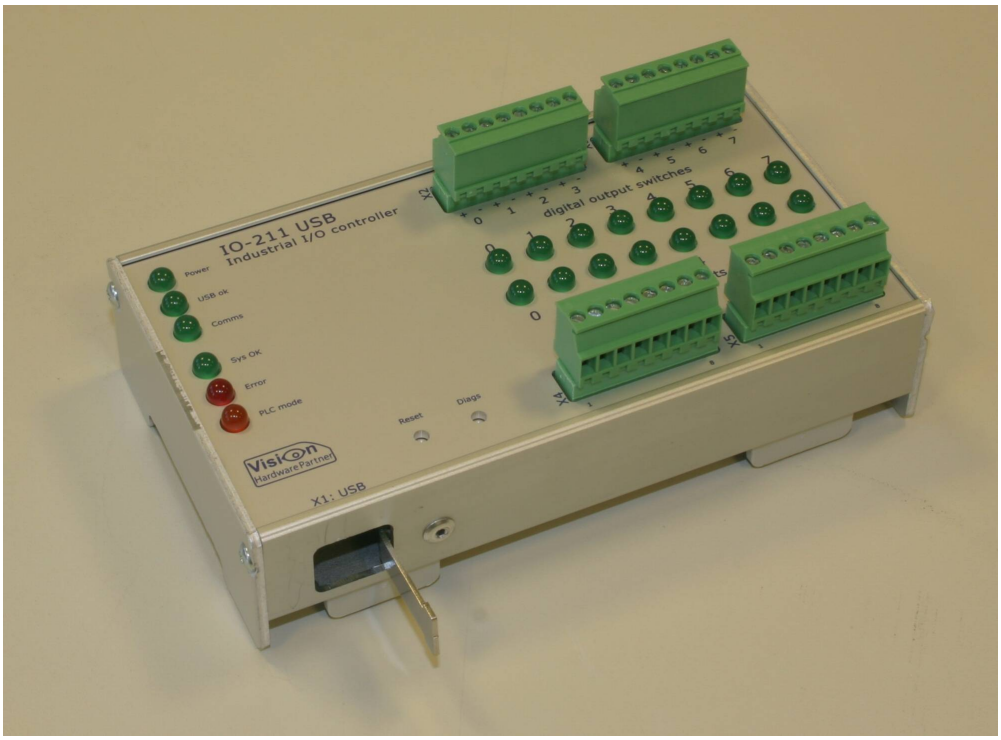


(Image for illustrative purposes only)

User manual

IO211

Product no:	1024_02
Versions:	V1.x.x
Release date:	2 Sep 2011
	Vision Hardware Partner Bolderweg 2 1332AT Almere The Netherlands www.VisionHardwarePartner.nl info@VisionHardwarePartner.nl

Foreword / disclaimer

This documentation has been prepared with the most possible care. However, Vision Hardware Partner does not take any liability for possible errors in the documentation.

In the interest of progress, Vision Hardware Partner reserves the right to perform technical changes without further notice.

Please notify Vision Hardware Partner (support@VisionHardwarePartner.nl) if you become aware of any errors in this manual or if a certain topic requires more detailed documentation.

This manual is intended for users of Vision Hardware Partner products only. Any publication of this document or parts thereof requires written permission by Vision Hardware Partner.

Your feedback is appreciated

Dear user,

Vision Hardware Partner has a rich experience of using machine vision products in industrial environments. We try to use this experience to create products which are robust, easy to use and suit your requirements while still being affordable.

However, not all applications are the same and not all users have the same requirements. In order to make sure that the needs of as many as possible customers are served it is important to keep in touch with them. So if you can spare a minute please tell us what you do and do not like about our product. This way you will help us to keep on improving our solutions for your machine vision challenges.

You can do this by sending a e-mail to feedback@VisionHardwarePartner.nl.

Thanks in advance.

Table of Contents

1 Introduction

1.1 Product overview

The USB I/O-211 is a rugged, versatile I/O device which communicates over USB.
It features 8 digital inputs and 8 digital outputs which can be configured to facilitate various applications.
The available modes include digital I/O, input counters and output pulse patterns.

With this variety of options available, the I/O-211 is capable of monitoring and controlling many different processes and applications.

The I/O-211 comes with Windows drivers and an open source .NET software API. As the I/O-211 has options for event notification, input changes and other events can be automatically sent to the computer and stored locally. The user can then retrieve the status without any communication delays.

