

USB-4711

**100 kS/s, 12-bit, USB
Multifunction Module**

User Manual

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 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

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Follow these simple precautions to protect yourself from harm and the products from damage.

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2. Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

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Introduction

This chapter will provide information on the features of the DAS module, a quick start guide for installation, and some brief information on software and accessories for the USB-4711 Module.

Sections include:

- Features
- Applications
- Installation Guide
- Software Overview
- Device Driver
Programming Roadmap

Chapter 1 Introduction

Thank you for buying the Advantech USB-4711 data acquisition module. The Advantech USB-4711 is a powerful data acquisition (DAS) module for the USB port. It features a unique circuit design and complete functions for data acquisition and control.

1.1 Features

USB-4711 has the most requested measurement & control functions:

- 16 single-ended analog input channels
- 12-bit resolution A/D converter, with up to 100 kS/s sampling rate
- 8 digital input & 8 digital output channels (TTL Level)
- 2 analog output channels
- 16-bit programmable counter/timer x 1
- Programmable gain for each analog input channel
- Automatic channel/gain scanning
- On-board 1K samples FIFO buffer for AI channels
- No need for external power
- Device status LED indicator
- Removable on-module wiring terminal
- Supports high-speed USB 2.0
- Auto calibration function
- Hot swappable

Note: *The USB chip on your system may have a limitation on the number of USB devices it will support. Normally, only five USB-4711 devices can be supported.*

Note: *The power output of an USB port is 500 mA, while the USB-4711 requires 360 mA (typical). This means that if an USB hub is used, it will need an external power supply to support more than one USB-4711 device.*

1.1.1 Programmable Gain for Each Analog Input Channel & Automatic Channel/Gain Scanning

USB-4711 features an automatic channel/gain scanning circuit. This circuit design controls multiplexer switching during sampling. You can set different gain values for each channel according to their needs for the corresponding range of input voltage. The gain value settings selected are stored in SRAM. This flexible design enables multi-channel and high-speed sampling for high-performance data acquisition (up to 100 kS/s).

1.1.2 On-board FIFO (First-In-First-Out) Memory

USB-4711 provides an on-board FIFO memory buffer, storing up to 1K A/D samples. This useful feature enables a continuous high-speed data transfer with a more flexible and predictable performance on operating systems.

1.1.3 Plug & Play Function

USB-4711 is a portable Plug-&-Play device that fully complies with the USB 2.0 specification. During module installation, all bus-related configurations such as base I/O address and interrupts are conveniently taken care of by the Plug-&-Play function. You have virtually no need to set any jumpers or DIP switches.

Note: For detailed specifications of USB-4711, please refer to Appendix A, Specifications.

1.2 Applications

- Transducer and sensor measurements
- Waveform acquisition and analysis
- Process control and monitoring
- Vibration and transient analysis

1.3 Installation Guide

Before you install your USB-4711 module, please make sure you have the following necessary components:

- USB-4711 DAS Module
- USB-4711 User Manual
- Shielded USB 2.0 cable (1.8 m)
- Driver software Advantech DLL drivers (included in the companion CD-ROM)
- Personal computer or workstation with a USB port (running Windows 2000, or XP)

Some application software is also available for enhanced operation. USB-4711 works with ActiveDAQ, ADAQview and other third-party software packages.

After you have the necessary components and maybe some accessories for enhanced operation of your USB DAS module, you can then begin the installation procedure. Figure 1.1 on the next page provides a concise flow chart to give a broad picture of the software and hardware installation procedures.

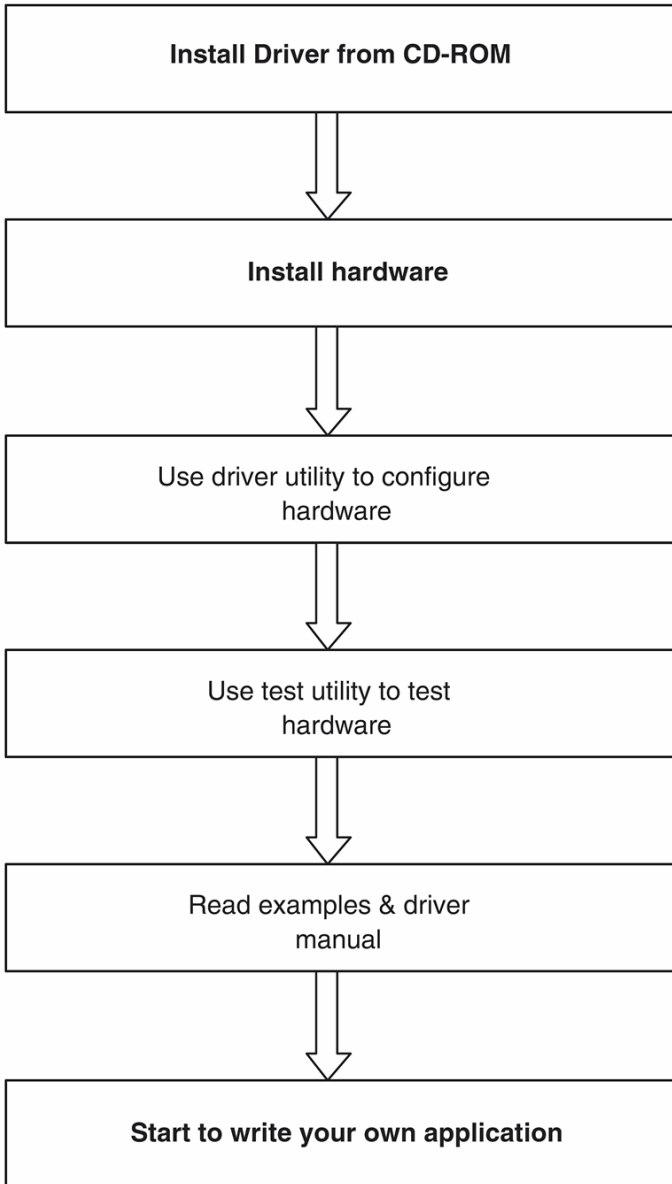


Figure 1.1: Installation Flow Chart

1.4 Software Overview

Advantech offers a rich set of DLL drivers, third-party driver support and application software to help fully exploit the functions of your USB-4711 module:

- Device Drivers (on the companion CD-ROM)
- LabVIEW driver
- Advantech ActiveDAQ
- Advantech ADAQView

1.4.1 Programming Choices for DA&C Module:

You may use Advantech application software like Advantech Device Drivers. On the other hand, advanced users are allowed to use register-level programming as another option, although this is not recommended due to its laborious and time-consuming nature.

1.4.2 Device Drivers

The Advantech Device Drivers software is included on the companion CD-ROM. Advantech's Device Drivers features a complete I/O function library to help boost your application performance. The Advantech Device Drivers for Windows 2000/XP works seamlessly with development tools such as Visual C++, Visual Basic, Inprise C++ Builder, and Inprise Delphi.

1.5 Device Driver Programming Roadmap

This section will provide a roadmap to demonstrate how to build an application from scratch using Advantech Device Drivers with your favorite development tools such as Visual C++, Visual Basic, Delphi, or C++ Builder. The step-by-step instructions on how to build your own applications using each development tool will be given in the Device Drivers Manual. Moreover, a rich set of example source code is also given for your reference.

1.5.1 Programming Tools

Programmers can develop application programs with the following development tools:

- Visual C++
- Visual Basic
- Delphi
- C++ Builder

For instructions on how to begin programming in each development tool, Advantech offers a Tutorial Chapter in the Device Drivers Manual for your reference. Please refer to the corresponding sections in this chapter on the Device Drivers Manual to begin your programming efforts. You can also look at the example source code provided for each programming tool, since they can get you very well oriented.

The Device Drivers Manual can be found on the companion CD-ROM. Alternatively, if you have already installed the Device Drivers on your system, The Device Drivers Manual can be readily accessed through the Start button:

Start/Programs/Advantech Automation/Advantech Device Manager /Device Driver's Manual

The example source code can be found under the corresponding installation folder such as the default installation path:

\\Program Files\\Advantech\\ADSAPI\\Examples

For information about using other function groups or other development tools, please refer to *Creating Windows 2000/XP Applications with Device Drivers* chapter and the *Function Overview* chapter in the Device Drivers Manual.

1.5.2 Programming with Device Drivers Function Library

Advantech Device Drivers offer a rich function library that can be utilized in various application programs. This function library consists of numerous APIs that support many development tools, such as Visual C++, Visual Basic, Delphi and C++ Builder.

1.5.3 Troubleshooting Device Drivers Error

Driver functions will return a status code when they are called to perform a certain task for the application. When a function returns a code that is not zero, it means the function has failed to perform its designated function. To troubleshoot the Device Drivers error, you can pass the error code to `DRV_GetErrorMessage` function to return the error message. Alternatively, you can refer to the Device Drivers Error Codes Appendix in the Device Drivers Manual for a detailed listing of Error Codes, Error IDs and the Error Messages.

