

8316.IIb VI Function Descriptions

The functionality of Vis in 8316.IIb can be classified to the following capabilities:

1. Card Configuration:

- Setup hardware base I/O address
- Setup AD/DA configuration

2. Analog Input:

- Perform one-shot single-channel analog input operation
- Perform continuous single/multiple-channel analog input operation

3. Analog Output:

- Performs single-channel analog output operation

4. Digital I/O:

- Input/output digital signals

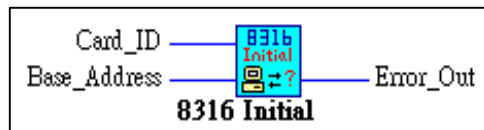
5. Timer/Counter:

- Timer/counter functions

In addition, several sample programs are also included. Thorough understanding of these sample programs will help you understand how to use the library more quickly. And you are welcome to modify the sample programs for your application needs.

8316 Initial

An ACL-8316/12 card is configured according to the base address. Every ACL-8316/12 multi-function data acquisition card has to be configured by this VI before using other VI.





Card_ID : the card to be initialized, up to three cards can be initialized, the *Card_ID* must be 0, 1, or 2.



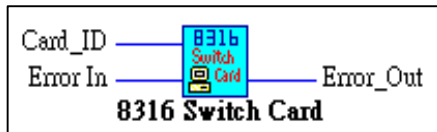
Base_Address : the I/O port base address of the card, the default address on the hardware setting is Hex 220.



Error Out : Error code. *Error Out* describes the error status of this VI.

8316 Switch Card

This VI is used more than one ACL-8316/12 cards on your system. After initialized more than one ACL-8316/12 card, this VI is used to select which card is activate currently.



Card_ID : the card to be set as active, the *Card_ID* must be 0, 1, or 2.



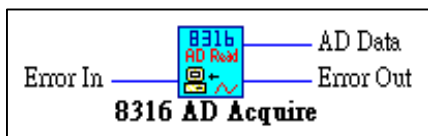
Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.



Error Out : Error code. *Error Out* describes the error status of this VI.

8316 AD Acquire

This VI is used to poll the A/D conversion data from a channel. It is an immediate, non-buffered operation, No buffering or timing is required, so the analog input data can be acquired when you need one data point from one selected channel. It is very useful for monitoring a system periodically. For ACL-8316 card, the return reading value is between -32768 and 32767. For ACL-8312, the return reading value is between 0 and 4095.



I16

Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.

I16

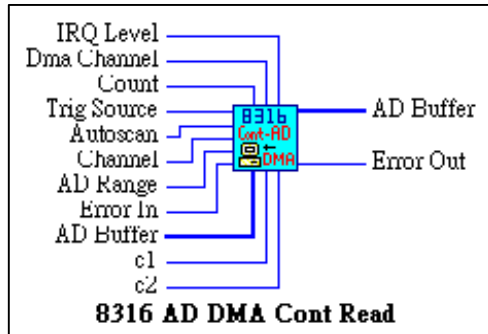
AD_Data : the 16-bit or 12-bit A/D converted value

I16

Error Out : Error code. If the *Error In* indicated an error, the *Error Out* contains the same value. Otherwise, *Error Out* describes the error status of this VI.

8316 AD DMA Cont Read

This VI performs continuous A/D conversions on the specified analog input channel at a rate as close to the rate you specified. It will transfer the data to memory (buffer) by DMA transfer.



U8

Trig Source : A/D trigger source
10: Internal timer pacer trigger
12: External trigger

I8

Autoscan : **0:** Auto-scan is disabled
1: Auto-scan is enabled

U8

Channel : If the auto-scan is enabled, the A/D channel selection sequence is:
 0,1,2,3, ... [Channel], 0,1,2,3, [Channel] ...
 If the auto-scan is disabled, only the [Channel] will be converted.

