## Manual

## for

# **USB-HV-RACK Interface**





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Α	2008-12-15	USB-HV-Rack Manual
В	2011-3-30	Revise instructions for determining the COM port.
С	2012-9-26	Add auto-detect for COM port

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Part A Software Installation for the USB-HV-RACK module

#### A-1.0 Introduction to Software Installation

This manual describes how to install the drivers for the USB module and how to configure the USB Application Program to recognize the USB port. It covers software installation for a PC -Windows 98, Windows 2000, Windows XP and Windows Vista.

This installation document is contained in the 'C:\Program Files\USB-HV-Rack\Documents' directory and is named "MANUAL-1001.pdf".

## A-2.0 Copy contents of the DVD

The software is supplied on a DVD which must be copied to the PC. Create a folder in the 'C:\Program Files' directory named 'USB-HV-Rack'. Copy the contents of the DVD into this folder.

## A-3.0 Software and Hardware Installation

The install procedure consists three parts. The first part is to install the UV application program and associated files. The second part is to install the Virtual COM Port (VCP) drivers for the USB interface. The third part is to install the VISA driver for the COM port. This third part will normally be done automatically when installing part one. However, if problems are encountered when trying to run the USB application program, this third part may have to done explicitly.

These three parts are described in sections A-3.1 through A-3.3.

## A-3.1 Installation of the Application Program

Start the program, 'C:\Program Files\USB-HV-Rack\Installer\Volume\setup.exe'.



Follow the on-screen instructions. When the installation of the application program is complete, there will be a program file named "USB-HV-Rack.exe" located in folder

'C:\Program Files\USB-HV-Rack\'. Please see Part B of this document for details on running this application program. This application program should not be started until the remaining steps in Part A are completed.

## A-3.2 Installation of USB Virtual Com Port Drivers

This installation process for the Virtual Com Port (VCP) drivers needs to be done twice. Each install appears identical to the user. The specific steps will depend on what operating system is being used.

The VCP driver installation instructions begin on the next page. Go to the section that matches your operating system.

## A-3.2.1 Install Drivers for Windows 98

Connect the supplied USB cable to the USB Interface Module. Then connect the other end of the USB cable to a dedicated USB port on the PC. The PC will then recognize a new device and bring up the following 'Add New Hardware Wizard' screen.

Add New Hardware Wiz	ard
	This wizard searches for new drivers for:
	USB <-> Serial Cable
	A device driver is a software program that makes a hardware device work.
، چ	
	Figure 3.2.2-1 – Add
	Welcome
	< Back Next > Cancel

On the screen shown above (figure 3.2.1-1) click the 'Next' button. This will bring up the screen shown in figure 3.2.1-2.

Add New Hardware Wiz	ard
	<ul> <li>What do you want Windows to do?</li> <li>Search for the best driver for your device. (Recommended).</li> <li>Display a list of all the drivers in a specific location, so you can select the driver you want.</li> </ul>
	Figure 3.2.1-2 – Add New         Hardware Wizard.         Search for Best Driver         < Back       Next >         Cancel

On the screen above (figure 3.2.1-2) click the radio button for 'Search for the best driver for your device (Recommended)'. Then click the 'Next' button. This will bring up the screen shown in figure 3.2.1-3.

Add New Hardware Wiz	ard
	Windows will search for new drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search.         □ Eloppy disk drives       Figure 3.2.1-3 – Add New Hardware Wizard.         □ CD-ROM drive       Specify a location         □ Microsoft Windows Update       Specify a location         ✓ Specify a location:       C:\         □ C:\       ■
	< <u>B</u> ack Next > Cancel

On the above screen click the check box for 'Specify a location'. Then click the 'Next' button. This will bring up figure 3.2.2-4 below. (Windows may display a message reading "Building driver data base" at this point which may take a few minutes to pass.) Once windows has found the required files, click "Next" to install the device.



Add New Hardware Wizard		
	FTDI FT8U2X Device Windows has finished installing the software that your new hardware device requires.	
	Figure 3.2.1-5 – Add New Hardware Wizard. Finished.	
	K <u>B</u> ack <b>Finish</b> Cancel	

Click the 'Finish' button. This will complete the first of two parts for the USB installation. The installation of the second part is exactly the same and begins with the screen show in figure 3.2.1-1. Follow the same steps again. After you click 'Finish' on this second time around, the 'Found New Hardware Wizard' will close.

Proceed to section A-4.0.

## A-3.2.2 Install Drivers for Windows 2000

Connect the supplied USB cable to the USB Interface Module. Then connect the other end of the USB cable to a dedicated USB port on the PC. The PC will then recognize a new device and bring up the following 'Found New Hardware Wizard' screen.



On the screen shown above (figure 3.2.2-1) click the 'Next' button. This will bring up the screen shown in figure 3.2.2-2.

Found New Development Uling and
rounu New Haruware Wizaru
Install Hardware Device Drivers A device driver is a software program that enables a hardware device to work with an operating system.
This wizard will complete the installation for this device:
DLP-USB232M
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.
What do you want the wizard to do?
<ul> <li>Search for a suitable driver for my device (recommended)</li> </ul>
<ul> <li>Display a list of the known drivers for this device so that I can choose a specific driver</li> </ul>
< Back Next > Cancel

On the screen above (figure 3.2.2-2) click the radio button for 'Search for a suitable driver for my device (recommended)'. Then click the 'Next' button. This will bring up the screen shown in figure 3.2.2-3.

