Data Acquisition

HUDAS TC

USB Thermocouple DAS Module - 8 Channels of 16-bit A/D

USER'S MANUAL

VER. 2.0C• Jul-09

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1.0	Initial Release	April 2007
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CHAPTER 1

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 HUDAS TC Module.

Sections include:

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

Chapter 1 Introduction

HUDAS TC 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, HUDAS TC is the perfect way to add measurement and control capability to any USB capable computer. The HUDAS TC 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

HUDAS TC 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 HUDAS TC, please refer to Appendix A, Specifications.

1.2 Applications

- Temperature measurement
- Industrial ON/OFF control
- Industrial and Lab automation

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1.3 Installation Guide

Before you install your HUDAS TC module, please make sure you have the following necessary components:

- HUDAS TC DAS Module
- HUDAS TC User Manual
- Shielded USB 2.0 cable (1.8 m)
- Driver software CyberResearch 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. HUDAS TC works with ActiveDAQ, ActiveDAQ Pro, and other third-party software packages.

After you have the necessary components and optional accessories for enhanced operation of your HUDAS TC 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.

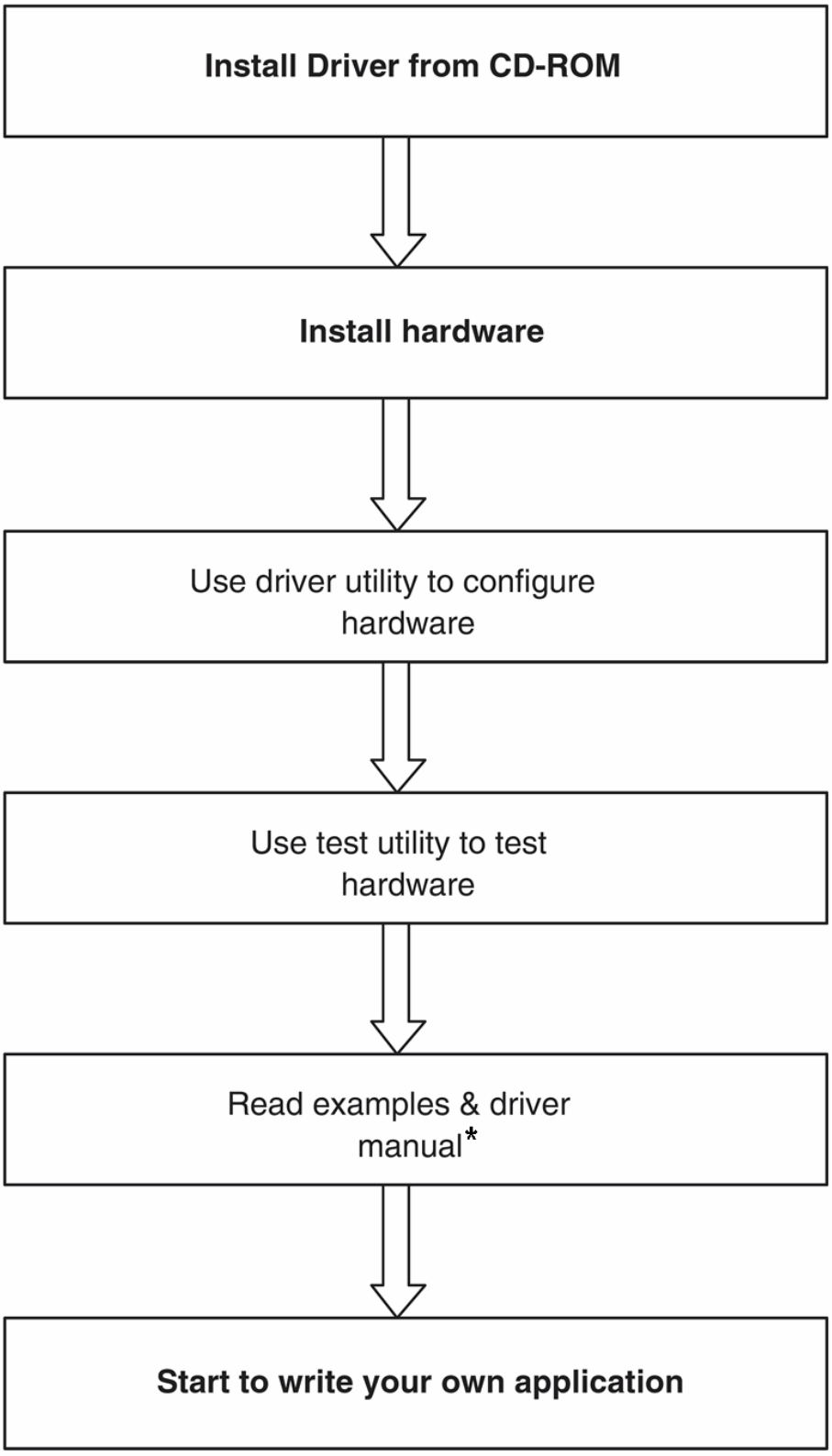

Figure 1.1: Installation Flow Chart

*See 2.21, "Programming Examples and Online Manual Installation"

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1.4 Software Overview

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

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

1.4.1 Programming Choices for DA&C Module:

You may use CyberResearch application software like CyberResearch 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 CyberResearch Device Drivers software is included on the companion CD-ROM. CyberResearch's Device Drivers features a complete I/O function library to help boost your application performance. The CyberResearch 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 CyberResearch 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 (see section 2.21). 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, CyberResearch 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. See section 2.21 for further details.

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1.5.2 Programming with Device Drivers Function Library

CyberResearch 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.

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CHAPTER 2

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

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

2.1 Unpacking

After receiving your HUDAS TC package, please inspect its contents first. The package should contain the following items:

- HUDAS TC card
- Companion CD-ROM (DLL driver included)
- User's Manual

The HUDAS TC card 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 card 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. Or one can also use a grounding strap.
- Touch the antistatic bag to a metal part of your computer chassis before opening the bag.
- Take hold of the card only by the metal bracket when removing it out of the bag.

After taking out the card, first you should:

- Inspect the card for any possible signs of external damage (loose or damaged components, etc.). If the card is visibly damaged, please notify our service department immediately. Avoid installing a damaged card into your system.

Also pay extra caution to the following aspects to ensure proper installation:

- Avoid physical contact with materials that could hold static electricity such as plastic, vinyl and Styrofoam.
- Whenever you handle the card, grasp it only by its edges. DO NOT TOUCH the exposed metal pins of the connector or the electronic components.

Note:

- Keep the antistatic bag for future use. You might need the original bag to store the card if you have to remove the card from PC or transport it elsewhere.

2.2 Driver Installation

We recommend you to install the driver before you install the card into your system, since this will guarantee a smooth installation process.

The 32-bit DLL driver Setup program for the HUDAS TC card is included on the companion CD-ROM that is shipped with your DAS card package. Please follow the steps below to install the driversoftware:

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 autoplay function enabled on your system. When the Setup Program is launched, you'll see the following Setup Screen.

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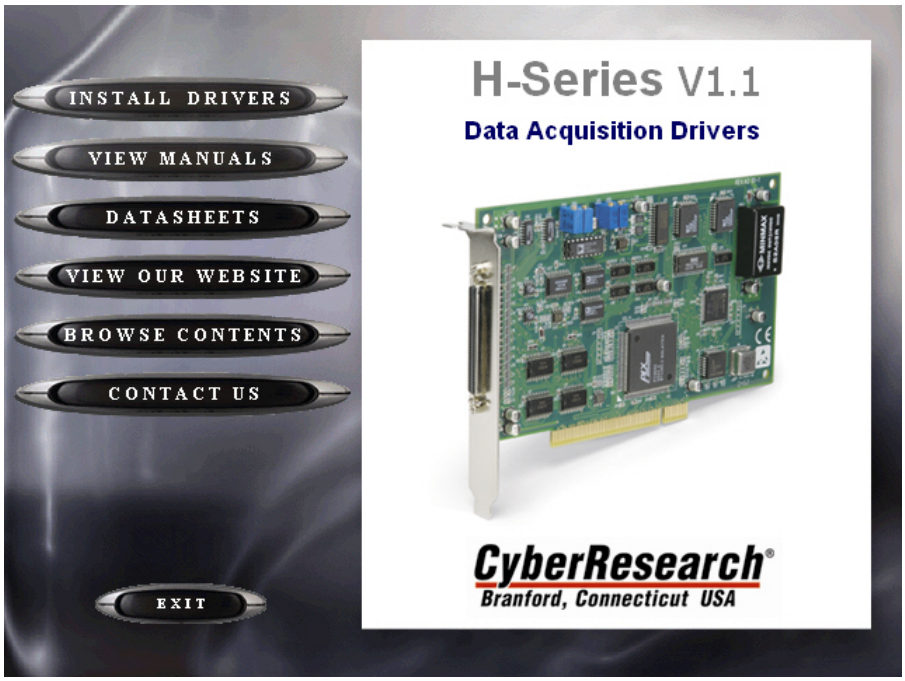

Fig. 2-1

Note:

- If the autoplay 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: Select the *Install Drivers* option.
Step 4: Select the *DLL Drivers* option.
Step 5: Select *HUDAS TC*
Step 6: Just follow the installation instructions step by step to complete your DLL driver setup.