U8

AD Range : analog input range. The possible values are:
8: Bipolar -10V to +10V
0: Bipolar -5V to +5V
1: Bipolar -2.5V to +2.5V
2: Bipolar -1.25V to +1.25V

U8

IRQ Level : IRQ channel number, used to stop DMA. Please make sure this value is the same as the setting on your data acquisition card.

U8

DMA Channel : DMA channel number. The valid value is 5, 6, or 7.

I32

Count : the number of A/D conversions to perform



AD Buffer :

An integer array to store the acquired data. The length of *buffer* must be equal to or greater than the value of input terminal *Count*. If auto-scan is enabled, the acquired data is stored in interleaved sequence. For example, if the value of *Channel* is 2, the data read from channel 0 is stored in *buffer*[0], *buffer*[3], *buffer*[6], ... the data from channel 1 is stored in *buffer*[1], *buffer*[4], *buffer*[7], ... the data from channel 2 is stored in *buffer*[2], *buffer*[5], *buffer*[8], ...



c1 :

frequency divider of timer #1. If A/D trigger mode is internal pacer trigger, the sampling rate is $2\text{MHz}/(c1*c2)$.



c2 :

frequency divider of timer #2. If A/D trigger mode is internal pacer trigger, the sampling rate is $2\text{MHz}/(c1*c2)$.



Error In :

The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.



AD Buffer :

An integer array containing the acquired data.

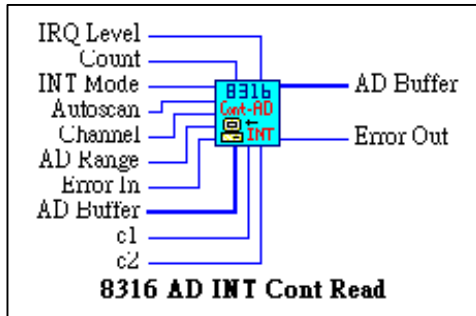


Error Out :

Error code. If the *Error In* indicated an error, the *Error Out* contains the same value. Otherwise, *Error Out* describes the error status of this VI.

8316 AD INT Cont Read

This VI performs continuous A/D conversions on the specified analog input channel at a rate as close to the rate you specified. It will transfer the data to memory (buffer) by interrupt transfer.



U8

INT Mode :

- 0:** Internal timer pacer trigger A/D conversion, EOC (end of conversion) interrupt
- 1:** Internal timer pacer trigger A/D conversion, FIFO_HF (FIFO half full ready) interrupt
- 2:** External trigger A/D conversion, EOC (end of conversion) interrupt
- 3:** External trigger A/D conversion, FIFO_HF (FIFO half full ready) interrupt

I8

Autoscan :

- 0:** Auto-scan is disable
- 1:** Auto-scan is enabled

U8

Channel :

If the auto-scan is enabled, the A/D channel selection sequence is:
 0,1,2,3, ... [*Channel*], 0,1,2,3, [*Channel*] ...
 If the auto-scan is disabled, only the [*Channel*] will be converted.

U8

AD Range :

analog input range. The possible values are:

- 8:** Bipolar -10V to +10V
- 0:** Bipolar -5V to +5V
- 1:** Bipolar -2.5V to +2.5V
- 2:** Bipolar -1.25V to +1.25V

U8

IRQ Level :

IRQ channel number, used to stop DMA. Please make sure this value is the same as the setting on your data acquisition card.



Count : the number of A/D conversions to perform



AD Buffer : An integer array to store the acquired data. The length of *buffer* must be equal to or greater than the value of input terminal *Count*. If auto-scan is enabled, the acquired data is stored in interleaved sequence. For example, if the value of *Channel* is 2, the data read from channel 0 is stored in *buffer*[0], *buffer*[3], *buffer*[6], ... the data from channel 1 is stored in *buffer*[1], *buffer*[4], *buffer*[7], ... the data from channel 2 is stored in *buffer*[2], *buffer*[5], *buffer*[8], ...



c1 : frequency divider of timer #1. If A/D trigger mode is internal pacer trigger, the sampling rate is $2\text{MHz}/(c1*c2)$.



c2 : frequency divider of timer #2. If A/D trigger mode is internal pacer trigger, the sampling rate is $2\text{MHz}/(c1*c2)$.



Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.



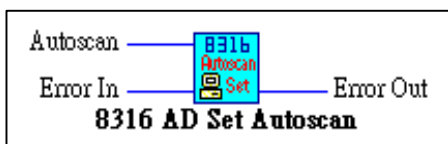
AD Buffer : An integer array containing the acquired data.



Error Out : Error code. If the *Error In* indicated an error, the *Error Out* contains the same value. Otherwise, *Error Out* describes the error status of this VI.

8316 AD Set Autoscan

This VI is used to set automatic hardware channel scan to be enabled or disabled. If the auto-scan is set as enable mode, the A/D channels can be converted automatically, that is, the hardware multiplexer will automatically increment until the channel set by **8316 AD Set Channel1**. And then, it will go back to channel 0. For example, the channel is set as 4, the A/D conversion sequence will be 0, 1, 2, 3, 4, 0, 1, 2, 3, 4, 0, ... If the auto-scan is set as disabled, the channel will be kept as single channel only, such as channel 4.



U8

Autoscan : 0: Auto-scan is disabled
1: Auto-scan is enabled

I16

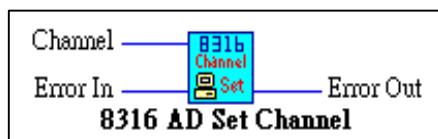
Error In : The error condition occurred before this VI executes. This code defaults to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code description.

I16

Error Out : Error code. *Error Out* describes the error status of this VI.

8316 AD Set Channel

This VI is used to set A/D channel by means of writing data to the multiplexer scan channel register. There are 16 single-ended or 8 differential A/D channels in ACL-8316/12, so the channel number should be set either 0~15 or 0~7. The initial state is channel 0 which is a default setting by the ACL-8316/12 hardware configuration.



Channel : channel number to perform AD conversion
single-ended: 0 ~ 15
differential: 0 ~ 7



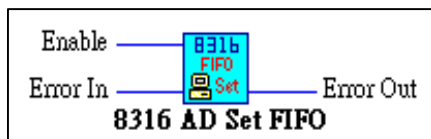
Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.



Error Out : Error code. *Error Out* describes the error status of this VI.

8316 AD Set FIFO

This VI is used to enable the FIFO on the ACL-8312/16. As the FIFO is enabled, all A/D converted data are stored into the FIFO. The size of A/D FIFO is 1K words on-board.





Enable : 1: FIFO enable
0: FIFO disable



Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.



Error Out : Error code. *Error Out* describes the error status of this VI.

8316 AD Set Mode

This VI is used to set the A/D trigger source, A/D channel selection and A/D data transfer mode by means of writing data to the *AD Mode Control Register* (refer to section 4.7 in ACL-8316/12 manual). The hardware initial state of the ACL-8316/12 is set as internal software trigger with program polling data transfer.



AD Mode : AD Mode control value



Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.



Error Out : Error code. *Error Out* describes the error status of this VI.

8316 AD Set Range

This VI is used to set the A/D analog input range by means of writing data to the A/D range control register. For ACL-8316/12 card, the gain values are only support 1, 2, 4, 8 four levels. The relationship between analog input voltage range, and gain are specified by table below:



U8

AD Range : analog input range. The possible values are:

8: Bipolar -10V to +10V

0: Bipolar -5V to +5V

1: Bipolar -2.5V to +2.5V

2: Bipolar -1.25V to +1.25V

I16

Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.

I16

Error Out : Error code. *Error Out* describes the error status of this VI.

8316 Counter Read

This function is used to read the counter value of the Timer #0.





Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.



Counter Value : the counter value of the Timer #0



Error Out : Error code. *Error Out* describes the error status of this VI.