Installation

This chapter has a package item checklist, proper instructions about unpacking and step-by-step procedures for both driver and USB installation..

Sections include:

- Unpacking
- Driver Installation
- Hardware Installation
- Device Setup & Configuration
- Device Testing
- Hardware Uninstallation

Chapter 2 Installation

2.1 Unpacking

After receiving your USB-4711 package, please inspect its contents first. The package should contain the following items:

- USB-4711 Module
- Shielded USB 2.0 Cable (1.8 m)
- Companion CD-ROM (DLL driver included)
- User Manual

The USB-4711 Module harbors certain electronic components vulnerable to *electrostatic discharge* (ESD). ESD could easily damage the integrated circuits and certain components if preventive measures are not carefully paid attention to. ***Before removing the module from the antistatic plastic bag, you should take following precautions to ward off possible ESD damage:***

- Touch the metal part of your computer chassis with your hand to discharge static electricity accumulated on your body. One can also use a grounding strap.
- Make contact between the antistatic bag and ground before opening the bag.

After taking out the module, you should first:

Inspect the module for any possible signs of external damage (loose or damaged components, etc.). If the module is visibly damaged, please notify our service department or our local sales representative immediately. Avoid using a damaged module with your system.

- Avoid physical contact with materials that could hold static electricity such as plastic, vinyl and Styrofoam.

2.2 Driver Installation

We recommend you install the software driver before you install the USB-4711 module into your system, since this will guarantee a smooth installation process.

The 32-bit DLL driver Setup program for the USB-4711 module is included on the companion CD-ROM that is shipped with your module package. Please follow the steps below to install the driver software:

Step 1: Insert the companion CD-ROM into your CD-ROM drive.

Step 2: The Setup program will be launched automatically if you have the auto-play function enabled on your system. When the Setup Program is launched, you'll see the following Setup Screen.

Note: *If the auto-play function is not enabled on your computer, use Windows Explorer or Windows Run command to execute Setup.exe on the companion CD-ROM.*



Figure 2.1: *The Setup Screen of Advantech Automation Software*

Step3: Click *Continue*, and select the *Installation* option

Step4: Select the specific device and then just follow the installation instructions step by step to complete your device driver installation and setup.

For further information on driver-related issues, an online version of the Device Drivers Manual is available by accessing the following path:

Start\Programs\Advantech Automation

\Advantech Device Manager\Device Driver's Manual

2.3 Hardware Installation

Note: Make sure you have installed the software driver before you install the module (please refer to Section 2.2 Driver Installation)

After the DLL driver installation is completed, you can now go on to install the USB-4711 module in any USB port that supports the USB 2.0 standard, on your computer. It is suggested that you refer to the computer's user manual or related documentation if you have any doubts. Please follow the steps below to install the module on your system.

Step 1: Touch the metal part on the surface of your computer to neutralize the static electricity that might be in your body.

Step 2: Plug your USB module into the selected USB port. Hold the module only by its edges. Plug the module firmly into place. Use of excessive force must be avoided; otherwise the module might get damaged.

Note: In case you installed the module without installing the DLL driver first, Windows 2000/XP will recognize your module as an "unknown device" after reboot, and will prompt you to provide necessary driver. You should ignore the prompting messages (just click the Cancel button) and set up the driver according to the steps described in Section 2.2 Driver Installation.

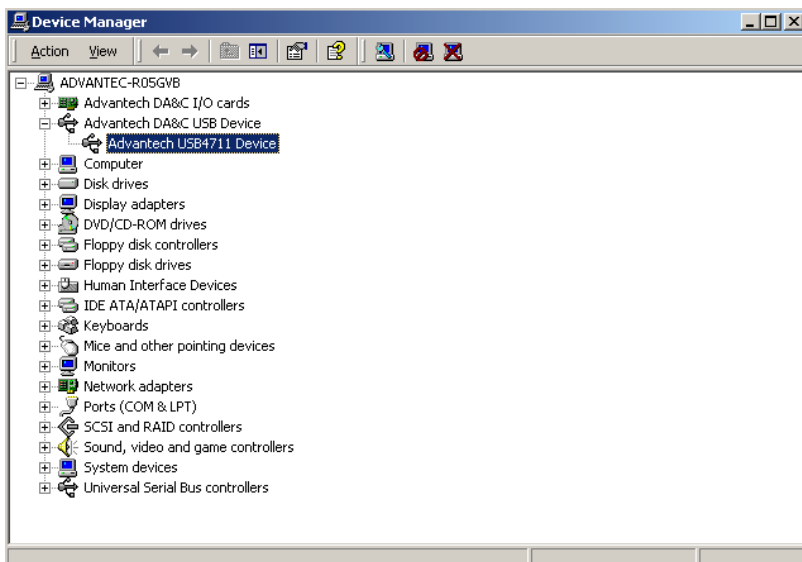


Figure 2.2: The Device Name Listed on the Device Manager

Note: *If your module is properly installed, you should see the device name of your module listed on the Device Manager tab. If you see your device name listed, but marked with an exclamation sign “!” (Fig. 2-4), it means your module has not been correctly installed. In this case, remove the module from Device Manager by selecting its device name and press the **Remove** button. Then go through the driver installation process again.*

You can check the Device Properties to see if your device is running under "Full Speed" mode (USB 1.1) or "High Speed" mode (USB 2.0). See figure 2.3 on the next page.

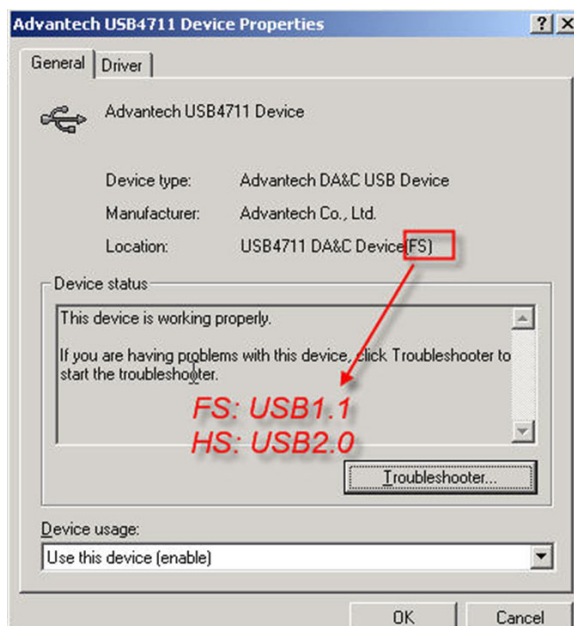


Figure 2.3: USB-4711 Device Speed

Note: The maximum sampling rate under FS mode(USB 1.1) is 25 kS/s.

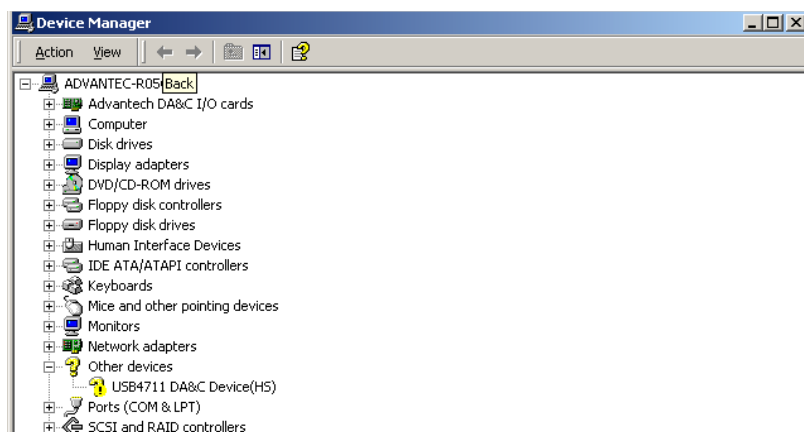


Figure 2.4: The Exclamation Mark (!) Indicates Improper Installation

After your module is properly installed with your system, you can now configure your device using the *Advantech Device Manager* that has itself already been installed on your system during driver setup. A complete device installation procedure should include *device setup*, *configuration* and *testing*. The following sections will guide you through the Setup, Configuration and Testing of your device.

2.4 Device Setup & Configuration

Advantech Device Manager is a utility that allows you to set up, configure and test your devices, and later stores your settings in the system registry. These settings will be used when you call the APIs of Advantech 32-bit DLL drivers.

2.4.1 Setting Up the Device

Step 1: To complete the device setup and configuration procedures, you must first install the device along with its driver. (Please refer to the previous section of Chapter 2 for detailed installation instructions).