1.2 Features

Inputs:

Number of inputs:	8
Type:	fully optically isolated
Voltage range:	3.3-28V DC

Outputs:

Number of outputs:	8
Type:	Solid state switch, fully optically isolated

Input counters:

Number of counters:	2
Max counting frequency:	100KHz

1.3 Basic operation

The IO211can be operated through the supplied .NET API, or through a simple protocol of terminal commands sent, and received through a virtual comm port.

2 Installing the IO-211

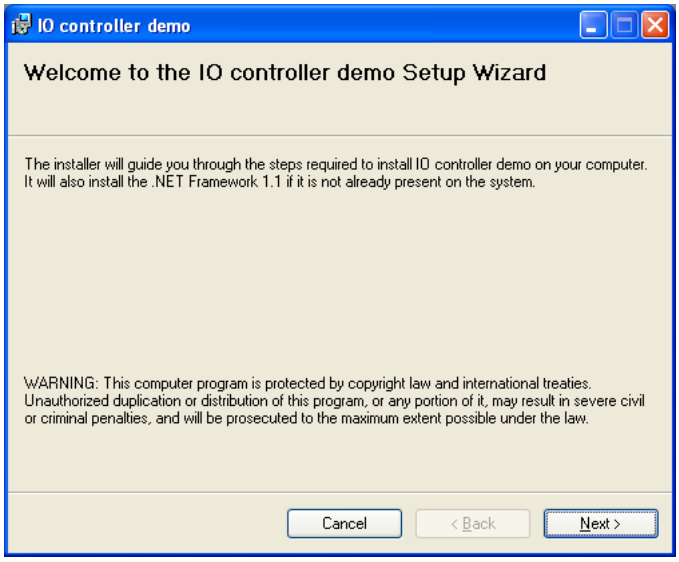
2.1 Installation steps

The following steps assume that the I/O-211 is used on Windows platforms.
Though it is possible to operate the I/O-211 under Linux this document will not cover this subject. Please contact Vision Hardware Partner for more details.

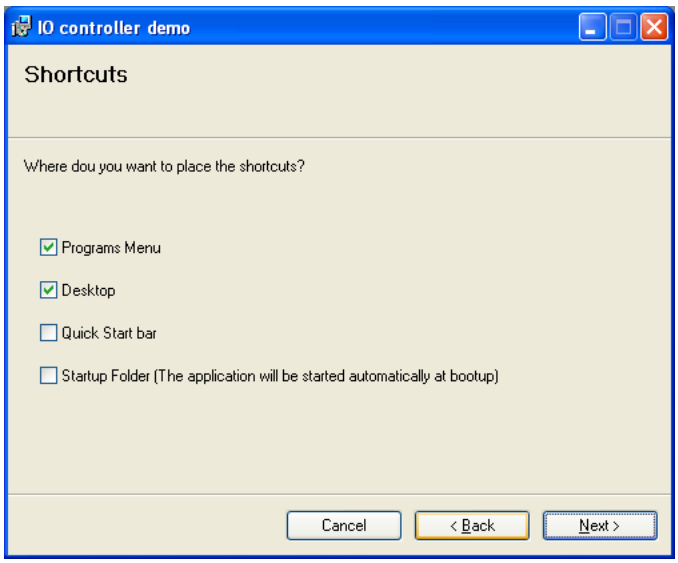
1. **Download the most recent software**: The USB I/O-211 is a dynamic product. Software is updated frequently. We recommended you to download the most recent version of the software from www.Vision Hardware Partner.nl
2. **Install the software**: Follow the steps described in 2.2 to install the software
3. **Connect the I/O-211**: connect the USB cable