Found New Hardware Wizard	
Locate Driver Files Where do you want Windows to search for driver files?	
Search for driver files for the following hardware device:	
The wizard searches for suitable drivers in its driver database on your computer and in	Figure 3.2.2-3 – Found New Hardware Wizard.
any of the following optional search locations that you specify. To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.	Locate Driver Files
Optional search locations: Floppy disk drives CD-ROM drives	
<ul> <li>Specify a location</li> <li>Microsoft Windows Update</li> </ul>	
< Back Next > Cancel	

On the above screen click the check box for 'Specify a location'. Then click the 'Next' button. This will bring up figure 3.2.2-4 below.

Found New Hardware Wizard	
Locate Driver Files Where do you want Windows to search for driver files?	Figure 3.2.2-4 – Found New Hardware Wizard.
Search for driver files for the following hardware device:	Browse to location.
Found New Hardware Wizard         The wizard searches for suitat any of the following optional search, click Next insert the floppy disk or CD bel         Optional search locations:         Floppy disk drives         CD-ROM drives         Specify a location	e OK Cancel
Microsoft Windows Up     Copy manufacturer's files from:	Browse

Click on the 'Browse' button and navigate to 'C:\Program Files\USB-HV-Rack\USB Drivers\Win 2000-XP-Vista\'. This is shown in Figure 3.2.2-5 below.

Found New Hardware W	/izard				
Locate Driver Files Where do you wa	nt Windows to searc	h for driver files?		Ð	
Found New Hard	ware Wizard		ſ	×	
Locate File					<u>? x</u>
Look in	: 🗋 Win 2000-XF	-Vista	- 🗧	i 💣 🎹	•
History History Desktop My Documents My Computer	FTDIBUS			+Figure Found I Hardwa Locate I	9 3.2.2-5 – New re Wizard. File
My Network P	, File name: Files of type:	FTDIBUS.INF Setup Information (*.inf)		•	Open Cancel

Click the 'Open' button. This will return to the previous screen but now with the file location placed in field adjacent the 'Browse' button. This is shown in figure 3.2.2-6.

Found New Hardware Wizard				
Locate Driver Files Where do you want Windows to search for driver files?		Figure 3.2.2-6 – Found New Hardware Wizard.		
Search for driver files for the following hardware o	device:		Browse	
USB Serial Converter	Found Nev	w Hardware Wizard		x
The wizard searches for suitable drivers in its dri any of the following optional search locations tha		Insert the manufacturer's installation selected, and then click OK.	disk into the drive	ОК
To start the search, click Next. If you are search insert the floppy disk or CD before clicking Next.				Cancel
Optional search locations:				
CD-ROM drives				
Specify a location		Copy manufacturer's files from:		
Microsoft Windows Update S\USB-HV-Rack\USB_Drivers\Win 2000		n 2000-XP-Vista 💌	Browse	
	< Back	Next> Cancel		

Click the 'OK' button. This will bring up the screen shown below that indicates that a driver was found.

Found New Hardware Wizard				
Driver Files Search Results The wizard has finished searching for driver files for your hardware device.				
The wizard found a driver for the following device:				
USB Serial Converter				
Windows found a driver for this device. To install the driver Windows found, click Next.				
c:\program files\usb-hv-rack\usb_drivers\win 2000-xp-vista\ftdibus.inf				
Figure 3.2.2-7 – Found New Hardware Wizard.				
Driver Files Search Results				
< Back Next > Cancel				

From the screen shown in figure 3.2.2-7, (Above), click the 'Next' button to install the driver. After the driver is installed the following screen will be displayed.



Click the 'Finish' button. This will complete the first of two parts for the USB installation. The installation of the second part is exactly the same and begins with the screen show in figure 3.2.2-1. Follow the same steps again. After you click 'Finish' on this second time around, the 'Found New Hardware Wizard' will close.

Proceed to section A-4.0, Determining the USB Virtual Com Port (VCP).

## A-3.2.3 Install Drivers for Windows XP

Connect the supplied USB cable to the USB Interface Module. Then connect the other end of the USB cable to a dedicated USB port on the PC. The PC will then recognize a new device and bring up the following 'Found New Hardware Wizard' screen.



On the screen shown above (figure 3.2.3-1) click the 'Next' button. This will bring up the screen shown in figure 3.2.3-2.



On the screen above (figure 3.2.3-2) click the radio button for 'Install From A List or Specific Location (Advanced)'. Then click the 'Next' button. This will bring up the screen shown in figure 3.2.3-3.

Found New Hardware Wizard	
Please choose your search and installation options.	
<ul> <li>Search for the best driver in these locations.</li> </ul>	
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.	Figure 3.2.3-3 – Found New Hardware Wizard.
<ul> <li>Include this location in the search:</li> <li>Browse</li> </ul>	Include this location.
Onn't search. I will choose the driver to install. Choose this option to select the device driver from a list. Windows does not guarantee th the driver you choose will be the best match for your hardware.	at
< Back Next > Cancel	

On the screen above (figure 3.2.3-3), un-click the first option and click the option for 'Include This Location in the Search". Then click the 'Browse' button. This will bring up the screen shown in figure 3.2.3-4 below. Browse to the location 'C:\Program Files\USB-HV-Rack\USB\_Drivers\Win 2000-XP-Vista\'. This is shown in Figure 3.2.3-5.

