ADLINK TECHNOLOGY INC.

D2K-DASK

Software Development Kit for
DAQ-2000 Data Acquisition Cards

Function Reference Manual

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Using this manual

Audience and scope

This manual guides you when using the D2K-DASK software driver for DAQ-2000 data acquisition cards. This manual also describes how to install and use the D2K-DASK function library when creating programs for your software applications.

How this manual is organized

This manual is organized as follows:

Chapter 1 Introduction: This chapter intoduces the D2K-DASK, the fundamentals of building Windows®-based applications, and describes the classes of functions that the D2K-DASK supports.

Chapter 2 Function Reference: This section provides detailed description of each function call that the D2K-DASK provides.

Appendix: This chapter provides references on status codes, AI range codes, AI data format, and supported functions.

Conventions

Take note of the following conventions used throughout the manual to make sure that you perform certain tasks and instructions properly.

NOTE	Additional information, aids, and tips that help you perform particular tasks.
IMPORTANT	Critical information and instructions that you MUST perform to complete a task.
WARNING	Information that prevents physical injury, data loss, module damage, program corruption etc. when trying to complete a particular task.

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1 Introduction

The D2K-DASK is a software driver for DAQ-2000 data acquisition cards. It is a high performance data acquisition driver for developing custom applications under Windows® and Linux environments.

Using D2K-DASK lets you enjoy the advantages of the power and flexibility of Windows® and Linux for your data acquisition applications. These include running multiple applications and using extended memory. In addition, implementing D2K-DASK under Visual Basic environment makes it easy to create custom user interfaces and graphics.

1.1 Application Building Fundamentals in Windows

The following sections provide fundamental instructions when using D2K-DASK to build application in Windows® 98/NT/2000/XP/Vista operating environment.

Using Microsoft® Visual C®/C++®

Follow these steps to create a data acquisition application using D2K-DASK and Microsoft Visual C/C++.

1. Launch the Microsoft Visual C/C++ application.
2. Open a new or existing project that you want to apply the D2K-DASK.
3. Include header file D2KDASK.H in the C/C++ source files that call D2K-DASK functions. D2KDASK.H contains all the function declarations and constants that can be used to develop data acquisition applications. Incorporate the following statement in the code to include the header file.

   ```
   #include "D2KDASK.H"
   ```
4. After setting the appropriate compile and link options, build the application by selecting the Build command from Build menu. Remember to link D2K-DASK's import library, D2K-DASK.LIB.

Using Microsoft® Visual Basic®

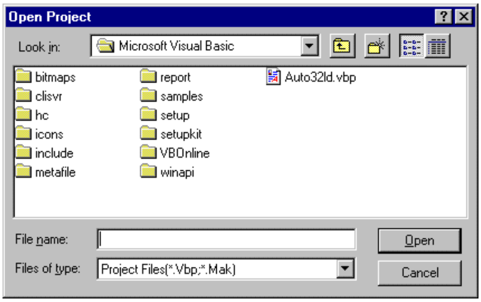
Follow the steps in the succeeding sections to create a data acquisition application using D2K-DASK and Visual Basic.

Open a project

Do one of the following to open a new or existing project:

1. Open a new project by selecting the New Project command from the File menu. To open an existing project,

select the Open Project command from the File menu to display the Open Project dialog box.

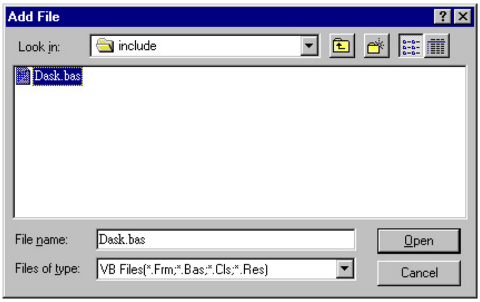


2. Locate the existing project, then double-click on the project file name to load.

Add the file

You must add the file **D2KDASK.BAS** to the project, if the file is not yet included. This file contains all the procedure declarations and constants that can be used to develop the data acquisition application. To add the file:

1. Select Add File from the File menu. The Add File window appears, displaying a list of files in the current directory.



2. Double-click on the D2KDASK.BAS file. If the file is not on the list, make sure the list is displaying files from the correct directory. By default, the D2KDASK.BAS file is installed at C:\ADLink\D2K-DASK\INCLUDE.

Design the interface

To design the interface for the application, place all the interface elements such as command buttons, list boxes, and text boxes on the Visual Basic form. These standard controls are available from the Visual Basic Toolbox.

To place a control on the form, select the desired control from the Toolbox, then draw it on the form. You may also double-click on the control icon from the Toolbox to place it on the form.

Set the interface controls

To view the property list, click the desired control, then choose the Properties command from the View menu, or press F4. You may also click on the Properties button from the toolbar.

Write the event code

The event code defines the required action to be performed when an event occurs. To write the event code, double-click on the control or form to view the code module, then add the event code. You can also call the functions declared in the D2KDASK.BAS file to perform data acquisition operations.

Run the application

Do one of the following to run the application:

- Choose **Start** from the **Run** menu
- Click the Start icon from the toolbar
- Press <F5>

Distribute the application

After completing the project, save the application as an executable (.EXE) file using the **Make EXE File** command from the File menu. The application, after being transformed into an executable file, is now ready for distribution.

You must include the D2K-DASK's DLL and driver files when the application is distributed. Refer to D2K-DASK User's Manual for details.

1.2 Application Building Fundamentals in Linux

The following sections provide fundamental instructions when using D2K-DASK to build application in Linux. To create a data acquisition application using D2K-DASK/X and GNU C/C++, follow these steps:

Edit the source files

Include the header file **d2kdask.h** in the C/C++ source files that call D2K-DASK/X functions. The d2kdask.h has all the function declarations and constants that you can use to develop your data acquisition application. Add this statement in your code to include the header file.

```
#include "d2kdask.h"
```

Build your application

Using the appropriate C/C++ compiler (gcc or cc) to compile the program. You should add **-lpci_dask2k** option to link **libpci_dask2k.so** library. For multi-threaded applications, the **-lpthread** string is required. For example:

```
gcc -o testai testai.c -lpci_dask2k
```

1.3 Function Classes

This chapter describes the classes of functions that the D2K-DASK supports.

All D2K-DASK functions are grouped into different classes:

- General Configuration Function Group
- Analog Input Function Group
  - Analog Input Configuration Functions
  - One-Shot Analog Input Functions
  - Continuous Analog Input Functions
  - Asynchronous Analog Input Monitoring Functions
- Analog Output Function Group
  - Analog output Configuration Functions
  - One-Shot Analog Output Functions
  - Continuous Analog Output Functions
  - Asynchronous Analog Output Monitoring Functions
- Digital Input Function Group
  - Digital Input Configuration Functions
  - One-Shot Digital Input Functions
- Digital Output Function Group
  - Digital Output Configuration Functions
  - One-Shot Digital Output Functions
- Timer/Counter Function Group
  - General-Purpose Timer/Counter Functions
- DIO Function Group
  - Digital Input/Output Configuration Function
- SSI Function Group
- Calibration Function Group

2 Function Reference

This chapter contains the detailed description of D2K-DASK functions, including the D2K-DASK data types and function reference. The functions are arranged alphabetically in section 2.2.

2.1 Data Types

The D2K-DASK library uses these data types in D2KDASK.H. It is recommended that you use these data types in your application programs. The table shows the data type names, ranges, and corresponding data types in C/C++, Visual Basic, and Delphi for your reference.

Type Name	**Description**	**Range**	**Type**		
			C/C++ (for 32-bit compiler)	**Visual Basic**	**Pascal (Delphi)**
U8	8-bit ASCII character	0 to 255	unsigned char	Byte	Byte
I16	16-bit signed integer	-32768 to 32767	short	Integer	SmallInt
U16	16-bit unsigned integer	0 to 65535	unsigned short	Not supported by BASIC, use the signed integer (I16) instead	Word
I32	32-bit signed integer	-2147483648 to 2147483647	long	Long	LongInt
U32	32-bit unsigned integer	0 to 4294967295	unsigned long	Not supported by BASIC, use the signed long integer (I32) instead	Cardinal
F32	32-bit single-precision floating-point	3.402823E38 to 3.402823E38	float	Single	Single
F64	64-bit double-precision floating-point	1.797683134862315E308 to 1.797683134862315E309	double	Double	Double

NOTE We didn't define these data types in D2KDASK.BAS and D2KDASK.PAS. Here they are just listed for reference

2.2 Function Reference

D2K_AI_AsyncCheck

Description

Checks the current status of the asynchronous analog input operation.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_AsyncCheck (U16 CardNumber, BOOLEAN
     *Stopped, U32 *AccessCnt)
```

Visual Basic

```
D2K_AI_AsyncCheck (ByVal CardNumber As Integer,
     Stopped As Byte, AccessCnt As Long) As
     Integer
```

Parameters

CardNumber	ID of the card performing asynchronous operation.
Stopped	Tells whether the asynchronous analog input operation is complete. If Stopped = TRUE, the analog input operation has stopped after the number of A/D conversions indicated in the call that initiated the asynchronous analog input operation is complete completed or an error has occurred. If Stopped = FALSE, the operation is not yet complete. Constants TRUE and FALSE are defined in D2KDASK.H.

AccessCnt	When the pre-trigger or middle trigger mode of AI acquisition is not used, AccessCnt returns the number of A/D data that has been transferred at the time when D2K_AI_AsyncCheck() is called. When pre-trigger or middle trigger mode of AI is enabled, and double-buffered mode is enabled, AccessCnt returns to the next position after the position of the last A/D data is stored in the circular buffer at the time calling D2K_AI_AsyncCheck().

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_AsyncClear

Description

Stops the asynchronous analog input operation.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_AsyncClear (U16 CardNumber, U32
     *StartPos, U32 *AccessCnt)
```

Visual Basic

```
D2K_AI_AsyncClear (ByVal CardNumber As Integer,
     StartPos As Long, AccessCnt As Long) As
     Integer
```

Parameters

CardNumber	ID of the card performing asynchronous operation.
StartPos	When trigger acquisition mode is not used, StartPos is zero. When pre-trigger or middle trigger mode of AI is used, StartPos returns the position of the first AD data in the data buffer at the time calling D2K_AI_AsyncClear().
AccessCnt	When pre-/middle trigger acquisition mode is not used, AccessCnt returns the number of A/D data that has been transferred at the time calling D2K_AI_AsyncClear(). When double-buffered mode is enabled, AccessCnt returns the next position after the position of the last A/D data is stored in the circular buffer.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_AsyncDblBufferHalfReady

Description

Checks whether the next half buffer of data in the circular buffer is ready for transfer during an asynchronous double-buffered analog input operation.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_AsyncDblBufferHalfReady (U16
     CardNumber, BOOLEAN *HalfReady, BOOLEAN
     *StopFlag)
```

Visual Basic

```
D2K_AI_AsyncDblBufferHalfReady(ByVal CardNumber
     As Integer, HalfReady As Byte, StopFlag As
     Byte) As Integer
```

Parameters

CardNumber	ID of the card performing asynchronous double-buffered operation.
HalfReady	Tells whether the next half buffer of data is available. Constants TRUE and FALSE are defined in D2KDASK.H.
StopFlag	Tells Whether the asynchronous analog input operation is complete. If StopFlag = TRUE, the analog input operation has stopped. If StopFlag = FALSE, the operation is not yet complete. Constants TRUE and FALSE are defined in D2KDASK.H.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_AsyncDblBufferHandled

Description

Notifies D2K-DASK that the ready buffer has been handled in user application.

For D2k-Dask, the data are transferred through DMA to the user's buffer directly. Therefor, while half buffer of data is ready (using D2K_AI_AsyncDblBufferHalfReady to check the ready status), the data in the ready buffer can be handled directly and don't need to be copied to another transfer buffer. This machanism eliminates the time taken for memory copy and another memory space for data transfer; however, D2K-DASK doesn't know if the data in the ready buffer have been handled (in user application). If the data is handled, the user application needs an interface to notify D2K-DASK this information. The new function D2K_AI_AsyncDblBufferHandled is used to for this purpose.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_AsyncDblBufferHandled (U16 CardNumber)
```

Visual Basic

```
D2K_AI_AsyncDblBufferHandled (ByVal CardNumber As
     Integer) As Integer
```

Parameter

CardNumber	ID of the card where double-buffered mode is to be set.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_AsyncDblBufferMode

Description

Enables or disables double-buffered data acquisition mode.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_AsyncDblBufferMode (U16 CardNumber,
     BOOLEAN Enable)
```

Visual Basic

```
D2K_AI_AsyncDblBufferMode (ByVal CardNumber As
     Integer, ByVal Enable As Byte) As Integer
```

Parameters

CardNumber	ID of the card where double-buffered mode is to be set.
Enable	Tells whether the double-buffered mode is enabled or not. Constants TRUE and FALSE are defined in D2KDASK.H.

TRUE	Double-buffered mode is enabled.
FALSE	Double-buffered mode is disabled.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_AsyncDblBufferOverrun

Description

Checks or clears the overrun status of the double-buffered analog input operation.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_AsyncDblBufferOverrun (U16 CardNumber,
     U16 op, U16 *overrunFlag)
```

Visual Basic

```
D2K_AI_AsyncDblBufferOverrun (ByVal CardNumber As
     Integer, ByVal op As Integer, overrunFlag As
     Integer) As Integer
```

Parameters

CardNumber	ID of the card where double-buffered mode is to be set.
op	Checks/clears the overrun status/flag.

`0`	Check the overrun status.
`1`	Clear the overrun flag.

overrunFlag	Returned overrun status.

`0`	No overrun occured.
`1`	Overrun occured.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_AsyncDblBufferToFile

Description

Call this function to log the data of the circular buffer into a disk file when the continuous AI function is:

```
D2K_AI_ContReadChannelToFile
D2K_AI_ContReadMultiChannelsToFile
D2K_AI_ContScanChannelsToFile
D2K_AI_ContMuxScanToFile
```

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_AsyncDblBufferToFile (U16 CardNumber)
```

Visual Basic

```
D2K_AI_AsyncDblBufferToFile (ByVal CardNumber As
     Integer) As Integer
```

Parameter

CardNumber	ID of the card where double-buffered mode is to be set.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_AsyncReTrigNextReady D2K_AI_AsyncReTrigNextReadyEx

Description

Checks whether the data associated to the next trigger signal is ready during an asynchronous re-triggered analog input operation. This function is based on the following conditions:

- D2K_AI_Config has to be called prior to D2K_AI_ContBufferSetup.
- Asynchronous mode should use ASYNCH_OP for continuous AI opertation.

The D2K_AI_AsyncReTrigNextReadyEx function is used for the devices (e.g. DAQ-2020/2022) which Trigger counters width are 32-bit long.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_AsyncReTrigNextReady (U16 CardNumber,
     BOOLEAN *trgReady, BOOLEAN *StopFlag, U16
     *RdyTrigCnt)
I16 D2K_AI_AsyncReTrigNextReadyEx (U16
     CardNumber, BOOLEAN *trgReady, BOOLEAN
     *StopFlag, U32 *RdyTrigCnt)
```

Visual Basic

```
D2K_AI_AsyncReTrigNextReady (ByVal CardNumber As
     Integer, trgReady As Byte, StopFlag As Byte,
     RdyTrigCnt As Integer) As Integer
D2K_AI_AsyncReTrigNextReadyEx (ByVal CardNumber
     As Integer, trgReady As Byte, StopFlag As
     Byte,RdyTrigCnt As Long) As Integer
```

Parameters

CardNumber	ID of the card performing asynchronous re-trigger operation.

trgReady	Tells whether the data associated with the next trigger signal is available. Constants TRUE and FALSE are defined in D2KDASK.H.
StopFlag	Tells whether the asynchronous analog input operation is complete. If StopFlag = TRUE, the analog input operation has stopped. If StopFlag = FALSE, the operation is not yet completed. Constants TRUE and FALSE are defined in D2KDASK.H.
RdyTrigCnt	This argument returns the count of trigger signal that occured if re-triggrt count is definite. If the re-triggrt count is infinite, this argument returns the index of the buffer that stored the data after the most recent trigger signal trigger is generated.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_CH_Config

Description

Informs the D2K-DASK library of the selected AI range for the specified channel of the card with CardNumber ID. After calling the D2K_Register_Card function, all analog input channels are configured as AD_B_10_V (for DAQ-2010, DAQ-2005, DAQ-2006, DAQ-2016, DAQ-2020/2022, DAQ-2501, and DAQ-2502) or AD_B_10_V with AI_RSE (for DAQ-2204, DAQ-2205, DAQ-2206, DAQ-2213, DAQ-2214, and DAQ-2208) by default. If you want to use the device with the default settings, there is no need to call this function again to configure the channel(s). You must call this function to program the device based on your settings before calling function to perform analog input operation.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_CH_Config (U16 CardNumber, U16
     Channel, U16 AdRange_RefGnd)
```

Visual Basic

```
D2K_AI_CH_Config (ByVal CardNumber As Integer,
     ByVal Channel As Integer, ByVal
     AdRange_RefGnd As Integer) As Integer
```

Parameters

CardNumber ID of the card performing the operation.

Channel A/D channel range for channel setting. Valid values:

DAQ-2010	0 to 3 or All_Channels (-1)
DAQ-2005	0 to 3 or All_Channels (-1)
DAQ-2006	0 to 3 or All_Channels (-1)
DAQ-2016	0 to 3 or All_Channels (-1)
DAQ-2204	0 to 63 or All_Channels (-1)
DAQ-2205	0 to 63 or All_Channels (-1)
DAQ-2206	0 to 63 or All_Channels (-1)
DAQ-2208	0 to 95 or All_Channels (-1)
DAQ-2213	0 to 15 or All_Channels (-1)
DAQ-2214	0 to 15 or All_Channels (-1)
DAQ-2501	0 to 7 or All_Channels (-1)
DAQ-2502	0 to 3 or All_Channels (-1)

AdRange_RefGnd

Analog input channel settings. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are two groups of constants:

A/D Range Selection:

Some constants are defined to represent various A/D input ranges in D2KDASK.H. Refer to **Appendix B: AI Range Codes** for valid range values. Default is AD_B_10_V.

A/D Reference Ground Selection (available only for DAQ-2204/2205/2206/2208/2213/2214)

DAQ-2010, DAQ-2005, DAQ-2006, DAQ-2016, DAQ-2501, DAQ-2502	0
DAQ-2204, DAQ-2205, DAQ-2206, DAQ-2208, DAQ-2213, DAQ-2214	AI_RSE: Referenced single ended mode (64-CH common to ground system onboard) is the default. AI_DIFF: Differential mode AI_NRSE: Non-referenced single ended mode (64-CH common to AISENSE pin)

When two or more constants are used to form the AdRange_RefGnd argument, the constants are combined with the bitwise-OR operator(|).

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_Config
D2K_AI_ConfigEx

Description

Informs the D2K-DASK library of the trigger source, trigger mode, and trigger properties for the DAQ-2000 device with the CardNumber ID. After calling the Register_Card function, the device is configured with the following default values:

A/D conversion source	`DAQ2K_AI_ADCONVSRC_Int`
A/D trigger mode	`DAQ2K_AI_TRGMOD_POST`
A/D trigger source	`DAQ2K_AI_TRGSRC_SOFT`
Auto reset buffer	`Enabled (AutoResetBuf : TRUE)`

If you want to use the device with the default settings, you do not need to call this function again to reset the configuration. However, you must call this function before calling a function to perform continuous analog input operation. The D2K_AI_ConfigEx function is used for the devices (e.g. DAQ-2020/2022) which counters width are 32-bit long.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_Config (U16 CardNumber, U16
     ConfigCtrl, U32 TrigCtrl, U32 MidOrDlyScans,
     U16 MCnt, U16 ReTrgCnt, BOOLEAN
     AutoResetBuf)
I16 D2K_AI_ConfigEx (U16 CardNumber, U16
     ConfigCtrl, U32 TrigCtrl, U32 MidOrDlyScans,
     U32 MCnt, U32 ReTrgCnt, BOOLEAN
     AutoResetBuf)
```

Visual Basic

```
D2K_AI_Config (ByVal CardNumber As Integer, ByVal
     ConfigCtrl As Integer, ByVal TrigCtrl As
     Long, ByVal MidOrDlyScans As Long, ByVal
```

```
          MCnt As Integer, ByVal ReTrgCnt As Integer,
          ByVal AutoResetBuf As Byte) As Integer
     D2K_AI_ConfigEx (ByVal CardNumber As Integer,
          ByVal ConfigCtrl As Integer, ByVal TrigCtrl
          As Long, ByVal MidOrDlyScans As Long, ByVal
          MCnt As Long, ByVal ReTrgCnt As Long, ByVal
          AutoResetBuf As Byte) As Integer
```

Parameters

CardNumber ID of the card performing the operation.

ConfigCtrl A/D configuration control setting. This argument is an integer expression formed from one or more of the manifest constants defined in D2kDASK.H. There are two groups of constants:

A/D Conversion Source Selection

`DAQ2K_AI_ADCONVSRC_Int`	Internal timer (default)
`DAQ2K_AI_ADCONVSRC_AFI0`	From AFI0 pin
`DAQ2K_AI_ADCONVSRC_SSI`	From SSI source
`DAQ2K_AI_ADCONVSRC_AFI1`	From AFI1 pin (DAQ-2501/ 2502 only)
`DAQ2K_AI_ADCONVSRC_AFI2`	From AFI2 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI3`	From AFI3 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI4`	From AFI4 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI5`	From AFI5 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI6`	From AFI6 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI7`	From AFI7 pin (DAQ-2020/ 2022 only)

A/D Delay Counter Source Selection
(available only for DAQ-2501/2502)

`DAQ2K_AI_DTSRC_Int`	Internal timer (default)
`DAQ2K_AI_DTSRC_AFI1`	From AFI1 pin
`DAQ2K_AI_DTSRC_GPTC0`	From GPTC0_OUT
`DAQ2K_AI_DTSRC_GPTC1`	From GPTC1_OUT

When two or more constants are used to form the ConfigCtrl argument, the constants are combined with the bitwise-OR operator(|).

TrigCtrl

A/D trigger control setting. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are six groups of constants:

Trigger Source Selection

`DAQ2K_AI_TRGSRC_SOFT`	Software (default)
`DAQ2K_AI_TRGSRC_ANA`	From analog trigger pin
`DAQ2K_AI_TRGSRC_ExtD`	From external digital trigger pin
`DAQ2K_AI_TRSRC_SSI`	From SSI source
`DAQ2K_AI_TRGSRC_AFI0`	From AFI0 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI1`	From AFI1 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI2`	From AFI2 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI3`	From AFI3 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI4`	From AFI4 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI5`	From AFI5 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI6`	From AFI6 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI7`	From AFI7 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_PXIStar`	PXI Star Trigger as the trigger source (available only for DAQ-2020/2022)
`DAQ2K_AI_TRGSRC_SMB`	From SMB Trigger IO Connector (available only for DAQ-2020/2022)

Trigger Mode Selection

`DAQ2K_AI_TRGMOD_POST`	Post Trigger Mode (default)
`DAQ2K_AI_TRGMOD_DELAY`	Delay Trigger Mode
`DAQ2K_AI_TRGMOD_PRE`	Pre-Trigger Mode
`DAQ2K_AI_TRGMOD_MIDL`	Middle-Trigger Mode

Delay Source Selection *(available only for Delay Trigger Mode)*

`DAQ2K_AI_Dly1InSamples`	Delay in samples (not afailable for DAQ-202/2022)
`DAQ2K_AI_Dly1InTimebase`	Delay in time base (default)

Re-Trigger Mode Enable
(available only for Delay and Post Trigger Mode)

`DAQ2K_AI_ReTrigEn`	Re-trigger in an acquisition is enabled

MCounter Enable
(available only for pre- and middle trigger mode and is only valid for pre-trigger and middle trigger mode)

`DAQ2K_AI_MCounterEn`	Mcounter is enabled and then the trigger signal is ignore before M terminal count is reached.

External Digital Trigger Polarity

`DAQ2K_AI_TrgPositive`	Trigger positive edge active (default)
`DAQ2K_AI_TrgNegative`	Trigger negative edge active

When two or more constants are used to form the TrigCtrl argument, the constants are combined with the bitwise-OR operator(|).

MidOrDlyScans Valid only for middle trigger and delay trigger modes. For middle trigger, this argument indicates the number of data that will be accessed after a specific trigger event. The valid value range of MidOrDlyScans for the middle trigger for cards except DAQ-2020/2022, is 0 to 16777215. For theDAQ-2020/2022, the range of valid values is from 0 to 2147483647.

For Delay trigger, this argument indicates the number of data or timer ticks that will be ignored after a specific trigger event. For the D2K_AI_Config, the valid value range of DlyScans for delay trigger is 0 to 65535. For the DAQ-2020/2022 and using the func-

	tion D2K_AI_ConfigEx, the valid value range of DlyScans for delay trigger is 0 to 4294967295.
MCnt	The counter value of MCounter. For D2K_AI_Config, the valid value range of MCnt is 0 through 65535. This argument is only valid for pre-trigger and Middle trigger mode. For the DAQ-2020/2022 and using the function D2K_AI_ConfigEx, the valid value range of MCnt is 0 to 4294967295.
ReTrgCnt	The accepted trigger times in an acquisition. For D2K_AI_Config, the valid range of ReTrgCnt is 0 to 65535. If the value of ReTrgCnt is 0, the AI operation is triggered infinitely. For DAQ-2020/2022 and using the function D2K_AI_ConfigEx, the valid value range of ReTrgCnt is 0 to 4294967295. This argument is only valid for delay trigger and post trigger modes.

NOTE To enable infinite re-trigger mode of continuous AI, call D2K_AI_Config with DAQ2K_AI_ReTrigEn and zero value of ReTrgCnt.

AutoResetBuf

FALSE	The AI buffers set by the D2K_AI_ContBufferSetup function are retained. You must call the D2K_AI_ContBufferReset function to reset the buffer.
TRUE	The AI buffers set by the D2K_AI_ContBufferSetup function are reset automatically by driver when the AI operation is completed.