2.2 Installing the software package

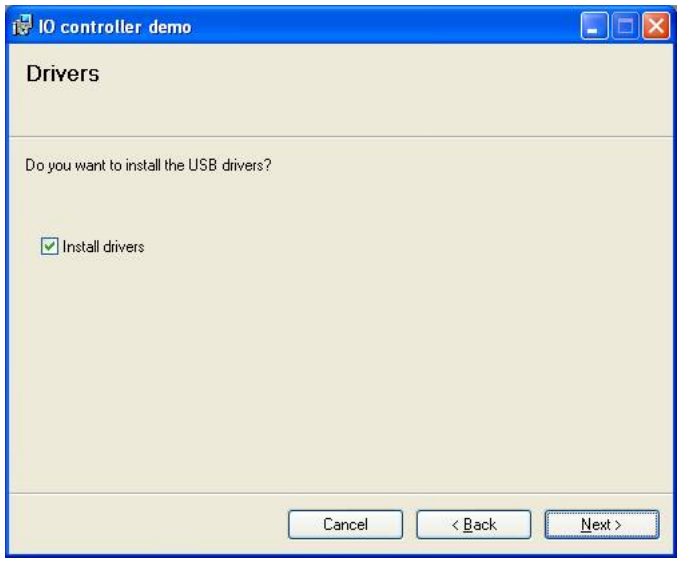
- First unzip the software package to a temporary folder (eg. c:\temp).
- Run the setup.exe
- Go through the installation procedure by following the instructions on the screen



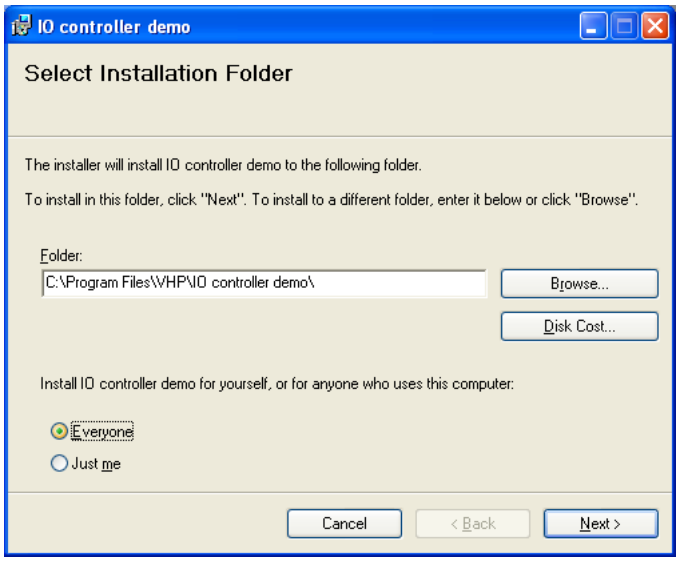
Click “next” here



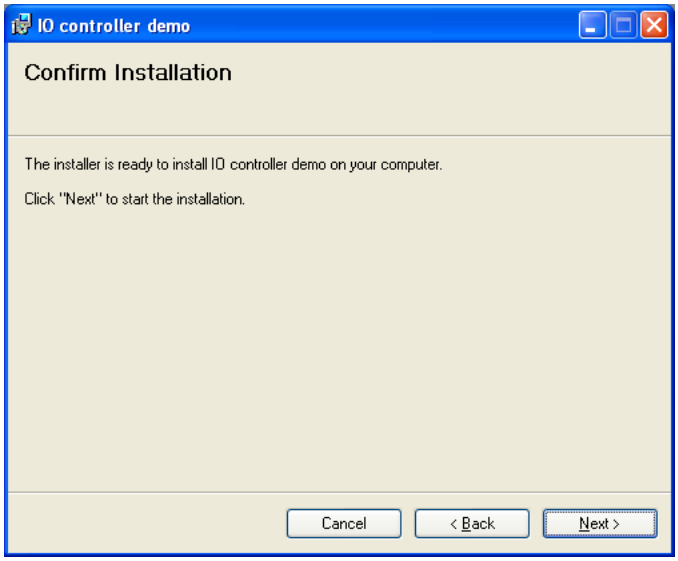
In this step you can select at which locations you want to have the shortcuts. If you plan on not using the IO211 tester program you can deselect all.