For further information on driver-related issues, an online version of the *DLL Driver Manual ('Driver.chm')* is available. See the next section for installation prior to attempting to locate this and other online manuals.

2.21 Programming Examples & Online Manual Installation

CyberResearch recommends installing the examples and online manuals after installing the drivers. The online manuals provide extremely detailed software programming information, and some relevant hardware installation procedures.
To install the online manuals and programming examples:

Step 1: Let CD autorun.

Step 2: Click Install Drivers.

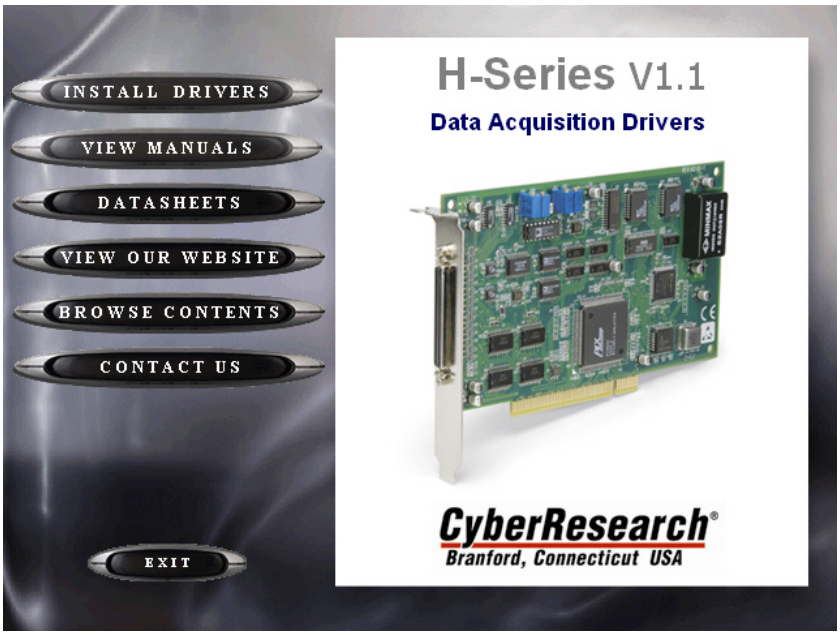

Fig. 2-2

Step 3: Click Examples/Manuals.

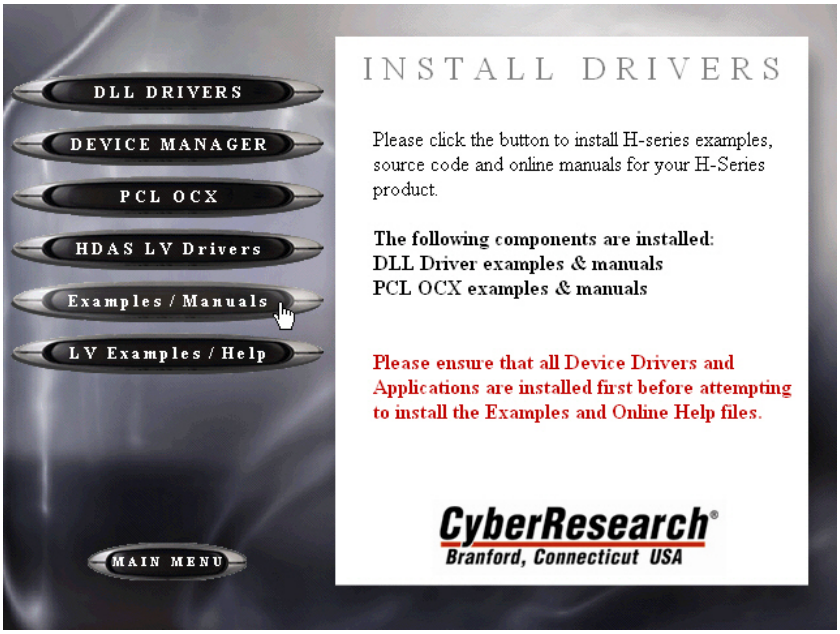

Fig. 2-3

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Step 4: Follow the Installer's on-screen instructions.

Step 5: When done, navigate to C:\Program Files\CyberResearch\ADSAPI\Manual to access the online HTML manuals. "Driver.chm" is the DLL Driver manual.

t

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 HUDAS TC 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.

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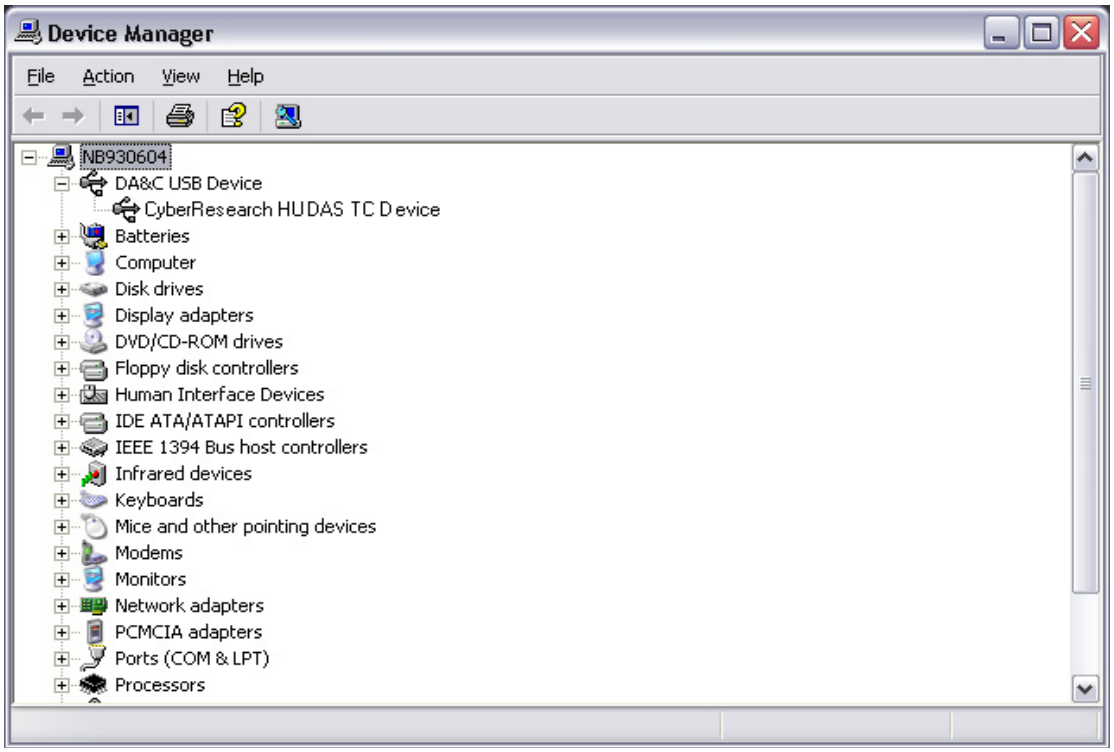

Figure 2.2: Device Manager Screen

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 "!" 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.

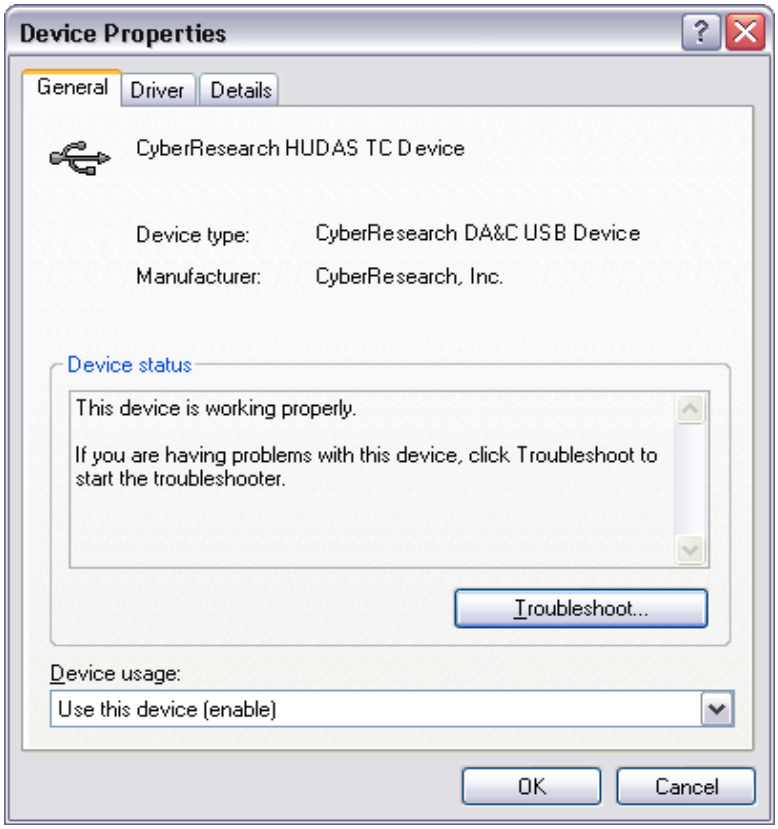

Figure 2.3: HUDAS TC Device Speed

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

CyberResearch DAQ 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 CyberResearch 32-bit DLL drivers.