Found New Hardware Wizard	Figure 3.2.3-4 – Found New Hardware Wizard.
Please choose your search and installation options.	Browse
<ul> <li>Search for the best driver in these locations.</li> <li>Use the check boxes below to limit or expand the default search, which incluse paths and removable media. The best driver found will be installed.</li> <li>Search removable media (floppy, CD-ROM)</li> <li>Include this location in the search:</li> <li>Brows</li> <li>Don't search. I will choose the driver to install.</li> <li>Choose this option to select the device driver from a list. Windows does not get the device driver from a list.</li> </ul>	Browse For Folder Select the folder that contains drivers for your hardware. MSN Gaming Zone NetMeeting Online Services Outlook Express USB-HV-RACK Windows Media Player Windows NT
the driver you choose will be the best match for your hardware.	To view any subfolders, click a plus sign above.

Found New Hardware Wizard			
Please choose your search and installation options.			
Search for the best driver in these locations. Use the check boxes below to limit or expand the default searc paths and removable media. The best driver found will be instal	Browse For Folder	? 🛛	
Search removable media (floppy, CD-ROM) Include this location in the search:	Select the folder that contains dri	ivers for your hardware.	1
Don't search. I will choose the driver to install. Choose this option to select the device driver from a list. Windo the driver you choose will be the best match for your hardware.	Conline Serv Cutlook Exp USB-HV-RA data Installed CuSB_pr Strailed Win CuSB_Win CuSB_Win	ices	Figure 3.2.3-5 - Found New Hardware Wiza Locate File
< Back N	To view any subfolders, click a plu	us sign above.	

Click the 'OK' button. This will return to the previous screen but now with the file location placed in field adjacent the 'Browse' button. This is shown below in figure 3.2.3-6.

Found New Hardware Wizard	
Please choose your search and installation options.	
<ul> <li>Search for the best driver in these locations.</li> <li>Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.</li> <li>Search removable media (floppy, CD-ROM)</li> <li>Include this location in the search:</li> <li>C:\Program Files\USB-HV-RACK\USB_Drivers\Win          <ul> <li>Browse</li> <li>Don't search. I will choose the driver to install.</li> <li>Choose this option to select the device driver form a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.</li> </ul> </li> </ul>	Figure 3.2.3-6 – Found New Hardware Wizard. Driver Files Location
< Back Next > Cancel	

Found New Hardware Wizard	
Please wait while the wizard installs the software	
DLP-	
USB Serial Converter	Figure 3.2.3-7 – Found New Hardware Wizard. Installing
<pre>     Cancel     C</pre>	

From the screen above (figure 3.2.3-7), click the 'Next' button to install the driver. After the driver is installed the following screen will be displayed:

Found New Hardware Wiz	ard	
	Completing the Found New Hardware Wizard	
	DLP-USB232M	Figure 3.2.3-8 – Found New Hardware Wizard. Completing
	Click Finish to close the wizard.	
	< Back Finish Cancel	

Click the 'Finish' button. This will complete the first of two parts for the USB installation. The installation of the second part is exactly the same and begins with the screen show in figure 3.2.3-1. Follow the same steps again. After you click 'Finish' on this second time around, the 'Found New Hardware Wizard' will close. Now proceed directly to section 4.0 *Determining the USB Virtual Com Port (VCP)*.

## A-3.2.4 Install Drivers for Windows Vista

Follow the procedure used for Windows XP (Section A-3.2.3).

## A-3.3 Installation of the VISA Driver

A VISA (Virtual Instrument Software Architecture) driver is automatically installed as part of the installation procedure of the previous sections. You should be able to run your USB interface after you perform the steps in A-4.0 through A-4.1. However, if you experience problems when you try the USB interface you may have to come back to this section and explicitly install version 4.41 of the VISA drivers. This installation is described below.

In order to communicate to the Virtual Com Port (VCP), the VISA driver must be installed. VISA is an industry standard that is used for Serial, GPIP, VXI, PXI, USB, and Ethernet. Use the following procedure to explicitly install the VISA driver, version 4.41.

Use Windows Explorer to navigate to 'C:\Program Files\USB-HV-Rack\VISA Drivers\Visa 4.41' and then execute the program, 'visa441runtime.exe', as show in figure 3.3-1A below.



You will proceed through a series of standard installation screens. These are shown in the figures below during an installation on a system running Windows XP Pro.

C: Program Files WSB-HV-F	RackWISA DriversWisa 4.41		
File Edit View Favorites To	ools Help		
😋 Back 👻 🕥 🕤 🏂 🎉	Search 🎼 Folders 🕼 🎯	× 9 💷	
Address 🗁 C:\Program Files\USB-H	V-Rack\VISA Drivers\Visa 4.41		💙 🄁 Go
Name 🔺	Size Type	Date Modified	
Visa441runtime.exe	35,687 KB Application	9/30/2008 5:05 PM	
Open File - Security Warning Do you want to run this file?			
Name: visa441runtime.ex Publisher: <u>National Instrum</u> Type: Application From: C:\Program Files\U	e nents Corporation ISB-HV-Rack\VISA Drivers\Visa 4 Run Cancel		
Always ask before opening this file			
While files from the Internet can potentially harm your computer. I you trust. <u>What's the risk?</u>	be useful, this file type can Only run software from publishers		

NI-VISA Runtime 4.4.1
This self-extracting archive will create an installation image on your hard drive and launch the installation. After installation completes, you may delete the installation image to recover disk space. You should not delete the installation image if you wish to be able to modify or repair the installation in the future.