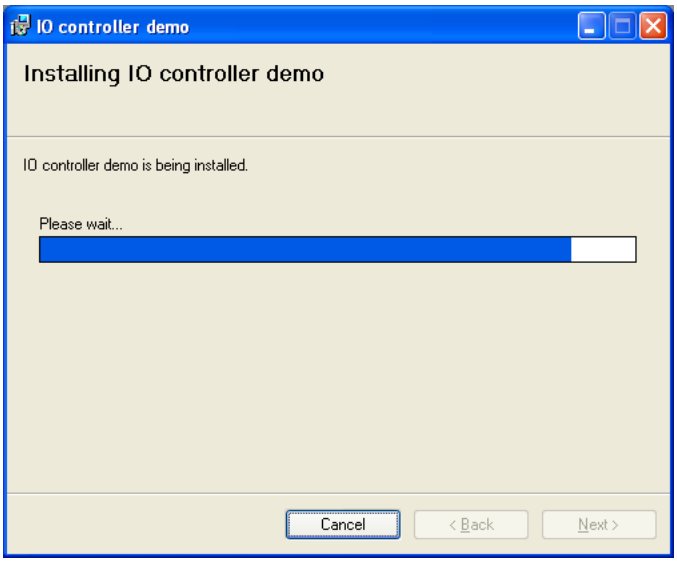
Keep this option selected. Only deselect it if you already have drivers installed and you want to keep those.



Select the “everyone” option at the bottom if you also want to use the IO211 tester program from other user accounts. Then click next.

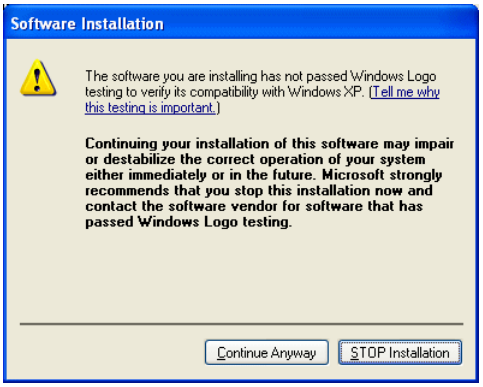


Click next here

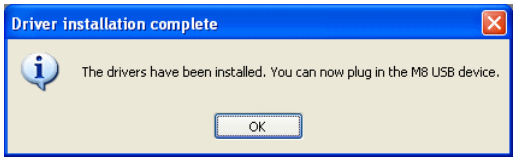


The package will now be installed

The device must only be connected after this step. If you had already plugged it in then unplug it now.



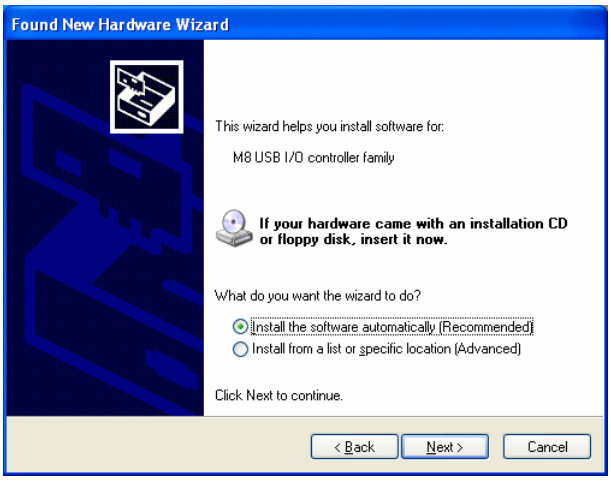
Select “Continue Anyway”



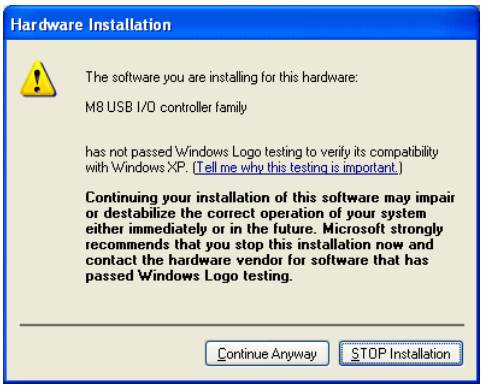
The drivers have been pre-installed now. You can plug in the device at this moment or any time after this.
The instruction assumes that you will connect it at this moment.

