



(Image for illustrative purposes only)

User manual

I0211

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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.



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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
Туре:	fully optically isolated
Voltage range:	3.3-28V DC
Outputs:	
Number of outputs:	8
Туре:	Solid state switch, fully optically isolated
Input counters:	
Number of counters:	2
Max counting frequency:	100KHz

1.3 Basic operation

The IO211 can 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.

- 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 <u>www.Vision Hardware</u> <u>Partner.nl</u>
- 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. <u>c:\temp</u>).
- Run the setup.exe
- Go through the installation procedure by following the instructions on the screen

🕫 10 controller demo
Welcome to the IO controller demo Setup Wizard
The installer will guide you through the steps required to install IO controller demo on your computer. It will also install the .NET Framework 1.1 if it is not already present on the system.
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Cancel < Back Next >

Click "next" here



1 IO controller demo
Shortcuts
Where dou you want to place the shortcuts?
Programs Menu
✓ Desktop
Quick Start bar
Startup Folder (The application will be started automatically at bootup)
Cancel < <u>B</u> ack <u>N</u> ext >

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.

🛃 10 controller demo					
Drivers					
Do you want to install the USB drivers?					
🗹 Install drivers					
	Ca	incel	< <u>B</u>	ack	<u>N</u> ext >

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



🕴 IO controller demo
Select Installation Folder
The installer will install IO controller demo to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
<u>F</u> older:
C:\Program Files\VHP\IO controller demo\ Browse
Disk Cost
Install ID controller demo for yourself, or for anyone who uses this computer
⊖ Just <u>m</u> e
Cancel < Back Next >

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

🙀 10 controller demo	
Confirm Installation	
The installer is ready to install ID controller demo on your computer.	
Click "Next" to start the installation.	
Cancel (Back)	Next >

Click next here



🛃 10 controller demo			
Installing IO controller	demo		
IO controller demo is being installed.			
Plassa wait			
	Cancel	< <u>B</u> ack	Next >

The package will now be installed

Unplug	M8 USB devices 🛛 🔀
⚠	Please make sure that all M8 USB devices have been unplugged.
	ОК

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

Softwar	e Installation
1	The software you are installing has not passed Windows Logo testing to verify its compatibility with Windows XP. (<u>Tell me why</u> <u>this testing is important</u>) Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the software vendor for software that has passed Windows Logo testing.
	Continue Anyway

Select "Continue Anyway"

Driver i	nstallation complete
(į)	The drivers have been installed. You can now plug in the M8 USB device.
	OK

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"

Found New Hardware Wizard		
	This wizard helps you install software for: M8 USB 1/O controller family If your hardware came with an installation CD or floppy disk, insert it now. What do you want the wizard to do?	
	Install from a list or specific location (Advanced)	
	Lick Next to continue.	
	< <u>B</u> ack Next≻ Cancel	

Now select "Install the software automatically" and click "next"



Hardware Installation			
1	The software you are installing for this hardware: M8 USB I/O controller family has not passed Windows Logo testing to verify its compatibility with Windows XP. (<u>Tell me why this testing is important</u> .) Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.		
	Continue Anyway		

Click "continue anyway"

i∰ M8_I0_controller		
Installation Complete		
M8_IO_controller has been successfully installed.		
LICK LIUSE IO EXIL		
Please use Windows Update to check for any critical updates to the .NET Framework.		
Cancel < <u>B</u> ack	<u>C</u> lose	

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.



i∰ M8_I0_controller		
Installation Complete		
M8_10_controller has been successfully installed.		
Click "Close" to exit.		
Please use Windows Update to check for any critical updates to the .NET Framework.		
Cancel < <u>B</u> ack	<u>C</u> lose	

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.

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-	

X4: Input 0 -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-	



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.

🖴 USB I/O controller demo V1.1.0	
Power USB I/O controller N 1 2 3 4 5 6 7 8 USB OK USB OK 0 1 2 3 4 5 6 7 8 Comms 0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7	device / connection status controller: M8RBG6E1 rescan fw ver. 1.0.0 Disconnect
Sys OK Error PLC mode X1:USB O Sys OK e e e e e e e e	system status
Counter 0 (@ digital input 6) notify when value reached counter events timer value 0 reset is relative fire pulse 0 fire pulse 0 cnt 1 set for: reached at: time stamp dig. input events enabled update	response time (ms): meas. samples/s 12815 best 0 avg. 0,01 worst 16 last reboot NoData reset reset
Counter 1 (@ digital input 7) notify when value reached catch dig. input events timer value 0 reset 0 is relative time stamp dig. input events fire pulse 1 last event: cnt0 / cnt1 / time:	pulses nr: ch: act. low delay length 0 0 0 0 set 1 0 0 0 set 2 0 0 0 set

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 /	Power	All Through USB. Max Current 500mA
Supply power		
	Low level voltage	< 1.5V
Digital inputs	High level voltage	> 3.0V
	Safe operating range	- 0.5V 30V
	Input current	8 mA max
	Galvanic separation	500V
	Max voltage	28V
Digital Outputs	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 100-200 μ S. 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 100 μ S.

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 100μ S. A command from the application is typically also carried out in 100μ S, 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.