NOTE If Mcounter is enabled, the ReadScans parameter of continuous AI functions D2K_AI_ContXXXX has to be equal to MidOrDlyScans+MCnt.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_ContBufferReset

Description

Resets all buffers set by function D2K_AI_ContBufferSetup for continuous analog input. Call this function when the data buffers will not be used.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContBufferReset (U16 CardNumber)
```

Visual Basic

```
D2K_AI_ContBufferReset (ByVal CardNumber As
     Integer) As Integer
```

Parameter

CardNumber	ID of the card performing the operation.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
```

D2K_AI_ContBufferSetup

Description

Sets up the buffer for continuous analog input. The function has to be called repeatedly to setup all the data buffers (two buffers maximum). For double buffer mode and infinite re-trigger mode of continuous AI, calling D2K_AI_ContBufferSetup twice sets up the ring buffer to store the data.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContBufferSetup (U16 CardNumber, void
     *Buffer, U32 ReadCount, U16 *BufferId)
```

Visual Basic

```
D2K_AI_ContBufferSetup (ByVal CardNumber As
     Integer, Buffer As Any, ByVal ReadCount As
     Long, BufferId As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Buffer	Starting address of the memory to contain the input data.
ReadCount	Buffer size (in samples); value must be even.
BufferId	Returns the index of the currently set up buffer.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
```

D2K_AI_ContMuxScan

Description

Initializes the Channel-Gain Queue to point to the start of the scan sequence as specified by D2K_AI_MuxScanSetup and starts a multiple-channel scanned data acquisition operation. This function is available only for multiplexed AD cards.

Supported Cards

2204, 2205, 2206, 2208, 2213, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContMuxScan (U16 CardNumber, U16
     BufId, U32 ReadScans, U32 ScanIntrv, U32
     SampIntrv, U16 SyncMode)
```

Visual Basic

```
D2K_AI_ContMuxScan (ByVal CardNumber As Integer,
     ByVal BufId As Integer, ByVal ReadScans As
     Long, ByVal ScanIntrv As Long, ByVal
     SampIntrv As Long, ByVal SyncMode As
     Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
BufId	ID (returned from function D2K_AI_ContBufferSetup) of the buffer containing the acquired data. The size of the buffer with BufId must have a length equal to the value of parameter ScanCount * (number of channels per scan). If double-buffered mode is enabled, the starting buffer id must be 0. You may ignore this argument. Refer to **Appendix C: AI Data Format** for the data format in the buffer with BufId.
ReadScans	If double-buffered mode is disabled, this is the total number of scans to be performed. For double-buffered acquisition, ReadScans is the size (in samples) allocated for each channel in the circular buffer. Range of valid values is 2 to 16777215. The value must be a multiple of two.

NOTE	If Mcounter is enabled, the ReadScans has to be equal to MidOrDlyScans+MCnt.

ScanIntrv The length of the scan interval or the counter value between the initiation of each scan sequence. The scan rate is TimeBase/ScanIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid value is 8 to 16777215. If the timer base is internal, the range of valid values are:

DAQ-2204	14 to 16777215
DAQ-2205	80 to 16777215
DAQ-2206	160 to 16777215
DAQ-2208	14 to 16777215
DAQ-2213	160 to 16777215
DAQ-2214	160 to 16777215

SampIntrv The length of the sample interval or the counter value between each A/D conversion within a scan sequence. The A/D conversion rate is TimeBase/ SampIntrv. The value of TimeBase depends on th ecard type.

If the timer base is external, the range of valid values is 8 to 65535. If the timer base is internal, the range of valid values are:

DAQ-2204	14 to 65535
DAQ-2205	80 to 65535
DAQ-2206	160 to 65535
DAQ-2208	14 to 65535
DAQ-2213	160 to 65535
DAQ-2214	160 to 65535

For example:

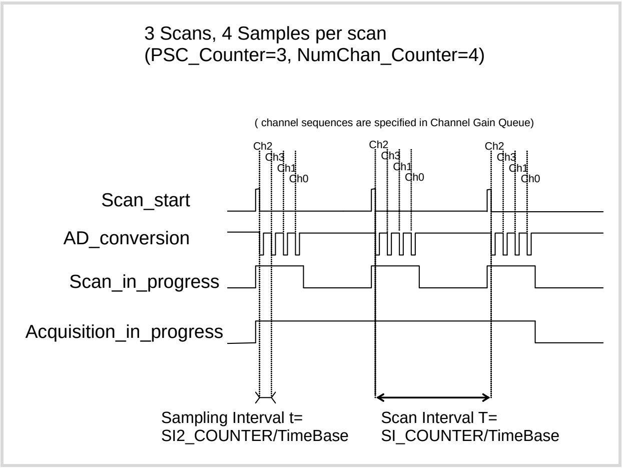


Figure 2-1: Scan Timing (D2K_AI_ContMuxScan)

NOTE The SampIntrv parameter is ignored on simultaneous AD card such as DAQ-2010.

SyncMode Tells whether this operation is performed synchronously or asynchronously. If pre-/middle trigger mode is enabled by calling D2K_AI_Config(), this operation should be performed asynchronously. Valid values:

`SYNCH_OP`	Synchronous A/D conversion. The function does not return until the A/D operation is completed.
`ASYNCH_OP`	Asynchronous A/D conversion

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
rrorInvalidSampleRate
ErrorInvalidAdRange
rrorTransferCountTooLarge
ErrorContIoNotAllowed
```

D2K_AI_ContMuxScanToFile

Description

Initializes the Channel-Gain Queue to point to the start of the scan sequence as specified by D2K_AI_MuxScanSetup, starts a multiple-channel scanned data acquisition operation, and saves the acquired data in a disk file. The data is written in binary format with the lower byte first (little endian). Refer to **Appendix D: Data File Format** for the data file structure and **Appendix C: AI Data Format** for supported data file formats. This function takes advantage of the DAQ-2000 channel-gain that can be set separately for each channel to perform multi-channel/gain analog input and is only available for multiplexed AD card.

Supported Cards

2204, 2205, 2206, 2208, 2213, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContMuxScanToFile (U16 CardNumber, U16
     BufId, U8 *FileName, U32 ReadScans, U32
     ScanIntrv, U32 SampIntrv, U16 SyncMode)
```

Visual Basic

```
D2K_AI_ContMuxScanToFile (ByVal CardNumber As
     Integer, ByVal BufId As Integer, ByVal
     FileName As String, ByVal ReadScans As Long,
     ByVal ScanIntrv As Long, ByVal SampIntrv As
     Long, ByVal SyncMode As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
BufId	ID (returned from function D2K_AI_ContBufferSetup) of the buffer containing the acquired data. The size of the buffer with BufId must have a length equal to the value of parameter ScanCount * (number of channels per scan). If double-buffered mode is enabled, the starting buffer id must be 0. You may ignore this argument. Refer to **Appendix C: AI Data Format** for the data format in the buffer with BufId.

FileName	Name of data file that stored the acquired data.
ReadScans	If double-buffered mode is disabled, this is the total number of scans to be performed. For double-buffered acquisition, ReadScans is the size (in samples) allocated for each channel in the circular buffer. Range of valid values is 2 to 16777215. The value must be a multiple of two.

NOTE If Mcounter is enabled, the ReadScans has to be equal to MidOrDlyScans+MCnt.

ScanIntrv The length of the scan interval or the counter value between the initiation of each scan sequence. The scan rate is TimeBase/ScanIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid value is from 8 to 16777215. If the timer base is internal, the range of valid values are:

DAQ-2204	14 to 16777215
DAQ-2205	80 to 16777215
DAQ-2206	160 to 16777215
DAQ-2208	14 to 16777215
DAQ-2213	160 to 16777215
DAQ-2214	160 to 16777215

SampIntrv The length of the sample interval or the counter value between each A/D conversion within a scan sequence. The A/D conversion rate is TimeBase/SampIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid values is 8 to 65535. If the timer base is internal, the range of valid values are:

DAQ-2204	14 to 65535
DAQ-2205	80 to 65535
DAQ-2206	160 to 65535
DAQ-2208	14 to 65535

DAQ-2213	160 to 65535
DAQ-2214	160 to 65535

For example:

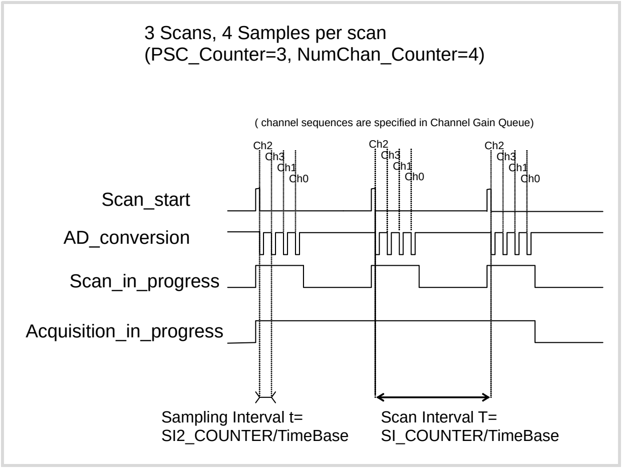


Figure 2-2: Scan Timing (D2K_AI_ContMuxScanToFile)

NOTE The SampIntrv parameter is ignored on simultaneous AD card such as DAQ-2010.

SyncMode Tells whether this operation is performed synchronously or asynchronously. If pre-/middle trigger mode is enabled by calling D2K_AI_Config(), this operation should be performed asynchronously. Valid values:

`SYNCH_OP`	Synchronous A/D conversion. The function does not return until the A/D operation is completed.
`ASYNCH_OP`	Asynchronous A/D conversion

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidSampleRate
ErrorInvalidAdRange
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
ErrorOpenFile
```

D2K_AI_ContReadChannel

Description

Performs continuous A/D conversions on the specified analog input channel at a rate closest to the specified rate.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContReadChannel (U16 CardNumber, U16
     Channel, U16 BufId, U32 ReadScans, U32
     ScanIntrv, U32 SampIntrv, U16 SyncMode)
```

Visual Basic

```
D2K_AI_ContReadChannel (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     BufId As Integer, ByVal ReadScans As Long,
     ByVal ScanIntrv As Long, ByVal SampIntrv As
     Long, ByVal SyncMode As Integer) As Integer
```

Parameter

CardNumber	ID of the card performing the operation.
Channel	Analog input channel number.

DAQ-2010, DAQ-2005, DAQ-2006, DAQ-2016, DAQ-2502	0 to 3
DAQ-2204, DAQ-2205, DAQ-2206	0 to 63
DAQ-2208	0 to 95
DAQ-2213, DAQ-2214, 2020, 2022	0 to 15
DAQ-2501	0 to 7

BufId ID (returned from function D2K_AI_ContBufferSetup) of the buffer containing the acquired data. The size of the buffer with BufId must have a length equal to the value of parameter ScanCount * (number of channels per scan). If double-buffered mode is enabled, the starting buffer id must be 0. You may ignore this argument. Refer to **Appendix C: AI Data Format** for the data format in the buffer with BufId.

ReadScans If double-buffered mode is disabled, this is the total number of scans to be performed. For double-buffered acquisition, ReadScans is the size (in samples) allocated for each channel in the circular buffer. For cards except DAQ-2020/2022, the range of valid values are form 2 to 16777215. For DAQ-2020/2022, the range of valid values is from 2 to 2147483647. The value must be a multiple of two.

NOTE If Mcounter is enabled, the ReadScans has to be equal to MidOrDlyScans+MCnt.

ScanIntrv The length of the scan interval or the counter value between the initiation of each scan sequence. The scan rate is TimeBase/ScanIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid value is from 1 to 4294967295 for DAQ-2020/2022 or 8 to 16777215 for the others. If the timer base is internal, the range of valid values are:

DAQ-2010	20 to 16777215
DAQ-2005	80 to 16777215
DAQ-2006	160 to 16777215
DAQ-2016	50 to 16777215
DAQ-2020/22	320 to 83886080
DAQ-2204	14 to 16777215
DAQ-2205	80 to 16777215
DAQ-2206	160 to 16777215
DAQ-2208	14 to 16777215
DAQ-2213	160 to 16777215
DAQ-2214	160 to 16777215
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

SampIntrv The length of the sample interval or the counter value between each A/D conversion within a scan sequence. The A/D conversion rate is TimeBase/ SampIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid values is 8 to 65535. If the timer base is internal, the range of valid values are:

DAQ-2010	Invalid
DAQ-2005	Invalid
DAQ-2006	Invalid
DAQ-2016	Invalid
DAQ-2020/22	Invalid
DAQ-2204	14 to 65535
DAQ-2205	80 to 65535
DAQ-2206	160 to 65535
DAQ-2208	14 to 65535
DAQ-2213	160 to 65535
DAQ-2214	160 to 65535
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

For example:

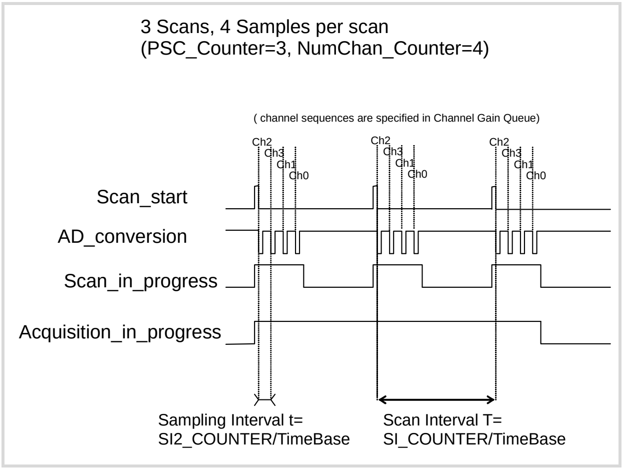


Figure 2-3: Scan Timing (D2K_AI_ContReadChannel)

NOTE	The SampIntrv parameter is ignored on simultaneous AD card such as DAQ-2010.

SyncMode Tells whether this operation is performed synchronously or asynchronously. If pre-/middle trigger mode is enabled by calling D2K_AI_Config(), this operation should be performed asynchronously. Valid values:

`SYNCH_OP`	Synchronous A/D conversion. The function does not return until the A/D operation is completed.
`ASYNCH_OP`	Asynchronous A/D conversion

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidAdRange
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
ErrorInvalidSampleRate
```

D2K_AI_ContReadChannelToFile

Description

Performs continuous A/D conversions on the specified analog input channel at a rate closest to the specified, then saves the acquired data in a disk file. The data is written in binary format with the lower byte first (little endian). Refer to **Appendix D: Data File Format** for the data file structure and **Appendix C: AI Data Format** for supported data file formats.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContReadChannelToFile (U16 CardNumber,
     U16 Channel, U16 BufId, U8 *FileName, U32
     ReadScans, U32 ScanIntrv, U32 SampIntrv, U16
     SyncMode)
```

Visual Basic

```
D2K_AI_ContReadChannelToFile (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     BufId As Integer, ByVal FileName As String,
     ByVal ReadScans As Long, ByVal ScanIntrv As
     Long, ByVal SampIntrv As Long, ByVal
     SyncMode As Integer) As Integer
```

Parameters

CardNumber ID of the card performing the operation.

Channel Analog input channel number.

DAQ-2010, DAQ-2005, DAQ-2006, DAQ-2016, DAQ-2502	0 to 3
DAQ-2204, DAQ-2205, DAQ-2206	0 to 63
DAQ-2208	0 to 95
DAQ-2213, DAQ-2214, DAQ-2020/2022	0 to 15
DAQ-2501	0 to 7

BufId	ID (returned from function D2K_AI_ContBufferSetup) of the buffer containing the acquired data. The size of the buffer with BufId must have a length equal to the value of parameter ScanCount * (number of channels per scan). If double-buffered mode is enabled, the starting buffer id must be 0. You may ignore this argument. Refer to **Appendix C: AI Data Format** for the data format in the buffer with BufId.
FileName	Name of data file that stored the acquired data.
ReadScans	If double-buffered mode is disabled, this is the total number of scans to be performed. For double-buffered acquisition, ReadScans is the size (in samples) allocated for each channel in the circular buffer. For cards except DAQ-2020/2022, the range of valid values are form 2 to 16777215. For DAQ-2020/2022, the range of valid values is from 2 to 2147483647. The value must be a multiple of two.

NOTE If Mcounter is enabled, the ReadScans has to be equal to MidOrDlyScans+MCnt.

ScanIntrv The length of the scan interval or the counter value between the initiation of each scan sequence. The scan rate is TimeBase/ScanIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid value is from 1 to 4294967295 for DAQ-2020/2022 or 8 to 16777215 for the others. If the timer base is internal, the range of valid values are:

DAQ-2010	20 to 16777215
DAQ-2005	80 to 16777215
DAQ-2006	160 to 16777215
DAQ-2016	50 to 16777215
DAQ-2020/22	320 to 83886080
DAQ-2204	14 to 16777215
DAQ-2205	80 to 16777215
DAQ-2206	160 to 16777215

DAQ-2208	14 to 16777215
DAQ-2213	160 to 16777215
DAQ-2214	160 to 16777215
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

SampIntrv The length of the sample interval or the counter value between each A/D conversion within a scan sequence. The A/D conversion rate is TimeBase/ SampIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid values is 8 to 65535. If the timer base is internal, the range of valid values are:

DAQ-2010	Invalid
DAQ-2005	Invalid
DAQ-2006	Invalid
DAQ-2016	Invalid
DAQ-2020/22	Invalid
DAQ-2204	14 to 65535
DAQ-2205	80 to 65535
DAQ-2206	160 to 65535
DAQ-2208	14 to 65535
DAQ-2213	160 to 65535
DAQ-2214	160 to 65535
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

For example:

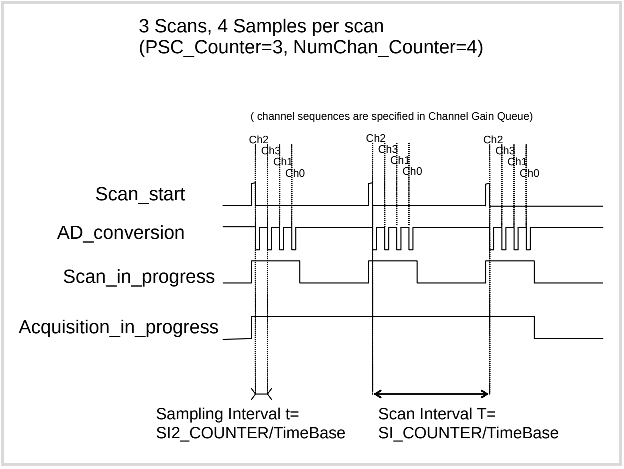


Figure 2-4: Scan Timing (D2K_AI_ContReadChannelToFile)

NOTE	The SampIntrv parameter is ignored on simultaneous AD card such as DAQ-2010.

SyncMode Tells whether this operation is performed synchronously or asynchronously. If pre-/middle trigger mode is enabled by calling D2K_AI_Config(), this operation should be performed asynchronously. Valid values:

`SYNCH_OP`	Synchronous A/D conversion. The function does not return until the A/D operation is completed.
`ASYNCH_OP`	Asynchronous A/D conversion

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidAdRange
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
ErrorInvalidSampleRate
```

```
ErrorOpenFile
```

D2K_AI_ContReadMultiChannels

Description

Performs continuous A/D conversions on the specified analog input channels at a rate closest to the specified rate. This function takes advantage of the DAQ-2000 channel-gain that can be set separately for each channel to perform multi-channel/gain analog input.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContReadMultiChannels (U16 CardNumber,
     U16 NumChans, U16 *Chans, U16 BufId, U32
     ReadScans, U32 ScanIntrv, U32 SampIntrv, U16
     SyncMode)
```

Visual Basic

```
D2K_AI_ContReadMultiChannels (ByVal CardNumber As
     Integer, ByVal NumChans As Integer, Chans As
     Integer, ByVal BufId As Integer, ByVal
     ReadScans As Long, ByVal ScanIntrv As Long,
     ByVal SampIntrv As Long, ByVal SyncMode As
     Integer) As Integer
```

Parameters

CardNumber ID of the card performing the operation.

NumChans Number of analog input channels in the array Chans. Valid values:

DAQ-2010	1 to 4
DAQ-2005	1 to 4
DAQ-2006	1 to 4
DAQ-2016	1 to 4
DAQ-2020/22	1 to 16
DAQ-2204	1 to 512
DAQ-2205	1 to 512

DAQ-2206	1 to 512
DAQ-2208	1 to 1024
DAQ-2213	1 to 512
DAQ-2214	1 to 512
DAQ-2501	1 to 8
DAQ-2502	1 to 4

Chans Array of analog input channel numbers.

DAQ-2010	Numbers in Chans must be within 0 and 3.
DAQ-2005	Numbers in Chans must be within 0 and 3.
DAQ-2006	Numbers in Chans must be within 0 and 3.
DAQ-2016	Numbers in Chans must be within 0 and 3.
DAQ-2020/22	Numbers in Chans must be within 0 and 15.
DAQ-2204	Numbers in Chans must be within 0 and 63.
DAQ-2205	Numbers in Chans must be within 0 and 63.
DAQ-2206	Numbers in Chans must be within 0 and 63.
DAQ-2208	Numbers in Chans must be within 0 and 95.
DAQ-2213	Numbers in Chans must be within 0 and 15.
DAQ-2214	Numbers in Chans must be within 0 and 15.
DAQ-2501	Numbers in Chans must be within 0 and 7.
DAQ-2502	Numbers in Chans must be within 0 and 3.

BufId ID (returned from function D2K_AI_ContBufferSetup) of the buffer containing the acquired data. The size of the buffer with BufId must have a length equal to the value of parameter ScanCount * (number of channels per scan). If double-buffered mode is enabled, the starting buffer id must be 0. You may ignore this argument. Refer to **Appendix C: AI Data Format** for the data format in the buffer with BufId.

ReadScans If double-buffered mode is disabled, this is the total number of scans to be performed. For double-buffered acquisition, ReadScans is the size (in samples) allocated for each channel in the circular buffer. All cards except for DAQ-2020/2022, the range of valid values are form 2 to 16777215. For DAQ-2020/2022, the range of valid values is from 2 to 2147483647. The value must be a multiple of two.

NOTE If Mcounter is enabled, the ReadScans has to be equal to MidOrDlyScans+MCnt.

ScanIntrv The length of the scan interval or the counter value between the initiation of each scan sequence. The scan rate is TimeBase/ScanIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid value is from 1 to 4294967295 for DAQ-2020/2022 or 8 to 16777215 for the others. If the timer base is internal, the range of valid values are:

DAQ-2010	20 to 16777215
DAQ-2005	80 to 16777215
DAQ-2006	160 to 16777215
DAQ-2016	50 to 16777215
DAQ-2020/22	320 to 83886080
DAQ-2204	14 to 16777215
DAQ-2205	80 to 16777215
DAQ-2206	160 to 16777215
DAQ-2208	14 to 16777215
DAQ-2213	160 to 16777215
DAQ-2214	160 to 16777215
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

SampIntrv The length of the sample interval or the counter value between each A/D conversion within a scan sequence. The A/D conversion rate is TimeBase/SampIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid values is 8 to 65535. If the timer base is internal, the range of valid values are:

DAQ-2010	Invalid
DAQ-2005	Invalid
DAQ-2006	Invalid
DAQ-2016	Invalid

DAQ-2020/22	Invalid
DAQ-2204	14 to 65535
DAQ-2205	80 to 65535
DAQ-2206	160 to 65535
DAQ-2208	14 to 65535
DAQ-2213	160 to 65535
DAQ-2214	160 to 65535
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

For example:

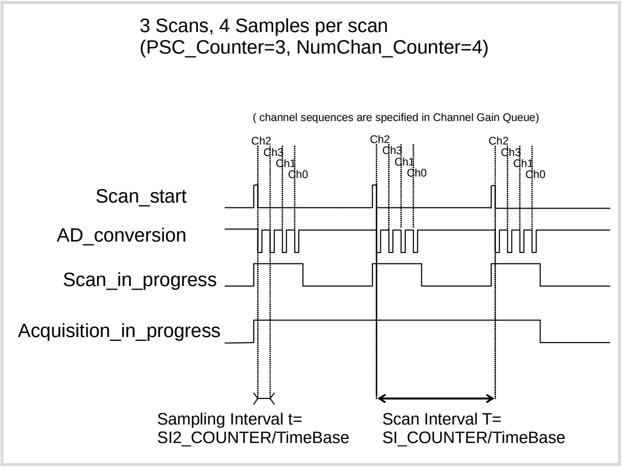


Figure 2-5: Scan Timing (D2K_AI_ContReadMultiChannels)

NOTE	The SampIntrv parameter is ignored on simultaneous AD card such as DAQ-2010.