Windows discovered that the device was connected

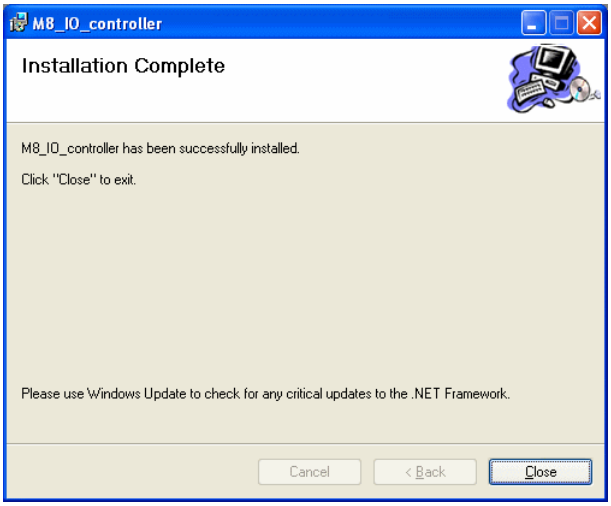
Now the new hardware wizard will start.
Select the option “No, not this time”, the click “next”



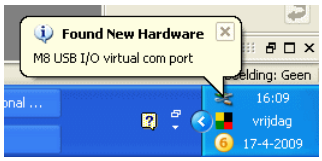
Now select “Install the software automatically” and click “next”



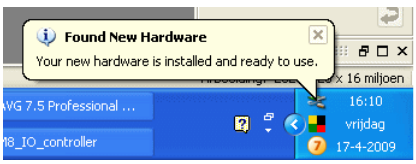
Click “continue anyway”



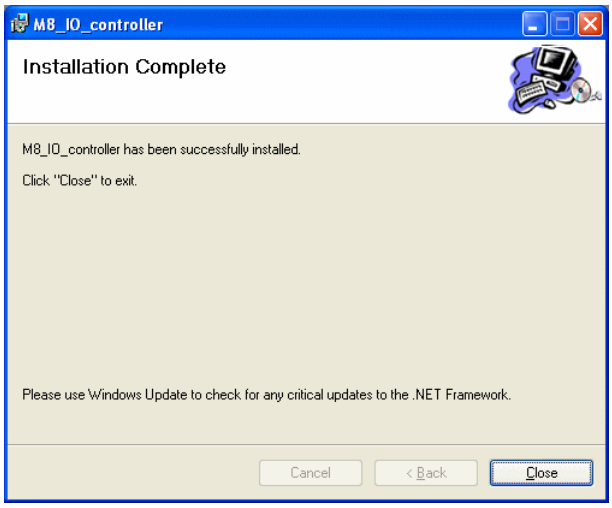
The drivers for the IO211 are now installed.



An extra driver will be installed in order to be able to communicate to the IO211 through a virtual com port. Follow the same 4 steps again as described above.



This notifies you that the device was successfully installed.

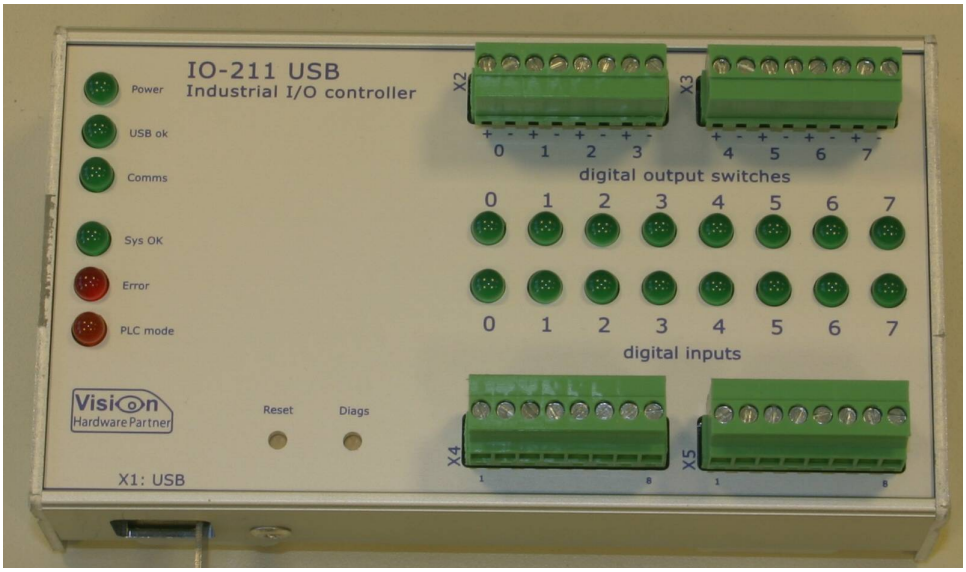


This notifies you that the software package was successfully installed.

You can now run the IO211 tester tool.

