

## Spectral Products

111 Highland Drive, Putnam, CT 06260 ,USA Tel ) 860 – 928 – 5834 Fax ) 860 – 928 – 2676

# SM240 USB Spectrometer

## LabVIEW Library Manual



Version 1.2

## ***Basic VI for USB Spectrometer***

Basic VIs and DLLs can be used to operate the USB spectrometer.

1. cviTestCard.vi
2. cviSetIntEx.vi
3. cviSetInt.vi
4. cviTriggerReadEx.vi
5. cviCloseEx.vi
6. CVIDBUSB.DLL

The CVIDBUSB.DLL can be found at C:\Program Files\CVI Spectral Products\SM32Pro\ folder. To use above VI files by LabVIEW, please copy this DLL file to the same folder in which you put the above VIs. ***All above VIs and CVIDBUSB.DLL should be located at same folder.***

All 5 basic VI files use the functions included in CVIDBUSB.DLL

In previous version (ver1.1), the intensity vs CCD pixels can be seen through “***Intensity Graph***” in LabVIEW, and in current version (ver1.2), the intensity vs Calibrated Wavelength is obtained through “***X-Y Graph***” in LabVIEW. Additional VI files have been added for this purpose as follows.

1. Calibration.vi
2. SM32Lab.ini

SM32Lab.ini includes only pixel and wavelength calibration values. A more detailed explanation follows in the next chapter.

## VI Interface

### 1. cviTestCard.vi



Test resource of USB interface.

	Terminal Name	Type	Function
Input	N/A	N/A	Not Available
Output	TestResult	I32	If test result for USB resource is OK, return zero or positive value

### 2. cviSetIntEx.vi



Initialize USB port and call this VI **once** in the first stage and should not call again before finishing the program. If you want to change the integration time of the CCD after using **cviSetIntEx.vi** in first initialization stage, you must use the next VI (**cviSetInt.vi**). **Don't use cviSetIntEx.vi again to change integration time!!** This is used only once in first initialization procedure.



	Terminal Name	Type	Function
Input	IntegrationTime	I32	Initialize Integration Time of CCD (Once!!)
Output	NewIntegrationTime	I32	After initialization was over, return set integration time value

### 3. cviSetInt.vi



As mentioned above, changing integration time of CCD at any time is done by using cviSetInt.vi.





**The following VI (cviTriggerReadEx.vi) cannot change the integration time value!. (Don't confuse IntegrationTime input of cviTriggerReadEx.vi with this Integration Time input of cviSetInt.vi !! )**

	Terminal Name	Type	Function
Input	IntegrationTime		Change Integration Time of CCD whenever you want to.
Output	SetIntegrationTime		Return new integration time value changed.

#### 4. cviTriggerReadEx.vi

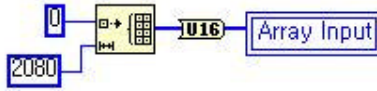


Read 16bit intensity value (Converted to Digital from Analog Voltage) from CCD once. Reading these values continuously is done by using loop functions (for example, while, loop) Use the **current integration time value for input**. This input is not used for changing integration time of the CCD. This is for error-check only. Always check current integration time and **whenever calling cviTriggerReadEx.vi, current integration time value for input must be used**.

	Terminal Name	Type	Function
Input	IntegrationTime		<b>Current</b> Integration Time Value
	ArrayInput		Temporary one-dimensional 2048-element array ( Unsigned Integer 16bit ) make this array for this purpose only. And this array should meet above condition necessarily.
Output	Intensity		Acquired one-dimensional intensity array. ( 2048-element and unsigned integer 16bit ) This array values are used as acquired intensity data
	PixelNumberResult		Return "2080 " if error does not happen

[ Note 1 ]

For ArrayInput, one-dimensional unsigned integer array temporarily and then use **Initialize Array** Function in LabVIEW as following diagram before USB initialization. Use this temporarily-made array for ArrayInput, an error message and program end will result. If this situation arises, remove USB cable from spectrometer and then hook up again, then initialize USB port again, and then use of this VI again correctly. You may see the same error again if this procedure is not followed!!



## 5. cviCloseEx.vi



Whenever you finish application program, call this VI. cviCloseEx.vi reset all initialized values.

	Terminal Name	Type	Function
Input	N/A	N/A	Not Available
Output	N/A	N/A	Not Available

## 6. Calibration.vi

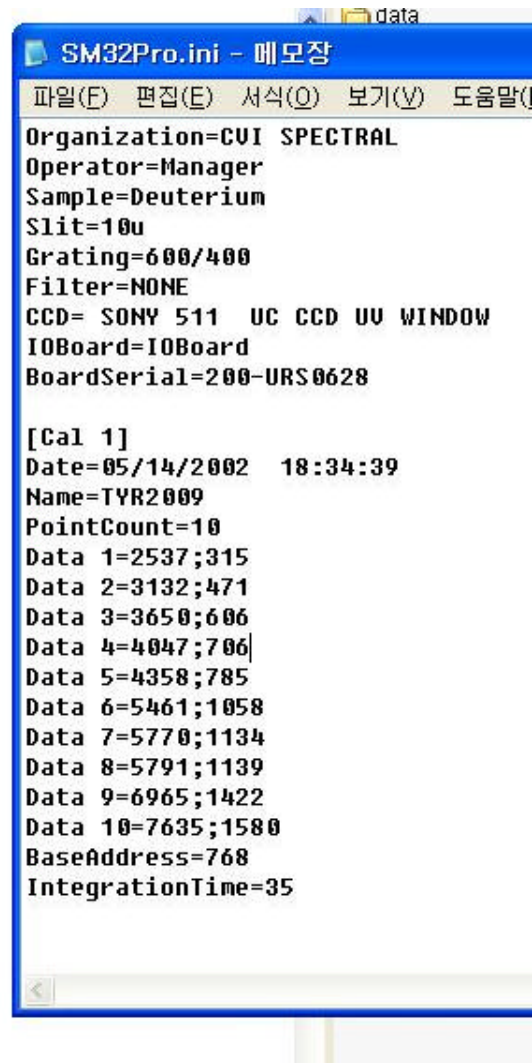


To view intensity vs wavelength graph, know the pixel-wavelength calibration data of your spectrometer. Call this VI, File Open Dialog Box opens, and choose SM32Lab.ini. Then this VI returns one-dimensional calibration wavelength array to the output. If the SM32Lab.ini was made correctly, call this VI for auto-calibration. **To use this VI correctly for the spectrometer, make the following SM32Lab.ini (or other name.ini is OK.) first!!**

	Terminal Name	Type	Function
Input	N/A	N/A	Not Available
Output	Pixel-WL Array	[001]	Return one-dimensional 2048-element calibration array

## 7. SM32Lab.ini

After installing SM32Pro Software CD, open SM32Pro.ini at C:\Program Files\CVI Spectral Products\SM32Pro\ folder. And check the calibration part as follows.



In above example, the number of calibration data in total is 10 and each part describes wavelength ( $\text{\AA}$ ) and pixel number. To make SM32Lab.ini for LabVIEW application program, create new SM32Lab.ini file by notepad software, and copy above calibration part to SM32Lab.ini. And then modify these values as follows. (This initial file doesn't have to have the same name as "SM32Lab.ini". This is the default name for our calibration VI, use another name(for example CAL.ini is ok), then choose that initial file when dialog box opened)



## Data Acquisition Procedure

