Keyword: PSL-DAQ Library dll, PSL-DAQ LabVIEW Library, PSL-iECG2, PSL-iEMG2, PSL-iEOG2

PSL-DAQ LabVIEW Library Manual

Manual

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Definition of Terms

PSL-DAQ	PSL-DAQ is a small 2-channel analog signal data acquisition module released with PSL-iModule V2 series(PSL-iECG2, PSL-iEMG2, PSL-iEOG2).
	PSL-DAQ is designed to receive analog 2-channel signals and supply DC 5V power source to the sensor module through a single input port. Therefore, it can be simply connected to the sensor module without any other power supply.
	PSL-DAQ has 2-channel 16bit ADC and 32bit micom, and re-transmission protocol(PysioLab's USB communication protocol) ensures reliable transmission of the obtained data to the PC.
	PSL-DAQ provides a powerful monitoring software, and also provides the LabVIEW and Visual C ++ libraries together.
PSL-DAQ RMSW	PSL-DAQ RMSW is software of PSL-DAQ on PC. It is available for real-time monitoring/ storing/ reviewing data obtained from the PSL-DAQ.
PSL-iModule V2	PSL-iModule V2 is the brand name of small bio-signal sensor module and is composed of ECG, EMG, and EOG module. PSL-iECG2 guarantees electrical safety through isolation power and signal during measuring. For the high quality of signal input the premium lead cable with shield is provided, and the cable is applied a stereo jack to connect simply.
	- PSL-iECG2 is a small ECG module that outputs ECG waveforms and heart beats.
	- PSL-iEMG2 is a small EMG module that outputs EMG waveforms and EMG Evelope signal.
	- PSL-iEOG2 is a small EOG module that outputs EOG and EOG Direction Event signal.
PSLDAQ_DII.dII	PSLDAQ_DLL.dll includes a function to control PSL-DAQ. Because It consists of the type of Regular DLL, it can be used in Visual C++ and LabVIEW.
PSL-DAQ LabVIEW Library	PSL-DAQ LabVIEW Library allows the use of the PSL-DAQ functions in LabVIEW
PSL-DAQ Visual C++ Library	PSL-DAQ Visual C++ Library allows the use of the PSL-DAQ functions in Visual C++.



Precaution

- PSL-DAQ LabVIEW Library is the dedicated library for the PSL-DAQ. To use the library, please connect a PSL-DAQ to your PC.
- The PSL-DAQ LabVIEW Library function can be used only when the USB driver of PSL-DAQ is installed.
- Before using PSL-DAQ LabVIEW Library, please turn on the power of the PSL-DAQ, and check if analog data can be acquired normally through the PSL-DAQ RMSW software.
- For more details, please contact PhysioLab Co., Ltd.



1. PSL-DAQ LabVIEW Library Summary

PSL-DAQ LabVIEW Library allows the use of the PSL-DAQ functions in LabVIEW.

PSL-DAQ converts analogue signals input by 2 channels into digital signals (display in data henceforth) at 1,000 samples per second and transmits to computer using the USB communication method. The data of 2 channels transmitted to computer is acquired data in real time using PSL-DAQ LabVIEW Library and is displayed the data in a graph. The library is provided along with a files of examples for explanation and learning of LabVIEW function.

PSL-DAQ LabVIEW Library consists of functions to be used by users and PSL-DAQ driver. Functions that users can call are provided in PSLDAQ_DLL.dll.

PSL-DAQ LabVIEW Library is normal operated in LabVIEW 2010 or later.

Main Functions of PSL-DAQ LabVIEW Library

- · Obtaining 2 channel data from PSL-DAQ
- · Checking the device ID of connected PSL-DAQ.
- · Checking the information status about the connection and signal acquisition to PSL_DAQ



Figure 1. For example, a acquisition screen of ECG data by using PSL-DAQ LabVIEW Library

Note) 'Data' terms

LabVIEW can accept a digital signal obtained from the DAQ device via the AI (Analog Input), and performs such a signal process for a graphical display or analysis. Therefore, the received signal represent data to avoid confusion of the user in LabVIEW.



2. Installation of PSL-DAQ LabVIEW Library

PSL-DAQ LabVIEW Library can be easily used in the function palette in LabVIEW as shown in Figure 2.

The package file(PSL-DAQ LabVIEW Library V1.0.vip) of library is supplied in the CD, and it is installed by using VI Package Manager.

Installed functions of library are available on function palette with path "PhysioLab>PSL-DAQ LabVIEW Library" as shown in Figure 2. The examples folder contains the example files installed with the library.



Figure 2. PSL-DAQ LabVIEW Library functions installed on the functions palette of LabVIEW.

2.1 Installation of the library by using VI Package Manager

If VI Package Manager is not installed, it can be downloaded from JKL website("http://jki.net/vipm"). More detailed instructions of installation, see "Appendix 1. Installation of VI Package Manager".



Running the VI Package Manager

LabVIEW provides a menu to execute the VI Packgae Manager.