WinZip Self-Extractor - visa441runtime.exe 🛛 🛛 🔀			
To unzip all files in visa441runtime.exe to the specified folder press the Unzip button.	Unzip		
Unzip to folder:	Run WinZip		
V-Rack\VISA Drivers\Visa 4.41  Browse	Close		
Overwrite files without prompting	About		
When done unzipping open:	Help		
.\setup.exe			

WinZip Self-Extractor - visa441ru	ntime.exe 🛛 🗙
To unzip all files in visa441runtime.exe to th specified folder press the Unzip button.	le Unzip
Unzip to folder: V-Ra WinZip Self-Extractor	Run WinZip se Close
W 180 file(s) unzipped successfully     N     OK	About Help
	,



🥫 NI-VISA 4.4.1 Runtime			
<b>Destination Directory</b> Select the primary installation directory.		V	NATIONAL NSTRUMENTS
National Instruments software will be installed in a sub different folder, click the Browse button and select an	folder of the followi other.	ng. Toinstall intoa	
Destination Directory			
C:\Program Files\National Instruments\		Bro	owse
	<< Back	Next >>	Cancel
🧏 NI-VISA 4.4.1 Runtime			
Features Select the features to install.		V	NATIONAL NSTRUMENTS
Run Time Support PXI GPIB Serial GPIB-VXI Ethernet Remote Enet-Serial USB FireWire TULIP COM Support	National Instrum provides an API and other types This feature will This feature and require up to 6.2	ents VISA driver va for controlling VXI, of instruments. be installed on the tits selected subco 22 MB of disk space	ersion 4.4.1. VISA GPIB, Serial, PXI
Directory for NI-VISA 4.4.1			Rrowco
Restore Defaults   Disk Cost	<< Back	Next>>	Cancel

🐺 NI-VISA 4.4.1 Runtime	
Start Installation Review the following summary before continuing.	
Upgrading         • NI-VISA 4.4.1         Run Time Support         PXI         GPIB         Serial         GPIB-VXI         Ethernet         Remote         Enet-Serial         USB         FireWrire         TULIP         COM Support         Adding or Changing         • NI-VISA 4.4.1	ngs.
Save File << Back Next >>	Cancel

🐺 NI-VISA 4.4.1 Runtime	
Overall Progress	
Currently installing NI Uninstaller. Part 1 of 10.	
(	
	<< Back Next >> Cancel

NI-VISA 4.4.1 Runtime	
Installation Complete	
Installation complete! You might be prompted to reboot your machine.	
NI-VISA 4.4.1 Runtime	
You must restart your computer to complete this operation.	
If you need to install hardware now, shut down the computer. If yo choose to restart later, restart your computer before running any of software.	u this
Restart Shut Down Restart La	ter
<< Back Next >	> Finish

At this point select the 'Restart' option.

## A-4.0 Determining the USB Virtual Com Port (VCP)

Connect the USB cable that was included with the kit. One end is connected to the PC and the other end to the USB-HV-RACK interface. The PC will display a message that new hardware has been found. After this message, please continue with determining the VCP designation described below.

Utilize 'Device Manager' to locate the COM port used by the USB interface.

Access by: "Start" > "Settings" > "Control Panel" > "System" > "Device Manager" (on the 'Hardware' tab).

<ul> <li>Set Program Access and Defaults</li> <li>Windows Update</li> <li>Adobe Reader 6.0</li> </ul>		
🛱 Programs		
😣 Settings	🕨 🚾ontrol Panel	
<ul> <li>Search</li> <li></li></ul>	<ul> <li>Network and Dial-up Connections</li> <li>Printers</li> <li>Taskbar &amp; Start Menu</li> </ul>	
🗊 Shut Down		
🕵 Start 🛛 🖾 🔯 🔣 📰	TekScope 🕅 🔚 A	dd/R

🕺 Control Panel	_ <b>_ _ _ _ _</b>				
<u>File Edit View Favorites Tools H</u> elp					
🖛 Back 👻 🤿 👻 💽 🔞 Search 🖓 Fold	ers 🧭 階 🧏 🗙 🕫 🎟 -				
Address 🖼 Control Panel	<b>▼</b> @Go				
Name 🛆	Comment				
Santel(R) Extreme Graphics	Control the graphic				
internet Options	Configure your Inte				
👙 Java Plug-in	Java Plug-in Control				
🕂 Java Plug-in 1.3.1_01	Java Plug-in Control				
i∰ Keyboard	Customizes your ke				
Message Queuing	Changes properties				
Mouse Customizes your mo					
Retwork and Dial-up Connections Connects to other c					
Phone and Modem Options	Configures your tel				
Printers	Adds, removes, an				
Regional Options	Customizes settings				
Canners and Cameras	Configures installed				
Scheduled Tasks	Schedules computer				
SoundMAX SoundMAX Control					
Sounds and Multimedia Assigns sounds to e					
Provides system inf					
Wapages users and     Provides system information and changes environment settings					
Provides system information and changes environ	ment setting				

