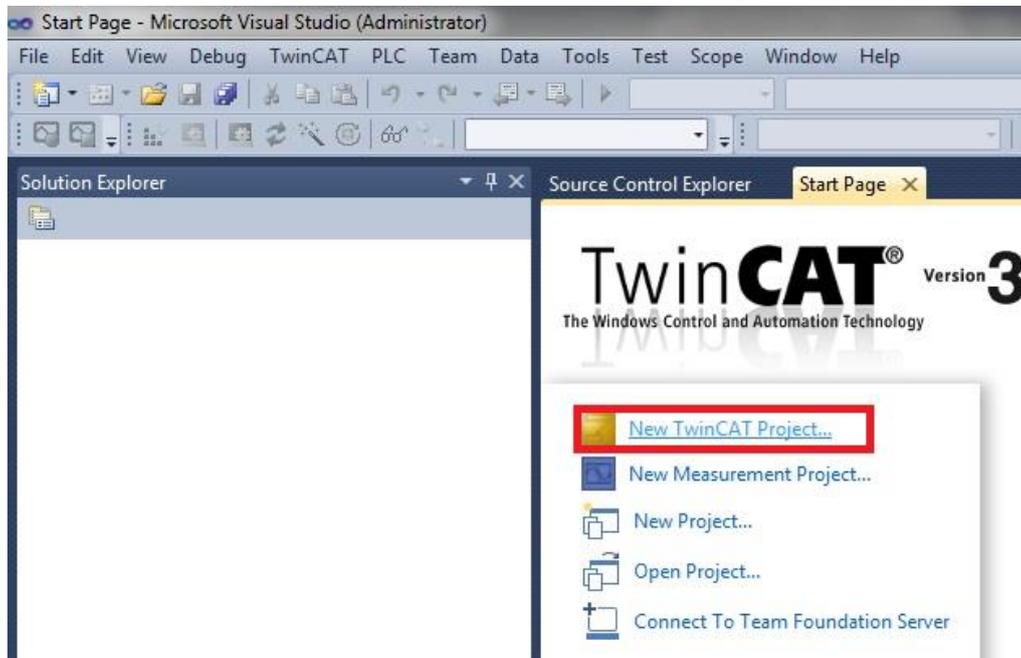
Right mouse-click on "I/O" → "Devices" and select "Scan".
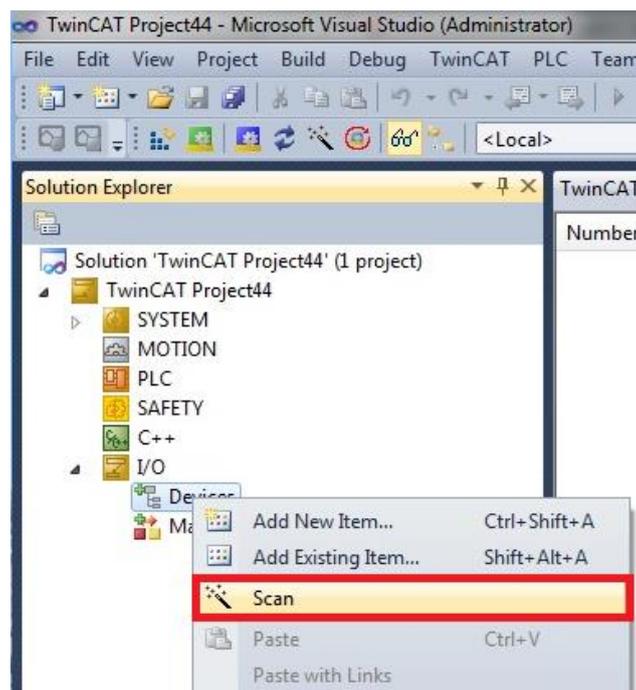
Confirm the message, which is always shown by TwinCAT when automatically scanning the hardware:
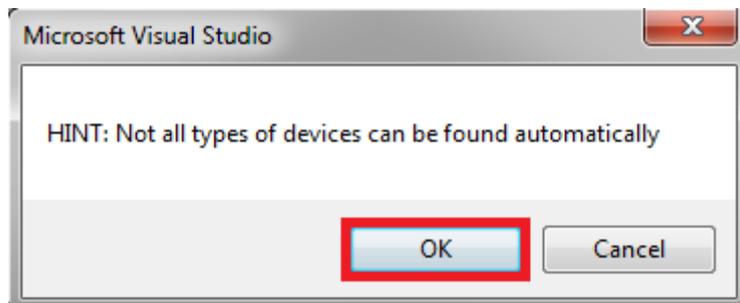
Check that the network card where the Real-Time Ethernet Driver was installed is marked as "Device n (EtherCAT)", then select "OK" (if other Devices are shown, deselect them).
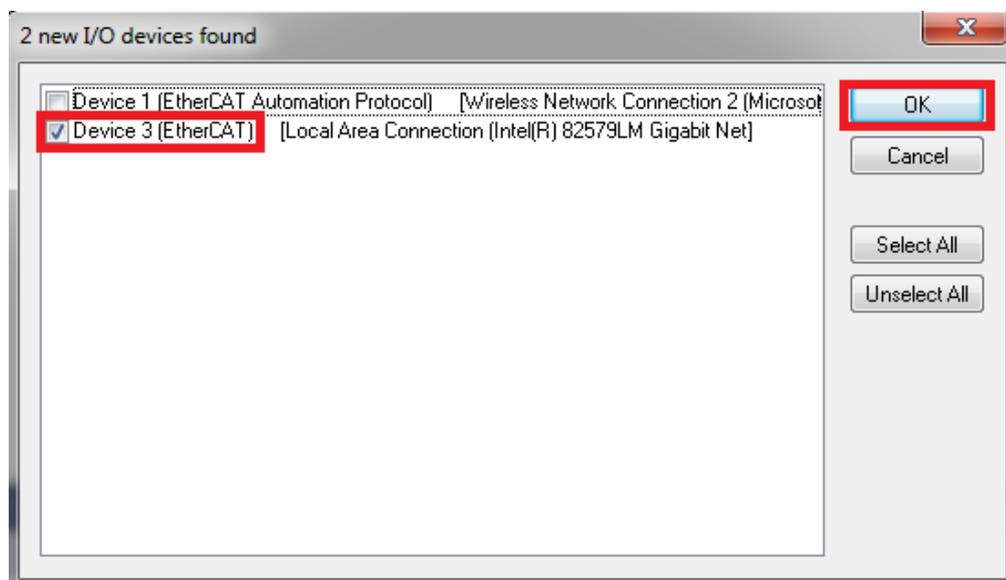
Request scan of Slave devices:
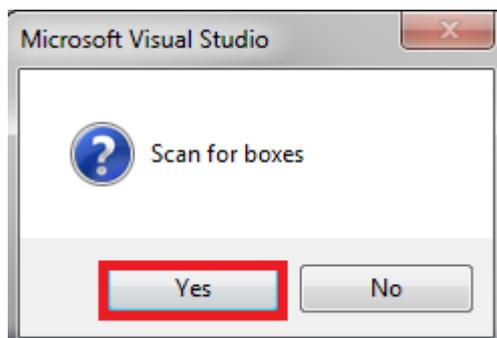
In case the following pop-up appears, just confirm it:
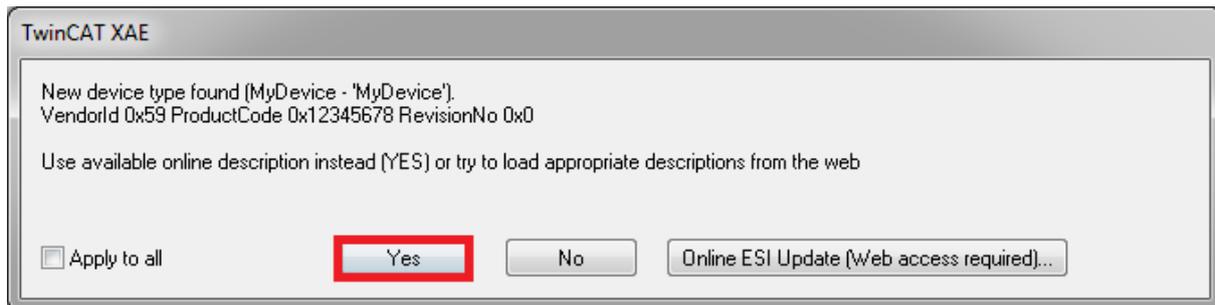
Check that one Slave device was detected and automatically added to the tree configuration under the EtherCAT Master:
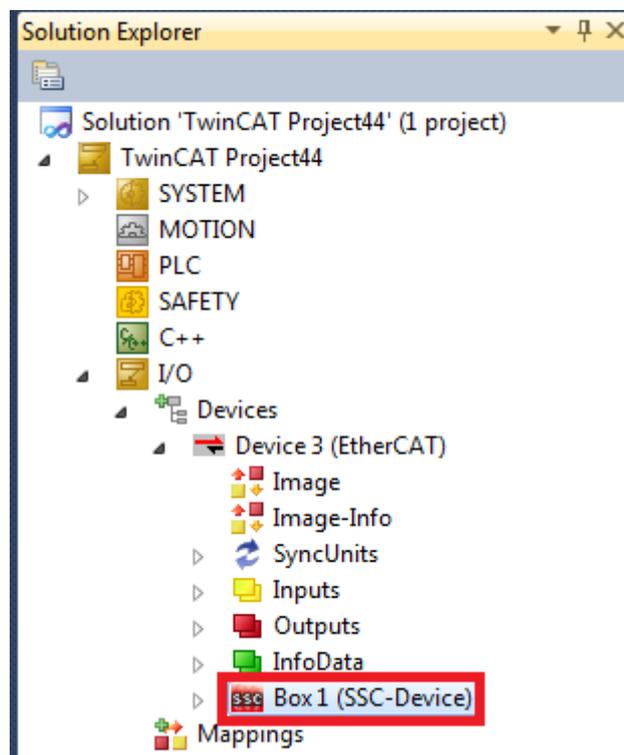
NOTE : The particular icon and name of the detected device are not relevant, as they depend on the previous status of the Evaluation Kit. The important thing is that a slave "Box m (xxxx)" is detected.

This confirms a correct communication between TwinCAT and the Evaluation Kit.

6   Installation - Additional Tools

- Microsoft Excel® 2013 or later is required
- Wireshark should be installed (https://www.wireshark.org/download.html).