

How to Control Tabor AWGs with LabVIEW

Getting Started

LabVIEW's graphical programming language is used to control and program various test & measurement instruments, be it a single instrument or a system with various instruments. This series of tutorials, "How to Control Tabor AWGs with LabVIEW", will provide step by step instructions and various examples of how to use LabVIEW in conjunction with Tabor Arbitrary Waveform Generators.

This first tutorial will explain how to get started and what needs to be installed in order to control the Tabor AWG with LabVIEW. This series of tutorials demonstrates how to program and control **Tabor's WX2184C** model. For connecting with other Tabor models, such as the **WW series**, just follow the same instructions with the relevant changes (eg. downloading the matching IVI driver for your specific model).

This set of tutorials assumes you successfully established connection with the Tabor unit using your preferred remote interface method (LAN,GPIB or USB). Please go over our <u>connectivity tutorials</u> (for establishing a USB connection using one of our Wonder Wave series of AWGs, you'll need to **download & install the Tabor USB driver**).

In order to control an instrument through LabVIEW, one needs to install the corresponding Tabor IVI driver of the instrument. The IVI driver provides a higher level of programming that doesn't require any knowledge of the instrument's SCPI commands. This tutorial will explain how to install all that is needed to control the instrument.

IMPORTANT NOTE BEFORE PROCEEDING

It is possible to control Tabor AWG without its IVI driver and only using NI-VISA. This is done using LABVIEW VISA VIs and instrument specific SCPI commands. For those interested in this method please proceed to the next tutorial "How to Control Tabor AWGs With LabVIEW – Using SCPI Commands".

To connect and control the Tabor AWG with LabVIEW

- 1. **National Instruments VISA** First you will need to install <u>NI-VISA</u>. Please visit National instruments download page and install the latest version of NI VISA.
- 2. Please verify you installed NI-VISA and that the visa32.dll libraries are at least 4.0 or higher as follows:



Control Panel >	Programs > Programs and Features • 47 Search Programs and Features	ـــــــــــــــــــــــــــــــــــــ
Control Panel Home View installed updates Turn Windows features on or	Uninstall or change a program To uninstall a program, select it from the list and then click Uninstall, Change, or Repair.	
off	Organize 👻	• 🔞
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	🎾 National Instruments Software	Nationa
	Notepad++	Notepac 👻
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	Currently installed programs Total size: 17.7 GB 174 programs installed	



- 3. **NI-IVI Compliance Package** Next, please download and install the latest release of National Instruments IVI Compliance Package.
- 4. **IVI Foundation** Next, please download and install the latest <u>IVI Shared Components</u>. Please make sure to choose the right version according to your OS.

IviSharedComponents_2.3.0.exe	This file is an executable installer that installs the IVI Shared Components on a 32-bit system. This executable installer installs the same components as the MSI package.
IviSharedComponents64_2.3.0.exe	This file is an executable installer that installs the IVI Shared Components on a 64-bit system. This executable installer installs the same components as the MSI package.



5. To verify that the IVI Shared Components were properly installed, please go to *Control Panel\Programs\Programs and Features*:

🔾 🔵 🗢 🕅 🕨 Control Panel	Programs Programs and Features	- 49	Search Programs a	nd Features	2
Control Panel Home View installed updates Turn Windows features on or off	Uninstall or change a program To uninstall a program, select it from the lis	t and then click Uninstall, Change, or R	epair.		
	Organize 👻	800 -	0		
Install a program from the network	Name	Publisher	Installed On	Size	Versie
	Manual Intel® HD Graphics Driver	Intel Corporation	8/6/2015 8/6/2015	74.2 MB 18.4 MB	8.15.1 10.1.2
	IVI Shared Components 2.3	IVI Foundation	8/6/2015		2.30.4
					,

- 6. Installation of the Tabor IVI driver
 - a. Please go to the <u>downloads</u> page on Tabor's website. Select the model from the Model Number's drop-down box, and select "Drivers" from the Download Type's drop-down box. Click on the "Search" button. Download the IVI driver that matches the LabVIEW version (64bit or 32bit) installed on the computer.

Please choose the type of content that you need

Model Number	Model WX2184C	▼ Do	ownload Type	Drive	rs	۲	SEARCH >
Model WX2184C							
Drivers	IVI Driver fo WX1281/2E WX2181/2/	r models WS8 8, WX2181/28 40 (32 Bit OS	3351/2, WX218 3, WX1281/2/4	1/2, C and	14/12/2014 Ver. 3.0.2		Download (7.2 Mb)
Drivers	IVI Driver fo WX1281/2B WX2181/2/	r models WS8 8, WX2181/28 40 <mark> (64 Bit OS</mark>	3351/2, WX218 3, WX1281/2/4	1/2, C and	14/12/2014 Ver. 3.0.2	bi	Download (10.5 Mb)

NOTE

In order to download the IVI driver, you must be registered to Tabor's website using an email and a password. After you finished your registration, click once again on the link to start the download.



b. After the download is complete execute the installation file and follow the on screen instructions.