Execution by clicking on the "Tools> VI Package Manager" menu of the LabVIEW.

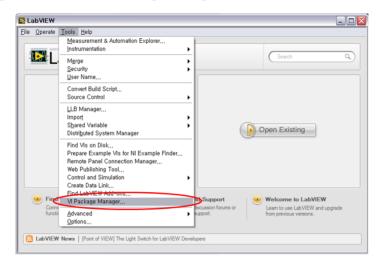


Figure 3. Execution of the VI Packge Manager.

Opening the package of library in VI Package Manager

The VI Package Manager runs, and list of library packages is appeared as shown in Figure 4. The process of installing 'PSL-DAQ LabVIEW Library V1.0.vip' is as follows.

Select "File>Open Package(s)" from the menu as shown in figure 4.

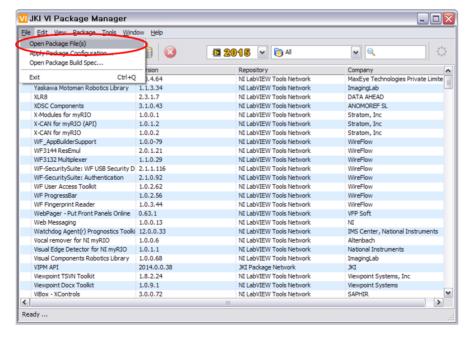


figure 4. Open the pakage file from JKI VI Package Manager.



Select "PSL-DAQ LabVIEW Library V1.0.vip" in the dialog box of 'Select one or more VIPM files'.

File path is "PSL-DAQ LabVIEW Library CD) \ PSL-DAQ LabVIEW Library V1.0.vip"

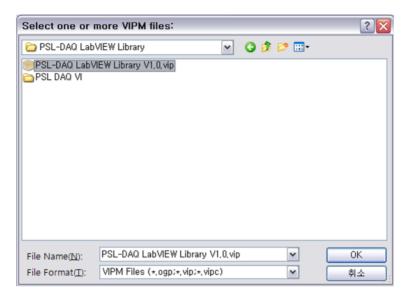


Figure 5. The dialog box to select the package file

● Installation of PSL-DAQ LabVIEW Library V1.0.vip

"PSL-DAQ LabVIEW Library V1.0.vip" is loaded, and then the information of package is appeared as shown figure 6. Verify the information and click Install button on the left side of screen.

☞ Click "Install" button.



Figure 6. The screen about the Information of PSL-DAQ LabVIEW Library package.



☞ Click on the "Continue" button on the screen shown in Figure 7 to proceed with the installation.

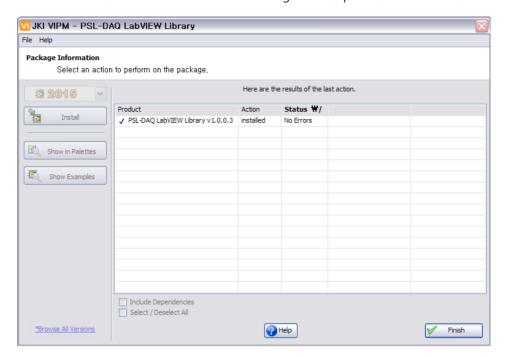


Figure 7. Screen of preparation to install PSL-DAQ LabVIEW Library package.

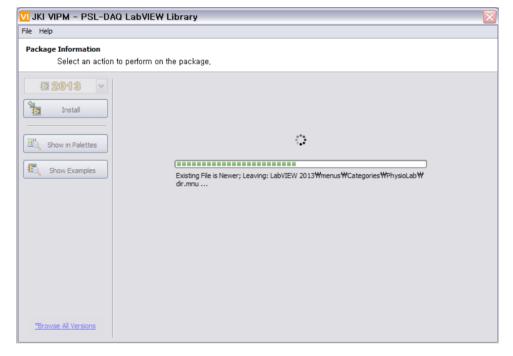


Figure 8. Screen about installation of PSL-DAQ LabVIEW Library package in progress.



Completion of installing PSL-DAQ LabVIEW Library

After "No Errors" is appeared in the "Status ₩/" of column, press "Finish" button as shown figure 9. When the installation is complete, the information screen of installation is appeared as shown in Figure 10.

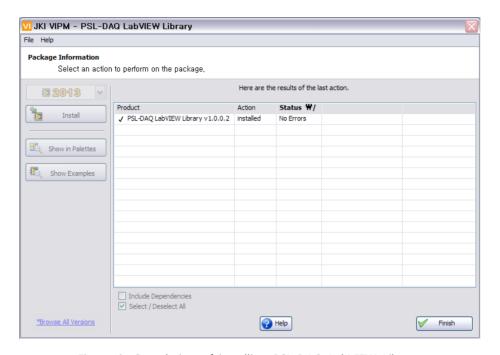


Figure 9. Completion of installing PSL-DAQ LabVIEW Library.