System Prop	erties			<u>?</u> ×
General N	etwork Identification	Hardware	User Profiles Adv	vanced
Hardward	e Wizard The Hardware wiza unplug, eject, and o	rd helps you configure you	install, uninstall, repa r hardware.	air,
			<u>H</u> ardware Wiza	ard
Device N	lanager			
	The Device Manag on your computer. I properties of any de	jer lists all the Use the Devid avice.	hardware devices ir ce Manager to chan	nstalled ge the
	Driver <u>S</u> ignin	g	<u>D</u> evice Manag	er
- Hardware	e Profiles			
Ð	Hardware profiles p different hardware o	rovide a way configurations	for you to set up an: :	d store
			Hardware <u>P</u> rofi	les
		OK	Cancel	Apply



Expand the 'Ports (COM & LPT)' and identify which port is mapped to the USB Serial Port. In the example above, it is "COM8'.

Pull up the properties for the 'USB Serial Port' by right clicking on the entry, 'USB Serial Port (COM8)' shown above in figure 4.0-3. This will pull up the 'Communications Port Properties' panel. Select the 'Port Settings' tab and be sure the settings match those shown below. Then click the 'OK' button.

Exit out of the 'Control Panel' screen.

Communications Port (COM2) Propertie	<u>?</u>	×
General Port Settings Driver Resource	es	
		1
Bits per second:	9600 💌	
Data bits:	8	
Parity:	None	Figure 4.0-4 – Com
Stop bits:	1	Properties
Flow control:	None	
Adv	vanced Restore Defaults	] []
	OK Cancel	

Now, we determine how National Instruments identifies 'COM8'. We do this by using the National Instruments, 'VISA Interactive Control' program.

Open the National Instruments, 'VISA Interactive Control' program.

Accessed by: "Start" > "Programs" > "National Instruments" > "VISA" > "VISA Interactive Control" (if this program does not exist, you will need to go back to section 3.3 *Installation of the VISA Driver* and explicitly install the driver via the instructions).



From the example above, we can see that the National Instruments, 'VISA Interactive Control' has identified 'COM8' as 'ASRL8' or as 'ASRL8::INSTR'. In most cases, we can simply tell the program to utilize 'COM8'. However, in some cases we must use the designation of 'ASRL8::INSTR'. That is what we will do now.

## A-4.1 Saving the Virtual Com Port

Saving the Virtual Com Port is normally not necessary and therefore the rest of this section need not be performed. That is, you should not need to utilize the program 'Put\_Comm\_into\_INI.exe'. This is because the program, 'USB-HV-Rack.exe' will find the first appropriate COM port and use that port. However, if you run into a problem, the remainder of this section will allow you to specify to the program what port to use.

If you need to explicitly define which port to use, then start the Ultravolt program named '**Put\_Comm\_into\_INI.exe**' (found in the 'c:\Program Files\USB-HV-Rack' folder. The front panel GUI (Graphical User Interface) for this program is shown below.

Put_Comm_into_INI.vi Front Panel
File Edit Operate Tools Browse Window Help
수 🌚 🔳 18pt 🔽 🔽
▲
Communications Channel
<b>™ COMxx</b> ►
Save COM
Setting

Put the Com VCP channel into the field that now shows as 'COMxx'. (For the example previously shown, put in ASRL8::INSTR). Then click the "Save COM Setting' button. When the 'Done' message is displayed, use the close icon ('x') on the upper right corner, to exit and close the program. The VCP channel is now stored in the configuration file 'Ultravolt\_USB\_HV\_Interface.INI'. The particular entry in this file is the line: "USB\_Port= ASRL8::INSTR" (if the VCP was identified as COM8 or ASRL8::INSTR). Also, edit the 'Ultravolt\_USB\_HV\_Interface.INI' (with a text editor) and change the entry – *USB\_Auto\_Detect='True'* – from 'True' to 'False', and save the file. When the USB application program (USB-HV-Rack-Application.EXE) begins, it will read the VCP from the configuration file.

If you experience problems communicating to the USB module, you may have to install an alternate VISA driver. See Appendix B for further details. Normally, this step will not be necessary. The "USB-HV-Rack-Application" program is now ready to be run. Proceed to Part B for detailed instructions on loading and operating this PC program.



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Part B USB-HV-Rack Users Manual

#### **B-1.0 Introduction to Users Manual**

The USB-HV-RACK module is used to control the Ultravolt HV Rack via a PC and a standard USB cable. The Windows application program supplied, 'USB-HV-Rack.exe' is then used to control the HV Rack.

## B-2.0 Software and Hardware Installation

First install the Driver and Application software from the CD that is supplied with the USB-HV-RACK module. The instructions are contained in Part A of this document. Then connect the USB-HV-RACK module to the back of the HV Rack. Connect the USB cable (supplied) to the USB-HV-RACK module and to a dedicated USB port on the PC.