Also (assuming that you chose to install to the default location) the files necessary for software development can be found at: **C:\Program Files\VHP\IO_controller**

3 connections and indicators



3.1 Connectors

Connectors are indexed on the front panel by the Xn numbers at the left of each connector, except for X1: USB, which is indicated at the lower left of the front panel.

Pin numbers are indicated above the higher connectors, and below the lower connectors.

3.1.1 Inputs

8 digital inputs are connected over X4 and X5.

All inputs are fully isolated. This means that in all cases both + and - will have to be connected.

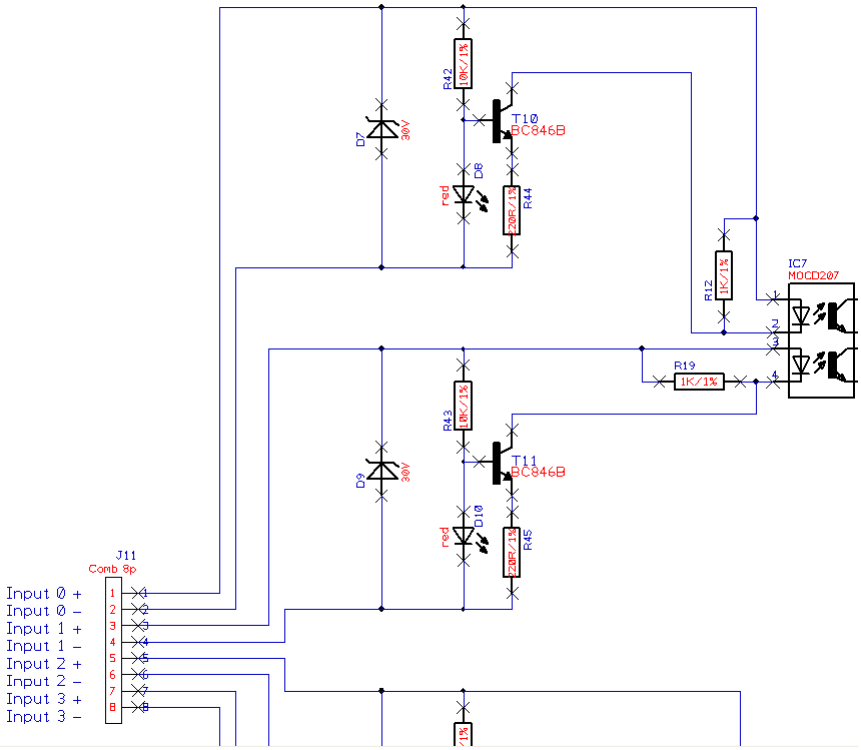
Inputs will need at least 3V and 4mA to signal a high level. Each input has a current limit, allowing a maximum current of 8mA.

X4: Input 0 -3

Pin	Signal	Description
1	Input 0+	
2	Input 0-	
3	Input 1+	
4	Input 1-	
5	Input 2+	
6	Input 2-	
7	Input 3+	
8	Input 3-	

X5: Input 4-7

Pin	Signal	Description
1	Input 4+	
2	Input 4-	
3	Input 5+	
4	Input 5-	
5	Input 6+	
6	Input 6-	
7	Input 7+	
8	Input 7-	



Schematic of input circuit

3.1.2 Outputs

8 solid state output switches are connected over X2 and X3.

All outputs are fully isolated. This means that in all cases both + and - will have to be connected.