SyncMode

Tells whether this operation is performed synchronously or asynchronously. If pre-/middle trigger mode is enabled by calling D2K_AI_Config(), this operation should be performed asynchronously. Valid values:

`SYNCH_OP`	Synchronous A/D conversion. The function does not return until the A/D operation is completed.
`ASYNCH_OP`	Asynchronous A/D conversion

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidSampleRate
ErrorInvalidAdRange
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
```

D2K_AI_ContReadMultiChannelsToFile

Description

Performs continuous A/D conversions on the specified analog input channels at a rate closest the specified rate, then saves the acquired data in a disk file. The data is written in binary format with the lower byte first (little endian). Refer to **Appendix D: Data File Format** for the data file structure and **Appendix C: AI Data Format** for supported data file formats. This function takes advantage of the DAQ-2000 channel-gain that can be set separately for each channel to perform multi-channel/gain analog input.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContReadMultiChannelsToFile (U16
     CardNumber, U16 NumChans, U16 *Chans, U16
     BufId, U8 *FileName, U32 ReadScans, U32
     ScanIntrv, U32 SampIntrv, U16 SyncMode)
```

Visual Basic

```
D2K_AI_ContScanChannelsToFile (ByVal CardNumber
     As Integer, ByVal NumChans As Integer, Chans
     As Integer, ByVal BufId As Integer, ByVal
     FileName As String, ByVal ReadScans As Long,
     ByVal ScanIntrv As Long, ByVal SampIntrv As
     Long, ByVal SyncMode As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
NumChans	Number of analog input channels in the array Chans. Valid values:

DAQ-2010	1 to 4
DAQ-2005	1 to 4
DAQ-2006	1 to 4
DAQ-2016	1 to 4
DAQ-2020/22	1 to 16

DAQ-2204	1 to 512
DAQ-2205	1 to 512
DAQ-2206	1 to 512
DAQ-2208	1 to 1024
DAQ-2213	1 to 512
DAQ-2214	1 to 512
DAQ-2501	1 to 8
DAQ-2502	1 to 4

Chans Array of analog input channel numbers.

DAQ-2010	Numbers in Chans must be within 0 and 3.
DAQ-2005	Numbers in Chans must be within 0 and 3.
DAQ-2006	Numbers in Chans must be within 0 and 3.
DAQ-2016	Numbers in Chans must be within 0 and 3.
DAQ-2020/22	Numbers in Chans must be within 0 and 15.
DAQ-2204	Numbers in Chans must be within 0 and 63.
DAQ-2205	Numbers in Chans must be within 0 and 63.
DAQ-2206	Numbers in Chans must be within 0 and 63.
DAQ-2208	Numbers in Chans must be within 0 and 95.
DAQ-2213	Numbers in Chans must be within 0 and 15.
DAQ-2214	Numbers in Chans must be within 0 and 15.
DAQ-2501	Numbers in Chans must be within 0 and 7.
DAQ-2502	Numbers in Chans must be within 0 and 3.

BufId ID (returned from function D2K_AI_ContBufferSetup) of the buffer containing the acquired data. The size of the buffer with BufId must have a length equal to the value of parameter ScanCount * (number of channels per scan). If double-buffered mode is enabled, the starting buffer id must be 0. You may ignore this argument. Refer to **Appendix C: AI Data Format** for the data format in the buffer with BufId.

FileName Name of data file that stored the acquired data.

ReadScans If double-buffered mode is disabled, this is the total number of scans to be performed. For double-buffered acquisition, ReadScans is the size (in samples) allocated for each channel in the circular buffer. All cards except for DAQ-2020/2022, the range of valid values are form 2 to 16777215. For DAQ-2020/2022, the range of valid values is from 2 to 2147483647. The value must be a multiple of two.

NOTE If Mcounter is enabled, the ReadScans has to be equal to MidOrDlyScans+MCnt.

ScanIntrv The length of the scan interval or the counter value between the initiation of each scan sequence. The scan rate is TimeBase/ScanIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid value is from 1 to 4294967295 for DAQ-2020/2022 or 8 to 16777215 for the others. If the timer base is internal, the range of valid values are:

DAQ-2010	20 to 16777215
DAQ-2005	80 to 16777215
DAQ-2006	160 to 16777215
DAQ-2016	50 to 16777215
DAQ-2020/22	320 to 83886080
DAQ-2204	14 to 16777215
DAQ-2205	80 to 16777215
DAQ-2206	160 to 16777215
DAQ-2208	14 to 16777215
DAQ-2213	160 to 16777215
DAQ-2214	160 to 16777215
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

SampIntrv The length of the sample interval or the counter value between each A/D conversion within a scan sequence. The A/D conversion rate is TimeBase/SampIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid values is 8 to 65535. If the timer base is internal, the range of valid values are:

DAQ-2010	Invalid
DAQ-2005	Invalid
DAQ-2006	Invalid
DAQ-2016	Invalid
DAQ-2020/22	Invalid
DAQ-2204	14 to 65535
DAQ-2205	80 to 65535
DAQ-2206	160 to 65535
DAQ-2208	14 to 65535
DAQ-2213	160 to 65535
DAQ-2214	160 to 65535
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

For example:

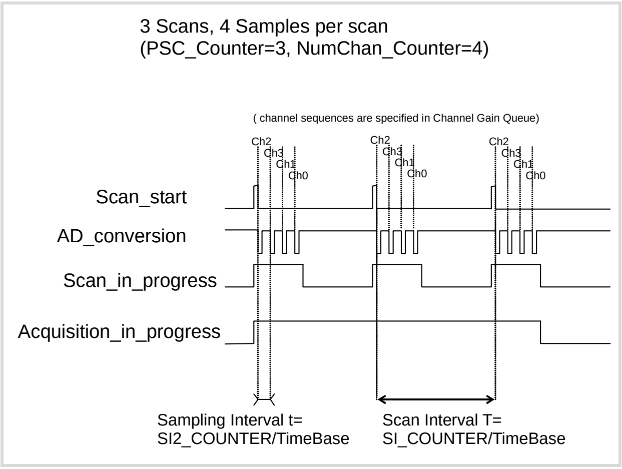


Figure 2-6: Scan Timing (D2K_AI_ContReadMultiChannelsToFile)

NOTE The SampIntrv parameter is ignored on simultaneous AD card such as DAQ-2010.

SyncMode	Tells whether this operation is performed synchronously or asynchronously. If pre-/middle trigger mode is enabled by calling D2K_AI_Config(), this operation should be performed asynchronously. Valid values:

`SYNCH_OP`	Synchronous A/D conversion. The function does not return until the A/D operation is completed.
`ASYNCH_OP`	Asynchronous A/D conversion

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidSampleRate
ErrorInvalidAdRange
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
ErrorOpenFile
```

D2K_AI_ContScanChannels

Description

Performs continuous A/D conversions on the specified continuous analog input channels at a rate closest to the specified rate. This function takes advantage of the hardware simultaneous or auto-scan functionality to perform multi-channel analog input.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContScanChannels (U16 CardNumber, U16
     Channel, U16 BufId, U32 ReadScans, U32
     ScanIntrv, U32 SampIntrv, U16 SyncMode)
```

Visual Basic

```
D2K_AI_ContScanChannels (ByVal wCardNumber As
     Integer, ByVal Channel As Integer, ByVal
     BufId As Integer, ByVal ReadScans As Long,
     ByVal ScanIntrv As Long, ByVal SampIntrv As
     Long, ByVal SyncMode As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Largest channel number of specified continuous analog input channel. The channel order for acquiring data is listed below:

`DAQ-2010`	Channel must be within 0 and 3. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2005`	Channel must be within 0 and 3. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2006`	Channel must be within 0 and 3. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.

`DAQ-2016`	Channel must be within 0 and 3. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2020/ 2022`	Channel must be within 0 and 15. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2204`	Channel must be within 0 and 63. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2205`	Channel must be within 0 and 63. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2206`	Channel must be within 0 and 63. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2208`	Channel must be within 0 and 95. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2213`	Channel must be within 0 and 15. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2214`	Channel must be within 0 and 15. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2501`	Channel must be within 0 and 7. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2502`	Channel must be within 0 and 3. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.

BufId
ID (returned from function D2K_AI_ContBufferSetup) of the buffer containing the acquired data. The size of the buffer with BufId must have a length equal to the value of parameter ScanCount * (number of channels per scan). If double-buffered mode is enabled, the starting buffer id must be 0. You may ignore this argument. Refer to **Appendix C: AI Data Format** for the data format in the buffer with BufId.

ReadScans
If double-buffered mode is disabled, this is the total number of scans to be performed. For double-buffered acquisition, ReadScans is the size (in

samples) allocated for each channel in the circular buffer. All boads except for DAQ-2020/2022, the range of valid values are form 2 to 16777215. For DAQ-2020/2022, the range of valid values is from 2 to 2147483647. The value must be a multiple of two.

NOTE If Mcounter is enabled, the ReadScans has to be equal to MidOrDlyScans+MCnt.

ScanIntrv The length of the scan interval or the counter value between the initiation of each scan sequence. The scan rate is TimeBase/ScanIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid value is from 1 to 4294967295 for DAQ-2020/2022 or 8 to 16777215 for the others. If the timer base is internal, the range of valid values are:

DAQ-2010	20 to 16777215
DAQ-2005	80 to 16777215
DAQ-2006	160 to 16777215
DAQ-2016	50 to 16777215
DAQ-2020/22	320 to 83886080
DAQ-2204	14 to 16777215
DAQ-2205	80 to 16777215
DAQ-2206	160 to 16777215
DAQ-2208	14 to 16777215
DAQ-2213	160 to 16777215
DAQ-2214	160 to 16777215
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

SampIntrv The length of the sample interval or the counter value between each A/D conversion within a scan sequence. The A/D conversion rate is TimeBase/SampIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid values is 8 to 65535. If the timer base is internal, the range of valid values are:

DAQ-2010	Invalid
DAQ-2005	Invalid
DAQ-2006	Invalid
DAQ-2016	Invalid
DAQ-2020/22	Invalid
DAQ-2204	14 to 65535
DAQ-2205	80 to 65535
DAQ-2206	160 to 65535
DAQ-2208	14 to 65535
DAQ-2213	160 to 65535
DAQ-2214	160 to 65535
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

For example:

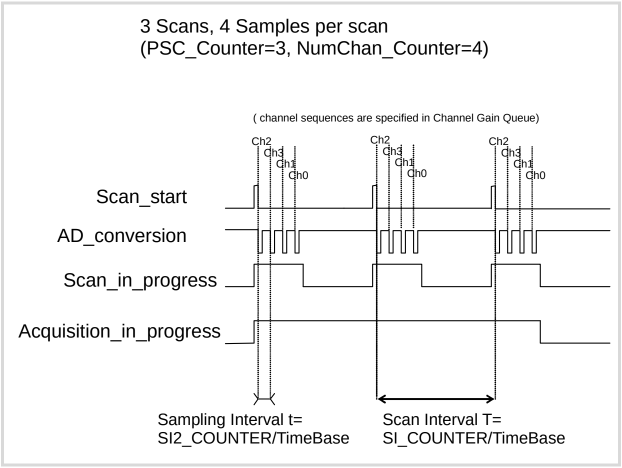


Figure 2-7: Scan Timing (D2K_AI_ContScanChannels)

NOTE The SampIntrv parameter is ignored on simultaneous AD card such as DAQ-2010.

SyncMode	Tells whether this operation is performed synchronously or asynchronously. If pre-/middle trigger mode is enabled by calling D2K_AI_Config(), this operation should be performed asynchronously. Valid values:

`SYNCH_OP`	Synchronous A/D conversion. The function does not return until the A/D operation is completed.
`ASYNCH_OP`	Asynchronous A/D conversion

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidSampleRate
ErrorInvalidAdRange
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
ErrorLastChannelNotZero
ErrorDiffRangeNotSupport
ErrorChannelNotDescending
ErrorChannelNotAscending
```

D2K_AI_ContScanChannelsToFile

Description

This function performs continuous A/D conversions on the specified continuous analog input channels at a rate as close to the rate you specified and saves the acquired data in a disk file. The data is written to disk in binary format, with the lower byte first (little endian). Please refer to Appendix D, Data File Format for the data file structure and Appendix C, AI Data Format for the format of the data in the data file. This function takes advantage of the hardware simultaneous or auto-scan functionality to perform multi-channel analog input.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContScanChannelsToFile (U16
     CardNumber, U16 Channel, U16 BufId, U8
     *FileName, U32 ReadScans, U32 ScanIntrv, U32
     SampIntrv, U16 SyncMode);
```

Visual Basic

```
D2K_AI_ContScanChannelsToFile (ByVal CardNumber
     As Integer, ByVal Channel As Integer, ByVal
     BufId As Integer, ByVal FileName As String,
     ByVal ReadScans As Long, ByVal ScanIntrv As
     Long, ByVal SampIntrv As Long, ByVal
     SyncMode As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Largest channel number of specified continuous analog input channel. The channel order for acquiring data is listed below:

`DAQ-2010`	Channel must be within 0 and 3. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.

`DAQ-2005`	Channel must be within 0 and 3. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2006`	Channel must be within 0 and 3. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2016`	Channel must be within 0 and 3. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2020/22`	Channel must be within 0 and 15. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2204`	Channel must be within 0 and 63. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2205`	Channel must be within 0 and 63. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2206`	Channel must be within 0 and 63. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2208`	Channel must be within 0 and 95. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2213`	Channel must be within 0 and 15. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2214`	Channel must be within 0 and 15. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2501`	Channel must be within 0 and 7. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.
`DAQ-2502`	Channel must be within 0 and 3. The continuous scan sequence is ascending and the first one must be zero. For example, 0, 1, 2, 3.

BufId ID (returned from function D2K_AI_ContBufferSetup) of the buffer containing the acquired data. The size of the buffer with BufId must have a length equal to the value of parameter ScanCount * (number of channels per scan). If double-buffered mode is enabled, the starting buffer id must be 0. You may ignore this argument. Refer to **Appendix C: AI Data Format** for the data format in the buffer with BufId.

ReadScans If double-buffered mode is disabled, this is the total number of scans to be performed. For double-buffered acquisition, ReadScans is the size (in samples) allocated for each channel in the circular buffer. All boards except for DAQ-2020/2022, the range of valid values are form 2 to 16777215. For DAQ-2020/2022, the range of valid values is from 2 to 2147483647. The value must be a multiple of two.

NOTE If Mcounter is enabled, the ReadScans has to be equal to MidOrDlyScans+MCnt.

ScanIntrv The length of the scan interval or the counter value between the initiation of each scan sequence. The scan rate is TimeBase/ScanIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid value is from 1 to 4294967295 for DAQ-2020/2022 or 8 to 16777215 for the others. If the timer base is internal, the range of valid values are:

DAQ-2010	20 to 16777215
DAQ-2005	80 to 16777215
DAQ-2006	160 to 16777215
DAQ-2016	50 to 16777215
DAQ-2020/22	320 to 83886080
DAQ-2204	14 to 16777215
DAQ-2205	80 to 16777215
DAQ-2206	160 to 16777215
DAQ-2208	14 to 16777215
DAQ-2213	160 to 16777215
DAQ-2214	160 to 16777215
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

SampIntrv The length of the sample interval or the counter value between each A/D conversion within a scan sequence. The A/D conversion rate is TimeBase/ SampIntrv. The value of TimeBase depends on the card type.

If the timer base is external, the range of valid values is 8 to 65535. If the timer base is internal, the range of valid values are:

DAQ-2010	Invalid
DAQ-2005	Invalid
DAQ-2006	Invalid
DAQ-2016	Invalid
DAQ-2020/22	Invalid
DAQ-2204	14 to 65535
DAQ-2205	80 to 65535
DAQ-2206	160 to 65535
DAQ-2208	14 to 65535
DAQ-2213	160 to 65535
DAQ-2214	160 to 65535
DAQ-2501	100 to 16777215
DAQ-2502	100 to 16777215

For example:

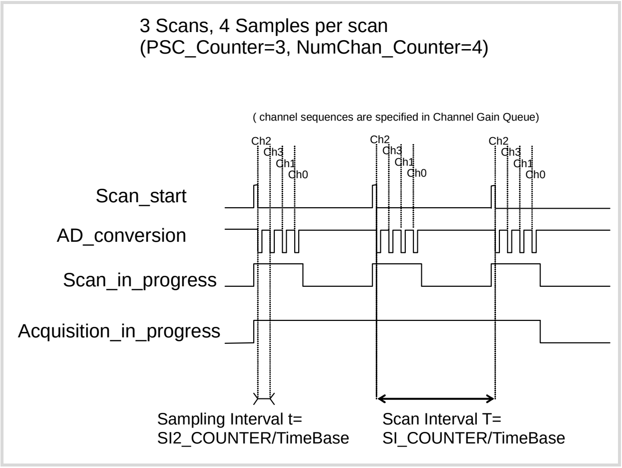


Figure 2-8: Scan Timing (D2K_AI_ContScanChannelsToFile)

NOTE The SampIntrv parameter is ignored on simultaneous AD card such as DAQ-2010.

SyncMode Tells whether this operation is performed synchronously or asynchronously. If pre-/middle trigger mode is enabled by calling D2K_AI_Config(), this operation should be performed asynchronously. Valid values:

`SYNCH_OP`	Synchronous A/D conversion. The function does not return until the A/D operation is completed.
`ASYNCH_OP`	Asynchronous A/D conversion

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidSampleRate
ErrorInvalidAdRange
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
ErrorLastChannelNotZero
ErrorDiffRangeNotSupport
ErrorChannelNotDescending
ErrorChannelNotAscending
```

D2K_AI_ContStatus

Description

While performing continuous A/D conversions, this function is called to get the A/D status. Refer to the documentation that came with your device for the AI status the device may meet.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContStatus (U16 CardNumber, U16
     *Status)
```

Visual Basic

```
D2K_AI_ContStatus (ByVal CardNumber As Integer,
     Status As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Status	The returned continuous AI status. The description of this parameter for various card types include:

DAQ-2010, DAQ-2005, DAQ-2006, DAQ-2016, DAQ-2204, DAQ-2205, DAQ-2206, DAQ-2208, DAQ-2213, DAQ-2214	bit 0: 1 indicates that the A/D FIFO is empty. bit 1: 1 indicates that the A/D FIFO is half-full. bit 2: 1 indicates that the A/D FIFO is full. bit 3: Not used bit 4: 1 indicates the A/D overspeed status. bit 5: 1 indicates the A/D overrun status. bit 6: 1 indicates the A/D trigger status. bit 7: 1 indicates the scan counter terminal count status. bit 8 ~ 15: Not used

DAQ-2020, DAQ-2022	bit 1: 1 indicates that the DMA FIFO is empty.
	bit 2: 1 indicates that the A/D FIFO is almost empty.
	bit 3: 1 indicates that the A/D FIFO is almost full.
	bit 4: 1 indicates that the A/D FIFO is full.
	bit 5-7: not used.
	bit 8: 1 indicates data acquisition is in-progress.
	bit 9: 1 indicates data acquisition is done.
	bit 10 ~ 15: Not used.
DAQ-2501, DAQ-2502	bit 0: 1 indicates that the A/D FIFO is empty.
	bit 1: 1 indicates that the A/D FIFO is half-full.
	bit 2: 1 indicates that the A/D FIFO is full.
	bit 3: 1 indicates that the A/D FIFO is almost empty.
	bit 4: 1 indicates that the A/D FIFO is almost full.
	bit 5: 1 indicates the A/D trigger status.
	bit 6: 1 indicates the A/D programming status.
	bit 7 ~ 15: Not used

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
```

D2K_AI_ContVScale

Description

Converts the values of an array of acquired binary data from a continuous A/D conversion call to actual input voltages. The acquired binary data in the reading array may include the channel information (refer to D2K_AI_ContReadChannel or D2K_AI_ContScanChannels for the detailed data format). However, the calculated voltage values in the voltage array returned does not include the channel message.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ContVScale (U16 CardNumber, U16
     AdRange, void *readingArray, F64
     *voltageArray, I32 count)
```

Visual Basic

```
D2K_AI_ContVScale  (ByVal CardNumber As Integer,
     ByVal AdRange As Integer, readingArray As
     Integer, voltageArray As Double, ByVal count
     As Long) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
AdRange	Analog input range and the setting of the continuous specified channel. Refer to **Appendix B: AI Range Codes** for the range of valid values.
readingArray	Acquired continuous analog input data array.
voltageArray	Computed voltages array returned.
count	Number of converted data.

Return Code

```
NoError, ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidAdRange
```

D2K_AI_DelayTrig_Config
D2K_AI_DelayTrig_ConfigEx

Description

Informs the D2K-DASK library of the conversion clock source and trigger properties of the device performing a delay triggered data acquisition operation.

The D2K_AI_DelayTrig_ConfigEx function is used for the devices (e.g. DAQ-2020/2022) which counters width are 32-bit long.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_DelayTrig_Config (U16 CardNumber, U16
     ClkSrc, U32 TrigSrcCtrl, U32 DlyScans, U16
     ReTrgEn, U16 ReTrgCnt, BOOLEAN AutoResetBuf)
I16 D2K_AI_DelayTrig_ConfigEx (U16 CardNumber,
     U16 ClkSrc, U32 TrigSrcCtrl, U32 DlyScans,
     U16 ReTrgEn, U32 ReTrgCnt, BOOLEAN
     AutoResetBuf)
```

Visual Basic

```
D2K_AI_DelayTrig_Config (ByVal CardNumber As
     Integer, ByVal ClkSrc As Integer, ByVal
     TrigSrcCtrl As Integer, ByVal DlyScans As
     Long, ByVal ReTrgEn As Integer, ByVal
     ReTrgCnt As Integer, ByVal AutoResetBuf As
     Byte) As Integer
D2K_AI_DelayTrig_ConfigEx (ByVal CardNumber As
     Integer, ByVal ClkSrc As Integer, ByVal
     TrigSrcCtrl As Long, ByVal DlyScans As Long,
     ByVal ReTrgEn As Integer, ByVal ReTrgCnt As
     Long, ByVal AutoResetBuf As Byte) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
ClkSrc	A/D clock source settings. This argument is an integer expression formed from one or more of the

manifest constants defined in D2KDASK.H. There are two groups of constants:

A/D Conversion Source Selection

`DAQ2K_AI_ADCONVSRC_Int`	Internal timer (default)
`DAQ2K_AI_ADCONVSRC_AFI0`	From AFI0 pin
`DAQ2K_AI_ADCONVSRC_SSI`	From SSI source
`DAQ2K_AI_ADCONVSRC_AFI1`	From AFI1 pin (available only on DAQ-2501/2502)
`DAQ2K_AI_ADCONVSRC_AFI2`	From AFI2 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI3`	From AFI3 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI4`	From AFI4 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI5`	From AFI5 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI6`	From AFI6 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI7`	From AFI7 pin (DAQ-2020/ 2022 only)

A/D Delay Counter Source Selection
(available only for DAQ-2501/2502)

`DAQ2K_AI_DTSRC_Int`	Internal timer (default)
`DAQ2K_AI_DTSRC_AFI1`	From AFI1 pin
`DAQ2K_AI_DTSRC_GPTC0`	From GPTC0_OUT
`DAQ2K_AI_DTSRC_GPTC1`	From GPTC1_OUT

When two or more constants are used to form the ClkSrc argument, the constants are combined with the bitwise-OR operator(|).

TrigSrcCtrl A/D trigger source control setting. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are three groups of constants:

Trigger Source Selection

`DAQ2K_AI_TRGSRC_SOFT`	Software (Default)
`DAQ2K_AI_TRGSRC_ANA`	From analog trigger pin

`DAQ2K_AI_TRGSRC_ExtD`	From external digital trigger pin
`DAQ2K_AI_TRSRC_SSI`	From SSI source
`DAQ2K_AI_TRGSRC_AFI0`	From AFI0 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI1`	From AFI1 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI2`	From AFI2 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI3`	From AFI3 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI4`	From AFI4 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI5`	From AFI5 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI6`	From AFI6 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI7`	From AFI7 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_PXIStar`	PXI Star Trigger as the trigger source (available only for DAQ-2020/2022)
`DAQ2K_AI_TRGSRC_SMB`	From SMB Trigger IO Connector (available only for DAQ-2020/2022)

Delay Source Selection

`DAQ2K_AI_Dly1InSamples`	Delay in samples (not available for DAQ-2020/2022)
`DAQ2K_AI_Dly1InTimebase`	Delay in timebase (Default)

External Digital Trigger Polarity

`DAQ2K_AI_TrgPositive`	Trigger positive edge active (Default)
`DAQ2K_AI_TrgNegative`	Trigger negative edge active

When two or more constants are used to form the TrigSrcCtrl argument, the constants are combined with the bitwise-OR operator(|).

DlyScans The number of data or timer ticks to be ignored after a specific trigger event. For D2K_AI_DelayTrig_Config, the valid range of value is 0 to 65535. For the DAQ-2020/2022, using the function D2K_AI_DelayTrig_ConfigEx, the valid value range of DlyScans for delay trigger is 0 to 4294967295.

ReTrgEn

`0`	Re-trigger in an acquisition is disabled. (Default)
`1`	Re-trigger in an acquisition is enabled.

ReTrgCnt The accepted trigger times in an acquisition. If the value of ReTrgCnt is 0, the AI operation is triggered infinitely. For D2K_AI_DelayTrig_Config, the valid range of value is 0 to 65535. For the DAQ-2020/2022, using the function D2K_AI_DelayTrig_ConfigEx, the valid value range of ReTrgCnt is 0 to 4294967295.

NOTE To enable infinite re-trigger mode for continuous AI, call D2K_AI_DelayTrig_Config, then assign 1 to ReTrgEn and 0 to ReTrgCnt.

AutoResetBuf

`FALSE`	The AI buffers set by the D2K_AI_ContBufferSetup function are retained and D2K_AI_ContBufferReset must be called to reset the buffer.
`TRUE`	The AI buffers set by the D2K_AI_ContBufferSetup function are reset automatically by the driver when AI operation is finished.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_EventCallBack

Description

Controls and notifies the user's application when a specified DAQ event occurs. The notification is performed through a user-specified callback function.

In Linux, the event message has to be manually removed by setting **mode** to 0. In Windows, the event message is removed automatically after calling D2K_AI_Async_Clear. The event message may also be manually removed by setting **mode** to 0.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++ and Borland C++

```
I16 D2K_AI_EventCallBack (U16 CardNumber, I16
     mode, I16 EventType, U32 callbackAddr)
```

Linux C++

```
I16 D2K_AI_EventCallBack (U16 CardNumber, I16
     mode, I16 EventType, void
     (*callbackAddr)(int))
```

Visual Basic

```
D2K_AI_EventCallBack (ByVal CardNumber As
     Integer, ByVal mode As Integer, ByVal
     EventType As Integer, ByVal callbackAddr As
     Long) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
mode	Adds or removes the event message. Valid values:

`0`	Remove
`1`	Add

EventType	Event criteria. Valid values:

`DAQEnd`	Notifies that the asynchronous analog input operation is completed.
`DBEvent`	Notifies that the next half buffer of data in the circular buffer is ready for transfer.
`TrigEvent`	Notifies that the data associated to the next trigger signal is available.

callbackAddr	Address of the user callback function. D2K-DASK calls this function when the specified event occurs. If you want to remove the event message, set callbackAddr to 0.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_InitialMemoryAllocated

Description

This function returns the available memory size for analog input in the device driver in argument MemSize. The continuous analog input transfer size can not exceed this size.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_InitialMemoryAllocated (U16
     CardNumber, U32 *MemSize)
```

Visual Basic

```
D2K_AI_InitialMemoryAllocated (ByVal CardNumber
     As Integer, MemSize As Long) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
MemSize	Available memory size in the device driver of the card for continuous AI. The unit is in KB (1024 bytes).

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
```

D2K_AI_MiddleTrig_Config D2K_AI_MiddleTrig_ConfigEx

Description

Informs the D2K-DASK library of the conversion clock source and trigger properties of the device performing a middle triggered data acquisition operation.

The D2K_AI_MiddleTrig_ConfigEx function is used for the devices (e.g. DAQ-2020/2022) which counters width are 32-bit long.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16  D2K_AI_MiddleTrig_Config (U16 CardNumber,
     U16 ClkSrc, U32 TrigSrcCtrl, U32
     MiddleScans, U16 MCtrEn, U16 MCnt, BOOLEAN
     AutoResetBuf)
I16  D2K_AI_MiddleTrig_ConfigEx (U16 CardNumber,
     U16 ClkSrc, U32 TrigSrcCtrl, U32
     MiddleScans, U16 MCtrEn, U32 MCnt, BOOLEAN
     AutoResetBuf)
```

Visual Basic

```
D2K_AI_MiddleTrig_Config (ByVal CardNumber As
     Integer, ByVal ClkSrc As Integer, ByVal
     TrigSrcCtrl As Integer, ByVal MiddleScans As
     Long, ByVal MCtrEn As Integer, ByVal MCnt As
     Integer, ByVal AutoResetBuf As Byte) As
     Integer
D2K_AI_MiddleTrig_Config (ByVal CardNumber As
     Integer, ByVal ClkSrc As Integer, ByVal
     TrigSrcCtrl As Long, ByVal MiddleScans As
     Long, ByVal MCtrEn As Integer, ByVal MCnt As
     Long, ByVal AutoResetBuf As Byte) As Integer
```

Parameter

CardNumber	ID of the card performing the operation.