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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 2.4: Device Manager Dialog Box

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

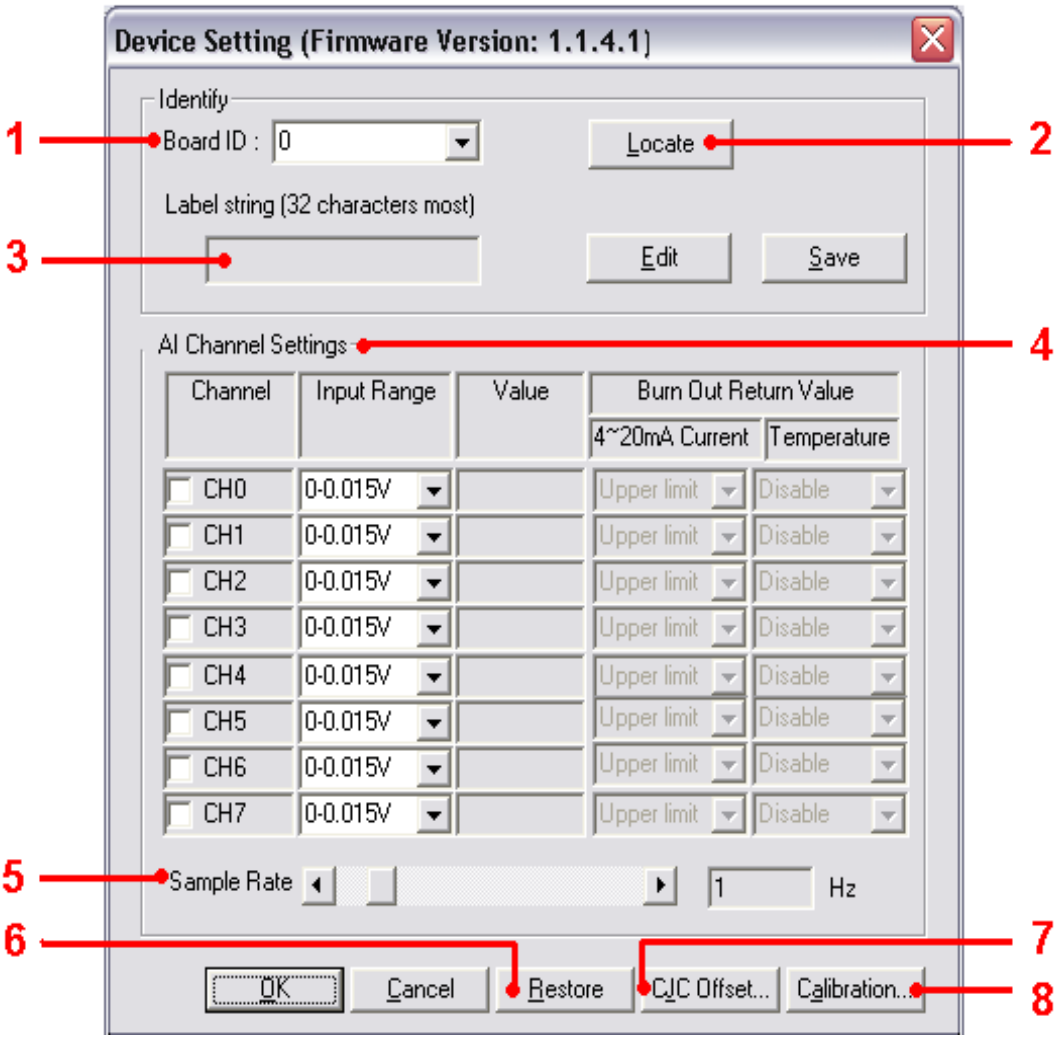

Figure 2.5: The Device Setting Dialog Box

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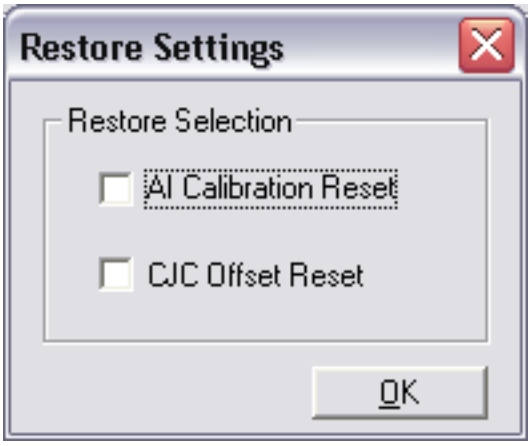
4.**AI Channel setting:** Set the thermocouple type/ analog input range for each AI channel.

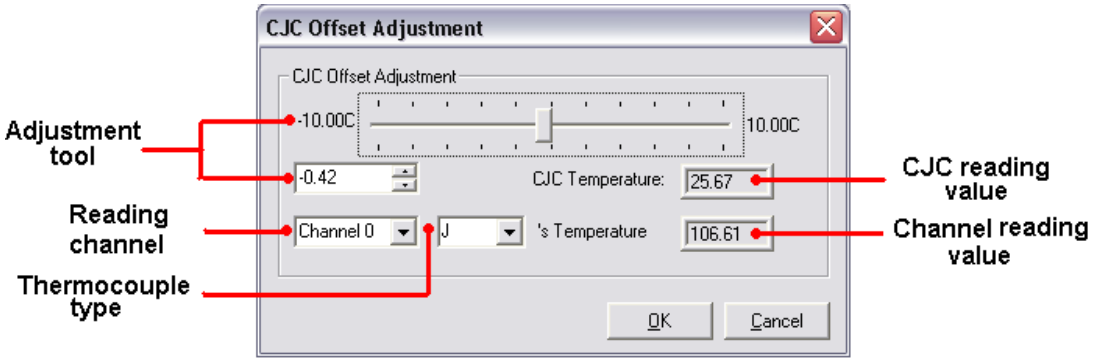
5.**Sample Rate adjustment:** Drag the slide bar to adjust the sampling rate of your device.

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



(Restore Setting. Tif)

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



(CJC Offset Adjustment. Tif)

8.**AI Calibration:** Analog input channel calibration function.

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.

Table 2.1: Gain Code		
Gain Code (Hex)	**Type**	**Range**
0x08	Voltage	0-15mV
0x0A	Voltage	0-50mV
0x0B	Voltage	0-100mV
0x0D	Voltage	0-500mV
0x0E	Voltage	0-1.0V
0x0F	Voltage	0-2.5V
0x8000	Current	0-20mA
0x8001	Current	4-20mA

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 HUDAS TC 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.

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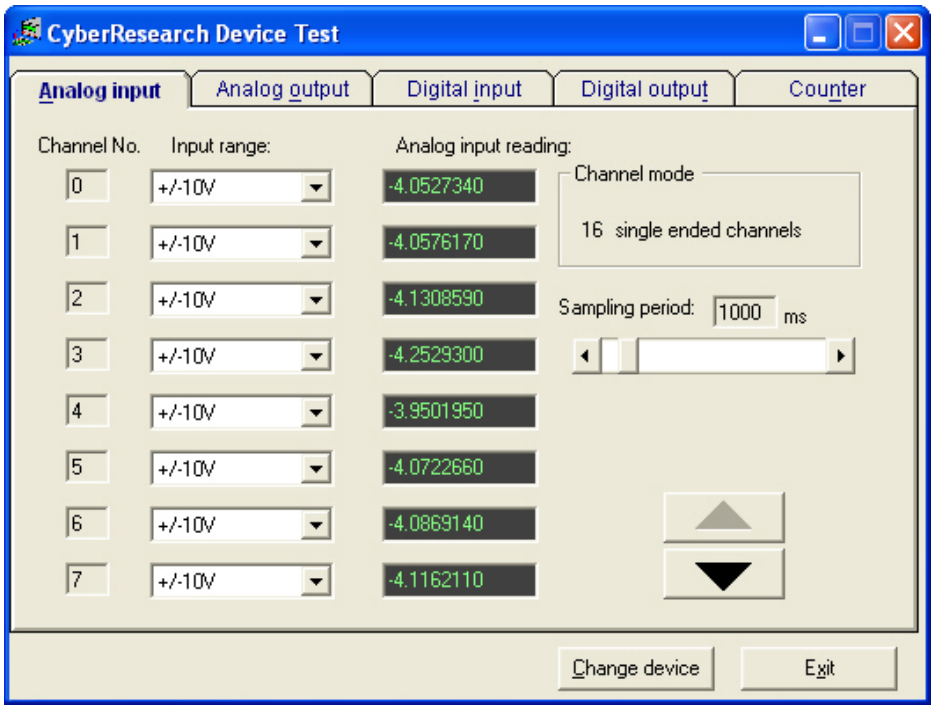

Figure 2.6: Analog Input Tab/Device Test Dialog

2.5.2 Testing Analog Output Function

Unsupported on this module.

