USB-4718
8 Channel Thermocouple Input USB Data Acquisition Module
OMEGAnet® Online Service
omega.com

Internet e-mail
info@omega.com

Servicing North America:

U.S.A.: One Omega Drive, Box 4047
ISO 9001 Certified
Stamford, CT 06907-0047
Tel: (203) 359-1660
FAX: (203) 359-7700
e-mail: info@omega.com

Canada: 976 Bergar
Laval (Quebec) H7L 5A1, Canada
Tel: (514) 856-6928
FAX: (514) 856-6886
e-mail: info@omega.ca

For immediate technical or application assistance:

U.S.A. and Canada: Sales Service: 1-800-826-6342/1-800-TC-OMEGA®
Customer Service: 1-800-622-2378/1-800-622-BEST®
Engineering Service: 1-800-872-9436/1-800-USA-WHEN®

Mexico: En Español: (001) 203-359-7803
FAX: (001) 203-359-7807
e-mail: espanol@omega.com
info@omega.com.mx

Servicing Europe:

Czech Republic: Frystatska 184, 733 01 Karviná, Czech Republic
Tel: +420 (0)59 6311899
FAX: +420 (0)59 6311114
Toll Free: 0800-1-66342
e-mail: info@omegashop.cz

Germany/Austria: Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
Tel: +49 (0)7056 9398-0
FAX: +49 (0)7056 9398-29
Toll Free in Germany: 0800 639 7678
e-mail: info@omega.de

United Kingdom: One Omega Drive, River Bend Technology Centre
ISO 9002 Certified
Northbank, Irlam, Manchester
M44 5BD United Kingdom
Tel: +44 (0)161 777 6611
FAX: +44 (0)161 777 6622
Toll Free in United Kingdom: 0800-488-488
e-mail: sales@omega.co.uk

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USB-4718
8-Channel Thermocouple Input Data Acquisition Module

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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-4718 Module. Sections include:

- Features
- Applications
- Installation Guide
- Software Overview
- Device Driver
- Programming Roadmap
Chapter 1  Introduction

USB-4718 offers 8 thermocouple inputs with 16-bit resolution, up to 0.1% input range accuracy, or 4~20 mA inputs. Reliable and rugged enough for industrial applications, yet inexpensive enough for home projects, USB-4718 is the perfect way to add measurement and control capability to any USB capable computer. The USB-4718 is fully USB plug and play and easy to use. It obtains all required power from the USB port, so no external power connection is ever required.

1.1  Features

USB-4718 has the most requested measurement & control functions:

•  8 differential thermocouple input channels
•  16 bits resolution
•  Software configurable for thermocouple, low level voltage or current inputs.
•  Wiring burned-out detectable function (Thermo mode)
•  2,500 Vdc isolation
•  Watchdog Timer
•  Supports 0~20 & 4~20mA current inputs.
•  Bus-powered
•  Device status LED indicator
•  Removable on-module wiring terminal
•  USB 2.0 Support
•  Hot swappable

Note:  For detailed specifications of USB-4718, please refer to Appendix A, Specifications.

1.2  Applications

•  Temperature measurement
•  Industrial ON/OFF control
•  Industrial and Lab. automation
1.3 Installation Guide

Before you install your USB-4718 module, please make sure you have the following necessary components:

- USB-4718 DAS Module
- Shielded USB 2.0 cable (1.8 m)
- Driver software DLL drivers (included in the companion CD-ROM)

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. **Install Driver from CD-ROM**
2. **Install hardware**
3. **Use driver utility to configure hardware**
4. **Use test utility to test hardware**
5. **Read examples & driver manual**
6. **Start to write your own application**
1.4 Software Overview

Omega offers a rich set of DLL drivers, third-party driver support and application software to help fully exploit the functions of your USB-4718 module:

• Device Drivers (on the companion CD-ROM)

1.4.1 Programming Choices for DA&C Module:
You may use the application software like the 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 Device Drivers software is included on the companion CD-ROM. the Device Drivers features a complete I/O function library to help boost your application performance. The Device Drivers for Windows 2000/XP works seamlessly with development tools such as Visual C++, Visual Basic
1.5 Device Driver Programming Roadmap

This section will provide a roadmap to demonstrate how to build an application from scratch using the Device Drivers with your favorite development tools such as Visual C++, Visual Basic. 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

For instructions on how to begin programming in each development tool, a Tutorial Chapter is included 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/Omega USB-4700 series/Device Driver’s Manual

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

Program Files/Omega/USB-4700/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
The 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.