ClkSrc A/D clock source settings. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H.

A/D Conversion Source Selection

`DAQ2K_AI_ADCONVSRC_Int`	Internal timer (default)
`DAQ2K_AI_ADCONVSRC_AFI0`	From AFI0 pin
`DAQ2K_AI_ADCONVSRC_SSI`	From SSI source
`DAQ2K_AI_ADCONVSRC_AFI2`	From AFI2 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI3`	From AFI3 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI4`	From AFI4 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI5`	From AFI5 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI6`	From AFI6 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI7`	From AFI7 pin (DAQ-2020/ 2022 only)

TrigSrcCtrl A/D trigger source control setting. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are two groups of constants:

Trigger Source Selection

`DAQ2K_AI_TRGSRC_SOFT`	Software (Default)
`DAQ2K_AI_TRGSRC_ANA`	From analog trigger pin
`DAQ2K_AI_TRGSRC_ExtD`	From external digital trigger pin
`DAQ2K_AI_TRSRC_SSI`	From SSI source
`DAQ2K_AI_TRGSRC_AFI0`	From AFI0 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI1`	From AFI1 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI2`	From AFI2 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI3`	From AFI3 pin (DAQ-2020/ 2022 only)

`DAQ2K_AI_TRGSRC_AFI4`	From AFI4 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI5`	From AFI5 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI6`	From AFI6 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI7`	From AFI7 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_PXIStar`	PXI Star Trigger as the trigger source (available only for DAQ-2020/2022)
`DAQ2K_AI_TRGSRC_SMB`	From SMB Trigger IO Connector (available only for DAQ-2020/2022)

External Digital Trigger Polarity

`DAQ2K_AI_TrgPositive`	Trigger positive edge active (Default)
`DAQ2K_AI_TrgNegative`	Trigger negative edge active

When two or more constants are used to form the TrigSrcCtrl argument, the constants are combined with the bitwise-OR operator(|).

MiddleScans The number of data accessed after a specific trigger event. For cards except the DAQ-2020/2022, the range of valid value is 0 to 16777215. For DAQ-2020/ 2022, the range of valid values is from 0 to 2147483647.

MCtrEn

`0`	Mcounter is disabled. (Default)
`1`	Mcounter is enabled and the trigger signal is ignored before M terminal count is reached.

MCnt Counter value of Mcounter. For D2K_AI_MiddleTrig_Config, the range of valid value is 0 to 65535. For DAQ-2020/2022, using the function D2K_AI_MiddleTrigConfigEx, the valid value range of MCnt is 0 to 4294967295.

AutoResetBuf

FALSE	The AI buffers set by the D2K_AI_ContBufferSetup function are retained and D2K_AI_ContBufferReset must be called to reset the buffer.
TRUE	The AI buffers set by the D2K_AI_ContBufferSetup function are reset automatically by the driver when AI operation is finished.

NOTE If Mcounter is enabled, the ReadScans parameter of continuous AI functions D2K_AI_ContXXXX has to be equal with MiddleScans+MCnt.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_MuxScanSetup

Description

Stores numChans, chans, and gain_refGnd in the Channel-Gain Queue for a scanned data acquisition operation. This function uses the memory table during the following scanning operations:

```
D2K_AI_ReadMuxScan
D2K_AI_ContMuxScan
D2K_AI_ContMuxScanToFile
```

and automatically sequence through an arbitrary set of analog input channels to allow gains to automatically change during scanning. This function is available only for multiplexed AD cards. The channel-gain queue is modified after calls to any AI functions other than those mentioned above.

Supported Cards

2204, 2205, 2206, 2208, 2213, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_MuxScanSetup (U16 CardNumber, U16
     NumChans, U16* Chans, U16* AdRange_RefGnds);
```

Visual Basic

```
D2K_AI_ MuxScanSetup (ByVal CardNumber As
     Integer, ByVal NumChans As Integer, Chans As
     Integer, AdRange_RefGnds As Integer) As
     Integer
```

Parameters

CardNumber ID of the card performing the operation.

NumChans Number of analog input channels in the array Chans. The valid value:

DAQ-2204	1 through 512
DAQ-2205	1 through 512
DAQ-2206	1 through 512
DAQ-2208	1 through 1024
DAQ-2213	1 through 512
DAQ-2214	1 through 512

Chans Array of analog input channel numbers.

DAQ-2204	Chans must be within 0 and 63.
DAQ-2205	Chans must be within 0 and 63.
DAQ-2206	Chans must be within 0 and 63.
DAQ-2208	Chans must be within 0 and 95.
DAQ-2213	Chans must be within 0 and 15.
DAQ-2214	Chans must be within 0 and 15.

AdRange_RefGnds

An integer array of length numChans that contains the analog input range and reference ground for every channel in array Chans. Refer to D2K_AI_CH_Config section for AdRange_RefGnd setting for each channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidAdRange
```

D2K_AI_PostTrig_Config
D2K_AI_PostTrig_ConfigEx

Description

Informs the D2K-DASK library of the conversion clock source and trigger properties of the device performing a post triggered data acquisition operation.

The D2K_AI_PostTrig_ConfigEx function is used for the devices (e.g. DAQ-2020/2022) which counters width are 32-bit long.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_PostTrig_Config (U16 CardNumber, U16
     ClkSrc, U32 TrigSrcCtrl, U16 ReTrgEn, U16
     ReTrgCnt, BOOLEAN AutoResetBuf)
I16 D2K_AI_PostTrig_ConfigEx (U16 CardNumber, U16
     ClkSrc, U32 TrigSrcCtrl, U16 ReTrgEn, U32
     ReTrgCnt, BOOLEAN AutoResetBuf)
```

Visual Basic

```
D2K_AI_PostTrig_Config (ByVal CardNumber As
     Integer, ByVal ClkSrc As Integer, ByVal
     TrigSrcCtrl As Integer, ByVal ReTrgEn As
     Integer, ByVal ReTrgCnt As Integer, ByVal
     AutoResetBuf As Byte) As Integer
D2K_AI_PostTrig_ConfigEx (ByVal CardNumber As
     Integer, ByVal ClkSrc As Integer, ByVal
     TrigSrcCtrl As Long, ByVal ReTrgEn As
     Integer, ByVal ReTrgCnt As Long, ByVal
     AutoResetBuf As Byte) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.

ClkSrc A/D clock source settings. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H.

A/D Conversion Source Selection

`DAQ2K_AI_ADCONVSRC_Int`	Internal timer (default)
`DAQ2K_AI_ADCONVSRC_AFI0`	From AFI0 pin
`DAQ2K_AI_ADCONVSRC_SSI`	From SSI source
`DAQ2K_AI_ADCONVSRC_AFI1`	From AFI1 pin (available only on DAQ-2501/2502)
`DAQ2K_AI_ADCONVSRC_AFI2`	From AFI2 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI3`	From AFI3 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI4`	From AFI4 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI5`	From AFI5 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI6`	From AFI6 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_ADCONVSRC_AFI7`	From AFI7 pin (DAQ-2020/ 2022 only)

TrigSrcCtrl A/D trigger source control setting. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are two groups of constants:

Trigger Source Selection

`DAQ2K_AI_TRGSRC_SOFT`	Software (Default)
`DAQ2K_AI_TRGSRC_ANA`	From analog trigger pin
`DAQ2K_AI_TRGSRC_ExtD`	From external digital trigger pin
`DAQ2K_AI_TRSRC_SSI`	From SSI source
`DAQ2K_AI_TRGSRC_AFI0`	From AFI0 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI1`	From AFI1 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI2`	From AFI2 pin (DAQ-2020/ 2022 only)

`DAQ2K_AI_TRGSRC_AFI3`	From AFI3 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI4`	From AFI4 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI5`	From AFI5 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI6`	From AFI6 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_AFI7`	From AFI7 pin (DAQ-2020/ 2022 only)
`DAQ2K_AI_TRGSRC_PXIStar`	PXI Star Trigger as the trigger source (available only for DAQ-2020/2022)
`DAQ2K_AI_TRGSRC_SMB`	From SMB Trigger IO Connector (available only for DAQ-2020/2022)

External Digital Trigger Polarity

`DAQ2K_AI_TrgPositive`	Trigger positive edge active (Default)
`DAQ2K_AI_TrgNegative`	Trigger negative edge active

When two or more constants are used to form the TrigSrcCtrl argument, the constants are combined with the bitwise-OR operator(|).

ReTrgEn

`0`	Re-trigger in an acquisition is disabled. (Default)
`1`	Re-trigger in an acquisition is enabled.

ReTrgCnt The accepted trigger times in an acquisition. If the value is 0, the AI operation is triggered infinitely. For D2K_AI_PostTrig_Config, the range of valid value is 0 to 65535. For the DAQ-2020/2022, using the function D2K_AI_PostTrig_ConfigEx, the valid value range of ReTrgCnt is 0 to 4294967295.

NOTE To enable infinite re-trigger mode for continuous AI, call this function, then set the ReTrgEn to 1 and ReTrgCnt to 0.

AutoResetBuf

FALSE	The AI buffers set by the D2K_AI_ContBufferSetup function are retained and D2K_AI_ContBufferReset must be called to reset the buffer.
TRUE	The AI buffers set by the D2K_AI_ContBufferSetup function are reset automatically by the driver when AI operation is finished.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_PreTrig_Config D2K_AI_PreTrig_ConfigEx

Description

Informs the D2K-DASK library of the conversion clock source and trigger properties of the device performing pre-triggered data acquisition operation.

The D2K_AI_PreTrig_ConfigEx function is used for the devices (e.g. DAQ-2020/2022) which counters width are 32-bit long.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16  D2K_AI_PreTrig_Config (U16 CardNumber, U16
     ClkSrc, U32 TrigSrcCtrl, U16 MCtrEn, U16
     MCnt, BOOLEAN AutoResetBuf)
I16 D2K_AI_PreTrig_ConfigEx (U16 CardNumber, U16
     ClkSrc, U32 TrigSrcCtrl, U16 MCtrEn, U32
     MCnt, BOOLEAN AutoResetBuf)
```

Visual Basic

```
D2K_AI_PreTrig_Config (ByVal CardNumber As
     Integer, ByVal ClkSrc As Integer, ByVal
     TrigSrcCtrl As Integer, ByVal MCtrEn As
     Integer, ByVal MCnt As Integer, ByVal
     AutoResetBuf As Byte) As Integer
D2K_AI_PreTrig_ConfigEx (ByVal CardNumber As
     Integer, ByVal ClkSrc As Integer, ByVal
     TrigSrcCtrl As Long, ByVal MCtrEn As
     Integer, ByVal MCnt As Long, ByVal
     AutoResetBuf As Byte) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.

ClkSrc A/D clock source settings. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H.

A/D Conversion Source Selection

`DAQ2K_AI_ADCONVSRC_Int`	Internal timer (default)
`DAQ2K_AI_ADCONVSRC_AFI0`	From AFI0 pin
`DAQ2K_AI_ADCONVSRC_SSI`	From SSI source
`DAQ2K_AI_ADCONVSRC_AFI2`	From AFI2 pin (DAQ-2020/2022 only)
`DAQ2K_AI_ADCONVSRC_AFI3`	From AFI3 pin (DAQ-2020/2022 only)
`DAQ2K_AI_ADCONVSRC_AFI4`	From AFI4 pin (DAQ-2020/2022 only)
`DAQ2K_AI_ADCONVSRC_AFI5`	From AFI5 pin (DAQ-2020/2022 only)
`DAQ2K_AI_ADCONVSRC_AFI6`	From AFI6 pin (DAQ-2020/2022 only)
`DAQ2K_AI_ADCONVSRC_AFI7`	From AFI7 pin (DAQ-2020/2022 only)

TrigSrcCtrl A/D trigger source control setting. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are two groups of constants:

Trigger Source Selection

`DAQ2K_AI_TRGSRC_SOFT`	Software (Default)
`DAQ2K_AI_TRGSRC_ANA`	From analog trigger pin
`DAQ2K_AI_TRGSRC_ExtD`	From external digital trigger pin
`DAQ2K_AI_TRSRC_SSI`	From SSI source
`DAQ2K_AI_TRGSRC_AFI0`	From AFI0 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI1`	From AFI1 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI2`	From AFI2 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI3`	From AFI3 pin (DAQ-2020/2022 only)

`DAQ2K_AI_TRGSRC_AFI4`	From AFI4 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI5`	From AFI5 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI6`	From AFI6 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_AFI7`	From AFI7 pin (DAQ-2020/2022 only)
`DAQ2K_AI_TRGSRC_PXIStar`	PXI Star Trigger as the trigger source (available only for DAQ-2020/2022)
`DAQ2K_AI_TRGSRC_SMB`	From SMB Trigger IO Connector (available only for DAQ-2020/2022)

External Digital Trigger Polarity

`DAQ2K_AI_TrgPositive`	Trigger positive edge active (Default)
`DAQ2K_AI_TrgNegative`	Trigger negative edge active

When two or more constants are used to form the TrigSrcCtrl argument, the constants are combined with the bitwise-OR operator(|).

MCtrEn

`0`	Mcounter is disabled. (Default)
`1`	Mcounter is enabled and the trigger signal is ignored before M terminal count is reached.

MCnt Counter value of Mcounter. For D2K_AI_PreTrig_Config, the range of valid value is 0 to 65535. For the DAQ-2020/2022, using the function D2K_AI_MiddleTrigConfigEx, the valid value range of MCnt is 0 to 4294967295.

AutoResetBuf

`FALSE`	The AI buffers set by the D2K_AI_ContBufferSetup function are retained and D2K_AI_ContBufferReset must be called to reset the buffer.
`TRUE`	The AI buffers set by the D2K_AI_ContBufferSetup function are reset automatically by the driver when AI operation is finished.

NOTE If Mcounter is enabled, the ReadScans parameter of continuous AI functions D2K_AI_ContXXXX has to be equal with MCnt.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AI_ReadChannel

Description

Performs a software triggered A/D conversion (analog input) on an analog input channel and returns the converted value.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ReadChannel (U16 CardNumber, U16
     Channel, U16 *Value)
```

Visual Basic

```
D2K_AI_ReadChannel (ByVal CardNumber As Integer,
     ByVal Channel As Integer, Value As Integer)
     As Integer
```

Parameters

CardNumber ID of the card performing the operation.

Channel Analog input channel number. Range:

DAQ-2010, DAQ-2005, DAQ-2006, DAQ-2016 DAQ-2502	0 to 3
DAQ-2204, DAQ-2205, DAQ-2206	0 to 63
DAQ-2208	0 to 95
DAQ-2213, DAQ-2214, DAQ-2020, DAQ-2022	0 to 15
DAQ-2501	0 to 7

Value The converted A/D value. For the correct data format, refer to the description of the Buffer argument in the D2K_AI_ContReadChannel() function.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

```
ErrorInvalidAdRange
```

D2K_AI_ReadMuxScan

Description

Returns the readings for all analog input channels selected by D2K_AI_MuxScanSetup. This function is available only for multiplexed AD card.

Supported Cards

2204, 2205, 2206, 2208, 2213, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ReadMuxScan (U16 CardNumber, U16
     *Buffer)
```

Visual Basic

```
D2K_AI_ReadMuxScan (ByVal CardNumber As Integer,
     Buffer As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Buffer	An integer array containing the acquired data. Refer to **Appendix C: AI Data Format** for the correct data format.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidAdRange
```

D2K_AI_ScanReadChannels

Description

This function performs software triggered A/D conversions (analog input) on analog input channels and returns the values converted. This function is only available for Multiplexed AD card (e.g. DAQ-2205).

Supported Cards

2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_ScanReadChannels (U16 CardNumber, U16
     NumChans, U16 *Chans, U16 *Buffer)
```

Visual Basic

```
D2K_AI_ScanReadChannels (ByVal CardNumber As
     Integer, ByVal NumChans As Integer, Chans As
     Integer, Buffer As Integer) As Integer
```

Parameters

CardNumber ID of the card performing the operation.

NumChans Number of analog input channels in the array Chans. The valid value:

DAQ-2204	1 to 512
DAQ-2205	1 to 512
DAQ-2206	1 to 512
DAQ-2208	1 to 1024
DAQ-2213	1 to 512
DAQ-2214	1 to 512
DAQ-2501	1 to 8
DAQ-2502	1 to 4

Chans Array of analog input channel numbers.

DAQ-2204	Numbers in Chans must be within 0 and 63.
DAQ-2205	Numbers in Chans must be within 0 and 63.
DAQ-2206	Numbers in Chans must be within 0 and 63.
DAQ-2208	Numbers in Chans must be within 0 and 95.
DAQ-2213	Numbers in Chans must be within 0 and 15.
DAQ-2214	Numbers in Chans must be within 0 and 15.
DAQ-2501	Numbers in Chans must be within 0 and 7.
DAQ-2502	Numbers in Chans must be within 0 and 3.

Buffer An integer array containing the acquired data. The length (in samples) of Buffer must be equal to or greater than the value of numChans. Refer to **Appendix C: AI Data Format** for the correct data format.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidAdRange
```

D2K_AI_SimuReadChannel

Description

Performs a software triggered A/D conversion (analog input) on the analog input channels and returns the converted values. This function is available only for simultaneous AD cards.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_SimuReadChannel (U16 CardNumber, U16
     NumChans, U16 *Chans, U16 *Buffer)
```

Visual Basic

```
D2K_AI_SimuReadChannel (ByVal CardNumber As
     Integer, ByVal NumChans As Integer, Chans As
     Integer, Buffer As Integer) As Integer
```

Parameters

CardNumber ID of the card performing the operation.

NumChans Number of analog input channels in the array Chans. The valid value:

DAQ-2010	1 to 4
DAQ-2005	1 to 4
DAQ-2006	1 to 4
DAQ-2016	1 to 4
DAQ-2020/22	1 to 16

Chans Array of analog input channel numbers.

DAQ-2010	Numbers in Chans must be within 0 and 3.
DAQ-2005	Numbers in Chans must be within 0 and 3.
DAQ-2006	Numbers in Chans must be within 0 and 3.
DAQ-2016	Numbers in Chans must be within 0 and 3.
DAQ-2020/22	Numbers in Chans must be within 0 and 15.

Buffer An integer array containing the acquired data. The length (in samples) of Buffer must be equal to or greater than the value of numChans. Refer to

Appendix C: AI Data Format for the correct data format.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidAdRange
```

D2K_AI_VoltScale

Description

This function converts the result from a D2K_AI_ReadChannel call to the actual input voltage.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_VoltScale (U16 CardNumber, U16
     AdRange, I16 reading, F64 *Voltage)
```

Visual Basic

```
D2K_AI_VoltScale (ByVal CardNumber As Integer,
     ByVal AdRange As Integer, ByVal reading As
     Integer, Voltage As Double) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
AdRange	The analog input range setting for the specified channel. Refer to **Appendix B: AI Range Codes** for the range valid values.
reading	AD conversion result.
Voltage	Computed voltage value.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidAdRange
```

D2K_AI_VReadChannel

Description

This function performs a software triggered A/D conversion (analog input) on an analog input channel and returns the value scaled to a voltage in units of volts.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AI_VReadChannel (U16 CardNumber, U16
     Channel, F64 *Voltage)
```

Visual Basic

```
D2K_AI_VReadChannel (ByVal CardNumber As Integer,
     ByVal Channel As Integer, Voltage As Double)
     As Integer
```

Parameters

CardNumber ID of the card performing the operation.

Channel Analog input channel number. Range:

DAQ-2010, DAQ-2005, DAQ-2006, DAQ-2016 DAQ-2502	0 to 3
DAQ-2204, DAQ-2205, DAQ-2206	0 to 63
DAQ-2208	0 to 95
DAQ-2213, DAQ-2214, DAQ-2020, DAQ-2022	0 to 15
DAQ-2501	0 to 7

Voltage The measured voltage value returned and scaled to units of voltage.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

```
        ErrorInvalidAdRange
```

D2K_AIO_Config

Description

Informs the D2K-DASK library of the timer source and the analog trigger setting of the device with CardNumber ID. You must call this function when using an external timer source or when performing an analog trigger mode of AI/AO.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AIO_Config (U16 CardNumber, U16
     TimerBase, U16 AnaTrigCtrl, U16 H_TrgLevel,
     U16 L_TrgLevel)
```

Visual Basic

```
D2K_AIO_Config (ByVal CardNumber As Integer,
     ByVal TimerBase As Integer, ByVal
     AnaTrigCtrl As Integer, ByVal H_TrgLevel As
     Integer, ByVal L_TrgLevel As Integer) As
     Integer
```

Parameters

CardNumber ID of the card performing the operation.

TimerBase The selected timebase for the device. Valid values:

`DAQ2K_IntTimeBase`	Internal timer as the time base
`DAQ2K_ExtTimeBase`	External timer as the time base (not valid for DAQ-2020/2022)
`DAQ2K_SSITimeBase`	The timer based on the SSI source
`DAQ2K_ExtTimeBase_AFI(n)`	From AFI0 -AFI7 pin, where n is 0 through 7 (available only for DAQ-2020/2022)
`DAQ2K_PXI_CLK`	From PXI Backplane Clock (available only for DAQ-2020/2022)

`DAQ2K_StarTimeBase`	PXI Star Trigger as the timebase (available only for DAQ-2020/2022)
`DAQ2K_SMBTimeBase`	From SMB CLK IN (available only for DAQ-2020/2022)

AnaTrigCtrl Analog trigger control setting. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are two groups of constants:

Trigger Source Selection

DAQ2010, DAQ2005, DAQ2006, DAQ2016

`CH0ATRIG`	AI channel 0
`CH1ATRIG`	AI channel 1
`CH2ATRIG`	AI channel 2
`CH3ATRIG`	AI channel 3
`EXTATRIG`	From external analog trigger pin

DAQ2204, DAQ2205, DAQ2206, DAQ2208, DAQ2213, DAQ2214, DAQ2501, DAQ2502

`ADCATRIG`	The first AI channel in the channel-gain queue
`EXTATRIG`	From external analog trigger pin

Trigger Condition Selection

`Below_Low_level`	Below-Low-Level Triggering
`Above_High_Level`	Above-High-Level Triggering
`Inside_Region`	Inside Region Triggering
`High_Hysteresis`	High Hysteresis Triggering
`Low_Hysteresis`	Low Hysteresis Triggering

When two or more constants are used to form the AnaTrigCtrl argument, the constants are combined with the bitwise-OR operator(|).

H_TrgLevel The high value setting of the trigger level. The range of valid value is 1 to 256. Refer to the device documentation for information on the relationship between the value of TrgLevel and trigger voltage.

L_TrgLevel The low value setting of the trigger level. The range of valid value is 1 to 255. Refer to the device documentation for information on the relationship between the value of TrgLevel and trigger voltage.

For example:

If the trigger voltage is 10 V, the relationship between the value of TrgLevel and trigger voltage is shown in the following table:

Trigger Level digital setting	Trigger voltage
0xFF	9.92V
0xFE	9.84V
—	—
0x81	0.08V
0x80	0
0x7F	-0.08V
—	—
0x02	-9.92V
0x01	-10V

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AO_AsyncCheck

Description

Checks the current status of the asynchronous analog output operation. This function is available only for devices that use timer pacer (DAQ2K_DA_WRSRC_Int) as D/A R/W source.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_AsyncCheck (U16 CardNumber, BOOLEAN
     *Stopped, U32 WriteCnt)
```

Visual Basic

```
D2K_AO_AsyncCheck (ByVal CardNumber As Integer,
     Stopped As Byte, WriteCnt As Long) As
     Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Stopped	Tells whether the asynchronous analog output operation is completed. If Stopped = TRUE, then the analog output operation has stopped after the number of D/A conversions indicated in the call that initiated the asynchronous analog output operation has completed or after an error occurred. If Stopped = FALSE, the operation is not yet completed. Constants TRUE and FALSE are defined in D2KDASK.H.
WriteCnt	Number of analog output data written during the time when D2K_AO_AsyncCheck() is called.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AO_AsyncClear

Description

Stops the asynchronous analog output operation.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_AsyncClear (U16 CardNumber, U32
     *UpdateCnt, U16 stop_mode)
```

Visual Basic

```
D2K_AO_AsyncClear (ByVal CardNumber As Integer,
     UpdateCnt As Long, stop_mode As Integer) As
     Integer
```

Parameters

CardNumber	ID of the card performing asynchronous operation.
UpdateCnt	Number of analog output data that have been written at the time calling D2K_AO_AsyncCheck().
stop_mode	Selected DA transfer termination mode. Valid values:

`DAQ2K_DA_TerminateImmediate`	Software terminates the continuous DA operation immediately
`DAQ2K_DA_TerminateUC`	Software terminates the continuous DA operation on the next counter terminal count update.
`DAQ2K_DA_TerminateIC`	Software terminates the continuous DA operation on iteration count.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AO_AsyncDblBufferHalfReady

Description

Checks whether the next half buffer is ready for new data during an asynchronous double-buffered analog output operation.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_AsyncDblBufferHalfReady (U16
     CardNumber, BOOLEAN *HalfReady)
```

Visual Basic

```
D2K_AO_AsyncDblBufferHalfReady(ByVal CardNumber
     As Integer, HalfReady As Byte) As Integer
```

Parameters

CardNumber	ID of the card performing asynchronous double-buffered operation.
HalfReady	Tells whether the next half buffer is ready for new data.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AO_AsyncDblBufferMode

Description

Enables or disables double-buffered data acquisition mode.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_AsyncDblBufferMode (U16 CardNumber,
     BOOLEAN Enable)
```

Visual Basic

```
D2K_AO_AsyncDblBufferMode (ByVal CardNumber As
     Integer, ByVal Enable As Byte) As Integer
```

Parameters

CardNumber	ID of the card where double-buffered mode is to be set.
Enable	Tells whether the double-buffered mode is enabled or not. Constants TRUE and FALSE are defined in D2KDASK.H.