Step2: You can view the device(s) already installed on your system (if any) in the Installed Devices list box. If you haven't installed any devices, you might see a blank list.

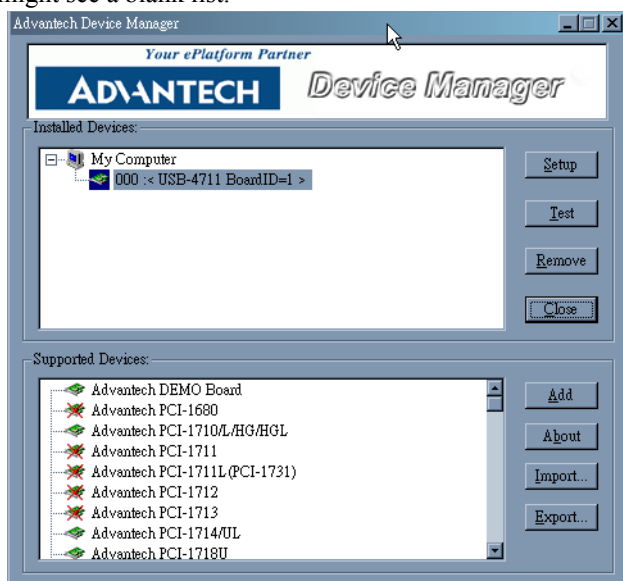


Figure 2.5: The Advantech Device Manager Dialog Box

Note: *If you have properly installed the device driver but still can't find it in Advantech Device Manager, please close the Advantech Device Manager and restart it.*

2.4.2 Configuring the Device

Step 3: Click “**Setup**” button and you will see the “*Device Setting*” dialog box as follow. On the *Device Setting* dialog box, you can specify the voltage output range for the 2 D/A channels and perform the AO/AI calibration function.

Note: *Please refer to Appendix C for a detailed calibration procedure.*

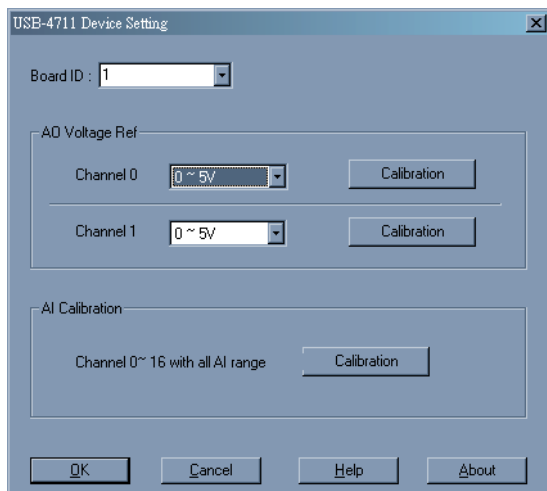


Figure 2.6: The Device Setting Dialog Box

2.5 Device Testing

Following the *Setup* and *Configuration* procedures to the last step described in the previous section, you can now proceed to test the device by clicking the **Test** Button in the *I/O Device Installation* dialog window. In the *Device Test* dialog window, you are free to test various functions of USB-4711 on the *Analog input*, *Analog output*, *Digital input*, *Digital output* or *Counter* tabs.

2.5.1 Testing Analog Input Function

Click the *Analog Input* tab to bring it up to front of the screen. Select the input range for each channel in the *Input range* drop-down boxes. Configure the sampling rate on the scroll bar. Switch the channels by using the up/down arrow.

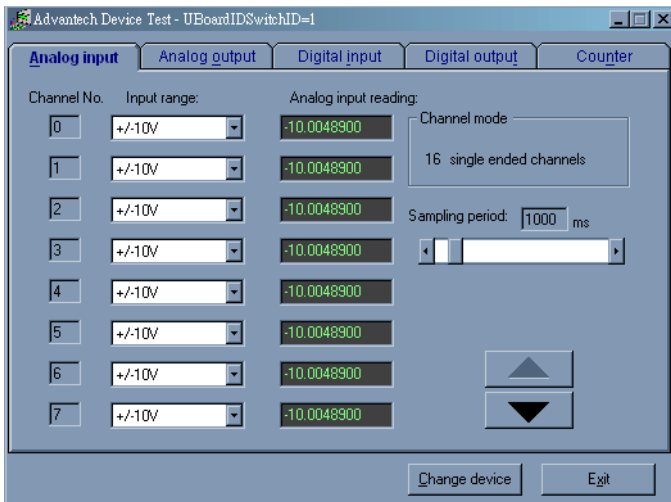


Figure 2.7: *Analog Input Tab in the Device Test Dialog*

2.5.2 Testing Analog Output Function

Click the *Analog Output* tab to bring it up to the foreground. The *Analog Output* tab allows you to output quasi-sine, triangle, or square waveforms generated by the software automatically, or output single values manually. You can also configure the waveform frequency and output a voltage range.

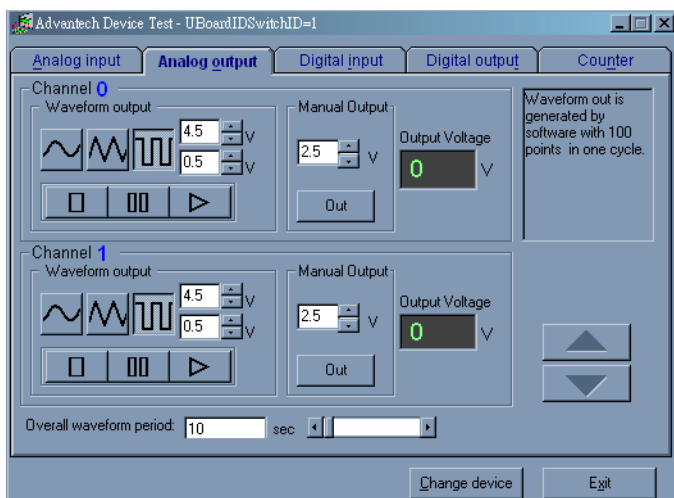


Figure 2.8: Analog Output Tab in the Device Test Dialog

2.5.3 Testing Digital Input Function

Click the *Digital Input* tab to show the *Digital Input* test panel as seen below. By the color of the LEDs, you can easily discern whether the status of each digital input channel is high or low.

Red lamp: High **Green lamp:** Low

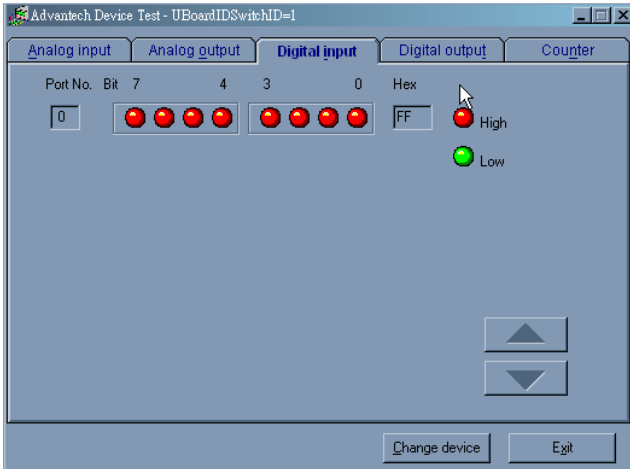


Figure 2.9: Digital Input Tab in the Device Test Dialog

2.5.4 Testing Digital Output Function

Click the *Digital Output* tab to bring up the *Digital Output* test panel as shown below. By pressing the buttons on each tab, you can easily set each digital output channel as *high* or *low* for the corresponding port.

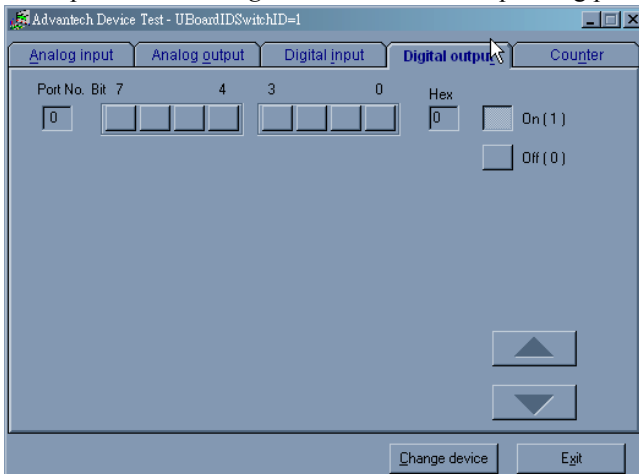


Figure 2.10: Digital Output Tab in the Device Test Dialog

2.5.5 Testing Counter Function

Click the *Counter* Tab to show its test panel. The counter channel (*Channel 0*) offers the *Event counting* function. If you select *Event counting*, you need to first connect your clock source to pin **EVT_IN**.