7. Once the installation is complete go to *Control Panel\Programs\Programs and Features* and check that the IVI driver has been installed properly:

Control Panel Home View installed updates	Uninstall or change a program To uninstall a program, select it from the lis	t and then click Uninstall, Change, or Rep	air.		
Turn Windows features on or off	Organize 🕶				0
Install a program from the network	Name	Publisher	Installed On	Size	Versi
	WW-107X-64bit IVI-C Driver 2.0.1	Tabor Electronics Ltd.	9/2/2015 8/6/2015	9.76 MB 15.8 MB	2.0.1
	WX218x IVI Driver 3.0.2	Tabor Electronics	10/8/2015	50.8 MB	3.0.2.

8. Next, go to START->ALL PROGRAMS->TABOR ELECTRONICS->WX218x and click on "Examples"





9. Go to *LabVIEW2010wrapper->>wx218x* and find the wx218x.llb LabVIEW Library file for the WX series :

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Documents	^		Name	Date modified	Туре
a) Music			ir - Instrument Specific - XInstrument.m	5/20/2014 2:22 PM	MNU File
Pictures			dir - Instrument Specific.mnu	5/20/2014 2:22 PM	MNU File
H Videos			📄 dir - Utility.mnu	5/20/2014 2:22 PM	MNU File
	Ξ		dir.mnu	5/20/2014 2:22 PM	MNU File
I Computer			💿 Report	5/20/2014 2:22 PM	Chrome HTML Do
🚢 Local Disk (C:)	-	·	🛋 wx218x	12/17/2014 4:43 PM	LabVIEW LLB
😢 CD Drive (F:)			🔠 wx218x	5/20/2014 2:22 PM	Resource Script
support (\\storage) (G:)	-	۲			•
wx218x Date modified:	12/1	7/2	2014 4:43 PM Date created: 12/17/2014 4:43	PM	

10. Copy the "wx218x" folder into the following directory of LabVIEW:

Organize Include in library Share with Burn New folder IEI III * Favorites Date modified Type Image: Desktop Agilent 34401 11/1/2015 4:13 PM File folder Image: Desktop Image: Desktop Image: Desktop Image: Desktop Image:	🕤 🔵 🗢 🌆 « National Instru	ments ► Lab	/IEW 2014 → instr.lib →	- ↓ ↓	Search instr.lib		
★ Favorites Name Date modified Type ■ Desktop ▲ Agilent 34401 11/1/2015 4:13 PM File folder ▶ Downloads ■ in 579x 11/1/2015 4:28 PM File folder ■ wu07x 11/2/2015 4:27 PM File folder ■ wu07x 11/2/2015 5:27 PM File folder ■ wu07x 12/20215 5:27 PM File folder ■ wu28x 12/16/2015 5:27 PM File folder ■ wu28x 7/17/2016 10:19 AM File folder ■ Music ■ dirmnu 6/24/2014 8:05 PM MNU File	Organize 🔻 🛛 😭 Open	Include in libra	ry ▼ Share with ▼ Burn	New folder		· ·	6
■ Desktop ■ Agilent 34401 11/1/2015 4:13 PM File folder ■ Downloads ■ ni73% 11/1/2015 4:28 PM File folder ■ ww107x 11/2/2015 1:15 AM File folder ww107x 11/2/2015 5:27 PM File folder ■ ww128x 12/16/2015 5:27 PM File folder ww257x 6/14/2016 12:12 PM File folder ■ Music ■ mmu 6/24/2018 8:05 PM MNU File	🔆 Favorites	A	Name		Date modified	Туре	
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↓ ww128x 12/16/2015 5:27 PM File folder ↓ ww28x 6/14/2015 12:12 PM File folder ↓ ww257x 6/14/2016 10:12 PM File folder ↓ ww218x 7/17/2016 10:19 AM File folder ↓ ww218x 7/17/2016 10:19 AM File folder ↓ Music ↓ G/24/2014 8:05 PM MNU File	Recent Places		鷆 ww107x		11/2/2015 11:15 AM	File folder	
Libraries Ww257x 6/14/2016 12:12 PM File folder Documents wx218x 7/17/2016 10:19 AM File folder Music dimmu 6/24/2014 8:05 PM MNU File			퉬 ww128x		12/16/2015 5:27 PM	File folder	
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E Disturer	J Music		dir.mnu		6/24/2014 8:05 PM	MNU File	
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If you already have an existing folder from a previous IVI driver version, please remove it prior to copying & pasting the new folder.