TRUE	Double-buffered mode is enabled.
FALSE	Double-buffered mode is disabled.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AO_CH_Config

Description

Informs D2K-DASK library of the reference voltage value selected for an analog output channel of DAQ-2000 Deivice. You can configure each channel to use an internal reference of 10V (default) or an external reference (-10V ~ +10V). After the function Register_Card is called, all of the analog output channels are configured as bipolar and internal reference source by default. If you wish to perform the device with the default settings, it is not necessary to call this function to configure the channel(s) again. Otherwise, this function has to be called to program the device for the settings you want before calling function to perform voltage output operation.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_CH_Config (U16 CardNumber, U16
     Channel, U16 OutputPolarity, U16
     IntOrExtRef, F64 refVoltage)
```

Visual Basic

```
D2K_AO_CH_Config  (ByVal CardNumber As Integer,
     ByVal Channel As Integer, ByVal
     OutputPolarity As Integer, ByVal IntOrExtRef
     As Integer, ByVal refVoltage As Double) As
     Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Configured AO channel number.

DAQ-2010	0 to 1 or All_Channels (-1)
DAQ-2005	0 to 1 or All_Channels (-1)
DAQ-2006	0 to 1 or All_Channels (-1)
DAQ-2016	0 to 1 or All_Channels (-1)
DAQ-2204	0 to 1 or All_Channels (-1)
DAQ-2205	0 to 1 or All_Channels (-1)
DAQ-2206	0 to 1 or All_Channels (-1)
DAQ-2214	0 to 1 or All_Channels (-1)
DAQ-2501	0 to 3 or All_Channels (-1)
DAQ-2502	0 to 7 or All_Channels (-1)

OutputPolarity Polarity (unipolar or bipolar) of the output channel. Valid values:

```
DAQ2K_DA_BiPolar
DAQ2K_DA_UniPolar
```

IntOrExtref DA reference voltage source of the output channel. Valid values:

`DAQ2K_DA_Int_REF`	Internal reference
`DAQ2K_DA_Ext_REF`	External reference

refVoltage Voltage reference value. If the device uses an internal D/A reference voltage source, the valid value for refVoltage is 10. If the device uses an external D/A reference voltage source, the range of valid value for refVoltage is -10 to +10.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidDaRefVoltage
```

D2K_AO_Config

Description

Informs the D2K-DASK library of the selected trigger source for the device CardNumber ID. After calling the Register_Card function, the device is configured to the following by default:

D/A R/W source	DAQ2K_DA_WRSRC_Int
D/A trigger mode	DAQ2K_DA_TRGMOD_POST
D/A trigger source	DAQ2K_DA_TRGSRC_SOFT
Auto reset buffer	Enabled (AutoResetBuf : TRUE)

If you want to use the device with the default settings, it is not necessary to call this function to make the configuration again. Otherwise, this function has to be called before calling function to perform continuous analog output operation.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_Config (U16 CardNumber, U16
     ConfigCtrl, U16 TrigCtrl, U16 ReTrgCnt, U16
     DLY1Cnt, U16 DLY2Cnt, BOOLEAN AutoResetBuf)
```

Visual Basic

```
D2K_AO_Config (ByVal CardNumber As Integer, ByVal
     ConfigCtrl As Integer, ByVal TrigCtrl As
     Integer, ByVal ReTrgCnt As Integer, ByVal
     DLY1Cnt As Integer, ByVal DLY2Cnt As
     Integer, ByVal AutoResetBuf As Byte) As
     Integer
```

Parameters

CardNumber	ID of the card performing the operation.
ConfigCtrl	D/A configuration control setting. This argument is an integer expression formed from one or more of the manifest constants defined in D2kDASK.H. There are four group of constants:

D/A R/W Source Selection

`DAQ2K_DA_WRSRC_Int`	Internal timer (Default)
`DAQ2K_DA_WRSRC_AFI0`	From AFI0 pin (available only on DAQ-2501/2502)
`DAQ2K_DA_WRSRC_AFI1`	From AFI1 pin (NOT available on DAQ-2501/2502)
`DAQ2K_DA_WRSRC_SSI`	From SSI source

The following constant groups are only available for DAQ-2501 and DAQ-2502

DA group Selection

`DA_Group_A`	DA group A
`DA_Group_B`	DA group B
`DA_Group_AB`	DA group A and group B

D/A Trigger delay Counter Source Selection

`DAQ2K_DA_TDSRC_Int`	Internal timer (Default)
`DAQ2K_DA_TDSRC_AFI0`	From AFI0 pin
`DAQ2K_DA_TDSRC_GPTC0`	From GPTC0_OUT pin
`DAQ2K_DA_TDSRC_GPTC1`	From GPTC1_OUT pin

D/A Break delay Counter Source Selection

`DAQ2K_DA_BDSRC_Int`	Internal timer (Default)
`DAQ2K_DA_BDSRC_AFI0`	From AFI0 pin
`DAQ2K_DA_BDSRC_GPTC0`	From GPTC0_OUT pin
`DAQ2K_DA_BDSRC_GPTC1`	From GPTC1_OUT pin

When two or more constants are used to form the ConfigCtrl argument, the constants are combined with the bitwise-OR operator(|).

TrigCtrl The setting for D/A Trigger control. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are seven groups of constants:

Trigger Source Selection

`DAQ2K_DA_TRGSRC_SOFT`	Software (Default)
`DAQ2K_DA_TRGSRC_ANA`	From analog trigger pin
`DAQ2K_DA_TRGSRC_ExtD`	From external digital trigger pin
`DAQ2K_DA_TRSRC_SSI`	From SSI source

Trigger Mode Selection

`DAQ2K_DA_TRGMOD_POST`	Post Trigger Mode (Default)
`DAQ2K_DA_TRGMOD_DELAY`	Delay Trigger Mode

Re-Trigger Mode Enable
(available only for post and delay trigger modes)

`DAQ2K_DA_ReTrigEn`	Re-trigger in an acquisition is enabled.

Delay2 (Break delay) Mode Enable

`DAQ2K_DA_DLY2En`	Delay2/Break delay (delay between two consecutive waveform generations) in an acquisition is enabled.

Delay1 Source Selection
(only available for delay trigger mode)

`DAQ2K_DA_Dly1InUI`	Delay in samples (not valid for DAQ-2501/2502)
`DAQ2K_DA_Dly1InTimebase`	Delay in time base (Default)

Delay2 Source Selection

`DAQ2K_DA_Dly2InUI`	Delay in samples (not valid for DAQ-2501/2502)
`DAQ2K_DA_Dly2InTimebase`	Delay in time base (Default)

External Digital Trigger Polarity

`DAQ2K_DA_TrgPositive`	Trigger positive edge active (Default)
`DAQ2K_DA_TrgNegative`	Trigger negative edge active

When two or more constants are used to form the TrigCtrl argument, the constants are combined with the bitwise-OR operator(|).

ReTrgCnt	The accepted trigger times in an acquisition. If the value of ReTrgCnt is 0, the fixed pattern generation is triggered infinitely. This argument is valid only for delay trigger and post trigger modes. The range of valid value is 0 to 65535.

NOTE To enable infinite re-trigger mode of fixed pattern generation, call D2K_AO_Config with DAQ2K_DA_ReTrigEn and assign a zero value to ReTrgCnt. To receive notification when the pattern generation associated to the next trigger signal of Group AB is completed, you can assign a callback function to D2K_AO_EventCallBack with DATrigEvent/DATrigEvent_A, DATrigEvent_B, or DATrigEvent_AB of event type.

DLY1Cnt	DLY1 counter value or the delay time to start waveform generation after the trigger signal. This argument is valid only for delay trigger mode. The range of valid value is 0 to 65535.
DLY2Cnt	DLY2 counter value or the delay between two consecutive waveform generations. The range of valid value is 0 to 65535.
AutoResetBuf	For DAQ-2502/2501, this parameter must be set to FALSE.

FALSE	The DA buffer set by the D2K_AO_ContBufferSetup function are retained. The D2K_AO_ContBufferReset fuction must be called to reset the buffer.
TRUE	The DA buffer set by the D2K_AO_ContBufferSetup function are reset automatically by driver when the AI operation is completed.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AO_ContBufferCompose

Description

Fills the data for a specified channel in the buffer for continuous analog output operation. The filled positions of the data in the buffer depend on the device type. Except for DAQ-2501/2502, this function may only be used for multi-channels of continuous analog output (waveform generation) operation.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_ContBufferCompose (U16 CardNumber, U16
     group, U16 Channel, U32 UpdateCount, void
     *ConBuffer, void *Buffer, BOOLEAN fifoload)
```

Visual Basic

```
D2K_AO_ContBufferCompose (ByVal CardNumber As
     Integer, ByVal group As Integer, ByVal
     Channel As Integer, ByVal UpdateCount As
     Long, ConBuffer As Any, Buffer As Any, ByVal
     fifoload As Byte) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
group	Group of analog output channels. Valid values:

DAQ-2010, DAQ-2005, DAQ-2006, DAQ-2016, DAQ-2204, DAQ-2205, DAQ-2206, DAQ-2214	No use
DAQ-2501	DA_Group_A
DAQ-2502	DA_Group_A, DA_Group_B and DA_Group_AB

Channel	Configured AO channel number.

DAQ-2010	0 to 1 or All_Channels (-1)
DAQ-2005	0 to 1 or All_Channels (-1)
DAQ-2006	0 to 1 or All_Channels (-1)
DAQ-2016	0 to 1 or All_Channels (-1)
DAQ-2204	0 to 1 or All_Channels (-1)
DAQ-2205	0 to 1 or All_Channels (-1)
DAQ-2206	0 to 1 or All_Channels (-1)
DAQ-2214	0 to 1 or All_Channels (-1)
DAQ-2501	0 to 3 or All_Channels (-1)
DAQ-2502	0 to 7 or All_Channels (-1)

UpdateCount	Size (in samples) of the specified channel buffer. This is not the size of the buffer for continuous output operation.
ConBuffer	Buffer for continuous output operation.
Buffer	Buffer containing the output data for the specified channel.
fifoload	Allows loading of data into the onborad DA FIFO using the D2K_AO_Group_FIFOLoad function. This parameter is valid only for DAQ-2502.

`0`	Data will not be loaded into DA FIFO.
`1`	Data will be loaded into DA FIFO.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorContIoNotAllowed
```

D2K_AO_ContBufferComposeAll

Description

Organizes the data for each channel and fills them in the buffer for continuous analog output operation. The filled positions of the data in the buffer depends on device type. Except for DAQ-2501/2502, this function may only be used for multi-channels of continuous analog output (waveform generation) operation.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_ContBufferComposeAll (U16 CardNumber,
     U16 group, U32 UpdateCount, void *ConBuffer,
     void *Buffer, BOOLEAN fifoload)
```

Visual Basic

```
D2K_AO_ContBufferCompose (ByVal CardNumber As
     Integer, ByVal group As Integer, ByVal
     UpdateCount As Long, ConBuffer As Any,
     Buffer As Any,  ByVal fifoload As Byte) As
     Integer
```

Parameters

CardNumber ID of the card performing the operation.

group Group of analog output channels. Valid values:

DAQ-2010, DAQ-2005, DAQ-2006, DAQ-2016, DAQ-2204, DAQ-2205, DAQ-2206, DAQ-2214	No use
DAQ-2501	DA_Group_A
DAQ-2502	DA_Group_A, DA_Group_B and DA_Group_AB

UpdateCount Size (in samples) of the specified channel buffer. This is not the size of the buffer for continuous output operation.

ConBuffer Buffer for continuous output operation.

Buffer	Buffer containing the output data for the specified channel.
fifoload	Allows loading of data into the onborad DA FIFO using the D2K_AO_Group_FIFOLoad function. This parameter is valid only for DAQ-2502.

`0`	Data will not be loaded into DA FIFO.
`1`	Data will be loaded into DA FIFO.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
```

D2K_AO_ContBufferReset

Description

Resets all buffers set by the D2K_AO_ContBufferSetup function for continuous analog output. This function must be called if the data buffers will be used.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_ContBufferReset (U16 CardNumber)
```

Visual Basic

```
D2K_AO_ContBufferReset (ByVal CardNumber As
     Integer) As Integer
```

Parameter

CardNumber	ID of the card performing the operation.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
```

D2K_AO_ContBufferSetup

Description

This function set up the buffer for continuous analog output operation. The function has to be called repeatedly to setup all of the data buffers (Except DAQ-2502, the maximum number of buffers is 2. For DAQ-2502, the maximum number of buffers is 4.).

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_ContBufferSetup (U16 CardNumber, void
     *Buffer, U32 WriteCount, U16 *BufferId)
```

Visual Basic

```
D2K_AO_ContBufferSetup (ByVal CardNumber As
     Integer, Buffer As Any, ByVal WriteCount As
     Long, BufferId As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Buffer	Starting address of the memory that contains the output data.
WriteCount	The size (in samples) of the buffer. The value of this parameter must be even.
BufferId	Returns the index of the buffer currently being set up.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
```

D2K_AO_ContStatus

Description

While performing continuous D/A conversions, this function is called to get the D/A status. Please refer to the manual for your device for the AO status the device might meet.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_ContStatus (U16 CardNumber, U16
      *Status)
```

Visual Basic

```
D2K_AO_ContStatus (ByVal CardNumber As Integer,
      Status As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Status	Returned continuous AO status. The description of this parameter for various card types is shown below:

DAQ-2010, DAQ-2005, DAQ-2006, DAQ-2016, DAQ-2204, DAQ-2205, DAQ-2206, DAQ-2214

`bit 0`	1 indicates that the D/A FIFO has underrun.
`bit 1 to 3`	Not used
`bit 4`	1 indicates that the D/A FIFO is empty.
`bit 5`	1 indicates that the D/A FIFO is half-full.
`bit 6`	1 indicates that the D/A FIFO is full
`bit 7 to 15`	Not used

DAQ-2501, DAQ-2502

`bit 0`	1 indicates that the D/A FIFO of group A is not empty.
`bit 1`	Not used
`bit 2`	'1' indicates that the D/A FIFO of group A is not almost full.
`bit 3`	Not used
`bit 4`	1 indicates that the D/A FIFO of group B is not empty.
`bit 5`	Not used
`bit 6`	1 indicates that the D/A FIFO of group B is not almost full.
`bit 7`	Not used
`bit 8 to 15`	Not used

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
```

D2K_AO_ContWriteChannel

Description

Performs continuous D/A conversions on the specified analog output channel at a rate closest to the specified rate.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_ContWriteChannel (U16 CardNumber, U16
     Channel, U16 BufId, U32 UpdateCount, U32
     Iterations, U32 CHUI, U16 definite, U16
     SyncMode)
```

Visual Basic

```
D2K_AO_ContWriteChannel (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     BufId As Integer, ByVal UpdateCount As Long,
     ByVal Iterations As Long, ByVal CHUI As
     Long, ByVal definite As integer, ByVal
     SyncMode As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog output channel number. Range is 0 to 1.
BufId	The buffer ID (returned from function D2K_AO_ContBufferSetup) of the buffer containing the acquired data. The size of the buffer with this parameter as buffer id must have a length (in samples) equal to the value of UpdateCount.
UpdateCount	If double-buffered mode is disabled, this is the total update count for each channel to be performed. For double-buffered acquisition, UpdateCount is the size (in samples) allocated for each channel in the circular buffer and its value must be a multiple of 2.
Iterations	The number of times the data in the buffer outputs to the port. From D2K-DASK version 1.1, a value of

	zero is not allowed. If the DA operation is perform synchronously, this argument must be set to 1.
CHUI	Length of the Channel Update interval (the counter value between the initiation of each update sequence). When the device has an external time base, the range of valid value is 8 to 16777215. If the time base is internal, the range of valid value is 40 to 16777215.
definite	Waveform generation proceeds in definite or indefinite manner. If double-buffered mode is enabled, this parameter is ignored. `0` Indefinite `1` Definite
SyncMode	Tells whether this operation is performed synchronously or asynchronously. If any trigger mode is enabled by calling D2K_AO_Config(), this operation must be performed asynchronously. Valid value is ASYNCH_OP for asynchronous D/A conversion.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidAdRange
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
ErrorInvalidSampleRate
```

D2K_AO_ContWriteMultiChannels

Description

Performs continuous D/A conversions on the specified analog output channels at a rate closest to the specified rate.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_ContWriteMultiChannels (U16
     CardNumber, U16 NumChans, U16 *Chans, U16
     BufId, U32 UpdateCount, U32 Iterations, U32
     CHUI, U16 definite, U16 SyncMode)
```

Visual Basic

```
D2K_AO_ContReadMultiChannels (ByVal CardNumber As
     Integer, ByVal NumChans As Integer, Chans As
     Integer, ByVal BufId As Integer, ByVal
     UpdateCount As Long, ByVal Iterations As
     Long, ByVal CHUI As Long, ByVal definite As
     integer, ByVal SyncMode As Integer) As
     Integer
```

Parameters

CardNumber ID of the card performing the operation.

NumChans Number of analog input channels in the array Chans. Valid value:

DAQ-2010	1 to 2
DAQ-2005	1 to 2
DAQ-2006	1 to 2
DAQ-2016	1 to 2
DAQ-2204	1 to 2
DAQ-2205	1 to 2
DAQ-2206	1 to 2
DAQ-2214	1 to 2

Chans	Array of analog output channel numbers. The channel order for update data is the same as the order you set in Chans.

DAQ-2010	Numbers in Chans must be within 0 and 1.
DAQ-2005	Numbers in Chans must be within 0 and 1.
DAQ-2006	Numbers in Chans must be within 0 and 1.
DAQ-2016	Numbers in Chans must be within 0 and 1.
DAQ-2204	Numbers in Chans must be within 0 and 1.
DAQ-2205	Numbers in Chans must be within 0 and 1.
DAQ-2206	Numbers in Chans must be within 0 and 1.
DAQ-2214	Numbers in Chans must be within 0 and 1.

BufId	ID (returned from function D2K_AO_ContBufferSetup) of the buffer containing the output data. The size of the buffer with BufId must have an equal length with or greater than the value of WriteCount x numChans. The data order in the buffer is in interleaved sequence. The data for channel 0 is stored in Buffer[0], Buffer[2], Buffer[4], and so on. The data for channel 1 is stored in Buffer[1], Buffer[3], Buffer[5], and so on.
UpdateCount	If double-buffered mode is disabled, this is the total update count for each channel to be performed. For double-buffered acquisition, UpdateCount is the size (in samples) allocated for each channel in the circular buffer and its value must be a multiple of 2.
Iterations	The number of times the data in the buffer outputs to the port. From D2K-DASK version 1.1, a value of zero is not allowed. If the DA operation is perform synchronously, this argument must be set to 1.
CHUI	Length of the Channel Update interval (the counter value between the initiation of each update sequence). When the device has an external time base, the range of valid value is 8 to 16777215. If the time base is internal, the range of valid value is 40 to 16777215.

definite	Waveform generation proceeds in definite or indefinite manner. If double-buffered mode is enabled, this parameter is ignored.

`0`	Indefinite
`1`	Definite

SyncMode	Tells whether this operation is performed synchronously or asynchronously. If any trigger mode is enabled by calling D2K_AO_Config(), this operation must be performed asynchronously. Valid value is ASYNCH_OP for asynchronous D/A conversion.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidSampleRate
ErrorInvalidAdRange
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
```

D2K_AO_DelayTrig_Config

Description

Informs the D2K-DASK library of the update clock source and the trigger properties of the device performing delay triggered waveform generation operation.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_DelayTrig_Config (U16 CardNumber, U16
     ClkSrc, U16 TrigSrcCtrl, U16 DLY1Cnt, U16
     DLY2Ctrl, U16 DLY2Cnt, U16 ReTrgEn, U16
     ReTrgCnt, BOOLEAN AutoResetBuf)
```

Visual Basic

```
D2K_AO_DelayTrig_Config (ByVal CardNumber As
     Integer, ByVal ClkSrc As Integer, ByVal
     TrigSrcCtrl As Integer, ByVal DLY1Cnt As
     Integer, ByVal DLY2Ctrl As Integer, ByVal
     DLY2Cnt As Integer, ByVal ReTrgEn As
     Integer, ByVal ReTrgCnt As Integer, ByVal
     AutoResetBuf As Byte) As Integer
```

Parameters

CardNumber ID of the card that performing the operation.

ClkSrc The setting for D/A update clock source. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are four groups of constants:

D/A R/W Source Selection

`DAQ2K_DA_WRSRC_Int`	Internal timer (Default)
`DAQ2K_DA_WRSRC_AFI0`	From AFI0 pin
`DAQ2K_DA_WRSRC_SSI`	From SSI source

The following constant groups are only available for DAQ-2501 and DAQ-2502:

DA group Selection

`DA_Group_A`	DA group A
`DA_Group_B`	DA group B
`DA_Group_AB`	DA group A and group B

D/A Trigger Delay Counter Source Selection

`DAQ2K_DA_TDSRC_Int`	Internal timer (Default)
`DAQ2K_DA_TDSRC_AFI0`	From AFI0 pin
`DAQ2K_DA_TDSRC_GPTC0`	From GPTC0_OUT pin
`DAQ2K_DA_TDSRC_GPTC1`	From GPTC1_OUT pin

D/A Break Delay Counter Source Selection

`DAQ2K_DA_BDSRC_Int`	Internal timer (Default)
`DAQ2K_DA_BDSRC_AFI0`	From AFI0 pin
`DAQ2K_DA_BDSRC_GPTC0`	From GPTC0_OUT pin
`DAQ2K_DA_BDSRC_GPTC1`	From GPTC1_OUT pin

When two or more constants are used to form the ConfigCtrl argument, the constants are combined with the bitwise-OR operator(|).

TrigSrcCtrl The setting for D/A Trigger control. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are three groups of constants:

Trigger Source Selection

`DAQ2K_DA_TRGSRC_SOFT`	Software (Default)
`DAQ2K_DA_TRGSRC_ANA`	From analog trigger pin
`DAQ2K_DA_TRGSRC_ExtD`	From external digital trigger pin
`DAQ2K_DA_TRSRC_SSI`	From SSI source

Delay1 Source Selection

`DAQ2K_DA_Dly1InUI`	Delay in samples (not valid for DAQ-2501/2502)
`DAQ2K_DA_Dly1InTimebase`	Delay in time base (Default)

External Digital Trigger Polarity

`DAQ2K_DA_TrgPositive`	Trigger positive edge active (Default)

`DAQ2K_DA_TrgNegative`	Trigger negative edge active

When two or more constants are used to form the TrigSrcCtrl argument, the constants are combined with the bitwise-OR operator(|).

DLY1Cnt	DLY1 counter value or the delay time to start waveform generation after the trigger signal. This argument is valid only for delay trigger mode. The range of valid value is 0 to 65535.
DLY2Ctrl	D/A trigger control setting. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are two groups of constants:

Delay2 (Break delay) Mode Enable

`DAQ2K_DA_DLY2En`	Delay2/Break delay (delay between two consecutive waveform generations) in an acquisition is enabled.

Delay2 Source Selection

`DAQ2K_DA_Dly2InUI`	Delay in samples (not valid for DAQ-2501/2502)
`DAQ2K_DA_Dly2InTimebase`	Delay in time base (Default)

When two or more constants are used to form the DLY2Ctrl argument, the constants are combined with the bitwise-OR operator(|).

DLY2Cnt	DLY2 counter value or the delay between two consecutive waveform generations. The range of valid value is 0 to 65535.
ReTrgEn	

`0`	Re-trigger in an acquisition is disabled. (Default)
`1`	Re-trigger in an acquisition is enabled.

ReTrgCnt	The accepted trigger times in an acquisition. The range of valid value is 0 to 65535.

AutoResetBuf	For DAQ-2502/2501, this parameter must be set to FALSE.	
	FALSE	The DA buffer set by the D2K_AO_ContBufferSetup function are retained. The D2K_AO_ContBufferReset fuction must be called to reset the buffer.
	TRUE	The DA buffer set by the D2K_AO_ContBufferSetup function are reset automatically by driver when the AI operation is completed.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AO_EventCallBack

Description

Controls and notifies the user's application when a specified DAQ event occurs. The notification is performed through a user-specified callback function.

In Linux, the event message has to be manually removed by setting **mode** to 0. In Windows, the event message is removed automatically by calling D2K_AO_Async_Clear or D2K_AO_Group_WFM_AsyncClear. The event message can also be removed manually by setting **mode** to 0.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++ and Borland C++

```
I16 D2K_AO_EventCallBack (U16 CardNumber, I16
     mode, I16 EventType, U32 callbackAddr)
```

Linux C++

```
I16 D2K_AO_EventCallBack (U16 CardNumber, I16
     mode, I16 EventType, void
     (*callbackAddr)(int))
```

Visual Basic 5

```
D2K_AO_EventCallBack (ByVal CardNumber As
     Integer, ByVal mode As Integer, ByVal
     EventType As Integer, ByVal callbackAddr As
     Long) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
mode	Adds or removes the event message. Valid values:

`0`	Remove
`1`	Add

EventType Event criteria. Valid values:

For DAQ-2005, DAQ-2006, DAQ-2010, DAQ-2016, DAQ-2204, DAQ-2205, DAQ-2206, DAQ-2214:

`DBEvent`	Notifies that the next half buffer of data in the circular buffer is ready for transfer.
`DAQEnd`	Notifies that the asynchronous analog output operation is completed.
`DATrigEvent`	Notifies that the pattern generation associated to the next trigger signal is completed.

For DAQ-2501 and DAQ-2502:

`DBEvent`	Notifies that the next half buffer of data in circular buffer is ready for transfer.
`DAQEnd_A`	Notifies that the asynchronous analog output operation of Group A is completed.
`DAQEnd_B`	Notifies that the asynchronous analog output operation of Group B is completed.
`DAQEnd_AB`	Notifies that the asynchronous analog output operation of Group AB is completed.
`DATrigEvent_A`	Notifies that the pattern generation associated to the next trigger signal of Group A is completed.
`DATrigEvent_B`	Notifies that the pattern generation associated to the next trigger signal of Group B is completed.
`DATrigEvent_AB`	Notifies that the pattern generation associated to the next trigger signal of Group AB is completed.

callbackAddr User callback function address. D2K-DASK calls this function when the specified event occurs. If you want to remove the event message, set callbackAddr to 0.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AO_Group_FIFOLoad

Description

Loads a waveform buffer to the onboard DA FIFOs.