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

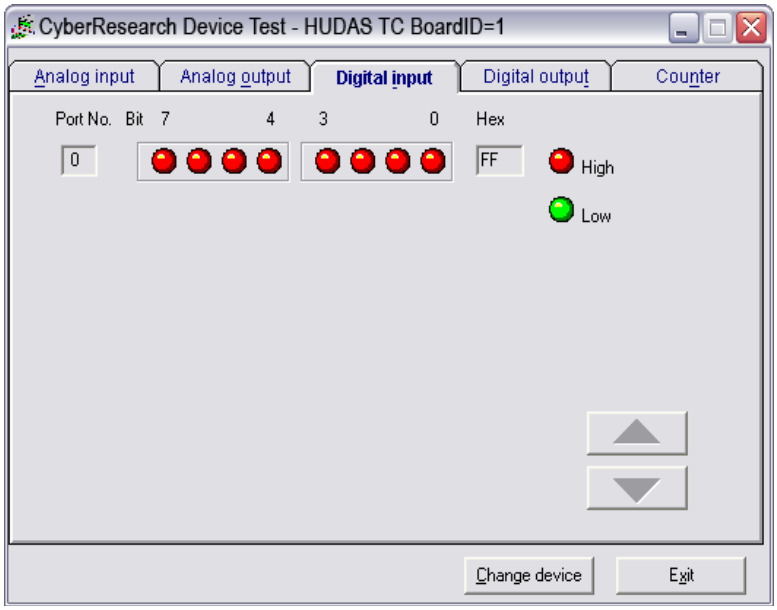

Figure 2.8: Digital Input Tab/Device Test Dialog

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.

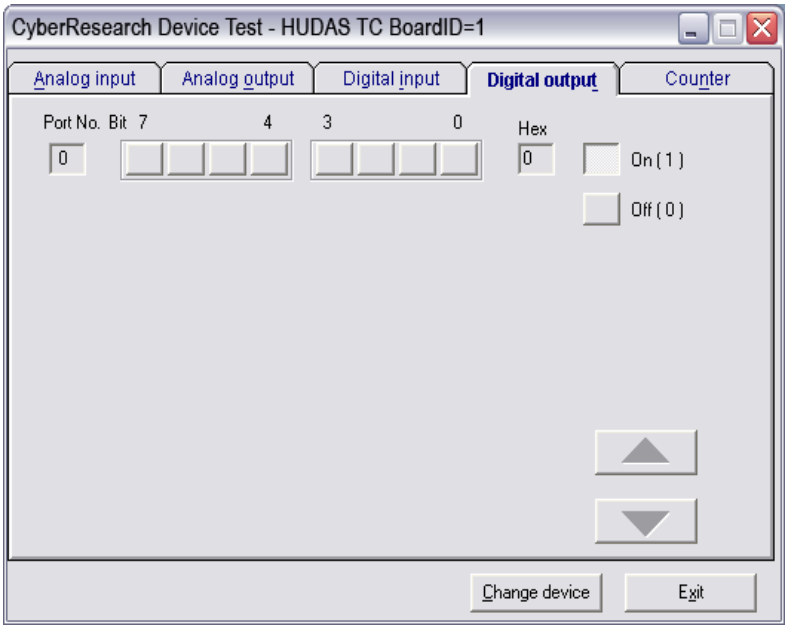

Figure 2.9: Digital Output Tab/Device Test Dialog

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2.5.5 Testing Counter Function

Unsupported on this module.

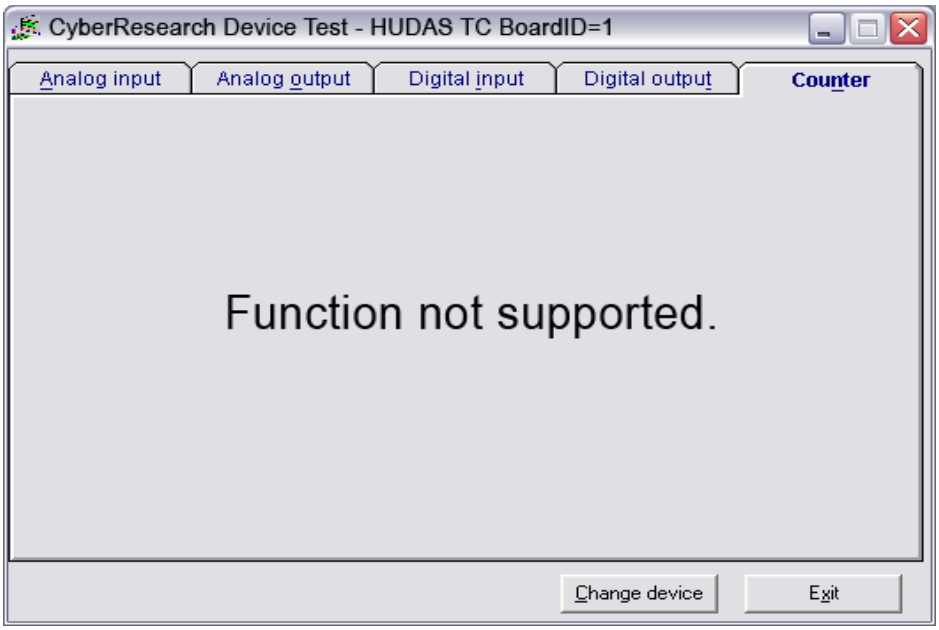

Figure 2.10: Counter Tab Testing Unsupported

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 CyberResearch 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. CyberResearch DAQ Device Manager).

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

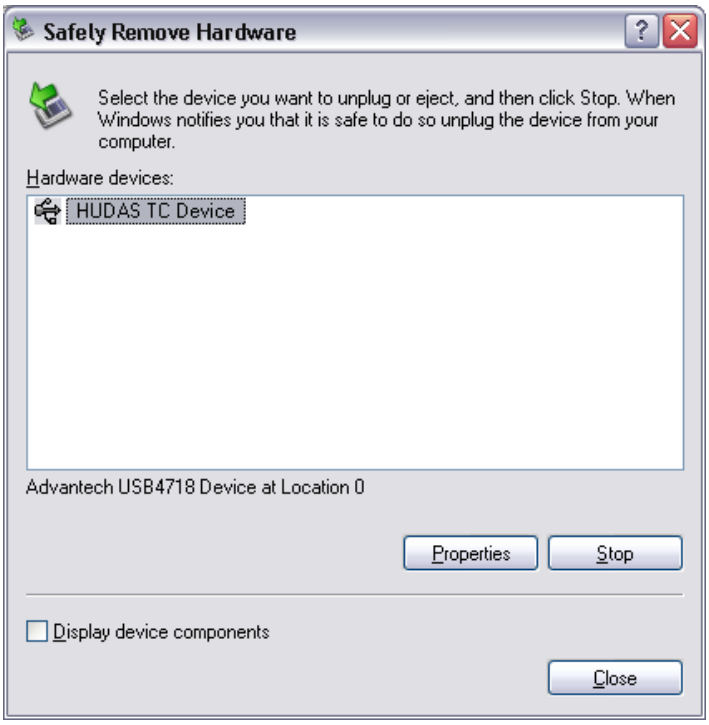

Figure 2.11: Unplug or Eject Hardware Dialog

Step3: Select "HUDAS TC Device" and press the "Stop" Button.

Figure 2.12: 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.

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CHAPTER 3

Signal Connections

This chapter provides useful information on how to connect input and output signals to the HUDAS TC 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

HUDAS TC 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 HUDAS TC.