11. In LabVIEW, open a new VI:

LabVIEW	
e Operate Tools Help	
New VI Ctrl+N	
New Open Ctrl+0 W 2014	(Search Q)
Create Project Open Project	Open Existing
Recent Projects	open Externing
Recent Files	All Recent Files
Exit Ctrl+Q	C:\Users\elad.TABORSBS\Documents\Elad work\answers\Labvi
	C:\Users\elad.TABORSBS\AppData\Local\Microsoft\Windows\T
	wx218x VI Tree.vi
	How ToCreateStandardWaveform vi
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Find Drivers and Add-ons Connect to devices and expand the for the address of the a	Community and Support Participate in the discussion forums or Participate of the discussion forums or
Tunctionality of Lab VIEW.	equest technical support. from previous versions.



12. From the "Tools" menu select "LLB Manager..." option:



13. The "LLB Manager" window will pop up. Browse for the "instr.lib" folder of the LabVIEW directory and you should find the "wx218x" folder:

File Edit View Fav	orites Help		
Select an LLB or Director	у		×
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\rm Downloads	🌗 _Template - Generic	11/1/2015 4:13 PM File fo	lder
📃 Recent Places	🌗 _Template - Power Meter	11/1/2015 4:13 PM File fo	lder
-	🎉 _Template - Register	11/1/2015 4:13 PM File fo	lder
🥽 Libraries	🌗 _Template - Scope	11/1/2015 4:13 PM File fo	lder
Documents	🎉 _Template - Spectrum Analyzer	11/1/2015 4:13 PM File fo	lder
🌙 Music	퉬 Agilent 34401	11/1/2015 4:13 PM File fo	lder
Pictures	\mu ni579x	11/1/2015 4:28 PM File fo	lder
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	퉬 ww128x	12/16/2015 5:27 PM File fo	lder
🖳 Computer	🐌 ww257x	6/14/2016 12:12 PM File fo	lder
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File	name:		•
		Current Folder Open 🔽	Cancel



14. Double click on the following "wx218x" folder and you should see the LabVIEW Library "wx218x.llb":

LLB Manager					<u>ן</u>
Select an LLB or Dire	ctory	-			×
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☆ Favorites	-	N	ame	Date modified	Туре ^
🧮 Desktop] dir - Instrument Specific - StateStorage	5/20/2014 2:22 PM	MNU File
🗼 Downloads] dir - Instrument Specific - Sweep.mnu	5/20/2014 2:22 PM	MNU File
📃 Recent Places] dir - Instrument Specific - Trigger - ARM	5/20/2014 2:22 PM	MNU File
	Ξ] dir - Instrument Specific - Trigger - Smar	5/20/2014 2:22 PM	MNU File
ᇘ Libraries] dir - Instrument Specific - Trigger.mnu	5/20/2014 2:22 PM	MNU File
Documents] dir - Instrument Specific - XInstrument.m	5/20/2014 2:22 PM	MNU File
J Music] dir - Instrument Specific.mnu	5/20/2014 2:22 PM	MNU File
Pictures] dir - Utility.mnu	5/20/2014 2:22 PM	MNU File
🛃 Videos] dir.mnu	5/20/2014 2:22 PM	MNU File
		(Report	5/20/2014 2:22 PM	Chrome HTML D
👰 Computer			wx218x	12/17/2014 4:43 PM	LabVIEW LLB
🚢 Local Disk (C:)		8	wx218x	5/20/2014 2:22 PM	Resource Script 🛛 👻
🧐 CD Drive (F:)	Ŧ				•
	File n	ame:	wx218x		-
			Current Fold	der Open 🖵	Cancel

15. Double click on the "wx218x.llb" library and you should see the "wx218x VI Tree.vi":





16. Double click on the "wx218x VI Tree.vi" and after loading the sub VI you should see the "wx218x VI Tree" Front Panel as shown below:

ile E	Edit Viev	v Projec	t Operate	Tools	Win	dow	Help					
	\$		15pt Appli	cation F	ont	· ا	· 🙃 ·	¥∰*	🤹 🕨 Se	arch	2	H H
		wx2	218x									