Supported Cards

2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_Group_FIFOLoad (U16 CardNumber, U16
     group, U16 BufId, U32 UpdateCount)
```

Visual Basic

```
D2K_AO_Group_FIFOLoad (ByVal CardNumber As
     Integer, ByVal group As Integer, ByVal BufId
     As Integer, ByVal UpdateCount As Long) As
     Integer
```

Parameters

CardNumber ID of the card performing the operation.

group Group of analog output channels. Valid value:

DAQ-2501	DA_Group_A
DAQ-2502	DA_Group_A. DA_Group_B and DA_Group_AB

BufId The buffer ID (returned from function D2K_AO_ContBufferSetup) of the buffer containing the output data. The size of the buffer with id with this parameter must have a length equal with or smaller than the size of the onboard FIFOs.

DAQ-2502

DA_Group_A	8K samples
DA_Group_B	8K samples
DA_Group_AB	16K samples

DAQ-2501

DA_Group_A	8K samples

The sequence of the data in the buffer is the same as the sequence of the channels in the specified group. For example:

DA_Group_A: channel 0, 1 enabled

DA_Group_B: channel 4, 5 enabled, and group loaded is DA_Group_AB, then

the data for channel 0 is in Buffer[0], Buffer[4], Buffer[8], ...

the data for channel 1 is in Buffer[1], Buffer[5], Buffer[9], ...

the data for channel 4 is in Buffer[2], Buffer[6], Buffer[10], ...

the data for channel 5 is in Buffer[3], Buffer[7], Buffer[11], ...

The range of valid data is within 0 to 4095.

UpdateCount Count of data loaded to the FIFOs.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_AO_Group_Setup

Description

Assigns one or more analog output channels to a waveform generation group.

Supported Cards

2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_Group_Setup (U16 CardNumber, U16
     group, U16 NumChans, U16 *Chans)
```

Visual Basic

```
D2K_AO_Group_Setup (ByVal CardNumber As Integer,
     ByVal group As Integer, ByVal NumChans As
     Integer, Chans As Integer) As Integer
```

Parameters

CardNumber ID of the card performing the operation.

NumChans The number of analog output channels in the array Chans. Valid value:

DAQ-2501	1 through 4
DAQ-2502	1 through 8

group The group of analog output channels. The valid value:

DAQ-2501	DA_Group_A
DAQ-2502	DA_Group_A, DA_Group_B and DA_Group_AB

Chans Array of analog output channel numbers. The channel order for update data is the same as the order you set in Chans.

DAQ-2501	Numbers in Chans must be within 0 and 3.
DAQ-2502	Numbers in Chans must be:
	DA_Group_A: 0 to 3
	DA_Group_B: 4 to 7
	DA_Group_AB: 0 to 7

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_AO_Group_Update

Description

Simultaneously writes binary values to the specified group of analog output channels.

Supported Cards

2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_Group_Update (U16 CardNumber,  U16
     group, I16 *Buffer)
```

Visual Basic

```
D2K_AO_Group_Update (ByVal CardNumber As Integer,
     ByVal group As Integer, Buffer As Integer)
     As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
group	The group of analog output channels. The valid value:

DAQ-2501	DA_Group_A
DAQ-2502	DA_Group_A, DA_Group_B and DA_Group_AB

Buffer	An integer array that contains the updated data. The length (in samples) of Buffer must be equal to or greater than the total number of channels in the specified DA group. The range of value to be written to the analog output channels is 0 to 4095.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_AO_Group_VUpdate

Description

Accepts voltage values, scales them to the proper binary values and Writes binary values to the specified group of analog output channels simultaneously.

Supported Cards

2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_Group_VUpdate (U16 CardNumber,  U16
     group, F64 *Voltage)
```

Visual Basic

```
D2K_AO_Group_VUpdate (ByVal CardNumber As
     Integer, ByVal group As Integer, Voltage As
     Double) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
group	The group of analog output channels. The valid value:
	DAQ-2501 DA_Group_A
	DAQ-2502 DA_Group_A, DA_Group_B and DA_Group_AB
Voltage	A floating-point voltage value array to contain the update data. The length (in samples) of Voltage must be equal to or greater than the total number of channels in the specified DA group. The range of voltages depends on the device, the output polarity, and the voltage reference (external or internal).

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_AO_Group_WFM_AsyncCheck

Description

Check the current status of the asynchronous analog output operation of a specified group. This function is only available for the device that uses timer pacer (DAQ2K_DA_WRSRC_Int) as the D/A R/W Source.

Supported Cards

2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_Group_WFM_AsyncCheck (U16 CardNumber,
     U16 group, U8 *Stopped, U32 *WriteCnt)
```

Visual Basic

```
D2K_AO_Group_WFM_AsyncCheck (ByVal CardNumber As
     Integer, ByVal group As Integer, Stopped As
     Byte, WriteCnt As Long) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
group	The group of analog output channels. The valid value:

DAQ-2501	DA_Group_A
DAQ-2502	DA_Group_A, DA_Group_B and DA_Group_AB

Stopped Tells whether the asynchronous analog output operation has completed.

DA_Group_A and DA_Group_B	If Stopped = 1, the analog output operation has stopped after the number of D/A conversions indicated in the call that initiated the asynchronous analog output operation is completed or an error has occurred. If Stopped = 0, the operation is not yet complete.
DA_Group_AB Bit0: Asynchronous analog output operation of group A. Bit1: Asynchronous analog output operation of group B.	If Stopped = 3, the analog output operation has stopped for both DA group A and group B. If Stopped = 1, the analog output operation has stopped for DA group A. If Stopped = 2, the analog output operation has stopped for DA group B. If Stopped = 0, the operation is not yet complete for both DA group A and group B.

WriteCnt The number of analog output data written at the time D2K_AO_Group_WFM_AsyncCheck () function is called.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AO_Group_WFM_AsyncClear

Description

The software terminates the asynchronous analog output operation of a specified group.

Supported Cards

2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_Group_WFM_AsyncClear (U16 CardNumber,
     U16 group, U32 *WriteCnt, U16 stop_mode)
```

Visual Basic

```
D2K_AO_Group_WFM_AsyncClear (ByVal CardNumber As
     Integer, ByVal group As Integer, WriteCnt As
     Long, ByVal stop_mode As Integer) As Integer
```

Parameters

CardNumber ID of the card performing the asynchronous operation.

group The group of analog output channels. Valid value:

DAQ-2501	DA_Group_A
DAQ-2502	DA_Group_A, DA_Group_B and DA_Group_AB

WriteCnt Number of analog output data written at the time D2K_AO_Group_WFM_AsyncClear () is called.

stop_mode Selected DA transfer termination mode. Valid values:

`DAQ2K_DA_TerminateImmediate`	Software immediately terminates the continuous DA operation.
`DAQ2K_DA_TerminateUC`	Software terminates the continuous DA operation on next counter terminal count update.
`DAQ2K_DA_TerminateIC`	Software terminates the continuous DA operation on iteration count

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AO_Group_WFM_Start

Description

This function performs continuous D/A conversions on the specified group of analog output channels at a rate as close to the rate you specified.

Supported Cards

2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_Group_WFM_Start (U16 CardNumber, U16
     group, U16 FstBufIdOrNotUsed, U16 sndBufId,
     U32 UpdateCount, U32 Iterations, U32 CHUI,
     U16 definite)
```

Visual Basic

```
D2K_AO_Group_WFM_Start (ByVal CardNumber As
     Integer, ByVal group As Integer, ByVal
     FstBufIdOrNotUsed As Integer, ByVal sndBufId
     As Integer, ByVal UpdateCount As Long, ByVal
     Iterations As Long, ByVal CHUI As Long,
     ByVal definite As Integer) As Integer
```

Parameters

CardNumber ID of the card performing the operation.

group The group of analog output channels. Valid value:

DAQ-2501	DA_Group_A
DAQ-2502	DA_Group_A, DA_Group_B and DA_Group_AB

FstBufIdOrNotUsed

If the data have been loaded by the function D2K_AO_Group_FIFOLoad, the value of fstBufIdOrNotUsed must be BufferNotUsed.

If the value of the parameter fstBufIdOrNotUsed is not BufferNotUsed, or the data has not been loaded, the value of fstBufIdOrNotUsed is the buffer ID (returned from function D2K_AO_ContBufferSetup) of the first buffer containing the output data.

DAQ-2501

The data are transferred to the DA FIFOs from the buffer with fstBufIdOrNotUsed ID through DMA operation. The sequence of the data in the buffer is the same as the sequence of the channels in the group.

For example:

`DA_Group_A`	Channel 0, 1, 2 enabled The data for channel 0 is in Buffer[0], Buffer[4], Buffer[8], and so on. The data for channel 1 is in Buffer[1], Buffer[5], Buffer[9], and so on. The data for channel 2 is in Buffer[2], Buffer[6], Buffer[10], and so on.

DAQ-2502

The data are transferred to the DA FIFOs from the buffer with fstBufIdOrNotUsed ID through 32-bit DMA operation. The upper 16 bits of data are for the FIFO of Group B and the lower 16 bits of data is for the FIFO of Group A.

If the group is DA_Group_A or DA_Group_B, the 16-bit buffer must contain two times the total update samples because of 32-bit DMA data transfer. The data points for the specified group are in the even elements of the buffer.

`DA_Group_A`	Channel 0, 1 enabled The data for channel 0 is in Buffer[0], Buffer[4], Buffer[8], and so on. The data for channel 1 is in Buffer[2], Buffer[6], Buffer[10], and so on.
`DA_Group_B`	Channel 4, 5 enabled The data for channel 4 is in Buffer[1], Buffer[5], Buffer[9], and so on. The data for channel 5 is in Buffer[3], Buffer[7], Buffer[11], and so on.

If the group is DA_Group_AB, the buffer must contain the same sample counts for group A and group B.

	The data for each group is in interleaved sequence. For example: DA_Group_A: Channel 0, 1 enabled DA_Group_B: Channel 4, 5 enabled, and group loaded is DA_Group_AB, then: The data for channel 0 is in Buffer[0], Buffer[4], Buffer[8], and so on. The data for channel 4 is in Buffer[1], Buffer[5], Buffer[9], and so on. The data for channel 1 is in Buffer[2], Buffer[6], Buffer[10], and so on. The data for channel 5 is in Buffer[3], Buffer[7], Buffer[11], and so on.
sndBufId	The buffer ID (returned from function D2K_AO_ContBufferSetup) of the second buffer containing the output data. This parameter is only available for double buffer mode of waveform generation.
UpdateCount	If data has been loaded by the function D2K_AO_Group_FIFOLoad, the parameter of UpdateCount has no function. If the data is transferred though DMA operation and double-buffered mode is disabled, the value of UpdateCount is the total update count for each channel that performs the operation. For double-buffered acquisition, UpdateCount is the size (in samples) allocated for each channel in the circular buffer and its value must be a multiple of 2.
Iterations	The number of times the data in the buffer outputs to the port. From D2K-DASK version 1.1, a value of zero is not allowed.

CHUI	Length of the Channel Update interval (the counter value between the initiation of each update sequence). When the device has an external time base, the range of valid value is 8 to 16777215. If the time base is internal, the range of valid value is 40 to 16777215.
definite	Waveform generation proceeds in definite or indefinite manner. If double-buffered mode is enabled, this parameter is ignored.

`0`	Indefinite
`1`	Definite

NOTES If FIFO mode of waveform generation is enabled, the double-buffered waveform generation is not allowed.

If the group DA_Group_AB is specified, the iterations and scan rate are the same for both groups.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidSampleRate
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
```

D2K_AO_Group_WFM_StopConfig

Description

Informs the D2K-DASK library of the stop source and the stop mode for the asynchronous analog output operation of a specified group.

Supported Cards

2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_Group_WFM_StopConfig (U16 CardNumber,
     U16 group, U16 stopSrc, U16 stopMode)
```

Visual Basic

```
D2K_AO_Group_WFM_StopConfig (ByVal CardNumber As
     Integer, ByVal group As Integer, ByVal
     stopSrc As Integer, ByVal stopMode As
     Integer) As Integer
```

Parameters

CardNumber ID of the card performing the asynchronous operation.

group The group of analog output channels. Valid value:

DAQ-2501	DA_Group_A
DAQ-2502	DA_Group_A, DA_Group_B and DA_Group_AB

stopSrc Selected DA transfer termination source:

`DAQ2K_DA_STOPSRC_SOFT`	Software terminates the continuous DA operation.
`DAQ2K_DA_STOPSRC_AFI0`	Terminates the continuous DA operation from the external signal of AFI0.
`DAQ2K_DA_STOPSRC_ATrig`	Terminates the continuous DA operation from the external signal of the analog trigger.
`DAQ2K_DA_STOPSRC_AFI1`	Terminates the continuous DA operation from the external signal of AFI1.

stop_mode The DA transfer termination mode selected. The valid values are:

`DAQ2K_DA_TerminateImmediate`	Terminates the continuous DA operation immediately.
`DAQ2K_DA_TerminateUC`	Terminates the continuous DA operation on the next counter terminal count update.
`DAQ2K_DA_TerminateIC`	Terminates the continuous DA operation on iteration count.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorInvalidSampleRate
ErrorTransferCountTooLarge
ErrorContIoNotAllowed
```

D2K_AO_InitialMemoryAllocated

Description

Returns the available memory size for analog output in the device driver in the MemSize argument. The continuous analog output transfer size may not exceed this size.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_InitialMemoryAllocated (U16
     CardNumber, U32 *MemSize)
```

Visual Basic

```
D2K_AO_InitialMemoryAllocated (ByVal CardNumber
     As Integer, MemSize As Long) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
MemSize	The available memory size for continuous AO in device driver of this card. The unit is KB (1024 bytes).

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
```

D2K_AO_PostTrig_Config

Description

Informs the D2K-DASK library of the update clock source and the trigger properties of the device performing post triggered waveform generation operation.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_PostTrig_Config (U16 CardNumber, U16
     ClkSrc, U16 TrigSrcCtrl, U16 DLY2Ctrl, U16
     DLY2Cnt, U16 ReTrgEn, U16 ReTrgCnt, BOOLEAN
     AutoResetBuf)
```

Visual Basic

```
D2K_AO_PostTrig_Config (ByVal CardNumber As
     Integer, ByVal ClkSrc As Integer, ByVal
     TrigSrcCtrl As Integer, ByVal DLY2Ctrl As
     Integer, ByVal DLY2Cnt As Integer, ByVal
     ReTrgEn As Integer, ByVal ReTrgCnt As
     Integer, ByVal AutoResetBuf As Byte) As
     Integer
```

Parameters

CardNumber	ID of the card performing the operation.
ClkSrc	D/A update clock source settings. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H.

D/A R/W Source Selection

`DAQ2K_DA_WRSRC_Int`	Internal timer (default)
`DAQ2K_DA_WRSRC_AFI0`	From AFI0 pin
`DAQ2K_DA_WRSRC_SSI`	From SSI source

The following constant groups are only available for DAQ-2501 and DAQ-2502

DA Group Selection

`DA_Group_A`	DA group A
`DA_Group_B`	DA group B
`DA_Group_AB`	DA group A and group B

D/A Break Delay Counter Source Selection

`DAQ2K_DA_BDSRC_Int`	Internal timer (Default)
`DAQ2K_DA_BDSRC_AFI0`	From AFI0 pin
`DAQ2K_DA_BDSRC_GPTC0`	From GPTC0_OUT pin
`DAQ2K_DA_BDSRC_GPTC1`	From GPTC1_OUT pin

When two or more constants are used to form the ConfigCtrl argument, the constants are combined with the bitwise-OR operator(|).

TrigSrcCtrl D/A trigger control setting. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are two groups of constants:

Trigger Source Selection

`DAQ2K_DA_TRGSRC_SOFT`	Software (Default)
`DAQ2K_DA_TRGSRC_ANA`	From analog trigger pin
`DAQ2K_DA_TRGSRC_ExtD`	From external digital trigger pin
`DAQ2K_DA_TRSRC_SSI`	From SSI source

External Digital Trigger Polarity

`DAQ2K_DA_TrgPositive`	Trigger positive edge active (Default)
`DAQ2K_DA_TrgNegative`	Trigger negative edge active

When two or more constants are used to form the TrigSrcCtrl argument, the constants are combined with the bitwise-OR operator(|).

DLY2Ctrl The setting for D/A Trigger control. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are two groups of constants:

Delay2 (Break delay) Mode Enable

`DAQ2K_DA_DLY2En`	Delay2/Break delay (delay between two consecutive waveform generations) in an acquisition is enabled.

Delay2 Source Selection

`DAQ2K_DA_Dly2InUI`	Delay in samples (not valid for DAQ-2501/2502)
`DAQ2K_DA_Dly2InTimebase`	Delay in time base (default)

When two or more constants are used to form the DLY2Ctrl argument, the constants are combined with the bitwise-OR operator(|).

DLY2Cnt The counter value of DLY2 Counter (the Delay between two consecutive waveform generations). The valid value range is 0 through 65535.

ReTrgEn

`0`	Re-trigger in an acquisition is disabled. (Default)
`1`	Re-trigger in an acquisition is enabled.

ReTrgCnt The accepted trigger times in an acquisition. The range of valid value is 0 to 65535.

AutoResetBuf For DAQ-2502/2501, this parameter must be set to FALSE.

FALSE	The DA buffers set by the D2K_AO_ContBufferSetup function are retained and D2K_AO_ContBufferReset must be called to reset the buffer.
TRUE	The AI buffers set by the D2K_AO_ContBufferSetup function are reset automatically by the driver when AI operation is finished.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_AO_SimuWriteChannel

Description

Simultaneously writes binary values to the specified analog output channels. This function is available only for simultaneous DA cards.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_SimuWriteChannel (U16 CardNumber, U16
     NumChans, U16 *Buffer)
```

Visual Basic

```
D2K_AO_SimuWriteChannel (ByVal CardNumber As
     Integer, ByVal NumChans As Integer, Buffer
     As Integer) As Integer
```

Parameters

CardNumber ID of the card performing the operation.

NumChans Number of analog output channels. Valid value:

DAQ-2010	1 to 2
DAQ-2005	1 to 2
DAQ-2006	1 to 2
DAQ-2016	1 to 2
DAQ-2204	1 to 2
DAQ-2205	1 to 2
DAQ-2206	1 to 2
DAQ-2214	1 to 2

Buffer An integer array to contain the update data. The length (in samples) of Buffer must be equal to or greater the value of parameter numChans. The range of value to be written to the analog output channels is 0 to 4095.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_AO_VoltScale

Description

Scales a voltage (or a current value) to a binary value.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_VoltScale (U16 CardNumber, U16
     Channel, F64 Voltage, I16 *binValue)
```

Visual Basic

```
D2K_AO_VoltScale (ByVal CardNumber As Integer,
     ByVal Channel As Integer, ByVal Voltage As
     Double, binValue As Integer) As Integer
```

Parameters

CardNumber ID of the card performing the operation.

Channel Analog output channel number.

DAQ-2010, DAQ-2005, DAQ-2006, DAQ-2016, DAQ-2205, DAQ-2206, DAQ-2204, DAQ-2214	0 or 1
DAQ-2501	0 to 3
DAQ-2502	0 to 7

Voltage Voltage, in volts, to be converted to a binary value.

binValue Converted binary value returned.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorDaVoltageOutOfRange
```

D2K_AO_VWriteChannel

Description

Accepts a voltage value (or a current value), scales it to the proper binary value, and writes a binary value to the specified analog output channel.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_VWriteChannel (U16 CardNumber, U16
     Channel, F64 Voltage)
```

Visual Basic

```
D2K_AO_VWriteChannel (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Voltage As Double) As Integer
```

Parameters

CardNumber ID of the card performing the operation.

Channel Analog output channel number.

DAQ-2010	0 or 1
DAQ-2005	0 or 1
DAQ-2006	0 or 1
DAQ-2016	0 or 1
DAQ-2204	0 or 1
DAQ-2205	0 or 1
DAQ-2206	0 or 1
DAQ-2214	0 or 1

Voltage The value to be scaled and written to the analog output channel. The range of voltages depends on the device type, output polarity, and voltage reference (external or internal).

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
ErrorDaVoltageOutOfRange
```

D2K_AO_WriteChannel

Description

Writes a binary value to the specified analog output channel.

Supported Cards

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_AO_WriteChannel (U16 CardNumber, U16
     Channel, I16 Value)
```

Visual Basic

```
D2K_AO_WriteChannel (ByVal CardNumber As Integer,
     ByVal Channel As Integer, ByVal Value As
     Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog output channel number. Range is 0 or 1.
Value	The value to be written to the analog output channel. Range is 0 to 4095.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_DB_Auto_Calibration_ALL

Description

Calibrates the device. When this function is called, the device goes into a self-calibration cycle. The function does not return until the self-calibration is completed.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_DB_Auto_Calibration_ALL(U16 CardNumber)
```

Visual Basic

```
D2K_DB_Auto_Calibration_ALL (ByVal CardNumber As
     Integer) As Integer
```

Parameter

CardNumber	ID of the card performing the operation.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_DI_ReadLine

Description

Reads the digital logic state of the specified digital line in the specified port.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_DI_ReadLine (U16 CardNumber, U16 Port,
     U16 Line, U16 *State)
```

Visual Basic

```
D2K_DI_ReadLine (ByVal CardNumber As Integer,
     ByVal Port As Integer, ByVal Line As
     Integer, State As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Port	Digital input port number. Valid values (not valid for DAQ-2020/2022): Channel_P1A, Channel_P1B, Channel_P1C, Channel_P1CL, Channel_P1CH. For DAQ-2020/2022: 0.
Line	The digital line to be read. Valid value is 0 to 7. DAQ-2020/2022: 0 to 3.
State	Returns the digital logic state (0 or 1) of the specified line.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_DI_ReadPort

Description

Reads the digital data from the specified digital input port.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_DI_ReadPort (I16 CardNumber, U16 Port,
     U32 *Value)
```

Visual Basic

```
D2K_DI_ReadPort (ByVal CardNumber As Integer,
     ByVal Port As Integer, Value As Long) As
     Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Port	Digital input port number. Valid values (not valid for DAQ-2020/2022): Channel_P1A, Channel_P1B, Channel_P1C, Channel_P1CL, Channel_P1CH. For DAQ-2020/2022: 0.
Value	Returns the digital data read from the specified port. The returned value is an 8-bit data.

Return Code

```
NoError
CardNotRegistered
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_DIO_LineConfig

Description

Informs D2K-DASK library of the line selected and the direction (Input or output) setting of the selected line.

Cards Support

2020, 2022

Syntax

Microsoft C/C++, Linux C/C++ and Borland C++

```
I16 D2K_DIO_LineConfig (U16 CardNumber, U16 Port,
     U32 Line, U16 Direction)
```

Visual Basic

```
D2K_DIO_LineConfig (ByVal CardNumber As Integer,
     ByVal Port As Integer, ByVal Line As Long,
     ByVal Direction As Integer) As Integer
```

Parameters

CardNumber	The card id of the card that want to perform this operation.
Port	The port selected. The valid value: DAQ-2020/2022: 0
Line	The line selected. The valid value: DAQ-2020/2022: 0 through 3
Direction	The line direction of PIO port. The valid value: INPUT_LINE, OUTPUT_LINE

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_DIO_LinesConfig

Description

Informs D2K-DASK library of the entire lines of the port selected and the direction (Input or output) setting of the entire lines of the selected port.

Cards Support

2020, 2022

Syntax

Microsoft C/C++, Linux C/C++ and Borland C++

```
I16 D2K_DIO_LinesConfig (U16 wCardNumber, U16
     wPort, U32 wLinesdirmap)
```

Visual Basic

```
D2K_DIO_LinesConfig (ByVal CardNumber As Integer,
     ByVal Port As Integer, ByVal Linesdirmap As
     Long) As Integer
```

Parameters

CardNumber	The card id of the card that want to perform this operation.
Port	The port selected. The valid value: DAQ-2020/2022: 0
Linesdirmap	The port direction of PIO port. The valid value: DAQ-2020/2022: Each bit of the value of Linesdirmap controls one line of the port selected. The '1' value of the bit value set the corresponding line to output, and the '0' value of the bit value set the corresponding line to input. The valid values for Linesdirmap: 0 through 15 (0xf)

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_DIO_PortConfig

Description

Informs D2K-DASK library of the port selected and the direction (Input or output) setting of the selected port.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_DIO_PortConfig (U16 CardNumber, U16 Port,
     U16 Direction)
```

Visual Basic

```
D2K_DIO_PortConfig (ByVal CardNumber As Integer,
     ByVal Port As Integer, ByVal Direction As
     Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Port	Digital input port number. Valid values (not valid for DAQ-2020/2022): Channel_P1A, Channel_P1B, Channel_P1C, Channel_P1CL, Channel_P1CH. For DAQ-2020/2022: 0.
Direction	Direction of PIO port. Valid value: INPUT_PORT or OUTPUT_PORT

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_DO_ReadLine

Description

Reads back the digital logic state of the specified digital output line in the specified port.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_DO_ReadLine (U16 CardNumber, U16 Port,
     U16 Line, U16 *State)
```

Visual Basic

```
D2K_DO_ReadLine (ByVal CardNumber As Integer,
     ByVal Port As Integer, ByVal Line As
     Integer, State As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Port	Digital input port number. Valid values (not valid for DAQ-2020/2022): Channel_P1A, Channel_P1B, Channel_P1C, Channel_P1CL, Channel_P1CH. For DAQ-2020/2022: 0.
Line	The digital line to be read. Valid value is 0 to 7.
State	Returns the digital logic state (0 or 1) of the specified line.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_DO_ReadPort

Description

Reads back the output digital data from the specified digital output port.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_DO_ReadPort (U16 CardNumber, U16 Port,
     U32 *Value)
```

Visual Basic

```
D2K_DO_ReadPort (ByVal CardNumber As Integer,
     ByVal Port As Integer, Value As Long) As
     Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Port	Digital input port number. Valid values (not valid for DAQ-2020/2022): Channel_P1A, Channel_P1B, Channel_P1C, Channel_P1CL, Channel_P1CH. For DAQ-2020/2022: 0.
Value	Returns the digital data read from the specified output port. Refer to the D2K_DI_ReadPort function.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_DO_WriteLine

Description

Sets the specified digital output line in the specified digital port to a specified state. This function is only available for cards that support digital output read-back functionality.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_DO_WriteLine (U16 CardNumber, U16 Port,
     U16 Line, U16 State)
```

Visual Basic

```
D2K_DO_WriteLine(ByVal CardNumber As Integer,
     ByVal Port As Integer, ByVal Line As
     Integer, ByVal State As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Port	Digital input port number. Valid values (not valid for DAQ-2020/2022): Channel_P1A, Channel_P1B, Channel_P1C, Channel_P1CL, Channel_P1CH. For DAQ-2020/2022: 0.
Line	The digital line to write to. Refer to the D2K_DI_ReadLine function.
State	The new digital logic state (0 or 1).