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-4718 package, please inspect its contents first. The package should contain the following items:

- USB-4718 Module
- Shielded USB 2.0 Cable (1.8 m)
- Companion CD-ROM (DLL driver included)

The USB-4718 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-4718 module into your system, since this will guarantee a smooth installation process.

The 32-bit DLL driver Setup program for the USB-4718 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.

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.

Step 3: Click Continue, and select the Installation option
Step 4: 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/Omega USB-4700 series/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-4718 module in any USB port that supports the USB 1.1/2.0 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: Device Manager Screen

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.
After your module is properly installed with your system, you can now configure your device using the 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

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 the 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).

**Step 2:** 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 2.4: Device Manager Dialog Box](image)

*Note:* If you have properly installed the device driver but still can't find it in Device Manager, please close the 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 BoardID of the device and perform the AI calibration function for the AI channels. "Locate" will blink the on-module LED till you release the bottom so you can easily identify the device you are operating.
"Restore" will reset device configurations to the factory settings.

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

**Figure 2.5: The Device Setting Dialog Box**

1. **Board ID:** Set the Board ID for easy identification.
2. **Locate:** The on-module LED indicator blinks when you continually press “Locate” button.
3. **Label string:** Edit the string label for identification purpose.

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4. **AI Channel setting:** Set the thermocouple type/ analog input range for each AI channel.

5. **Sample Rate adjustment:** Drag the slide bar to adjust the sampling rate of your device.

6. **Restore:** Restore the AI Calibration setting or the CJC offset setting to default.

7. **CJC Offset:** Adjust CJC offset setting.

8. **AI Calibration:** Analog input channel calibration function. Please refer to Appendix D for detailed operating guide.

### 2.4.3 Gain Code Setting

Configure the AI (analog input) channel's input voltage/current range by setting the corresponding *GainCode* of the device. The configuration for voltage and current is differentiated by the value of *GainCode*. The value of current *GainCode* is greater than 0x8000. Please refer to USB-4718’s software manual for more detail information.
Table 2.1: Gain Code

<table>
<thead>
<tr>
<th>Gain Code (Hex)</th>
<th>Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x08</td>
<td>Voltage</td>
<td>0-15mV</td>
</tr>
<tr>
<td>0x0A</td>
<td>Voltage</td>
<td>0-50mV</td>
</tr>
<tr>
<td>0x0B</td>
<td>Voltage</td>
<td>0-100mV</td>
</tr>
<tr>
<td>0x0D</td>
<td>Voltage</td>
<td>0-500mV</td>
</tr>
<tr>
<td>0x0E</td>
<td>Voltage</td>
<td>0-1.0V</td>
</tr>
<tr>
<td>0x0F</td>
<td>Voltage</td>
<td>0-2.5V</td>
</tr>
<tr>
<td>0x8000</td>
<td>Current</td>
<td>0-20mA</td>
</tr>
<tr>
<td>0x8001</td>
<td>Current</td>
<td>4-20mA</td>
</tr>
</tbody>
</table>

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-4718 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.
2.5.2 Testing Analog Output Function

Unsupported on this module.

Figure 2.6: Analog Input Tab/Device Test Dialog

Figure 2.7: Analog Output Function Not Supported
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 2.8: Digital Input Tab/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 2.9: Digital Output Tab/Device Test Dialog
2.5.5 Testing Counter Function
Unsupported on this module.

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 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. Device Manager).