Figure 10. The installed information of PSL-DAQ LabVIEW Library.



2.2 Verifying the installed PSL-DAQ LabVIEW Library

If you click the "Shown in Palettes" button on the left side of Figure 10, Front panel and Block diagram of the LabVIEW is executed. The functions palette of PSL-DAQ LabVIEW Library appears automatically on the Block diagram as shown in Figure 11.

PSL-DAQ LabVIEW Library is installed on the Functions palette that can be found in the "PhysioLab> PSL-DAQ LabVIEW Library", as shown in Figure 12. Examples are included in the Example folder.

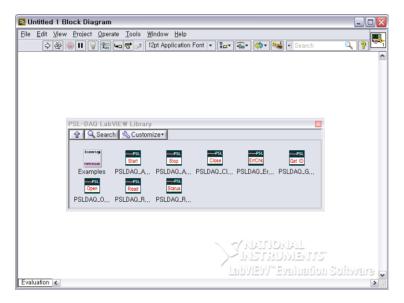


Figure 11. Installed PSL-DAQ LabVIEW Library.

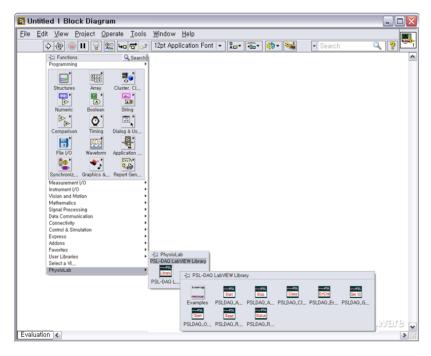


Figure 12. Installed PSL-DAQ LabVIEW Library on the Functions palette.



3. PSL-DAQ LabVIEW Library Description

3.1 PSL-DAQ LabVIEW Library Summary

PSL-DAQ LabVIEW Library is consists of a single shared library (PSLDAQ_DII.dll) files and 10 SubVI (PSLDAQ_name.vi). PSLDAQ_DII.dll controls the PSL-DAQ device and receives data from it by using USB communication.

SubVI files is defined by the form of functions to use the functionality of PSLDAQ_DII.dll in LabVIEW.

Table 1. PSL-DAQ LabVIEW Library functions

Functions	Basic Help	Description
PSLDAQ_Open	PSLDAQ_Open.vi DeviceID PSL Open Handle Out	Activates the communication function to PSL-DAQ, and provides overall initialization, memory allocation, and device handling to operate PSLDAQ_DII.dll.
PSLDAQ_Close	PSLDAQ_Close, vi Handle In Close	Performs finishing process, such as disable communication connection of devices and removal of allocated memories.
PSLDAQ_GetDeviceID	PSLDAQ_GetDeviceID.vi Handle In	Gets a unique ID from the linked PSL-DAQ devces.
PSLDAQ_AcquireStart	PSLDAQ_AcquireStart, vi Handle In PSL Trigger Start	Starts the acquisition of data from PSL-DAQ.
PSLDAQ_AcquireStop	PSLDAQ_AcquireStop, vi Handle In	Stops the acquisition of data from PSL-DAQ.
PSLDAQ_Read	PSLDAQ_Read.vi CH1 Data CH2 Data Read # Read Int16 Ch2 Data Int16 Ch1 Data	Reads the acquired data from PSL-DAQ.
PSLDAQ_ReadStatus	PSLDAQ_ReadStatus, vi PSL # Read Status Status	Receives the information of status about a link of communication and a acquisition of data.
PSLDAQ_ErrChkSigGen	PSLDAQ_ErrChkSigGen, vi Handle In ———————————————————————————————————	Requests a generation of data to check the communication data error.



3.2 Understanding functions of PSL-DAQ LabVIEW Library

There are basic functions that you can utilize by using PSL-DAQ LabVIEW Library - obtaining data, and checking the status of PSL-DAQ. Functionality and the relevant function will be provided in the later session.

Data Acquisition

The input signal of PSL-DAQ is 2 channels analogue signal in the range of 0~3.3V, and signals input are converted to digital signals of 1,000 SPS (Samples per Second) through 16 bit ADC of the internal device. Digital signals are transmitted to computer by USB communication, and data can be acquired from user programs by using PSL-DAQ LabVIEW Library.

To use PSL-DAQ LabVIEW Library, you must start with the PSLDAQ_OPEN function, complete by using the PSLDAQ_Close function, and assign functions of your choice in between. The functions relevant to data acquisition in library are PSLDAQ_AcquireStart, PSLDAQ_AcquireStop, and PSLDAQ_Read.