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_DO_WritePort

Description

Writes digital data to the specified digital output port.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_DO_WritePort (U16 CardNumber, U16 Port,
     U32 Value)
```

Visual Basic

```
D2K_DO_WritePort (ByVal CardNumber As Integer,
     ByVal Port As Integer, ByVal Value As Long)
     As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Port	Digital output port number. Valid values (not valid for DAQ-2020/2022): Channel_P1A, Channel_P1B, Channel_P1C, Channel_P1CL, Channel_P1CH. For DAQ-2020/2022: 0.
Value	Digital data written to the specified port. The value is an 8-bit data.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_EEPROM_CAL_Constant_Update

Description

Saves the new calibration constants to the specified bank of the EEPROM.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_EEPROM_CAL_Constant_Update(U16
     CardNumber, U16 bank)
```

Visual Basic

```
D2K_EEPROM_CAL_Constant_Update (ByVal wCardNumber
     As Integer, ByVal bank As Integer) As
     Integer
```

Parameters

CardNumber	ID of the card performing the operation.
bank	Storage location on the EEPROM. The range of valid value of the bank is 1 to 2 for DAQ-2020/2022 and 0 to 3 for others.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_GCTR_Control

Description

Controls the selected counter/timer using the software.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16  D2K_GCTR_Control (U16 CardNumber, U16 GCtr,
     U16 ParamID, U16 Value)
```

Visual Basic

```
D2K_GCTR_Control (ByVal CardNumber As Integer,
     ByVal GCtr As Integer, ByVal ParamID As
     Integer, ByVal Value As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
GCtr	Counter number. Range is 0 to 1.
ParamID	The internal parameter ID is the general-purpose timer/counter you want to control. The valid control include:

`GPTC_IntGATE`	Internal gate
`GPTC_IntUpDnCTR`	Internal updown counter
`GPTC_IntENABLE`	Start or stop counter operation

Value	The value of the controlled item specified by ParamID. Valid value for is 0 or 1.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
InvalidCounter
```

D2K_GCTR_Read

Description

Reads the counter value of the general-purpose counter without disturbing the counting process.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_GCTR_Read (U16 CardNumber, U16 GCtr, U32
     *Value)
```

Visual Basic

```
D2K_GCTR_Read (ByVal CardNumber As Integer, ByVal
     GCtr As Integer, Value As Long) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
GCtr	Counter number. Range is 0 to 1.
Value	Returns the counter value of the specified general-purpose timer/counter. For the devices except for DQ-2020/2022, the range is 0 to 65535. For DAQ-2020/2022, the range is 0 to 4294967295.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
InvalidCounter
```

D2K_GCTR_Reset

Description

Halts the specified general-purpose timer/counter operation and reloads the initial value of the timer/counter.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_GCTR_Reset (U16 CardNumber, U16 GCtr)
```

Visual Basic

```
D2K_GCTR_Reset (ByVal CardNumber As Integer,
     ByVal GCtr As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
GCtr	Counter number. Range is 0 to 1.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
InvalidCounter
```

D2K_GCTR_Setup
D2K_GCTR_SetupEx

Description

Controls the operation of the selected counter/timer.

The D2K_GCTR_SetupEx function is used for the devices (e.g. DAQ-2020/2022) which counters width are 32-bit long.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16  D2K_GCTR_Setup (U16 CardNumber, U16 GCtr,
     U16 Mode, U8 SrcCtrl, U8 PolCtrl, U16
     LReg1_Val, U16 LReg2_Val)
I16  D2K_GCTR_SetupEx (U16 CardNumber, U16 GCtr,
     U16 Mode, U8 SrcCtrl, U8 PolCtrl, U32
     LReg1_Val, U32 LReg2_Val)
```

Visual Basic

```
D2K_GCTR_Setup (ByVal CardNumber As Integer,
     ByVal GCtr As Integer, ByVal Mode As
     Integer, ByVal SrcCtrl As Byte, ByVal
     PolCtrl As Byte, ByVal LReg1_Val As Integer,
     ByVal LReg2_Val As Integer) As Integer
D2K_GCTR_SetupEx (ByVal CardNumber As Integer,
     ByVal GCtr As Integer, ByVal Mode As
     Integer, ByVal SrcCtrl As Byte, ByVal
     PolCtrl As Byte, ByVal LReg1_Val As Long,
     ByVal LReg2_Val As Long) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
GCtr	Counter number. Range is 0 to 1.

Mode	Timer/Counter mode. Valid modes: ▷ SimpleGatedEventCNT ▷ SinglePeriodMSR ▷ SinglePulseWidthMSR ▷ SingleGatedPulseGen ▷ SingleTrigPulseGen ▷ RetrigSinglePulseGen ▷ SingleTrigContPulseGen ▷ ContGatedPulseGen Refer to the device manual for the mode description.
SrcCtrl	General-purpose timer/counter source control setting. This argument is an integer expression formed from one or more of the manifest constants defined in D2KDASK.H. There are three groups of constants:

Timer/Counter Source

`GPTC_CLKSRC_INT`	Internal time base
`GPTC_CLKSRC_EXT`	External time base from GPTC0_SRC or GPTC1_SRC pin.

Timer/Counter Gate Source

`GPTC_GATESRC_INT`	Gate is controlled by software.
`GPTC_GATESRC_EXT`	Gate is controlled by GPTC0_GATE or GPTC1_GATE pin.

Timer/Counter UpDown Source

`GPTC_UPDOWN_SEL_INT`	Up/Down controlled by software.
`GPTC_UPDOWN_SEL_EXT`	Up/Down controlled by GPTC0_UPDOWN or GPTC1_UPDOWN pin.

When two or more constants are used to form the GCtrCtrl argument, the constants are combined with the bitwise-OR operator(|).

PolCtrl	Polarity settings for general-purpose timer/counter. This argument is an integer expression formed from

one or more of the manifest constants defined in D2KDASK.H. There are four groups of constants:

Timer/Counter Gate Polarity

`GPTC_GATE_LACTIVE`	Low active
`GPTC_GATE_HACTIVE`	High active

Timer/Counter UpDown Polarity

`GPTC_UPDOWN_LACTIVE`	Low active
`GPTC_UPDOWN_HACTIVE`	High active

Timer/Counter ClockEn Polarity

`GPTC_CLKEN_LACTIVE`	Low active
`GPTC_CLKEN_HACTIVE`	High active

Timer/Counter Output Polarity

`GPTC_OUTPUT_LACTIVE`	Low active
`GPTC_OUTPUT_HACTIVE`	High active

When two or more constants are used to form the GCtrCtrl argument, the constants are combined with the bitwise-OR operator(|).

LReg1_Val Counter value of the timer/counter load register 1. The meaning for the value depends on the mode the timer /counter is performing. For mode 1 to mode 3, the value of LReg1_Val is the initial count of the GPTC. For mode 4 to mode 8 (or pulse generation modes), the value of LReg1_Val is configured as the pulse delay. For DAQ-2020/2022, LReg1_Val is configured for both the pulse delay and pulse width.

LReg2_Val Counter value of the timer/counter load register 2. For mode 1 to mode 3, the value of LReg2_Val is not used. For mode 4 to mode 8 (pulse generation modes), the value of LReg2_Val is configured as the pulse width. For DAQ-2020/2022, the value is ignored.

Return Code

```
NoError
ErrorInvalidCardNumber
```

```
ErrorCardNotRegistered
ErrorFuncNotSupport
InvalidCounter
```

D2K_GCTR_Status

Description

Reads the latched GPTC status of the general-purpose counter from the GPTC status register.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_GCTR_Status (U16 CardNumber, U16 GCtr,
     U16 *Value)
```

Visual Basic

```
D2K_GCTR_Status (ByVal CardNumber As Integer,
     ByVal GCtr As Integer, Value As Integer) As
     Integer
```

Parameters

CardNumber	ID of the card performing the operation.
GCtr	Counter number. Range is 0 to 1.
Value	Returns the latched GPTC status of the specified general-purpose timer/counter from the GPTC status register. The format of Value is as follows:

2010, 2005, 2006, 2016, 2204, 2205, 2206, 2213, 2214, 2501, 2502:

`bit 0`	The former latched status of enable.
`bit 1`	The former latched status of gate.
`bit 2`	The former latched status of up/down.
`bit 3`	The former latched status of output.
`bit 4`	The former latched status of clk.
`bit 5`	The former latched status of interrupt.
`bit 6 to 15`	Not used

2020, 2022:

`bit 2`	Counter operation is in progress.
`bit 3`	Counter operation is done.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
InvalidCounter
```

D2K_Get_Default_Load_Area

Description

Gets the number of bank where the calibration data are loaded by default when D2K_Register_Card is called.

Cards Support

2020, 2022

Syntax

Microsoft C/C++, Linux C/C++ and Borland C++

```
I16  D2K_Get_Default_Load_Area(U16 CardNumber)
```

Visual Basic

```
D2K_Get_Default_Load_Area (ByVal CardNumber As
     Integer) As Integer
```

Parameter

CardNumber :	The card id of the card that wants to perform this operation.

Return Code

The default bank number

D2K_GetPXISlotGeographAddr

Description

Get the physical slot number of the slot where the specified PXI module installed in.

Cards Support

PXI-2020, PXI-2022

Syntax

Microsoft C/C++, Linux C/C++ and Borland C++

```
I16 D2K_GetPXISlotGeographAddr (U16 wCardNumber,
     U8* geo_addr)
```

Visual Basic

```
D2K_GetPXISlotGeographAddr (ByVal CardNumber As
     Integer, geo_addr As Byte) As Integer
```

Parameter

CardNumber :	The card id of the card that want to perform this operation.
geo_addr :	The physical slot number of the slot the module plugged in.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_Load_CAL_Data

Description

Loads the calibration constants from the specified EEPROM bank.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_Load_CAL_Data (U16 CardNumber, U16 bank)
```

Visual Basic

```
D2K_Load_CAL_Data (ByVal CardNumber As Integer,
     ByVal bank As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
bank	Storage bank on the EEPROM. The range of valid value is 0 to 2 for DAQ-2020/2022 is and 0 to 3 for others.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

D2K_Register_Card

Description

Initializes the hardware and software states of the card, then returns a numeric card ID that corresponds to the initialized card. You must call this function before calling any other D2K-DASK library functions. This function initializes the card and variables internal to D2K-DASK library. Since DAQ-2000 come in plug-and-play design, the base address (pass-through address) and IRQ level are automatically assigned by the system BIOS.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_Register_Card (U16 CardType, U16
    card_num)
```

Visual Basic

```
D2K_Register_Card (ByVal CardType As Integer,
    ByVal card_num As Integer) As Integer
```

Parameters

CardType Type of card to be initialized. ADLINK periodically upgrades the D2K-DASK to support new data acquisition cards. Refer to the card's release notes if D2K-DASK supports it. The table below shows the constants defined in D2KDASK.H which represent cards that D2K-DASK currently supports:

`DAQ_2010`	DAQ-2010
`DAQ_2005`	DAQ-2005
`DAQ_2006`	DAQ-2006
`DAQ_2016`	DAQ-2016
`DAQ_2204`	DAQ-2204
`DAQ_2205`	DAQ-2205
`DAQ_2206`	DAQ-2206
`DAQ_2208`	DAQ-2208

`DAQ_2213`	DAQ-2213
`DAQ_2214`	DAQ-2214
`DAQ_2501`	DAQ-2501
`DAQ_2502`	DAQ-2502
`DAQ-2020`	DAQ-2020
`DAQ-2022`	DAQ-2022

card_num The sequence number of cards with the same card type (as defined in argument CardType) plugged in the PCI slot. The card sequence number is based on the PCI slot sequence in the motherboard. The first card in the first slot is assigned card_num=0. For example, if there are two DAQ-2010 cards installed, the first card in the first slot should be registered with card_num=0 while the other one is registered with card_num=1.

Return Code

This function returns a numeric card ID for the initialized card. The range of card ID is between 0 and 31. If any error occured, it will return a negative error code from the list of codes below:

```
ErrorTooManyCardRegistered
ErrorUnknownCardType
ErrorOpenDriverFailed
ErrorOpenEventFailed
```

D2K_Register_Card_By_PXISlot_GA

Description

Initializes the hardware and software states of a D2k_DASK device with the geographic address of the pxi slot where it is plugged in, and then returns a numeric card ID that corresponds to the card initialized. *D2K_Register_Card* or *D2K_Register_Card_By_PXISlot_GA* (only for PXI module) must be called before any other D2K-DASK library functions can be called for that card. The function initializes the card and variables internal to D2K-DASK library. Because D2K-DASK devices meet the plug-and-play design, the base address (pass-through address) and IRQ level are assigned by system BIOS directly.

Cards Support

PXI-2020, PXI-2022

Syntax

Microsoft C/C++, Linux C/C++ and Borland C++

```
I16  D2K_Register_Card_By_PXISlot_GA (U16
     CardType, U16 geo_addr)
```

Visual Basic

```
D2K_Register_Card_By_PXISlot_GA (ByVal cardType
     As Integer, ByVal geo_addr As Integer) As
     Integer
```

Parameter

CardType	The type of card to be initialized. ADLink will periodically upgrades D2K-DASK to add support for new DAQ-2000 data acquisition cards. Please refer to Release Notes for the card types that the current release of D2K-DASK actually supports. Following are the constants defined in D2KDASK.H that represent the DAQ-2000 devices that D2K-DASK supports currently or in the near future:
	`DAQ_2020 (for  DAQ-2020)`
	`DAQ_2022 (for  DAQ-2022)`

geo_addr	The geographic address of the card plugged in the PXI slot.

Return Code

This function returns a numeric card id for the card initialized. The range of card id is between 0 and 31. If there is any error occurs, it will return negative error code, the possible error codes are listed below:

```
ErrorTooManyCardRegistered
ErrorOpenDriverFailed
ErrorOpenEventFailed
```

D2K_Release_Card

Description

A maximum of 32 cards may be registered simultaneously. This function tells the D2K-DASK library that the registered card is not currently used and may be released to make room for new card to register. At the end of the program, you need to call this function to release all registered cards.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_Release_Card (U16 CardNumber)
```

Visual Basic

```
D2K_Release_Card (ByVal CardNumber As Integer) As
     Integer
```

Parameter

CardNumber	ID of the card for release.

Return Code

```
NoError
```

D2K_Route_Signal

Description

This function is used to route an internal signal to the AFIn, PXI_STAR line or the PXI trigger bus line, or to enable clock sharing through the PXI trigger bus line or the PXI_STAR line.

Cards Support

PXI-2020, PXI-2022

Syntax

Microsoft C/C++, Linux C/C++ and Borland C++

```
I16 D2K_Route_Signal (U16 wCardNumber, U16
     signal, U16 polarity, U16 Line, U16 dir)
```

Visual Basic

```
D2K_Route_Signal (ByVal CardNumber As Integer,
     ByVal signal As Integer, ByVal polarity As
     Integer, ByVal Line As Integer, ByVal dir As
     Integer) As Integer
```

Parameter

CardNumber : The card id of the card that want to perform this operation.

signal : The signal is routed to the specified line.
The valid signal codes are as follows:

SSI_TIME	SSI_TIMEBASE output
SSI_CONV	SSI_ADCONV output
SSI_ADTRIG	SSI_ADTRIG output
SSI_WR	SSI_DAUpdate output
SSI_ADSTART	SSI_ADSTART output
SSI_DATRIG	SSI_DATRIG output
SMB_CLK_IN	SMB_CLK input

Line : The trigger line to drive.
The valid lines are as follows:
The following lines are only valid for PXI module:

PXI_TRIG_n	PXI trigger bus lines (n is line number and the value is 0 through 7)

PXI_START_TRIG	PXI_START line
PXI_CLK	PXI clock

The following line is valid for both PXI and PCI modules:

TRG_IO	TRG_IO pin
AFI0	AFI0 pin (DAQ-2020/2022 only)
AFI1	AFI1 pin (DAQ-2020/2022 only)
AFI2	AFI2 pin (DAQ-2020/2022 only)
AFI3	AFI3 pin (DAQ-2020/2022 only)
AFI4	AFI4 pin (DAQ-2020/2022 only)
AFI5	AFI5 pin (DAQ-2020/2022 only)
AFI6	AFI6 pin (DAQ-2020/2022 only)
AFI7	AFI7 pin (DAQ-2020/2022 only)

dir : The direction of the connection.

0	receive signal from the connection line. This value is not valid for PCI modules
1	transmit signal to the connection line

NOTE For DAQ-2020/2022, to share clock signal through lines, the frequency of timebase source can't exceed 20M. Therefore, the internal 80M Clock signal can't share between multiple devices.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorNotStartTriggerModule
```

```
ErrorInvalidRouteLine
ErrorInvalidSignalCode
ErrorInvalidSignalDirection
```

D2K_Set_Default_Load_Area

Description

Informs D2K-DASK library the the number of bank where the calibration data are loaded by default when D2K_Register_Card is called.

Cards Support

2020, 2022

Syntax

Microsoft C/C++, Linux C/C++ and Borland C++

```
I16  D2K_Set_Default_Load_Area(U16 CardNumber,
     U16 bank)
```

Visual Basic

```
D2K_Set_Default_Load_Area (ByVal CardNumber As
     Integer, ByVal bank As Integer) As Integer
```

Parameter

CardNumber :	The card id of the card that want to perform this operation.
bank :	The storage location on EEPROM. The valid range of the value of bank is 1 through 2. The default value is 1.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

D2K_Signal_DisConn

Description

Disconnects a device signal from AFIn, PXI_STAR line or the dedicated PXI trigger bus line.

Cards Support

PXI-2020, PXI-2022

Syntax

Microsoft C/C++, Linux C/C++ and Borland C++

```
I16 D2K_Signal_DisConn (U16 wCardNumber, U16
      signal, U16 polarity, U16 Line)
```

Visual Basic

```
D2K_Signal_DisConn (ByVal CardNumber As Integer,
      ByVal signal As Integer, ByVal polarity As
      Integer, ByVal Line As Integer) As Integer
```

Parameter

CardNumber : The card id of the card that want to perform this operation.

Signal : The specified signal is disconnected from the specified line.
The valid signal codes are as follows:

`SSI_TIME`	SSI_TIMEBASE output
`SSI_CONV`	SSI_ADCONV output
`SSI_ADTRIG`	SSI_ADTRIG output
`SSI_WR`	`SSI_DAUpdate output`
`SSI_ADSTART`	`SSI_ADSTART output`
`SSI_DATRIG`	`SSI_DATRIG output`
`SMB_CLK_IN`	`SMB_CLK input`

polarity : The polarity of the signal
The valid polarity are as follows:

`Signal_ActiveHigh`	active high
`Signal_ActiveLow`	active low

Line : Specified the line that is to be disconnected from the signal.
The valid lines are as follows:

`PXI_TRIG_n`	PXI trigger bus lines (n is line number and the value is 0 through 7)
`PXI_START_TRIG`	PXI_START line
`AFIn`	AFIn pin (n is line number and the value is 0 through 7)
`SMB_CLK_OUT`	SMB CLK OUT
`TRG_IO`	TRG_IO pin

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorFuncNotSupport
ErrorInvalidRouteLine
ErrorInvalidSignalCode
ErrorInvalidSignalDirection
```

D2K_SoftTrigGen

Description

Generates a software trigger signal manually.

Cards Support

2020, 2022

Syntax

Microsoft C/C++, Linux C/C++ and Borland C++

```
I16 D2K_SoftTrigGen (U16 CardNumber, U8 op)
```

Visual Basic

```
D2K_SoftTrigGen (ByVal CardNumber As Integer,
     ByVal op As Byte) As Integer
```

Parameter

CardNumber :	The card id of the card that want to be released.
op :	Ignored.

Return Code

```
NoError
```

D2K_SSI_SourceClear

Description

Disconnects all device signals from the SSI bus trigger lines.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_SSI_SourceClear (U16 CardNumber)
```

Visual Basic

```
D2K_SSI_SourceClear (ByVal CardNumber As Integer)
     As Integer
```

Parameter

CardNumber	ID of the card performing the operation.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
InvalidCounter
```

D2K_SSI_SourceConn

Description

Connects a device to the specified SSI bus trigger line.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_SSI_SourceConn (U16 CardNumber, U16
     sigCode)
```

Visual Basic

```
D2K_SSI_SourceConn (ByVal CardNumber As Integer,
     ByVal sigCode As Integer) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
sigCode	Specified SSI signal code number of the device signal to be connected to the SSI bus trigger line. The direction of the connection is transmitted from the device to the SSI bus trigger line. Valid signal codes:

`SSI_TIME`	SSI_TIMEBASE output
`SSI_CONV`	SSI_ADCONV output
`SSI_WR`	SSI_DAWR output
`SSI_ADTRIG`	SSI_ADTRIG output
`SSI_DATRIG`	SSI_DATRIG output

NOTE For DAQ-2020/2022, to share clock signal through lines, the frequency of timebase source can't exceed 20M. Therefore, the internal 80M Clock signal can't share between multiple devices.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

```
        InvalidCounter
```

D2K_SSI_SourceDisConn

Description

Disconnects a device signal from the specified SSI bus trigger line.

Supported Cards

2010, 2005, 2006, 2016, 2020, 2022, 2204, 2205, 2206, 2208, 2213, 2214, 2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 D2K_SSI_SourceDisConn (U16 CardNumber, U16
     sigCode)
```

Visual Basic

```
D2K_SSI_SourceDisConn (ByVal CardNumber As
     Integer, ByVal sigCode As Integer) As
     Integer
```

Parameters

CardNumber	ID of the card performing the operation.
sigCode	Specified SSI signal code number of the device signal to be disconnected from the SSI bus trigger line. Valid signal codes:

`SSI_TIME`	SSI_TIMEBASE output
`SSI_CONV`	SSI_ADCONV output
`SSI_WR`	SSI_DAWR output
`SSI_ADTRIG`	SSI_ADTRIG output
`SSI_DATRIG`	SSI_DATRIG output

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
InvalidCounter
```

DAQ2005_Acquire_AD_Error

Description

Acquires the offset and gain errors of the specified AI channel in the specified polarity mode.

Supported Cards

2005

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2005_Acquire_AD_Error (U16 CardNumber, U16
     Channel, U16 Polarity, F32 *gain_err, F32
     *offset_err)
```

Visual Basic

```
DAQ2005_Acquire_AD_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, gain_err As Single,
     offset_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog input channel number. Range is 0 to 3.
Polarity	Polarity (unipolar or bipolar) of the input channel. Valid values: `1` Bipolar `0` Unipolar
gain_err	Returns the gain error of the specified AI channel.
offset_err	Returns the offset error of the specified AI channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2005_Acquire_DA_Error

Description

Acquires the offset and gain errors of the specified DA channel in the specified polarity mode.

Supported Cards

2005

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2005_Acquire_DA_Error (U16 CardNumber, U16
     Channel, U16 Polarity, F32 *gain_err, F32
     *offset_err)
```

Visual Basic

```
DAQ2005_Acquire_DA_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, gain_err As Single,
     offset_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog output channel number. Range is 0 to 1.
Polarity	Polarity (unipolar or bipolar) of the output channel. Valid values:

`DAQ2K_DA_BiPolar`	Bipolar
`DAQ2K_DA_UniPola`	Unipolar

gain_err	Returns the gain error of the specified AO channel.
offset_err	Returns the offset error of the specified AO channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2006_Acquire_AD_Error

Description

Acquires the offset and gain errors of the specified AI channel in the specified polarity mode.

Supported Cards

2006

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2006_Acquire_AD_Error (U16 CardNumber, U16
     Channel, U16 Polarity, F32 *gain_err, F32
     *offset_err)
```

Visual Basic

```
DAQ2006_Acquire_AD_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, gain_err As Single,
     offset_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog input channel number. Range is 0 to 3.
Polarity	Polarity (unipolar or bipolar) of the input channel. Valid values: `1` Bipolar `0` Unipolar
gain_err	Returns the gain error of the specified AI channel.
offset_err	Returns the offset error of the specified AI channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2006_Acquire_DA_Error

Description

Acquires the offset and gain errors of the specified DA channel in the specified polarity mode.

Supported Cards

2006

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2006_Acquire_DA_Error (U16 CardNumber, U16
     Channel, U16 Polarity, F32 *gain_err, F32
     *offset_err)
```

Visual Basic

```
DAQ2006_Acquire_DA_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, gain_err As Single,
     offset_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog output channel number. Range is 0 to 1.
Polarity	Polarity (unipolar or bipolar) of the output channel. Valid values:

`DAQ2K_DA_BiPolar`	Bipolar
`DAQ2K_DA_UniPola`	Unipolar

gain_err	Returns the gain error of the specified AO channel.
offset_err	Returns the offset error of the specified AO channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2010_Acquire_AD_Error

Description

Acquires the offset and gain errors of the specified AI channel in the specified polarity mode.

Supported Cards

2010

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2010_Acquire_AD_Error(U16 CardNumber, U16
     Channel, U16 Polarity, F32 *gain_err, F32
     *offset_err)
```

Visual Basic

```
DAQ2010_Acquire_AD_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, gain_err As Single,
     offset_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog input channel number. Range is 0 to 3.
Polarity	Polarity (unipolar or bipolar) of the input channel. Valid values: `1` Bipolar `0` Unipolar
gain_err	Returns the gain error of the specified AI channel.
offset_err	Returns the offset error of the specified AI channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2010_Acquire_DA_Error

Description

Acquires the offset and gain errors of the specified DA channel in the specified polarity mode.

Supported Cards

2010

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2010_Acquire_DA_Error(U16 CardNumber, U16
     Channel, U16 Polarity, F32 *gain_err, F32
     *offset_err)
```

Visual Basic

```
DAQ2010_Acquire_DA_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, gain_err As Single,
     offset_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog output channel number. Range is 0 to 1.
Polarity	Polarity (unipolar or bipolar) of the output channel. Valid values:

`DAQ2K_DA_BiPolar`	Bipolar
`DAQ2K_DA_UniPola`	Unipolar

gain_err	Returns the gain error of the specified AO channel.
offset_err	Returns the offset error of the specified AO channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2016_Acquire_AD_Error

Description

Acquires the offset and gain errors of the specified AI channel in the specified polarity mode.