**Step2:** Right click the “Unplug or Eject Hardware” icon on your task bar.
Step 3: Select “USB4718 Device” and press “Stop” Button.

Step 4: 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-4718 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-4718 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-4718.
Figure 3.1: I/O Connector Pin Assignment
3.2.2 I/O Connector Signal Description

<table>
<thead>
<tr>
<th>Signal Name</th>
<th>Reference</th>
<th>Direction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDI&lt;0~7&gt;</td>
<td>ICOM</td>
<td>Input</td>
<td>Isolated Digital Input Channels</td>
</tr>
<tr>
<td>ICOM</td>
<td>--</td>
<td>--</td>
<td>Common Port of IDI Channels</td>
</tr>
<tr>
<td>IDO&lt;0~7&gt;</td>
<td>OCOM</td>
<td>Output</td>
<td>Isolated Digital Output Channels</td>
</tr>
<tr>
<td>OGND</td>
<td>--</td>
<td>--</td>
<td>Isolated Digital Output Ground</td>
</tr>
<tr>
<td>OCOM</td>
<td>--</td>
<td>--</td>
<td>Positive External Power Supply</td>
</tr>
<tr>
<td>AI&lt;0~7&gt;</td>
<td>--</td>
<td>Input</td>
<td>Analog Input Channels</td>
</tr>
<tr>
<td>CJC+/CJC-</td>
<td>--</td>
<td>--</td>
<td>Cold Junction Compensation</td>
</tr>
<tr>
<td>NC</td>
<td>--</td>
<td>--</td>
<td>No connected</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>LED Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>Device ready for work</td>
</tr>
<tr>
<td>Off</td>
<td>Device not ready to work</td>
</tr>
<tr>
<td>Slow Blinking (5 times)</td>
<td>Device Initialization</td>
</tr>
<tr>
<td>Fast Blinking (Depends on data transfer speed)</td>
<td>Device working</td>
</tr>
</tbody>
</table>
### 3.2.4 Jumper Setting Description

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Description</th>
<th>Jumper</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP1</td>
<td>Input mode setting for analog input ch0</td>
<td>JP6</td>
<td>Input mode setting for analog input ch6</td>
</tr>
<tr>
<td>JP2</td>
<td>Input mode setting for analog input ch4</td>
<td>JP7</td>
<td>Input mode setting for analog input ch3</td>
</tr>
<tr>
<td>JP3</td>
<td>Input mode setting for analog input ch1</td>
<td>JP8</td>
<td>Input mode setting for analog input ch7</td>
</tr>
<tr>
<td>JP4</td>
<td>Input mode setting for analog input ch5</td>
<td>JP13</td>
<td>Watchdog timer setting</td>
</tr>
<tr>
<td>JP5</td>
<td>Input mode setting for analog input ch2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**JP1~JP8: Input Mode Setting for Analog Input Channels**

The analog input mode of every AI channel on USB-4718 can be set by JP1~JP8 separately to measure the voltage sources or the current sources. Inappropriate setting of the jumpers can cause unpredictable errors or malfunction of USB-4718.

<table>
<thead>
<tr>
<th>Jumper Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Jumper Setting" /></td>
<td>Set the channel to voltage input mode (Default setting)</td>
</tr>
<tr>
<td></td>
<td>Set the channel to current input mode</td>
</tr>
</tbody>
</table>
JP13: Watchdog Timer Setting

The watchdog timer supervisory function will automatically reset USB-4718 in the event of system failure. JP13 on USB-4718 can enable/disable watchdog timer function or reset module manually.

<table>
<thead>
<tr>
<th>Jumper Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enable watchdog timer function (Default setting)</td>
</tr>
</tbody>
</table>

How to Reset USB-4718 Manually

Plug the jumper to JP13 pin2-3 and then remove it, USB-4718 will reset.

NOTE: Users may restart the application programs after USB-4718 is reset.
3.3 Analog Input Connections

The differential input channels operate with two signal wires for each channel, and the voltage difference between both signal wires is measured. There are 8 analog input channels available on USB-4718.