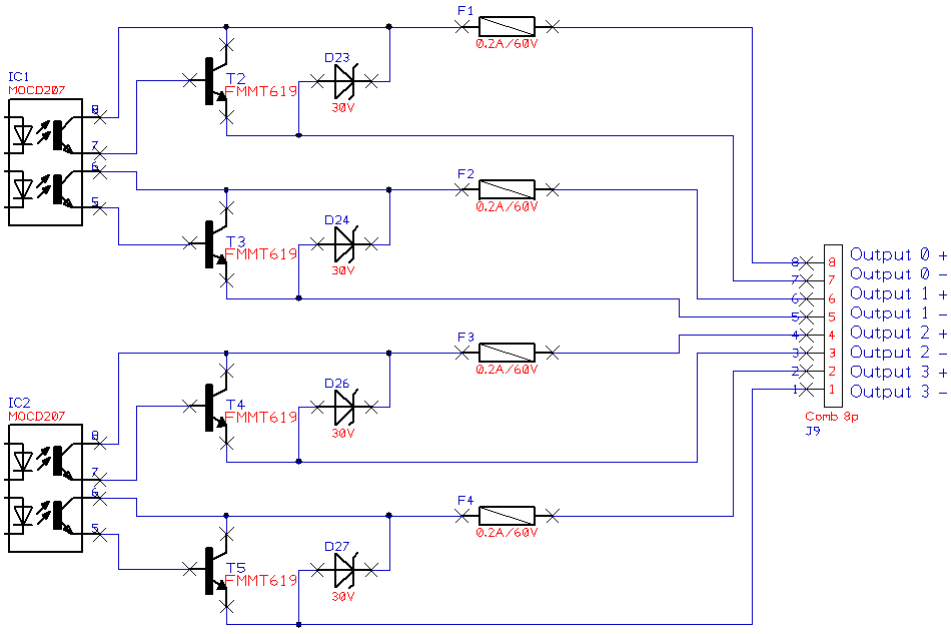
Each output is fitted with a 0.2A auto-reset fuse. This fuse will trip on an over current condition, and automatically reset when the load is removed for about 10 seconds.

X2: Output 0 -3

Pin	Signal	Description
1	Output 0+	
2	Output 0-	
3	Output 1+	
4	Output 1-	
5	Output 2+	
6	Output 2-	
7	Output 3+	
8	Output 3-	

X3: Output 4-7

Pin	Signal	Description
1	Output 4+	
2	Output 4-	
3	Output 5+	
4	Output 5-	
5	Output 6+	
6	Output 6-	
7	Output 7+	
8	Output 7-	



Schematic of the output circuit

3.2 Indicators

Indicator	Description
Power	Lights when the controller is powered.
USB OK	Lights when the USB connection is functioning correctly.
Comms	Lights when a message is sent / received over USB
Sys OK	Lights and gives a short blink each 3 seconds to indicate that the controller is running.
Error	Will light when an error is detected. Will remain on when a fatal error was detected.
PLC mode	Currently not implemented. Will light when the I/O-211 has some event based output functions set. In this mode outputs may be set based on events rather than on PC input
Inputs	Will light when a logic high level is detected on the corresponding input
Outputs	Will light when an output is switched on.

3.3 Buttons

The buttons can be pushed by using a pencil, or small screw driver.

Reset:
The reset may be used to reset the I/O-211 in the unlikely case that it stops responding.
Reset can also be used to test the communication channel. When the button is pushed the IO211 will send “!REBOOT”

Diags:
Activates a test sequence in which each output is set on and off one after each other.

4 Using I/O-211 functionality

4.1 Controlling the IO211

Currently there are two ways of controlling the I/O-211. The .NET class library and by directly communicating the protocol to the device.