#### B-3.0 Starting the Application Software

Prior to starting the UV-HV-Rack-Application software, power up the HV rack by using the following steps –

- 1. Set the ten-turn potentiometers on the front panel to the minimum (fully counterclockwise) values.
- 2. Insure that the 'HV ON' push-buttons are set to 'disabled'. Depressing these buttons sets the channel to enable. When they are not depressed the channels are disabled.
- 3. Turn on the power to the HV Rack. The HV Rack has two power-on switches. One is located on the rear panel and one is located on the front panel. Both must be on.
- 4. Start the UV-HV-Rack-Application software by selecting '**Start** | **All Programs** | **USB-HV-Rack**'. The Graphical User Interface (GUI) will be presented as shown in the figure below.



Start the USB application program by pressing the 'Run' icon near the upper left corner of the 'Main\_UV\_USB\_2007.vi Front Panel' window shown above. This icon appears as an outline of a right-pointing arrow. When the program is running, this arrow changes from a white outline to a solid black arrow. When the program begins running, it will load the VCP from the configuration file, 'Ultravolt\_USB\_HV\_Interface.INI'.

If you receive an error message on startup, insure that the virtual comm port number is correct. See section 3.3 of Part A for details. If this does not solve the problem please refer to Appendix B for alternate VISA drivers.

#### B-4.0 Controlling the HV Rack with the Application Software

The default start-up mode for the HV Rack is 'Remote' mode, meaning that all operations are controlled by the Application Software. This mode can be toggled between 'Remote' and 'Local' modes by using the 'Remote/Local' button on the Setup tab of the GUI. When in 'Local' mode the user controls the set points using the multiturn pots on the HV Rack. However, the 'Disable' button on the Application Software must still be set to 'Enable', as this is the master 'Enable/Disable' button and is used in both 'Remote' and 'Local' modes. In 'Local' operation, the 'Set points and Monitors' tab can only be used to monitor the read-back monitors from the HV Rack. In 'Local' mode all GUI controls on this tab are rendered invisible.

With the GUI set to 'Remote' mode and the *Master Enable* set to 'Master Enabled', the GUI controls on the 'Set points and Monitors' tab are visible and are used to turn on each channel and to set the current and voltage set points for each channel.

#### B-4.1 Turning the Channels On

The 'Set point and Monitors' tab contains an 'HV ON/HV OFF' button for each channel. These are each defaulted to HV OFF. If the *Master Enable* is set to 'enable' then clicking the channel 'HV ON/HV OFF' button causes it to go to the HV ON mode. Clicking again goes back to the HV OFF mode. The mode must be set to HV ON in order to control the HV output.

#### B-4.2 Setting the Current or Voltage Set Points

The set points for current and voltage can be set in one of two ways. The simulated potentiometer can be used to make a gross change or to set the HV output to the approximate setting. This is done by clicking and holding the left mouse button on the dial control and causing the dial to rotate. The control set point is indicated in the numeric text field as shown below. For a more precise setting the desired set point can be typed in as numeric text in the data entry field, also shown below.



The numeric data entry field has an up/down control located on the left side of the field. This can be used to increment or decrement by one unit (one Volt or one Kilo Volt for example) at a time. Please note – You must set the current control to some positive value to insure that the output voltage will respond to the voltage control.

#### B-4.3 Shutting down the Application Software

Each of the two tabs has a red circular button labeled 'EMO' (Emergency Off). The application software is halted by clicking this button. When the application software is in the 'Remote' mode, the 'EMO' button causes each HV channel to go to zero output and sets all channels to the HV OFF mode. Then the software stops running but stays in memory and the GUI continues to be shown. To remove the application from memory and from the PC monitor, click the 'X' icon on the top right corner of the application display.

When the application software is running but set to 'Local' mode, clicking the 'EMO' button merely stops the application program and does not change any of the set points.

To restart the application, click the 'Run' icon on the application tool-bar as described above in section 2.1.

#### **B-4.4 Voltage and Current Mode indication**

The control mode, either voltage control or current control, is shown just to the left of the 'HV ON/HV OFF' buttons.

#### B-5.0 Changing the Units of Measure

The units of measure for voltage can be controlled and displayed, independently for each channel, as either KiloVolts or Volts. The current can be controlled and displayed as either amps, milliamps, or micro amps for each channel. This selection is made from the drop-down menu on the Setup tab as shown below. This menu is accessed by clicking on the units indication above the digital display.

Volts	micro Amps
Volts Kilo Volts	micro Amps milli Amps Amps

When the Channel B is changed from Volts to Kilo Volts, and Channel C is changed from micro Amps to milli Amps, the 'Set points and Monitors' tab will display the data as shown below.

Main_U¥_U5B_2007.vi				
<u>File Edit Operate Tools Browse Window Help</u>				
				<u> ?</u> 1≯
Set points and Monitors Setup Version 1.1, 2007-6-	D1			<b>^</b>
CHANNEL A	CHANNEL B	CHANNEL C	CHANNEL D	PR-
Volts JOLTAGA	Kilo Volts	Volts OLIAG	Volts	OLTAG
000.00	05.00	6051.4	000.00	
	0 20			
micro Amps	UU MICRO Amps	milli Amps	000 micro Amps	URRENZUUUU
000.00	03.44	000.02	000.00	
9491.175 -12	4.9951 -1 20	0 0.	<sup>D2</sup> (1) 7535.6503	20
HV	Voltage HV Regulation	Voltage Regulation		HV NI Davis
ULTRAVOLT. 05.804	3.441	0.02	3.357	TWO CHANNEL
			-	

## B-6.0 Saving the Setup settings

After the desired settings are made, they can be saved to the 'Ultravolt\_USB\_HV\_Interface.INI' file by clicking the 'Save Setup' button on the Setup tab.