3.4 Isolated Digital Input Connections

USB-4718 has 8 isolated digital input channels designated IDI0~IDI7. Each of isolated digital input channel accepts 5~30 VDC voltage inputs, and accept bi-directional input. It means that you can apply positive or negative voltage to an isolated input pin (IDI). All 8 input channels share one common pin. Figure 3-3 shows how to connect an external input source to one of the module’s isolated input channels.

![Figure 3.2: Differential Input Channel Connection](image)

29 Chapter 3
3.5 Isolated Digital Output Connections

USB-4718 has 8 isolated digital output channels designated IDO0~IDO7. Each of isolated output channels comes equipped with a Darlington transistor. All 8 output channels share common collectors and integral suppression diodes for inductive loads. Figure 3-4 shows how to connect an external output load to the module’s isolated outputs.

**Note:**

If an external voltage (5 ~ 30 VDC) is applied to an isolated output channel while it is being used as an output channel, the current will flow from the external voltage source to the card. Please take care that the current through each IDO pin not exceed 200 mA.
3.6 Field Wiring Considerations

- When you use USB-4718 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-4718.

- 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.
Specifications
Appendix A  Specifications

A.1  Analog Input

<table>
<thead>
<tr>
<th>Table A.1: Analog Input</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Channels</strong></td>
</tr>
<tr>
<td><strong>Input type</strong></td>
</tr>
<tr>
<td><strong>Input range</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Sampling rate</strong></td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
</tr>
<tr>
<td><strong>Zero drift</strong></td>
</tr>
<tr>
<td><strong>Span drift</strong></td>
</tr>
<tr>
<td><strong>CMR @ 50/60 Hz</strong></td>
</tr>
<tr>
<td><strong>Input impedance</strong></td>
</tr>
</tbody>
</table>

A.2  Accuracy for Thermocouple:

<table>
<thead>
<tr>
<th>Table A.2: Accuracy for Thermocouple</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Range</strong></td>
</tr>
<tr>
<td>J thermocouple 0 to 760 °C</td>
</tr>
<tr>
<td>K thermocouple 0 to 1370 °C</td>
</tr>
<tr>
<td>T thermocouple -100 to 400 °C</td>
</tr>
<tr>
<td>E thermocouple 0 to 1000 °C</td>
</tr>
<tr>
<td>R thermocouple 500 to 1750 °C</td>
</tr>
<tr>
<td>S thermocouple 500 to 1750 °C</td>
</tr>
<tr>
<td>B thermocouple 500 to 1800 °C</td>
</tr>
</tbody>
</table>

**NOTE:** Due to the location of the CJC sensor, the measurement will have a 1°C max. difference in channels.
A.3  Isolated Digital Input

Table A.3: Isolated Digital Input

<table>
<thead>
<tr>
<th>Channels</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interrupt Inputs</td>
<td>N/A</td>
</tr>
<tr>
<td>Optical Isolation</td>
<td>2500 VDC</td>
</tr>
<tr>
<td>Opto-isolator response time</td>
<td>25 μs</td>
</tr>
<tr>
<td>ESD</td>
<td>2,000 VDC</td>
</tr>
<tr>
<td>Input Voltage</td>
<td></td>
</tr>
<tr>
<td>VIH (max.)</td>
<td>30 VDC</td>
</tr>
<tr>
<td>VIH (min.)</td>
<td>5 VDC</td>
</tr>
<tr>
<td>VIL (max.)</td>
<td>3 VDC</td>
</tr>
<tr>
<td>Input Current</td>
<td></td>
</tr>
<tr>
<td>10 VDC</td>
<td>2.9 mA (typical)</td>
</tr>
<tr>
<td>12 VDC</td>
<td>3.5 mA (typical)</td>
</tr>
<tr>
<td>24 VDC</td>
<td>7.2 mA (typical)</td>
</tr>
<tr>
<td>30 VDC</td>
<td>9.1 mA (typical)</td>
</tr>
</tbody>
</table>