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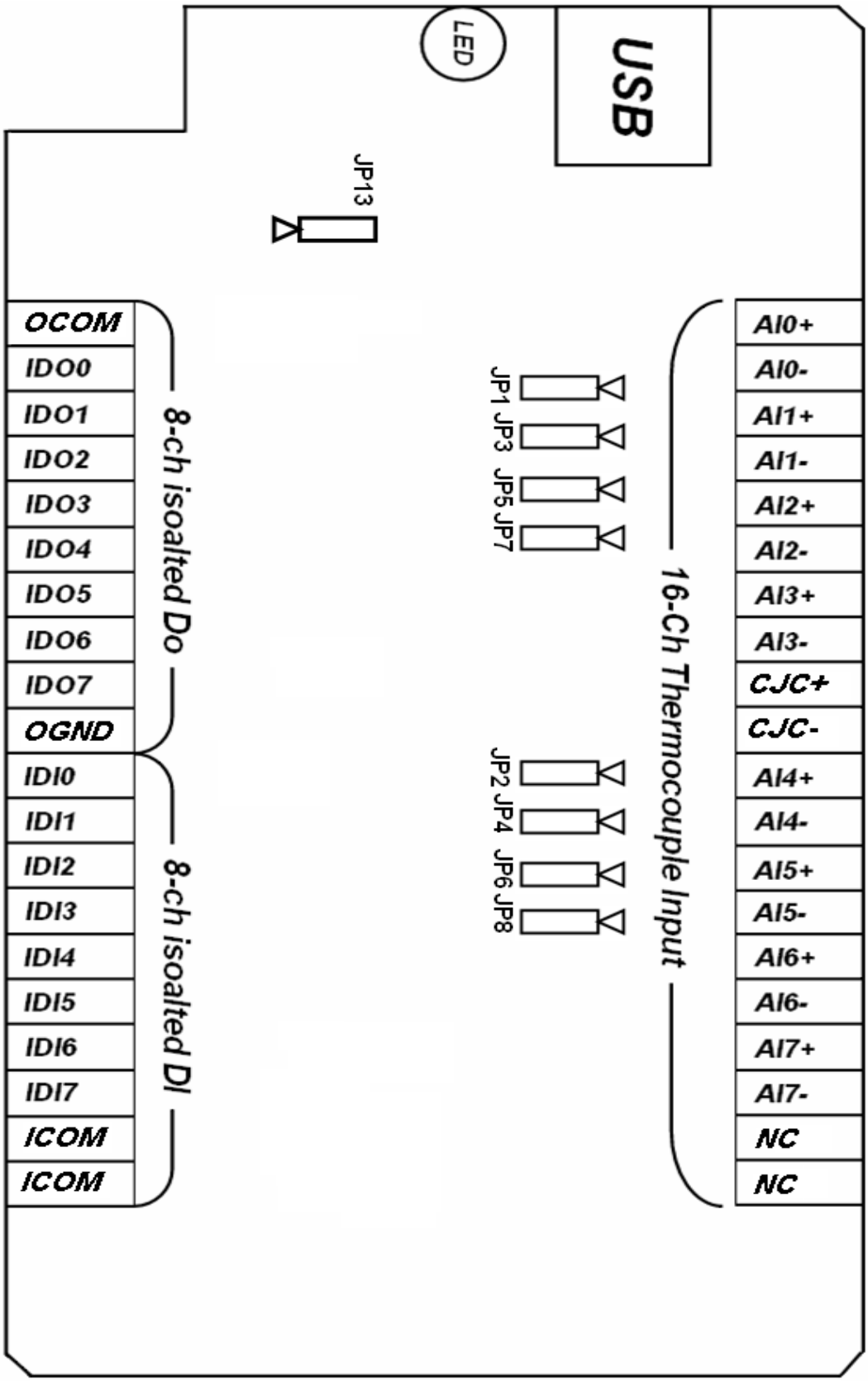

Figure 3.1: I/O Connector Pin Assignment

3.2.2 I/O Connector Signal Description

Table 3.1: I/O Connector Signal Description

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

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 3.2: LED Indicator Status Description

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

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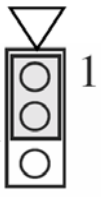
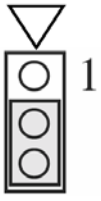
3.2.4 3.2.4 Jumper Setting Description

Table 3.3: Jumper Setting Description			
Jumper	**Description**	**Jumper**	**Description**
JP1	Input mode setting for analog input ch0	**JP6**	Input mode setting for analog input ch6
JP2	Input mode setting for analog input ch4	**JP7**	Input mode setting for analog input ch3
JP3	Input mode setting for analog input ch1	**JP8**	Input mode setting for analog input ch7
JP4	Input mode setting for analog input ch5	**JP13**	Watchdog timer setting
JP5	Input mode setting for analog input ch2		

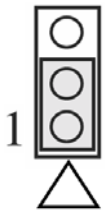
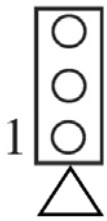
JP1~JP8: Input Mode Setting for Analog Input Channels

The analog input mode of every AI channel on HUDAS TC 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 HUDAS TC.

Jumper Setting		
Description	Set the channel to voltage input mode (Default setting)	Set the channel to current input mode

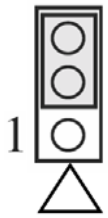
JP13: Watchdog Timer Setting

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

Jumper Setting		
Description	Enable watchdog timer function (Default setting)	Disable watchdog timer function

How to Reset HUDAS TC Manually

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



Note:

Users may restart the application programs after HUDAS TC is reset.

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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 HUDAS TC.

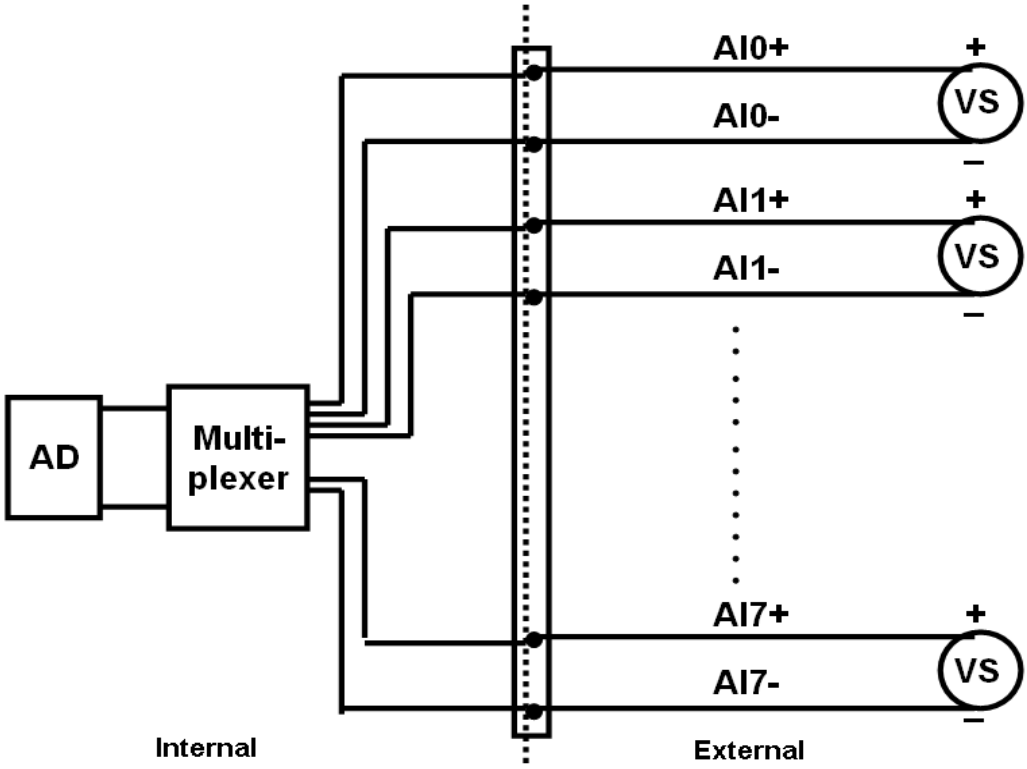

Figure 3.2: Differential Input Channel Connection

3.4 Isolated Digital Input Connections

HUDAS TC 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.