## B-7.0 Selecting between Full-Precision and Reduced-Precision

'Full-Precision and Reduced-Precision' refer to the precision of displaying the data on the GUI. The GUI has the ability of displaying data in greater precision than can be displayed on the front panel of the actual HV Rack. To emulate the actual HV Rack, the application software defaults to the reduced precision of the HV Rack panel indicators.

The precision setting of the application software can be changed by toggling the button labeled as either, 'Now in Reduced Precision' or 'Full Precision'. The text on the button indicates the precision that is being used.

The difference in the two displays is shown below. The first is the default, lowerprecision display. The second is the full precision display.



(Reduced Precision Display)

Main_U¥_USB_2	007.vi				<u>-                                    </u>
<u>File E</u> dit <u>O</u> perate ]	<u>[</u> ools <u>B</u> rowse <u>W</u> indow <u>H</u> elp				
🔹 🕑 🔳					2 TÞ
Set points and Monito	rs Setup Version 1.1, 2007-	5-01			<b>_</b>
	CHANNEL A	CHANNEL B	CHANNEL C	CHANNEL D	P B
	Volts OLTAG	Volts OLIA	C. Volts	Volts	LTAG.
SP	0.0000	4995.09	6051.39	0.0000	
2			A20000 micro Amps	20000 micro Amps	R R E 120000
779	0.0000	3.4409	0.0201	0.0000	
K	€) 9491.175 <sup>-1</sup>	20 -1 4995.0743 Yoltage	20 () 6051.3975 Voltage	20 7535.6503 -1	20 HV
ULTRAVOLT.	5.804	Regulation 3.441	0.02	3.357	OFF WRANNEL
•					Þ //
	(= 11	5 11 51 1	à		

(Full Precision Display)



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Part C Description of the USB Labview Modules

#### C-1.0 Introduction to Labview Modules

Ultravolt supplies Labview Virtual Instruments (VI's) as source code so that users can create their own software for controlling the USB to HV Rack interface. This manual describes these Labview VI's. An example Labview program is included to show how these modules can be used. These VI's are in Labview version 2009 format. To use these VI's, the user must have the Labview development software loaded on the computer. Labview is a graphical programming environment from National Instruments.

#### C-2.0 Description of the Labview VI's

The Labview VI's supplied by Ultravolt are described here in the approximate order in which they would normally be used. These VI's are in a NI Library file named  $LV_9\_Ultravolt\_USB\_Interface\_Example Ver 3.0.llb$ . A LabView project is provide and is named  $Ultravolt\_USB\_Interface\_Example.lvproj$ .

#### C-2.1 – Find\_USB\_Comm\_Port.vi

This determines what port is connected to the USB interface.

#### C-2.2 – Init USB Port.vi

Sets the USB communications for 9600 baud, 8 data bits, one stop bit, no parity, and no flow control.

#### C-2.3 – Read SW Version.vi

Sends a command to the USB interface, requesting that the interface return the version numbers for each of the two microprocessors, M1 and M2. This vi returns two strings representing the software versions. The versions for M1 and M2 should be the same.

#### C-2.4 – Local\_Remote\_and\_Enables.vi

Sends the HV ON/OFF bit for each of the four HV channels and sends a bit for the Master Enable/Disable. Also sends a bit to command the 'Remote' or 'Local' mode.

#### C-2.5 – Format\_PCMM.vi

Formats the enable bits.

#### C-2.6 – Send and Receive Data Block.vi

Sends a properly formatted message to the USB interface and waits for the USB response. Each message to the USB interface causes a response to be returned.

#### C-2.7 – Send Set Points.vi

Formats the set points for voltage and current and sends the formatted message to the USB interface. The set points consist of two bytes for each of 8 set points (4 voltage and 4 current set points).

#### C-2.8 – Perform Serial Write and Read.vi

Sends a string of data to the USB interface and, returns the response string if approbriate.

#### C-2.9 – Parse Response Array.vi

Takes the raw data response from the USB interface and decodes it into the Voltage and Current monitors.

#### **C-2.10** – LED Test.vi

Sends a command to the USB interface to turn a designated LED on or off. When this command is sent, the normal operation of the LED is bypassed so that it can be controlled remotely from the PC. The normal functioning of the LEDs is restored whenever a new message, other then this LED Test message, is sent to the USB module.

#### C-2.11 – Close USB Port.vi

Breaks the connection to the Virtual Com Port and closes the VCP and releases the connection resources.

#### C-3.0 Description of the Labview example application

The example Labview GUI uses the VI's described in section 2. The name of this example is 'Ultravolt\_USB\_Interface\_Example.vi. When this example program is loaded the users screen, shown below, is presented.



This program uses the Labview VI's described earlier to exercise various aspects of the USB interface. With these VI's and a description of the USB communications protocol, a programmer can build a custom interface for the Ultravolt USB module with Labview version 9.0 or later. The communications protocol is described in the document 'Ultravolt USB Message Protocol'. This document is on the CD (in the *Documents* folder) that came with the USB module.