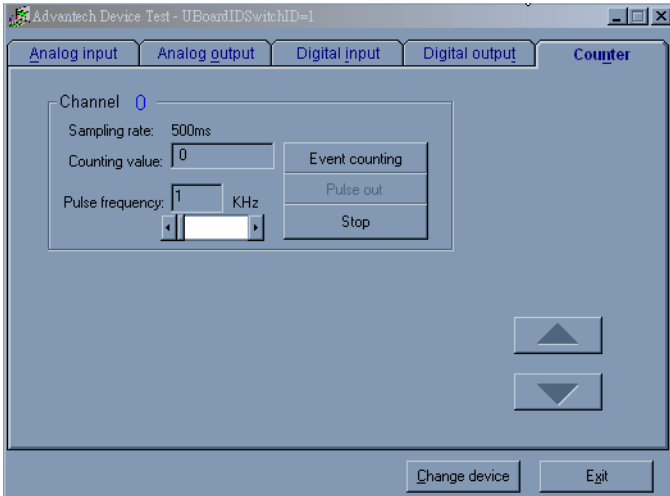


Figure 2.11: Counter Tab in the Device Test Dialog

Only after your module device is properly set up, configured and tested, can the device installation procedure be considered complete. After the device installation procedure is completed, you can safely proceed to the next chapter, *Signal Connections*.

2.6 Hardware Uninstallation

Though the Advantech USB modules are hot swappable, we still recommend you to follow the hardware un-installation procedure to avoid any unpredictable damages to your device or your system.

Step1: Close the applications of the USB module (ex. Advantech Device Manager).

Step2: Right click the “Unplug or Eject Hardware” icon on your task bar.

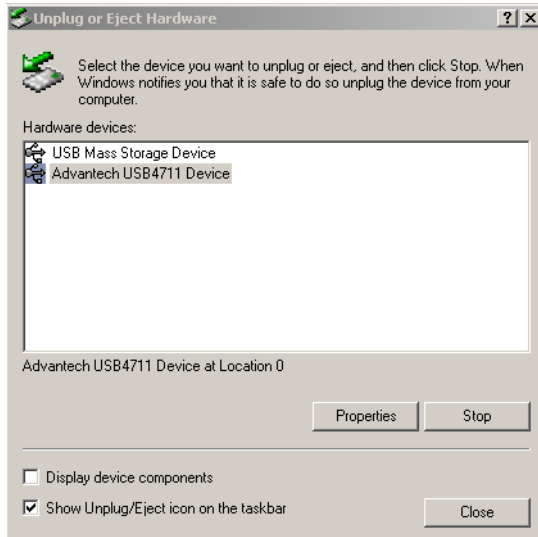


Figure 2.12: Unplug or Eject Hardware Dialog

Step3: Select “Advantech USB4711 Device” and press “Stop” Button.

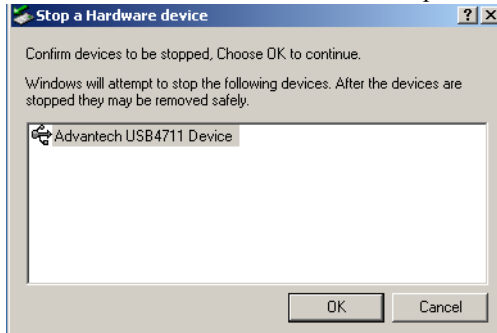


Figure 2.13: *Stop a Hardware device dialog box*

Step4: Unplug your USB device from the USB port.

Note: Please make sure that you have closed the application programs before unplugging the USB device, otherwise some unexpected system errors or damages may happen.

Signal Connections

This chapter provides useful information on how to connect input and output signals to the USB-4711 via the I/O connectors..

Sections include:

- Overview
- I/O Connectors
- Analog Input Connections
- Analog Output Connections
- Trigger Source Connections
- Field Wiring Considerations

Chapter 3 Signal Connections

3.1 Overview

Maintaining good signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly. A good signal connection can avoid unnecessary and costly damage to your PC and other hardware devices.

3.2 I/O Connectors

USB-4711 is equipped with plug-in screw-terminal connectors that facilitate connection to the module without terminal boards or cables.

3.2.1 Pin Assignment

Figure 3.1 on next page shows the pin assignments for the five 10-pin I/O connectors on USB-4711.

Warning: The two ground references AGND and DGND should be used separately for their designated purpose. Do not connect them together.

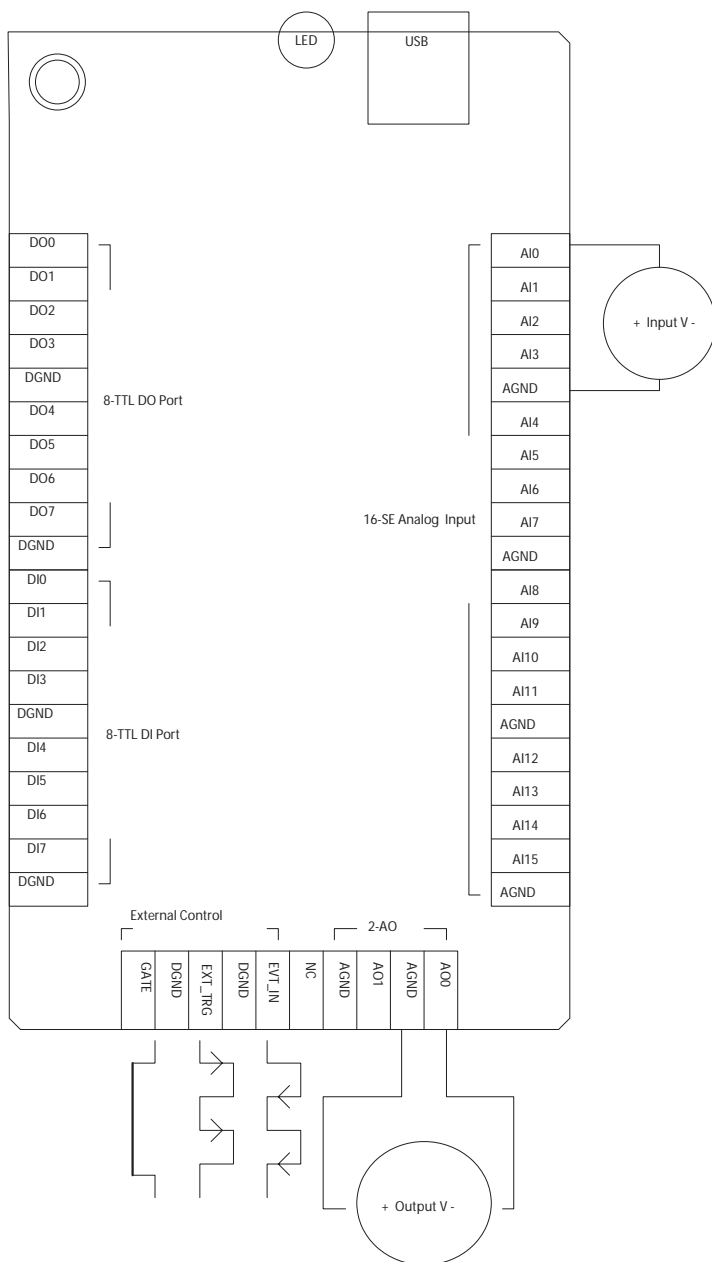


Figure 3.1: I/O Connector Pin Assignment

3.2.2 I/O Connector Signal Description

Table 3.1: I/O Connector Signal Description

Signal Name	Reference	Direction	Description
AI<0...15>	AGND	Input	Analog Input Channels 0 through 15.
AIGND	-	-	Analog Input Ground.
AO0 AO1	AGND	Output	Analog Output Channels 0/1.
AOGND	-	-	Analog Output Ground. The analog output voltages are referenced to these nodes.
DI<0..7>	DGND	Input	Digital Input channels.
DO<0..7>	DGND	Output	Digital Output channels.
DGND	-	-	Digital Ground. This pin supplies the reference for the digital channels at the I/O connector.
GATE	DGND	Input	A/D External Trigger Gate. When GATE is connected to +5 V, it will disable the external trigger signal to input.
EXT_TRG	DGND	Input	A/D External Trigger. This pin is external trigger signal input for the A/D conversion. A low-to-high edge triggers A/D conversion to start.
EVT_IN	DGND	Input	External events input channel.

3.2.3 LED Indicator Status Description

The USB Module is equipped with a LED indicator to show the current status of the device. When you plug the USB device into the USB port, the LED indicator will blink five times and then stay lit to indicate that it is on. Please refer to the following table for detailed LED indicator status information.