8316 Counter Start

The Timer #0 on the ACL-8316/12 can be freely programmed by the users. This function is used to program the Timer #0. This timer can be used as frequency generator if internal clock is used. It also can be used as event counter if external clock is used. All the 8254 mode is available.



Timer Mode : the 8254 timer mode, the possible values are 1 through 5.



Counter Value : the counter value of the Timer #0



Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**,

for a code descriptions.

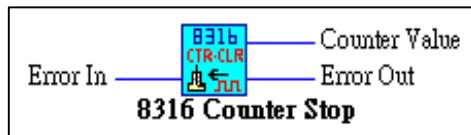


Error Out :

Error code. *Error Out* describes the error status of this VI.

8316 Counter Stop

This VI is used to stop the timer operation. The timer is set to the 'One-shot' mode with counter value '0'. That is, the clock output signal will be set to high after executing this function.



Error In :

The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.



Counter Value :

the current counter value of the Timer #0



Error Out :

Error code. *Error Out* describes the error status of this VI.

8316 DA Set Mode

This VI is used to configure the D/A output mode. There are four modes can be set ACL-8316/12 when the D/A output is used.





DA Mode : 2: transparency, binary data format
 0: transparency, 2's complement format
 3: double buffered, binary data format
 1: double buffered, 2's complement format



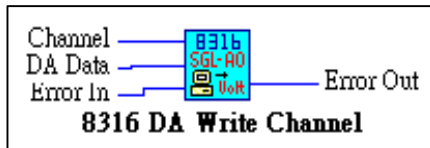
Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.



Error Out : Error code. *Error Out* describes the error status of this VI.

8316 DA Write Channel

This VI is used to write data to D/A converters. There are two Digital-to-Analog conversion channels on the ACL-8316/12. The resolution of each channel is 12 bits; its data format can be binary or two's complement format. Which data format is used for this function, it is dependent on the VI **8316 DA Set Mode**.



Channel : D/A channel number, either 0 or 1.



DA Data : D/A converted value



Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.

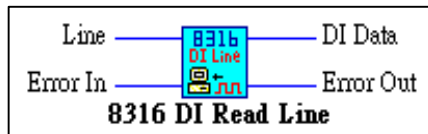


Error Out : Error code. *Error Out* describes the error status of this VI.

8316 DI Read Line

This VI is used to read data from digital input line (bit). There are 16 digital input lines on the ACL-8316/12. When performs this function, the digital input port is read and the value of the corresponding line is returned.

** line means each bit of digital input port.*



Line : the DI line number, the value has to be set from 0 to 15.



Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.



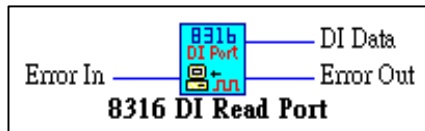
DI Data : return value, either 0 or 1.

I16

Error Out : Error code. *Error Out* describes the error status of this VI.

8316 DI Read Port

This VI is used to read data from digital input port. There are 16-bit digital inputs on the ACL-8316/12. The digital input status can be accessed by this function directly.



I16

Error In : The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.

U16

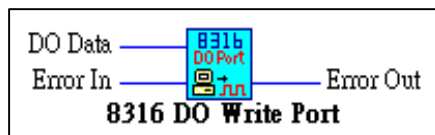
DI Data : return value from digital input port

I16

Error Out : Error code. *Error Out* describes the error status of this VI.

8316 DO Write Port

This VI is used to write data to digital output port. There are 16 digital outputs on the ACL-8316/12. You can control the digital outputs by this function directly.





DO Data :

value will be written to digital output port



Error In :

The error condition occurred before this VI executes. This code default to no error. If an error has already occurred, this VI does not perform any operation. A value of 0 means no error, a negative value means an error. Refer to the Appendix, **Error Codes**, for a code descriptions.



Error Out :

Error code. *Error Out* describes the error status of this VI.