#### C-3.1 – Simulation Control tab

The example software can be run without having it connected to a USB module by setting the simulation switch to the down position. If the switch is in the up position the contents of the 'VISA resource name' must be set to the VCP for the USB module. However, the switch just below the 'VISA resource name' field can be set to cause the VCP to be read from the USB configuration INI file.

#### C-3.2 – Set Points tab

The set points for Voltage and Current are input on this tab. When the 'Send' button is clicked, these settings are sent to the USB module. Each set point is a hexadecimal number in the range of 0 to ffff. This will cause the USB-HV-RACK module to create analog output voltages in the range of 0 to +5 volts for each of 8 channels.

Set Points	Simulation Control	Enables	LED contro	ol
Se	end	Set point V &	s for I	
		€x	D	V set pt. Chan 1
		€x	D	I set pt. Chan 1
		X (S	D	V set pt. Chan 2
		€x	0	I set pt. Chan 2
		€) x (	D	V set pt. Chan 3
		€x	0	I set pt. Chan 3
		() X	D	V set pt. Chan 4
		€x	D	I set pt. Chan 4

#### C-3.3 – Enables tab

The data put in here is sent to the USB module when the 'Send' button is clicked.



#### **C-3.4** – LED tab

This tab is used to override the normal operation of the LEDs on the USB module. This tab causes the LEDs to take the ON/OFF state directed by the settings on this tab when the 'Send' button is clicked. The LEDs on the USB module revert to their normal operation whenever one of the other tabs is used to send data to the module.



#### **APPENDIX A**

#### **SPECIFICATIONS**

#### **Storage Temperature**

Storage temperature range is  $-55^{\circ}$  to  $+105^{\circ}$ .

#### **Operating Altitude, Humidity & Temperature:**

**UltraVolt** *HV Rack* Series operating performance is guaranteed between sea level and 10,000ft in non-condensing relative humidity up to 95% between temperatures of  $+10^{\circ}$ C and  $+40^{\circ}$ C.

Shock and vibration

TBD

#### Package

Chassis dimensions: 3.1" wide x 2.5" deep x 4.5" high.

Weight: Approximately 0.44 pounds.

#### **APPENDIX B**

#### VISA DRIVERS

In some rare cases, the NI-VISA (National Instruments – VXI*plug&play* Systems Alliance) driver that is installed may not function on your computer. If this is what you experience, Ultravolt has provided other versions of the NI-VISA drivers. The latest driver (version 5.2) may not function with versions of Windows 9x. For those versions, you may have to use VISA version 2.6.1. These two other VISA drivers are located on the DVD, in the 'VISA Drivers' folder along with version 3.0.1. VISA version 5.2 can be downloaded from National Instruments with this link: http://joule.ni.com/nidu/cds/view/p/id/3337/lang/en

The latest NI driver for VISA can be found at the National Instruments web site: <u>http://www.ni.com</u> Navigate to: NI Home > Support > Drivers and Updates

In the search field in the upper right corner, enter 'VISA' and click search. In the window that comes up, click the first entry, "National Instruments VISA". On the next window – near the bottom – click the 'Downloads' text, and then click the 'NI-VISA Run-time' text. Then, select the latest version consistent with your operating system. Finally (I promise), click the ".exe" file that is presented and select the Save option. These steps are shown below for VISA version 4.41.

Address 🗃 http://www.ni.com/suppo	ort/					
				ЪЦ	Cart   Help	Search Hello Willi
MyNI Contact NI N I Home > Support	Products & Services	Solutions	Support	NI Developer Zone	Academ	ic Eve
Technical Support						
By Product						
Product Search						
eg. PXI-8195 Search	<u>»</u>					
Most Popular Searches Software LabVIEW DIAdem	Hardware NI-DAQmx NI-VISA	Driver		Hardware USB-6008 PCI-6251		
Measurement Studio Multisim TestStand	NI-488.2 NI Vision A NI-Motion	cquisition		GPIB-USB-HS CFP-2120 CRIO-9012		
Browse By Resourt Product Manuals View the most up-to installation guides, your product.	CE D-date manuals, and release notes for	$\bigcirc$	Drivers an Download updates t performan	nd Updates 1 the latest drivers ar 0 optimize your syste nce.	ıd softwarı m	e

Address 🕘 http://search.ni.com/r	nisearch/main/p?q=VISA&x=:	10&y=7					
							Site Help
MyNI Contact NI	Products & Services	Solutions	Support	NI Developer Zone	Academic	Events	Company
						U	nited States
Search Results						S	earch Tips
Category(s) Selected [start over]	VISA	Next »	Sea	rch		,	/iew: 10 25
Search Within	National Instrum	ents VISA	Architectu	re (VISA) is a standa	ard for config	urina prod	aramming
Content Type Products, Services (54)	and troubleshooting www.ni.com/visa	instrumenta	ation syster	ns comprising GPIB	, vxi,	31 [;	,
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## **ENGINEERING SIGN-OFF SHEET**

PREPARED BY:	William Grauer	Date:	2012/10/02
REVIEWED BY:	Melvyn Maxwell	Date:	2012/10/11
APPROVED BY:	Peter Match	Date:	2012/10/11

## **REVISION HISTORY**

REV	DATE	DESCRIPTION	APPROVED
А	2007-10-05	USB-HV-Rack manual.	
В	2011-3-30	Revise the procedure for determining the COM port.	
С	2012-9-26	Add auto-detect for COM port.	Peter Match