Table 2. The library functions used for data acquisition

Functions	Description
PSLDAQ_Open	Activates the communication function to PSL-DAQ, and provides overall initialization, memory allocation, and device handling to operate PSLDAQ_DII.dII. If multiple PSL-DAQ are connected to your computer, the PSLDAQ_Open function must be used according to the number of devices being connected and obtain device handle for each device.
PSLDAQ_Close	Performs finishing process, such as disable communication connection of devices and removal of allocated memories.
PSLDAQ_AcquireStart	Starts data acquisition
PSLDAQ_Read	Reads acquired data
PSLDAQ_AcquireStop	Stops data acquisition

Note) The process description of the Queue in which data is delivered to the function of PSLDAQ_Read

- Queue for sending from the PSL-DAQ device to the PC(Out Queue).
- Receiving Queue of LabVIEW_DLL.dll
- Receiving Queue for LabVIEW is created to use PSLDAQ_Read easily.

Check the status of PSL-DAQ device

After initializing by the PSLDAQ_Open, it can be received the status of PSL-DAQ device. The status of PSL-DAQ can be obtained by the function of PSLDAQ ReadStatus.

Functions	Description
PSLDAQ_ReadStatus	 Receives a information of communication with PSL-DAQ device. Receives a response about the request for starting/stopping acquisition of data. Receives a information about the status of Queue relevant to read data



3.3 PSL-DAQ LabVIEW Library Functions

PSLDAQ_Open

1. Description

a. It activate the communication with the device and performs initialization and memory allocation in order to operate PSLDAQ_DII.

2. Role

- a. Initializing a memory allocation/thread creation related to DLL.
- b. Activating a communication link with PSL-DAQ device.
- c. Creating a device handle to be used in functions.

3. Terminal

- a. Terminal Input
 - O DeviceID:
 - It is the ID of PSL-DAQ device and can be obtained from PSLDAQ GetDeviceID VI.
 - PDAQ-xxxxxxx(PDAQ 7 number of digits)
 - In case a PSL-DAQ device is connected to the PC.
 - Case I : Input an empty string to the DeviceID The ID of PSL-DAQ device is obtained automatically and the communication link is activated.
 - Case II : Input a DeviceID If the DeviceID matches with the ID of PSL-DAQ device, the communication link is activated.
 - In case several PSL-DAQ devices are connected to the PC.
 - Case I : Input an empty string to the DeviceID "Device Selection Dialog" window is appeared and several ID of PSL-DAQ devices are shown in the Dialog. The communication link is activated by selecting one of the ID.
 - Case II : Input a DeviceID If the DeviceID matches with one of the several ID, the communication link is activated with the same ID of PSL-DAQ device.

("Device Selection Dialog" is not appeared.)

b. Terminal Output

O Handle Out: Device handle, it is used all functions except PSLDAQ_Open.

4. Note

- a. The PSLDAQ_Open and the PSLDAQ_Close function should be used together.
- b. Devices will not be opened if the parameter of DeviceID does not match with the ID of PSL-DAQ.
- c. If you use N number of PSL-DAQ, also N number of PSLDAQ_Open function must be created.
- d. If you use N numner of PSL-DAQ, we recommend that you use to record the DeviceID for each of the PSLDAQ_Open function.



PSLDAQ Close

- 1. Description
 - a. It disables the communication link and removes the allocated memory.
- 2. Role
 - a. Removing a allocated memories/threads in PSLDAQ_Open.
 - b. Terminating the communication link with PSL-DAQ and all other functions.
- 3. Terminal
 - a. Terminal Input
 - Handle In : Device handle.
- 4. Note
 - a. If the PSLDAQ_Open() function is used, also the PSLDAQ_Close() function must be used.
 - b. After all functions are used, PSLDAQ_Close must be used.
 - c. After using the PSLDAQ_Close function, the PSLDAQ_Open function can be called again.

Note) Communication Connection

PSL-DAQ is a device that receives power and implements communication via USB and it can be connected or removed from computers at anytime. When power is supplied to PSL-DAQ (when the power is turned on and connected to the USB port, your computer will be able to control PSL-DAQ through communication. This state is described as active communication, while the opposite state is inactive communication.

Of the PSLDAQ_Open functions, there is a communication connection function activation. At the time of function calling, devices cannot be controlled (communicated with PC) if power is not supplied to PSL-DAQ. Since communication can be connected when power is supplied to PSL-DAQ after the function is called, such a state is described as function activation, meaning that connection is feasible anytime. Also, the expression "function activation" is used because a sustainable function is required to detect changes in communication since the connection may vary even after connection.

The information of communication status is checked by using PSLDAQ_ReadStatus function.



PSLDAQ_AcquireStart

- 1. Description
 - a. It starts data acquisition from PSL-DAQ.
- 2. Role
 - a. Sending the start command of data acquisition to the PSL-DAQ.
- 3. Terminal
 - a. Terminal input
 - O Handle In: Device handle
 - O Trigger: Trigger signal for operating PSLDAQ_AcquireStart only once.
- 4. Note
 - a. It operates normally when PSL-DAQ is linked.
 - b. If the trigger input is used by the Boolean-type control, the control properties should be modified to be possible only one-time input.
 - · Setting: "Control Properties>Operation>Latch When released"

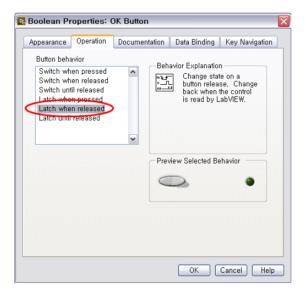


Figure 12. The latch setting of Boolean control.