<i>Table 3.2: LED Indicator Status Description</i>	
LED Status	Description
ON	Device ready for work
Off	Device not ready to work
Slow Blinking (5 times)	Device Initialization
Fast Blinking (Depends on data transfer speed).	Device working

3.3 Analog Input Connections

USB-4711 supports 16 single-ended analog inputs. Each individual input channel is software-selected.

3.3.1 Single-ended Channel Connections

The single-ended input configuration has only one signal wire for each channel, and the *measured voltage* (V_m) is the voltage of the wire as referenced against the common ground.

A signal source without a local ground is also called a “floating source”. It is fairly simple to connect a single-ended channel to a floating signal source. In this mode, USB-4711 provides a reference ground for external floating signal sources.

Figure 3.2 shows a single-ended channel connection between a floating signal source and an input channel on USB-4711.

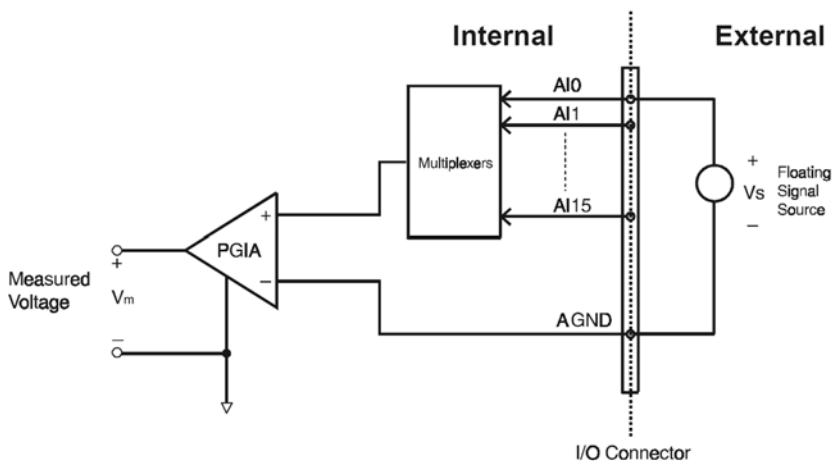


Figure 3.2: Single-Ended Input Channel Connection

3.4 Analog Output Connections (Voltage)

USB-4711 provides two analog output channels, AO0 and AO1. Figure 3-3 shows how to make analog output connections on USB-4711.

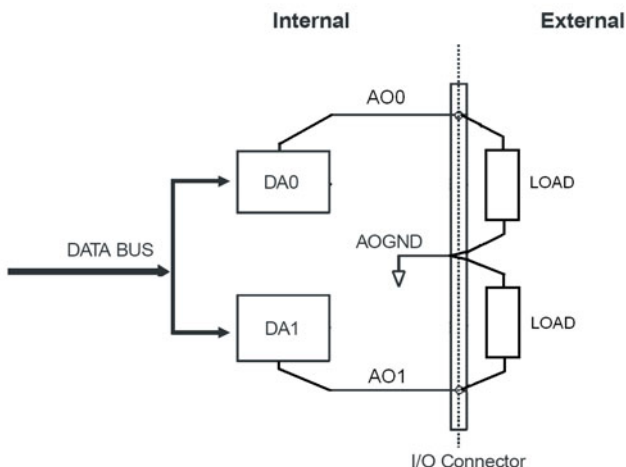


Figure 3.3: Analog Output Channel Connections

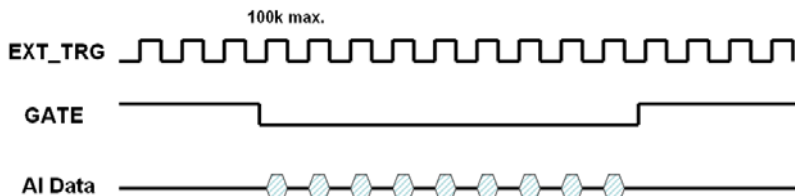
3.5 Trigger Source Connections

3.5.1 Internal Pacer Trigger Connection

USB-4711 provides two 16-bit counters connected to a 10 MHz clock. Counter 0 is a counter that counts events from an input channel. Counter 1 is a 16-bit timer for pacer triggering. A low-to-high edge from the Counter 1 output will trigger an A/D conversion on USB-4711.

3.5.2 External Trigger Source Connection

In addition to pacer triggering, USB-4711 also allows external triggering for A/D conversions. When GATE is connected to a +5V DC source, the external trigger function is thereby disabled. And the external trigger function will be enabled once the +5V DC source is removed.



3.6 Field Wiring Considerations

- When you use USB-4711 to acquire data from outside, noises in the environment might significantly affect the accuracy of your measurements if due cautions are not taken. The following measures will be helpful to reduce possible interference running signal wires between signal sources and the USB-4711.
- The signal cables must be kept away from strong electromagnetic sources such as power lines, large electric motors, circuit breakers or welding machines, since they may cause strong electromagnetic interference. Keep the analog signal cables away from any video monitor, since it can significantly affect a data acquisition system.
- If the cable travels through an area with significant electromagnetic interference, you should adopt individually shielded, twisted-pair wires as the analog input cable. This type of cable has its signal wires twisted together and shielded with a metal mesh. The metal mesh should only be connected to one point at the signal source ground.
- Avoid running the signal cables through any conduit that might have power lines in it.
- If you have to place your signal cable parallel to a power line that has a high voltage or high current running through it, try to keep a safe distance between them. Or place the signal cable in a right angle to the power line to minimize the undesirable effect.

APPENDIX A

Specifications

Appendix A Specifications

A.1 Analog Input

Channels	16 Channels Single-Ended						
Resolution	12 bits	FIFO Size	1K Samples				
Sampling Rate		100 kS/s					
Input Range and Gain List	Gain	0.5	1	2	4	8	
	Gain Code	4	0	1	2	3	
	Bipolar (V)	±10	±5	±2.5	±1.25	±0.625	
Drift	Gain	0.5	1	2	4	8	
	Zero (µV/° C)	±30					
	Gain (ppm/° C)	30	30	30	30	30	
Small Signal Bandwidth for PGA	Gain	0.5	1	2	4	8	
	Bandwidth (MHz)	0.64	1.1	1.7	1.4	0.75	
Input Overvoltage		30 V max.					
Input Impedance		1GΩ					
Accuracy	DC	INLE(LSB)	1	1	1	1	2
		DNLE(LSB)	1	1	1	1	1
	AC	SINAD	68 dB				
		THD	-88 dB				
		ENOB	11 bit				

A.2 Analog Output:

Channels	2		
Resolution	12 bits	FIFO Size	N/A
Throughput	2 kHz		
Operating Mode	Single output		
Output Range	0~5, 0~10, ± 5 , ± 10		
Accuracy	DC	INLE	$\pm 1\text{LSB}$
		DNLE	$\pm 1\text{LSB}$
Dynamic Performance	Slew Rate	0.7 V/ μs	
	Settling Time	100 μs (to $\pm 1/2$ LSB of FSB)	
Driving Capability	5 mA		
Output Impedance	0.1 Ω max.		

A.3 Non-Isolated Digital Input/Output

Input Channels	8 Non-Isolation TTL	
Input Voltage	Low	0.0 Vdc (Min) / 1.0Vdc (Max)
	High	2.0 Vdc (Min) / 5.0Vdc (Max)
Output Channels	8 Non-Isolation TTL	
Output Voltage	Low	0.4 Vdc / -6mA (Sink)
	High	2.4 Vdc / 6mA (Source)

A.4 Counter

Channels	1		
Resolution	32-bit software base	Capability	TTL level
Input Frequency	1 kHz max.		
Clock Input	Low	0.0 Vdc (Min) / 1.0 Vdc (Max)	
	High	2.0 Vdc (Min) / 5.0 Vdc (Max)	
Gate Input	Low	0.0 Vdc (Min) / 1.0 Vdc (Max)	
	High	2.0 Vdc (Min) / 5.0 Vdc (Max)	