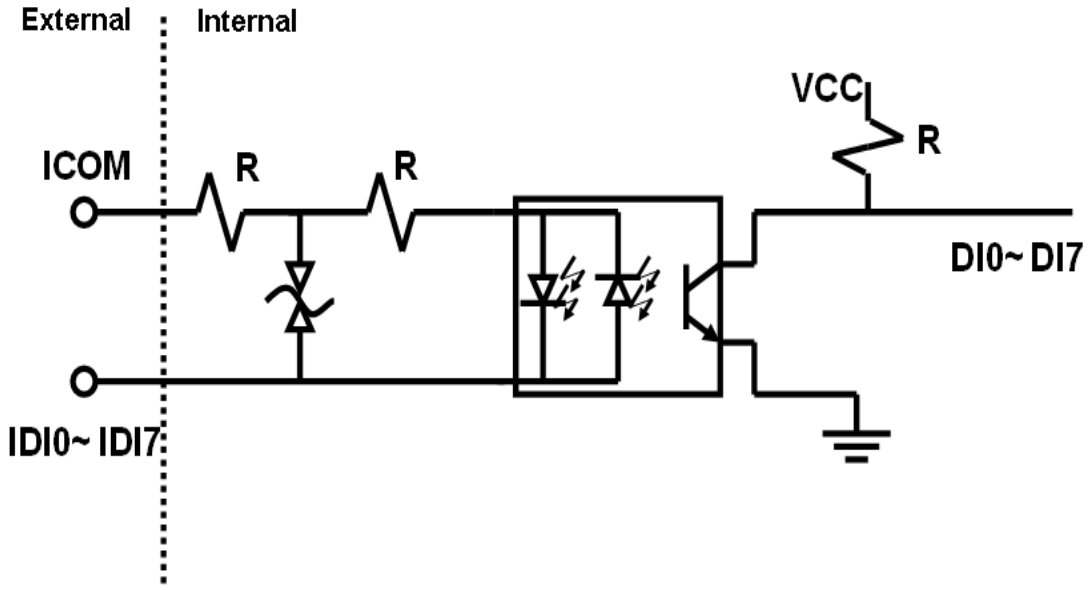

Figure 3.3: Digital Input Channel Connections

3.5 Isolated Digital Output Connections

HUDAS TC 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:

1. It is necessary to connect the "OCOM" pin with a external power source for wiring.

2. 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 willflow from the external voltage source to the card. Please take care thatthe current through each IDO pin not exceed 200 mA.

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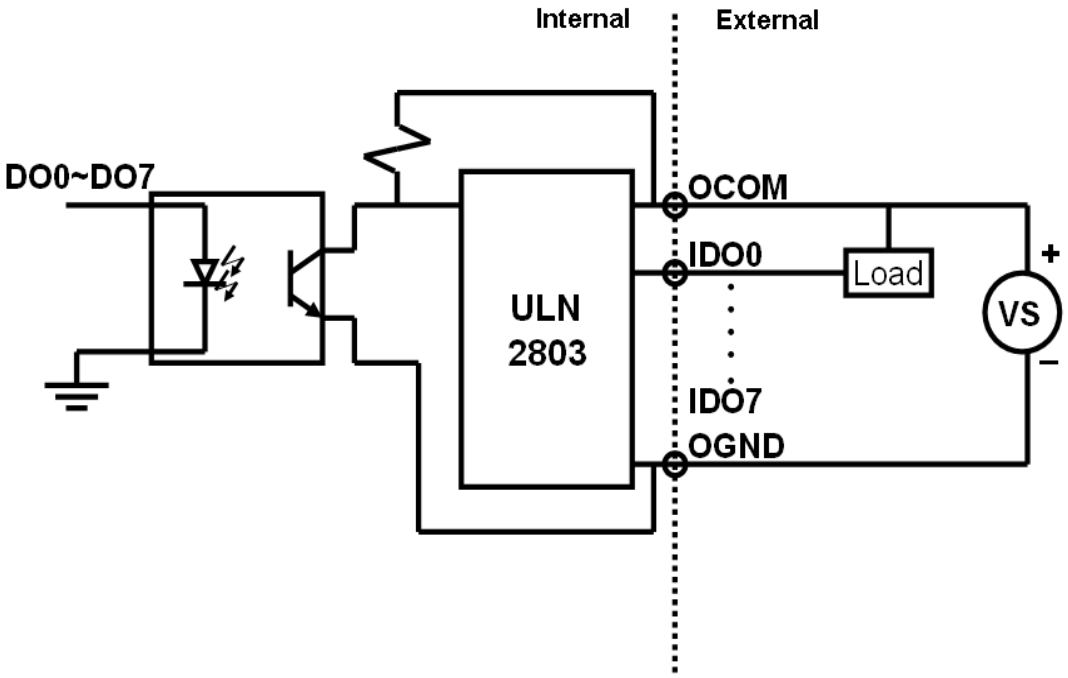

Figure 3.4: Isolated Digital Output Channel Connections

3.6 Field Wiring Considerations

- When you use HUDAS TC 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 HUDAS TC.
- 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.

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APPENDIX A

Specifications

Appendix A Specifications

A.1 Analog Input

Table A.1: Analog Input	
Channels	8 differential
Input type	mV, V, and mA
Input range	J, K, T, E, R, S and B Thermocouple
	Uni-polar 0~15mV, 0~50mV, 0~100mV, 0~500mV, 0~1V, 0~2.5V, 0~20mA, 4~20mA
Sampling rate	10 samples/s(total)
Accuracy	±0.1% or better (voltage and current input)
Zero drift	±0.3 uV / °C
Span drift	±25 ppm / °C
CMR @ 50/60 Hz	92 dB
Input impedance	1.8 M

A.2 Accuracy for Thermocouple:

Table A.2: Accuracy for Thermocouple		
Input Range	Typical Accuracy	Maximum Error
J thermocouple 0 to 760 °C	±1.0 °C	±1.5 °C
K thermocouple 0 to 1370 °C	±1.0 °C	±1.5 °C
T thermocouple -100 to 400 °C	±1.0 °C	±1.5 °C
E thermocouple 0 to 1000 °C	±1.0 °C	±1.5 °C
R thermocouple 500 to 1750 °C	±1.2 °C	±2.5 °C
S thermocouple 500 to 1750 °C	±1.2 °C	±2.5 °C
B thermocouple 500 to 1800 °C	±2.0 °C	±3.0 °C

NOTE: Due to the location of the CJC sensor, the measurement will have a 1°C max. difference in channels.

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A.3 Isolated Digital Input

Table A.3: Isolated Digital Input		
Channels	8	
Interrupt Inputs	N/A	
Optical Isolation	2500 VDC	
Opto-isolator response time	25 μs	
ESD	2,000 VDC	
Input Voltage	VIH (max.)	30 VDC
	VIH (min.)	5 VDC
	VIL (max.)	3 VDC
Input Current	10 VDC	2.9 mA (typical)
	12 VDC	3.5 mA (typical)
	24 VDC	7.2 mA (typical)
	30 VDC	9.1 mA (typical)

A.4 Isolated Digital Output

Table A.4: Isolated Digital Output	
Channels	8
Optical Isolation	2500 VDC
Opto-isolator response time	25μs
Supply Voltage	5 ~ 30 VDC
Sink Current	200 mA max./ch, 1.1A/total

A.5 General

Table A.5: General		
I/O Connector Type	Removable 10-pin screw terminal x 4	
Dimensions (LxWxH)	132 x 80 x 32 mm (5.2" x 3.2" x 1.3")	
Watchdog timer	Yes	
Power requirements	USB bus-powered	
Power Consumption	100mA @5V max.	
Temperature	**Operation**	0~60° C (32~140° F) (refer to IEC 68-2-1, 2)
	Storage	-20~70° C (-4~158° F)
Relative Humidity	5~ 95 % RH non-condensing (refer to IEC 68-2-1, 2)	

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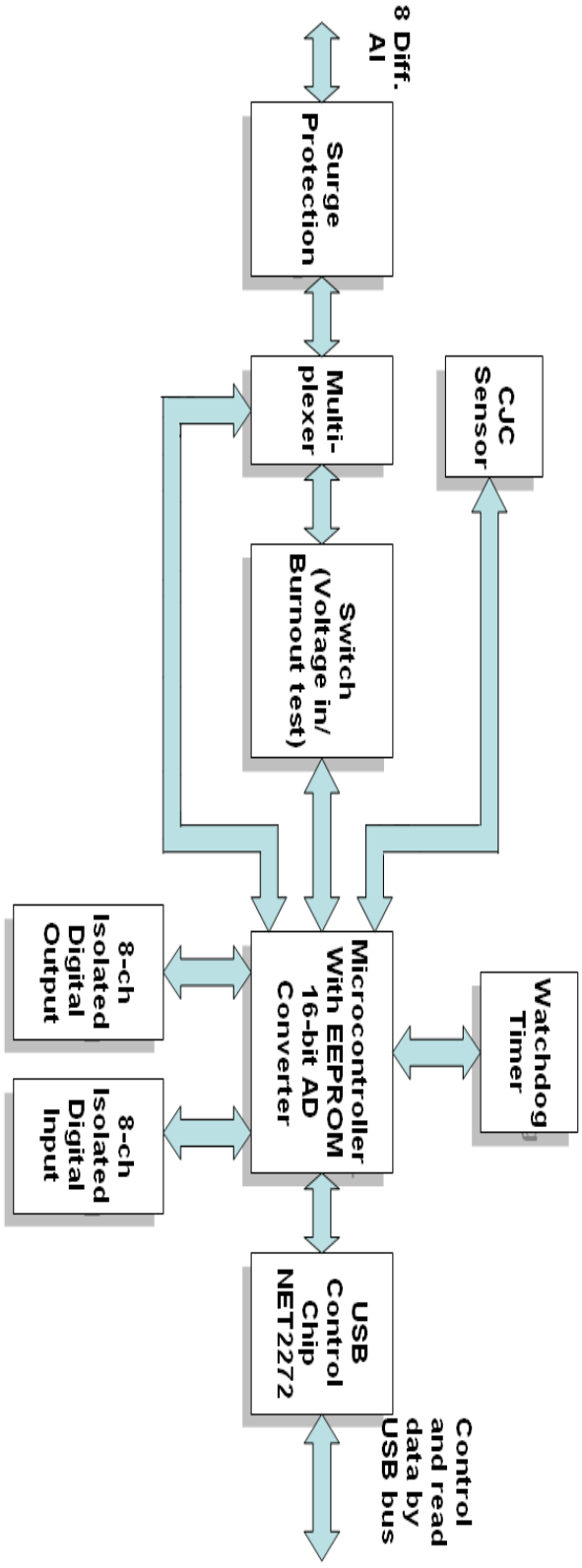
APPENDIX B