PSLDAQ AcquireStop

- 1. Description
 - a. It stops data acquisition from PSL-DAQ.
- 2. Role
 - a. Sending a stop command of data acquisition to the PSL-DAQ.
- 3. Terminal
 - a. Terminal input
 - O Handle In: Device handle
 - O Trigger: It is trigger signal for operating PSLDAQ_AcquireStop VI only once.
- 4. Note
 - a. It operates when PSL-DAQ is linked.
 - b. If you use the Trigger input to the Boolean-type control, the control properties should be modified to be possible only one-time input
 - Setting: "Control Properties>Actions>When you release the latch"

PSLDAQ_Read

- 1. Description
 - a. It reads acquired data from PSL-DAQ.
- 2. Role
 - a. Reading acquired data of 2 channels from PSL-DAQ.
- 3. Terminal
 - a. Terminal Input
 - O Handle In: Device handle
 - b. Terminal Output
 - \bigcirc Chn Data(n=1~2) : A double array data for each channel of the two channels
 - \bigcirc Int16 Chn Data(n=1~2) : 16 bit signed integer array data for each channel of the two channels
 - It is the ADC value of PSL-DAQ device and can be used to determine a error of reception.
 - O #Read : The size of array data. It means a number of samples when is called.
- 4. Note
 - a. It operates normally when PSL-DAQ is linked.
 - b. PSLDAQ_AcquireStart is called first.



PSLDAQ_ReadStatus

- 1. Description
 - a. It receives the information of status about a communication.
- 2. Role
 - 1. Receiving the information of status about a link of communication.
 - 2. Receiving the information of status about a acquisition of data.
- 3. Terminal
 - a. Terminal Input
 - O Handle In: Device handle.
 - b. Terminal Output
 - O Status: A type of I32 array is output. Status informations are as follows:
 - Informations of status about a communication link with PSL-DAQ device.
 - 1005 : Communication link is terminated.
 - 1006: Communication link is connected.
 - Informations of status about a acquisition data from PSL-DAQ device.
 - 1001 : Receiving a response about the request for starting acquisition of data.
 - 1002 : Receiving a response about the request for stopping acquisition of data.
 - 1003 : Receiving a Send Queue overflow of PSL-DAQ.
 - 1004: Receiving a overflow of internal receive Queue in the PSLDAQ_DII.dll.
 - 1008 : Receiving a packet length error of the received data from PSLDAQ_DII.dll.
 - O #Read : The number of data samples read from the device.

PSLDAQ_GetDeviceID

- 1. Description
 - a. It gets the device ID from the linked PSL-DAQ.
 (PSL-DAQ has a unique ID of device.)
- 2. Role
 - a. After getting the device ID from the linked PSL-DAQ, output the ID as a string.
- 3. Terminal
 - a. Terminal Input
 - O Handle In: Device handle.
 - b. Terminal Output
 - O Device ID: A ID of the linked PSL-DAQ.
- 4. Note
 - a. Operates normally when PSL-DAQ is linked.



4. Examples of PSL-DAQ LabVIEW Library

Two examples are provided to understand PSL-DAQ LabVIEW Library function. It will be described in detail in "ex1_SimpleDAQ.vi" example to output the ECG wave simply. Example of "ex2_TotalDAQ.vi" is made using all the functions of the library.

4.1 Preparation for using PSL-DAQ LabVIEW Library

Preparation for hardware

In the examples PSL-DAQ and PSL-iECG2 are used, as shown in Figure 13. PSL-DAQ and PSL-iECG2 are PhysioLab's products.

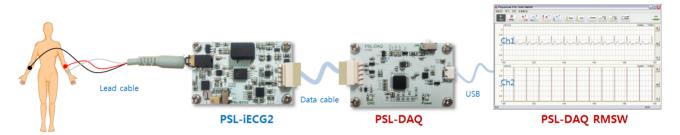


Figure 13. Preparation for using PSL-DAQ LabVIEW Library.

Preparation for software

PSL-DAQ LabVIEW Library and example will work properly in LabVIEW 2010 and later. Check the prepared hardware are operated properly by using the PSL-DAQ RMSW software. After confirming the function of acquisition data from PSL-DAQ by using the PSL-DAQ RMSW, execute the examples of PSL-DAQ LabVIEW Libarary, and then write a programming in LabVIEW.