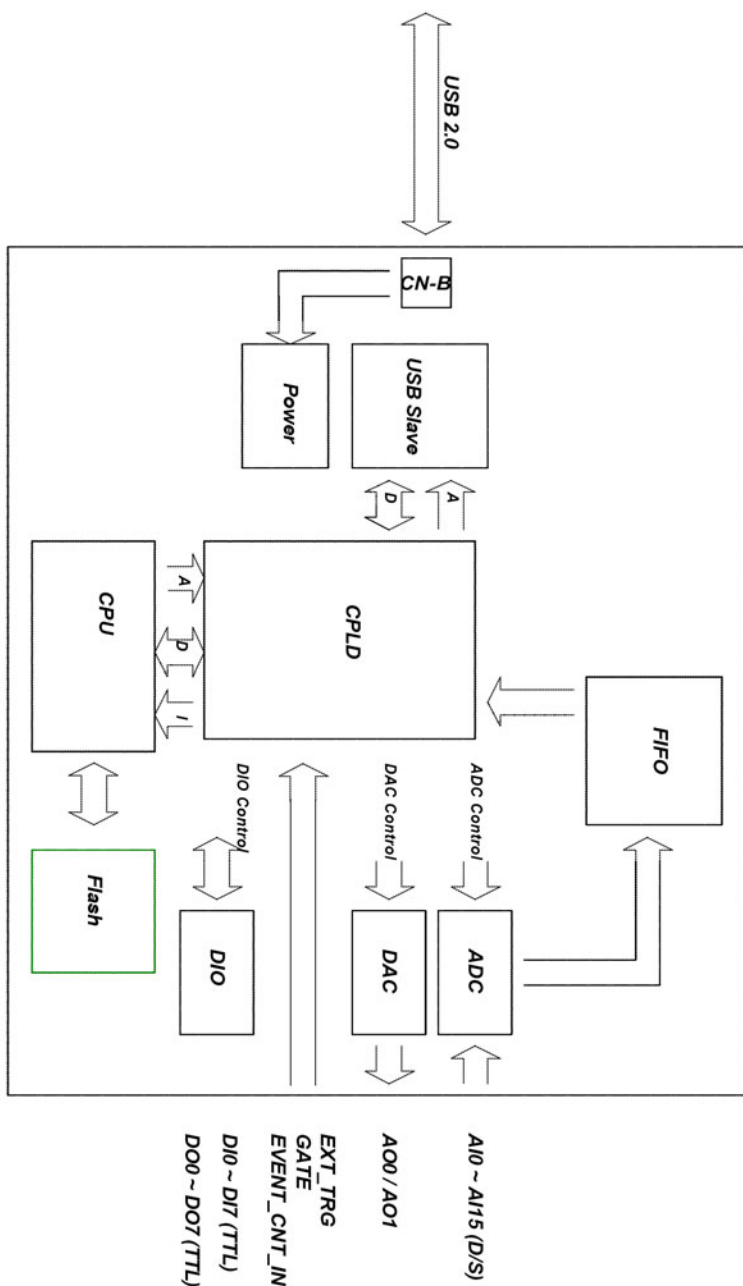
A.5 General

I/O Connector Type	Removable 10-pin screw terminal x 5		
Dimensions	145 x 100 mm (5.7" X 3.9")		
Power Consumption	360 mA @ +5.0V Typical 450 mA @ +5.0 V max.		
Temperature	Operation	0~60 (32~140) (refer to IEC 68-2-1, 2)	
	Storage	-20~70 (-4~158)	
Relative Humidity	5~ 95 % RH non-condensing (refer to IEC 68-2-1, 2)		

APPENDIX **B**

Function Block

Appendix B Function Block



APPENDIX C

Calibration

Appendix C Calibration

This section provides brief information on USB-4711 calibration. Regular calibration checks are important to maintain accuracy in data acquisition and control application. The calibration utility is included in Advantech Device Manager.

USB-4711 modules are calibrated at the factory for initial use. However, a recalibration of the analog input and the analog output function is recommended every six months.

We provide a calibration function on the Advantech Device Manager to assist you with analog input/output channel calibration. The calibration function makes calibration an easy job. With a variety of prompts and graphic displays, this function will lead you through the calibration and setup procedures, showing you all the correct settings and adjustments.

To perform a satisfactory calibration, you will need a 4½-digit digital multi-meter and a voltage calibrator or a stable, noise-free DC voltage source.

Note: *Before you calibrate the analog input/output function, you should turn on the power for at least 15 minutes to make sure the DA&C module is already stable.*

C.1 Analog Output Calibration

The following steps will guide you through the USB-4711 analog output channel software calibration.

Step1: Click the **Setup** button in the Advantech Device Manager window (Figure D.1) to launch the USB-4711 Device Setting window (Figure D.2)

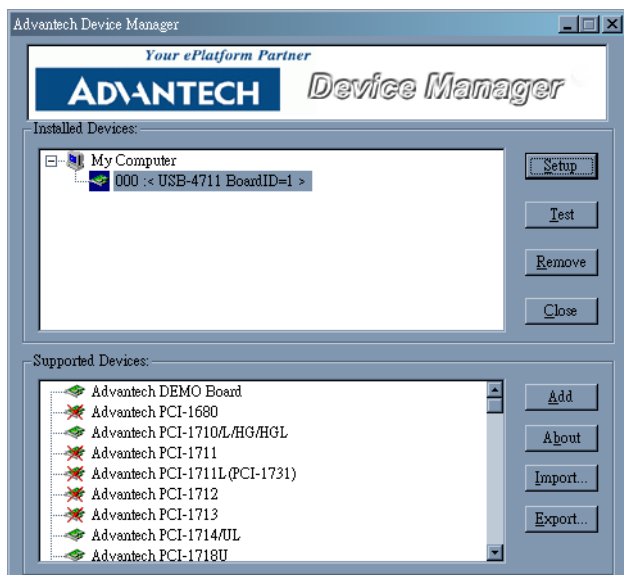


Figure C.1: Click the **Setup** button to Launch the Device Setting

Step2: Select the channel and its output range. (Corresponding to your AO range setting)

Step3: Click the **Calibration** button to start the calibration process. The Calibration Wizard window will pop up.

Note: *Each calibration process can calibrate only one channel and one output range at a time.*

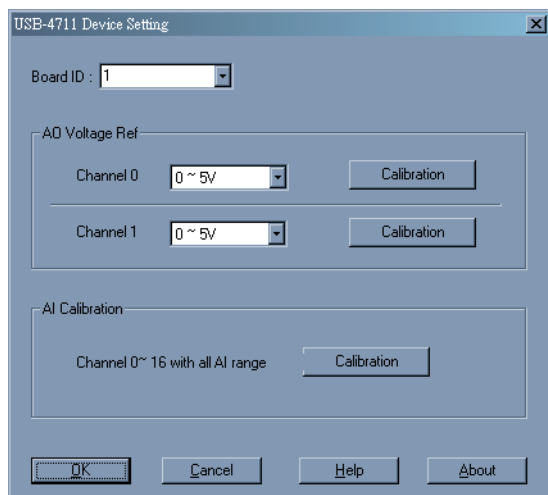


Figure C.2: Click the Calibration Button to Start Calibrating

Step4: Follow the instructions of the Calibration Wizard and click the Next button to proceed to the next step.

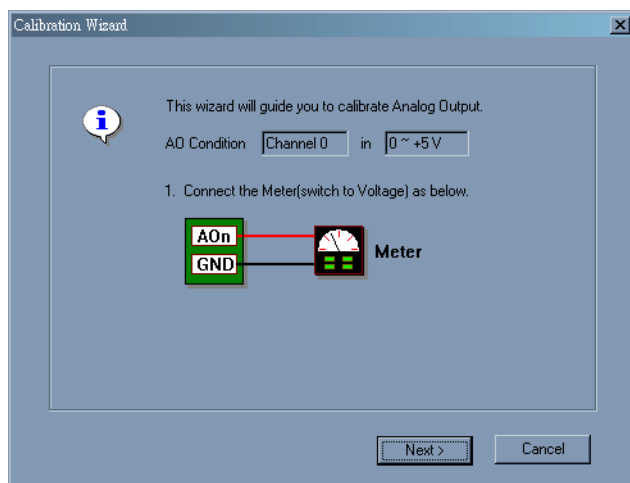


Figure C.3: The Calibration Wizard of AO Channel Calibration

Step5: At this step, the Wizard will output 0V on the channel you selected. Please check that the value on the meter is in this range. If the value does not fit, please perform an adjustment. There are 3 ways to perform the adjustment.

1. Move the slider.
2. Input the adjusted value. Note that the effect will only take place if the **Set** button is pressed.
3. Press Default. This will load the factory default values.

The value on the meter will change after you modify the Adjust Value. Please check that the value on the meter is in the range again. If the value fits the condition, press the [Next] button to continue.

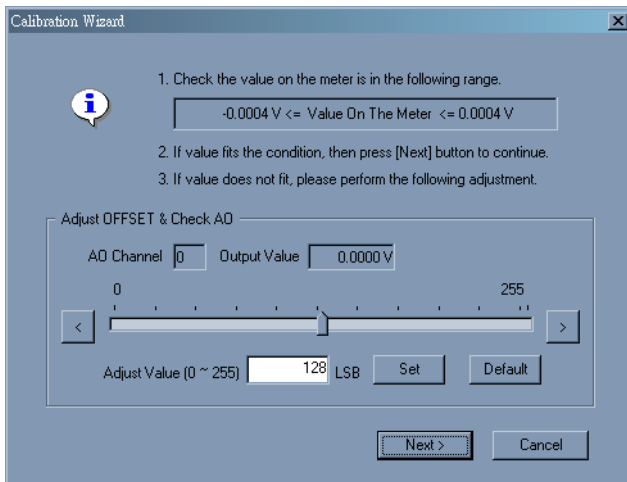


Figure C.4: The Adjustment Process of Offset Calibration

Step6: This step is to adjust Span. The Wizard will output a voltage value on the channel you selected. (Depending on the output range). The steps of span calibration are quite similar to those of the offset calibration (Step 5). Follow the instructions of the Calibration Wizard. If the value fits the condition, press **Next** to continue.