Supported Cards

2016

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2016_Acquire_AD_Error (U16 CardNumber, U16
     Channel, U16 Polarity, F32 *gain_err, F32
     *offset_err)
```

Visual Basic

```
DAQ2016_Acquire_AD_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, gain_err As Single,
     offset_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog input channel number. Range is 0 to 3.
Polarity	Polarity (unipolar or bipolar) of the input channel. Valid values:

`1`	Bipolar
`0`	Unipolar

gain_err	Returns the gain error of the specified AI channel.
offset_err	Returns the offset error of the specified AI channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2016_Acquire_DA_Error

Description

Acquires the offset and gain errors of the specified DA channel in the specified polarity mode.

Supported Cards

2016

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2016_Acquire_DA_Error (U16 CardNumber, U16
     Channel, U16 Polarity, F32 *gain_err, F32
     *offset_err)
```

Visual Basic

```
DAQ2016_Acquire_DA_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, gain_err As Single,
     offset_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog output channel number. Range is 0 to 1.
Polarity	Polarity (unipolar or bipolar) of the output channel. Valid values:

`DAQ2K_DA_BiPolar`	Bipolar
`DAQ2K_DA_UniPola`	Unipolar

gain_err	Returns the gain error of the specified AO channel.
offset_err	Returns the offset error of the specified AO channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2204_Acquire_AD_Error

Description

Acquires the offset and gain errors of ADC.

Supported Cards

2204

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2204_Acquire_AD_Error (U16 CardNumber, F32
     *gain_err, F32 *bioffset_err, F32
     *unioffset_err, F32 *hg_bios_err)
```

Visual Basic

```
DAQ2204_Acquire_AD_Error (ByVal CardNumber As
     Integer, gain_err As Single, bioffset_err As
     Single, unioffset_err As Single, hg_bios_err
     As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
gain_err	Returns the gain error of the ADC.
bioffset_err	Returns the offset error of the ADC in bipolar mode.
unioffset_err	Returns the offset error of the ADC in unipolar mode.
hg_bios_err	Returns the high-gain offset error of the ADC in bipolar mode.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2204_Acquire_DA_Error

Description

Acquires the offset and gain errors of the specified DA channel in the specified polarity.

Supported Cards

2204

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2204_Acquire_DA_Error(U16 CardNumber, U16
     Channel, U16 Polarity, F32 *da0v_err, F32
     *da5v_err)
```

Visual Basic

```
DAQ2204_Acquire_DA_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, da0v_err As Single,
     da5v_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog output channel number. Range is 0 to 1.
Polarity	Polarity (unipolar or bipolar) of the output channel. Valid values:

`DAQ2K_DA_BiPolar`	Bipolar
`DAQ2K_DA_UniPola`	Unipolar

da0v_err	Returns the gain error of the specified AO channel.
da5v_err	Returns the offset error of the specified AO channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2205_Acquire_AD_Error

Description

Acquires the offset and gain errors of ADC.

Supported Cards

2205

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2205_Acquire_AD_Error(U16 CardNumber, F32
     *gain_err, F32 *bioffset_err, F32
     *unioffset_err, F32 *hg_bios_err)
```

Visual Basic

```
DAQ2205_Acquire_AD_Error (ByVal CardNumber As
     Integer, gain_err As Single, bioffset_err As
     Single, unioffset_err As Single, hg_bios_err
     As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
gain_err	Returns the gain error of the ADC.
bioffset_err	Returns the offset error of the ADC in bipolar mode.
unioffset_err	Returns the offset error of the ADC in unipolar mode.
hg_bios_err	Returns the high-gain offset error of the ADC in bipolar mode.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2205_Acquire_DA_Error

Description

Acquires the offset and gain errors of the specified DA channel in the specified polarity.

Supported Cards

2205

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2205_Acquire_DA_Error(U16 CardNumber, U16
     Channel, U16 Polarity, F32 *da0v_err, F32
     *da5v_err)
```

Visual Basic

```
DAQ2205_Acquire_DA_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, da0v_err As Single,
     da5v_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog output channel number. Range is 0 to 1.
Polarity	Polarity (unipolar or bipolar) of the output channel. Valid values:

`DAQ2K_DA_BiPolar`	Bipolar
`DAQ2K_DA_UniPola`	Unipolar

da0v_err	Returns the offset error of the specified AO channel.
da5v_err	Returns the gain error of the specified AO channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2206_Acquire_AD_Error

Description

Acquires the offset and gain errors of ADC.

Supported Cards

2206

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2206_Acquire_AD_Error(U16 CardNumber, F32
     *gain_err, F32 *bioffset_err, F32
     *unioffset_err, F32 *hg_bios_err)
```

Visual Basic

```
DAQ2206_Acquire_AD_Error (ByVal CardNumber As
     Integer, gain_err As Single, bioffset_err As
     Single, unioffset_err As Single, hg_bios_err
     As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
gain_err	Returns the gain error of the ADC.
bioffset_err	Returns the offset error of the ADC in bipolar mode.
unioffset_err	Returns the offset error of the ADC in unipolar mode.
hg_bios_err	Returns the high-gain offset error of the ADC in bipolar mode.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2206_Acquire_DA_Error

Description

Acquires the offset and gain errors of the specified DA channel in the specified polarity.

Supported Cards

2206

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2206_Acquire_DA_Error(U16 CardNumber, U16
     Channel, U16 Polarity, F32 *da0v_err, F32
     *da5v_err)
```

Visual Basic

```
DAQ2206_Acquire_DA_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, da0v_err As Single,
     da5v_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog output channel number. Range is 0 to 1.
Polarity	Polarity (unipolar or bipolar) of the output channel. Valid values:

`DAQ2K_DA_BiPolar`	Bipolar
`DAQ2K_DA_UniPola`	Unipolar

da0v_err	Returns the offset error of the specified AO channel.
da5v_err	Returns the gain error of the specified AO channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2208_Acquire_AD_Error

Description

Acquires the offset and gain errors of ADC.

Supported Cards

2208

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2208_Acquire_AD_Error(U16 CardNumber, F32
     *gain_err, F32 *bioffset_err, F32
     *unioffset_err, F32 *hg_bios_err)
```

Visual Basic

```
DAQ2208_Acquire_AD_Error (ByVal CardNumber As
     Integer, gain_err As Single, bioffset_err As
     Single, unioffset_err As Single, hg_bios_err
     As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
gain_err	Returns the gain error of the ADC.
bioffset_err	Returns the offset error of the ADC in bipolar mode.
unioffset_err	Returns the offset error of the ADC in unipolar mode.
hg_bios_err	Returns the high-gain offset error of the ADC in bipolar mode.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2213_Acquire_AD_Error

Description

Acquires the offset and gain errors of ADC.

Supported Cards

2213

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2213_Acquire_AD_Error(U16 CardNumber, F32
     *gain_err, F32 *bioffset_err, F32
     *unioffset_err, F32 *hg_bios_err)
```

Visual Basic

```
DAQ2213_Acquire_AD_Error (ByVal CardNumber As
     Integer, gain_err As Single, bioffset_err As
     Single, unioffset_err As Single, hg_bios_err
     As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
gain_err	Returns the gain error of the ADC.
bioffset_err	Returns the offset error of the ADC in bipolar mode.
unioffset_err	Returns the offset error of the ADC in unipolar mode.
hg_bios_err	Returns the high-gain offset error of the ADC in bipolar mode.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2214_Acquire_AD_Error

Description

Acquires the offset and gain errors of ADC.

Supported Cards

2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2214_Acquire_AD_Error(U16 CardNumber, F32
     *gain_err, F32 *bioffset_err, F32
     *unioffset_err, F32 *hg_bios_err)
```

Visual Basic

```
DAQ2214_Acquire_AD_Error (ByVal CardNumber As
     Integer, gain_err As Single, bioffset_err As
     Single, unioffset_err As Single, hg_bios_err
     As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
gain_err	Returns the gain error of the ADC.
bioffset_err	Returns the offset error of the ADC in bipolar mode.
unioffset_err	Returns the offset error of the ADC in unipolar mode.
hg_bios_err	Returns the high-gain offset error of the ADC in bipolar mode.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ2214_Acquire_DA_Error

Description

Acquire the offset and gain errors of the specified DA channel in the specified polarity.

Supported Cards

2214

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ2214_Acquire_DA_Error(U16 CardNumber, U16
     Channel, U16 Polarity, F32 *da0v_err, F32
     *da5v_err)
```

Visual Basic

```
DAQ2214_Acquire_DA_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, da0v_err As Single,
     da5v_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog output channel number. Range is 0 to 1.
Polarity	Polarity (unipolar or bipolar) of the output channel. Valid values:

`DAQ2K_DA_BiPolar`	Bipolar
`DAQ2K_DA_UniPola`	Unipolar

da0v_err	Returns the offset error of the specified AO channel.
da5v_err	Returns the gain error of the specified AO channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

DAQ250X_Acquire_AD_Error

Description

Acquires the offset and gain errors in the specified polarity mode.

Supported Cards

2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ250X_Acquire_AD_Error(I16 CardNumber, U16
     Polarity, F32 *gain_err, F32 *offset_err)
```

Visual Basic

```
DAQ250X_Acquire_AD_Error (ByVal CardNumber As
     Integer, ByVal Polarity As Integer, gain_err
     As Single, offset_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Polarity	Polarity (unipolar or bipolar) of the input channel. Valid values: `1` Bipolar `0` Unipolar
gain_err	Returns the gain error of the specified AI channel.
offset_err	Returns the offset error of the specified AI channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
```

DAQ250X_Acquire_DA_Error

Description

Acquires the offset and gain errors of the specified DA channel in the specified polarity mode.

Supported Cards

2501, 2502

Syntax

Microsoft C/C++, Linux C/C++, and Borland C++

```
I16 DAQ250X_Acquire_DA_Error(U16 CardNumber, U16
     Channel, U16 Polarity, F32 *gain_err, F32
     *offset_err)
```

Visual Basic

```
DAQ250X_Acquire_DA_Error (ByVal CardNumber As
     Integer, ByVal Channel As Integer, ByVal
     Polarity As Integer, gain_err As Single,
     offset_err As Single) As Integer
```

Parameters

CardNumber	ID of the card performing the operation.
Channel	Analog output channel number. Range is 0 to 3 for DAQ-2501 and 0 to 7 for DAQ-2502.
Polarity	Polarity (unipolar or bipolar) of the output channel. Valid values:

`DAQ2K_DA_BiPolar`	Bipolar
`DAQ2K_DA_UniPola`	Unipolar

gain_err	Returns the gain error of the specified AO channel.
offset_err	Returns the offset error of the specified AO channel.

Return Code

```
NoError
ErrorInvalidCardNumber
ErrorCardNotRegistered
ErrorFuncNotSupport
ErrorInvalidIoChannel
```

Appendix

Appendix A Status Codes

This appendix lists the status codes returned by D2K-DASK, including the name and description.

Each D2K-DASK function returns a status code that indicates whether the function was performed successfully. When a D2K-DASK function returns a negative number, it means that an error occurred while executing the function.

Status Code	Status Name	Description
0	NoError	No error occurred
-1	ErrorUnknownCardType	The CardType argument is not valid
-2	ErrorInvalidCardNumber	The CardNumber argument is out of range (larger than 31).
-3	ErrorTooManyCardRegistered	There have been 32 cards that were registered.
-4	ErrorCardNotRegistered	No card registered as id CardNumber.
-5	ErrorFuncNotSupport	The function called is not supported by this type of card..
-6	ErrorInvalidIoChannel	The specified Channel or Port argument is out of range..
-7	ErrorInvalidAdRange	The specified analog input range is invalid.
-8	ErrorContIoNotAllowed	The specified continuous IO operation is not supported by this type of card.
-9	ErrorDiffRangeNotSupport	All the analog input ranges must be the same for multi-channel analog input.
-10	ErrorLastChannelNotZero	The channels for multi-channel analog input must be ended with or started from zero.
-11	ErrorChannelNotDescending	The channels for multi-channel analog input must be contiguous and in descending order.
-12	ErrorChannelNotAscending	The channels for multi-channel analog input must be contiguous and in ascending order.
-13	ErrorOpenDriverFailed	Failed to open the device driver.
-14	ErrorOpenEventFailed	Open event failed in device driver.
-15	ErrorTransferCountTooLarge	The size of transfer is larger than the size of Initially allocated memory in driver.
-16	ErrorNotDoubleBufferMode	Double buffer mode is disabled.
-17	ErrorInvalidSampleRate	The specified sampling rate is out of range.
-18	ErrorInvalidCounterMode	The value of the Mode argument is invalid.
-19	ErrorInvalidCounter	The value of the Ctr argument is out of range.
-20	ErrorInvalidCounterState	The value of the State argument is out of range.

Table 3-1: Status Codes

Status Code	Status Name	Description
-21	ErrorInvalidBinBcdParam	The value of the BinBcd argument is invalid.
-22	ErrorBadCardType	The value of Card Type argument is invalid
-23	ErrorInvalidDaRefVoltage	The value of DA reference voltage argument is invalid
-24	ErrorAdTimeOut	Time out for AD operation
-25	ErrorNoAsyncAI	Continuous Analog Input is not set as Asynchronous mode
-26	ErrorNoAsyncAO	Continuous Analog Output is not set as Asynchronous mode
-27	ErrorNoAsyncDI	Continuous Digital Input is not set as Asynchronous mode
-28	ErrorNoAsyncDO	Continuous Digital Output is not set as Asynchronous mode
-29	ErrorNotInputPort	The value of AI/DI port argument is invalid
-30	ErrorNotOutputPort	The value of AO/DO argument is invalid
-31	ErrorInvalidDioPort	The value of DI/O port argument is invalid
-32	ErrorInvalidDioLine	The value of DI/O line argument is invalid
-33	ErrorContIoActive	Continuous IO operation is not active
-34	ErrorDblBufModeNotAllowed	Double Buffer mode is not allowed
-35	ErrorConfigFailed	The specified function configuration is failed
-36	ErrorInvalidPortDirection	The value of DIO port direction argument is invalid
-37	ErrorBeginThreadError	Failed to create thread
-38	ErrorInvalidPortWidth	The port width setting is not allowed
-39	ErrorInvalidCtrSource	The clock source setting is invalid
-40	ErrorOpenFile	Failed to Open file
-41	ErrorAllocateMemory	The memory allocation is failed
-42	ErrorDaVoltageOutOfRange	The value of DA voltage argument is out of range
-43	ErrorInvalidSyncMode	The sync. mode of operation is invalid
-44	ErrorInvalidBufferID	The buffer id selected is invalid
-45	ErrorInvalidCNTInterval	The counter value is invalid
-46	ErrorReTrigModeNotAllowed	The Re-Trigger mode of operation is invalid
-47	ErrorResetBufferNotAllowed	The buffer is not allowed to be reset
-48	ErrorAnaTriggerLevel	The value of analog trigger level is invalid
-49	ErrorDAQEvent	The DAQEvent is invalid
-50	ErrorInvalidCounterValue	The Counter value is invalid
-51	ErrorOffsetCalibration	Error on AI offset calibration
-52	ErrorGainCalibration	Error on AI Gain calibration
-53	ErrorCountOutofSDRAMSize	The data count is out of the size of on-board SDRAM
-54	ErrorNotStatTriggerModule	The PXI module is not at slot 2
-55	ErrorInvalidRouteLine	The signal route line is invalid

Table 3-1: Status Codes

Status Code	Status Name	Description
-56	ErrorInvalidSignalCode	The signal code is invalid
-57	ErrorInvalidSignalDirection	The signal route direction is invalid
-58	ErrorTRGOSCalibration	The trigger offset calibration is invalid
-59	ErrorNoSDRAM	No onboard embedded SDRAM
-60	ErrorIntegrationGain	The integration gain is invalid
-61	ErrorAcquisitionTiming	The acquisition time-out value is invalid
-62	ErrorIntegrationTiming	The value of integration time is invalid
-70	ErrorInvalidTimeBase	The Timebase is invalid
-71	ErrorUndefinedParameter	The parameter is undefined
-110	ErrorCalAddress	The memory address of calibration is invalid
-111	ErrorInvalidCalBank	The calibration bank is invalid
-201	ErrorConfigIoctl	The configuration API is failed
-202	ErrorAsyncSetIoctl	The async. mode API is failed
-203	ErrorDBSetIoctl	The double-buffer setting API is failed
-204	ErrorDBHalfReadyIoctl	The half-ready API is failed
-205	ErrorContOPIoctl	The continuous data acquisition API is failed
-206	ErrorContStatusIoctl	The continuous data acquisition status API setting is failed
-207	ErrorPIOIoctl	The polling data API is failed
-208	ErrorDIntSetIoctl	The dual interrupt setting API is failed
-209	ErrorWaitEvtIoctl	The wait event API is failed
-210	ErrorOpenEvtIoctl	The open event API is failed
-211	ErrorCOSIntSetIoctl	The COS interrupt setting API is failed
-212	ErrorMemMapIoctl	The memory mapping API is failed
-213	ErrorMemUMapSetIoctl	The memory Un-mapping API is failed
-214	ErrorCTRIoctl	The counter API is failed
-215	ErrorGetResIoctl	The resource getting API is failed

Table 3-1: Status Codes

Appendix B   AI Range Codes

The table below lists the analog input range of NuDAQ PCI-bus cards.

AD_B_10_V	Bipolar -10V to +10V
AD_B_5_V	Bipolar -5V to +5V
AD_B_2_5_V	Bipolar -2.5V to +2.5V
AD_B_1_25_V	Bipolar -1.25V to +1.25V
AD_B_0_625_V	Bipolar -0.625V to +0.625V
AD_B_0_3125_V	Bipolar -0.3125V to +0.3125V
AD_B_0_5_V	Bipolar -0.5V to +0.5V
AD_B_0_05_V	Bipolar -0.05V to +0.05V
AD_B_0_005_V	Bipolar -0.005V to +0.005V
AD_B_1_V	Bipolar -1V to +1V
AD_B_0_1_V	Bipolar -0.1V to +0.1V
AD_B_0_01_V	Bipolar -0.01V to +0.01V
AD_B_0_001_V	Bipolar -0.01V to +0.001V
AD_B_2_V	Bipolar -2V to +2V
AD_B_0_2_V	Bipolar -0.2V to +0.2V
AD_U_20_V	Unipolar 0 to +20V
AD_U_10_V	Unipolar 0 to +10V
AD_U_5_V	Unipolar 0 to +5V
AD_U_2_5_V	Unipolar 0 to +2.5V
AD_U_1_25_V	Unipolar 0 to +1.25V
AD_U_1_V	Unipolar 0 to +1V
AD_U_0_1_V	Unipolar 0 to +0.1V
AD_U_0_01_V	Unipolar 0 to +0.01V
AD_U_0_001_V	Unipolar 0 to +0.001V
AD_U_2_V	Unipolar 0 to +2V

Table 3-2: AI Range Codes

Valid values for each card:

DAQ-2005 DAQ-2006 DAQ-2010 DAQ-2016 DAQ-2205 DAQ-2206 DAQ-2213 DAQ-2214	• AD_B_10_V • AD_B_5_V • AD_B_2_5_V • AD_B_1_25_V • AD_U_10_V • AD_U_5_V • AD_U_2_5_V • AD_U_1_25_V
DAQ-2204 DAQ-2208	• AD_B_10_V • AD_B_5_V • AD_B_2_5_V • AD_B_2_V • AD_B_1_25_V • AD_B_1_V • AD_B_0_5_V • AD_B_0_25_V • AD_B_0_2_V • AD_B_0_05_V • AD_U_10_V • AD_U_5_V • AD_U_4_V • AD_U_2_5_V • AD_U_2_V • AD_U_1_V • AD_U_0_5_V • AD_U_0_4_V • AD_U_0_1_V
DAQ-2501 DAQ-2502	• AD_B_10_V • AD_U_10_V
DAQ-2020 DAQ-2022	• AD_B_10_V • AD_B_2_5_V

Table 3-3: Valid Card AI Range

Appendix C AI Data Format

This appendix lists the AI data format for the cards performing analog input operation, as well as the calculation methods to retrieve the A/D converted data and the channel where the data read from* channel no. (CH#) * A/D converted data (ND) * Value returned from AI function (OD)

Card Type	Data Format	**Value calculation** • channel no. (CH#) • A/D converted data (ND) • Value returned from AI function (OD)
DAQ-2010	Every 16-bit signed integer data: D13 D12...D1D0 b1 b0, where D13,D12, ... , D0 is the A/D converted data and b1, b0 is the simultaneous digital input data.	• ND = OD >>2 • ND = OD/4
DAQ-2005 DAQ-2006 DAQ-2016	Every 16-bit unsigned integer data: D15 D14 D13...D1 D0, where D15, D14, ... , D0 is the converted A/D data.	• ND = OD
DAQ-2204	Every 16-bit signed integer data: D12 D11...D1 D0 b3 b2 b1 b0, where D12, D11, ... , D0 is the converted A/D data and b3, b2, b1, b0 is the simultaneous digital input data.	• ND = OD >>4 • ND = OD/16
DAQ-2205 DAQ-2206 DAQ-2213 DAQ-2214 DAQ-2020 DAQ-2022	Every 16-bit signed integer data D15 D14 D13...D1 D0, where D15, D14, ... , D0 is the converted A/D data.	• ND = OD
DAQ-2208	Every 16-bit signed integer data: D12 D11...D1 D0 b3 b2 b1 b0, where D12, D11, ... , D0 is the converted A/D data and b3, b2, b1, b0 are not used.	• ND = OD >>4 • ND = OD/16
DAQ-2501 DAQ-2502	Every 16-bit signed integer data: D13 D12... D1 D0 b1 b0, where D13, D12, ... , D0 is the converted A/D data and b1, b0 is the AI auto-scan channel.	• ND = OD >>2 • ND = OD/4

Table 3-4: AI Data Format

Appendix D Data File Format

This appendix describes the file format of the data files generated by the functions performing continuous data acquisition followed by storing the data to disk.

The data file includes three parts, Header, ChannelRange (optional), and Data block. The file structure is shown below:

Header
ChannelRange (Optional)
DAQ data

Header

The header part records the information related to the stored data and has 60 bytes of length. The data structure of the file header is listed in the table:

Header Total Length: 60 bytes			
Elements	**Type**	**Size** (bytes)	**Comments**
ID	char	10	File ID (ADLINKDAQ2)
card_type	short	2	Card Type (DAQ-2010)
num_of_channel	short	2	Number of scanned channels (1, 2)
channel_no	unsigned char	1	Channel number where data is read from. Only available as the num_of_channel is 1. (0, 1)
num_of_scan	long	4	Number of scan for each channel (total count / num_of_channel)
data_width	short	2	Data width (0: 8 bits, 1: 16 bits, 2: 32 bits)
channel_order	short	2	Channel scanned sequence 0: normal (0-1-2-3) 1: reverse (3-2-1-0) 2: custom* (0, 1, 3)
ad_range	short	2	AI range code. (0: AD_B_5V) Refer to Appendix B
scan_rate	double	8	Scanning rate of each channel (total sampling rate/num_of_channel)

Header Total Length: 60 bytes			
Elements	**Type**	**Size** (bytes)	**Comments**
num_of_channel _range	short	2	Number of ChannelRange* structure
start_date	char	8	Starting date of data acquisition (12/31/99)
start_time	char	8	Starting time of data acquisition (18:30:25)
start_millisec	char	3	Starting millisecond of data acquisition (360)
reserved	char	6	Not used

* If the num_of_channel_range is 0, the ChannelRange block will not be included in the data file.

* The channel_order is set to "custom" only when the card supports variant channel scanning order.

ChannelRange

The ChannelRange part records the channel number and data range information related to the stored data. This part consists of several channel and range units. The length of each unit is 2 bytes. The total length depends on the value of num_of_channel_range (one element of the file header) and is calculated with this formula:

Total Length = 2 * num_of_channel_range bytes

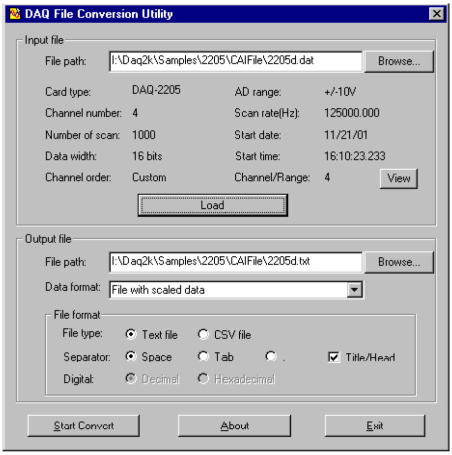
The data structure of each ChannelRange unit is listed below:

ChannelRange (Unit Length: 2 bytes)			
Elements	**Type**	**Size (bytes)**	**Comments**
channel	char	1	Scanned channel number (0, 1)
range	char	1	AI range code of channel. (0: AD_B_5V) Refer to Appendix B

Data Block

The data is written to file in a 16-bit binary format, with the lower byte first (little endian). For example, the value 0x1234 is written to disk with 34 first followed by 12. The total length of the data block depends on the data width and the total data count.

The file is written in Binary format and may not be read by normal text editor. You can use any binary file editor to view it or the functions used for reading files (such as fread) to get the file information and data value. D2K-DASK provides the DAQCvt utility to convert the binary file. Refer to the D2K-DASK user manual for details.


DAQ File Conversion Utility

Input file
File path: I:\Daq2k\Samples\2205\CAIFile\2205d.dat
Browse...

Card type:	DAQ-2205	AD range:	+/-10V
Channel number:	4	Scan rate(Hz):	125000.000
Number of scan:	1000	Start date:	11/21/01
Data width:	16 bits	Start time:	16:10:23.233
Channel order:	Custom	Channel/Range:	4

View
Load

Output file
File path: I:\Daq2k\Samples\2205\CAIFile\2205d.txt
Browse...
Data format: File with scaled data

File format
File type: [✓ Text file] CSV file
Separator: [✓ Space] Tab , [✓ Title/Head]
Digital: [✓ Decimal] Hexadecimal

Start Convert
About
Exit

DAQCvt translates the information stored in the header part and the ChannelRange part, then displays the corresponding information in the **Input File** frame of DAQCvt main window. After setting the properties (File Path, Format, …etc) of the converted file and after clicking the **Start Convert** button, DAQCvt gets rid of header and ChannelRange parts and converts the data in data block according to the card type and the data width. DAQCvt also writes the converted data to a disk and lets you use any text editor or Excel to view or analyze the accessed data.