Function Block

Appendix B Function Block



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Appendix C

Analog Input Calibration

Appendix C Analog Input Calibration

The following steps will guide you through the HUDAS TC analog input channel software calibration. Please perform BOTH voltage and current input calibrating procedures to complete the calibration of HUDAS TC's analog input channels.

C.1 Voltage Input Calibration

You need to calibrate only one channel (AI0). The other channels of HUDAS TC will be calibrated automatically.

NOTE: Please make sure that the JP1 on HUDAS TC is set to voltage input mode before you start voltage input calibrating.

Step 1: Click the "**Setup"** button in the CyberResearch DAQ Device Manager window to launch the HUDAS TC Device Setting window. Then click "**Calibration"** to start the calibration process. The Calibration Wizard window will pop up.

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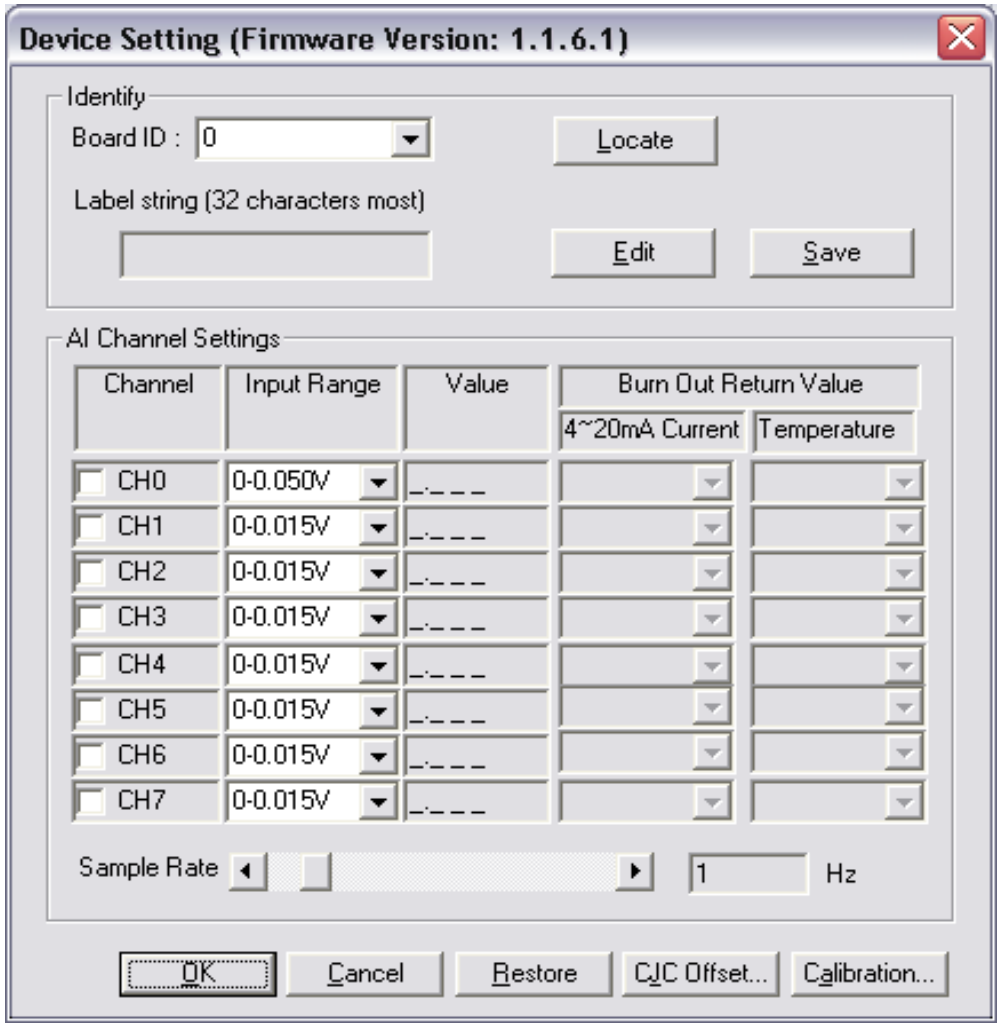

Figure C.1: HUDAS TC Device Setting window

Step 2: Select **"0~0.015V**" voltage input range (or any) and connect the 0V voltage source to **AI0** of HUDAS TC, then click "**Calibrate**". The information box will show up after the **zero range calibration** is completed. Then click "**OK**".