A.4  Isolated Digital Output

Table A.4: Isolated Digital Output

<table>
<thead>
<tr>
<th>Channels</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical Isolation</td>
<td>2500 VDC</td>
</tr>
<tr>
<td>Opto-isolator response time</td>
<td>25 μs</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>5 ~ 30 VDC</td>
</tr>
<tr>
<td>Sink Current</td>
<td>200 mA max./ch, 1.1A/total</td>
</tr>
</tbody>
</table>
### Table A.5: General

<table>
<thead>
<tr>
<th><strong>I/O Connector Type</strong></th>
<th>Removable 10-pin screw terminal  x 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions (LxWxH)</strong></td>
<td>132 x 80 x 32 mm (5.2” x 3.2” x 1.3”)</td>
</tr>
<tr>
<td><strong>Watchdog timer</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Power requirements</strong></td>
<td>USB bus-powered</td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
<td>100mA @5V max.</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td><strong>Operation</strong></td>
</tr>
<tr>
<td></td>
<td>0<del>60° C (32</del>140° F) (refer to IEC 68-2-1, 2)</td>
</tr>
<tr>
<td></td>
<td><strong>Storage</strong></td>
</tr>
<tr>
<td></td>
<td>-20<del>70° C (-4</del>158° F)</td>
</tr>
<tr>
<td><strong>Relative Humidity</strong></td>
<td>5~ 95 % RH non-condensing (refer to IEC 68-2-1, 2)</td>
</tr>
</tbody>
</table>
Function Block
Firmware Download Utility
Appendix C  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.

Note: After installation, the USB firmware download utility is located at C:/Program Files/Omega/USB-4700/Examples by default.

The steps on the following pages will guide you through the USB-4718 firmware update.
Step 1 - Select Device: Launch the firmware download utility and press “Select…” button to choose the target device. You can check the working firmware version at the “Firmware Version” item.

Figure C.2: USB Download Utility

Step 2 - Select Firmware File: Press “Load…” button to select the firmware.

Figure C.3: Firmware Selection
**Step 3 - 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.4: Firmware Download Completed.*
Analog Input Calibration
Appendix D  Analog Input Calibration

The following steps will guide you through the USB-4718 analog input channel software calibration. Please perform BOTH voltage and current input calibrating procedures to complete the calibration of USB-4718’s analog input channels.

D.1  Voltage Input Calibration

You need to calibrate only one channel (AI0). The other channels of USB-4718 will be calibrated automatically.

**NOTE:** Please make sure that the JP1 on USB-4718 is set to voltage input mode before you start voltage input calibrating.

**Step 1:** Click the “Setup” button in the Device Manager window to launch the USB-4718 Device Setting window. Then click “Calibration” to start the calibration process. The Calibration Wizard window will pop up.
Step 2: Select “0~0.015V” voltage input range (or any) and connect the 0V voltage source to AI0 of USB-4718, then click “Calibrate”. The information box will show up after the zero range calibration is completed. Then click “OK”.

Figure D.1: USB-4718 Device Setting window
Step 3: Please start the **full range calibration** by connecting to the full range voltage source and click **“Calibrate”**. You will see a dialog box and click **“OK”** to finish the calibration process.
Step 4: Please repeat the procedures above to complete the other input ranges (0~0.050V/0~0.100V/0~0.500V/0~1.0V/0~2.5V) calibration.
D.2 Current Input Calibration

You need to calibrate only one channel (AI0). The other channels of USB-4718 will be calibrated automatically.

**NOTE:** Please make sure that the JP1 on USB-4718 is set to current input mode before you start voltage input calibrating.

**Step 1:** Please follow the procedures of voltage input calibration but select the current input range setting in Calibration Wizard.

![Calibration Wizard](image)

*Figure D.6: Select the current input range setting*

**Step 2:** Please perform the **zero range calibration** (connect to a 0mA current source) and the **full range calibration** (connect to a 20mA current source) as well.
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