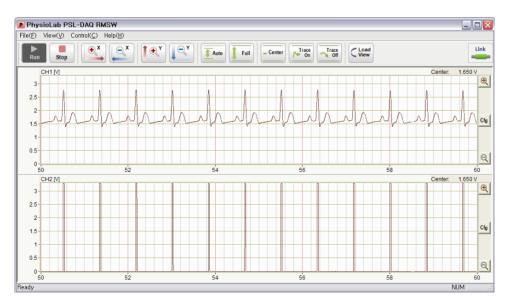


Figure 14. Checking the normal operation of PSL-DAQ by using the PSL-DAQ RMSW.



4.2 Example: "ex1_SimpleDAQ.vi"

The hardware configuration is used in the example as shown figure 13. The input signal can be used by a ECG simulator or human body. We used SimDAQ-KIT that has a function of biosignal simulator in this example.

In the example PSLDAQ_Open, PSLDAQ_Close, PSLDAQ_ AcquireStart, PSLDAQ_AcquireStop, and PSLDAQ_Read are used





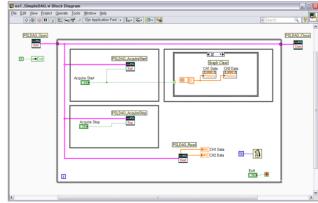


Figure 15. The screen of "ex1_SimpleDAQ.vi" example.



Selecting PSL-DAQ LabVIEW Library

- After executing LabVIEW, open "New VI" and select Block Diagram of "New VI".
- Select "PhysioLab>PSL-DAQ LabVIEW Library>PSLDAQ_Open" in function palette.

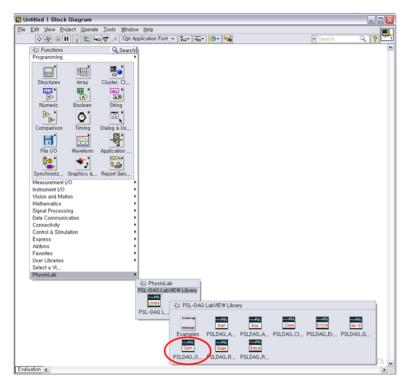


figure 16. Selecting PSLDAQ_Open function.

- Select PSLDAQ_Close, PSLDAQ_AcquireStart, PSLDAQ_AcquireStop, PSLDAQ_Read, and While loop. And arrange the functions as shown figure 17. Note that the programming is started by PSLDAQ_Open and closed by PSLDAQ_Close. For the iteration other functions is placed in While loop.

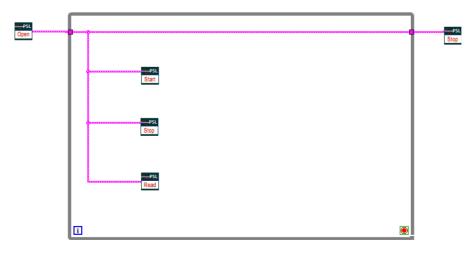
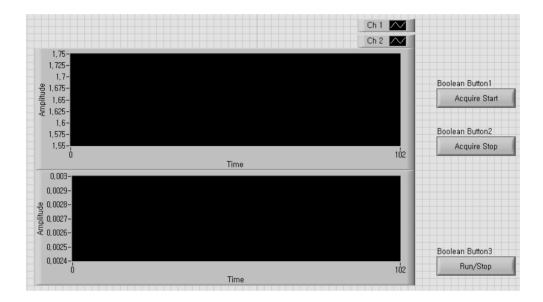


Figure 17. Arrangement of the library functions and While loop.



Arrangement of Waveform chart and Boolean button

- Select and arrange two Waveform charts, three Boolean buttons on the Front Panel as shown figure 18.
- Two Waveform chart is used to output the Ch1 and Ch2 signal of PSL-iECG2. Boolean buttons are used to input the trigger signal of PSLDAQ_AcquireStart and PSLDAQ_AcquireStop and exit While loop.
- In the Block Diagram connects the Boolean buttons with PSLDAQ_AcquireStart, PSLDAQ_AcquireStop, and conditional terminal of While loop in order. Connects the Waveform charts with Ch1 Data and Ch2 Data of PSLDAQ_Read.
- Selects Wait function and input the time of 50ms to set the period of acquisition data in the While loop.
- If only one PSL-DAQ device is connected, the input of DeviceID is not necessary.



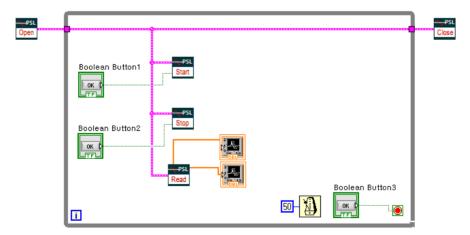


Figure 18. The screen of the arranged Waveform charts and Boolean buttons on the Front panel and the Block Diagram.



• Setting operation of the Boolean properties by using trigger

- If the trigger input is used by the Boolean-type control, the control properties should be modified to be possible only one-time input. The setting value is "Control Properties>Operation>Latch when released".