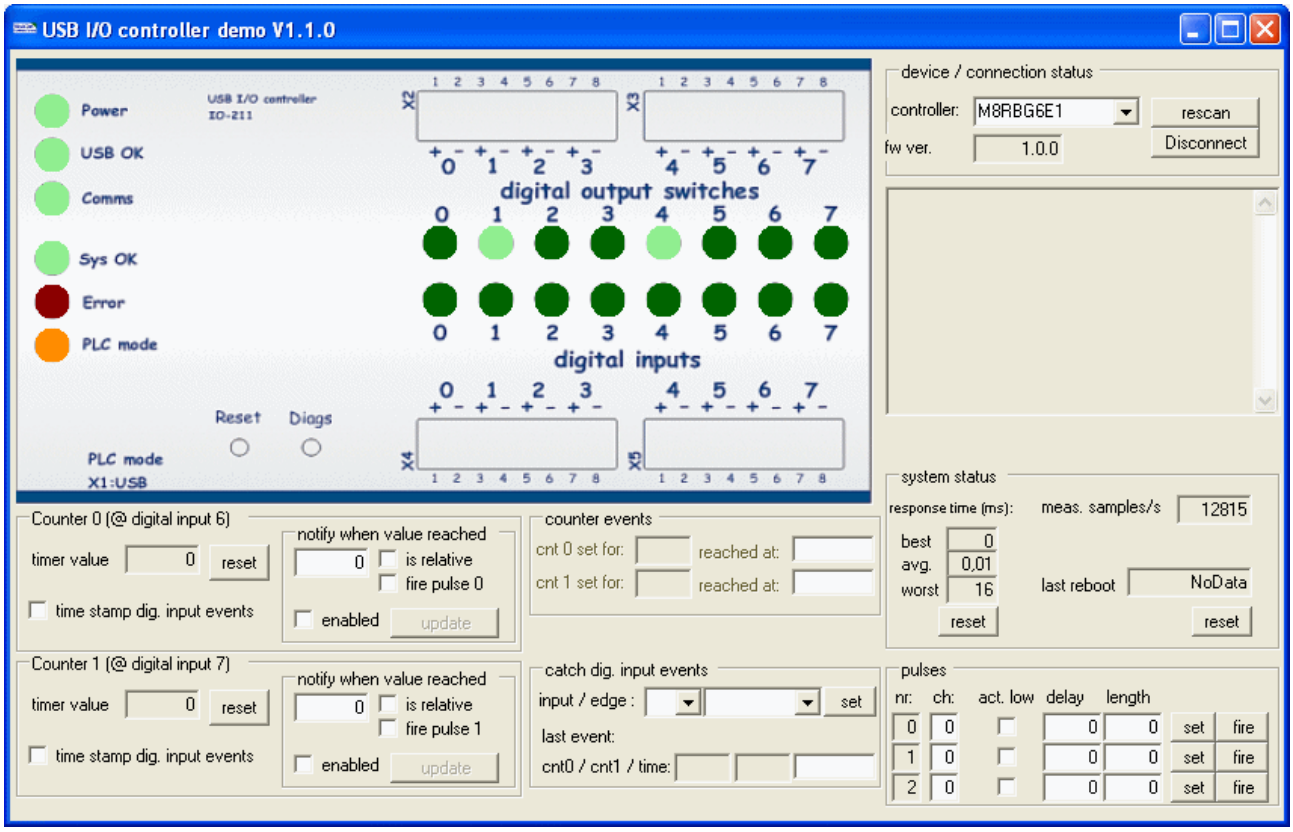
4.1.1 .Net Class library

This would be the preferred way to go for .Net developers. The class library is available with the installation package in both a DLL and the source code. The demo program (Source code available) will give a good impression of how to use the class library. Please contact Vision Hardware Partner for support on developing with the .Net Class library.

4.1.2 Direct communication

Direct communication can be used by developers that want to have 100% control over the PC software. They can connect to the device through the virtual comm port, or through the USB direct drivers and then generate the and decode the protocol themselves.
A detailed description can be found in the protocol manual.

4.2 The IO211 demo tool



The demo tool is the quickest way how to learn about the IO211s functionality. The code is provided with the software package. This will allow the developer to test all functionality and to see how it would be connected to his own application.

5 Specifications

5.1 Electrical

USB / Supply power	Power	All Through USB. Max Current 500mA
Digital inputs	Low level voltage	< 1.5V
	High level voltage	> 3.0V
	Safe operating range	- 0.5V ... 30V
	Input current	8 mA max
	Galvanic separation	500V
Digital Outputs	Max voltage	28V
	On state voltage drop	<=1V
	Max switching current	200mA
	Galvanical seperation	500V

5.2 Timing

A number of factors will influence the time between an input change and the moment that it will be signalled by software on the PC.

The total time between any event happening on the IO211 and the notification on the PC application is usually well below 0.2mS. However if either the PC or the USB bus are heavily loaded, Messages can be delayed 16 or in rare cases even 64ms. As IO211 relies on the Windows USB engine special care has to be taken has to be taken when real time response is demanded. Contact Vision Hardware Partner for details.

5.2.1 Digital Inputs

Input changes are detected by the IO211 firmware within 100-200µS. When the notify option option is enabled, a notification to the PC will be generated immediately and queued for USB communication. This message will typically arrive within 100µS.

If an output needs to be set in response to an input event, it is also possible to program a reflex operation in the IO211. This will eliminate the USB / PC reaction latency.

5.2.2 Digital outputs

Output can be set either by issuing software commands, or by setting a reflex operation on the IO211.
A reflex operation is carried out in well below 100µS.
A command from the application is typically also carried out in 100µS, however, depending on the load on the CPU and USB bus this can take 16 or in rare cases upto 64mS

5.2.3 Input counter

Pulses on the input counter can be counted at a frequency up to 100Khz.

A trap can set to notify the user application or certain counter values. This notifier will typically reach the application in well under 0.2mS.