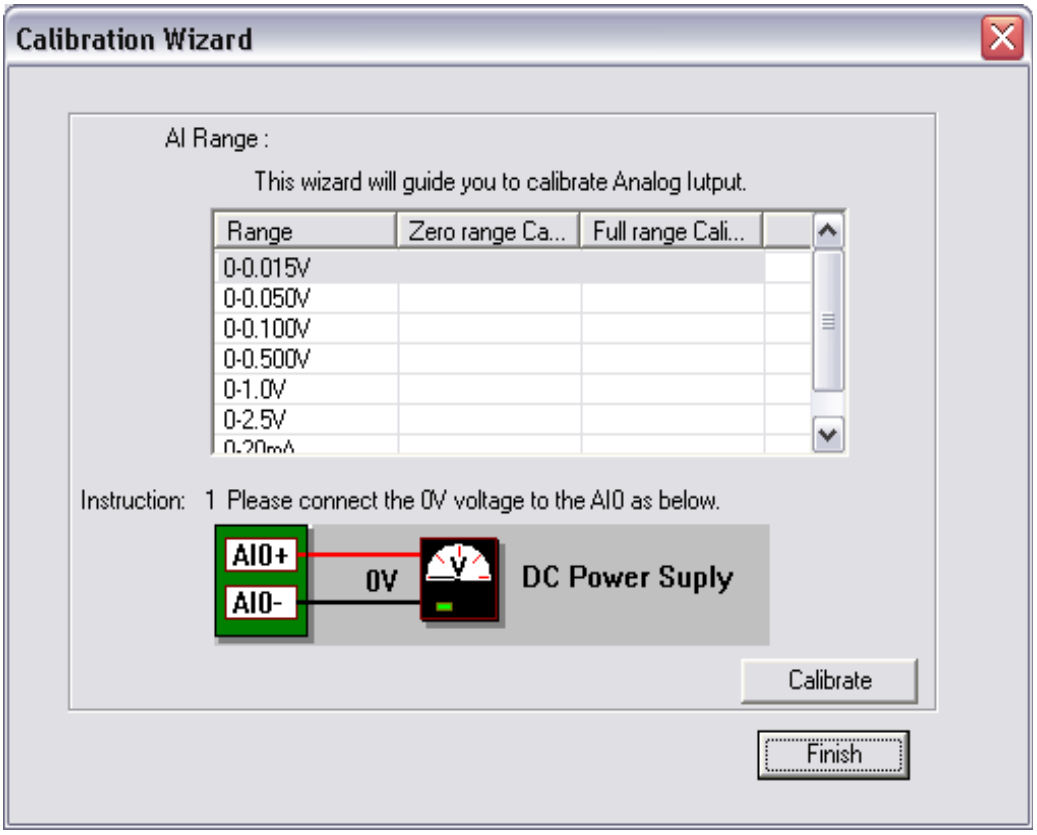

Figure C.2: HUDAS TC Calibration Wizard

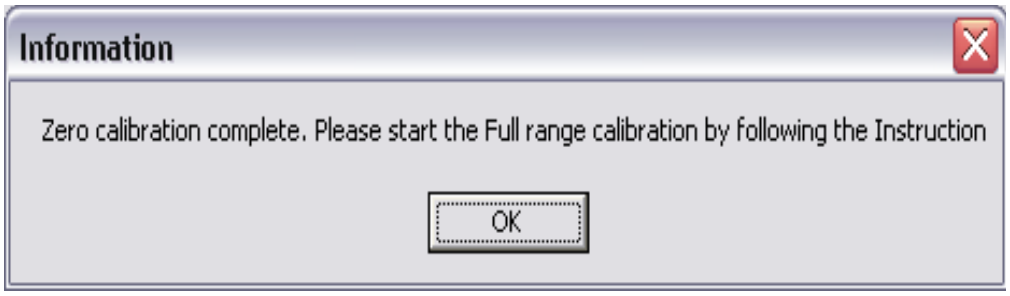

Figure C.3: Zero range calibration complete

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

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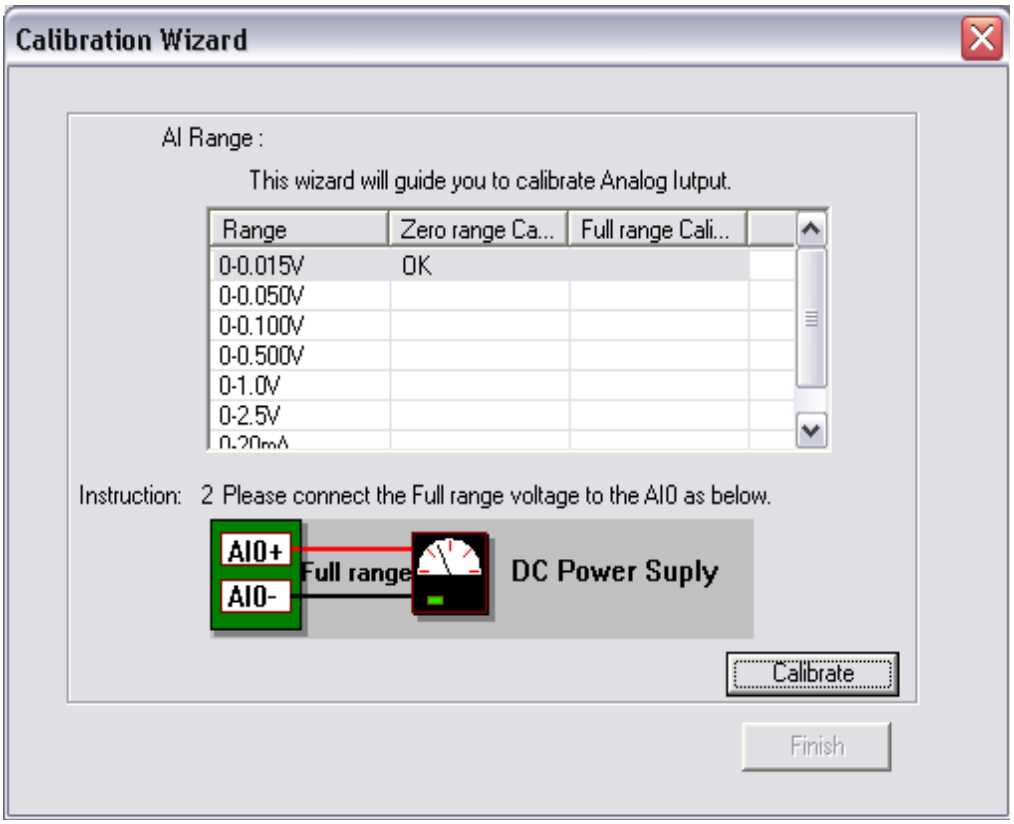

Figure C.4: Full range calibration

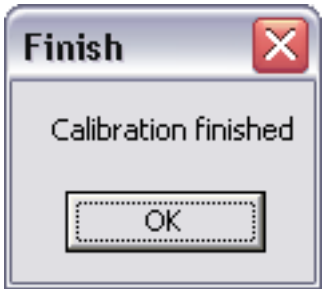

Figure C.5: Calibration Complete

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.

C.2 Current Input Calibration

You need to calibrate only one channel (AI0). The other channels of HUDAS TC will be calibrated automatically.

NOTE: Please make sure that the JP1 on HUDAS TC 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.

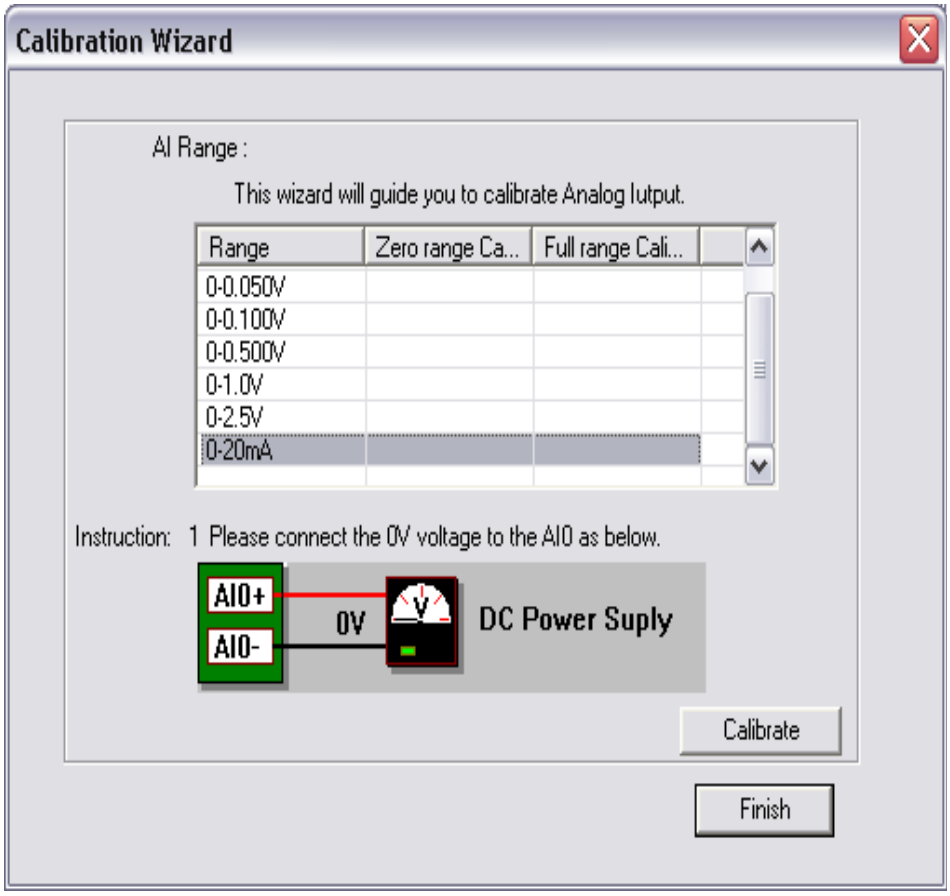

Figure C.6: Select the current input range setting

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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Product Service

Diagnosis and Debug

CyberResearch, Inc. maintains technical support lines staffed by experienced Applications Engineers and Technicians. There is no charge to call and we will return your call promptly if it is received while our lines are busy. Most problems encountered with data acquisition products can be solved over the phone. Signal connections and programming are the two most common sources of difficulty. CyberResearch support personnel can help you solve these problems, especially if you are prepared for the call.

To ensure your call's overall success and expediency:

1) Have the phone close to the PC so you can conveniently and quickly take action that the Applications Engineer might suggest.
2) Be prepared to open your PC, remove boards, report back-switch or jumper settings, and possibly change settings before reinstalling the modules.
3) Have a volt meter handy to take measurements of the signals you are trying to measure as well as the signals on the board, module, or power supply.
4) Isolate problem areas that are not working as you expected.
5) Have the source code to the program you are having trouble with available so that preceding and prerequisite modes can be referenced and discussed.
6) Have the manual at hand. Also have the product's utility disks and any other relevant disks nearby so programs and version numbers can be checked.

Preparation will facilitate the diagnosis procedure, save you time, and avoid repeated calls. Here are a few preliminary actions you can take before you call which may solve some of the more common problems:

1) Check the PC-bus power and any power supply signals.
2) Check the voltage level of the signal between SIGNAL HIGH and SIGNAL LOW, or SIGNAL+ and SIGNAL– . It CANNOT exceed the full scale range of the board.
3) Check the other boards in your PC or modules on the network for address and interrupt conflicts.
4) Refer to the example programs as a baseline for comparing code.

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In most cases, a returned package will be refused at the receiving dock if its contents are not known. The RMA number allows us to reference the history of returned products and determine if they are meeting your application's requirements. When you call customer service for your RMA number, you will be asked to provide information about the product you are returning, your address, and a contact person at your organization.

Please make sure that the RMA number is prominently displayed on the outside of the box.

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