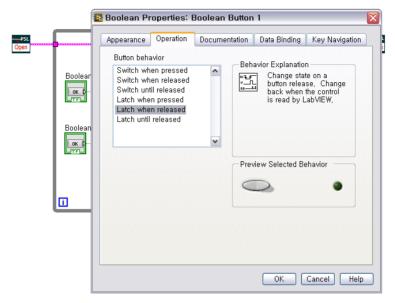


Figure 19. Setting operation of the Boolean button by using trigger.

Setting Waveform chart properies

- If you have completed the above configuration, it is possible to run() the example. But when the example is run, the unknown waveform is appeared as shown in figure 20. Because the range of X axis and Y axis are set too narrow, the Waveform chart shows little part of ECG wave.
- Chart History Length of Waveform charts should be modified to show the several period of ECG wave.

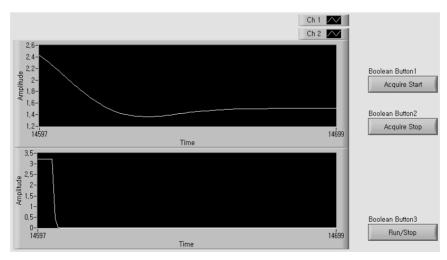


Figure 20. The screen of Waveform chart before modifying the properties.



- Before extending the range of the X-axis with five seconds you should modify the value of Chart History Length. The value of Chart History Length should have a value equal or greater than the number data can be plotted on the X-axis range. If the sampling rate of PSL-DAQ is 1,000 SPS and the range of the X-axis is 5 seconds, the value of chart history length should be a value equeal or greater than 10,000(1,000 SPS x 5 Sec.). Here, modifies 10,000 as the value of Chart History Length.

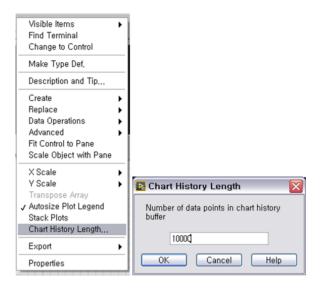


Figure 21. Setting the value of Chart History Length.

- Setting the properties of Waveform charts as shown in figure 22.

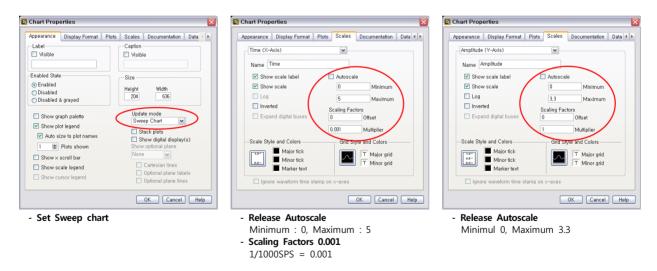


Figure 22. Setting the properties of Waveform charts.



- When the previous procedures are completed, run the example. And then the ECG wave is appeared normally as shown in figure 23.



Figure 23. The screen of ECG wave and Beat signal output.

Setting the button of "Run/Stop" and initializing the History of the Waveform chart

- When VI is running in LabVIEW, the VI is stopped by pressing the button of "Run/Stop". And then you press again to run the VI, the VI is stopped at the same time as the running VI. Because the Boolean button has "TRUE" still accrding to the execution of the prior state, the While loop is executed once and exited. Therefore the Boolean buttons are initialized when the VI will be run again. And the operation of Boolean button should be selected "Switch When released".

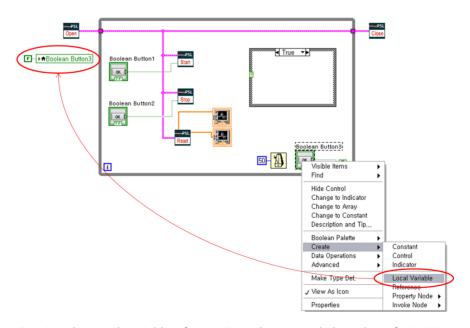


Figure 24. Creating the Local Variable of "Run/Stop" button and the value of 'FALSE' as an input.



- When the acquisition of data is started by pressing the button of "Acquire Start", the Waveform chart should be initialized. In other words, the trigger signal of PSLDAQ_AcquireStart has value of "TRUE", the Waveform chart should be initialized.
- As shown in figure 25 and 26, Select "Create>Property Node>History Data" and input the empty array("0"). Place the History Data of Waveform chart in the Case statement with "TRUE" and connect the Case Statement to the trigger signal of PSLDAQ AcquireStart.

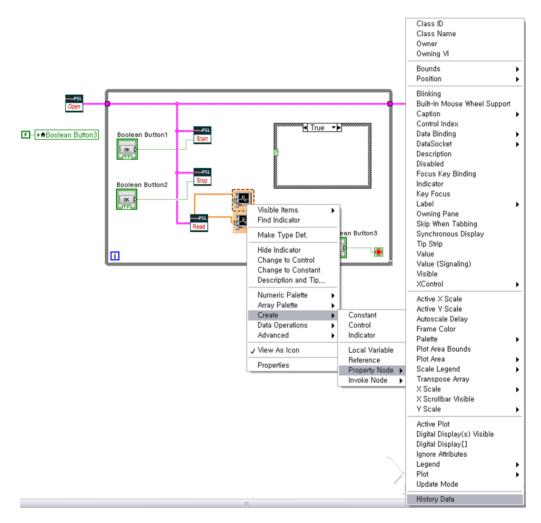


Figure 25. Selecting a History Data of Waveform chart.