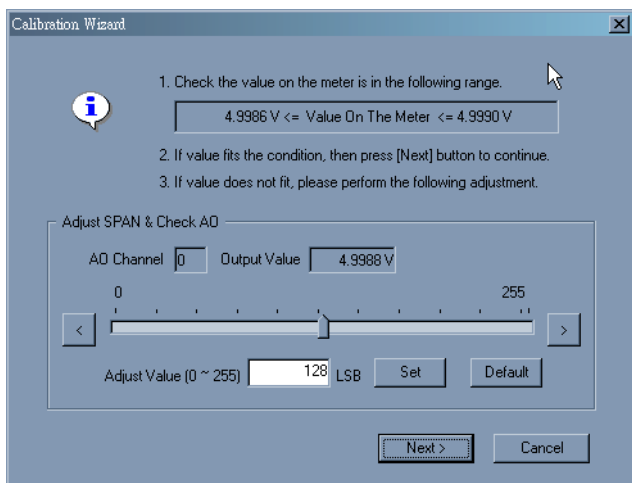


Figure C.5: The Adjustment Process of Span Calibration

Step 7: After span calibration, you have successfully calibrated your USB-4711 device. Please press **Finish** to finish it.

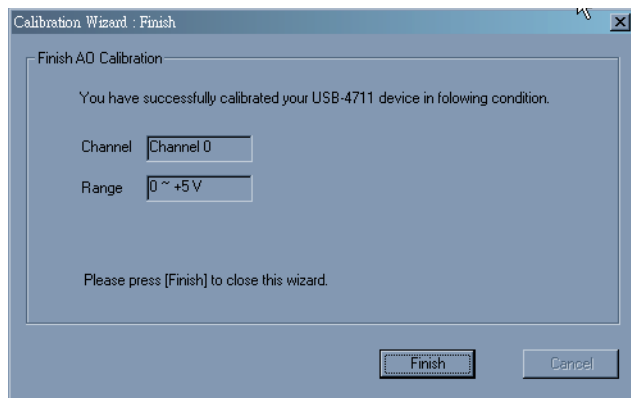


Figure C.6: Calibration Finished

Step 8: The wizard will display a dialog to inform you that the current calibration data of this channel will be overwritten if you click **Yes**. Otherwise click **No** to give up the data.

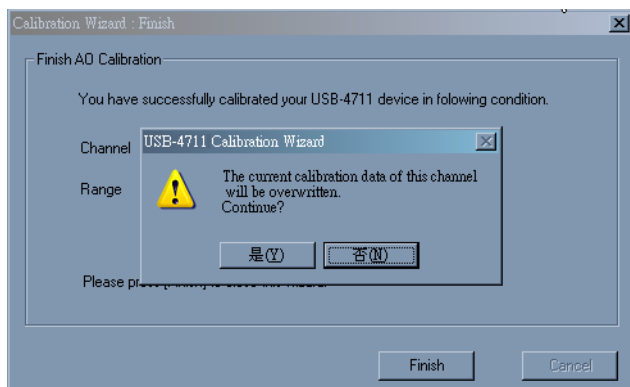


Figure C.7: Data will be Overwritten

Note: *It is not necessary to re-calibrate the AO channels after changing the out range setting.*

C.2 Analog Input Calibration

The following steps will guide you through the USB-4711 analog input channel software calibration.

Note: Make sure that you have calibrated your analog output channel 0 before you progress analog input calibrating. Please refer to Section C.1 for the detail step-by-step process of analog output calibration.

Step1: Click the **Setup** button in the Advantech Device Manager window to launch the USB-4711 Device Setting window.

Step2: Click the **Calibration** button of AI Calibration to start the calibration process. The Calibration Wizard window will pop up.

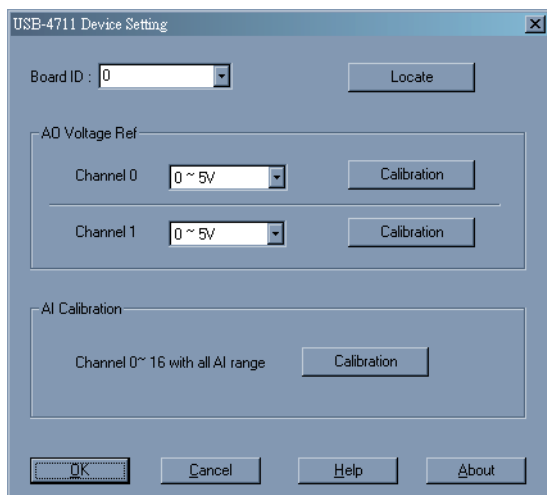


Figure C.8: Click Calibration Button of AI Calibration to Start Calibrating

Step3: Follow the instructions of the Calibration Wizard and click the “Next” button to proceed to the next step.

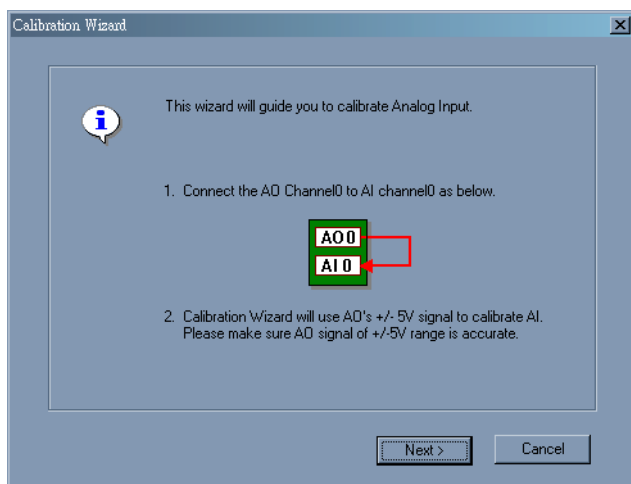


Figure C.9: The Calibration Wizard of AI Channel Calibration

Step4: You can start calibrating by clicking “**Start**” button or restore to the default setting by “**Default**” button. Click “**Start**”.

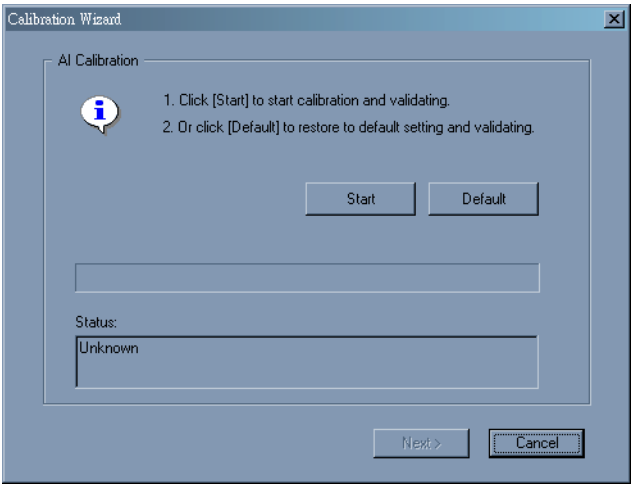


Figure C.10: Start Calibration or Restore to Default Setting

Step5: The status windows shows that the calibration success, click “**Next**” to continue.

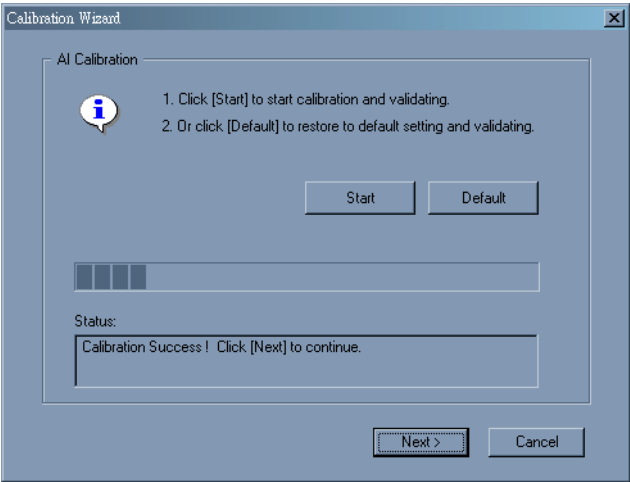


Figure C.11: Analog Calibration Successfully Completed.