17. Open the Block Diagram of the "wx218x VI Tree" Front Panel:

	ct Operate Too	Is Window Help	Ctub E	
P & U	15pt Application	Show Project		
		Tile Left and Right Tile Up and Down	Ctrl+T	
	21.8v	Full Size	Ctrl+/	
		1 wx218x VI Tree.vi Front 2 Untitled 1 Front Panel 3 Untitled 1 Block Diagram 4 LLB Manager	Panel *	
		All Windows	Ctrl+Shift+W	



wx218x VI Tree.vi Block Diagram *	
File Edit View Project Operate Tools Window Help	WE218E
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Initialize & Close	
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AM THE AMERICAN AND A AN	
Arbitrary Picture Miceture Mic	
(W221081 W0221081 W020181 W020	W82108 W82108 W85488 *

18. Double click on one of the sub VI's and its Front Panel will pop up as shown below:

wx218x VI Tree.vi Block Diagram *		
le Edit View Project Operate Too	s Window Help	
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Initialize & Close		
WE219X	214X WE218X	
Examples (B)	wx218x Initialize With Ontions vi Front	Panel*
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Configuration		
Amplitude Modulation	© 2000-2012 National I	instruments. All Rights Reserved.
	resource name	instrument handle out
Arbitrary Sequence	1/6 -	L
Arbitrary Waveform		
	a query (Off) reset device (O	m
Arbitrary Waveform Frequency		
Burst	option string	
Frequency Modulation	error in (no error)	error out
General	status code	status code
		√ <u></u>
Standard Waveform	source	source
Trigger		
	P	"
Internal Trigge		
Instrument Specific	IZTER WELTER WELTER	
		W2248M
AHOP (not for WX2181, WX2182)	NAL PART FART FART FART	Servery .



To Test Communication with Tabor AWG using LabVIEW

For this example a WX2184C unit will be connected remotely to the computer through the USB port:

 Set the USB/LAN/GPIB as the remote interface, using the Tabor's front panel buttons. To do so, go to: "Utility"->"Remote Interface"->"Select Interface"->"Control from Interface". Press Enter to select the active Interface you need. Wait for the answer "Done".



2. Use NI MAX to determine the unit's remote control Address (**Close** NI MAX prior executing the LabVIEW application):

File Edit View Tools Help My System Data Neighborhood Wax2184C "USB0::0x168C::0x2184::0000215470::INSTR" Metwork Devices Metwork Devices Metwork Devices Mare Model With ray Model With ray Serial Number USB Interface Number VisA Resource Name VisA Resource Name VisA Resource Name	WX2184C "USB0::0x168C::0x2184::0000215470::INSTR" - Measurem	nent & Automation Explorer	_ O X
 My System Data Neighborhood Devices and Interfaces What Neighborhood Devices and Interfaces WatzB4C "USB0::0x168C::0x2184::0000215470::INSTR" Name Software IN Drivers Remote Systems Settings Model WX2184C Serial Number 0000215470 Status Present USB Interface Number USB Interface Number USB Interface Number USB Interface Number USB: Interface Number USB: Interface Number USB: Interface Name USB: Interface Name USB: USA: 168C::0x2184::0000215470::INSTR 	File Edit View Tools Help		
▲ With Devices and Interfaces ▲ WX2184C "USB0::0x168C::0x2184::0000215470::INSTR" ▲ Accales ▲ Scales ▲ Model WX2184C With region of the second s	My System Data Neighborhood	🕞 Save 🛛 Refresh 🛛 🔀 Open VISA Test Panel	Y Hide Help
< III > Contraction of the second sec	 	Settings Name Vendor Tabor Electronics Model WX2184C Serial Number 0000215470 Status Present USB Interface Number 0 488.2 Compliant ✓ VISA Resource Name USB0::0x168C::0x2184::0000215470::INSTR	What do you want to do? <u>Rename</u> <u>My resource</u> <u>Communics</u> with my resource <u>View and</u> edit properties for my resource



- 3. In the following example, the user will communicate with a WX unit using either USB, GPIB or LAN remote interface as shown below. In order to do so, you will need to drag to the Block Diagram of your application two sub VIs from the "wx218x VI Tree" Block Diagram:
 - I. wx218x Initialize With Options.vi :



II. wx218x Close.vi







4. Once you'll run the example, a red REMOTE LOCKOUT sentence will pop up on the LCD display of the WX unit when the I/O session will open.

Now that all the software and drivers required to work with the LabVIEW have been installed, please proceed to the next tutorial "How to Control Tabor AWGs Using LabVIEW – Using SCPI commands".

For More Information

To learn more about how to remote control Tabor instruments using LabVIEW, visit our website Support & Tutorials zone. If you encounter difficulties with connecting to Tabor units using LabVIEW, please contact us at <u>support@taborelec.com</u> and our support team will gladly help. For more of Tabor's solutions or to schedule a demo, please contact your local Tabor representative or email your request to <u>info@tabor.co.il</u>. More information can be found at our website at <u>www.taborelec.com</u>

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