● The completed Front Panel and Block Diagram of "ex2_SimpleECG.vi"



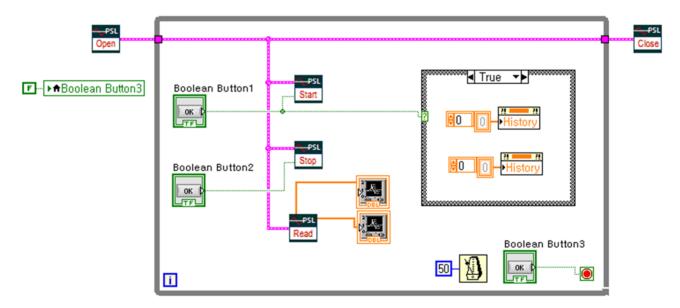


Figure 26. The completed Front Panel and Block Diagram of "ex2_SimpleECG.vi"



4.3 Example: "ex2_TotalDAQ.vi"

- The example of "ex2_TotalDAQ.Vi" is almost similar to the example of "ex1_SimpleDAQ.vi". This example includes the usage of PSLDAQ_GetDeviceID and PSLDAQ_ReadStatus.
- Hardware configuration is shown in Figure 13.



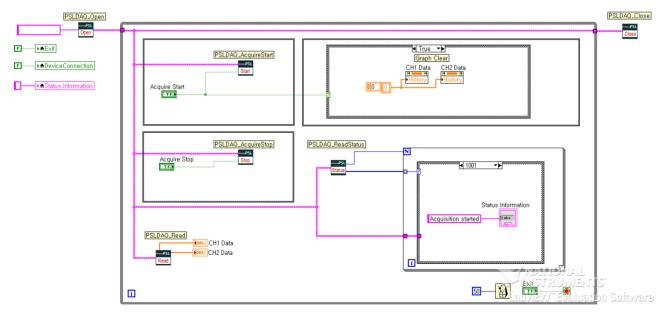


Figure 27. The Front Panel and Block Diagrapm of "ex2_TotalDAQ.vi".



Appendix 1. Installation guide of VI Package Manager

- When you visit the website(http://jki.net/vipm) of HKI, you can download the VI as shown in Figure 28.



Figure 28. The downloadable website of JKI VI Pacakage Manager.

- Fills in the information and clicks the "Download Now" button. And then the installation file of VI Package

Manger(Vipn-13.0,1878-windows-setup,exe
Manger(Vipnackage Manager 2013 Build (1878)) are downloaded.



Figure 29. Downloading VI Pacakge Manger



- When you execute the installation file of VI Package Manager, the installation wizard is started, and then clik the Next(N) button. Agree the SOFTWARE LICENSE AGREEMENT, and then continue with the installation.

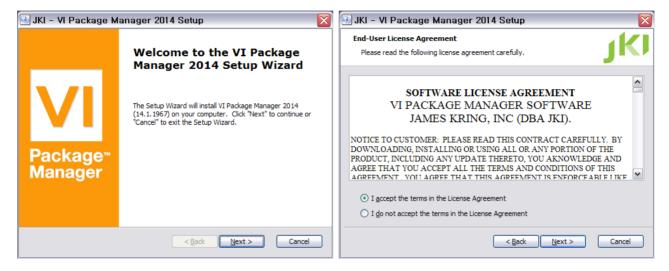


Figure 30. Installation Wizard of VI Package Manager. Figure 31. The screen of SOFTWARE LICENSE AGREEMENT.

- When the installing folder is displayed, install the default path, and then the installation is completed. Launches the program to verify the installation.



Figure 32. Installation folder of VI Package Manager.

Figure 33. The screen of completed installation.



- When VI Package Manager is executed, check the screen is appeared such as shown in figure 34.

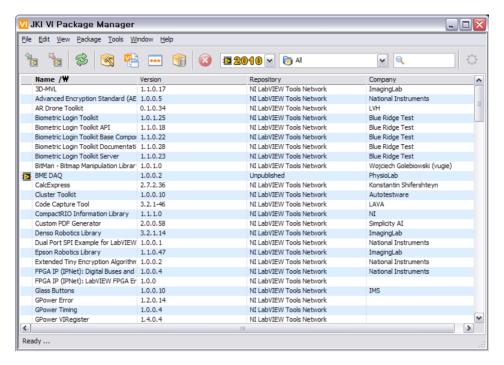


Figure 34. The screen of JKI VI Package Manager.

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Tel. +82-51-325-2868, Fax. +82-51-325-2869

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