Note: If the calibration can not successfully completed. Please recalibrate the analog output channel 0 first.

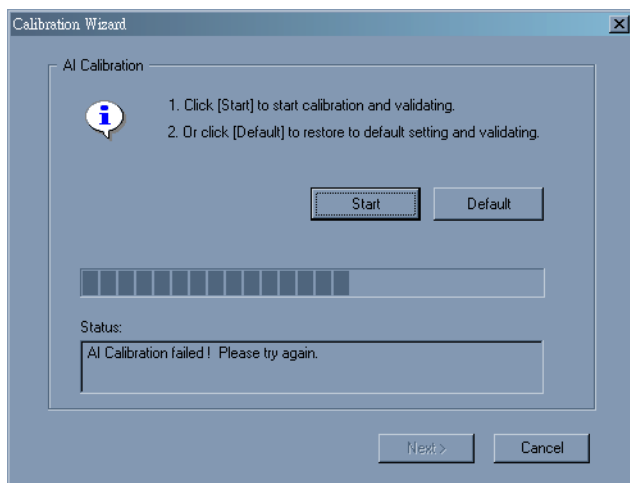


Figure C.12: Analog Calibration Failed..

Step 6: You have successfully calibrated your device. Please press “**Finish**” to close Calibration Wizard and “**Yes**” if you want to save the calibration data.

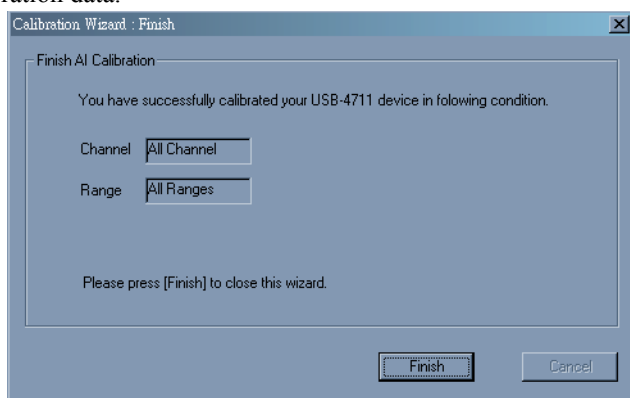


Figure C.13: Close Calibration Wizard

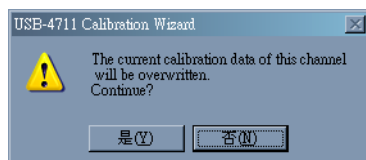


Figure C.14: Save The Calibration Data

C.3 Firmware Download Utility

The firmware download utility can help you update your device's firmware to the newest version to get the latest bug fixes and function improvements.

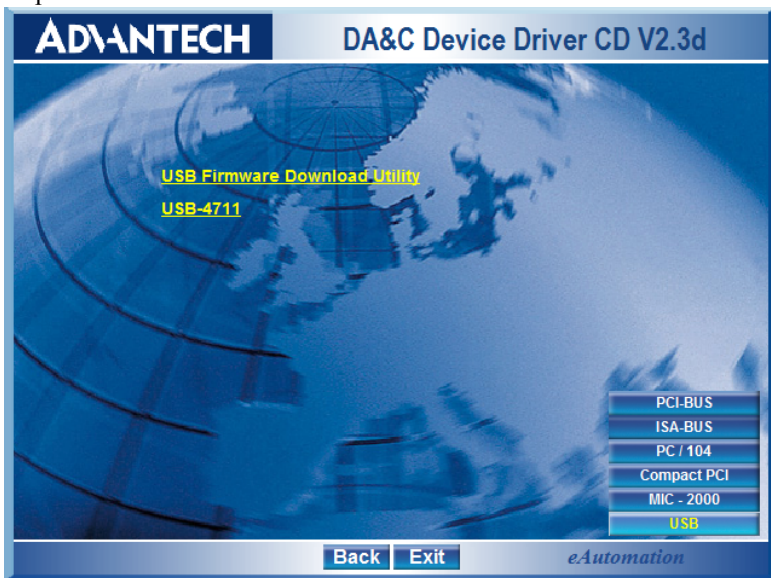


Figure C.15: Install Firmware Download Utility Screen

Note: After installation, the USB firmware download utility is located at C:\Program Files\Advantech\ADSAPI\Utilities by default.

Note: You can get the newest firmware from Advantech's website: www.advantech.com

The steps on the following pages will guide you through the USB-4711 firmware update.

Step1 - Select Device: Launch the firmware download utility and press “Select...” button to choice the target device. You can check the working firmware version at the “Firmware Version” item.

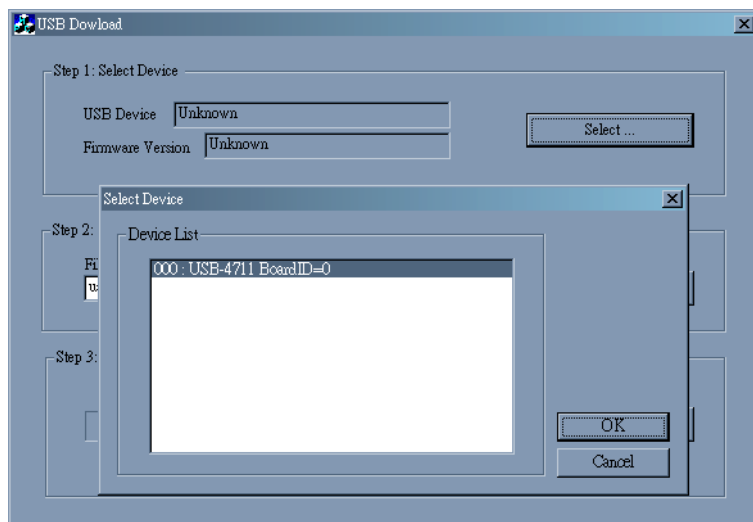


Figure C.16: USB Download Utility

Step2 - Select Firmware File: Press “Load...” button to select the firmware.

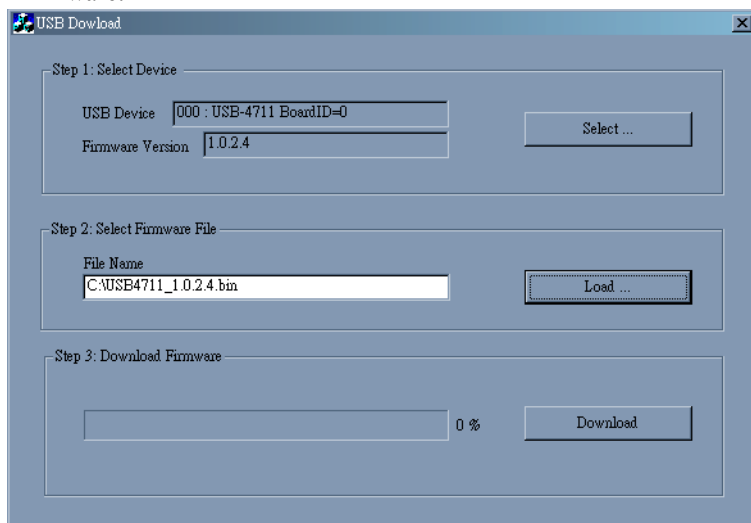


Figure C.17: Firmware Selection

Step3 - Download Firmware: Press “**Download**” to start downloading the firmware to your target device. Then press “OK”, unplug your device and reinstall it to bring the new settings effective.

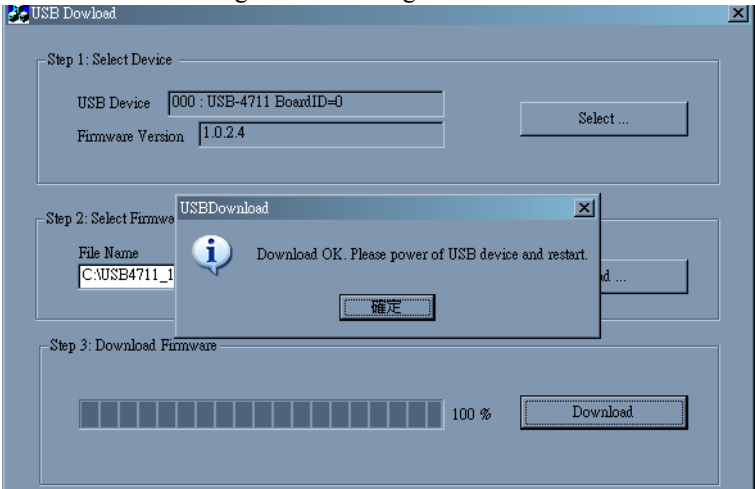


Figure C.18: Firmware Download Completed.

